



Llywodraeth Cymru  
Welsh Government

## **A55 Junctions 16 and 16A Improvements**

### **Environmental Statement**

### **Volume 1 Assessment Chapters**

**March 2021**



UNDEB EWROPEAIDD  
EUROPEAN UNION



Llywodraeth Cymru  
Welsh Government

**Cronfa Datblygu  
Rhanbarthol Ewrop  
European Regional  
Development Fund**

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Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 1 INTRODUCTION**

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# 1. CHAPTER INTRODUCTION

## 1.1 The Scheme

- 1.1.1 This document is Volume 1 of the Environmental Statement (ES) for the A55 Junction 16 Improvement Scheme (referred to in this document as 'the Scheme'). The ES reports the findings of the Environmental Impact Assessment (EIA) process.
- 1.1.2 Historically, the schemes at Junction 15 and Junction 16 have been referred to collectively as the 'Junction 15 and Junction 16 Improvements'. Since the Statutory Processes for each junction are being conducted independently of one another and because of the proposed minor improvements to the Junction 14 layout, a decision has been taken to rename the draft Orders, associated Environmental Statements and reporting as follows: the Junction 15 Scheme is now known as the Junction 14 and 15 Improvement Scheme. The Junction 16 Scheme is now known as the Junction 16 and 16A Improvement Scheme.
- 1.1.3 The A55, also known as the North Wales Expressway, is a strategic route along the North Wales Coast connecting many towns, villages and local communities. The route is heavily used during the summer months by tourists travelling to holiday destinations such as Snowdonia, Anglesey, the Llyn Peninsula and Holyhead Port for the ferry service connection to Dublin, Ireland.
- 1.1.4 The A55 is part of Euroroute E22 Trans-European Transport Network (TEN-T) that runs from Dublin in Ireland to Ishim in Russia, one of the longest European routes stretching a distance of 5,320 km<sup>1</sup>. The A55 Junction 15 and Junction 16 are the only two roundabouts on Euroroute E22 and hence are a constraint to the smooth flow of traffic leading to increased journey times and poor journey time reliability. They also contribute to the incidence of stationary traffic backing up into the A55 Pen-y-Clip and Penmaenbach Tunnels, which in turn can be an increased safety hazard.
- 1.1.5 The scheme proposals are to remove the roundabouts on the A55 at both Junction 15 and Junction 16 and construct new junctions to improve safety and access to Llanfairfechan and Penmaenmawr. The scheme proposals for both junctions require an EIA due to their scale and location. The purpose of the EIA is described below in Paragraph 1.2.1. The location of the Scheme is shown on Figure 1.1. Further details of the Scheme are provided in Chapter 2 and Chapter 3 of this ES.

<sup>1</sup> [https://en.wikipedia.org/wiki/European\\_route\\_E22](https://en.wikipedia.org/wiki/European_route_E22)

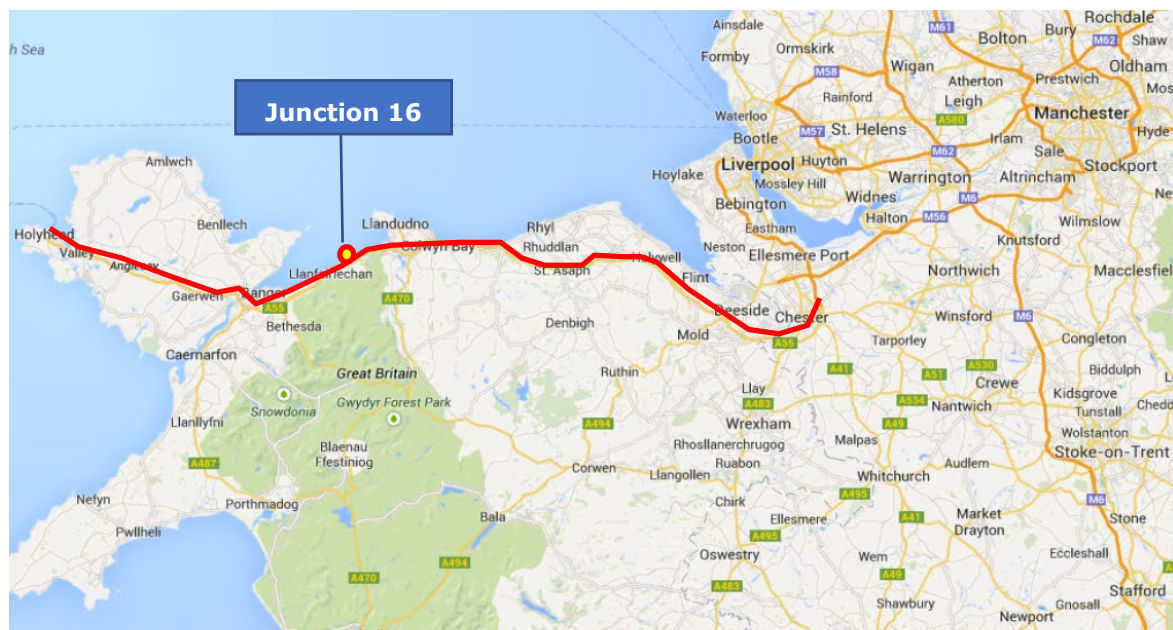


Figure 1.1: Location of the Scheme

## 1.2 Purpose of the Environmental Statement (ES)

- 1.2.1 EIA is a means of identifying and collating information to inform an assessment of the likely significant environmental effects of a project. The findings of the EIA process are reported in an ES in order to ensure that, when deciding whether to grant consent for a project, the decision-maker has access to information regarding the likely significant effects on the environment. This allows these effects to be considered in the decision-making process. The requirement to prepare an ES is set out in law.

### The EIA Regulations

- 1.2.2 Guidance on the procedure for determining whether or not an EIA is required for highways schemes is set out in the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 3 (HD 47/08) (Highways Agency et al, 2008) and Interim Advice Note (IAN) 126/09(W) (Welsh Assembly Government, 2011). This requires that a 'determination' process is followed for certain highways schemes. The determination process (Screening) for this EIA is summarised in Chapter 4, Section 3, while the full Screening Report is provided in Appendix 4.1.

### The Requirement for EIA for the Scheme

- 1.2.3 The proposed Junction 16 Improvements requires an EIA because the scheme is of sufficient size to be a 'relevant project' as defined in Annex II, 'a project for constructing or improving a highway where the area of the completed works together with any area occupied during the period of construction or improvement by requisite apparatus, equipment, machinery, materials, plant, spoil heaps or other such facilities exceeds 1 hectare or where any such area is situated in whole or in part in a sensitive area.' The area of land required for the Scheme exceeds the minimum threshold and so is treated as a 'relevant project'.

### 1.3 Scope and Content of the ES

1.3.1 Although there is no statutory provision as to the form of an ES, the Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017<sup>2</sup>, states that information must include at least:

- a description of the site, design, size and any other relevant features of the project,
- a description of the likely significant effects of the project on the environment,
- a description of any features of the project or measures envisaged to avoid, prevent or reduce and, if possible, offset any likely significant adverse effects of the project on the environment,
- a description of the reasonable alternatives studied by the applicant, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the likely effects of the project on the environment,
- a non-technical summary of the information mentioned in Paragraphs (a) to (d), and
- any additional information specified in Annex IV to the EIA Directive (information for the environmental impact assessment report) relevant to the specific characteristics of the project or type of project and to the environmental features likely to be affected.

1.3.2 This ES provides the information set out above, together with other relevant information listed in the EIA Directive. The information supplied within this ES is considered to provide a clear understanding of the main or likely significant effects of the Scheme on the environment. Further detail regarding the scope of the ES in relation to legislative requirements is provided in Chapter 4 of this ES. The Scoping Report is included in Volume 3 Appendix 4.2.

1.3.3 Welsh Government Schemes for Junction 15 and Junction 16 are both subject to EIA but are reported in separate ESs because the proposed improvements are separated geographically and are not reliant on each other to individually achieve the Scheme Objectives set out in Chapter 2. There is no unifying Line Order linking both proposals and so separate statutory procedures and Orders are required for each junction. As the ES is published in support of the Draft Orders, a separate ES setting out the environmental effects of each Scheme is also required.

### 1.4 Structure of the ES

1.4.1 The ES has been structured in order to allow relevant environmental information to be easily accessible. The information is set out in the following documents, which make up the full Environmental Statement (ES):

1.4.2 This volume of the ES (Volume 1) includes the main text of the ES.

- **Chapter 2:** Description of the context to the Scheme, transport planning objectives and Scheme proposals.
- **Chapter 3:** Information relating to the main alternatives considered during the evolution of the Scheme and the reasons for the choices made.
- **Chapter 4:** Outlines the approach and methodology adopted during the EIA process.
- **Chapter 5:** Legislative and policy context.

1.4.3 The ES Volume 1 environmental assessment topic chapters that follow Chapter 5 are listed in Table 1.1.

<sup>2</sup> Schedule 1 para 8, (10) (3)

1.4.4 Volume 2 of the ES includes all the figures and Volume 3 includes Appendices.

## 1.5 New DMRB Guidance

1.5.1 In August 2019 Highways England began the replacement of the DMRB Volume 11. The new guidance (DMRB 2019) has published in Sections commencing in August 2019. Work on the screening and scoping stages of the EIA for this Scheme began in 2018 and all of the assessments were well advanced by August 2019. The decision was made to continue using the DMRB 2008 guidance, rather adopting the 2019 version, because of the advanced state of the EIA. An initial analysis to determine the differences between the scope of the proposed EIA and the scope that would be required under the 2019 guidance was undertaken in December 2019. The main factors in the decision were:

- The new topics set out in the EU Directive 2014/52/EU included Climate Change, Heat and Radiation, Population and Human Health, Risk of Major Accident and Disaster had already been included in the scope of the EIA and were set out in the Scoping Report. Heat and Radiation was the only topic scoped-out. The new topics were assessed using methodologies already available.
- The DMRB Volume 11 (2019) re-ordered the topics (to be known in the future as 'factors') which meant that the ES for the project would have to contribute to a different set of factors, for example topics which would form chapters addressing land use and agriculture, community and private assets, walkers, cyclists and horse-riders and human health would be brought together in the new Population and Human Health chapter.
- The assessment methods for those topics that had been published by December 2019 were proving to be broadly similar to the 2008 guidance.

1.5.2 The decision was made to maintain the assessments and chapters as set out in the scoping report, but to consider the new guidance for each topic in turn. Those topics where the new DMRB guidance was adopted are shown with an \* asterisk in Table 1.1.

**Table 1-1: Structure of this ES**

Chapter	Topic Title	DMRB 2008	DMRB 2019	Notes
6	Geology and Soils		*	
7	Drainage and Water		*	LA113 published early: August 2019
8	Nature Conservation		*	
9	Landscape	*		Further updates to guidance published in February 2020
10	Cultural Heritage	*		
11	Community Assets	*		
12	Air Quality	*		The new DMRB would require a lower level of assessment for the scheme
13	Noise and Vibration	*		
14	All Travellers	*		

Chapter	Topic Title	DMRB 2008	DMRB 2019	Notes
15	Material Assets and Waste		*	Assessment commenced after LA110 published August 2019
16	Climate Change		*	LA114 available
17	Risk of Major Accident and Disaster			No guidance provided in either version of guidance
18	Population and Health		*	LA112 published in January 2020
19	Assessment of Cumulative Effects			
20	Management of Environmental Effects	*		
21	Conclusion			N/A
22	Glossary			N/A

## 1.6 The Assessment Team

- 1.6.1 The Welsh Government (as the Overseeing Organisation) awarded a Professional Services Contract for the Scheme development and environmental surveys, including publication of the ES and up to any Public Local Inquiry. The contract was awarded to Ramboll, supported by Ymgynghoriaeth Gwynedd Consultancy (YGC) and Richards Moorehead & Laing Ltd (RML).
- 1.6.2 The EIA process has been managed by RML considering information and assessments provided by the Welsh Government and the design team. Individual chapters have been prepared by authors from Ramboll and RML.

## 1.7 Publication of the ES

- 1.7.1 This ES has been submitted alongside the draft Orders for the Scheme. Statutory Orders are prepared by Welsh Ministers and published in draft. The draft Orders for the Scheme include the following:
- **Draft Trunk Road Side Roads Order:** to deal with local highway issues (including roads, footpaths, bridleways, byways and cycleways) and private access issues. Side Roads Orders can relate to closure, diversion, improvement, or new provision.
  - **Draft Compulsory Purchase Order:** which provides for the acquisition of the land and **rights** required.
- 1.7.2 The chapters of this environmental statement were completed in early 2020 in accordance with current methods of assessment. The publication of the ES has been delayed because of the COVID-19 pandemic.
- 1.7.3 In 2019, after the EIA Screening and Scoping of the ES had been agreed, the Design Manual for Roads and Bridges, including Volume 11, was withdrawn but was not immediately replaced. In the absence of a replacement, the old guidance was still applicable (see Section 1.5 above). The new guidance was published on a topic-by-topic basis over the months that followed. For this project, a review of the new guidance was completed by each topic specialist as it was published. In discussion with Welsh Government a decision was made to apply the new guidance in the following manner:

- **First consideration:** if the new guidance were published before an ES chapter was completed, and the work of assessment had not advanced beyond the evaluation of baseline data, the old guidance would be applied; but
- **Second consideration:** if the new guidance were considered to produce substantially different assessment outcomes, or where the old guidance might under report the significance of impacts, or the need for mitigation, the new guidance would apply.

1.7.4 Data about the site and the setting, on which the ES assessments are based, has been gathered since 2017 with some of the ecological surveys continuing into 2021. The assessments have been reviewed periodically to determine the impact of new data arising from the surveys. No changes have emerged that would change the assessments or the conclusions of any chapter.

## 1.8 Appropriate Assessment

1.8.1 In accordance with Regulation 63 of The Conservation of Habitats and Species Regulations 2017, an Assessment of Implication of European Sites (AIES) has also been carried out to consider the possible effects of the Scheme on European sites. The findings of the AIES are reported within a Statement to Inform an Appropriate Assessment.

## 1.9 Britain's Departure from the European Union

1.9.1 The UK left the EU on 31 January 2020 and entered a transition period until 31 December 2020. The transition period has now ceased, and new Regulations have come into force. The Conservation of Habitats and Species Regulations 2017 (as amended) will remain in place with only relatively minor changes (the changes are being effected by the Conservation of Habitats and Species Amendment (EU Exit) Regulations 2019 which came into force on 31 December 2020). The Habitat and Species Regulations 2017 (as amended) (referred to as the 2017 Regulations) are one of the pieces of domestic law that transposed the land and marine aspects of the Habitats Directive (Council Directive 92/43/EEC) and certain elements of the Wild Birds Directive (Directive 2009/147/EC) (known as the Nature Directives).

1.9.2 The 2017 Regulations (Regulation 9(1)), as amended by the 2019 Regulations, require the Secretary of State and Welsh Ministers to secure compliance with the requirements of the Nature Directives. Any new powers in the 2019 Regulations must be exercised in line with the Directives and retained EU case law up to 1 January 2021.

1.9.3 The European Commission's role in the Habitat Regulations Assessment (HRA) derogation test process will be replaced by the Secretary of State for the Environment, Food and Rural Affairs. The HRA regime set out in the Conservation of Habitats and Species Regulations 2017 (as amended) will continue to apply in largely the same way. Parliament will however be at liberty to introduce future changes to the Conservation of Habitats and Species Regulations 2017 (as amended) since, after 31 December 2020, the UK is no longer bound by the EU Habitats and Wild Birds Directives.

1.9.4 Changes include arrangements replacing the European Commission's functions with regard to the imperative reasons of overriding public interest (IROPI) test where a plan or project affects a priority habitat or species. The appropriate authority must consult with the devolved administrations, JNCC and any other person the appropriate authority considers appropriate in developing its opinion. The appropriate authority will also take account of the broader national interest in developing their IROPI opinion. The appropriate authority will publish the IROPI opinion they give to the competent authority.

- 1.9.5 SACs and Special Protection Areas (SPAs) in the UK no longer form part of the EU's Natura 2000 ecological network. The 2019 Regulations have created a national site network on land and at sea, including both the inshore and offshore marine areas in the UK. The national site network includes existing SACs and SPAs, new SACs and SPAs designated under these Regulations. Any references to Natura 2000 in the 2017 Regulations and in guidance now refers to the new national site network.
- 1.9.6 This assessment was undertaken prior to the transition period and adoption of the amended Regulations. It is acknowledged that while the process may have changed slightly, the conclusions reached in the assessment are the same.

## **1.10 How to View or Obtain Copies of the Documents**

### **Viewing the Documents**

- 1.10.1 Copies of the draft Orders, the ES and supporting information are available to view free of charge during the objection period either online (via the document library or Welsh Government project websites for Junction 14/15 and Junctions 16/16A) or by visiting one of the following premises:
- **Conwy Culture Centre**, Town Ditch Road, Conwy, LL32 8NU;
  - **Penmaenmawr Library**, Bangor Road, LL34 6DA; or
  - **Llanfairfechan Library**, Village Road, LL33 0AA,
- 1.10.2 Due to COVID-19 social distancing restrictions, viewing will be by prior appointment only. To arrange to view the documents, please contact the venues directly. In the event of changed COVID-19 restrictions or for further information, please contact the Scheme Public Liaison Officer or the project team. Their contact details can be found on the Help and Support page.

### **Obtaining Copies**

- 1.10.3 Further copies of the Non-Technical Summary can be obtained free of charge from the Welsh Government in Cardiff at the following address: Orders Branch Transport Department of Economy, Science and Transport Welsh Government Cathays Park, Cardiff CF10 3NQ.
- 1.10.4 The full Environmental Statement is available to view and download from the Welsh Government website: <http://www.wales.gov.uk/transport>
- 1.10.5 Electronic copies of the Environmental Statement (on USB) can be purchased from the above Welsh Government address.
- 1.10.6 Paper copies of the Environmental Statement are also available from the above address, although an administrative charge will be made to cover the cost of producing (price on application).

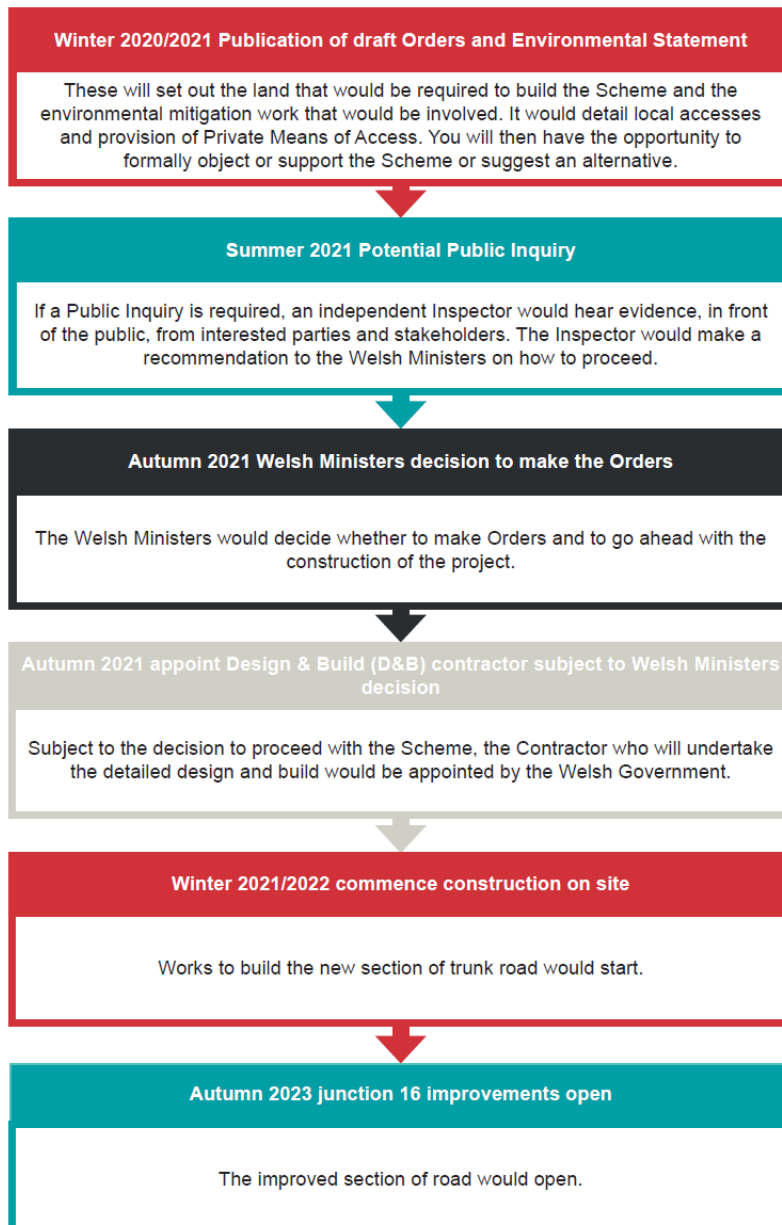
## **1.11 Next Steps**

- 1.11.1 Following publication of the draft Orders, there will be an opportunity to support, comment or object to the draft Orders, put forward alternative proposals, or comment on the Environmental Statement by writing to the Welsh Government at the address shown above for obtaining copies of the Non-technical Summary (NTS) and ES. All such correspondence should be sent to arrive at the Welsh Government no later than six weeks after the publication date.



- 1.11.2 Welsh Government will consider all the responses to the draft Orders and then decide whether to hold a Public Local Inquiry. Such Inquiries are held before an independent Inspector who would hear and consider the evidence both for and against the published Scheme and subsequently report the findings and recommendations to the responsible Welsh Ministers. The Welsh Ministers would consider all issues before deciding whether to proceed with the Scheme and, if so, make the Orders with or without modification.
- 1.11.3 Subject to the above process, the key dates for progressing the scheme are set out in Table 1.2.

**Table 1.2: Project Timeline**





Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 2 DESCRIPTION OF THE SCHEME**

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## 2. DESCRIPTION OF THE SCHEME

### 2.1 Background

- 2.1.1 This chapter provides a description of the Scheme together with the process of construction, which forms the basis for the environmental assessment provided in this Environmental Statement (ES).
- 2.1.2 As described in Section 2.2 the Scheme is located at Junctions 16 and 16A of the A55, which are the primary junctions for Penmaenmawr and Dwygyfylchi, Conwy. The Scheme's objectives detailed in Section 2.4 have been developed in response to problems and opportunities identified (in Section 2.3) through consultation with key stakeholders and the public, in relation to the existing junction arrangement.
- 2.1.3 The scheme involves measures intended to improve the corridor associated with the A55. These are shown in the General Arrangement Drawings in Appendix 2.5:
- A. The removal of the existing Junction 16 roundabout and construction of a replacement junction with westbound on and off slip roads only.
  - B. A range of Active Travel measures to enhance the provision made for walkers and cyclists that would promote active travel journeys. These measures would improve the local network within Dwygyfylchi and between the Penmaenmawr and Dwygyfylchi and facilities and connect with established long-distance routes.
  - C. A new link road would be constructed running roughly parallel with the A55 to the south of the Puffin Café linking back into the local road network at Ysguborwen Road, near the Gladstone Hotel.
  - D. On the south side of the A55 a corridor of Green Infrastructure would be created separating the strategic transport routes and the new link road to the north from the residential and agricultural areas to the south. The corridor would contain an active travel route with links to Dwygyfylchi and Penmaenmawr and new and existing crossings to the foreshore.
  - E. Within the green corridor a large earthwork, known as a false cutting, would be formed with tree and shrub planting to provide visual separation of the intrusive transport routes to the north from the existing and possible future residential areas to the south.
  - F. The green corridor would incorporate links to existing facilities such as the football field by Maes-y-Llan, and the Puffin Café and provide a naturalistic landscape barrier of woodland and meadows as a setting for circular cycle and walking routes and safe access to the shore.
  - G. Measures to reduce through traffic using Glan-yr-Afon Road and Ysguborwen Road.
  - H. A new junction would be constructed further east at Junction 16A Dwygyfylchi with a new overbridge and grade separated junction with slip roads in both directions.
- 2.1.4 The likely significant effects of the Scheme have been described throughout the ES based on what is the likely eventuality considering the requirements of the EIA Directive 2011/92/EU, as amended by Directive 2014/52/EU. Several mitigation measures have been incorporated into the design of the Scheme to avoid or reduce potential adverse environmental effects. In some cases, these measures may result in enhancement of environmental conditions. Details of measures forming part of the design of the Scheme are listed later in this chapter. These measures have been considered in assessing the effects of the Scheme.
- 2.1.5 Chapters 2 and 3 of this ES, together with the subsequent topic chapters, provide the data and information required to identify and assess the likely significant effects of the Scheme in accordance with Annex IV of the EIA Directive.

- 2.1.6 'Chainage' (ch) is the term used to refer to a distance in metres (m) from the western end of the Scheme. For example, chainage (ch) 750 is located 750 m east from the western end of the Scheme. There is a separate chainage reference for the A55 and the proposed link road which runs parallel.

## 2.2 Context

- 2.2.1 The A55 Junction 16 Scheme lies mainly within the administrative area of Conwy County Borough Council (CCBC), although the works at the eastern end of the scheme at Junction 16A lie just within the administrative area of Snowdonia National Park Authority. Figure 2.1 shows the Scheme in relation to the administrative areas of Conwy, Snowdonia National Park and Gwynedd.
- 2.2.2 The A55 is important to the economy of North Wales. It forms part of the Trans-European Transport Network (TEN-T), connecting coastal communities, transporting people and goods to homes, industry and employment, provides access to ports and serves the Welsh tourism industry. The topographical setting of the A55 is shown on Figure 2.2.
- 2.2.3 Between Llanfairfechan and Conwy the A55 and the North Wales Chester to Holyhead railway follow a tightly constrained corridor to pass the northern extreme of the Snowdonia Massif where mountainous terrain abuts the coast and splits the coastal plain. The A55, which runs parallel with, and in proximity to the railway is punctuated by tunnels required to pass through the headlands and under the River Conwy.
- 2.2.4 Junction 16 on the A55 is an existing at-grade roundabout on the A55, located to the south of the Chester to Holyhead railway, and providing access to the town centre of Penmaenmawr and residential areas such as Pen-y-Coed and Pen-y-Cae lying on elevated land to the south and south east. To the north of the A55 and the railway lies Penmaenmawr Promenade and the foreshore.
- 2.2.5 There are a wide range of community facilities in the town of Penmaenmawr including schools, care homes, health centre, public halls, public parks and recreation areas, shops, public houses, places of worship and a seaside promenade. The Wales Coastal Path and National Cycle Network Route 5 run along the promenade and follow the A55 and the coast to the east and west.
- 2.2.6 Further east of Penmaenmawr lie Dwygyfylchi and Capelulo. These villages are accessible from the A55 at Junction 16A, which lies further east of Junction 16. Junction 16A provides westbound access only. The only other means of access to the two towns is via the Sychnant Pass Road, an unclassified local road with steep gradients and tight bends that connects the two villages to the town of Conwy.
- 2.2.7 Penmaenmawr is Welsh for 'Head of the Great Stone' and relates to the prominent headland that rises steeply above the coastal plain to the south of the town. The town is a former quarry town that developed in 1830 as a result of quarrying the igneous rock diorite. The stone was widely used in the industrial towns of northern England as cobblestones and was quarried out of the nearby Penmaenmawr mountain. Graiglwyd Quarries have over time greatly reduced the height of the mountain that was once much higher with a rounded top and crowned with an old hillfort. Quarrying activity has dramatically affected the topography of the local area and reportedly has been responsible for the loss of many prehistoric sites such as hill forts and trackways.
- 2.2.8 The Chester Holyhead main line railway opened in 1850 and saw a change in quarrying practices with the production of crushed rock for railway ballast transported directly from the quarry by rail. As a result of the railway the town also grew as a seaside resort and saw the development of the

promenade and splendid Victorian seafront terrace. The town became popular with the upper classes and benefitted from the patronage of the Prime Minister William Gladstone between the mid and late 1900s, a statue commemorating his visits stands in the centre of the town overlooking the sea. The beach was popular for bathing with wheeled beach huts used for changing, wheeled into the sea by strong men known as “dippers”<sup>1</sup>.

- 2.2.9 The A55 coastal route from Conwy to Bangor was originally built by Thomas Telford in the early 19<sup>th</sup> century and once ran through the centre of Penmaenmawr. It was greatly improved in the 1930s to negotiate the rocky headlands to the east and west of the town. By the late 1970s the town was becoming heavily congested with a combination of tourist traffic, quarry wagons and commercial lorries travelling to and from the ferry port of Holyhead. The A55 expressway was constructed in 1991 following construction of the Conwy Tunnel and effectively by-passed the town centre. Two other tunnels were constructed, the most westerly of which lies to the east of Junction 15 and carries the A55 through a headland known as Pen y Clip. The eastern tunnel is through the headland at Penmaenbach, which lies to the east of Junction 16. This section of the A55 was constructed parallel to the railway and involved the removal of some of the promenade and direct access to the town centre.
- 2.2.10 Dwygyfylchi lies to the north east of Penmaenmawr, at the northern limit of the foothills of Snowdonia between the peaks of Foel Lûs and Alltwen. The parish church of St Gwynin stands in the centre of the village, primarily a residential area occupying the generally much flatter coastal plain. On the outskirts of the village lie Penmaenmawr Golf Course and several static caravan sites. North of the village lies the A55 (Junction 16A) and the Chester Holyhead Railway Line. A sewage treatment works lies on a small coastal strip north of the railway and A55. The village is well connected to the A55 and local road network that provide access to amenities in Penmaenmawr and the village of Capelulo.
- 2.2.11 Capelulo is a small village south east of Dwygyfylchi occupying slightly higher land at the foot of Sychnant Pass and the wooded valley of the Afon Gyrach known as Fairy Glen. The village lies just within Snowdonia National Park and is popular venue for walkers and ramblers with a network of footpaths and long-distance paths leading to the surrounding hills and countryside.
- 2.2.12 There are two main watercourses in the area, the Afon Pabwyr and the larger Afon Gyrach. The Afon Pabwyr flows north from Cwm Graiglwyr south of Penmaenmawr for about 1.2 kms, initially in an elevated and steep-sided upland valley before passing under the town centre, railway and A55 before discharging into the sea. The Afon Gyrach has a wider catchment area and flows generally north west from the elevated slopes of Tal-y-fan through Fairy Glen and the villages of Capelulo and Dwygyfylchi. The river continues north across the coastal plain before passing through a culvert under the A55 and railway and discharging onto the beach south-west of the water treatment works. Much of the coastal plain north of Dwygyfylchi is used as pasture, with caravan parks and residential encroaching northwards towards the A55.
- 2.2.13 There are several statutory designated nature conservation sites nearby Penmaenmawr and Junctions 16 and 16A, including a Special Protection Area (SPA) and a Special Area of Conservation (SAC). Details of these are provided in Chapter 8 and shown on Figure 8.1 and Figure 8.2. Snowdonia National Park (SNP) lies close to the Scheme (shown in Figure 2.1). Further details of these areas are provided in Chapters 7 Road Drainage and the Water Environment and Chapter 9 Landscape and Visual Effects.
- 2.2.14 Heritage designations in the area include several Listed Buildings (LB), Scheduled Ancient

<sup>1</sup> Y Llygad – The Eye [info@theeyepenmaenmawr.org](mailto:info@theeyepenmaenmawr.org)

Monuments (SAM) and Conservation Areas. Details of these are provided in Chapter 10 Cultural Heritage.

2.2.15 Photographs illustrating the existing situation are provided in Figure 2.3 Sheets 1 to 4.

## 2.3 Problems and Opportunities Associated with the Existing Situation

- 2.3.1 This section sets out how the problems and opportunities are seen and have been considered together and provide a basis for the overall design strategy for all aspects of the Scheme. Aspects of the strategy that can be implemented using the powers given under the umbrella of Highways Act 1980 would be possible as part of the Junction 16 Improvements Scheme, but others may have to be carried out by others in the future.
- 2.3.2 Fundamental to the identification of problems and opportunities has been the involvement of the local communities through on-going key stakeholder meetings and a programme of public engagement events, which have been held since the first Public Information Exhibition in December 2017 (see Chapter 4). The communities of Penmaenmawr and Dwygyfylchi have raised many of the concerns addressed in the Scheme, both during these events and directly via the Public Liaison Officer. Some of the principle environmental concerns have related to traffic noise, retaining views of the sea and access to the shore across the road.
- 2.3.3 A summary of the existing problems that have been identified as being associated with the existing situation are listed in Table 2.1. These problems have been confirmed through consultation with key stakeholders, including Conwy County Borough Council (CCBC), North and Mid Wales Trunk Roads Agency (NMWTRA) and the Welsh Government.
- 2.3.4 Many of these problems primarily relate to environmental and social issues associated with the relative location of the settlement and hinterland to the existing A55 corridor, in addition to transport problems. The proposed Scheme provides the opportunity to address many of the issues and potentially provide improvements to the existing situation as discussed in the following paragraphs.

**Table 2.1: Existing Problems Associated with the Existing Situation**

Issue	Existing Problems
Environmental and social issues	Existing environmental issues include noise and the visual impact associated with the A55. The Welsh Government has identified the section along the A55 near Llanfairfechan and Penmaenmawr as being a priority area for intervention in North-West Wales. Social issues include those associated with the communities' reliance on the A55 plus the impact of the A55 severing the communities from themselves and the coast.
Transport - Safety	The junctions and A55 mainline between Junctions 14 and 16A do not comply with current design standards. Based on feedback from public consultation, there is a perception that the roundabouts are dangerous, with members of the public raising concerns about near misses and their fears of using the junctions.
Transport - Delays	The A55 corridor experiences seasonal traffic and delays, especially during summer weekends and where peak flows correspond with the ferry.

Issue	Existing Problems
Poor Network Resilience	The primary issues identified relate to the lack of local and strategic diversion routes, during incidents or planned works, and the operational requirements for tunnel maintenance.
Sustainable Travel	Public consultation has identified that there is a perception that there is a lack of competitive sustainable travel options, poor coastal access for non-motorised users and concerns with respect to the safety of cyclists.

## The Settlements and Countryside

- 2.3.5 The two settlements, Penmaenmawr and Dwygyfylchi, were no more than tiny fishing and farming communities until the diorite quarries were opened in the 1830s. The history is explained in greater detail following Paragraph 2.2.6. During the later 19<sup>th</sup> century Penmaemawr grew rapidly as it found a role as a seaside resort, encouraged by the new Chester to Holyhead railway. Much of the resort development occurred along the coast by the railway and the coast road. A promenade was built and developed in the early years of the 20<sup>th</sup> century. The town fell into a gradual economic decline and the population began to reduce. The A55 Expressway was built in the late 1980s, introducing large structures, a wide dual carriageway and fast-moving traffic. A consequence of the new road was that a wide swathe of the established town promenade and rural hinterland was lost and connections between the coastal plain and the shore were constrained and less attractive to residents and visitors.
- 2.3.6 Ever since the A55 Expressway was opened residents have expressed concern about the poor relationship of the road with the setting. The scale and intrusive character of the road, its effects on views of the sea, its impacts on the townscape of Penmaenmawr and the landscape of Dwygyfylchi and traffic noise, are the main criticisms. However, the A55 is also vitally important as the only good quality road in and out of Llanfairfechan.
- 2.3.7 Although established links under or over the railway to the sea were retained when the Expressway was built, a new promenade was constructed to replace the Edwardian original. While the new promenade is well-used, the seaside resort has declined and local stakeholders indicate that traffic noise, physical barriers to movement across the A55, and the presence of the road itself are negative factors.
- 2.3.8 The North Wales Coastal Path and the National Cycle Network Route 5 follow the A55 along the route corridor from Penmaenbach in the east to Penmaenmawr in the west with only three opportunities to link with the local services and the communities to the south. On the south side of the A55 there is an extensive network of public rights of way and unclassified roads that provide access into the mountains and to extensive areas of designated Open Access land.
- 2.3.9 The challenges faced by both communities are those experienced by other small North Wales towns; namely, the need to remain resilient for future generations in the face of competition for a share of public resources, and the need for economic viability. Both communities are isolated by the mountains and sea with only a very limited rural hinterland. The A55 Expressway, which provides a lifeline for communications along the coast, has compromised the former role as a quiet seaside resort. In the face of these challenges, the population of the area is gradually declining and some important services, such as the post office and the Doctor's Surgery have closed in the last few years. Residents now travel to find alternatives and are dependent on A55 to travel to work, to trade and to access services in other places.

- 2.3.10 In recent years residential development has begun to spread across previously open farmland and there is pressure for the remaining lower-lying coastal land to be allocated for development, particularly close to the two Junctions 16 and 16A. The local perception of this is that all the remaining farmland will be developed in time. Whilst an expanding settlement means a growing population and potentially enhanced viability for commercial and public services, there would be a related increase in traffic using the junctions on the A55 and this will have been considered in predicted traffic growth.
- 2.3.11 Land allocations in the Local Development Plan and recent housing construction indicate that farmland to the south of the road corridor is under increasing pressure for development, to meet LDP allocations and to stem the gradual loss of population. These incremental expansions of the settlement should gradually increase demand for local services and make remaining services more viable. With the LDP under periodic review, the remaining fields between the village and the A55 could also be used to meet demand for a new school or other public services and facilities.
- 2.3.12 Piecemeal development to meet the demand is likely to take up the flatter coastal land near to the A55 junctions and to place new houses close to the road. Without an overall masterplan for residential expansion it is unlikely large areas of land can be accumulated to provide suitable public open space and there will be very limited resources to implement a scheme of enhancements. Of the farmland that remains, there is a finite supply of low-lying open countryside, of which very little is accessible and there are few public rights of way. There is an acknowledged under-provision of dedicated public open space in both settlements.
- 2.3.13 Some of the land near the A55 in Dwygyfylchi, including land within the Snowdonia National Park, is used for mobile homes, touring caravans and camping. There is also a large field beside Junction 16A that is used for public events such as a fairground. These facilities bring a significant increase in population in holiday periods. During these periods of peak demand, the limited open space and public rights of way are heavily used but provide poor connections over or under the railway and the Expressway to the shore. There is anecdotal evidence that walkers use public rights of way to cross the A55 boundary fences and carriageways to reach the beach.

### **Traffic and Highways**

- 2.3.14 Junctions 15 and 16 are the only at-grade roundabout interchanges on this major North Wales trunk road. This has led to increased journey times and poor journey time reliability. They also contribute to the incidence of stationary traffic backing up into Pen-y-Clip and Penmaenbach Tunnels, which in turn can be an increased safety hazard. The proposed replacement junction arrangements at Junctions 16 and 16A would be designed and constructed in accordance with modern standards. Thus, providing opportunities to optimise traffic management along the section of the A55 corridor, both during normal operation and planned maintenance, as well as during incidents. In particular, the Scheme would improve resilience along the section of the A55 between Junctions 16 and 16A by providing a parallel section of road that can be used to divert vehicles in case of incidents, instead of vehicles routing through the village of Dwygyfylchi.
- 2.3.15 The existing dual carriageway was built in the 1980s to make the best use of the original A55 carriageway and to avoid demolition of properties where possible. To fit the road into the narrow corridor the designers had to use horizontal and vertical alignments which are subject to departures from standard.
- 2.3.16 By removing the roundabout at Junction 16 and replacing it with safer junctions at 16 and 16A with associated infrastructure, the proposed Scheme supports the aspiration to bring this section



of the A55 up to Expressway standards (DMRB 2019) including the provision of concrete central barriers instead of steel barriers (thus reducing the frequency of routine maintenance work and the need for replacement of assets following incidents). Moreover the provision of new junctions at Junction 16 and 16A would remove a number of existing features, which would be considered non-compliant with modern design standards and have associated safety and maintenance liabilities (such as those associated with existing manhole covers that are located within the carriageway, resulting in problems with potholes in the surrounding road surfacing). It would also reduce the need for routine maintenance tasks including grass and hedge cutting to be carried out at the roundabout, reducing the need for temporary closures of the carriageway to allow the work to be carried out safely.

- 2.3.17 The dual carriageway is perceived by residents to intrude into attractive seaward views. Roadside plantations that were planted to screen the road from nearby properties, have grown to a height that obscures view of north over the sea, during the summer months. Since it was constructed residents and visitors have found that their access to facilities across the road is restricted. Of concern to Penmaenmawr Town Council is the restricted access to the beach and promenade, which once formed the focus for the many seasonal visitors to the town and its former prosperity. The local community have raised their concerns that traffic noise is considered intrusive in day to day life, particularly at peak periods of use. The installation of speed-reducing 'rumble strips' at approaches to the roundabouts causes additional noise. These would be removed as part of the Scheme.

## 2.4 Scheme Objectives

- 2.4.1 The transport and technical Scheme objectives have been developed during previous development work and engagement, aiming to address one or more of the identified problems. During the early stages of Key Stage 3 the problems and objectives were refreshed during a focused workshop event with key stakeholders, considering the WelTAG 2017 guidance and Wellbeing of Future Generations (Wales) Act wellbeing goals.

- 2.4.2 The Scheme objectives are:

### **Scheme Objectives**

- OBJ1 Improve access to regional, national and international markets and improve access to employment opportunities
- OBJ2 Improve road safety on the A55 from Junction 14 to Junction 16A
- OBJ3 Improve journey times and journey time reliability on the A55 from Junction 14 to Junction 16A
- OBJ4 Improve resilience on the A55 for strategic and local traffic
- OBJ5 Improve journey times, journey time reliability and safety for access onto the A55 from Llanfairfechan and Penmaenmawr
- OBJ6 Reduce severance with coastal areas for the Non-Motorised Users and enhance provision made for walkers and cyclists
- OBJ7 To take reasonable steps to build healthier communities and better environments
- OBJ8 Opportunities to provide integrated transport are increased

### Technical Objectives

TECJ OBJ9	Minimising technical departures from standards
TECH OBJ10	Minimising need to reduce speed limits
TECH OBJ11	Minimising disruption during construction

### Scheme Environmental Objectives

- 2.4.3 Working with the Statutory Environmental Bodies (SEBs) the following Scheme Environmental Objectives were agreed:

#### We want to achieve:

##### A. Avoidance or mitigation of impacts to provide:

- i. Connectivity to and from the coast, and either side of the A55 so that communities continue to enjoy public services and open spaces;
- ii. Protection of community assets and local businesses from adverse impacts during construction;
- iii. Protection of the quality of urban spaces, listed buildings, and registered Parks and Gardens that are adversely affected through the careful alignment of roads, surfacing of footways and tree and shrub planting;
- iv. Avoid adverse impacts on buried archaeological sites;
- v. Landscape integration the junctions into their coastal settings by avoidance of further 'industrialisation' of the road corridor;
- vi. Consider the design of the Scheme to achieve an overall reduction in traffic noise nuisance, problems associated with airborne pollution and visual impact of traffic;
- vii. Protect valued seaward views in the long term through careful design and aftercare
- viii. Minimise light spill from highway lighting to avoid or reduce the impact on 'Dark Skies' within the Snowdonia National Park;
- ix. Protection of the marine SPA, associated species and habitats;
- x. Improved road drainage to reduce the adverse impacts of A55 traffic pollutant spills on water quality in watercourses and on the sea;
- xi. Protect habitats and biodiversity and provide habitats designed to suit the coastal context;
- xii. Consider whole-life cost, health and safety risks and onerous management commitments when designing the soft estate.

##### B. Enhancements that could further the purposes of the Well-Being of Future Generations Act:

- i. Support community life and economic viability through enhanced cohesion and connectivity, support for education, learning and community involvement;
- ii. Enhanced quality and quantity of public spaces associated with the road corridor;
- iii. Improve access and enjoyment of the coastal setting, the townscape and the seafront, while enhancing opportunities for walking cycling and healthy lifestyles;
- iv. Enhance biodiversity through habitat creation, habitat connectivity and improvements within the road corridor in a manner that reflects and supports the coastal setting.

## 2.5 Description of the Highways Design Proposals for the Junction 16 Improvements

- 2.5.1 Economy and Transport Minister Ken Skates announced the preferred option for the Scheme on 5 April 2019, having taken full account of the technical, social, economic and environmental aspects of the Scheme and listened carefully to the consultation responses. Further information

with respect to the alternatives considered and the selected option can be found in Chapter 3.

- 2.5.2 The total length of new trunk road (including slip roads and the overbridge) would be 3072 m, with 1535 m of two-way link road, and would affect 479 m of side roads. The General Arrangement drawings are provided in Appendix 2.5 and the extent of permanent land-take for the Scheme is shown in two drawings in Figure 2.4 A to Figure 2.4 B. The Scheme is described in the paragraphs that follow.

### **A55 Trunk Road**

- 2.5.3 The Scheme would encourage free-flowing traffic in both directions on the A55, improve road safety and improve access to the communities of Penmaenmawr and Dwygyfylchi by replacing the roundabout at Junction 16 with westbound on and off slip roads only and upgrading Junction 16A to a grade-separated junction. Slip roads would allow safer access and egress from the A55 with local roads meeting at a roundabout designed to meet current highway design standards. The Scheme involves changes to both Junction 16 and 16A.
- 2.5.4 At Junction 16 the existing roundabout at the eastern approach to Penmaenmawr would be replaced by westbound on and off-slip roads. The new arrangement at Junction 16 would only be used by westbound vehicles for access to Penmaenmawr and by vehicles leaving Penmaenmawr to travel west towards Bangor. The works would start on the A55 mainline approximately 280 m south west of existing Junction 16 roundabout and extend north eastwards for a distance of 580 m to approximately 242 m north east from the roundabout. The new at-grade junction would lie to the south of A55 and to the south of Conwy Road with a roundabout to facilitate the west bound on and off slips and connections to Conway Road and Ysguborwen Road. The total length of new road at Junction 16, including slip roads and the roundabout, would be in the order of 950 m.
- 2.5.5 A new signal-controlled grade-separated junction would be constructed further east at Junction 16A, at Dwygyfylchi, with a new overbridge and with on and off east and west bound slip roads that would provide four-way movement. The westbound slip roads would rise on embankments to a height of approximately 9 m above existing ground level, to meet an overbridge across the A55. There would also be access off the eastbound off slip road to the Dwr Cymru/ Welsh Water (DCWW) water treatment works, on the northern side of the A55.
- 2.5.6 The realigned A55 mainline and lengthened slip roads would extend approximately 420 m south west from the existing junction with Glan-Yr-Afon Road for a distance of 805 m, to a point approximately 315 m north east from the existing junction, where the road would taper back to meet the existing dual carriageway. The total length of new road at Junction 16A, including slip roads and overbridge, would be in the order of 2,122 m.

### **Link Road**

- 2.5.7 A new link road running roughly parallel to the A55 on the south side would form a new junction with Ysguborwen Road in the west. Extending east it would pass close to the north side of houses in Maes-y-Llan and then loop round the south side of Puffin Café and Service Station to meet the new grade separated junction 16A. Glan-Yr-Afon Road, to Dwygyfylchi and Capelulo, would meet with the link road at a 'T' junction close to Junction 16A. The total length of new road between the extent of the changes to the side roads, would be approximately 1,530 m.

### **Local Side Roads**

- 2.5.8 The existing highway network would be modified at a number of locations, where the proposed

improvements would join or cross existing routes. Details are provided in Table 2.2.

**Table 2.2: Local Side Roads**

Side Road	Proposed Works
Glan-yr-Afon Road	Consisting of realignment works and localised road widening, over a length in the order of 251 m, to enable Glan-yr-Afon Road to tie in with the new link road. Much of the approximately 207 m of stopped up existing road, would be located under new embankments for Junction 16A westbound off-slip and the link road. A cattle grid would be provided on Glan yr Afon Road.
Ysguborwen Road	New realigned length of approximately 60 m to tie in with new link road. Approximately 170 m of the old road would either be incorporated into the new roundabout and link road alignment or would no longer be required. Dependant on detailed design, there is an opportunity for a part of the existing road to provide a section of footpath next to The Oasis.
Conwy Road	Realigned over a length of approximately 170 m to accommodate the upgraded westbound slip road arrangement at Junction 16. Part of the original alignment would be located under the new slip roads and roundabout.

### Design Speed

- 2.5.9 The Design Speed of the proposed Trunk Road is 120 kph and would be subject to the national speed limit. Side Roads would be in keeping with the existing local road network.

### Traffic Flows

- 2.5.10 Details of traffic flows are provided in Appendix 2.1 Traffic Forecasting Report, but a summary of the information is provided in Tables 2.3 and 2.4.
- 2.5.11 Table 2.3 provides a summary of the total (all vehicles) for the Existing and Predicted traffic flows on the new trunk road in the Base Year (2016), the Opening Year (2023)<sup>2</sup> and the Design Year (2037).
- 2.5.12 Table 2.4 provides a summary of the Existing and Predicted flows of heavy goods vehicles (HGVs) on the new trunk road in the Base Year (2016), the Opening Year (2023)<sup>2</sup> and the Design Year (2037). Further details of traffic flows are provided in Appendix 2.1 Traffic Forecasting Report.

<sup>2</sup> Due to an extension by six months in the proposed construction programme the Opening Year has changed from late 2022 to early/mid 2023. It should be noted that the traffic modelling has not been updated to reflect this change in opening year due to the anticipated 1% growth in traffic between 2022 and 2023. It is considered that this change in traffic flow would have a negligible impact on the operational performance of the highway network, as the network is not operating near capacity. The following assessment is therefore based upon traffic data from 2022, whilst assuming an opening year of 2023

**Table 2.3: Existing and Predicted AADT Traffic Flows (all vehicles) - Summary of the Total Two-way Traffic Flows for the New Trunk Road in the Base Year (2016), Opening Year (2023) and Design Year (2037)**

Location	Base Year 2016	Opening Year 2023			Design Year 2037		
	Do Nothing	Do Minimum	Do Something	Difference from Do Minimum	Do Minimum	Do Something	Difference from Do Minimum
A55 between J15A and J16	32,736	35,576	35,459	<b>0%</b>	41,277	41,074	<b>0%</b>
Conway Road (south of J16)	1,070	1,369	2,869	<b>110%</b>	1,591	3,317	<b>108%</b>
Ysguborwen Road (north of J16)	3,975	4,321	4,669	<b>8%</b>	4,985	5,388	<b>8%</b>
A55 (north of J16)	36,644	39,782	37,259	<b>-6%</b>	46,120	43,145	<b>-6%</b>
A55 northbound (north of J16A)	18,775	20,402	20,596	<b>1%</b>	23,631	23,795	<b>1%</b>
High Street, Penmaenmawr	1,280	1,350	1,346	<b>0%</b>	1,556	1,556	<b>0%</b>
Conway Old Road, Penmaenmawr	457	497	266	<b>-46%</b>	516	317	<b>-39%</b>
Conway Old Road, Capelulo	346	348	169	<b>-51%</b>	342	201	<b>-41%</b>
Ysguborwen Road, Dwygyfylchi	735	928	576	<b>-38%</b>	1,084	662	<b>-39%</b>
Glan-Yr-Afon, Dwygyfylchi	713	920	955	<b>4%</b>	1,067	1,101	<b>3%</b>
A55 southbound (north of J16A)	18,583	20,300	20,304	<b>0%</b>	23,557	23,557	<b>0%</b>
Bangor Road, Penmaenmawr	2,486	2,662	2,779	<b>4%</b>	3,006	3,209	<b>7%</b>
Link Road, Dwygyfylchi	N/A	N/A	2,751	<b>N/A</b>	N/A	3,181	<b>N/A</b>
Treforris Road, Capelulo	112	150	98	<b>1736%</b>	175	117	<b>-33%</b>

**Table 2.4: Heavy Goods Vehicles (HGVs) a Summary of Existing and Predicted Flows on the New Trunk Road in the Base Year (2016) Opening Year (2023) and Design Year (2037)**

Location	Base Year 2016	Opening Year 2023			Design Year 2037		
	Do Nothing	Do Minimum	Do Something	Difference from Do Minimum	Do Minimum	Do Something	Difference from Do Minimum
A55 between J15A and J16	2,743	2,898	3,054	<b>5%</b>	3,300	3,416	<b>4%</b>
Conway Road (south of J16)	67	70	144	<b>106%</b>	78	161	<b>106%</b>
Ysguborwen Road (north of J16)	223	233	264	<b>13%</b>	261	295	<b>13%</b>
A55 (north of J16)	2,962	3,127	3,174	<b>1%</b>	3,557	3,550	<b>0%</b>
A55 northbound (north of J16A)	1,660	1,740	1,914	<b>10%</b>	1,999	2,141	<b>7%</b>
High Street, Penmaenmawr	127	110	106	<b>-4%</b>	118	118	<b>0%</b>
Conway Old Road, Penmaenmawr	213	201	14	<b>-93%</b>	166	16	<b>-91%</b>
Conway Old Road, Capelulo	203	191	12	<b>-94%</b>	155	13	<b>-92%</b>
Ysguborwen Road, Dwygyfylchi	22	23	16	<b>-33%</b>	26	17	<b>-33%</b>
Glan-Yr-Afon, Dwygyfylchi	53	55	40	<b>-27%</b>	62	45	<b>-27%</b>
A55 southbound (north of J16A)	1,355	1,443	1,448	<b>0%</b>	1,619	1,619	<b>0%</b>
Bangor Road, Penmaenmawr	415	413	257	<b>-38%</b>	404	287	<b>-29%</b>
Link Road, Dwygyfylchi	N/A	N/A	148	<b>N/A</b>	N/A	165	<b>N/A</b>
Treforris Road, Capelulo	10	10	2	<b>-76%</b>	11	3	<b>-76%</b>

### **Active Travel Measures**

- 2.5.13 As part of the Scheme, several proposed improvements to walking and cycling routes are presented below. It is anticipated that these would improve the quality and connectivity of the existing walking and cycling routes. Figure 14.6 identifies the location of the proposed 'mini Schemes' in the vicinity of J16 and J16A.
- 2.5.14 The Scheme includes several proposed active travel measures. These are described in detail in Chapter 14 and summarised below.

### **Active Travel Route Alongside the Link Road**

- 2.5.15 Shared cycleway and footpath route alongside the link road, intercepting existing footpaths. Signal controlled crossing to be provided for cyclists/ pedestrians at Junction 16A, providing new improved connectivity to the National Cycle Network Route 5, the beach and routes further afield.

### **Puffin Services Footbridge**

- 2.5.16 Replacement footbridge with Disability Discrimination Act (DDA) compliant ramps and enhanced access to the beach at Puffin Services. Improvements to incorporate a safe crossing for cyclists/pedestrians across the link road.

### **Non-motorised User (NMU) Mini Scheme 1: Improvements to Glan-y-Afon Road**

- 2.5.17 A new 160 m cycle/ footway along Glan-y-Afon Road would provide improved connectivity to Dwygyfylchi from the east and to the proposed new segregated route along the new link road towards Penmaenmawr. The improvements would include a route avoiding the replacement cattle grid on to the signalised crossing at the proposed overbridge onto the National Cycle Network Route 5, where provision would be made for cyclists and pedestrians.
- 2.5.18 As part of the improvements, the stone walls to the north side of Glan-y-Afon Road would need to be rebuilt. Further works might include rebuilding the caravan park walls locally, to further enhance visibility.

### **NMU Mini Scheme 2: Improvements to Conway Road**

- 2.5.19 Consists of a 400 m segregated cycle/ footway along the north side of Conway Road, providing a link between the residential area of Penmaenmawr, the existing Footpath 29/06 and local amenities such as the Penmaenmawr Phoenix Football Club ground.

### **Road Drainage and Disposal of Water**

- 2.5.20 The Scheme would use conventional piped drainage to remove water from the carriageway. This drainage, along with attenuation storage, would be designed to store surface water and then discharge it to the existing network, under the North Wales coastal railway line and then into the sea via existing outfalls. The drainage measures are set out in Chapter 7. The locations of the proposed road drainage outfalls are detailed in Table 2.5.

**Table 2.5: Locations of Proposed Road Drainage Outfalls**

Outfall	Approximate Chainage	Description
A	Chainage 2250 m north side	Existing sea outfall
B	Chainage 2350 m north side	Existing outfall discharging to culverted watercourse
1	Chainage 1725 m south side	New outfall discharging to Afon Gyrach Main River
C	Chainage 1725 m north side	Existing outfall discharging to Afon Gyrach Main River
D	Chainage 1725 m north side	Existing outfall discharging to Afon Gyrach Main River
E	Chainage 1725 m north side	Existing outfall discharging to Afon Gyrach Main River
F	Chainage 1125 m north side	Existing sea outfall
G	Chainage 525 m south side	Existing land drain

## Fencing

- 2.5.21 Fencing of the road boundary would be provided, where required, in the form of post and wire stock-proof mesh fences, to discourage farm stock and pets from adjacent areas and to delineate the Welsh Government landownership. Special forms of this fence, with mesh buried below the ground would be required to reduce the risk of collisions with legally protected species such as badger and otter. Further fences would be required to discourage access to hazardous locations, such the tops of retaining walls and steep slopes. In other locations, where noise or visual assessments indicate they are required, the boundary would be formed by walls, or, for example, by acoustic barriers.
- 2.5.22 A summary of the locations where proposed environmental fencing and barriers have been proposed is provided in Table 2.6. Indicative alignments of proposed fences are shown in the Environmental Masterplan included in Appendix 2.6.

**Table 2.2: Locations of Proposed Environmental Mitigation Fencing/Barriers**

Proposed Environmental Mitigation	Status	Location
Drystone Wall	Replacement	Along the northern boundary of Conwy Road from the end of the proposed cycleway opposite the entrance to the football ground east to chainage 150 on Conwy Road to terminate with a stone pier
Mortared stone wall	Repair/close gaps	North side of Ysguborwen Road opposite Oasis Retreat Centre.
	New wall	Along the ridge of the proposed false cutting on south side of link road from chainage 370 to 720
	New wall	Along the back of the verge on Ysguborwen Road/ the proposed link road from approximately chainage 220 to chainage 400 with the east end tapering down to meet the retaining wall. At the west end the wall is to follow the back of the verge/ sightlines towards the west bound off-slip and to terminate with a pier.
	New wall	Along proposed false cutting on south side of



Proposed Environmental Mitigation	Status	Location
		link road from east side of Maes y Llan to chainage 380 by Puffin Cafe
	New wall	From the tie in on Glan yr Afon Road northwards along the east side of the grade separated junction and slip road and eastwards to tie in with the boundary wall on the tunnel
Vertical timber noise barrier	New barrier	On the proposed retaining wall and parapet wall on north side of Maes y Llan to provide up to 3 m height overall within remaining tree and shrub planting.
Mammal fence (based on standard badger fence to a height of 1.5 m)	New fence	Over the Afon Gyrach crossing and 100 m east and 200 m west at the back of the link road verge.

### Signs and Communications

- 2.5.23 The improvements would incorporate signage, for example, in relation to junctions and destinations. Although there would be no proposed Intelligent Transport Systems (ITS) provided as part of the Scheme, it includes for the provision of ducting which would enable ITS to be installed after completion of the Scheme by others. The approximate locations of signs are indicated on the General Arrangement drawings in Appendix 2.5. A symbol is used to show the location but does not indicate actual sizes of signs. Design of signs to accord with standards would be the responsibility of the future design and build contractor.

### Lighting

- 2.5.24 Highway lighting is already provided along this length of the A55 and on adjacent county roads. New lighting would be installed along the A55 and at Junction 16 to meet current standards. Luminaires would be designed to emit no light above the horizontal level, with a dark zone provided at the Afon Gyrach crossing. LED Luminaires are proposed because these can be more directional and so reduce light spill beyond the road. Lighting of the link road would be subject to agreement with the highway authority.

### Utilities

- 2.5.25 The Scheme affects several utilities and all owners and operators of the various utilities have been consulted to establish how their equipment would be affected by the proposed Scheme. The design has taken these into account and seeks to minimise the impact.

### Existing Features Affected by the Scheme

- 2.5.26 The requirement to provide a safe road with good visibility for drivers, pedestrians and cyclists means that sometimes features in the setting are adversely affected by the proximity of the new road and associated structures and earthworks. The route has been aligned to minimise the impact of the Scheme on adjacent properties and other features.

### Public Rights of Way

- 2.5.27 Public rights of way (Footpath 29/08) would require modification in the form of localised footpath diversion works where the existing footpath crosses the proposed link road. Further details are provided in Chapter 14 (All Travellers) and are shown on Figure 14.1 and Figure 14.2.

## 2.6 Design Strategy for the Scheme

- 2.6.1 In June 2019 the project team, led by Welsh Government, met with the Design Commission for Wales (DCfW) to discuss the Scheme. The DCfW promotes the importance of good design for the built environment across all sectors, including infrastructure. The Design Commission reviewed the Scheme and responded by letter on the 28 June<sup>3</sup>, welcoming the project team's analysis and insight regarding travel, traffic, future opportunities and the area's overall enhancement. The full written response is provided in a written response which is included in Appendix 2.4.
- 2.6.2 The DCfW letter acknowledged that the proposals had been through a WelTAG appraisal in accordance with Welsh Government procedures. It continued by stating that, *'there is a clear design ambition behind the project focusing on the highway and the delivery of future enhanced links and spaces for the area, however, the aspects of connections, road safety, active travel, visual impact and public realm are topics that should be considered within a holistic design impact rational and this is not evident [in the material used to present the Scheme to the DCfW]. It is imperative that the access narrative is translated into all levels in the design process.'*
- 2.6.3 This section aims to set out how the Scheme has been considered holistically and to explain the design strategy. Fundamental to the design process, are the views of key stakeholder and the opinions and ideas expressed at public engagement events. A programme of these has been held since December 2017. The community of Llanfairfechan have raised many of the concerns we are aiming to address with the Scheme. Some of the principle environmental concerns have related to traffic noise, retaining views of the sea and access to the shore across the road. Specific social concerns raised by the community included that the Scheme design should minimise any loss of social housing.

### Responding to the Scheme Objectives

- 2.6.4 The vision that has emerged from the Scheme objectives, taking into consideration the problems and challenges that have been noted. The comments and advice from stakeholder is that the two settlements of Dwygyfylchi and Penmaenmawr should have a thriving coastal corridor of beaches, foreshore, strategic transport routes, countryside, public open space and residential areas that provide a clean environment, allows effective access to employment, viable public services and appropriate space for recreation. These should exist within a framework of green infrastructure, enhanced biodiversity, attractive urban and rural spaces and routes between valued local destinations. Overall, the Scheme should seek to provide separation between the Expressway and existing and future residential development.

### Recent Legislation that Would Assist in Achieving the Vision

- 2.6.5 The key policies and legislation behind achieving the vision, or to assist in achieving it are the *Well Being of Future Generations (Wales) Act 2015*, *The Active Travel (Wales) Act 2013* and the *Environment (Wales) Act 2016*. These are reflected in Planning Policy Wales Edition 10 (PPW10) and the newly drafted National Development Framework (NDF).
- 2.6.6 **Well Being of Future Generations (Wales) Act:** the vision would be implemented initially through the construction and aftercare of the A55 Junction 16 Improvements Scheme, but also through longer term projects, implemented by others to achieve 'sustainable development', which is the *'process of improving the economic, social, environmental and cultural well-being of Wales*

<sup>3</sup> Design Review Report DCfW Ref 201: provided in Appendix 2.4

*by taking action, in accordance with the sustainable development principle, aimed at achieving the well-being goals'. The Well-being goals are set out in the Act.*

- 2.6.7 **Active Travel Act:** further duties of public bodies are set out in the Active Travel (Wales) Act 2013. The intention is to 'increase levels of walking and cycling in Wales to realise the many benefits that travelling actively brings - for individuals and for society'. It paves the way for a lasting transformation of how we plan and build walking and cycling infrastructure as well as encourage behaviour change in Wales. But the Act is only a part of the picture. It needs to be accompanied by a range of wider reaching actions and changes by government and others in order to achieve the change we wish to see.'<sup>4</sup>.
- 2.6.8 **Environment (Wales) Act:** put in place the necessary legislation to enable the planning and management of the natural resources (Natural Capital) of Wales in a more sustainable, pro-active and joined-up way than was previously possible. The sections of the Act that are most relevant are Sections 6 and 7:
- 2.6.9 Section 6, Biodiversity and resilience of ecosystems duty: The Section 6 'duty requires that public authorities must seek to maintain and enhance biodiversity so far as consistent with the proper exercise of their functions and in so doing promote the resilience of ecosystems'.
- 2.6.10 Section 7, Biodiversity lists and duty to take steps to maintain and enhance biodiversity: 'this section replaces the duty in section 42 of the NERC Act 2006. The Welsh Ministers will publish, review and revise lists of living organisms and types of habitat in Wales, which they consider are of key significance to sustain and improve biodiversity in relation to Wales. The Welsh Ministers must also take all reasonable steps to maintain and enhance the living organisms and types of habitat included in any list published under this section and encourage others to take such steps.'
- 2.6.11 **Road to Zero:** The United Kingdom Government's policy is for at least half of new cars to be ultra-low emission by 2030 and the sale of new conventional petrol and diesel cars and vans to end by 2040. Electric vehicles are currently considered a suitable low-emission alternative to the use of vehicles with internal combustion engines. The change to electric vehicles has the potential to benefit the town and the residents of Llanfairfechan by reducing exhaust emissions and reducing some aspects of traffic noise.
- 2.6.12 **Planning Policy Wales Edition 10:** published in December 2018, sets out to 'promote actions at all levels of the planning process which is conducive to maximising its contribution to the well-being of Wales and its communities. It encourages a wider, sustainable and problem-solving outlook which focuses on integrating and addressing multiple issues'<sup>5</sup>. PPW10 has encourages the 'preparation of development plans and strategies and individual proposals' to 'stimulate and support innovative and creative ideas as well as high standards of evidence and assessment' so that sustainable improvements can be achieved.

### **Environmental Design Principles (Mitigation and Enhancement)**

- 2.6.13 The design for the Scheme has been developed iteratively by the design team to ensure that the most appropriate solutions have been identified and developed. Numerous minor adjustments were made to improve the design or to avoid or minimise impacts. The proposed Scheme is complex because it must satisfy wide ranging Scheme objectives as well as complying with legislation and the requirements of safety and of highways design standards.

<sup>4</sup> An Active Travel Action Plan for Wales, Welsh Government, 2016

<sup>5</sup> Planning Policy Wales Edition 10, Introduction

- 2.6.14 Environmental constraints of the site must also be considered during route selection and design. To identify constraints the design team have gathered environmental data about the area through field surveys, consultations with statutory consultees, as well as comments and advice from stakeholders in the community. Environmental constraints include:
- A. Designated nature conservation site: Marine Special Areas of Conservation (SAC), Sites of Special Scientific Interest (SSSI);
  - B. Designated heritage assets: Scheduled Ancient Monuments (SAM), sites on the Historic Environment Record (HER), Listed Buildings, Conservation Areas, Historic Landscapes and Registered Parks and Gardens;
  - C. Snowdonia National Park (the eastern end of the Scheme lies within the National Park boundary);
  - D. Landform: topography, geology and soils;
  - E. Watercourses, ground water, sea level, flooding;
  - F. Landownership including agriculture, land use, planning allocations, existing and proposed residential areas;
  - G. Vegetation cover;
  - H. Habitat and European Protected Species (EPS)
- 2.6.15 The design has continued to develop with refinements to the road alignments and structures to minimise or avoid impacts. The residual environmental impacts of the Scheme, which remain once the route is fixed, are then considered and measures to compensate or mitigate any adverse impacts are designed. Measures to enhance the Scheme, beyond the limits of mitigation were also developed in the interests of future generations.
- 2.6.16 The proposed link road, which would extend along the south side of the dual-carriageway from the proposed A55 Grade-separated Junction at Junction 16A to Ysguborwen Road beside Junction 16, would bypass Dwygyfylchi, but bring traffic closer to some residential areas, in particular to properties on the northern edge of Maes-y-Llan. The A55 is recognised locally as a source of traffic noise and as an intrusion into popular views to the sea. The design strategy has been developed to address these concerns, and others associated with the piecemeal expansion of suburban development on the coastal plain to the south of the A55. The strategy is based on the provision of a high-quality linear Green Infrastructure forming a landscape corridor on the south side of the expressway and the proposed link road, and extending from Penmaenmawr in the east to the Penmaenbach tunnel portal in the west. The corridor would include retained existing roadside vegetation and public green space, dedicated Public Open Space, new mass planting of roadside trees, shrubs and grassland and new Public Open Space<sup>6</sup>. The corridor would include cycleways and footpaths and would connect with existing public rights of way and crossings over the A55. An additional crossing over the Expressway would be provided at the Junction 16A with the junction overbridge.
- 2.6.17 A key feature of the green corridor would be noise mitigation from Junction 16 to east of Orme Services. The noise mitigation takes the form of an earth bank, or false cutting, although at Maes y Llan a vertical barrier with tree and shrub planting is used due to the lack of space. The false cutting will rise to around 5 m in height to provide screening to all or most vehicles on the proposed link road and the existing A55 from residential properties within Dwygyfylchi. The north side of the false cutting, facing towards the A55, will be formed at a gradient of 1:2, in keeping with typical roadside cutting and embankments. These slopes would be planted with native coastal trees and shrubs. Slopes on the south side will be formed to a shallower and more natural

<sup>6</sup> An area of replacement Public Open Space is required to address a designated area that will be taken for the proposed scheme.

slope to blend with the natural ground. In some places a wall will be added along the crest of the false cutting to integrate it with some local landscape features.

2.6.18 The landscape corridor should provide permanent separation of the transport corridor from residential areas. In accordance with the Welsh Minister's Green Corridor Initiative the green space provided as part of the scheme would be developed to provide connectivity and habitat, and link with the habitats provided by the Afon Gyrach, to enhance local biodiversity in accordance with the requirements of the Environment Act.

2.6.19 In summary the Environmental Masterplan shows measures that will:

- A. Protect the quality of views, minimise and mitigate any adverse impacts and, where physically achievable, providing some enhancement on the existing situation.
- B. Provide visual screening of the link road and traffic (also serving to screen traffic on the existing A55).
- C. Reduce traffic noise for many residential properties and public areas and provide mitigation with a noise barrier to traffic noise for those properties where existing conditions would be adversely affected.
- D. Retain views from residential areas over the false cutting to the sea.
- E. Protect landscape/ scenic quality for residents and visitors to Penmaenmawr, Dwygyfylchi and for viewers within Snowdonia National Park.
- F. Adopt distinctive forms, patterns, and landscape characteristics from the surrounding coastal landscape: to be retained or reinstated within the Scheme using appropriately located hedges, hedge banks, walls, replacement trees, woodland, scrub and grassland, and by selecting species suited to the setting.
- G. Protect cultural heritage features and their settings on the mountains and within settlements: and mitigate adverse impacts where opportunities fall within the boundary of the Scheme.
- H. Provide landscape separation of a minimum of 15 m, but up to 70 m between high-speed traffic on the A55 dual carriageway and existing and future housing to the south.
- I. Accommodate east to west cycleways and footpaths connecting with existing and proposed new crossings over the A55 to the shoreline and existing footpaths and roads. These would collectively form a network of routes for Active Travel and for leisure.
- J. Settlement 'Gateways' and other Green Corridor Initiative measures including wildflower rich grassland, and seasonally wet basins.
- K. Provide a linear public open space parallel with, and connected to the shoreline for informal recreation, active travel and local recreational cycling and walking and circuits connecting to footpaths and roads in Dwygyfylchi.
- L. Enhance connectivity requirements of indigenous native species and habitat in accordance with the Environment Act 2016: using design of the carriageway, structures, earthworks, boundaries, and landscape to maintain existing safe routes across the new road so that natural patterns of movement are not unduly interrupted and casualties from collisions with vehicles are minimised:
  - i. An east-west wildlife corridor for connectivity between established woodland and scrub on the two headlands and the Afon Gyrach corridor.
  - ii. Protecting the Afon Gyrach wildlife corridor and route under the A55 and railway.
  - iii. Specific habitat for relevant local species including birds, bats and otter.

2.6.20 Some further environmental aspects were also considered within the design:

- A. Dark Skies: to avoid or minimise lighting, where possible, using products that minimise light spillage. This was particularly important at the Afon Gyrach Bridge.
- B. Minimising changes to existing watercourses, with new crossings designed to retain the existing water course channels capacity and avoid realignment.
- C. Enhancements of the public realm around the junctions to integrate the Scheme and minimise and mitigate for adverse impacts of the Scheme on the townscape and the Penmaenmawr Conservation Area; and
- D. New structures: consideration to the design and integration into the sensitive landscape with careful selection of materials, planting treatments and associated earthworks.

## 2.7 Construction

- 2.7.1 Some of the most significant effects on the environment would occur during construction of the Scheme. Construction experts have advised on suitable construction methods and a construction programme has been developed so that these significant effects can be predicted, and measures developed to protect the environment. This section describes the likely phases of construction activities.

### Phases of Construction Activities

- 2.7.2 Following the issue of the 'Notice to Proceed to Construction', there would be a period when the detailed design would be developed. Prior to work starting on site, property precondition surveys and vegetation surveys would be carried out.
- 2.7.3 The construction site would be made secure as early as possible by the erection of permanent fencing. Where this is not possible temporary fencing would be installed. Site clearance work would commence with vegetation clearance at a time and method to avoid harm to wildlife.
- 2.7.4 Early construction activities would include:
- A. Construction of the main site compound;
  - B. Construction of main site access points;
  - C. Temporary and permanent fencing;
  - D. Construction of temporary diversions to existing footpath and cycleways.
  - E. Ongoing programme of seasonal ecological surveys;
  - F. Development of site haul roads;
  - G. Statutory Undertakers service diversions;
  - H. Topsoil stripping and stockpiling with archaeological monitoring;
  - I. Site clearance of trees, hedges, fencing, walls and small structures;
  - J. Construction of structures would commence as soon as possible;
  - K. Earthworks operations to form embankments and cuttings;
  - L. Drainage operations including pre-earthworks drainage ditches and existing water course culvert installation;
  - M. Haulage of materials to and from the site on the existing road network;
  - N. Construction of the carriageways:
    - i. Side road works; and
    - ii. Accommodation works.

### Construction Working Hours

- 2.7.5 Working hours would be subject to agreement with CCBC Environmental Health Officer and may

vary by location and activity. Typically, contractors work Monday to Friday with reduced activity on a Saturday. There would normally be no working on Sundays or Bank Holidays. Typical working hours are shown in Table 2.7.

**Table 2.7: Typical Site Working Hours**

Period	Day	Start Time	Finish Time
Summer	Monday to Friday	7 am	7 pm
	Saturday	7 am	4.30 pm
Winter	Monday to Friday	7.30 am	5.30 pm

### **Construction Timing, Durations and Programme**

- 2.7.6 This section outlines the proposed construction sequence and the key construction activities. Construction would be anticipated to commence in 2021, with work programmed to take place over a period of approximately 18 to 24 months. The construction would be completed, and the Scheme opened in 2023, followed by a three-year period of environmental maintenance and aftercare extending until 2026.

### **Construction Strategy**

- 2.7.7 The overriding consideration throughout the construction stage is to maintain two lanes of traffic in each direction on the A55 throughout daytime working hours. The existing central reserve and roundabout island would be excavated and replaced with full depth road construction. This would give the Contractor the facility to relocate lanes to the north and south of their existing alignment within the A55 corridor as needed, thereby enabling sufficient working space for construction activities whilst maintaining dual carriageway traffic flows on the A55. Consideration must be given to the high proportion of heavy goods vehicle traffic using this route and consequently lane widths would be minimised with Lane 1 at 3.25 m wide and Lane 2 at 3 m wide. There would also be a 50 mph speed limit.

### **Phase 1 (approximately eight weeks duration)**

- 2.7.8 Junction 16 remains open to traffic turning movements: the existing Junction 16A slip roads are permanently closed.
- 2.7.9 In this phase A55 would retain two narrow lanes as described in Paragraph 2.7.7. The work entails site clearance and excavation within the existing central reserve and roundabout island and full depth road reconstruction at both Junctions 16 and 16A. Whilst westbound access and egress lanes would be temporary, those from the eastbound carriageway would utilise the permanent works alignment and therefore be constructed accordingly. All excavated arisings would be hauled to a stockpile - assumed to be located adjacent to the site offices at Dwygyfylchi – for later reuse within the Works.
- 2.7.10 Site clearance, fencing, pre-earthworks and earthworks operations together with construction of the structure spanning Afon Gyrach can be commenced for the new offline county road between the two parts of the junction. Earthworks operations, requiring 47,000 cu m of cut, would be undertaken wholly offline, thereby using conventional excavator and dump truck methodology.

### **Phase 2 (approximately 50 weeks duration)**

- 2.7.11 At Junction 16, the A55 carriageways would be realigned to the north of the corridor and the roundabout reduced in diameter whilst maintaining all junction movements in order to permit construction of the westbound on and off slip roads. Fill to the slip roads, approximately 3,000 m<sup>3</sup>, would be won from the adjacent cut required for the remodelled junction with the county road, the balance of excavated fill being used at Junction 16A.
- 2.7.12 At Junction 16A, narrow lanes would be required on both carriageways.
- 2.7.13 The south abutment and central pier of the overbridge would be constructed adjacent to the westbound carriageway together with construction for the new eastbound carriageway and crossover within the existing central reserve. New communications equipment would be mounted over the eastbound carriageway using the new overbridge, by means of overnight closures of the eastbound A55.
- 2.7.14 The westbound slip roads embankment construction would continue using material won from site augmented by approximately 60,000 m<sup>3</sup> of import.
- 2.7.15 Construction works for the new county road, including contiguous bored piled retaining walls at Maes Y Llan, would continue. A local traffic management scheme at the junction of Ysguborwen Road would be needed to maintain local traffic flows to Junction 16.

### **Phase 3 (approximately 25 weeks duration)**

- 2.7.16 Junction 16 remains open to traffic throughout.
- 2.7.17 Once all westbound slip road construction has been completed, the A55 carriageways would be relocated to their final alignment.
- 2.7.18 At Junction 16A, traffic would be diverted onto the new eastbound carriageway, thus providing space for construction of the overbridge north abutment and the slip road earthworks and retaining walls.
- 2.7.19 On completion of the north abutment, the beams would be placed in a weekend closure of the A55, and deck construction would follow on. All work would be remote from A55 traffic, permanent formwork for the deck soffit and cantilever formwork for the parapet together with all access and safety measures having been erected at the same time as the beams. Further A55 night closure(s) would be needed to remove the parapet falsework and safety measures spanning the live carriageway.
- 2.7.20 The eastbound slip road embankments would be constructed using a mix of conventional embankment, reinforced soil embankment and reinforced earth retaining wall for which approximately 12,000 m<sup>3</sup> of acceptable fill and 9,000 m<sup>3</sup> of specialist fill would need to be imported. Very high containment road restraint barrier with its associated ground beam would be needed on the north side of the slip roads due to the proximity of the railway.
- 2.7.21 Carriageway and finishing works would follow with tie-in work at either end being undertaken at night utilising single lane working on the eastbound A55 as needed.
- 2.7.22 Carriageway and finishing works would be completed on the westbound slip roads, the overbridge



and the new county road.

#### **Phase 4 (approximately five weeks duration)**

- 2.7.23 The A55 traffic would remain on its final alignment with all eastbound turning traffic now using Junction 16A, allowing the roundabout at Junction 16 to be closed.
- 2.7.24 Work to permanently close off the roundabout would be undertaken with A55 traffic running in appropriately aligned narrow lanes.
- 2.7.25 Final tie-in and overlay works to both A55 carriageways would be carried out at night under contraflow conditions together with application of permanent road markings.
- 2.7.26 At Junction 16A, final tie-in works to both realigned carriageways together with planing-out and overlaying the entire westbound carriageway and sections of the eastbound carriageway would be carried out at night under contraflow conditions together with application of the remaining permanent road markings.

## **2.8 Construction Activities**

### **Site Clearance, Topsoil Strip and Archaeological Watching Brief**

- 2.8.1 All site clearance would be carried out under ecological supervision considering ecological seasonal constraints as identified in Chapter 8 of this ES.
- 2.8.2 During and after site clearance the Archaeologist would carry out any recording of above ground features. The details of any recording of above ground features are set out in Chapter 10. Topsoil would generally be stripped from areas within the construction footprint and where necessary would be subject to archaeological supervision. Topsoil would be stored in temporary stockpiles and re-used within the works. Wherever there is enough space over and above that required for construction movements, topsoil would be stored close to the source so that it would be replaced as near as possible to origin. Storage areas have been allowed for within the Scheme boundary for this purpose.

### **Demolition**

- 2.8.3 The existing footbridge at Puffin Services would be dismantled once the replacement footbridge has been opened. At the existing Junction 16 roundabout, the existing masonry walls would be demolished and replaced, plus the CCTV and steel sign gantries would (especially in the case of the light-weight gantry) where viable be dismantled and relocated. The Variable Message Sign (VMS) adjacent to Old Ship Cottages, to the east of Junction 16A would be demolished and replaced. Additionally, the bus stops on Ysgurborwen Road and Glan Y Afon Road would need to be removed, as part of their relocation. Opportunities for reuse/ recycling have been considered as part of the design development of the Scheme. These are described further in Chapter 15 (Materials).
- 2.8.4 A detailed method statement would be produced for prior to demolition. In addition to identifying all the safety and environmental protection measures required this would include investigation for the presence of any hazardous materials which may require special procedures for disposal. As described in Chapter 15 (Materials), where viable, demolition materials would be recycled.

## **Service Diversions**

- 2.8.5 Diversions to Statutory Undertakers plant would need to be carried out throughout the construction period. These works would be planned and coordinated to meet the construction programme.
- 2.8.6 Utility diversions are necessary where existing roads would be stopped-up or realigned. The diversions would generally be routed along existing service corridors, roads or footpaths. Where the service could be retained in its present location but would be affected by the proposed Scheme, appropriate protection measures would be agreed with the relevant authority.
- 2.8.7 Through ongoing liaison appropriate protection measures and/ or diversions are being determined which would be implemented as part of the construction of the Scheme. These measures would comply with the relevant standards and codes of practice agreed nationally with utilities companies.

## **Earthworks**

- 2.8.8 A major element of constructing the Scheme would be excavation of earthworks and construction of new embankments. Wherever possible, designers try to balance the volume of excavated materials (cut) with volume required to raise ground levels (fill). The cut fill balance associated with the earthworks has been assessed for the Scheme. It is anticipated that the Scheme would require the movement of approximately 87,287 tonnes of cut earthworks materials and 144,540 tonnes of imported earthworks materials. Further information can be found in Chapter 15 (Materials).
- 2.8.9 During detailed design construction experts would assist the designers in optimising the balance of cut and fill and to plan out how the future contractor would need to move excavated material around the Scheme. That information would form the basis for planning the optimum movement of excavation and haulage plant around the site. It is envisaged that bulk earthworks would mainly be carried out in the summer, but the contractor would take advantage of any periods of dry weather in the other seasons.
- 2.8.10 Wherever possible all excavated material would be reused in the design to minimise the volume that would leave site. It is currently anticipated that overall, there would be some importation of bulk fill because a balance cannot be achieved. If the Junction improvements for Junctions 16 are carried out concurrently with a separate scheme for Junction 15, there would be some opportunities to use materials excavated in Junction 15 in the Junction 16 Scheme and vice versa. If material does have to leave the site there will always be careful consideration about where it should go and how it can be used productively, rather ending up in a landfill.
- 2.8.11 The large volumes of excavated material often need to be stored on a temporary basis and to enable this, some temporary working areas located outside the permanent land take for the Scheme would be required. So that the Scheme can be built efficiently and safely, whilst minimising the environmental impacts, temporary areas have been identified and incorporated within the draft Compulsory Purchase Order. The land would be properly restored on completion.
- 2.8.12 Earthwork excavation would generally be carried out using hydraulic excavators loading articulated dump trucks that would transport material along haul routes to identified filling locations. Filling operations would involve using bulldozers and vibrating rollers. Where no practicable site alternative is available road lorries would be used to transport material on the

public highway. Operations on public roads would be carefully controlled and monitored to minimise disruption to the travelling public.

- 2.8.13 An assessment of the geotechnical information available indicates that glacial material (including cobbles and boulders) and localised clay is present on site. The assessments of the ease of excavation undertaken indicates that generally excavation can be carried out with mechanical excavators. For grading work, a large bulldozer might be used. However, where large boulders are encountered, they might need to be broken out by means of a hydraulic breaker.
- 2.8.14 The earthworks activities would be coordinated with the construction programme for structures to minimise the interface between public highway and construction plant. The number of plant crossings and the length of time they are required will be minimised.
- 2.8.15 Earthworks activities are vulnerable to wet weather. North Wales presents challenging weather conditions with a high annual rainfall. The earthworks season normally lasts from April to October, but with the opportunity taken to extend the season as weather conditions permit. Clay materials are susceptible to degradation when they get wet. To ensure that they remain suitable for reuse it would be important to protect them from rainfall and surface and groundwater flows. Control and management of all water sources would be given particular consideration in the method statements for all earthwork activities.
- 2.8.16 In addition to safety and quality problems associated with carrying out earthworks operations in the wet there are also environmental implications. These can include increased risk of silt entering watercourses, mud spreading onto local roads and subsequent dust as the mud dries. These environmental risks are managed by careful construction methods and temporary measures to contain mud, dust and silt. These measures would be set out in the contractors Construction Environmental Management Plan (CEMP).
- 2.8.17 The Scheme requires the movement of approximately 231,827 tonnes of earthworks materials. Further details can be found in Chapter 15 Materials.

### **Potential Contaminated Land**

- 2.8.18 There are several locations in the area of the Scheme where previous industrial activity and landfilling has occurred with inert, commercial and household waste being buried. A ground investigation has been completed and the results have been considered in the Geology and Soils Chapter 6 of this ES. During construction the excavation would be carefully monitored to identify any contaminated materials that might be present in the ground. Any contaminated material that is excavated would be treated in accordance with environmental best practice. This could include removal to a suitably licensed disposal facility or on-site remediation. The advice of Natural Resources Wales (NRW) and contaminated land specialists would be consulted.

### **Haulage of Materials**

- 2.8.19 The main materials that would be transported onto site in bulk have been estimated following several preliminary design iterations. Table 2.8 summarises these bulk quantities. Imported materials would be delivered via the closest site access point to the point of work and from there proceed on site haul roads.

**Table 2.8: Indicative Bulk Quantities to be Transported**

<b>Material</b>	<b>Estimated Quantity</b>	<b>Numbers of Loads<sup>7</sup></b>
Aggregates	50,596 tonnes	1946
Ready-mix concrete	16,683 tonnes	642
Pre-cast concrete	1,607 tonnes	80
Steel	4,366 tonnes	218
Asphalt	29,385 tonnes	1469
Plastic (e.g. pipework)	13,793 m	276

- 2.8.20 These estimated quantities result in an estimated 4,631 loads delivering to the site over the 18 to 24 month construction period; with peak summer weekday truck movements being estimated at 10/day.

### **Road and Land Drainage**

- 2.8.21 Pre-earthworks drainage ditches or filter-drains would be installed along the periphery of excavated slopes. These would ensure that any surface run-off entering the site is directed away from the construction operations to suitable discharge points.
- 2.8.22 It is envisaged that the construction of the permanent attenuation would be carried out as part of the pre-earthworks process in order to serve where appropriate as temporary settlement lagoons, to prevent silt entering the existing drainage or watercourses.

### **Sustainable Urban Drainage**

- 2.8.23 Since 7 January 2019, certain new developments require a sustainable drainage system (SuDS) to manage surface water. The system must be designed and built in accordance with statutory standards published by the Welsh Ministers. Sustainable drainage systems are designed to manage *'rainwater (including snow and other precipitation) with the aim of reducing damage from flooding, improving water quality, protecting and improving the environment, protecting health and safety and ensuring the stability and durability of drainage system'*<sup>8</sup>. However as confirmed in the October 2019 Welsh Government Sustainable Urban Drainage (SuDS) Newsletter, there are a small number of exemptions allowed in the legislation, including construction related to major roads built by the Welsh Government.
- 2.8.24 The drainage design for the Junction 16 improvements would be carried out in accordance with the Design Manual for Roads and Bridges (DMRB) 2019 Volume 4 and incorporates a range of measures intended to meet the equivalent requirements for SuDS. These include the provision of surface water attenuation to provide balancing capacity and controlled discharge into the existing surface water system, and the protection of flood storage capacity where there are risks of surface water and fluvial flooding occurring. Details of the drainage for the Scheme are set out in Chapter 7 Drainage and Water Environment.

<sup>7</sup> Based on typical haulage vehicles

<sup>8</sup> Implementation of Schedule 3 to the Flood and Water Management Act 2010 for mandatory Sustainable Drainage Systems (SuDS) on new developments (Draft) Frequently Asked Questions; Guidance for local authorities, developers and statutory and non-statutory consultees.

<https://qweddill.gov.wales/docs/desh/publications/190108-suds-statutory-guidance-en.pdf>

## Structures

- 2.8.25 The Scheme includes a bridge over the dual-carriageway, which based on the outline design could consist of a prestressed concrete structure. The retaining walls around Junction 16A and the associated slip roads, could consist of a combination of reinforced concrete and earth retaining walls. Further retaining walls would be required to the north of Maes-y-Llan. A bridge is also required for the link road to cross the Afon Gyrach. In addition, a replacement steel footbridge is proposed at the Puffin Services. These structures vary in size and form to suit the function.
- 2.8.26 The outline structures design has taken maintenance, buildability issues and environmental constraints into consideration. Construction of structures would be progressed throughout the construction period because the activities are often of long duration.
- 2.8.27 The outline structures design has taken buildability issues and environmental constraints into consideration. Construction of structures would take place all year round as they are less weather susceptible than earthworks operations. The construction sequence has been determined to ensure that the Scheme would be built with minimum disruption to the local environment, local population and the travelling public.
- 2.8.28 It is planned to commence construction of the following structures early in the construction programme.
- A. Retaining walls along the north side of Maes-y-Llan; and
  - B. Afon Gyrach link road bridge.

## Roadworks

- 2.8.29 Roadworks activities would include pavement construction, carriageway drainage, kerbing, surfacing, safety fencing, signing, lighting, road markings, cycleway and footways. Pavement construction would be undertaken using conventional pavers and smooth wheeled rollers.

## Footpaths, Bridleways and Private Means of Access

- 2.8.30 Existing footpaths, bridleways and private means of access that are affected by the Scheme would be suitably diverted during construction and then returned to the original route, or to a proposed new alignment. Details of these diversions are set out in Chapter 14. Key footpaths affected by the Scheme include:

**Table 2.9: Proposed works to footpaths**

Footpath	Proposed Works
National Cycle Network Route 5	Minor changes to the alignment of the cycleway, to accommodate the eastbound slip roads and changes to the DCWW access.
Shared cycleway/ footpath from Maes-y-Llan	The footpath to the Puffin Services from Maes-y-Llan would end at the new link road, where it joins with footpath number 29/08. A new footpath link to the Puffin services to be provided.
Footpath which was formed from the stopped up 'Bangor Field Road' footpath	The existing footpath would end at the new link road instead of connecting with the footpath which runs along the A55 westbound carriageway, which would be closed.

Footpath	Proposed Works
when the A55 Scheme was constructed in the 1980s.	
Footpath at Maes-y-Llan to the A55	The existing footpath from Maes-y-Llan which consists of steps to the footpath which runs along the A55 westbound carriageway would be closed.

- 2.8.31 Access would always be maintained during construction. If temporary diversions are to be provided, they would be constructed to an appropriate standard and would be well maintained. The duration of temporary diversions would be kept to a minimum, taking account of the construction programme.

### Landscaping and Planting Works

- 2.8.32 Subject to seasonal and construction constraints grass seeding and planting would be undertaken as early as possible in the construction programme to ensure the maximum establishment, growth and coverage by the time the five-year aftercare period is completed. Where feasible, any planting that could be satisfactorily completed in advance of construction would be carried out in the first available planting season. Other areas of planting and seeding would be completed in the earliest planting season that follows, when areas of the Scheme are made available.
- 2.8.33 Opportunities to translocate younger trees and shrubs by various techniques would be considered and used to provide new plantations.
- 2.8.34 The Contractor would carry out landscape and environmental maintenance in accordance with the Maintenance Environmental Management Plan (MEMP) for three years following completion of the works.
- 2.8.35 The details of the proposed landscape works are set out in the Landscape and Visual Effects Chapter 9 and shown on the Environmental Masterplan (EMP) (Appendix 2.6).

## 2.9 Temporary Measures During Construction

### Site Construction Compounds and Land for Required for Construction

- 2.9.1 Temporary working space would be required outside the permanent land take for the Scheme and this land has been identified and included within the draft Compulsory Purchase Order. Land required on a temporary basis would be taken to allow efficient, safe construction and to minimise the environmental impacts and would be used for the contractor's compound, materials storage areas, haul roads and to provide adequate space to erect boundary fences, divert services and install drains and culverts.
- 2.9.2 The contractor's construction compound would contain the main construction site office, stores, plant maintenance facilities, welfare facilities and car parking. The compound and storage areas would be secured against theft and vandalism through the provision of fencing, lighting, CCTV, mobile and fixed security personnel as appropriate to the location.
- 2.9.3 The site of the compound has been identified and included within the Compulsory Purchase Order. The area, located on the south side of the A55 and to the west of the existing Junction 16A, would be taken from the duration of construction and fully restored on completion to the original greenfield condition for agricultural use. The area is shown on the Environmental Masterplan

(EMP) in Appendix 2.6.

- 2.9.4 During the construction phase the number of people expected to be working on site, and to make use of the compound, is anticipated to average 50 with an estimated peak of 100. It is anticipated that most of the labour force would be sourced locally with local subcontractors employed. However, some specialist or skilled labour may be required from outside the locality.

#### **Site Access and Site Traffic**

- 2.9.5 Main site access points would be established, and internal site haul roads would be developed to enable deliveries to arrive at the intended destination within the site and to minimise the interface with the public. All site access points would be clearly signed on the road network.

#### **Traffic Management and Road Closures During Construction**

- 2.9.6 The requirements for traffic management have been carefully considered in design to minimise the disruption to road users during construction. Before a contractor commences construction of the Scheme they will have developed a plan for traffic management throughout the construction period so that all the existing routes would remain open and access would be maintained to all residential areas around the junction.

### **2.10 Construction Management**

- 2.10.1 Civil Engineering contractors normally operate a Management System (IMS) which would be accredited to appropriate British and international standards. The system would form the foundation for the management of the construction works and would integrate the requirements to manage health and safety, the environmental protection, construction quality and public relations into a Contract Management Plan to clearly define standards, processes, procedures, organisation, roles responsibility and key performance indicators.

- 2.10.2 Under the overall control of the CEMP would be:

- A. Health and Safety Management: (refer to Section 2.10.3);
- B. Environmental Management (CEMP): (refer to Section 2.10.5 and Chapter 20);
- C. Quality management: (refer to Section 2.10.10); and
- D. Public Relations: (refer to Section 2.10.11);

#### **Health and safety management**

- 2.10.3 In accordance with current Health and Safety legislation, approved codes of practice and a Health and Safety Policy, the contractor would:
- A. Provide and maintain a place of work that is safe and without risk to the health and welfare of all its employees, subcontractors and the general public.
  - B. Provide and maintain plant and systems of work that are safe with minimum risk to health.
  - C. Provide appropriate information, instruction, training and supervision to ensure the health and safety at work for all employees.
  - D. Allocate enough resources to enable the policy to function effectively.
  - E. Seek to continually improve health and safety performance.
  - F. Consult with and maintain good relations with employees, trade unions representatives, the Health and Safety Executive and other relevant organisations.
  - G. Review operational performance using appropriate measures. Review accident investigation

reports and audit information.

- 2.10.4 Site specific risk assessments and method statements would be produced by the contractor, prior to any work activates commencing to ensure that health and safety responsibilities are met in relation to site personnel and the public. A 'Permit to Work' procedure is required for any construction activities where the contractor has identified that there is a high residual risk of harm.

### **Construction Environmental Management Plan (CEMP)**

- 2.10.5 Chapter 20 of this ES sets out the approach to environmental management. An outline of the Construction Environmental Management Plan (CEMP) is included in Appendix 2.2.
- 2.10.6 The CEMP is a live document that is developed and updated through the detailed design and construction stages. Development and implementation would be managed throughout by the Environmental Coordinator. The CEMP would ensure that construction activities are planned and managed in accordance with all the environmental requirements identified in the Environmental Statement.

### **Register of Environmental Actions and Commitments (REAC)**

- 2.10.7 The REAC is a schedule of all environmental matters that have been agreed as part of the Scheme. It will include commitments to complete actions such as surveys, monitoring or reporting, or consulting with stakeholders; or commitments to provide mitigation or enhancements as part of the Scheme. A draft of the REAC is included in Appendix 2.3. During detailed design, construction and operation the REAC will be used record how the successful contractor implements planned mitigation and enhancements.
- 2.10.8 The key to effective environmental management during the construction phase lies in the comprehensive training of the workforce. This would be controlled by a full-time site-based Environmental Clerk of Works (ECoW). The ECoW would be managed by the Environmental Coordinator (ECO), to:
- A. Administer the CEMP and assist in the production and review of environmental content of method statements;
  - B. Provide guidance to the site team in dealing with environmental matters;
  - C. Raise awareness of site environmental issues;
  - D. Assist with obtaining and programming any licences from regulatory authorities such as the NRW; and
  - E. Monitoring site performance against the CEMP, raising standards and reporting to site management.

### **Environmental Masterplan**

- 2.10.9 The environmental mitigation measures incorporated within the design of the Scheme are illustrated on the Environmental Masterplan (see drawings in Appendix 2.6 Sheets 1 to 3, Volume 3). The masterplan drawings have been prepared in accordance with DMRB (2008) Volume 10. The landscape and environmental design proposals for the proposed new section of highway are described in Chapter 9 Landscape and Visual Effects.



## **Quality Management**

2.10.10 The future contractor's on-site construction management team would ensure that proactive quality control is achieved by:

- A. Defining and coordinating an agreed Inspection & Test Plan (I&TP) and regime for each element of work.
- B. Setting the acceptance criteria for the I&TP to meet all the relevant design, specification and Employer's requirements.
- C. Adopting an open Non-Conformance Reporting (NCR) process detailing corrective and preventative actions.
- D. Monitoring timely close out of NCR to prevent jeopardising follow on work which would otherwise be compliant.
- E. Maintain essential documentation plus sufficient documentation to demonstrate that the product has been installed in a compliant manner.
- F. A materials-testing laboratory, with UKAS Accreditation or similar, would carry out the defined compliance sampling.

## **Public Relations**

2.10.11 Construction works on the scale required for the Junction 16 Improvements would result in some inconvenience and disruption to residents and travellers, although traffic management and limits on construction noise would be implemented to keep these problems to a minimum. Where construction works could have significant impact on neighbouring properties the affected parties would be advised of these works prior to their commencement.

2.10.12 During the works it will be important that there are effective channels of communication in place to keep all interested parties informed of activities and to quickly address any complaints or queries. A full time Public Liaison Officer (PLO) would keep the public and affected landowners informed of progress and advise on forthcoming activities. During the construction phase they would be based in the site office. The PLO would be the first point of contact for any concerns or queries and a dedicated telephone number would be provided for members of the public to use.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 3 ALTERNATIVES**

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## 3. ALTERNATIVES CONSIDERED

### 3.1 Chapter Introduction

3.1.1 This chapter of the Environmental Statement (ES) outlines the main alternatives considered during the development of the Scheme and sets out the main reasons for the selection of:

- The broad route corridor;
- The junction options;
- Changes to local roads;
- Selection of the design which is included within the draft Statutory Orders.

3.1.2 The current Environmental Impact Assessment (EIA) Directive requires that an ES should include 'A description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking account of the effects of the project on the environment'<sup>1</sup>.

3.1.3 This chapter includes an outline account of the main and reasonable alternatives to the Scheme that have been considered by the Welsh Government and its advisors, taking account of their potential environmental impacts.

### 3.2 Previous Studies

3.2.1 The two roundabouts at Junction 15 and Junction 16 and the dual carriageway formed part of the Llanfairfechan and Penmaenmawr Bypasses which were completed in October 1989. Penmaenbach and Pen y Clip tunnels were first built in the 1930s to carry a single carriageway road, but as part of the planned A55 improvements a second tunnel at Penmaenbach was completed in June 1989, while Pen y Clip tunnel was completed in October 1993. The designs were based on traffic forecasts available at that time. Traffic volumes have increased, and the strategic importance of the A55 Trunk Road has grown.

#### 2003 to 2007

3.2.2 Following a closure of the Penmaenbach headland in 2003/2004 for maintenance, a study was carried out to consider the highway geometry between Junction 15 and Junction 17, including consideration of grade separated junctions at Junction 15 and Junction 16. Increased traffic flows and road safety issues were evident. Safety concerns in tunnels were given more emphasis along the route following the EU Tunnel Directive 2004/54/EC and the subsequent Road Tunnel Safety Regulations 2007, which came into force in June 2007.

3.2.3 The initial study and assessment of the junctions was completed by Capita Symonds in 2005. This study included three options for Junction 15 and six options for Junctions 16. Increased traffic flows and road safety issues have been evident for a period of time and a study in 2005 identified A55 route improvements including options for grade separation at Junctions 15 and 16.

<sup>1</sup> The 2011 EIA Directive requires the following to be included within an ES. 'An outline of the main alternatives studied by the developer and an indication of the main reasons for his choice, taking into account environmental effects' (Article 5, 3(d) Directive 2011/92/EU). Directive 2011/92/EU has been amended by Directive 2014/52/EU. Although the transitional measures in place mean that the provisions of Directive 2011/92/EU remain applicable for the Scheme, the requirements of Directive 2014/52/EU have been taken into account within this ES, where practicable. Directive 2014/52/EU amends Article 5, 3 as follows. 'A description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment'. (Article 5, 3(d) Directive 2011/92/EU).

The study also highlighted other safety issues relating to lay-bys, direct accesses and hard strip provisions along the route.

## **2008**

- 3.2.4 In February 2008 Atkins was commissioned by the North and Mid-Wales Trunk Road Agency (NMWTRA) to examine road safety improvements along the A55 in the vicinity of Llanfairfechan and Penmaenmawr, with a focus on considering options for improving Junctions 15 and 16 by removing the at-grade roundabouts. These two are the only at-grade roundabouts on this road and are considered to be a cause of increased journey times and poor journey time reliability. The safety hazard posed by incidences of stationary traffic backing-up into Pen-y-Clip and Penmaenbach Tunnels was also an important consideration.
- 3.2.5 In April 2008 the '*One Wales: Connecting the Nation – The Wales Transport Strategy*' was developed and published by the Welsh Assembly Government. In the foreword of the strategy Ieuan Wyn Jones Assembly Member (AM), Deputy First Minister and Minister for the Economy & Transport, stated that among '*the five key areas where substantial progress is anticipated*, were '*Improving links and access between key settlements and sites across Wales and strategically important all-Wales links; enhancing international connectivity, and increasing safety and security*'.
- 3.2.6 Part of the 2008 Atkins study was consideration of environmental matters associated with the options put forward. The report *A55 Jct15 & 16 Study Preliminary Planning Report – Environmental Issues* was published in April 2008. At that stage, no consultation with the statutory bodies had been carried out, but various public sources of environmental data were used. The study considered the potential impacts and environmental constraints of noise, air quality, landscape, townscape, biodiversity, soil, heritage and water environment and then made recommendations for further work and consultations required.

## **2009**

- 3.2.7 Stakeholders, including local councillors were consulted on the proposed options at a workshop and an initial Stage 1 WelTAG appraisal was completed and a preliminary environmental assessment carried out. This study which was completed in April 2009 concluded that new grade separated options should be progressed to provide safety improvements.
- 3.2.8 In January 2009, *Environmental Report* was published by Atkins. This report covered a much more detailed assessment of all the options under consideration and was prepared as part of the WelTAG 2008 Stage 1 appraisal. The report covered an assessment of environmental constraints associated with all the options for Junctions 14, 15, 15A, 16 and 16A.

## **2011**

- 3.2.9 In February 2011, following inclusion of the scheme in the Welsh Government's National Transport Plan, Atkins was instructed to review the options, address potential alternatives and hold an Options Workshop. The scheme options and cost estimates developed up to that time were reviewed and new options developed and priced for both junctions.
- 3.2.10 Following the review the report concluded that while 'the benefits have not been the subject of assessment at this stage, the need and the anticipated positive effects associated with the project do not appear to have diminished despite a small reduction in traffic flow.'

- 3.2.11 The review found that one option at Junction 16 appeared to address the key objectives and provide value for money. The report stated that the *'environmental impacts arising from the improvements will be complex to assess especially considering the nature of the site and existing landscape'*.

## **2013**

- 3.2.12 In 2013, the Minister for Economy, Science and Transport, Edwina Hart's written statement (dated 10th July 2013) included a commitment to improve the efficiency of the network across A55/A494 dual carriageway between J11 (Llandygai) and Welsh/English Borders in the east by introducing emergency verge refuges. Several studies were undertaken with the purpose of progressing schemes so that physical works could be carried out.

## **2015**

- 3.2.13 The A55 /A494 Network Resilience Phase 2 Feasibility Report led to a programme of physical improvement works, which were implemented between September 2014 and March 2015, during and after significant incidents, with the objective of maintaining or improving traffic flow on the dual carriageway network. This included the installation of Emergency Crossing Points (ECP) and the construction of 8 hardened verges at strategic locations between A55 Junction 11 at Llandygai to the West and the Welsh/English borders to the east. The works also included closure of 12 laybys with road markings. The study also identified improvements to junctions including Junction 16.
- 3.2.14 A commitment for improvements at Junction 16 to be constructed by the end of 2020, was included in the National Transport Finance Plan 2015 (NTFP). To progress the scheme and to further develop certain elements Welsh Government appointed Corderoy assisted by TACP to act as the Employer's representative through the design development and statutory processes for both Junctions 15 and 16. Some early environmental surveys were carried out.
- 3.2.15 TACP, as part of the Employer's Representative team, were commissioned by Welsh Government in August 2015 to undertake a Phase 1 habitat survey and initial protected species assessment to inform the proposed improvement works at Junctions 15 and 16 of the A55 in North Wales. The report, entitled *A55 Junctions 15 and 16 Improvements – Ecological Statement October 2015*, was produced incorporating an up-to-date desktop study and site surveys and an ecological overview, listing potential impacts and mitigation and further surveys that were recommended.

## **2017**

- 3.2.16 On 28 April 2017 the Cabinet Secretary for Economy and Infrastructure announced that a commission to investigate options to improve journey times, reliability and the resilience of the A55 corridor from Holyhead to Post House (Chester) would be undertaken. This would include associated routes such as the A494 corridor from the Ewloe Interchange to Drome Corner, Strategic Diversion Routes (SDRs) and Tactical Diversion Routes (TDRs). WSP were commissioned by the (NMWTRA) to undertake a WeITAG Stage One Study to improve resilience of the A55/ A494 dual carriageway network in North Wales. The report *A55 / A494 Network Resilience Study WeITAG Stage 1 Report* was published in October 2017 by WSP on behalf of NMWTRA.

### 3.2.17 The study concluded that,

*'In recognition of the strategic importance of the route, the current approach to managing the A55 / A494 exceeds the statutory requirements for a rural dual carriageway and adopts a number of provisions that would normally be associated with motorway management, e.g. Traffic Management Centre and Traffic Officer Service. Current performance levels consistently meet or exceed standards. During normal operating conditions the route performs well with some localised congestion during peak traffic flows. The route however is vulnerable during incidents or significant road work events due to a combination of topographical and infrastructure constraints and lack of viable diversion routes. The route runs close to capacity during normal traffic flows and is above capacity at peak times.'*

### 3.2.18 The study findings and recommendation were that a total of 33 unique problems have been identified across the study area and these have been grouped into several themes, of which Environment and Sustainable Travel are relevant to the ES. The proposals set out in the report included short, medium and long-term measures for the whole A55 corridor, of which a number are relevant to the Junction 14A to 16A corridor, although are not necessarily included in the current scheme:

- **Short term**      Improve NMU Crossings -Penmaenbach Beach Subway  
                              Increase VMS signage (fixed or mobile) along the A55 and A494 between each junction  
                              Increased Emergency Crossing Provision Operation
- **Medium term**    Improve non-standard junctions
- **Long term**        Expressway two-lane; whole corridor with reduced number of junctions  
                              New Diversion Route A55 J12 (Tal y Bont) -J14 (Madryn): New Parallel Route  
                              New Penmaenbach Tunnel  
                              Penmaenbach Eastbound Marine Embankment: 120 kph Design Speed  
                              Provision of Hard shoulder (network wide)

### 3.2.19 The decision was made by Welsh Government to procure an Early Contractor Involvement (ECI) contractor to develop the improvements schemes for Junction 15 and Junction 16, with tender procedures commencing in 2015. Carillion with Ramboll, RML and YGC were awarded the (ECI) contract in 2017.

## 3.3 The Current Study (2017 onwards)

### 3.3.1 Work under the ECI contract commenced in late 2017 but was halted following the liquidation of Carillion. Ramboll, RML and YGC were reappointed by Welsh Government to continue with developing the schemes under a new consultancy contract.

#### **What is WelTAG?**

### 3.3.2 Welsh Government adopted the Welsh Transport Planning and Appraisal Guidance (WelTAG) in 2008 as a suitable method of appraisal for assessing proposed strategies, plans and schemes.

WelTAG is intended to provide information about significant economic, environmental and social impacts so that decision makers can judge the merits of proposals using a consistent approach.

- 3.3.3 Applying the WelTAG appraisal method, the options for Junction 16 have been compared against the Transport Planning Objectives and the criteria of Welsh Impact Areas, the 'three pillars of sustainability' that underlie policy in Wales: the economy, the environment and society. These include legal requirements and the desire to protect and enhance the condition of the built and natural environment.
- 3.3.4 The Transport Planning Objectives and Welsh Impact Areas underpin the appraisal process by allowing each option to be appraised to see if it is likely to succeed in addressing problems and achieving the objectives. When a proposal performs poorly against Welsh Impact Areas it is unlikely to gain support from the Welsh Government.

### **WelTAG Stage 1**

- 3.3.5 The team began work by reviewing the WelTAG Stage 1 Assessment in the light of the newly published WelTAG 2017 guidance and held a Public Information Exhibition (PIE) in December 2017. The WelTAG Stage 1 built on previous development work by considering the outcome of the 2008 consultation work by Atkins. The options that were presented were those prepared by previous consultants with the addition of an option developed by the Carillion team at tender. The options are shown in the WelTAG Stage 2 Reports in Appendix 3.2 and in the EIA Screening Report in Appendix 4.2.
- 3.3.6 The Public Information Exhibitions (PIE) were held on 13 December 2017 to 15 December 2017, with a day in Llanfairfechan, Penmaenmawr and Dwygyfylchi. The exhibition was well attended with 762 people registered as attending the exhibition. Five options for Junction 15 and four options for Junction 16 were presented together with the project objectives. Based on the comments received in written responses, both the project objectives and the proposed options were reviewed, and further alternative options were developed.
- 3.3.7 The questions posed in the questionnaire did not explicitly invite responses of an environmental character, although open questions were asked regarding the stakeholder's options and preferences. Several environmental matters associated with the existing A55 were identified, primarily traffic noise and visual impact. Other environmental issues include air quality, greenhouse gas emissions, landscape and townscape impacts, biodiversity, soil, heritage and the water environment.
- 3.3.8 The communities in the vicinity of Junction 16 are affected by issues relating to housing, income, employment, health, access to services and community safety. Many of these social issues are exacerbated by the communities' reliance on the A55, including the effect that the A55 has in severing continuity between the communities and the coast.

### **WelTAG Stage 2**

- 3.3.9 Following the Stage 1 review, a WelTAG Stage 2 Workshop was held on 7 February 2018. Transport Planning Objectives (TPO) for Junctions 16 were reviewed and updated. These are set out in Chapter 2, Section 4.
- 3.3.10 Four options for Junction 16 (A to D) were developed in more detail than previously and were then appraised so that a comparison between them could be made. All the options include:



- Removal of the Junction 16 roundabout;
- Retention of the footbridge over the A55 at The Puffin;
- Retention of the SUTRANS Route 5, which runs parallel to the A55; and
- Retention of the existing bus stops.

### **Difficulties Encountered During the Development of Options**

3.3.11 The proximity of the railway to the north and residential areas to the south of the A55 have been the greatest constraint on the development of the options. Further concerns have been:

- Achievement of suitable horizontal alignments to the required standards within the corridor;
- Limitations on reducing the vertical alignment of the dual-carriageway because of the need to remain above sea level;
- Retaining sea views from residential properties across the A55;
- The presence of residential properties close to the existing road in critical locations such as Maes y Llan and along Ysguborwen Road;
- Avoidance of any entry into the area below the Mean High Tide line due to the presence of the Special Protection Area (SPA), Special Areas of Conservation (SAC) and Site of Special Scientific Interest (SSSI).

3.3.12 The options are shown in Appendix 3.2 and described in the following paragraphs.

3.3.13 The following paragraphs describe the options in turn and explain some of the advantages and disadvantages that have influenced an option might be rejected or considered further. These descriptions *do not include mitigation or* enhancement measures. Mitigation such as visual screening and noise barriers, for example, would result in reduced environmental impacts. The full mitigation proposals are described in detail in the environmental assessment chapters of the ES. These options are illustrated in the WelTAG Stage 2 Options Appraisal Report, which is included in Appendix 3.2.

3.3.14 All four options will remove the roundabout and associated road surfacing including the yellow rumble strips. This will change traffic noise by replacing the noises created by vehicles passing over the rumble strips, slowing down, crossing the roundabout and accelerating to cruising speed. Instead, traffic will pass through the junction without slowing.

3.3.15 In all four options the dual-carriageway would be moved southwards into pastureland and into a deeper cutting to provide space to improve the alignment of the A55 over the railway bridge and to allow adequate space on the north side of the A55 to provide eastbound slip-roads. At Maes y Llan the dual carriageway would be slightly closer to the houses. In Option A the extent of the southern realignment extends up to J16A in order to accommodate eastbound slip roads here.

### **Junction 16 Option A**

3.3.16 The dual carriageway would be moved a short distance southwards. The roundabout will be removed and a westbound on and off slip-road provided that would meet Conwy Road at a proposed roundabout. In the immediate vicinity of the roundabout, Ysguborwen Road and Conwy Road would be moved slightly southwards requiring the loss of part of the roadside plantation that surrounds the northern edge of the Oasis Centre garden.

3.3.17 The existing Junction 16A, for Dwygyfylchi, will be remodelled as a full grade-separated junction with four-way movement, which would require slip-road embankments rising upwards to a height

of 7 m above the dual-carriageway, and a bridge across the A55. The access road and railway bridge to the sewage works would be retained with access off the eastbound off slip-road. Being elevated above the surrounding ground the slip roads and bridge would be more readily visible from some residential properties in Dwygyfylchi and from the static caravan park at Pendyffryn and the Camping Site on the west side of Glan yr Afon Road, although the natural landform provides some visual screening.

- 3.3.18 A 1.5 km long single-carriageway link road will connect the new grade separated junction at 16A with Conwy Road and provide a more direct route that avoids taking A55 traffic through Dwygyfylchi. This new link road would run parallel to the A55 but loop to the south of the Puffin service area and cut through fields currently used for informal recreation or for agricultural grazing. The link road would extend eastwards through the fields between the A55 and Ysguborwen Road at a similar level to the dual carriageway with a cutting slope on the south side. At Maes y Llan the link road would occupy the narrow strip of ground separating the most northerly houses in that estate from the A55, but at the lower level of the dual carriageway. The proximity of the link road to the houses would result in increased traffic noise. The loss of roadside vegetation would also mean the traffic on the A55 would be more visible. Continuing eastwards the link road would return to the line of the A55 to pass through farmland before reaching the proposed grade separated junction at 16A. The link road would be roughly at ground level through the farmland with traffic more visible from some residential properties in Dwygyfylchi and from the Camping Site on the west side of Glan yr Afon Road, although the natural landform and distances involved would provide some visual screening.
- 3.3.19 Approximately 150 m east of Junction 16, Ysguborwen Road will meet the link Road at a 'T' junction. At Junction 16A, Glan yr Afon Road would also meet the link road at a 'T' junction. Measures would be taken to encourage traffic to use the link road rather than driving through Dwygyfylchi along Glan yr Afon Road and Ysguborwen Road.

#### **Junction 16 Option B**

- 3.3.20 The dual carriageway would be moved southwards as described in Paragraph 3.4.6. The former Junction 16 roundabout would be removed and replaced with slip-roads providing four-way movements. Westbound on and off slip-roads would be provided at grade on the site of the roundabout. Eastbound slip roads would rise on embankments 6 m high to meet at a 'T' Junction 300m to the east of the roundabout and cross the dual carriageway on a bridge. Continuing southwards from the bridge on an embankment the short road link would meet Ysguborwen Road at a 'T' junction. Junction 16A would remain unchanged. The embankments would be visible from residential properties on Ysguborwen Road, Maes y Llan and from some pitches in Tyddyn Du Touring Caravan Park.

#### **Junction 16 Option C**

- 3.3.21 The dual carriageway would be moved a short distance southwards. The former Junction 16 roundabout would be removed and westbound on and off slip-roads provided at grade. The dual carriageway would be raised above the existing level by 4.5 m so that the road surface and the traffic on it would be elevated into view from surrounding viewpoints. A slip-road would pass under the A55 in a 4.5 m deep cutting and then climb to join the eastbound carriageway. Due to constraints on space an eastbound off slip-road would not be possible, so this junction would only provide three-way movement.

- 3.3.22 The northern strip of the garden to the Oasis Centre would be taken to allow space for the alignment of Ysguborwen Road to be lowered into cutting so that the slip road could pass under the dual carriageway with adequate headroom.

#### **Option 16 Option D**

- 3.3.23 The dual carriageway would be moved a short distance southward. The former Junction 16 roundabout would be removed and westbound on and off slip-roads provided at slightly lower than the existing situation. The dual carriageway would be lowered too, so that the cutting slope would take much of the land currently separating the A55 and the Ysguborwen Road. An east bound on slip-road would be accessed at a 'T' junction from Ysguborwen Road and cross over the A55 on a bridge 6 m above the current ground level and then descend on embankment to join the eastbound carriageway. Due to constraints on space an eastbound off slip-road would not be possible, so this junction would only provide three-way movement.
- 3.3.24 The northern strip of the garden to the Oasis Centre would be taken to allow space for the alignment of Ysguborwen Road to be lowered into cutting so that the slip road could pass under the dual carriageway with adequate headroom.

### **3.4 Statutory Consultation on the Options**

- 3.4.1 Over a 12-week period from 4 June 2018 to 28 August 2018 the public were consulted on the Options described above. Information on the options, including plans, was set out in a brochure. The brochure, general project information, and a questionnaire were displayed on the Welsh Government website for the duration of the consultation period. The consultation was publicised using posters, press releases and letters to local premises. Key stakeholders were separately invited to provide their views.
- 3.4.2 To ensure the maximum public exposure, three public exhibitions were held on 12 June 2018 to 14 June 2018 in Dwygyfylchi, Penmaenmawr and Llanfairfechan. Each event was open to the public from 10:00 until 20:00. The BBC and ITV news, and the North Wales Chronicle and North Wales Pioneer, reported on the exhibitions.
- 3.4.3 Those who attended could view the options on large display boards which were supplemented with visualisations. The Project Team attended the events to discuss the various options and any concerns raised by members of the public. Paper versions of the consultation document and questionnaires were available at these events. Copies were also deposited in some key locations within the local communities.
- 3.4.4 A total of 738 people attended the public consultation exhibitions. A total of 362 completed questionnaires were received. Responses were also received from members of the public and other key stakeholders including the Conwy County Council, Penmaenmawr and Llanfairfechan Town Councils, North Wales Fire Service, North Wales Police, North and Mid-Wales Trunk Road Agent, Network Rail, Bus operators, Natural Resources Wales, Sustrans, Cycling UK, Dwr Cymru Welsh Water, and Movement Along Welsh Routes.
- 3.4.5 Further meetings and presentations in the form of 3D visualisations were held during September 2018, giving more detail on the junction options to provide a better understanding of the likely effects. Three events were held, where the visualisations were presented, one for Llanfairfechan Town Council, a second for a group of residents in Llanfairfechan and the third was a public meeting in Dwygyfylchi.

- 3.4.6 Analysis of the questionnaires and other responses shows that there is support for improvements along the A55 Junctions between Junction 14 and Junction 16A in particular improvements to Junction 15 and Junction 16. However, there is no clear consensus regarding the preferred options i.e. there are some differences of opinion from the public responses and key stakeholders organisations in terms of preferred options.
- 3.4.7 The various consultations and responses from stakeholders to public exhibitions, has shown that there is support for an improvement to solve the transport problems at Junctions 16, with most respondents viewing the removal of the roundabouts as important to improving the transport network in the area.
- 3.4.8 The preferred option has been selected following a rigorous assessment of each. These included appraisal against the Project Objectives (set out in Chapter 2, Section 4). The preferred option must also satisfy performance requirements set out in Welsh Transport Appraisal Guidance 2017, which include the:
- A. Ability of the option to prevent, or solve the problem now and in the future;
  - B. Ability of the option to meet the objectives set and improve the social, cultural, environmental and economic well-being of Wales;
  - C. Short and longer-term impacts of the options in delivering multiple benefits across the four aspects of well-being and to maximise contribution to all seven well-being goals;
  - D. Deliverability of the options; and
  - E. Robustness to uncertainty and potential to drive long lasting change.
- 3.4.9 Based on the questionnaire responses and key stakeholder engagement, there is no clear consensus in favour of any single option at the junction, but key concerns were identified in the responses from key stakeholders and organisations, local communities and the public and these have also been taken into consideration.
- 3.4.10 The preferred Option A for Junctions 16 performs best when measured against the project objectives and the WelTAG criteria and addresses stakeholder concerns in the following ways:
- A. By providing four-way traffic movements as recommended by key stakeholders, including NMWTRA, Emergency Services and the Bus Operators that regularly operate on the A55, thus comparing favourably against Options C and D.
  - B. By significantly improving network resilience as compared to Options B, C and D, by providing a new parallel link road between Junction 16 and 16A.
  - C. By providing the greatest opportunities for social and environmental benefit when compared to Options B, C and D. Examples being the opportunity to develop public open spaces, that will tie in with the existing network.
  - D. By minimising the overall visual impact of the new junction on both Penmaenmawr and Dwygyfylchi, as compared to the impact on the scheme that would occur if Option B was chosen.
  - E. By Providing habitat enhancements and forming a new wildlife corridor.
  - F. By delivering significant opportunities to promote active travel, including the creation of a new circular route, which will intercept existing footpaths and provide improved access to the Sustrans NCN Route 5 and the coast, so encouraging healthier lifestyles.
  - G. By reducing the traffic impact on Glan yr Afon Road and Ysguborwen Road as compared to other options, in particular Option B.
  - H. By minimising the impact on the Menai Strait and Conwy Bay Special Area of Conservation, as compared to Option B.

### **3.5 Minister for Economy and Transport's Decision**

- 3.5.1 The Preferred Route was announced by the Minister in April 2019, having taken into account the technical, social, economic and environmental aspects of the scheme and the outcome of the Public Consultation, the Cabinet Secretary decided to adopt Junction 16 Option A to address the transport problems identified in the A55 Junctions 15 and 16 Improvements project. A requirement to develop a junction arrangement through further preliminary design to minimise the need to demolish property and minimise impact on the local area was included. A TR111 Plan was published to protect the entire Junction 16 Option A route for planning purposes. The TR111 plan shows the Preferred Route as a broad black line. This is indicative only and may change slightly during the next stage of design.
- 3.5.2 The Minister stated that by publishing a TR111 plan, 'we protect the route/options under the Town and Country Planning (General Development Procedure) Order 1995. This means that the Local Planning Authority will refer to the Welsh Government all future planning applications that are near the Preferred Route/Options. You may inspect the TR111 plan at the offices of Conwy Council, Conwy and at the WG Offices in Llandudno Junction, Conwy.

*In certain circumstances, any owner having difficulty selling property on the line of the route may apply for blight. If any case meets set criteria, we will purchase the property.*

*The protection of the preferred route/options does not commit us to the line/layout of that route/option. We are only committed once the Line Order/Slip Road Orders are made, described in the next section "What happens next".*

- 3.5.3 The Preferred Route, Option A, has already been described in Chapter 2.

### **3.6 Changes to the Design of the Local Road Network at Junction 16**

- 3.6.1 In December 2020 a consultation with Conwy County Council led to consideration of a new layout for the design of the junction between the slip roads, Ysgyborwen Road and the proposed new link road. A roundabout was proposed instead of a 'T' junction. The change had the benefit that the junction would occupy a narrow strip of land on the south side of the dual-carriageway without requiring further cutting into the hill slope to the south. There would be no effect on the amount of traffic but the roundabout would allow more free-flowing movements.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 4 METHODOLOGY**

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## 4. ENVIRONMENTAL IMPACT ASSESSMENT METHOD

### 4.1 Chapter Introduction

- 4.1.1 This chapter of the Environmental Statement (ES) sets out the approach taken in undertaking the Environmental Impact Assessment (EIA) of the proposed Scheme. The chapter describes the overall approach to the assessment of the likely effects of the Scheme proposals. It also includes details of consultation undertaken with statutory environmental bodies and key stakeholders during the assessment process. The EIA assesses the likely impact of the scheme proposals on several environmental topics. Further details of the environmental topics and any specialist methods used in the assessment are provided in each topic chapter of this ES.

### 4.2 Legislative Framework

#### Environmental Impact Assessment (EIA)

- 4.2.1 The legislative framework for EIA is set by the EIA Directive (2014/52/EU) that came into force in May 2014. The regulations to transpose the 2014 Directive for projects under the Highways Act came into force on 5 December 2017 under The Environmental Impact Assessment (Miscellaneous Amendments relating to Harbours, Highways and Transport Regulations 2017). The main changes to the Directive include revisions to how screening and scoping are undertaken and the requirements for a Screening Report that sets out the likely significant effects as well as outlining any mitigation measures. The Directive also requires new topics to be considered in the EIA process and that competent experts with sufficient expertise are used in the preparation of the ES.
- 4.2.2 As set out in Chapter 1 Introduction of this ES, there is no statutory provision to the form of an ES. Section 105A of the Highways Act states that the ES must contain the information referred to in Annex IV of the EIA Directive 2014/52/EU. Annex IV is included in Appendix 4.1. That information must include at least<sup>1</sup>:
- A. a description the site, design, size and any other relevant features of the project.
  - B. a description of the likely significant effects of the project on the environment.
  - C. a description of the features of the project or measures envisaged to avoid, prevent or reduce and, if possible, offset any likely significant effects of the project on the environment.
  - D. a description of the reasonable alternatives studied by the project authority which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, considering the effects of the project on the environment.
  - E. a non-technical summary of the information mentioned in paragraphs (A) to (D); and
  - F. any additional information specified in Annex IV that is relevant to the specific characteristics of the project, or type of project, and to the environmental features likely to be affected.
- 4.2.3 This ES provides the information required by the Highways Act 1980 together with other relevant information listed in the EIA Directive (as amended). Together, the information supplied within this ES is considered to provide a clear understanding of the likely significant effects of the Scheme on the environment.

<sup>1</sup> EIA Regulations 2017; Schedule 2 Amendments to the Highways Act 4(4)



### **Assessment of Impacts on European Sites (AIES)**

- 4.2.4 In accordance with Regulation 63 of the Conservation of Habitats and Species Regulations 2017 and the Habitats Directive (92/43/EEC), an Assessment of Implications on European Sites (AIES) has also been prepared to consider the possible effects of the Scheme on European sites. The findings of the AIES are reported separately.

### **Water Framework Directive**

- 4.2.5 In accordance with the Water Framework Directive<sup>2</sup>, an assessment of effects on Water Framework Directive watercourses has been undertaken and is provided in Appendix 7.1 of this ES.

## **4.3 EIA Screening (Determination)**

- 4.3.1 EIA is an iterative process that evolves alongside a development proposal. The process occurs in a series of steps, which include screening, scoping, assessment and reporting. Screening and Scoping, which are the first steps, are described here.
- 4.3.2 EIA is a means of identifying and collating information to inform an assessment of the likely significant environmental effects of a project. The process requires consideration of the likely changes to the environment as a result of the project, through comparison with the existing and likely future baseline conditions in the absence of the proposed scheme.
- 4.3.3 The requirement to complete a statutory Environmental Impact Assessment (EIA) and publish an Environmental Statement only applies to certain projects that are deemed to exceed certain thresholds and are predicted to have a significant effect on the environment. The process for deciding whether it is necessary to carry out an EIA and publish an Environmental Statement (ES) is called Screening.
- 4.3.4 DMRB (2008) Volume 11 Environmental Assessment Section 2 Environmental Impact Assessment Part 3 'Screening of Projects for Environmental Impact Assessment (HD47/08) sets out four steps to appropriate screening. These are summarised in Table 4.1.<sup>3</sup> DMRB is being updated over the course of late 2019 and 2020 and these changes will affect the screening process in the future. For Junction 16 screening was conducted before the new guidance was published, but the method applied to the project accords with the additional requirements set out in the new EIA Directive (2014/52/EU).

A screening exercise was undertaken in 2018 and 2019 to establish if the project falls within the thresholds of an Annex I or II project and if it is classified as a Relevant Project as set out in Table 4.1. The Record of Determination (RoD) concludes that the project is classified as an EIA development and determined that a Statutory Environmental Impact Assessment is required. The primary reasons for this determination is that:

- A. the project lies adjacent to Natura 2000 sites.
- B. the eastern section of the project lies partly within the Snowdonia National Park, a designated area and.

<sup>2</sup> The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

<sup>3</sup> DMRB Volume 11 Section 2 Part 3 HD 47/08 paras 1.6 – 1.20

- C. there is the potential for the project to have significant effects on several environmental topics including ecology, cultural heritage, landscape and townscape, motorised and non-motorised users and community facilities.

- 4.3.5 During the Screening exercise it was identified that because the schemes were geographically separate with no connecting Line Order a separate statutory process would be required for each junction improvement. For this reason, to maintain the separation of legal procedures a separate ES would have to be prepared for each junction. As a result, the junctions have become two Schemes with their own sets of Draft Orders, ES and AIES.

**Table 4.1: The steps to screening a project**

Requirements of Screening	Result for this Scheme
<b>Step 1</b> Deciding if the Project Falls within Annex I or II of the EIA Directive	The Scheme falls below the Annex II because it would not involve the construction of a motorway or express road of four or more lanes, nor would it constitute a realignment or widening of a two-lane road or less to provide four lanes over a continuous length of 10 km.
<b>Step 2</b> Deciding if the Annex II Project is a 'Relevant Project'	The scheme exceeds the Annex II threshold of 1 hectare and is therefore a 'Relevant project' for constructing or improving a highway where the area exceeds 1 hectare or where any such area is situated in whole or in part in a sensitive area.
<b>Step 3</b> The Determination of a 'Relevant Project' for the Purposes of the EIA Regulations	Based on the criteria set out in Annex III an assessment of the Scheme indicates that the Scheme is considered likely to significant effects on the environment The focus of the determination is based on the question 'Is the project being considered likely to have a significant effect on the environment?'
<b>Step 4</b> Reporting the Determination	A Record of Determination (RoD) has been prepared based on the results of the screening assessment.

- 4.3.6 A copy of the Screening Report and Record of Determination is included in Appendix 4.2 and 4.3.

## 4.4 EIA Scoping

- 4.4.1 The screening exercise determined that an EIA is required, and this is recorded in the RoD referred to above and included in Appendix 4.4. The next step of the EIA process is to clearly define the scope and contents of the EIA.
- 4.4.2 The process of identifying the matters to consider within the EIA process is known as scoping. Scoping is an important preliminary procedure which sets the context for the EIA. DMRB Volume 11 Section 2 Part 4 (HA 204/08) "*Scoping of Environmental Impact Assessments*" provides guidance on the scoping a project<sup>4</sup>. "*Scoping can be an internal process and an external activity in which stakeholders are engaged in defining the assessment activities*".<sup>5</sup> DMRB is being updated over the course of late 2019 and 2020 and these changes will affect scoping in the future. For Junction 16 scoping was conducted before the new guidance was published, but the method applied to the project accords with the additional requirements set out in the new EIA Directive (2014/52/EU).

<sup>4</sup> Volume 11 Section 2 Part 4: HA 204/08

<sup>5</sup> Volume 11 Section 2 Part 4: HA 204/08 para 1.3

- 4.4.3 The results of the scoping exercise are reported and used to provide the basis for further assessment throughout the project. The preparation of a Scoping Report is how the scope of the EIA is clearly defined and agreed with key stakeholders and Statutory Environmental Bodies (SEBs) often through the forum of an Environmental Liaison Group (ELG).

### **Environmental Liaison Group Meetings (ELG)**

- 4.4.4 The ELG is an ideal forum where environmental issues associated with the Scheme can be discussed and the scope of the EIA agreed with SEBs and key stakeholders. The inaugural meeting of the ELG for the A55 Junctions 15 and 16 Improvements was held on 9 May 2018.
- 4.4.5 A copy of the Scoping Report is provided at Appendix 4.3 of this ES. The purpose of the Scoping Report is to identify the proposed scope of the EIA process and to set out the proposed assessment methodologies for comment. It also identifies aspects proposed to be scoped out of the assessment.
- 4.4.6 This ES considers the legislative requirements, the nature, size and location of the Scheme, the responses provided by consultees, and includes the information required by the EIA Regulations 2017. Together, the information supplied within this ES is considered to provide a clear understanding of the main or likely significant effects of the Scheme on the environment.

### **Content of the Environmental Statement**

- 4.4.7 Based on the scoping report and the requirements of the Design Manual for Roads and Bridges (DMRB), the volumes and sections that make up the content of this ES is set out in Table 4.2 below:

**Table 4.2: Scope of this Environmental Statement (ES)**

<b>Non-Technical Summary: Summary of this ES using non-technical language</b>	
<b>Volume 1 : Environmental Statement</b>	
<b>Chapter</b>	<b>Title of Chapter</b>
1.0	Introduction
2.0	Scheme Description
3.0	Assessment of Alternatives
4.0	EIA Methodology
5.0	Legislation and Policy Context
<b>Chapter</b>	<b>Environmental Topics</b>
6.0	Geology and Soils
7.0	Road Drainage and Water Environment
8.0	Nature Conservation (Biodiversity)
9.0	Landscape and Visual
10.0	Archaeology and Cultural Heritage
11.0	Community and Private Assets (including Agricultural and land use)
12.0	Air Quality

<b>Non-Technical Summary: Summary of this ES using non-technical language</b>	
<b>Volume 1 : Environmental Statement</b>	
<b>Chapter</b>	<b>Title of Chapter</b>
13.0	Noise and Vibration
14.0	All Travellers
15.0	Materials
16.0	Climate Change
17.0	Risks of Accidents or Disasters
18.0	Population and Human Health
19.0	Cumulative Effects
20.0	Management of Environmental Effects
21.0	Conclusions
22.0	Glossary
<b>Volume 2 : Figures</b>	
Including all figures and drawings to accompany the text	
<b>Volume 3 : Appendices</b>	
Including specialist reports forming technical Appendices to the main text in Volume 1	

## 4.5 EIA Regulations 2017 – Additional Environmental Topics

- 4.5.1 In addition to the standard range of environmental topics covered in DMRB Volume 11<sup>6</sup>, the EIA Regulations 2017 that implement the EU Directive 2014/52/EU require additional topics to be considered as part of the EIA. Welsh Government guidance sets out how the topics are to be addressed in the ES within the framework established in DMRB Volume 11. DMRB is being updated over the course of late 2019 and 2020 and these changes will affect the content and scope of future EIA. For Junction 16 the EIA addresses the additional requirements set out in the new EIA Directive (2014/52/EU)

### Assessments of Material Assets

- 4.5.2 Annex IV of the EIA Directive includes reference to 'material assets'. The phrase 'material assets' has a broad scope, which may include assets of human or natural origin, valued for socio-economic/ community or heritage reasons. Material assets are in practice considered across the range of standard DMRB topic areas within the ES. Materials associated with construction are considered in Chapter 15 Materials, therefore, no separate consideration of material assets is considered necessary.

<sup>6</sup> DMRB Volume 11 Section1 Part 1 HA 200/08 Table 1.1 Structure of DMRB Volume 11 Environmental Statement

## Climate Change

- 4.5.3 The 2017 amendments to the EIA Directive place an emphasis on climate change and the likely significance effects of the project on climate and the vulnerability of the project to climate change. Although the provisions of Directive 2011/92/EU remain the relevant consideration for the Scheme, the requirements of the amended Directive in relation to climate change were considered, as a matter of best practice. Predicted changes to future environmental conditions and climate change is set out within each ES chapter where appropriate. Resilience to climate change was considered during design, particularly regarding future flood risk (Chapter 7) and air quality (Chapter 12).
- 4.5.4 Effects of the Scheme on Climate has also been considered through an assessment of atmospheric emissions associated with use of the Scheme. A carbon assessment was undertaken and is reported in Chapter 16 Climate Change. This report sets out carbon emissions associated with the construction and operation of the Scheme.

## Assessments of Radiation and Heat

- 4.5.5 The EIA Regulations require a description of the likely significant effects of the project on the environment resulting from the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances and the disposal and recovery of waste.<sup>7</sup>
- 4.5.6 Given the nature of the Scheme, no significant radiation or heat effects are anticipated, and these effects were scoped out of the assessment. Other emissions referred to above are covered under the other relevant environmental topics.

## Risk of Major Accident and Disaster

- 4.5.7 Scoping identified that accidents or disasters that caused the closure of the road, could isolate communities that rely on the A55 corridor for access to the road network and to public and emergency services. The Scheme is located on the coast and close to watercourses and coastal protection measures could influence flood risk which could close the A55 or affect land and communities nearby. It is considered necessary to examine the potential risk of major accidents and disasters in Chapter 17.

## Assessments of Population and Human Health

- 4.5.8 The 2017 EIA Regulations 7A(a)<sup>8</sup> state that an EIA should consider the likely significant effects and risks of a project on population and human health. An assessment of the health impacts associated with the Scheme was undertaken. This assessment is discussed in ES Chapter 18 Population and Human Health.
- 4.5.9 Health Impact Assessment (HIA) and Equality Impact Assessment (EqIA) are a key part of the appraisal process for major transport schemes in Wales. The Welsh Government has statutory duties to promote well-being and racial, disability and gender equality. Public Health Wales has published their Long-Term Strategy (2018 to 2030), entitled 'Working to Achieve a Healthier Future for Wales'<sup>9</sup>, to improve the quality and length of life for all members of the community.

<sup>7</sup> The Environmental Impact Assessment Regulations 2017 5(1)(c)

<sup>8</sup> The Environmental Impact Assessment Regulations 2017 7A(a)

<sup>9</sup> Public Health Wales, Long Term Strategy 2018-30, available at:

([http://www.wales.nhs.uk/sitesplus/documents/888/Long%20Term%20Strategy\\_English\\_single%20pages%20%28print%20version%20191118%29.pdf](http://www.wales.nhs.uk/sitesplus/documents/888/Long%20Term%20Strategy_English_single%20pages%20%28print%20version%20191118%29.pdf))

Social Impact Assessment (SIA) is often developed as an independent SIA report; however, social, health and equality impacts are intrinsically linked and reported in ES Chapter 18 Population and Human Health.

- 4.5.10 A combined assessment covering health, social and equalities effects has therefore been undertaken for the Scheme. This assessment considers how the Scheme may influence public health and well-being in the areas surrounding the proposed road improvement through environmental and socio-economic pathways. The assessment also considers, where possible, the distribution of impacts and any potential disproportionate impacts of the Scheme on sensitive community groups.

## 4.6 Environmental Assessment Methodology

### Relevant EIA Guidance

- 4.6.1 The relevant EIA guidance has been followed and documents listed below referred to in undertaking the EIA and the preparation of the ES. While DMRB 2008 has been withdrawn since this assessment was carried out, the advice it contains remains relevant and useful. The application of the 2008 and 2019 versions of DMRB are set out in Chapter 1 of this ES.
- 4.6.2 The references below are to general guidance and do not refer to specific guidance referred to under specific environmental topic areas.

**Design Manual for Roads and Bridges (DMRB) Volume 11, Section 1** Aims and Objectives of Environmental Assessment HA 200/08 (Highways Agency et al., 2008a, as amended).

**DMRB Volume 11, Section 2** General Principles of Environmental Assessment, including HA 201/08, HA 202/08, HA 204/08, HA 205/08 and HD 48/08 (Highways Agency et al., 2008 b, c, d, e, f).

**DMRB Volume 11 Section 4 Part 1:** Assessment of Implications (of highway and road projects) on European Sites (including Appropriate Assessment HD 44/09).

**Interim Advice Note 125/09(W) Supplementary Guidance** for Users of DMRB Volume 11 'Environmental Assessment'. Wales Only (Welsh Assembly Government, 2010).

**Guidelines for Environmental Impact Assessment** (Institute of environmental Management and Assessment 2004).

**The State of Environmental Impact Assessment Practice in the UK.** Special Report (Institute of Environmental Management and Assessment, 2011).

**Environmental Impact Assessment Guide to Delivering Quality Development** (IEMA July 2016).

- 4.6.3 Other topic specific legislation and good practice guidance has been considered and details of these can be found in the topic chapters within this ES.

## 4.7 Assessment Methodology for each Environmental Topic (Factor)

- 4.7.1 The assessment of each environmental topic forms a single chapter within this ES, and will contain details of:

- A. Legislation and policy context relevant to the topic;
- B. Assessment method used.
- C. Description of the baseline environmental conditions including any predicted changes to future environmental baseline conditions;
- D. Identification of potential environmental effects including:
  - i. Permanent and temporary impacts;
  - ii. Direct, indirect and secondary impacts;
  - iii. Cumulative impacts;
  - iv. Effects arising during the construction and operational phases;
  - v. Identification of mitigation and monitoring measures, where appropriate;
  - vi. Evaluation and assessment of the significance of identified effects and;
  - vii. Legislation and policy relevant to the topic
- E. Identification of mitigation and monitoring measures
- F. Evaluation and assessment of the significance of identified effects

- 4.7.2 Legislation and National and Local Planning Policies relevant to the particular environmental topic will be reviewed and referenced. General policies that are not specific to an environmental topic will be covered in Section 5 Legislative and Policy Context.

#### **Assessment Method Used**

- 4.7.3 Each topic chapter provides details of the methodology for baseline data collection and the approach to the assessment of effects. Each environmental topic has been considered by a specialist in that area. The identification and evaluation of effects has been based on the information set out in the Scheme description and *construction* details contained within Chapters 2 and 3 of this ES, EIA good practice guidance documents and relevant topic specific guidance where available.
- 4.7.4 Cumulative effects with other proposed developments and inter-relationships between topic areas are assessed within Chapter 17 of this ES.

### **4.8 Identification of the Baseline Environmental Conditions**

- 4.8.1 An ES requires enough data to form the basis of the assessment. Each topic chapter includes a description of the current (baseline) environmental conditions. This is based on the study area identified for each topic chapter. Where appropriate, study areas have been agreed in consultation with statutory consultees. In some instances, more than one study area has been defined in accordance with relevant standards and guidance for that topic.
- 4.8.2 The following scenarios have been considered (without the Scheme), in the relevant assessments, for comparison against the situation with the Scheme in place. These could include:
- A. The existing baseline conditions at the time of survey/ writing (2017-2019) depending on the availability of existing data and new surveys;
  - B. During construction (Spring 2022);
  - C. Opening Year that follows completion of the Junction improvement works, when the scheme would be open to traffic – Summer 2023;
  - D. Design Year, 15 years after opening – Spring 2038.

- 4.8.3 Baseline data has been obtained from existing sources (including published and unpublished data sources, surveys by others), from surveys commissioned specifically for the Scheme, or both. Future baseline scenarios have been informed by extrapolation of the currently available data by reference to, for example, Government policy, other planning applications, climate change and expert judgement of the individual topic specialists. Clearly the more distant a future baseline is, the greater the uncertainty is in relation to the conditions that would pertain at that time.
- 4.8.4 A programme of surveys for the Scheme were carried out between October 2017 and Autumn 2019 to provide additional data for the design and the EIA. These included noise and air quality baseline surveys, further ecological surveys, summer and winter landscape and visual surveys, ground investigation, non-invasive archaeological investigations, farm surveys and interviews, non-motorised users and traffic surveys and water resources surveys.
- 4.8.5 Each topic chapter identifies the limitations of the assessment and whether there were any difficulties encountered in compiling the information that is presented in this ES.

## 4.9 Assessment Environmental Effects

- 4.9.1 The EIA process requires the identification of the likely significant environmental effects of the Scheme. This includes consideration of the likely effects during the construction and operational phases.
- 4.9.2 Volume 11, Section 2 of the DMRB (HA 205/08 para 2.3)<sup>10</sup> provides guidance on the determination of significance of environmental effects for highway schemes. This includes consideration of the following, which are discussed in the following sections:
  - A. Assigning Environmental value (or sensitivity) of a resource or receptor;
  - B. Assigning magnitude of impact;
  - C. Assigning significance;
  - D. Cumulative Effects.

## 4.10 Sensitivity or Value of Receptors

- 4.10.1 'Receptors' are defined as '*individual environmental features that have the potential to be affected by a scheme*'<sup>11</sup>. For each topic, baseline studies have informed the identification of potential environmental receptors. Some receptors will be more sensitive to certain environmental effects than others. The sensitivity or value of a receptor may depend, for example, on its frequency, extent of occurrence or conservation status at an international, national, regional or local level.
- 4.10.2 Sensitivity is defined within each ES topic chapter and considers factors including the following:
  - A. Vulnerability or susceptibility of the receptor to change;
  - B. Recoverability of the receptor (ability to recover from a temporary impact);
  - C. Importance of the receptor.
- 4.10.3 The assessment process examines how the proposed Scheme will impact on environmental receptors (people, heritage, air, water soils and species). Each receptor will have been identified in baseline surveys and desk studies and is given a value based on rarity or sensitivity to change. As a general guide, the definitions set out in Table 2.1 of HA205/08 have been taken into account

<sup>10</sup> The updated DMRB sets out this advice in LA104

<sup>11</sup> DMRB Volume 11 Section 2 Part 7 HA 218/08 Glossary of Terms



except where topic guidance requires otherwise. This includes a five-point scale for assigning environmental sensitivity as shown in Table 4.3.

**Table 4.3 Environmental Sensitivity (or value) and Typical Descriptors**

Environmental Sensitivity	Typical Descriptors
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale and limited potential for substitution.
Medium	High or Medium importance and rarity, regional scale, limited potential for substitution.
Low (or lower)	Low or medium importance and rarity, local scale.
Negligible	Very Low importance and rarity, local scale.
Based on Table 2.1 of HA205/08 (Highways <i>et al.</i> , 2008e)	

#### 4.11 Magnitude of Impact

- 4.11.1 The DMRB defines an 'Impact' as: 'Change that is caused by an action; for example, land clearing (action) during construction which results in habitat loss (impact)' (Highways Agency *et al.*, 2008g).
- 4.11.2 For each topic, the likely environmental impacts have been identified. The likely environmental change arising from the Scheme has been identified and compared with the baseline (the situation without the Scheme). Impacts are divided into those occurring during the construction and operation phases.
- 4.11.3 The categorisation of the magnitude of impact is topic specific but generally considers factors such as:
- A. Extent (Area and distance);
  - B. Duration (how long a time it will last);
  - C. Frequency (how often will it occur);
  - D. Reversibility (will the effect be undone or repaired).
- 4.11.4 When undertaking an EIA, environmental impacts are classified as either permanent or temporary, as appropriate. 'Permanent' changes are those which cannot be reversed (e.g. permanent land take) or will last for the foreseeable future (e.g. noise from generated road traffic). 'Temporary' are short term impacts that can be reversed. Within the assessments applied in this ES the following has been used as a guide, unless defined separately within the topic assessments:
- Short-term:** one to three years;
  - Medium-term:** four to nine years;
  - Long-term:** greater than nine years.
- 4.11.5 Impacts are also defined as either 'Adverse' or 'Beneficial'. Depending on discipline, they may also be described as:

**Direct:** Arise from activities associated with the Scheme. These tend to be either spatially or temporally concurrent.

**Indirect:** Impacts on the environment that are not a direct result of the Scheme, often produced away from the Scheme or as a result of a complex pathway.

- 4.11.6 Where environmental impacts are described as 'Episodic', the Frequency of the episodes have been predicted in the assessment.
- 4.11.7 The magnitude of the impact is ascribed to a receptor where it is influenced by the Scheme (see Table 4.3). For example, an area of habitat might be unaffected, partially affected or destroyed.
- 4.11.8 As a general guide, the definitions set out in Table 2.2 of HA205/08 have been considered (except where topic guidance requires otherwise). This includes a five-point scale for assigning impact magnitude as shown in Table 4.4.

#### 4.12 Significance of Effects

- 4.12.1 The approach to assigning the significance of an effect relies on professional judgement of the environmental topic specialist. Assigning each effect to one of the five significance categories enables different topic issues to be placed upon the same scale. The significance categories are set out in Table 4.5 below from HA205/08 Table 2.4.
- 4.12.2 The DMRB<sup>12</sup> defines an 'effect' as a 'term used to express the consequence of an impact (expressed as 'significance of effect'), which is determined by correlating the magnitude of the impact to the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria. For example, land clearing during construction results in habitat loss (impact), the effect of which is the significance of the habitat loss on the ecological resource' (Highways Agency *et al.*, 2008g).
- 4.12.3 The magnitude of impact on a receptor is combined with the value/ sensitivity/ importance of that receptor to determine the significance (see Table 4.6). For example, a significant effect may arise as a result of a relatively modest impact on a resource of national value/ sensitivity, or a large impact on a resource of local value/ sensitivity. In broad terms, therefore, the significance of the effect can depend on both the impact magnitude and the value or sensitivity of the receptor.
- 4.12.4 An 'effect' is therefore the consequence of an impact (expressed as the 'significance of effect'). This is identified by considering the magnitude of the impact and the sensitivity or value of the receptor. This is reported using the matrix set out in Table 4.5.

<sup>12</sup> DMRB Volume 11 Section 2 Part 7 HA 218/08 Glossary of Terms used in Volume 11, Sections 1 and 2

**Table 4.4: Five-point scale for assessing Magnitude of Impact**

Magnitude of Impact	Typical Descriptors
Major	<p><b>Adverse:</b> loss of resource and/ or quality and integrity of resource; severe damage to key characteristics, features or elements.</p> <p><b>Beneficial:</b> large scale or major improvement of resource quality, extensive restoration or enhancement; major improvement of attribute quality.</p>
Moderate	<p><b>Adverse:</b> loss of resource but not adversely affecting integrity; partial loss or damage to key characteristics, features or elements.</p> <p><b>Beneficial:</b> to, or addition of key characteristics, features or elements; improvement of attribute quality.</p>
Minor	<p><b>Adverse:</b> some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.</p> <p><b>Beneficial:</b> minor benefit to or addition of one (maybe more) key characteristics, features or elements; some beneficial impact on attribute, or a reduced risk of negative impact occurring.</p>
Negligible	<p><b>Adverse:</b> very minor loss or detrimental alteration to one or more characteristics, features or elements.</p> <p><b>Beneficial:</b> very minor benefit or positive addition of one or more characteristics, features or elements.</p>
No change	<b>Adverse/beneficial:</b> no loss or alteration of characteristics, features or elements, no observable impact in either direction.
Based on Table 2.2 of HA205/08 (Highways et al., 2008e)	

**Table 4.5: Arriving at the Significance of Effect Categories**

		MAGNITUDE OF IMPACT				
		No Change	Negligible	Minor	Moderate	Major
ENVIRONMENTAL SENSITIVITY (VALUE)	Very High	Neutral	Slight	Moderate Large	Large Very Large	Very Large
	High	Neutral	Slight	Slight Moderate	Moderate Large	Large Very Large
	Medium	Neutral	Neutral Slight	Slight	Moderate	Moderate Large
	Low	Neutral	Neutral Slight	Neutral Slight	Slight	Slight/Moderate
	Negligible	Neutral	Neutral	Neutral Slight	Neutral Slight	Slight

**Table 4.6: Descriptors of the Significance of Effect Categories**

<b>Significance Category</b>	<b>Typical Descriptors of Effect</b>
Very Large	Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of International, National or Regional Importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may enter this category.
Large	These beneficial or adverse effects are likely to be very important considerations and are likely to be material in the decision-making process.
Moderate	These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
Slight	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.
Based on Table 2.3 of HA205/08 (Highways Agency <i>et al.</i> , 2008e)	

- 4.12.5 Each chapter defines the approach taken to the assessment of significance. Where appropriate, topic chapters have adopted the general approach set out in DMRB HA 205/08 (see Table 4.5). The evaluation of significance for each topic will consider industry and professional guidance; codes of practice; policy objectives regulations or standards; advice from statutory consultees and other stakeholders, as well as expert judgement of the EIA practitioners, based on specialist experience. For some topics, a simplified or quantitative approach is considered appropriate.
- 4.12.6 Where more than one significance level is provided, professional judgement has been used to determine the significance of effect. Slight, moderate, large or very large effects may be beneficial or adverse.
- 4.12.7 Except where guidance requires otherwise, the significance of effect is described using the terms very large, large, moderate, slight and neutral. The broad definitions of these terms are provided in Table 4.6.
- 4.12.8 In terms of the EIA Regulations, significant effects are generally those where the significance of the effect is 'moderate' or greater. It should be noted however that, as described in Table 4.5, a significant effect in EIA terms simply means that the effect should be given careful consideration in the decision-making process.

### **4.13 Mitigation and Monitoring Measures**

- 4.13.1 DMRB Volume 11 Section 1 Part 7 (HA 218/08) defines mitigation measures as follows; 'Measures intended to avoid, reduce and, where possible, remedy significant adverse environmental effects.'

Legislation also provides the Overseeing Organisation with powers to: “acquire land for the purpose of mitigating any adverse effect which the existence or use of a highway constructed or improved by them, or proposed to be constructed or improved by them, has or will have on the surroundings of the highway. (Highways Act 1980 (as amended), Part XII, Section 246).

4.13.2 DMRB (HA 205/08 para 1.41) states that the ‘mitigation of significant adverse environmental effects should be dealt with as an iterative part of the option choice, planning and design stage. Failure to do so may result in failure to deliver the project; and failure to avoid, reduce or remedy significant adverse environmental effects, particularly where land is not secured to allow delivery or future maintenance’.

4.13.3 The DMRB (HA 218/08) defines two types of mitigation measures as essential and desirable mitigation:

**Essential mitigation:** Mitigation which the Overseeing Organisation has the statutory power to achieve.

**Desirable mitigation:** A measure considered to be environmentally beneficial but that cannot usually be achieved using statutory powers. For example, third party agreement may be required.

4.13.4 It also includes a description of enhancement as:

**Enhancement:** A measure that is over and above what is required to mitigate the adverse effects of a project. This could also be interpreted as desirable mitigation.

4.13.5 The development of mitigation and monitoring measures is part of an iterative EIA process. Measures included in the Scheme will have been developed throughout the EIA process in response to the findings of initial assessments. In some cases, these measures may result in enhancement of environmental conditions. Essential mitigation measures can include the following<sup>13</sup>:

**Primary** measures incorporated within the Scheme design sometimes referred to as embedded mitigation. These are often measures of avoidance or minimisation of adverse effects considered in the design process and that may not readily be recognisable as mitigation. These measures are a fundamental part of the design and incorporated within the scheme shown on the Environmental Masterplans (EMP).

**Secondary** additional measures identified during the EIA process to further prevent, reduce and, where possible, offset any adverse effects on the environment. These measures are supplementary to those measures in (1) above and are also shown on the EMP and best managed through the environmental management plan and is recorded in the Register of Environmental Actions and Commitments (REAC).

**Tertiary** good practice measures to be adopted during construction to avoid and minimise environmental effects, such as pollution control measures identified in a Construction Environmental Management Plan (CEMP) and monitoring to ensure that is effective. Note: The terms Primary, Secondary and Tertiary are not used in DMRB but are from IEMA<sup>14</sup>.

<sup>13</sup> IEMA Delivering Quality Development-Annex A: Classifying the three types of Environmental Impact Assessment mitigation

<sup>14</sup> IEMA Delivering Quality Development-Annex A: Classifying the three types of Environmental Impact Assessment mitigation

- 4.13.6 Some forms of mitigation require a controlling mechanism or legal undertaking to be implemented but are under the control of the 'Overseeing Organisation' and therefore are regulated and have greater certainty of delivery.

#### **4.14 Assessment of Environmental Impacts**

- 4.14.1 The purpose of an EIA is to identify and evaluate the environmental effects associated with the proposed development. These are assessed based on the magnitude of the effect (both before and following mitigation) and the sensitivity of the receiving environment.
- 4.14.2 In Wales, HA 205/08 recommends assignment of significance before and after the consideration of mitigation measures is undertaken to allow for the case or reason for, and effectiveness of mitigation to be described.<sup>15</sup>

##### **Monitoring of Mitigation**

- 4.14.3 The requirement for monitoring during construction or following completion of construction has been considered. A description of proposed monitoring measures is provided within each topic chapter of this ES. Monitoring would be reported in annual Environmental Monitoring Reports and on completion of aftercare a final environmental monitoring report will be prepared.
- 4.14.4 Mitigation and monitoring measures proposed during the construction phase are set out in the Pre-Construction Environmental Management Plan in Appendix 2.2. The REAC in Appendix 2.3 provides an overview of the key mitigation and monitoring proposed for the Scheme.
- 4.14.5 The determination of impact significance will be undertaken against the environmental baseline and be based on the significance matrix included in Table 4.5 this chapter. The section will then be presented under sub-sections:

**Impact Assessment:** with inherent and standard mitigation measures implemented;

**Residual Impact Assessment:** with inherent/ standard and actionable mitigation measures implemented;

**Cumulative Impacts** of the proposed scheme and other developments will be covered in ES Section 19.

- 4.14.6 For the purposes of the assessment, certain measures are considered to be an integral part of the Scheme and are therefore taken into consideration in the 'without mitigation' assessment. Those measures, which include careful adjustment of the vertical and horizontal alignment, for example, form part of the Scheme design are briefly mentioned within Chapter 2 and are set out within each topic chapter of this ES.

#### **4.15 Benefits of the Scheme**

- 4.15.1 Enhancements of the Scheme would go further than the conventional approach to mitigation. Normally an ES will include measures such as avoidance of an impact, or if the impact cannot be avoided, it will include appropriate mitigation measures. Enhancement goes further to improve on the circumstances that existed before the Scheme is implemented to provide benefits. The delivery of these benefits is encouraged by the following two items of legislation.

<sup>15</sup> DMRB Volume 11 Section 2 Part 5 HA 205/08 para 2.9

## Environment (Wales) Act 2016

- 4.15.2 Central to this Act is the need to adopt a new, more integrated approach to managing natural resources in order to achieve long-term sustainability and improved resilience of natural systems. The Act provides an iterative framework that ensures that managing our natural resources sustainably will be a core consideration in decision-making.
- 4.15.3 The Act includes a new biodiversity duty intended to reverse the decline and secure the long-term resilience of biodiversity in Wales.

## Enhancement (Well-Being of Future Generations (Wales) Act 2015)

- 4.15.4 Enhancement goes further than the conventional approach to planning a scheme of development. Normally an ES will include measures such as avoidance of an impact, or if the impact cannot be avoided, it will include mitigation or replacement for the consequences. Enhancement goes further to improve on the circumstances that existed before the scheme is implemented. In Wales, the Future Generations Act 2015 places a duty on public organisations to achieve seven sustainability goals.



Figure 4.1: The Well-being Goals of the Future Generations Act 2016

- 4.15.5 Part 2, Section 2 of the Act defines the relevant meaning of sustainable development; as 'the process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle, aimed at achieving the well-being goals.' Public Bodies are required to set objectives for their actions which should be 'in accordance with the 'sustainable development principle', which means the body 'must act in a manner which seeks to ensure the needs of the present are met without compromising the ability of future generations to meet their own needs'.
- 4.15.6 The Scheme will include measures, or enhancements, that will contribute to the achieving the goals. These will be separately identified. Enhancements will be separately listed in the Chapter 21 Conclusions.

## 4.16 Assessment of Cumulative Effects

- 4.16.1 EIA Directive 2011/92/EU, as amended, requires the EIA to consider cumulative effects. Cumulative effects result from multiple actions on receptors and resources over time and are generally additive or interactive (synergistic) in nature. Cumulative impacts can also be

considered as: *'...impacts resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the project.'*<sup>16</sup>

- 4.16.2 Major developments for consideration within the cumulative effects assessment were identified within the following categories:
- A. Development under construction.
  - B. Application(s) permitted but which are not yet implemented.
  - C. Submitted applications not yet determined, and which, if permitted, would affect the proposed development in the scoping request.
  - D. Development identified in the adopted and emerging development plan (with appropriate weight being given as they move closer to adoption), recognising that information on any relevant proposals will be limited.
- 4.16.3 A review of sources was undertaken. A key source of proposed developments in closest proximity to the site is the Conwy County Borough Council planning authority website to:
- A. Adopted and emerging Local Plans.
  - B. Planning Inspectorate website, to identify any Nationally Significant Infrastructure Projects in the vicinity of the Scheme.
- 4.16.4 Advice and guidance on the assessment of cumulative effects is given in HA 205/08<sup>17</sup> and HD 48/08<sup>18</sup> (Highways Agency *et al.*, 2008e and 2008f). Additionally, IAN 125/09(W) acknowledges that *'as yet there is no industry standardised approach'*<sup>19</sup> to the assessment of cumulative effects. However, the cumulative assessment should nevertheless differentiate between permanent, temporary, direct, indirect and secondary effects, positive and negative' (Welsh Assembly Government, 2010).
- 4.16.5 Relevant guidance considered during the assessment of cumulative effects includes:
- A. HA205/08 Principles of Environmental Assessment – Assessment and Management of Environmental Effects (Highways Agency *et al.*, 2008).
  - B. Welsh Assembly Government (2010) Interim Advice Note 125/09(W) Supplementary Guidance for Users of DMRB Volume 11 'Environmental Assessment' Wales Only.
  - C. Advice Note 17: Cumulative effects assessment relevant to nationally significant infrastructure projects (Planning Inspectorate, 2015).
  - D. Advice Note 9: Rochdale Envelope (Planning Inspectorate, 2012).

- 4.16.6 The cumulative effects of the Scheme in conjunction with other proposed developments have been assessed and the findings are presented within Chapter 19 of this ES.

### **Inter-relationships**

- 4.16.7 Consideration of inter-relationships is a requirement of the EIA Directive. Interrelationships refer to the combined effect on individual (or groups of) receptors or resources from more than one source or type of environmental effect (e.g. noise, loss of amenity, visual impact on a dwelling). Inter-relationships are also considered within Chapter 20 of this ES.

<sup>16</sup> European Commission, 1999.

<sup>17</sup> DMRB Volume 11 Section 2 Part 5 HA 205/08 IV Determining Significance of Cumulative Effects paras 2.13 – 2.16

<sup>18</sup> DMRB Volume 11 Section 2 Part 6 HD 48/08 para 3.23 and Table 3.2

<sup>19</sup> IAN 125/09 Section 3 2<sup>nd</sup> para



## **4.17 Consultation**

- 4.17.1 This section summarises the consultation undertaken with stakeholders at key stages during the development of the Scheme. Further details of the comments received (where relevant to the EIA process) are set out within each topic chapter of this ES.
- 4.17.2 During development of the Scheme, consultation has been undertaken with, or information requested from, a number of organisations including (but not limited to) Statutory and non-statutory consultees, interest groups, commercial, industrial and business operators, The general public (mainly from the local and surrounding communities).
- 4.17.3 The process also centred on engagement with key stakeholders in order to establish the proposed scope and level of detail required for the draft Plan's associated environmental, health and equality assessments. Key stakeholders, Listed in Table 4.7 include statutory consultees and those with a particular stake or significant interest in transport issues relevant to the economy, environment and society in North Wales and beyond.
- 4.17.4 A Public Information Exhibition (PIE) was undertaken during three days in December 2017, based in community buildings in Llanfairfechan, Penmaenmawr and Dwygyfylchi. A bilingual Information Leaflet about the Scheme was delivered in advance to the relevant communities. Exhibition boards were displayed and members of the project team, including technical experts, were available to answer any questions and explain how the public could express their opinions formally.
- 4.17.5 Feedback at the exhibition was invited from those who attended the exhibition through a questionnaire survey and enquiry form. The feedback was taken into consideration during subsequent selection and development of the route options.

### **Statutory Public Consultation**

- 4.17.6 The options were then shown to the community during a 12-week Public Consultation in June, July and August 2018. A Public exhibition was held between the 12 and 14 of June 2018, with a viewing held for local politicians in Conwy Business Centre in the evening of Monday the 11 June 2018. Subsequent day-long exhibitions were held in Llanfairfechan, Dwygyfylchi and Penmaenmawr in June 2019. Once again feedback was invited and received using questionnaires.

### **Statutory Environmental Consultees**

- 4.17.7 An integral part of the Consultation process are the Environmental Liaison Group (ELG) meetings. These were held with key environmental consultees during the Scheme evolution. Those who attended were invited to comment on the Scheme Objectives and Environmental Objectives and subsequently to comment on the EIA Scoping Report. The Scoping Report sets out the proposed scope of the EIA, and the assessment methodologies.
- 4.17.8 The approach to consultation during the EIA process has built on the consultation undertaken at previous stages. Statutory bodies have been consulted throughout the development of the Scheme and meetings held with key consultees.
- 4.17.9 Meetings with farm owners and tenants have been organised throughout the process, including completion of a questionnaire relating to existing land uses. Some landowners and tenants attended the PIE and responded to the statutory Public Consultation and were able to provide

comments using the exhibition questionnaire and through discussions with technical staff who attended.

**Table 4.7: Statutory and public stakeholders**

Organisation	Representative or Department
Welsh Assembly	Local Assembly Member
Welsh Government	Technical Approvals Authority Technical Standards and Departures Lands and Orders Network Management Route Manager Environmental Science Advisor
Conwy County Borough Council	Chief Executive Officer Head of Services Leader of the Council Infrastructure Cabinet Member Councillor for the wards affected Head of Highways Landscape Officer Transport Planner Ecologist
Snowdonia National Park Authority	Head of Development Management and Compliance
Town and Community Councils	Clerk to the Council
Natural Resources Wales	Liaison Officer and Protected Species team
Cadw	Conservation Officer, or the Gwynedd Archaeological Trust representative.
North and Mid Wales Trunk Road Agent	Road and soft estate maintenance managers, Environmental Coordinator and Ecologists
Design Commission for Wales	Review Panel
Utilities	Various

- 4.17.10 Other key stakeholders involved in the consultations include Sustrans, North Wales Ambulance, Fire Service, Public Transport organisations, Road Haulage Association, Freight Transport Association, Businesses in Penmaenmawr, Dwygyfylchi and Capellulo, and farm businesses affected by the Scheme.

#### 4.18 The Preferred Route

- 4.18.1 Following the results of the Public Consultation, a report on the route options and the consultation were submitted to Welsh Ministers with a recommendation for the Preferred Route. A decision was made by Welsh Government on 5 April 2019 to progress with Junction 16 Option A.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 5 POLICY AND PLANS**

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## 5. POLICY AND LEGISLATION

### 5.1 Chapter Introduction

- 5.1.1 The purpose of this chapter is to provide an overarching and strategic legislative and policy context for the Scheme from an environmental perspective. The Design Manual for Roads and bridges (DMRB)<sup>1</sup> advises that environmental planning and management of highway construction and improvement schemes is controlled by a wide range of legislation. As such it briefly describes key legislation and the main planning policies of specific reference to the scheme at European, UK and Welsh levels.
- 5.1.2 The scheme will be developed and delivered following the procedures under the Highways Act 1980 (as amended). Due consideration will also be given to legislation, national and regional planning policies in the decision-making process. This chapter refers planning policies and other relevant plans and strategies set at a national level by Welsh Government.
- 5.1.3 Due consideration will also be given to the development planning policies at the local level. The scheme falls almost entirely within the jurisdiction of Conwy County Borough Council (CCBC) as the local planning authority and therefore the relevant policies of Conwy Local Development Plan (LDP) are included within the chapter. The eastern section of the scheme encroaches marginally within the boundary of Snowdonia National Park Authority where the rearrangement of the existing Junction 16A necessitates some additional land take south of the existing junction. However, this is not considered to be significant in terms of planning policy due to the minor changes in land take.
- 5.1.4 Specific legislation and policy is also considered further on a topic by topic basis within Chapter 6 to Chapter 18 of this Environmental Statement (ES). Individual chapters also provide further detail on how the design of the scheme has been developed by consideration of the relevant policies.
- 5.1.5 Table 5.1 to Table 5.3 below summarises the legislation, National and Regional Planning Policies and other relevant documents together with the local development plans that are considered further in this chapter and a reference to the relevant section of the chapter is given in the right-hand column.

**Table 5.1: Key Legislation which is Relevant to the Scheme at European, UK and Welsh Levels**

Document Reference	Refer to Section
Highways Act 1980	5.2
The Environmental Impact Assessment Regulations 2017	5.3
Environment (Wales) Act 2016	5.4
Historic Environment (Wales) Act 2017	5.5
Well-Being of Future Generations Act (Wales) 2015	5.6
Active Travel (Wales) Act 2013	5.7
Wildlife and Countryside Act 1981 (as amended)	5.8

<sup>1</sup> DMRB Volume 10 Section 7 Part 1 HA 99/01

Document Reference	Refer to Section
Natural Environment and Rural Communities Act 2006	5.9
Conservation of Habitats and Protective Species Regulations 2017	5.10
Climate Change Act 2008	5.11
Human Rights Act 1998	5.12
Planning (Wales) Act 2015	5.13

**Table 5.2: National and Regional Planning Policies**

Document Reference	Section
National Planning Policy: The Wales Spatial Plan (Update 2008)	5.14
Planning Policy Wales (10 <sup>th</sup> Edition)	5.14.8
Planning Policy Wales: Technical Advice Notes (TAN's)	5.14.11
North Wales Regional Planning Guidance 2002	5.14.13

**Table 5.3: Other Relevant Documents at National Level/Welsh Government Plans and Strategies**

Document Reference	Section
A Growth Deal for North Wales	5.15.1
Economic Development: Taking Wales Forward 2016-2021	5.15.3
Economic Renewal, A New Direction (July 2010)	5.15.7
Economic Development: Wales - A Vibrant Economy (November 2005)	5.15.10
Wales Infrastructure Investment Plan (2012)	5.15.13
Wales Infrastructure Investment Plan – Mid-point Review 2018	5.15.16
Partnership for Growth: strategy for tourism 2013-2020	5.15.17
North Wales Tourism Strategy 2010 to 2015	5.15.19
One Wales Connecting the Nation- The Wales Transport Strategy (April 2008)	5.15.20
North Wales Joint Local Transport Plan 2015	5.15.24
The Vision for Transport in North Wales	5.15.25
National Transport Finance Plan for Wales (2015)	5.15.32
National Transport Finance Plan for Wales (2017 update)	5.15.36
One Wales: One Planet (May 2009)	5.15.38
Climate Change Strategy for Wales (October 2010)	5.15.42
Conwy Local Development Plan	5.16
Snowdonia National Park Authority: Eryri Local Development Plan	5.17

## **5.2 Highways Act 1980**

- 5.2.1 The scheme is being promoted and would be constructed using the powers of the Welsh Ministers as Highway Authority in accordance with the Highways Act 1980. These powers have been transferred to them by virtue of the National Assembly for Wales (Transfer of Functions) Order 1999 and the Government of Wales Act 2006.
- 5.2.2 The powers to construct the new section of trunk road and junction (Junction 16 and Junction 16A) at Penmaenmawr would be obtained through the Statutory Orders which will be published alongside the application in addition to a Compulsory Purchase Order which would enable Welsh Ministers to acquire all land and rights over land necessary for the construction and operation of the proposed scheme.
- 5.2.3 As part of the legal process, the Welsh Ministers would consider all the responses to the draft scheme and Orders and then decide whether to hold a Public Local Inquiry.

## **5.3 The Environmental Impact Assessment Regulations 2017**

- 5.3.1 European EIA directives require an EIA to be undertaken in support of an application for development consent for certain types of scheme. The legislative framework for EIA is set by *European Directive 2011/92/EU*, as amended by *Directive 2014/52/EU* (collectively referred to as the EIA Directive). From May 2017 the new EIA Directive EC2014/52/EU, is transposed into the *Harbours, Docks, Piers and Ferries Environmental Protection - The Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017 (EIA Regulations 2017)* 5<sup>th</sup> December 2017. The equivalent under town and country planning act is the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2016.

## **5.4 Environment (Wales) Act 2016**

- 5.4.1 Enacted in 2016 by the National Assembly for Wales, the Environment (Wales) Act 2016 provides an iterative framework that ensures managing natural resources sustainably will be a core consideration in decision-making. Natural Resources Wales are the principle organisational body to help deliver the aims of the Act and are required to prepare a number of documents, which include:
- a) State of Natural Resources Report;
  - b) National Natural Resources Policy; and
  - c) Area Statements.
- 5.4.2 These documents will help inform the designers of road schemes so that schemes can be delivered in a way that manages natural resources sustainably. The Act also includes provisions to:
- a) Tackle climate change, through statutory emission reduction targets and carbon budgeting to support their delivery; and
  - b) Provide enhancements of benefit to biodiversity.
- 5.4.3 The Environment (Wales) Act 2016 supersedes the biodiversity duty outlined in Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006 which was relevant to both England and Wales.

## 5.5 Historic Environment (Wales) Act 2017

5.5.1 The Historic Environment (Wales) Act 2017 was passed by the National Assembly for Wales on 9 February 2016 and became law after receiving Royal Assent on 21 March 2016. It has three main aims:

- a) To give more effective protection to listed buildings and scheduled monuments;
- b) To improve the sustainable management of the historic environment; and
- c) To introduce greater transparency and accountability into decisions taken on the historic environment.

5.5.2 The Act amends the two pieces of UK legislation, the *Ancient Monuments and Archaeological Areas Act 1979* and the *Planning (Listed Buildings and Conservation Areas) Act 1990*, that currently provide the framework for the protection and management of the Welsh historic environment. It also contains new stand-alone provisions relating to historic place names; historic environment records, the Advisory Panel for the Historic Environment in Wales and;

- a) Extending of the definition of a Scheduled Ancient Monument (SAM) to allow recognition and protection of any nationally important sites that provide evidence of past human activity. This will mean many sites on the Historic Environment Record will have protection as will the setting.
- b) Amendments to the criminal offences and defences for damage to scheduled monuments and powers of entry to inspect or investigate SAMs and to issue stop notices for SAMs and Listed Buildings.
- c) Statutory registers powers to compile and maintain a comprehensive register of parks and gardens of historic interest in Wales, a statutory list of historic place names, and statutory historic environment record for each local authority area in Wales.

## 5.6 Well-being of Future Generations Act (Wales) 2015

5.6.1 The Well-being of Future Generations Act (Wales) 2015 Act is about improving the social, economic, environmental and cultural well-being of Wales with an overarching aim of creating a Wales we all want to live in, now and in the future. The Act puts in place seven well-being goals shown in Table 5.4.

5.6.2 The 2015 Act places a duty on public bodies in Wales and those listed in the Act to work to improve the economic, social, environmental and cultural well-being of Wales. To help do this they must set and publish well-being objectives and give greater consideration to the long term, work better with people and communities and each other, look to prevent problems and take a more joined-up approach.

5.6.3 The A55 Junction 16 and 16A Improvements have been assessed using the Welsh Transport Appraisal Guidance (WelTAG) 2017 procedure. The primary purpose of WelTAG is to allow the comparison of schemes on a like-for-like basis. It achieves this by providing a framework for thinking about proposed changes to the transport system. In particular the procedure gives consideration to sustainability and the seven well-being goals. Each option was assessed qualitatively against the WelTAG criteria to allow the economic, social, cultural and environmental impacts to be assessed as described below. The results of this appraisal were presented during the 12-week public consultation held in 2018. The appraisal findings have been reviewed under the following headings as the Preferred Option design has been developed.



- **Economic** – Journey time reliability changes, transport operating costs accidents and local economy;
- **Social and Cultural** – Journey quality, accident savings, security, severance, accessibility/permeability and equality, diversity and human rights; and
- **Environment** – Noise, air quality, greenhouse gases, landscape and townscape, historic environment, biodiversity and water environment.

5.6.4 Such impacts are clearly aligned to the sustainable development principles as set out in the 2015 Act and the proposed scheme seeks to improve a key piece of infrastructure for future generations in Conwy County Borough, the adjoining Gwynedd (connected by the A55 road corridor) and the wider region and for those visiting from elsewhere.

5.6.5 The Act defines Sustainable Development in Wales as: *'The process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle, aimed at achieving the well-being goals.'* It sets out five ways of working needed for Public Bodies to achieve the seven well-being goals namely:

- Long Term** - The importance of balancing short-term needs with the needs to safeguard the ability to also meet long-term needs
- Integration** - Considering how the public body's well-being objectives may impact upon each of the well-being goals, on their objectives, or on the objectives of other public bodies;
- Involvement** - The importance of involving people with an interest in achieving the well-being goals, and ensuring that those people reflect the diversity of the area which the body serves;
- Collaboration** - Acting in collaboration with any other person (or different parts of the body itself) that could help the body to meet its well-being objectives;
- Prevention** - How acting to prevent problems occurring or getting worse may help public bodies meet their objectives.

5.6.6 In preparing the scheme proposals, a number of consultation events have been held<sup>2</sup> to address the five ways of working and where the local authority and other public bodies have had the opportunity to comment on the proposals. Additional meetings with the Local Authority have also been held discuss more specific issues such as the emerging Local Development Plan.

**Table 5.4: The Seven Well Being Goals**

Goal	Description of Goal
1. A Prosperous Wales	An innovative, productive and low carbon society which recognises the limits of the global environment and therefore uses resources efficiently and proportionately (including acting on climate change); and which develops a skilled and well-educated population in an economy which generates wealth and provides employment opportunities, allowing people to take advantage of the wealth generated through securing decent work.
2. A Resilient Wales	A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change).

<sup>2</sup> <https://gov.wales/a55-junctions-15-and-16-overview>

Goal	Description of Goal
3. A Healthier Wales	A society in which people's physical and mental well-being is maximised and in which choices and behaviours that benefit future health are understood.
4. A More Equal Wales	A society that enables people to fulfil their potential no matter what their background or circumstances (including their socio-economic background and circumstances).
5. A Wales of Cohesive Communities	Attractive, viable, safe and well-connected communities.
6. A Wales of Vibrant Culture and Thriving Welsh Language	A society that promotes and protects culture, heritage and the Welsh language, and which encourages people to participate in the arts and sports and recreation.
7. A Globally Responsible Wales	A nation which, when doing anything to improve the economic, social, environmental and cultural well-being of Wales, takes account of whether doing such a thing may make a positive contribution to global well-being.

## 5.7 Active Travel (Wales) Act 2013

- 5.7.1 The Active Travel Act 2013 sets a legal requirement for local authorities in Wales to map and plan for suitable routes for active travel, and to build and improve infrastructure for walking and cycling every year. It creates new duties for highways authorities to consider the needs of walkers and cyclists and make better provision for them.
- 5.7.2 It also requires both the Welsh Government and local authorities to promote walking and cycling as a mode of transport so that local communities rely less on cars when making short journeys.
- 5.7.3 In the context of road schemes, there is significant opportunity to reconfigure existing infrastructure so that it better meets the needs of existing and new settlements and facilitates active travel. For example, bypass road schemes can address settlement severance and in doing so provide opportunities for active travel because pedestrians and cyclists would no longer need to compete with significant volumes of vehicular traffic for short journeys in the locality.
- 5.7.4 The Act sets out that where offline improvements are proposed, the new section of road will allow for existing roads to be declassified. This will allow governments and local authorities to explore opportunities to provide benefits to Non-Motorised Users (NMU's).

## 5.8 Wildlife and Countryside Act 1981 (as amended)

- 5.8.1 The Wildlife and Countryside Act 1981 (as amended) (WCA) remains the principal mechanism for the protection of wildlife in the UK and is in four parts:
- a) Part 1 covers the protection of wildlife, including birds, their nests and eggs; wild animals, mammals and wild plants;
  - b) Part 2 makes provision for the countryside, national parks, the designation of protected areas including Sites of Special Scientific Interest (SSSIs), limestone pavements, National Nature Reserves, and grants by the national nature conservation bodies in England and Wales;
  - c) Part 3 covers public rights of way, including footpaths and bridleways; and
  - d) Part 4 deals with miscellaneous provisions.

- 5.8.2 Schedule 9 of the Countryside and Rights of Way Act (CROW,2000) introduced a new Section to the WCA, Section 28G, which places a duty on the Welsh Government *'in exercising its functions so far as their exercise is likely to affect the flora, fauna or geological or physiographical features by reason of which a site of special scientific interest is of special interest'* to *'take reasonable steps, consistent with the proper exercise of the authority's functions, to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest'*.

## **5.9 Natural Environment and Rural Communities Act 2006 (NERC Act)**

- 5.9.1 The NERC Act was designed to help achieve a rich and diverse natural environment and thriving rural communities through modernised and simplified arrangements for delivering UK Government policy. The Act implemented key elements of the (then) UK Labour Government's Rural Strategy published in July 2004 (Defra, 2004).
- 5.9.2 The NERC Act established Natural England and made amendments to both the Wildlife and Countryside Act 1981 and the Countryside and Rights of Way Act 2000. Section 40 sets out a duty to conserve biodiversity whereby 'every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity', whilst Section 42 requires the National Assembly of Wales to *'publish a list of the living organisms and types of habitat which in the Assembly's opinion are of principal importance for the purpose of conserving biodiversity'*. The NERC Act has now been largely superseded by the Environment (Wales) Act 2016 referred to above in Section 5.4.

## **5.10 Conservation of Habitats and Protected Species Regulations 2017**

- 5.10.1 Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna provides legal protection for habitats and species of European importance. The Directive is transposed into UK law by the Conservation of Habitats and Species Regulations 2017 (the 'Habitat Regulations').
- 5.10.2 Screening (the first stage in the Habitats Regulations Assessment process) identified that the Scheme had the potential for significant effects on qualifying features of the following European sites:
- a) Y Fenai a Bae Conwy / Menai Strait and Conwy Bay Special Area of Conservation (SAC);
  - b) Liverpool Bay/Bae Lerpwl (Wales) Special Protection Area (SPA);
  - c) Traeth Lafan/Lafan Sands, Conway Bay SPA;
  - d) Coedydd Aber SAC;
  - e) Aber Afon Conwy Site of Special Scientific Interest (SSSI); and
  - f) Sychnant Pass SSSI to the south of J16A.
- 5.10.3 The Habitats Regulations requires the competent authority to consider, inter alia, whether the plan or project is likely to have a significant effect on a European site. If there is a likely significant effect an 'appropriate assessment' of the implications of the project for that site must be undertaken either alone or in combination with other plans or projects. This is referred to as a Habitat Regulations Assessment (HRA).
- 5.10.4 The project can only proceed if it has been ascertained that it will not affect the integrity of the European site (unless there are no alternatives and there are imperative reasons of overriding public interest supporting the project ('IROPI')).

- 5.10.5 The first stage of the HRA process is to undertake a Test of Likely Significance Effect (TLSE). The TLSE has identified that likely significant effects on qualifying features of European Sites (Liverpool Bay / Bae Lerpwl (Wales) SPA) could not be ruled out.
- 5.10.6 It is therefore considered necessary for an Appropriate Assessment to be carried out for this project on the qualifying features of these European Sites, in line with DMRB HD44/09 guidance. This is reported as a Habitat Regulations Assessment (HRA), which takes the form of a Statement to Inform an Appropriate Assessment (SIAA), a standalone document outside the content of the ES. Under the same Regulations, it is considered that it is unlikely that there will be significant effects on the other European Sites referred to above and therefore no further assessment is needed.

## **5.11 Climate Change Act 2008**

- 5.11.1 The Act imposes a duty on the Secretary of State to reduce UK wide greenhouse gas emissions in 2050 to a level which is at least 80% below the level of emissions in 1990. It also obliges the Secretary of State to set carbon budgets for successive five-year period and to prepare proposals and policies for meeting those carbon budgets. Part 2 of the Act establishes the Committee on Climate Change.
- 5.11.2 Parts 4 and 5 of the Act impose limited duties and confer limited powers on Welsh Ministers in terms of contributing towards meeting the UK wide carbon targets. The Environment (Wales) Act 2016, imposes specific carbon budgeting duties on Welsh Ministers like those to which the Secretary of State is subject.
- 5.11.3 Further information on climate change and how the scheme would accord with the principles set out by relevant climate change policies and legislation is set out in Chapter 16 of the ES.
- 5.11.4 By removing the existing roundabouts on the A55 Expressway, which typically requires vehicles to decelerate, brake and accelerate hard, a benefit of the A55 Junction 16 Improvements is to minimise stop-start conditions. This will contribute to improved vehicle emissions. The proposed roundabout on the local network at Junction 16 should encourage more free-flowing conditions.

## **5.12 Human Rights Act 1998**

- 5.12.1 The Human Rights Act 1998 is relevant where there is a need for compulsory purchase to acquire the necessary minimum land to construct the Scheme. Schedule 1 Part II of the Act (The First Protocol Article 1) states that '*No one shall be deprived of his possession except in the public interest and subject to the conditions provided for by law*'. This means that a Compulsory Purchase Order (CPO) should only be made where there is a compelling case in the public interest. An acquiring authority, including Welsh Ministers, should be sure that the purposes for which it is making a CPO sufficiently justify interfering with the human rights of those with an interest in the land affected having regard, in particular, to the provision of Article 1 of The First Protocol to the European Convention on Human Rights and, in the case of dwellings, Article 8 of the Convention.

## **5.13 Planning (Wales) Act 2015**

- 5.13.1 The Planning (Wales) Act 2015 became law in Wales on 6 July 2015. The overall aim of the Act is to provide a modern legislative framework for the operation of the planning system in Wales

thereby creating a more consistent planning system that enables development and enhances built and natural environments. The key purposes of the bill are to:

- a) Strengthen the plan-led approach to planning. The Bill introduces a new legal framework for the Welsh Ministers to prepare a national land use plan, to be known as the National Development Framework for Wales. The framework will set out national land use priorities and infrastructure requirements for Wales;
- b) Make provision for the production of Strategic Development Plans, to tackle larger-than-local cross-boundary issues, such as housing supply and areas for economic growth and regeneration;
- c) Make provision for pre-application consultation, and to require local planning authorities to provide pre-application services;
- d) Provide for planning applications for nationally significant projects to be made to the Welsh Ministers. Applicants for planning permission will also be able to apply to the Welsh Ministers for planning permission where a local planning authority is deemed to be poorly performing;
- e) Reform the development management system to streamline procedures, to ensure that applications are dealt with promptly, providing certainty for developers and communities;
- f) Improve enforcement and appeal procedures. Changes are also made in relation to the recovery of costs for parties involved in planning cases; and
- g) Make changes in relation to applications to register town and village greens.

- 5.13.2 The Act makes provision for the preparation and revision of a National Development Framework (NDF) for Wales. The NDF is a national land use plan which will set out Welsh Government's policies in relation to the development and use of land in Wales. This is scheduled to replace the Wales Spatial Plan (WSP) in 2020.

## **5.14 National and Regional Planning Policy**

### **The Wales Spatial Plan (Update 2008)**

- 5.14.1 Ultimately, through provisions in the Planning (Wales) Act 2015 the Wales Spatial Plan (WSP) will be replaced by the National Development Framework (NDF) when published, however the current programme suggests publication in 2020 and therefore the WSP remains relevant to this assessment.
- 5.14.2 The WSP was originally adopted by the Welsh Government in November 2004 and was updated in July 2008 (Welsh Assembly Government, 2008a). The overall role, purpose and principles of the Wales Spatial Plan are set out at Paragraph 1.2. They include the following:
- a) Making sure that decisions are taken with regard to their impact beyond the immediate sectoral or administrative boundaries and that the core values of sustainable development govern everything the Welsh Government does.
  - b) Setting the context for local and community planning.
  - c) Influencing where money is spent by the Welsh Government through an understanding of the roles of and interactions between places.
  - d) Providing a clear evidence base for the public, private and third sectors to develop policy and action.
- 5.14.3 It is a principle of the Wales Spatial Plan that development should be sustainable. The concept of sustainable development was described by the 1987 Bruntland Commission Report as

*'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.* Section 2 of the Well-Being of Future Generations (Wales) Act 2015 provides that *'sustainable development'* means the process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle, aimed at achieving the well-being goals.

- 5.14.4 It is a principle of the WSP that development should be sustainable. Sustainable development is about improving well-being and quality of life by integrating social, economic and environmental objectives in the context of more efficient use of natural resources.
- 5.14.5 The Scheme is located in North West Wales – Eryri a Mon as defined by Chapter 17 of the WSP. The vision for this area is *'A high-quality natural and physical environment supporting a cultural and knowledge-based economy that will help the area to maintain and enhance its distinctive character, retain and attract back young people and sustain the Welsh language.'*
- 5.14.6 Improvements to transport links and economic infrastructure is identified as a key strategic priority which will contribute to achieving the above vision. Furthermore, the WSP recognises that *'Maximising the opportunities of Holyhead as a major international gateway and the A55 and E22 Trans-European Networks route as a key transportation corridor, particularly between the prosperous economies of Ireland, North East Wales and beyond, whilst ensuring appropriate transport links between the hubs and rural areas are adequate to provide access to services, employment and leisure opportunities.'*
- 5.14.7 Later in the same chapter the importance of the A55 as a strategic route is supported by the identification of Holyhead Port developments as having *'further potential to enhance the region's status as an international gateway and communications corridor'.*
- 5.14.8 Under Promoting a Sustainable Economy, the update states that *'The primary corridor for external connectivity into and out of the region is based along the North Wales coast and through the heart of Anglesey to the region's international gateway at Holyhead. This Area benefits from the good connectivity offered on road by the A55 Expressway and the North Wales Coast mainline railway (both of which are part of the Trans European Transport Network).'*

#### **Planning Policy Wales (10th Edition)**

- 5.14.9 Planning Policy Wales (PPW) was originally published in 2002 and is the principal and authoritative source of national planning policy, under which local planning authorities prepare their Local Development Plans. PPW 10 (December 2018) is the latest edition of Planning Policy Wales and takes account of the Well-being of Future Generations (Wales) Act 2015. It outlines policies on all the key land use topics, and is supplemented by Technical Advice Notes, Circulars and Policy Clarification Letters.
- 5.14.10 Edition 10 of PPW, published on 5 December 2018, *'puts the concept of placemaking into the heart of national planning policy. This ensures planning decisions consider all aspects of well-being and deliver new development which is sustainable and provides for the needs of all people'.* PPW has been completely reworked to take account of the Well-being of Future Generations Act. The seven well-being goals and five ways of working provide links through the document which is now based around four themes:
  - i. Strategic and Spatial Choices;
  - ii. Active and Social Places;

- iii. Productive and Enterprising Places; and
- iv. Distinctive and Natural Places.

5.14.11 Together these promote placemaking with a view to achieving sustainable places. The policy content of PPW has also been updated to deliver wider Welsh Government objectives. Our commitment to decarbonisation has been enshrined in PPW by the promotion of walking and cycling through the planning system and the introduction of an energy hierarchy.

#### **Technical Advice Notes (TAN's)**

5.14.12 PPW 10 sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. TAN's cover a range of topics and these are referred to as appropriate within the environmental topic chapters and are set out for reference below. Note some of the TAN's have been withdrawn or time expired and are not listed. Relevant Technical Advice Notes are listed in Table 5.5.

5.14.13 Other documents published by Welsh Government of direct relevance to the development and design of the Scheme can be grouped under the general headings of, economics, transport, environment, and climate change. However, all have been written within the framework of sustainable development, and as such need to be considered collectively as well as individually.

**Table 5.5: Technical Advice Notes (TAN)**

<b>Technical Advice Note (TAN)</b>	<b>Subject /Title</b>
1 (January 2015)	Joint housing land availability studies
2 (November 2016)	Planning and affordable housing
3 (September 2009)	Simplified Planning Zones (SPZ)
4 (November 2016)	Retail and commercial development
5 (September 2009)	Nature conservation and planning
6 (July 2010)	Planning for sustainable rural communities
7 (November 1996)	Outdoor advertisement control
8 (July 2005)	Renewable energy
10 (November 1996)	Tree Preservation Orders (TPO)
11 (October 1997)	Noise
12 (March 2016)	Design
13 (October 1997)	Tourism
14 (March 1998)	Coastal Planning
15 (July 2004)	Development and flood risk
16 (July 2004)	Sport, recreation and open space
18 (March 2007)	Transport
19 (August 2002)	Telecommunications
20 (August 2002)	Planning and Welsh Language
21 (February 2017)	Waste
23 (February 2014)	Economic development

Technical Advice Note (TAN)	Subject /Title
24 (May 2017)	The historic environment

### **North Wales Regional Planning Guidance 2002**

- 5.14.14 Planning Policy Wales does not provide defined regional; planning policy guidance or a sub-regional planning policy context for the preparation of Unitary Development Plans (UDP). These are now superseded by LDP that will subsequently be superseded by the National development Framework in 2022. In the absence of any guidance, the then Welsh Assembly Government advised local authorities to collaborate in setting strategic policies and objectives that could be used in the preparation of the Wales Spatial Plan.
- 5.14.15 In response to this, the North Wales Regional Planning Group was formed that consisted of elected Members from Anglesey, Conwy, Denbighshire, Flintshire, Gwynedd and Wrexham Councils and the Snowdonia National Park Authority.
- 5.14.16 The Regional Planning Guidance covered the period 1996 to 2011 and was scheduled for review on a five-year cycle. The guidance does not appear to have been updated and is therefore time expired and a National Development Plan will override this older guidance in time (2020).

## **5.15 Welsh Government Plans and Strategies**

### **A Growth Deal for North Wales – Smart, Resilient and Connected**

- 5.15.1 A Growth Deal for North Wales is an economic initiative seeking investment of £1.3 billion into the North Wales economy. In 2018 it was announced that the scheme will be given £120 million by the Welsh Government. The North Wales Economic Ambition Board (NWEAB) had hoped to secure £335.5 million between the Welsh and UK governments. the announcement took the total committed to £240 million.
- 5.15.2 The growth deal is aimed at improving what the region has to offer in a number of areas, including land and property, energy, skills, technology and adventure tourism as well as digital connectivity and transport. A total of 16 projects are planned. A Growth Deal for North Wales Proposition Document acknowledges that the A55 corridor is of key importance to the region as a catalyst for wider economic growth. However, it is not included within the project list as it states that funds are already committed to a number of strategic projects in North Wales on which the Proposition Document will build.

### **Economic Development: Taking Wales Forward 2016-2021**

- 5.15.3 *Taking Wales Forward 2016-2021* sets out the Welsh Government's programme to drive improvement in the Welsh economy and public services, delivering a Wales which is prosperous and secure, healthy and active, ambitious and learning, united and connected.
- 5.15.4 Taking Wales Forward 2016-2021 outlines this government's priorities for delivering those improvements. They are ambitious measures, aimed at making a difference for everyone, at every stage in their lives.
- 5.15.5 The United and Connected commitments include delivery of 'an M4 relief road, and improvements to the A55, the A40 in West Wales and other trunk roads.



- 5.15.6 Alongside the programme, the Welsh Government have published well-being objectives which set out how we will use the Well-being of Future Generations Act 2015 to help deliver its programme for government and maximise its contribution to the seven shared national well-being goals.

### **Economic Renewal, A New Direction (July 2010)**

- 5.15.7 *Economic Renewal, A New Direction* was published in July 2010. It sets out the role that the Welsh Government can play in providing the best conditions and framework to enable the private sector to grow and flourish.
- 5.15.8 Part 3 of the document encourages investment in high quality and sustainable infrastructure to underpin economic growth. People, businesses and communities need to be well connected within and beyond Wales and to have access to the right facilities and services where they live and work. Investors and indigenous businesses must be able to count on communications, transport, energy and other infrastructure necessary for 21st century enterprise.
- 5.15.9 The document continues to state that people cannot work if they are not linked to their jobs, training and public services. Businesses cannot operate without access to the labour forces, materials and markets. Furthermore, faster physical connections, such as an efficient and reliable road network, increase productivity because they save time and therefore lower costs. Excellent infrastructure is also a prerequisite for creating the right conditions to enable businesses to locate and flourish.

### **Economic Development: Wales – A Vibrant Economy (November 2005)**

- 5.15.10 *Wales – A Vibrant Economy* was published in November 2005 and is the strategic framework for economic development in Wales. The main vision of the document is of; ‘*a vibrant Welsh economy delivering strong and sustainable economic growth by providing opportunities for all.*’
- 5.15.11 As part of the aims for economic development set out in *Wales – A Vibrant Economy*, one important part of allowing businesses to grow and flourish is by investing in networks and other forms of economic infrastructure whilst always ensuring sustainable development.
- 5.15.12 It is the view of the policy that more and more businesses are depending on fast, safe and reliable transport networks and services. Improving the productivity of Welsh businesses through reducing journey times for individuals and goods and encouraging international trade through larger and more connected markets provides an attractive investment environment.

### **Wales Infrastructure Investment Plan (2012)**

- 5.15.13 The Wales Infrastructure Investment Plan for Growth and Jobs (WIIP) is designed to prioritise, scope and coordinate delivery of the Welsh Government’s major infrastructure investments, whilst improving the long term economic, social and environmental well-being of people and communities in Wales
- 5.15.14 Chapter 1 of the Plan sets a number of high-level investment priorities including: ‘*Improving transport links, particularly East-West transport links in both North and South Wales*’. This priority is further explored through Chapter 2 of the Plan which outlines an aim to ‘*secure the most out of the existing road network through well planned maintenance and upgrades to ensure the road network operates more efficiently by:*

- *Prioritising investments which contribute to economic growth – addressing urban congestion and improving access to key areas, and by improving the capacity and reliability of our key east-west corridors.*
- *Being more agile in our approach to developing solutions to underlying problems to address problems that people face every day. '*

5.15.15 The A55 forms one of the key east-west corridors in Wales and the Plan recognises the importance of the route.

#### **Wales Infrastructure Investment Plan – Mid-point Review 2018**

5.15.16 This document reports on progress in investment in the infrastructure needs and projects identified in the 2012 plan. With regard to the A55 corridor and the Junctions 16 and 16A schemes it states *'More than £40m is being invested in upgrading the A55 including the design and construction of junctions, slip roads and bridges. The funding will also support the widening of 2.1km of the A55'.*

#### **Partnership for Growth: strategy for tourism 2013-2020**

5.15.17 Tourism makes a major contribution to the Welsh economy and Welsh Government assert that *'the prospects for further sustainable growth are good. The competition, however, is also increasing and it will be those tourist destinations that can best satisfy and exceed the needs of their customers that will stand out and perform best in a crowded marketplace. If we do nothing new or fail to make the most of the opportunities that will arise, we will go backwards against our competitors'.*

5.15.18 The whole Wales aims to *'drive higher tourism earnings to deliver maximum value for the Welsh economy'* and to develop tourism activity and specialist markets, secure maximum benefit from major events, promote Wales as a high-quality destination, extend the tourism season, identify funding opportunities to improve the visitor infrastructure and support investment in training and management.

#### **North Wales Tourism Strategy 2010 to 2015**

5.15.19 Tourism is vitally important to the Welsh economy, generating £1.8 Billion spend in North Wales each year. The strategy, which covers all six of the North Wales counties, was commissioned by Tourism Partnership North Wales (TPNW) and it sets out how North Wales could achieve its potential over the five years up to 2015. As a key component of an 'outstanding experience' for tourists, efficient transport is listed. This plan for the period 2010 to 2015 has not yet been updated or superseded.

#### **One Wales: Connecting the Nation – The Wales Transport Strategy (April 2008)**

5.15.20 This document establishes a national framework for transport planning in Wales and is therefore pertinent to the Scheme.

5.15.21 The main aim of is *'to promote sustainable transport networks that safeguard the environment while strengthening our country's economic and social life.'* The One Wales Programme is working towards promoting sustainable transport between communities in different parts of Wales to access services, jobs and facilities where travelling is both easy and sustainable, which will support the growth of the economy.

- 5.15.22 Connecting the Nation endorses the proposition that a good transport system is central to achieving a vibrant economy and social justice through equality of access and greater mobility. It sees transport as having a leading role to play in adapting to the impacts of climate change. Fundamentally, economic prosperity is at the forefront of Connecting the Nation in order to connect people with businesses for employment and businesses with their customers and suppliers. Chapter 4 of the strategy provides the focus for the national and regional plans.
- 5.15.23 Table 5.6 sets out the long-term outcomes sought from transport within Wales.

**Table 5.6: One Wales: Connecting the Nation Long Term Outcome**

One Wales: Connecting the Nation Long-term Outcomes		
Social	Economic	Environmental
Improve access to healthcare	Improve access to employment opportunities	Increase the use of more sustainable materials
Improve access to education, training and lifelong learning	Improve connectivity within Wales and internationally	Reduce the contribution of transport to greenhouse gas emissions
Improve access to shopping and leisure facilities	Improve the efficient, reliable and sustainable movement of freight	Adapt to the impacts of climate change
Encourage healthy lifestyles	Improve access to visitor attractions	Reduce the contribution of transport to air pollution and other harmful emissions
Improve the actual and perceived safety of travel		Improve the impact of transport on the local environment
		Improve the impact of transport on our heritage
		Improve the impact of transport on biodiversity

### **North Wales Joint Local Transport Plan 2015**

- 5.15.24 Published in 2015, the North Wales Joint Local Transport Plan is the culmination of collaborative working between the six local authorities in North Wales and was overseen by Taith. This collaborative working is closely linked with wider initiatives under the North Wales Ministerial Task Force and the Economic Ambition Board, together with the statutory plans and policies of each of the authorities. The plan will provide a detailed programme for improving connectivity to, from and within the region for the period 2015 to 2020 and provides a framework for schemes until 2030. *'It sets out a range of interventions and schemes for all modes of travel, some applying across all authorities and some locally based. Schemes respond to the issues for transport in the region and complement those being developed at the national level and across borders'*<sup>3</sup>.

<sup>3</sup> Forward to the North Wales Joint Local Transport Plan

## The Vision for Transport in North Wales

- 5.15.25 *'The North Wales Local Authorities aim to remove barriers to economic growth, prosperity and well-being by delivering safe, sustainable, affordable and effective transport networks'.*
- 5.15.26 The plan is targeted at addressing the key transport issues for North Wales:
- *The ability of the strategic road and rail corridors to provide the necessary good connectivity, for people and freight, within North Wales, to the ports and to the rest of the UK to support the economy and jobs, including tourism;*
  - *The lack of resilience of the road and rail networks to planned and unplanned events including extreme weather;*
  - *The need for good access to and between the three Enterprise Zones in North Wales;*
  - *The lack of viable and affordable alternatives to the car to access key employment sites and other services; and*
  - *The need for good road links to / from the trunk road network into the rural areas to help retain the viability of local businesses and support the Welsh language and culture.*
- 5.15.27 The plan also *'aims to improve connections to key destinations and markets, enhance access to employment and services, increase levels of walking and cycling, bring improved safety and security and at the same time bring benefits and minimised impacts on the environment'.*
- 5.15.28 The Welsh Government produced the Programme for Government document in 2011, providing the priorities and programme for the term of the Assembly. Whilst there are 12 priority areas, those of crucial relevance to the North Wales Joint LTP are:
- *Growth and sustainable jobs – the aim is "to strengthen the conditions that will enable business to create jobs and sustainable economic growth";*
  - *Tackling poverty – the aim is "reducing poverty, especially persistent poverty amongst some of our poorest people and communities, and reducing the likelihood that people will become poor;" and*
  - *Rural communities - to "ensure that rural communities remain vibrant and able to offer people an excellent quality of life with access to high quality employment, affordable housing and public services and sustained by reliable and effective infrastructure in terms of broadband, public transport and utilities."*
- 5.15.29 The relationship of transport to the Programme for Government Priority Areas demonstrates the importance of access, affordable, sustainable and integrated transport to all aspects of Welsh Government priorities.
- 5.15.30 The plan states that the A483/A55 corridor is of key importance to the region, *'as a catalyst for wider economic growth. The economy of the region is diverse with key sectors being manufacturing, energy and tourism as well as public sector jobs. There are two designated Enterprise Zones – Anglesey, which aims to complement the Energy Island Programme and bring high skilled jobs to the area from major energy investments and Deeside which has ambitions to be recognised as a centre for advanced manufacturing and technology excellence on a world scale'.*
- 5.15.31 A55 /A494 corridor is recognised as the route into north Wales. A high-level intervention for the plan is to *'develop [the] local Highway Network to accommodate any lack of capacity and resilience issues on the Trunk Road network.* The need to reduce impact to the local network

from critical failure of the nationally strategic routes into Wales is also explained.

### **National Transport Finance Plan for Wales (2015)**

- 5.15.32 The National Transport Finance Plan for Wales 2015 was approved in August 2015. Welsh Government's National Transport Finance Plan was released in July 2015. The plan sets out investment for transport and services, with the delivery of the timescale extending beyond the Plan period 2015 to 2020 thereby setting out a means for the delivery of continuous improvement in the transport system.
- 5.15.33 The foreword to the plan emphasises that *'Transport has a critical role to play in improving Wales' economic competitiveness and provides enhanced access to jobs and services. When delivering our investment in transport, it is important to focus on how it can serve the needs of businesses to enable them to prosper; and allow people to access the opportunities they need to live healthy, sustainable and fulfilling lives'*.
- 5.15.34 The plan sets out in detail how the Welsh Government proposes to deliver the outcomes set out in the Wales Transport Strategy from 2015 and beyond. The Finance Plan is not a policy document but provides the timescales, budgets and likely sources of financing for Schemes being undertaken by Welsh Government.
- 5.15.35 A delivery schedule is set out in Annex A of the Finance Plan to cover the next five-year period (between April 2015 and March 2020) and in the medium term (beyond April 2020). Under 'Roads – New Road Infrastructure – Schemes to be Constructed', Scheme reference is R18 'A55 Junctions 15 and 16 improvements' with a delivery period of 2015 to 2020.

### **National Transport Finance Plan for Wales (2017 update)**

- 5.15.36 The National Transport Finance Plan 2017 Update provides information on progress since publication and provides a revised programme for the next three years and beyond. The Plan also sets out:
- a) The timescale for financing and delivering the schemes undertaken by the Welsh Government;
  - b) The estimated expenditure required to deliver the schemes; and
  - c) The likely sources of financing to allow delivery to take place.
- 5.15.37 The Update includes reference to R18 'A55 Junctions 15 and 16 improvements' and that Carillion have been appointed as Early Contractor Involvement (ECI) Contractor in September 2017 and that European Regional Development Fund (ERDF) funding has been secured for the delivery of the scheme. It is well documented elsewhere that in January 2018 Carillion went into liquidation and alternative arrangements had to be made in order to progress with scheme R18.

### **One Wales: One Planet (May 2009)**

- 5.15.38 One Wales: One Planet was first launched by the Welsh Government in May 2009. This document sets out the objectives to achieving the goal of sustainable development. One Wales: One Planet defines sustainable development as *'enabling all people throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations.'*

5.15.39 In Wales this means achieving a better quality of life for this and future generations by:

- Promoting social justice and equality of opportunity; and
- Enhancing the natural and cultural environment and respect its limits – using only a fair share of the earth’s resources and sustaining our cultural legacy.

5.15.40 One Wales: One Planet also sets out sustainable development as a core principle of the Welsh Government’s founding statute. The Welsh Government has a statutory duty to set out how it proposes to promote sustainable development.

5.15.41 Within the document, five main chapters demonstrate the actions that will be taken to deliver sustainability. They are set out under the following headings:

- Sustainable Resource Use;
- Sustaining the Environment;
- A Sustainable Economy;
- A Sustainable Society; and
- The Wellbeing of Wales.

#### **Climate Change Strategy for Wales (October 2010)**

5.15.42 The Climate Change Strategy for Wales (Welsh Assembly Government, 2010c) sets out the Welsh Government’s plan to tackle the causes and the consequences of climate change. The Welsh Government’s key target is to reduce greenhouse gas emissions by 3% per year from 2011.

5.15.43 Section 8 of the Strategy in particular refers to the transport sector, which is most relevant to the Scheme. In order to reduce transport emissions the Welsh Government sets out the following actions:

- a) Develop sustainable travel centres and supporting ‘Smarter Choices’;
- b) Promote eco-driving, walking and cycling;
- c) Invest in bus and rail services and improve traffic management; and
- d) Promote infrastructure of electric and hydrogen vehicles.

#### **Green Corridors Initiative**

5.15.44 The *Green Corridors on the Welsh Government Trunk Road and Motorway Network* initiative was announced by the Transport Secretary, Ken Skates, in July 2018. Over a five-year period the initiative is intended to deliver against the Economic Action Plan ‘Prosperity for All’. The initiative is to contribute to creating a sustainable economy, promoting the economic, cultural, social and environmental well-being, and enhancing people’s quality of life in Wales.

5.15.45 The Transport Secretary stated that ‘Wales has the potential to be a world class sustainable tourist destination and I am pleased to announce my decision to approve a ‘Green Corridors on the Welsh Government Trunk Road and Motorway Network’ initiative. It will build upon and complement other work already completed or underway to improve the benefits provided by the land associated with the trunk road and motorway network, delivering a range of economic, environmental, social and cultural benefits’.

5.15.46 The priority is to implement measures along the three routes making up the Wales Way (A487, A470 and A55) as well as entrances into Wales on the M4, M48, A483, A5 and A494 Deeside.

Work will continue in subsequent years on other gateway routes and strategic sites such as principal towns and cities.

- 5.15.47 The initiative is an opportunity to investigate and implement nature-based solutions such as vegetated systems for sustainable drainage, tree and shrub planting for earthworks stabilization, restoring or creating habitats, providing safe crossing points for protected species, tree planting to improve structure and age range of the planted area, and introducing wildflower areas or improving the diversity of existing areas. These could arise from the design of new roads and along the existing network. Applying the principles of Green Corridors will set us as an exemplar of best practice, showing innovation in the sustainable management of green transport infrastructure.

## **5.16 Local Planning Policy: Conwy County Borough Council Local Development Plan, 2013**

- 5.16.1 The Junction 16 improvements lie wholly within the jurisdiction of Conwy County Borough Council (CCBC). The local planning context is set out within the Conwy Local Development Plan (LDP) 2007 – 2022. The Junction 16 and 16A Scheme is being taken forward via the Highways Act (1980) as amended. Consequently, the Scheme is not governed by local planning policy but does have regard to it.
- 5.16.2 Local planning policies would need to be considered as there is a potentially direct relationship between land allocated in the local plan and that required for the construction of the Scheme
- 5.16.3 In addition to the LDP, this section also considers other policy and guidance at the local level considered to be of relevance to the ES.
- 5.16.4 The Conwy LDP was adopted in 2013 and establishes the local policy framework to guide development in the area. The LDP acknowledges the importance of the A55 and rail corridors as a strategic route corridor connecting settlements along the North Wales Coast. The plan also recognises that the focus of future development in the Plan Area should be in highly accessible areas predominantly along the A55 and railway network and on the edge of Urban Development Strategy Areas within the coastal belt (Policy DP/2).

### **Strategic Policy DP/2 – Overarching Strategic Approach**

- 5.16.5 The Policy advocates development within and on the fringe of urban areas including Llanfairfechan and Penmaenmawr and main villages such as Dwygyfylchi, part of which lies within Snowdonia National Park. The Overarching Strategic Approach defines the framework for the location of development and aims to protect the countryside from encroachment on the edges of villages and to guard against incremental growth.
- 5.16.6 The Policy identifies urban areas as key in providing opportunities for a combination of market and Affordable Housing for Local Need (AHLN) on both allocated and windfall sites and that settlement boundaries will be amended to reflect the proposed development.

### **Strategic Policy STR/1: Sustainable Transport, Development and Accessibility**

- 5.16.7 The policy is to locate development where the need to travel can be minimised. Infrastructure such as cycle routes, footways and public transport and the improved accessibility of services should be provided to encourage change of travel behaviour to using these modes of travel for local journeys. This will be achieved by:

- 5.16.8 Focussing *'future development in the Plan Area in highly accessible locations, predominantly along the A55 and railway network within and on the edge of the Urban Development Strategy Area within the coastal belt'*. The policy refers to Policy DP/2 Overarching Strategic Approach (as referred to above).
- 5.16.9 In line with the Active Travel Act the policy also requires the planning authority to:
- Promote sustainable modes of transport in line with the Policy STR4 Non-Motorised Travel;
  - Safeguard land to promote accessible communities that encourage integrated sustainable modes of travel;
  - Improve public transport and promote sustainable modes;
  - Promote walking and cycling throughout the Plan Area;
  - The design and construction of walking and cycling facilities and infrastructure and quality and convenient pedestrian crossings will be improved to make walking and cycling more attractive, direct and safe; and
  - Transport schemes which lead to improvements in accessibility will be supported in principle.

### **Policy STR/3: Mitigating Travel Impact**

- 5.16.10 This policy sets out how the planning authority will address undesirable effects of travel such as noise, pollution, impact on amenity and health and other environmental impacts. Where there is need to understand the traffic impact and the transport, social or environmental implications of a proposed development the Council will require developers to submit a Transport Assessment, a Travel Plan and a Road Safety Audit. Where the proposed development is considered to have significant transport implications on a wider area, financial contributions will be required towards improvements in transport infrastructure, in particular to support public transport, cycling and walking, in accordance with the development principles in Section 4 of the LDP.

### **Policy STR/4: Non-Motorised Travel**

- 5.16.11 The Council will support increased levels of non-motorised travel, including cycle use and walking, by ensuring that travel generating developments are located and designed to facilitate and encourage short distance trips between home, work, schools and colleges, other suitable destinations and for leisure. The policy also indicates that detailed designs and layouts should encourage cycling and walking.

### **Strategic Policy CTH/1 – Cultural Heritage**

- 5.16.12 This policy states that the council is committed to protecting and, where appropriate, enhancing its cultural and heritage assets. It seeks to Seeking to *'preserve and, where appropriate, enhance conservation areas'*, historic landscapes, parks and gardens and *'protecting buildings and structures of local importance'*. It also states that a commitment to *'enhancing heritage assets through heritage and regeneration initiatives.'*

### **Strategic Policy CTH/2 – Development Affecting Heritage Assets**

- 5.16.13 The council's intention is to ensure that *'development proposals which affect a heritage asset [the list includes Conservation Areas, Listed Buildings, Historic Landscapes and Parks and Gardens] and/or its setting, shall preserve or, where appropriate, enhance that asset'*.



## Strategic Policy NTE/1 – The Natural Environment and NTE/5 Coastal Zone

- 5.16.14 The importance of the Coast is stressed in this policy, which sets out to conserve and enhance the coastal zone (as part of the natural environment) by regulating development. A key reason is *'to support the wider economic and social needs of the Plan Area'*. The Coastal Zone is specifically defined in Policy NTE/5 (see Figure 5.1). Development will only be permitted where it will not cause various adverse effects on coastal landscape character, nature conservation, tourism or coastal defence.

### Settlement Boundaries

- 5.16.15 In some areas of Conwy the settlement boundaries have been extended to accommodate new allocations for housing. Development outside the new settlement boundaries will not be allowed in these locations in order to protect the natural and historic environment, except in exceptional circumstance for employment and for Affordable Housing for Local Need (AHLN). Llanfairfechan and Penmaenmawr are classified as urban areas (refer to Strategic Policy DP/2) whose settlement boundaries can be amended to reflect the proposed development. The Junction 16 scheme falls outside the settlement boundary of Penmaenmawr but in proximity to its eastern limits.

### LDP Land Allocations in Penmaenmawr

- 5.16.16 The scheme proposals for Junction 16 are geographically limited to a localised area south of the existing A55 road corridor and at the existing Junctions 16 (Penmaenmawr) and Junction 16A (Dwygyfylchi). Therefore, local development plan policies will be considered to a similarly local geographical area and where they may have relevance to the scheme proposals. The policies considered most relevant are summarised in Table 5.7 below, however the Local Planning Authority may consider other policies are relevant and require further consideration.

**Table 5.7: Local Plan Policies Relevant to the Location of the Scheme**

Title of Policy	Policy Reference
Settlement Boundaries	DP/2, HOU/1, HOU/2, HOU/6, EMP/1, EMP/2
Housing Contingency (Conway Road)	HOU/1
Housing Allocation (Site 53 North of Groesffordd)	HOU/1, HOU/2, HOU/3, HOU/4, HOU/5
Housing Allocation (Site 56 off Ysguborwen Road)	HOU/, HOU/2, HOU/3, HOU/4, HOU/5
Green Wedge	NTE/1, NTE/2
Orme View Filling Station (Puffin Café)	EMP/1, EMP/2
Coastal Zone	DP/6, NTE/1, NTE/5 TAN 14 Coastal Planning
Safeguarding Hard Rock and Sand and Gravel resources	MWS/1, MWS/2, MWS/3

### Contingency Housing Allocation – Conway Road (Policy HOU/1)

- 5.16.17 The LDP shows an area of approximately 1.3 hectares allocated as contingency for 15 dwellings (Policy HOU1). The contingency site referred to as Conway Road in the LDP is a rectangular piece of land immediately south of the A55 and approximately 450 m south west of Junction 16. Contingency sites are allocated in the LDP as reserve sites should other land allocated for housing not come forward as anticipated. The current Scheme proposals do not directly affect the site but may have some secondary effects on the area. This area is shown in Figure 5.1.

**Mixed Use Allocation – Site 53 North of Groesffordd (Policies HOU/1, HOU/2, HOU/3, HOU/4 and HOU/5)**

- 5.16.18 The site of approximately 1.28 hectares is allocated for 30 dwellings under the Tier 1 main villages of Dwygyfylchi and falls within the settlement boundary. The site lies between Junction 16 and Junction 16A and east of the residential area of Maes-y-Llan. The site was developed by Beech Homes in 2017 and marketed as Gwel-y-Môr, view of the sea.

**Housing Allocation – Site 56 off Ysguborwen Road (Policies HOU/1, HOU/2, HOU/3, HOU/4 and HOU/5)**

- 5.16.19 The site of approximately 0.5 hectares is allocated for 15 dwellings under the Tier 1 main villages of Dwygyfylchi and falls within the settlement boundary. The site lies between Junction 16 and Junction 16A south east of and adjacent to the A55 and west of the existing residential area of Maes-y-Llan. The current scheme proposals would directly affect the site adjacent to the A55 and reduce the total area allocated, there may also be some secondary effects such as noise on the site due to the realignment of the A55 further south.

**Green Wedge (Strategic policies NTE/1 and NTE/2 and BP/12 Green Barriers Assessment)**

- 5.16.20 The area of green wedge lies between the two settlements of Penmaenmawr and Dwygyfylchi to the east and west of the existing Junction 16 and south of the A55. The scheme proposals encroach within this area through the realignment of the existing Junction 16 and the widening of the A55 road corridor and soft estate north east of the junction. The aim of the policy is to prevent coalescence of the settlements and retain the open character of the area and to enhance the natural environment.

**Orme View Filling Station (Puffin Café – Strategic Policies EMP/1 and EMP/2)**

- 5.16.21 The policies address the need to meet and support employment needs of the county and supporting new employment. The Orme View Filling Station is allocated for employment (B1, B2, B8) with adjacent land to the east (0.5 hectares) allocated for employment contingency should expansion be required. The scheme proposals run to the south of the existing filling station and pass through the area allocated for employment contingency.

**Coastal Zone (Policy NTE/5)**

- 5.16.22 The Policy relates to the coastal zone promenade that lies north of Junction 16 and Junction 16A, the A55 and railway line. The policy seeks to control development along the coastline and recognises that the coastline of Conwy is a significant factor in attracting visitors to the area. *'Due to the role which tourism and recreation plays in the local economy it is important to maintain and enhance the attractiveness of the area through the development of improved facilities.'*

**5.17 Local Planning Policy: Minerals**

- 5.17.1 The plan includes measures intended to safeguard the supply of minerals to meet the needs of industry and the community.

### **Policies MWS/1 and MWS/3 –Safeguarded Sand and Gravel**

- 5.17.2 This Policy applies to an area of land in the coastal zone north of the A55 and railway line and encompassing the area occupied by the Penmaenmawr Water Treatment Works.

### **Policy MWS/3 – Safeguarding Hard Rock Reserves**

- 5.17.3 To the south and west of Penmaenmawr is an extensive area of safeguarded hard rock mineral reserve associated with the existing quarries.
- 5.17.4 The safeguarding policy resists development within the reserves to avoid direct or indirect harm to the long-term viability of working those resources. Exceptions would be if the need for development outweighs the need to protect the mineral resource or; b) Where such development would not have a significant impact on the viability of the mineral being worked or; c) Where the mineral is extracted prior to the development.

### **Snowdonia National Park Authority (SNPA)Policies**

- 5.17.5 The boundary of the Snowdonia National Park Authority lies immediately adjacent to the eastern extent of the scheme at Junction 16A Dwygyfylchi where it reaches north to include Penmaenbach headland, the most northerly part of the Snowdonia National Park. Although the re-alignment associated with the Scheme for Junction 16A extends into the National Park boundary, it is considered unlikely that there will be any direct or significant detriment to the SNPA planning policies. Any indirect or significant effects on the setting of the Snowdonia National Park or Area of Outstanding Natural Beauty (AONB) will be addressed in the individual environmental topic chapters.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 6 GEOLOGY & SOILS**

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## 6. GEOLOGY & SOILS

### 6.1 Chapter Introduction

- 6.1.1 This chapter considers the likely significant effects on and from Geology and Soils associated with the construction and operation of the Scheme. The specific objectives of the chapter are to:
- a) Describe the geology, soils and contaminated land baseline;
  - b) Describe the assessment methodology and significance criteria used in completing the impact assessment;
  - c) Describe the potential effects, including direct, indirect and cumulative effects;
  - d) Describe the mitigation measures proposed to address likely significant effects; and
  - e) Assess the residual effects remaining following the implementation of mitigation.
- 6.1.2 This chapter is supported by:
- a) Appendix 6.1 Envirocheck Report and Historical Ordnance Survey Maps;
  - b) Appendix 6.2 Geotechnics Factual Ground Investigation Report; and
  - c) Appendix 6.3 Contaminated Land Risk Assessment (Table 6.17).
- 6.1.3 For details of the project description, reference should be made to Chapter 2: The Scheme.
- 6.1.4 This assessment assumes the use of standard construction techniques and practices commensurate for works of this nature, and full compliance with UK legislation and guidance including Pollution Prevention Guidelines. The final installation techniques and their sequencing would be determined by the construction works contractor in consultation with the relevant authorities. In addition, incorporated mitigation measures are described which have been included in the Scheme design to reduce identified impacts.
- 6.1.5 As part of the consideration of Geology and Soils the assessment considers designated geological sites, hydrogeology (groundwater), contaminated land, geohazards and geotechnical issues associated with the Scheme.
- 6.1.6 Sites can be designated for their importance in terms of geology, for example, exposures of the rock represent a good example of a particular rock type or contain a specific geological feature.
- 6.1.7 Hydrogeology relates to the groundwater present in the soils and rocks beneath the Scheme. Groundwater is an important resource and is vulnerable to various impacts, particularly those associated with construction. With regards to groundwater it should be noted that whilst this chapter considers groundwater quality and hydrogeology the issue of groundwater and potential influences on surface water are addressed in Chapter 7: Road Drainage and the Water Environment.
- 6.1.8 The presence of contaminated land has the potential to affect both the Scheme and the surrounding environment as a result of Scheme. Although the assessment of contaminated land is not a formal requirement under the Environmental Impact Assessment (EIA) Regulations or specific legislation (Part 2A of the Environmental Protection Act), it is covered by planning guidance and an assessment of contamination has been undertaken to confirm whether any environmental effects could arise.
- 6.1.9 The assessment of geohazards and geotechnical issues is similarly not a formal requirement of the EIA regulations. 'Geohazards' is a term covering a broad range of geological and ground

related hazards such as landslips, underground mining and compressible soils. Geotechnical issues dictate the foundation design for the Scheme which could lead to environmental effects.

- 6.1.10 Consideration of agricultural land classification has been addressed within Chapter 11: Community and Private Assets.

## **6.2 Legislation, Policy Context**

- 6.2.1 This section outlines the legislation, policy and guidance relevant to the assessment of potential effects on and from geology and ground conditions associated with the Scheme based on the following:
- a) National Legislation and Policy;
  - b) Local Planning Policy; and
  - c) Guidance and Industry Standards.

### *National Legislation*

#### Geological features

- 6.2.2 Geological features can have protected status nationally. National legislation relating to geological sites is limited but it is covered by:
- a) Countryside Act 1968;
  - b) Wildlife and Countryside Act 1981 (as amended); and
  - c) Environment Act 1995.
- 6.2.3 Nationally Protected Sites are designated as Sites of Special Scientific Interest (SSSI) and/or as part of National Nature Reserves (NNR).

#### Hydrogeology

- 6.2.4 Regarding groundwater, the following national legislation is relevant:
- a) European Community Groundwater Directive (2006/118/EC) on the protection of groundwater against pollution caused by certain dangerous substances.
  - b) European Union (EU) Water Framework Directive (2000/60/EC); and
  - c) Environmental Permitting Regulations (EPR) (2010) and amendments.
- 6.2.5 Under the Water Framework Directive (WFD), the Environment Agency has divided the UK into a series of River Basin Districts and has prepared River Basin Management Plans (RBMPs) for each. These documents set out the current situation within each District, with respect to the key objectives, and discuss how they can be met in order to comply with the WFD, and if not, why not. As well as surface water features, groundwater is also included under the RBMPs.

#### Contaminated Land

- 6.2.6 The following national legislation and policies are relevant to contaminated land issues:
- a) Part 2A of the Environmental Protection Act (EPA), 1990; and
  - b) Contaminated Land (Wales) Regulations 2006
  - c) Contaminated Land (Wales) (Amendment) Regulations 2012.

- 6.2.7 UK legislation on contaminated land is principally contained within Part 2A of the Environmental Protection Act 1990 which establishes a legal framework based on the principle of a 'suitable for use' approach taking into account the land use and environmental setting, with remedial action only required where there are unacceptable risks to human health and/or the environment.
- 6.2.8 Part 2A of the Environmental Protection Act 1990 was implemented by The Contaminated Land (England) Regulations 2006 and accompanying statutory guidance (DEFRA, 2012). Part 2A takes a risk-based approach to defining contaminated land, in the statutory guidance "risk" means the combination of:
- a) The likelihood that harm, or pollution of water, will occur as a result of contaminants in, on or under the land; and
  - b) The scale and seriousness of such harm or pollution if it did occur.
- 6.2.9 For a risk to exist there needs to be one or more contaminant source-pathway-receptor linkages by which a relevant receptor might be affected by a contaminant(s). For land to be determined as 'contaminated' under the legislation and, therefore, require remedial action, all three elements of a contaminant linkage must be present. There is a test of the significance on the receptor which requires that there is evidence that:
- a) Significant harm is being caused.
  - b) There is a possibility of significant harm being caused; and/or
  - c) Pollution of controlled waters is being, or is likely to be, caused.
- 6.2.10 The statutory guidance indicates that normal background levels of contaminants in soil should not be considered to qualify as contaminated land.
- 6.2.11 Part 2A requires local authorities to inspect their areas with a view to identifying contaminated land, and to do this in accordance with the statutory guidance. Under Part 2A, risks should be considered only in relation to the current use of the land. When considering risks in relation to any future use or development, the local authority should assume this would be carried out under the planning regime.

### *National Policy - Planning Policy Wales*

#### Geological Features

- 6.2.12 Planning Policy Wales (PPW) notes that planning authorities should protect the features and qualities for which Geoparks and Regionally Important Geodiversity Sites (RIGS) have been designated and are encouraged to promote opportunities for the incorporation of geological features within the design of development.
- 6.2.13 PPW also notes that some statutory SSS are also designated for their nationally important geological or geomorphological features, and that planning authorities have a duty to further the conservation and enhancement of these features.

#### Contaminated Land

- 6.2.14 PPW provides a number of policies relating to contaminated land.
- 6.2.15 When considering development proposals PPW indicates planning authorities should take into account the nature, scale and extent of surface and subsurface hazards which may pose risks to health and environment, to ensure that:
- a) New development is not undertaken without an understanding of the risks, including those



- associated with the previous land use, pollution, groundwater, subsidence, landslips, rock falls, mine and landfill gas emissions and rising groundwater from abandoned mines;
- b) development does not take place without appropriate remediation or precautions; and
- c) consideration is given to the potential impacts which remediation of land, including land contamination, might have upon the natural and historic environment.

- 6.2.16 Planning authorities should take into account the nature, scale and extent of land contamination which may pose risks to health and the environment so as to ensure the site is capable of effective remediation and is suitable for its intended use. In doing so, development management decisions need to take into account:
- a) potential hazard that contamination presents to the development itself, its occupants and the local environment; and
  - b) the results of a specialist investigation and assessment by the developer to determine the contamination of the ground and to identify any remedial measures required to deal with any contamination.
- 6.2.17 PPW notes there are two areas of interface between the planning system and the contaminated land regime; where land is already designated as contaminated land under Part 2A and the owner wishes subsequently to develop the land, and the second where a development proposal may introduce changes to a site which may result in land potentially meeting the definition of contaminated under Part 2A.
- 6.2.18 In both circumstances, PPW notes that the onus remains with the developer to ensure that the development of the site will remove any unacceptable risks and the planning authority in making development management decisions will need to ensure that the land is suitable for its proposed use and would not meet the legal definition of contaminated land under Part 2A.

#### Ground Instability

- 6.2.19 When considering development proposals PPW consider that planning authorities should take into account the nature, scale and extent of ground instability and that planning decisions will need to take into account the potential hazard that instability could create to the development itself, to its occupants and to the local environment.

#### *Conwy Local Development Plan 2007-2022 Adopted October 2013*

#### Geological Features

- 6.2.20 Geological features can have protected status locally. Regional or local sites that are not legally protected can be taken into account by planning authorities; these sites are known as Local Geological Sites (formerly known as Regionally Important Geological and Geomorphological Sites or RIGGS) and have a similar status to Sites of Importance to Nature Conservation (SINCs or SNCIs).
- 6.2.21 Strategic Policy NTE/1 of the Conwy Local Development Plan relates to the natural environment and indicates the Council will seek to regulate development so as to conserve and, where possible, enhance the Plan Area's natural environment, countryside and coastline. With regards to geological features this policy indicates this will be achieved by measures including:
- a) Safeguarding the Plan Area's biodiversity, geology, habitats, history and landscapes through the protection and enhancement of sites of international, national, regional and local importance, in line with Policy DP/6 which relates to development proposals complying with national planning policy and guidance';

b) Protecting the Coastal Zone in line with Policy NTE/5 – ‘The Coastal Zone’.

- 6.2.22 Strategic Policy NTE/1 indicates that geodiversity relates to geological and geomorphological features. Such features include the Little Orme, which hosts a limestone pavement, and Llanddulas caves (both of which are outside of the Scheme). Some sites have statutory protection such as Sites of Special Scientific Interest. In addition, Regionally Important Geological Sites (RIGGS) are designated by regional groups on the basis of their scientific, educational, historic and aesthetic value. Planning applications that are likely to impact on these areas will be subjected to Policy DP/6.
- 6.2.23 Policy DP/6 which relates to national planning policy and guidance, subjects all planning applications to up-to-date planning guidance to avoid unnecessary repetition throughout the LDP.

#### Contamination

- 6.2.24 No specific policy has been included within the Local Development Plan (LDP) which relates to contaminated land.
- 6.2.25 Strategic Policy NTE/1, which relates to the natural environment, indicates the Council will seek to regulate development so as to conserve and, where possible, enhance the Plan Area’s natural environment, countryside and coastline. One of the measures indicated relates to “preventing, reducing or remedying all forms of pollution including air, light, noise, soil and water, in line with Policy DP/6.”
- 6.2.26 Strategic Policy DP/1 relates to sustainable development principles and indicates development proposals should also where appropriate *‘protect the quality of natural resources including water, air and soil in line with Strategic Policy NTE1.’*

#### Instability

- 6.2.27 Policy NTE/5 – The Coastal Zone considers the undeveloped coast will be protected as it will rarely be the most appropriate location for new development. The developed coast, by contrast, may provide opportunities for restructuring and regenerating existing urban areas. Where new development requires a coastal location, the developed coast will normally provide the best option, provided that due regard is paid to the risks of erosion, flooding or land instability.

#### Geohazards

- 6.2.28 The concept of “geohazards” covers a wide range of potential ground conditions that could affect a development or be affected by development. There is not a defined list of what constitute geohazards in any legislation or guidance, however, for the purposes of this assessment, the following have been considered:
- a) Brine Compensation Areas;
  - b) Coal Mining Affected Areas;
  - c) Mining Instability;
  - d) Potential for Collapsible Ground Stability Hazards;
  - e) Potential for Compressible Ground Stability Hazards;
  - f) Potential for Ground Dissolution Stability Hazards;
  - g) Potential for Landslide Ground Stability Hazards;
  - h) Potential for Running Sand Ground Stability Hazards;
  - i) Potential for Shrinking or Swelling Clay Ground Stability Hazards;

- j) Unexploded Ordnance; and
- k) Radon Affected Areas.

### Geotechnical Issues

- 6.2.29 Ground conditions influence geotechnical design, in particular the design of foundations, for example, in areas of soft ground. This area is covered by British Standards and Eurocodes.

## **6.3 Relevant Guidance**

### *Land Contamination: Risk Management*

- 6.3.1 Contaminated Land Report (CLR) 11 'Model procedures for the management of land contamination - contaminated land report' provides the technical framework for structured decision making about land contamination. CLR 11 is due to be withdrawn and replaced early in 2020 by guidance 'Land contamination: risk management' although the scope, framework and purpose will remain the same as this is based on CLR 11. Guidance provided in CLR 11 advocates a phased approach to risk assessment comprising:
- a) Tier 1: Preliminary Risk Assessment (PRA) – first tier of risk assessment that develops the outline conceptual model (CM) and establishes whether there are any potentially unacceptable risks;
  - b) Tier 2: Generic Quantitative Risk Assessment (GQRA) – carried out using generic assessment criteria and assumptions to estimate risk; and
  - c) Tier 3: Detailed Quantitative Risk Assessment (DQRA) – carried out using detailed site-specific information to estimate risk.
- 6.3.2 Each of tier of the risk assessment follows the same basic steps but adds site specific details and further certainty into the assessment as the stages progress. The steps comprise:
- a) Identify the hazard - establish contaminant sources.
  - b) Assess the hazard - use a source-pathway-receptor (S-P-R) pollutant linkage approach to find out if there is the potential for unacceptable risk.
  - c) Estimate the risk - predict what degree of harm or pollution might result and how likely it is to occur by using the tiered approach to risk assessment.
  - d) Evaluate the risk - decide whether a risk is unacceptable.

### *British Standards*

- 6.3.3 BS10175:2011+A2:2017 provides recommendations and guidance relating to the investigation of land potentially affected by contamination and land with naturally elevated concentrations of potentially harmful substances, to determine or manage any risks.

### *Design Manual for Roads and Bridges (DMRB)*

- 6.3.4 LA 109 Geology and Soils of the DMRB provides guidance on the requirements for considering the potential effects of highways projects on soils and rocks along with effects from contamination on human health, groundwater and surface water. Reference is also provided to RIGS, Local Geological / Geodiversity Sites.

### *Other Sources*

- 6.3.5 A number of sources have been used to assess the soil and groundwater contamination and the ground gas results in the Baseline section, these have been referenced below:
- a) DEFRA, March 2014. The Development of Category 4 Screening Levels (C4SL) for Assessment of Land Affected by Contamination;
  - b) LQM/CIEH, 2014. Suitable 4 Use Levels (S4ULs);
  - c) The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015;
  - d) The Water Supply (Water Quality) Regulations 2010;
  - e) The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015
  - f) BS3882 2015 Specification for topsoil;
  - g) BRE Special Digest 1 (2005) Concrete in aggressive ground;
  - h) Health and Safety Executive in Workplace Exposure Limits HSE EH40/2005; and
  - i) BR211, 2015. Radon Guidance on protective measures for new buildings.
  - j) Series 600 Earthworks Manual of Contract Documents for Highway Works Volume 1 Specification for Highway Works (February 2016 Amendment); and
  - k) Series NG 600 Earthworks Notes for Guidance on the Specification for Highway Works Volume 2 (February 2016 Amendment).

## **6.4 Study Area**

- 6.4.1 The assessment has been undertaken for the Scheme construction works area and up to 500 m. The key justification for this 500 m buffer is to identify potential historical land uses which may have contributed to contamination issues within the area and potentially sensitive land uses in the surrounding area that could be impacted if contaminants were mobilised. It is considered that other geological and ground condition issues are also covered by such a buffer.

## **6.5 Methodology**

- 6.5.1 The methodology outlined below is considered to be applicable for the construction and operational stages.

### *Definition of Study Area*

### Scope of the Assessment

- 6.5.2 The scope of this assessment comprised the following:
- a) A review of whether any protected geological features were likely to be impacted by the Scheme;
  - b) A review of historical land uses and potentially contaminative land uses;
  - c) A review of the geological and hydrogeological setting;
  - d) A review of the mining history of the area and potential implications on the Scheme;
  - e) A review of geo-hazard issues and the associated implications on the Scheme or potential effects arising from the Scheme;
  - f) A review of the existing potential for ground gas and radon;
  - g) A review of the potential for encountering Unexploded Ordnance (UXO);
  - h) A review of environmental regulatory information relating to issues such as waste management, industrially permitted sites, water abstractions and discharges;
  - i) Review of information obtained from the 2019 ground investigation and historical ground investigations;

- j) Consultation with the Conwy County Borough Council Contaminated Land Officer and Natural Resources Wales ;
- k) Consultation and liaison with Network Rail during design and construction; and
- l) Undertake a review of the proposed works for the construction and operation phases against the baseline information and provide an assessment of the potential impacts and mitigation measures that might be required.

### Desk-based Assessment

- 6.5.3 A review of published information on historical site uses and environmental conditions relating to the Scheme was undertaken. The assessment considered:
- a) Protected geological features;
  - b) Historical land use and potentially contaminative land uses;
  - c) Geological and hydrogeological setting;
  - d) The potential for mining and implications for the Scheme;
  - e) Potential geohazards issues and the associated implications on the Scheme or potential effects arising from the Scheme;
  - f) The potential for ground gas and radon;
  - g) Environmental regulatory information relating to issues such as waste, industrially permitted sites, water abstractions and discharges; and
  - h) Potential for UXO.
- 6.5.4 Information was obtained from the following sources:
- a) Landmark Envirocheck Environmental Database Information (referred to as the “Envirocheck Report” in this chapter) (included as Appendix 6.1);
  - b) Historical Ordnance Survey (OS) Maps provided with the Envirocheck Report;
  - c) British Geological Survey (BGS) including maps and historical borehole logs;
  - d) Environment Agency Groundwater Vulnerability Map and Source Protection Zones provided with the Envirocheck Report;
  - e) Zetica Unexploded Bomb Risk Map<sup>1</sup>;
  - f) Geotechnics, September 2019. Ground Investigation A55 Junctions 15 and 16 Improvements. Prepared for Ramboll UK.

### Historical Ground Investigation

- 6.5.5 The following previous ground investigation information has been obtained for the Scheme which were carried out to inform the design and construction of the existing A55:
- a) Ground Engineering Ltd, 1979. North Wales Coast Road A55. Stage III Morfa Conwy to Aber Site Investigation – Contract F. Prepared for R. Travers Morgan & Partners
  - b) Terresearch Ltd, March 1983. North Wales Coast Road A55 Stage 3 - Llanfairfechan Contract K. Prepared for Transport and Highways Group, Welsh Office.
  - c) Norwest Holst Soil Engineering Ltd, March 1985. Site Investigation Report - North Wales Coast Road (A55) - Stage 3 - Pen y Clip / Llanfairfechan Site Investigation Contract S. Stage 1 – Llanfairfechan Volume 1 Factual Report. Prepared for Welsh Office.
  - d) Norwest Holst Soil Engineering Ltd, March 1985. Site Investigation Report - North Wales Coast Road (A55) - Stage 3 - Pen y Clip / Llanfairfechan Site Investigation - Contract S. Stage 1 – Llanfairfechan Volume 2 Interpretative Report. Prepared for Welsh Office.

<sup>1</sup> <https://zeticauxo.com/downloads-and-resources/risk-maps/>

- 6.5.6 The exploratory hole records are also provided on the British Geological Survey website <sup>2</sup>.

#### Site Walkover and Surveys

- 6.5.7 Site walkovers have been undertaken on the 25<sup>th</sup> September 2018. Additional site visits were undertaken during the ground investigation from May to August 2019.

#### *Method of Baseline Data Collection*

#### Ground Investigation Information

- 6.5.8 An intrusive investigation was completed by Geotechnics in 2019 to obtain information on contamination and geotechnical data along the alignment of the Scheme. The ground investigation was based on the findings of desk-based information and construction proposals.
- 6.5.9 This investigation comprised:
- a) 24 no. cable percussion boreholes (BH201 to BH228 <sup>3</sup>) up to 27.00m bgl;
  - b) 8 no. windowless sample boreholes (WS201 to WS207) up to 5.45m bgl; and
  - c) 12 no. machine excavated trial pits (TP201 to TP212) up to 4.20m bgl.
- 6.5.10 Combined gas and groundwater monitoring wells were installed at the following locations:

**Table 6.1: Monitoring Well Installation Details**

Monitoring Well	Response Zone Depth (m bgl)	Strata Screened
BH201	1.0-6.5	Made Ground / Clay
BH202	11.0-14.7	Gravelly Clay / Gravel
BH204A	8.0-10.0	Gravelly Clay
BH210	5.0-8.0	Clay, Sand and Gravel
BH212	6.0-12.0	Sand
BH213	15.0-20.0	Gravel, Cobbles, Boulders
BH216A	10.0-15.0	Very gravelly Clay
BH217	3.0-8.0	Sandy Clay and Gravel
BH218	6.0-8.0	Sand
BH219	5.0-9.0	Gravelly Clay, Clay and sandy Clay
BH220A	10.0-12.70	Sand and gravelly Clay
BH221	1.0-6.0	Gravelly Clay
BH228	7.0-9.0	Gravelly Clay
WS201	1.5-4.5	Made Ground
WS202	1.0-3.5	Made Ground
WS203	1.0-5.0	Made ground and gravelly Clay

<sup>2</sup> Geoindex Onshore: <http://mapapps2.bgs.ac.uk/geoindex/home.html>

<sup>3</sup> List of boreholes drilled: BH201 to BH205, BH204A, BH205A, BH205B, BH205C, BH207 to BH210, BH212, BH213, BH216 to BH221, BH216A, BH220A, BH228

Monitoring Well	Response Zone Depth (m bgl)	Strata Screened
WS204	1.0-5.0	Made Ground
WS205A	1.0-3.0	Made Ground
WS207	1.0-5.0	Made Ground and gravelly Clay

- 6.5.11 Soil and groundwater samples were taken during the site works and tested for a range of potential contaminants.

#### Soil

- 6.5.12 A total of 56 no. soil samples were tested for parameters from the following suite:
- Metals (see list below)<sup>4</sup>;
  - pH;
  - Water soluble sulphate;
  - Total organic carbon;
  - United States Environmental Protection Agency (USEPA) speciated 16 polycyclic aromatic hydrocarbons (PAHs); and
  - Petroleum hydrocarbons – as Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG).
- 6.5.13 A selected number of soil samples were also analysed for the following:
- Asbestos screen (37 no.);
  - Volatile Organic Compounds (VOCs) (9 no.);
  - Semi-Volatile Organic Compounds (SVOCs) (9 no.);
  - Cyanide (9 no. Total and Free);
  - Phenols (10 no.); and
  - USEPA speciated 16 polycyclic aromatic hydrocarbons (PAHs) – road cores (6 no.).

#### Soil Leachate

- 6.5.14 A total of 15 no. soil samples were tested for the following parameters following leachate preparation (BS EN 12457 2:1 extract):
- Metals (see list for soils above)
  - pH
  - Sulphate
  - Total organic carbon
  - PAHs
  - Petroleum hydrocarbons – as TPHCWG
  - Hardness
  - Conductivity
  - Ammoniacal Nitrogen
- 6.5.15 A selected number of soil leachate samples were also analysed for the following:
- Semi-Volatile Organic Compounds (SVOCs) (5 no.);
  - Total cyanide (5 no.)
  - Monohydric Phenols (4 no.)

<sup>4</sup> Metals suite: arsenic, antimony, barium, boron, cadmium, chromium (III and VI), copper, lead, mercury, nickel, selenium, vanadium and zinc.

### Groundwater

6.5.16 A total of 14 no. groundwater samples were tested for the following parameters:

- a) Metals (see list for soils)
- b) pH
- c) Sulphate
- d) Sulphide
- e) Total organic carbon
- f) PAHs
- g) Petroleum hydrocarbons – as TPHCWG
- h) Hardness
- i) Conductivity
- j) Ammoniacal Nitrogen

6.5.17 A selected number of groundwater samples were also analysed for the following:

- a) Volatile Organic Compounds (SVOCs) (9 no.)
- b) Semi-Volatile Organic Compounds (SVOCs) (9 no.)
- c) Total Cyanide (7 no.)

### Groundwater Level and Ground Gas Monitoring

6.5.18 Five rounds of groundwater level and ground gas monitoring have been undertaken on the following dates:

- a) 8<sup>th</sup> July 2019
- b) 23<sup>rd</sup> July 2019
- c) 6<sup>th</sup> August 2019
- d) 14<sup>th</sup> August 2019
- e) 28<sup>th</sup> August 2019

6.5.19 The following parameters were recorded:

- a) Methane (%) – peak and steady state
- b) Carbon dioxide (%) – peak and steady state
- c) Oxygen (%) – peak and steady state
- d) Hydrogen sulphide (parts per million (ppm)) – peak and steady state
- e) Carbon monoxide (ppm) – peak and steady state
- f) Flow rate (litres / hour) – peak and steady state
- g) Water level (metres below ground level (m bgl))
- h) Barometric pressure (millibars (mb))

## **6.6 Significance Criteria**

6.6.1 This section sets out the methodology by which the impacts have been assessed include tables which outlining how the sensitivity of the receptor and magnitude of impact have been defined.

### *Sensitivity Criteria*

6.6.2 There are no formal guidance documents defining a framework for the specific assessment of impacts with regard to geology and soils. Some aspects of this assessment, for example, contaminated land, do have a structured approach based on risk assessment and where appropriate this has been taken into account in making the assessment. Therefore, conclusions have been drawn on the significance of each effect through reference to relevant legislation and professional judgement.



- 6.6.3 In determining whether an effect is significant or not, the sensitivity of the receptor and the magnitude of the impact are combined. Sensitivity, magnitude and significance criteria were developed for the geology and soils baseline for the Scheme. These are detailed in Tables 6.2 to 6.4.

Table 6.2: Sensitivity Criteria

Sensitivity	Criteria
<b>Negligible</b>	Designated Geological Sites: not a designated geological site. Hydrogeology: Receptor is unproductive strata in hydrogeological terms. Geotechnical: Development not sensitive to ground movement
<b>Low</b>	Hydrogeology: Receptor is a Secondary B aquifer. Contaminated Land: No contamination present. Low sensitivity land use in terms of contamination. Geohazards: No evidence of geohazard/s on the Scheme, within 100 m depth beneath the Scheme or within 250m. Geotechnical: Development has low sensitivity or not sensitive to low levels of ground movement.
<b>Medium</b>	Designated Geological Sites: Receptor is locally designated for its geological importance via the planning authority (Local Geological Sites). Hydrogeology: Receptor is a Secondary A aquifer or other aquifer providing water for agricultural or industrial uses with limited / local connection to surface water. Contaminated Land: Contamination present but unlikely to represent Significant Harm or SPOSH*. Moderate sensitivity land use in terms of contamination**. Geohazards: Geohazard/s are present in the vicinity but are unlikely to be present in the Scheme, within 30 m to 50 m of the ground surface beneath the Scheme or within 50 m of the Scheme. Geotechnical: Development has moderate sensitivity to ground movement.
<b>High</b>	Designated Geological Sites: Receptor designated for its geological importance on a national (SSSI/NNR) or international basis. Hydrogeology: Receptor is a Principal aquifer providing locally important resource or supporting a river ecosystem. Contaminated Land: Contamination present and is likely to represent Significant Harm or SPOSH. High sensitivity land use in term of contamination**. Geohazards: Geohazard/s present within the Scheme, or at depths of less than 30 m beneath the Scheme or within 50 m of the Scheme. Geotechnical: Development highly sensitive to ground movement.
<b>Very High</b>	Hydrogeology: Receptor is a Principal aquifer providing a regionally important resource and / or supporting a site protected under UK and EC legislation for ecology and nature conservation. Contaminated Land: Site designated as Part IIA statutory contaminated land. High sensitivity land use in term of contamination**. Geohazards: Geohazard/s present at shallow depth beneath the Scheme and / or adjacent to the Scheme. Geotechnical: Scheme highly sensitive to ground movement which is likely to result in structural failure.
<p>* Significant Possibility of Significant Harm (SPOSH) is a term defined in the statutory guidance for contaminated land and defines the intervention level where a remediation notice can be served.</p> <p>** If either of these situations exists, a Contaminated Land Qualitative Risk Assessment is needed to assess whether significant harm or a significant possibility of significant harm (SPOSH) exists.</p> <p>Groundwater sensitivity takes account of guidance provided within DMRB LA113 for estimating the importance of water environment attributes but this has been modified for the sensitivity categories within the Junction 15 EIA Scoping Report.</p>	

### Designated Geological Sites

- 6.6.4 This aspect considers the sensitivity and potential impacts on sites protected because of their geological importance. Impacts could arise from direct damage to such features though it also possible that construction works can be beneficial, for example, forming new rock exposures in cuttings.

### Hydrogeology

- 6.6.5 This aspect considers the sensitivity and potential impacts on groundwater resources. These could arise from alterations in site conditions or from contamination or changes in hydrology but could also be direct impacts from construction, for example, loss of fuels or oils into an important aquifer. In this respect there are links between hydrogeology, contaminated land and hydrology. Therefore, whilst this heading considers groundwater quality and hydrogeology the issue of groundwater flooding and potential influences on surface water are addressed in Chapter 7.

### Contaminated Land

- 6.6.6 This aspect addresses the risks specifically associated with historic contamination that may be present in the Scheme including potential impacts on human health, ecology and other sensitive receptors.
- 6.6.7 The sensitivity criteria consider two aspects of contamination, firstly whether significant harm or a significant possibility of significant harm (SPOSH) is likely to be present or not. This links to Part 2A of the Environmental Protection Act that covers the concept of statutory contaminated land and cases where remediation may be needed regardless of whether the Scheme is developed or not. The second aspect is the sensitivity of the Scheme in terms of the end use. Low sensitivity end uses would be ones not used extensively by humans or ones where the Scheme is unlikely to give rise to exposure to contamination. Moderate sensitivity land uses are considered to be commercial / industrial land uses (as discussed in current guidance) whilst high sensitivity end uses would be residential land uses.
- 6.6.8 Under current guidance and best practice, the assessment of the effects of contamination is based on risk assessment. If contamination is present then a qualitative risk assessment would be required in addition to any impact assessment, for the purposes of the EIA it has been assumed that this would be necessary for all sites with a moderate or high sensitivity end use.
- 6.6.9 Contaminated land links to geotechnics since some geotechnical engineering activities (particularly piling) have the capability to alter risks/impacts.
- 6.6.10 This chapter utilises desk study information and information from a ground investigation in order to assess the potential impacts from contaminated land.

### Geohazards

- 6.6.11 This aspect represents a range of potential ground related hazards including mine workings, ground dissolution, slope stability and collapsible / compressible soils (including peat). Such features can represent a risk to human life, for example, where construction works cause slope failures, or may affect the construction work needed to carry out a project. Mine workings represent a particular issue as not only can they affect construction requirements, they can also cause environmental impacts if they are affected by construction work.
- 6.6.12 Desk study information, information from recent and historical ground investigations have been used to inform the assessment of geohazards.

### Geotechnical Issues

- 6.6.13 Ground conditions can influence road pavement and structures foundation design. These have not been explicitly covered in the assessment. However, the ground conditions define the geotechnical requirements of the Scheme, and these activities can give rise to environmental impacts. The options that might be used for the Scheme have formed the basis for the assessment of various issues including contaminated land and geo-hazards.

### *Impact Magnitude*

- 6.6.14 The criteria used to determine the magnitude of a potential impact is defined in Table 6.3. Assessment of magnitude includes consideration of the amount and intensity of disturbance and duration, such as whether it is temporary or permanent.

**Table 6.3 Magnitude Criteria**

<b>Magnitude</b>	<b>Geologically Protected Area / Hydrogeology</b>
<b>No Change</b>	No change from baseline conditions.
<b>Negligible</b>	Very minor change from baseline conditions.
<b>Minor</b>	Some detectable change to protected geological site or hydrogeological conditions. Development changes site conditions and resulting exposure to contamination represents a low risk to receptors* Development unlikely to be affected by geohazard/s and unlikely to alter any geohazard/s on or near the site.
<b>Moderate</b>	Evident change to protected geological site or hydrogeological conditions resulting in temporary or consequential changes to baseline. Development changes site conditions and resulting exposure to contamination represents a moderate risk to receptors* Development may be affected by geohazard/s or could alter a geohazard/s on or near the development.
<b>Major</b>	Large scale change to protected site or hydrogeological receptor. Change likely to be permanent / long term. Development changes site conditions and resulting exposure to contamination represents a high or very high risk to receptors* Development represents a near or certain probability of encountering geohazard/s and/or altering geohazard/s over a wider area.

\* Based on the risk definitions in CIRIA C552 (2001).<sup>5</sup> using a qualitative risk assessment.

### *Significance Criteria*

- 6.6.15 The following information has been considered as part of considering the significance of the effects:
- Status of the effect (beneficial or adverse);
  - Duration of the effect (short or long term);
  - Permanent or Temporary;
  - Direct or Indirect; and
  - Significance (significant or not significant).

<sup>5</sup> Rudland, D. J., Lancefield, R. M., and Mayell, P. N., 2001. Construction Industry Research and Information Association (CIRIA) C552 Contaminated Land Risk Assessment - A Guide to Good Practice.

- 6.6.16 There are no formal guidance documents detailing specific assessment criteria of effects with regards to geology and soils. However, conclusions can be drawn on the significance of each effect through reference to relevant EIA legislation and guidance, professional judgment, evaluation against the effect assessment criteria detailed below.

#### Status of the Effect

- 6.6.17 The status of the effects have been assessed by considering whether the Scheme would have a beneficial or adverse effect on the receptor, and whether the Scheme would lead to a change in exposure.

#### Timescales

- 6.6.18 In assessing the effect, the likely length of the effect has been considered. These have been summarised under the following timescales:
- a) Short term – construction phase which is anticipated to be approximately 22 months; and
  - b) Long term – operational phase.

#### Permanent or Temporary

- 6.6.19 In assessing whether an effect is permanent, the effect would be regarded as one which is not reversible and would last for the lifespan of the Scheme and beyond.
- 6.6.20 A temporary effect was considered to be one that is reversible or where it ceases to be an issue at some point during the Scheme.

#### Direct or Indirect

- 6.6.21 Direct effects are considered to arise from activities associated with the Scheme.
- 6.6.22 An indirect effect is one which is not considered to arise directly from the Scheme or one which is already present and may continue after it has been constructed.

#### Significance of Effect

- 6.6.23 Significance has been assessed using the matrix in Table 6.4. Consideration has been given to the need for mitigation measures for moderate and above effects.
- 6.6.24 The combination of magnitude and sensitivity have been combined to provide a matrix categorisation of effect. Effects considered to be significant are classed as 'moderate' or greater. These are showing in Table 6.4

**Table 6.4: Significance Criteria**

		Magnitude of Impact Degree of change)				
		No change	Negligible	Minor	Moderate	Major
Sensitivity (or value)	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or large
	High	Neutral	Slight	Slight or Moderate	Moderate or large	Large or Very Large
	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large

### *Assessment for Contaminated Land*

- 6.6.25 Current guidance and best practice for the assessment of contaminated land is based on risk assessment. Under current guidance risk assessment is based on the "Source - Pathway - Receptor" approach. This risk assessment can be either qualitative or quantitative.
- 6.6.26 For a risk to be considered plausible a pollutant linkage must be "present and operating", i.e. all three components of the model need to be present. The aim of the risk assessment is to identify, on a qualitative basis, the extent to which linkages may be present and the risks associated with them.
- 6.6.27 The assessment of whether Source – Pathway – Receptor linkages are present is based on a Conceptual Site Model (CSM) developed specifically for the Scheme. A CSM has been developed for the Scheme to confirm the extent to which any linkages may be present.
- 6.6.28 If no contamination sources are considered to be present then the risk assessment has not been developed any further than the CSM. Scenarios have been assessed for the construction and operational phases.
- 6.6.29 This approach is considered to be consistent with current guidance and best practice and results in a proportionate approach to assessing contamination and to addressing sites where contamination is very unlikely to be present.

### *Limitations to Assessment*

- 6.6.30 Interpretation of the ground conditions has been undertaken using exploratory hole records from the 2019 ground investigation. It is possible there could be some variations between the ground conditions encountered in the Scheme.

## 6.7 Consultations

- 6.7.1 Table 6.5 below summarises the consultation responses received regarding Geology and Soils and provides information on where and/or how they have been addressed in this assessment.

**Table 6.5: Consultation Responses**

Consultee and Date	Type of Consultation	Issue/s Raised	Response/Action Taken
Conwy County Borough Council (Simon Cottrill, Principal Environment Officer, Regulatory and Housing Services) 28 <sup>th</sup> November 2019	Telephone call	Initial discussion relating to Council records on areas of potential contamination within the Scheme.	Discussion indicated known areas of potential contamination had been identified.  Arrange meeting to discuss potential contamination issues relating to the Scheme.
Conwy County Borough Council (Simon Cottrill, Principal Environment Officer, Regulatory and Housing Services) 5 <sup>th</sup> December 2019	Meeting	Discussion on records held by the Council relating to areas of potential contamination and historical evidence obtained as part of the ES preparation.  Discuss information obtained from recent and historical ground investigation and potential risks identified relating to the Scheme.	Discussion indicates that known areas of potential contamination have been covered.  No potential significant additional issues relating to ground conditions / contamination and the proposed works were identified from the meeting.  Council to review ES Chapter when submitted.

### *Potential Effects Scoped Out of Assessment*

- 6.7.2 The decommissioning phase has been scoped out of the scope of the assessment for Geology and Soils.

## 6.8 Baseline Environment

- 6.8.1 This section contains the environmental assessments for Junction 16. A summary of the likely significant effects associated with the Scheme, the proposed mitigation and any residual effects is included in Section 6.9.

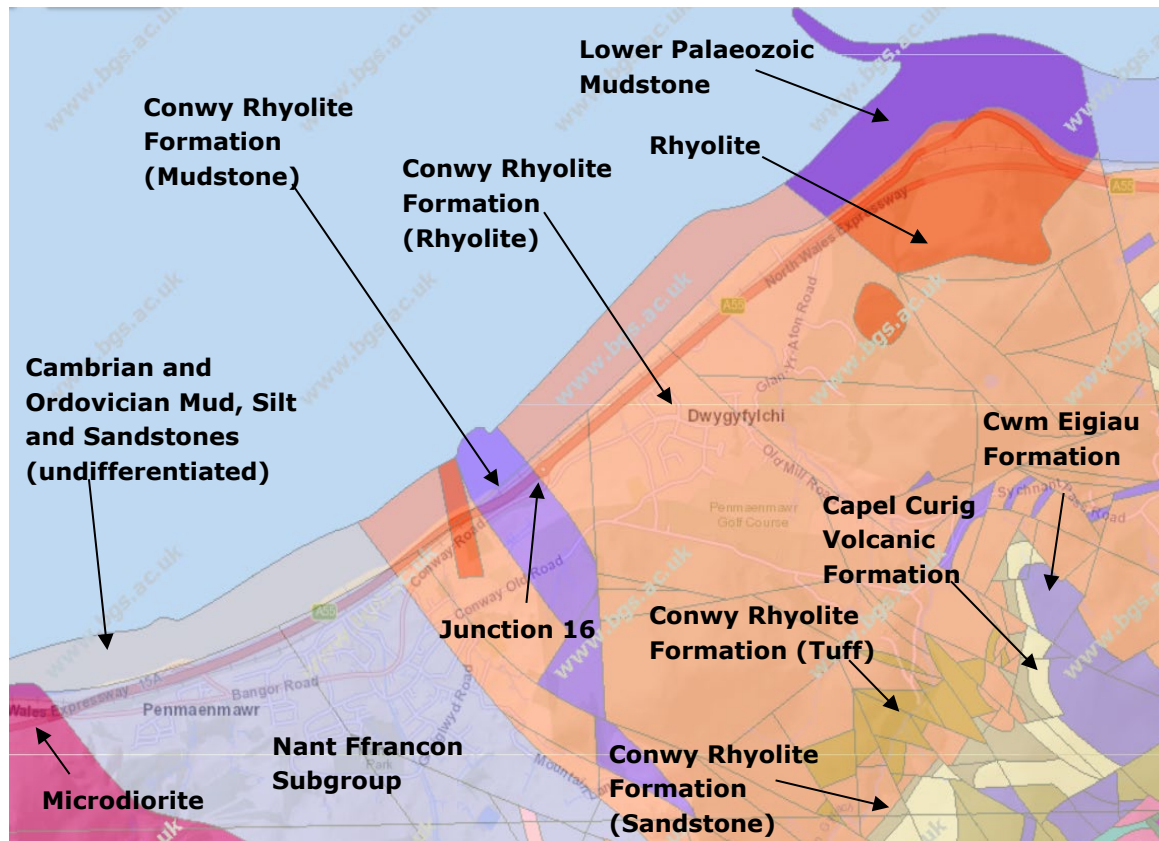
### *Geology*

- 6.8.2 The British Geological Survey 'Geology of Britain Viewer' and 1:50,000 geological map shows that the solid geology within the Scheme mostly comprise Mudstone and Rhyolite of the Conwy Rhyolite Formation, which are Ordovician in age. Unnamed Rhyolite intrusions of Ordovician age are located in the eastern and western parts of the Scheme.
- 6.8.3 Approximately 110m to the west of the Scheme, the bedrock comprises siltstone of the Nant Ffrancon subgroup, which is Ordovician in age.
- 6.8.4 Bedrock below the sea to the north of the Scheme is mostly continuous with that beneath the Scheme, with Lower Palaeozoic mudstone to the north, and mudstone, siltstone and sandstone of Cambrian and Ordovician (undifferentiated) age to the north west.
- 6.8.5 The near surface superficial deposits in the Scheme comprise mainly Devensian Till (glacial till)

comprising Diamicton which is Quaternary in age, which the British Geological Survey <sup>6</sup> indicate is a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape.

- 6.8.6 Localised deposits of Peat, Alluvium and Blown Sand are located within the eastern part of the Scheme. Storm Beach deposits (predominantly gravels) lie to the north and west of the Scheme, with Coastal Zone deposits (predominately clay and silt) and Tidal Flat deposits (predominantly sand and gravel) below the sea to the north of the Scheme.

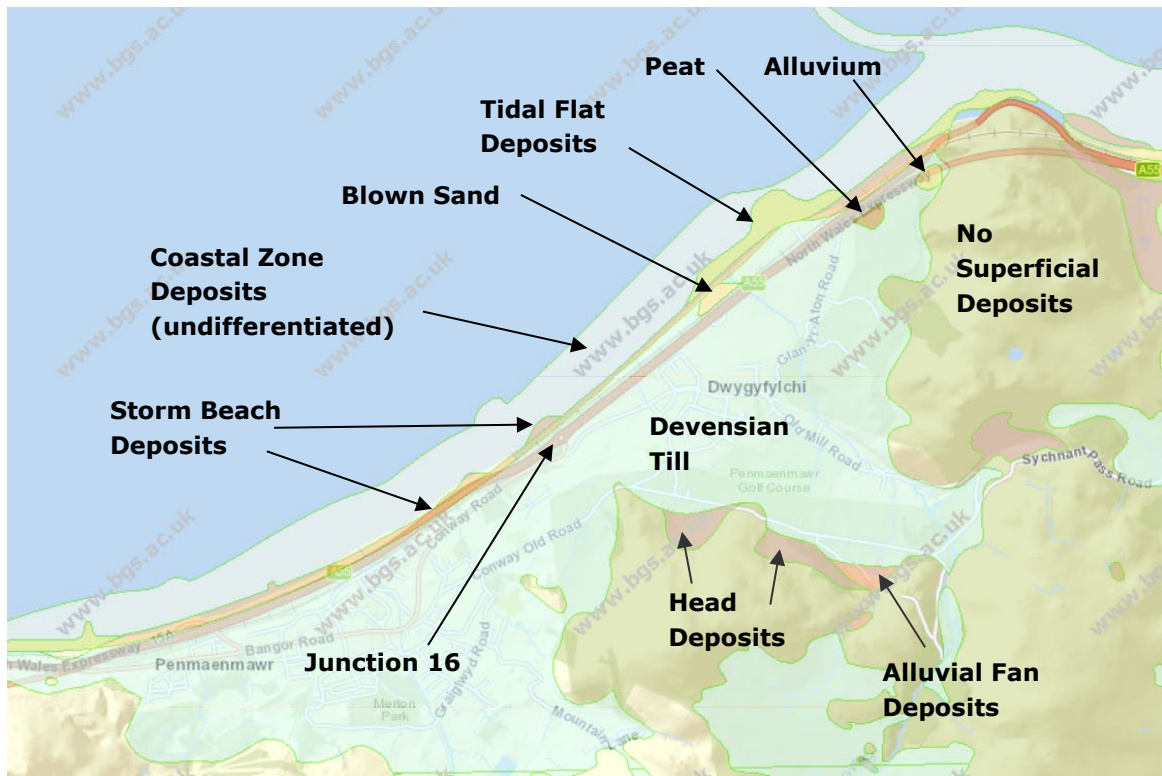
**Figure 6.1: Junction 16 Bedrock Geology <sup>7</sup>**



<sup>6</sup> <https://www.bgs.ac.uk/lexicon/lexicon.cfm?pub=TILL>

<sup>7</sup> <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

**Figure 6:2: Junction 16 Superficial Geology 7**



- 6.8.7 Made ground is not shown on the published mapping, although the Envirocheck report identified areas of made ground/fill adjacent to the petrol filling station, at the former brick field to the north of the Scheme, and at the former refuse tip adjacent to the current roundabout. Further made ground is likely to be present in association with previous developments, including the A55, access roads and the railway.
- 6.8.8 A number of geological faults have been inferred within the surrounding area, which generally trend northwest to southeast with downthrow to the east (magnitude not given).
- 6.8.9 There is no evidence of coal mining or non-coal related mining within the Scheme. Quarrying was undertaken at the Penmaenmawr Quarries, on the top and north side of the hill to the south of the A55 and Penmaenmawr (within the area identified as comprising microdiorite bedrock), approximately 2km to the south west of the Scheme. Quarrying was also undertaken to the east of the Scheme, between Penmaenbach and Mynydd y Dref.

#### *Historical Records – Ground Conditions*

- 6.8.10 Previous ground investigation information has been obtained from historical borehole records provided on the British Geological Survey website. These historical exploratory holes were carried out to inform the original design and construction of the A55.
- 6.8.11 Records indicate that anthropogenic deposits (made ground/fill) are underlain by firm to stiff clay with variable amounts of gravel and occasional bands of cobbles or boulders, which are considered to be of glacial origin. Peat was also identified in boreholes surrounding the current Junction 16A.
- 6.8.12 The stratigraphy identified on the logs is considered to represent the fluctuating depositional systems associated with glaciation, sea level fluctuations and the dynamic coastal environment.



- 6.8.13 Prior to the construction of the A55, Rhyolite bedrock was encountered at approximately 15m below ground level within boreholes located 300m to the west of the existing roundabout.
- 6.8.14 Long sections along the line of the existing A55 indicate that there is a substantial thickness of engineered fill forming an embankment under the current alignment of the road.

*Ground Investigation (2019) – Ground Conditions*

- 6.8.15 The ground conditions encountered by Geotechnics during the ground investigation undertaken for the Scheme in 2019 can be summarised as follows:

**Table 6.6: Ground Conditions**

Strata	Depths to Base (m bgl)	Typical Description
Topsoil	0.1-0.4	Variable slightly gravelly, slightly clayey to clayey, occasionally silty sand, slightly clayey sand, slightly gravelly or gravelly sand. Slightly gravelly sandy clay or sandy clay Encountered within 33 no. exploratory holes.
Made Ground	0.4 – 5.45 (base not proved)	Variable clay, silt, sand and gravel. Gravels of various lithology including mudstone, limestone, brick fragments, tarmacadam. Occasional low to high cobble content. Black gravelly sand of ash in BH215 (0.3-0.8m) and TP211 (0.0-2.0m) Asphalt road surfacing in BH208, BH212, BH214, WS201, WS202, WS203, WS205 / WS205A, WS207, PC201, PC202, PC203, PC204 Concrete at surface in WS206. Encountered in 30 no. exploratory holes (excluding PC201 to PC204). Base of made ground in WS201 and WS204 (5.45m bgl) not proved.
Superficial Deposits – Alluvium	3.8 – 20.0 (base not proved)	Variable clay, silt, sand and gravel. Gravel comprises various lithologies. Spongy pseudofibrous peat (1.8-3.7m) and pockets of fibrous peat (3.7-5.9m) in BH219. Encountered in BH209, BH210, BH218, BH219, TP203, TP211 and TP212. Base of alluvium in BH219 (20m bgl) not proved.
Superficial Deposits – Glacial Deposits	0.7 – 40.5 (base not proved)	Variable slightly sandy to sandy, gravelly to very gravelly clay or slightly gravelly to gravelly, slightly silty to silty sand. Gravels of varying lithologies including rhyolite, quartzite, sandstone, siltstone, limestone and mudstone. Variable slightly clayey to clayey, sandy to very sandy angular to subrounded fine to coarse GRAVEL of typically varying lithologies. Occasional low to high cobble content and boulders. Encountered within 32 no. exploratory holes - base only proved in BH203 and BH204A. Base of glacial deposits not proved in BH204 (terminated on a boulder at 0.7m bgl).
Nant Ffrancon Subgroup - Bedrock	11.56-13.16 (base not proved)	strong grey MUDSTONE and strong black metamorphosed MUDSTONE. Encountered in BH203 and BH204A.

- 6.8.16 A 'slight hydrocarbon odour' was encountered within arisings from 3.00-3.50m bgl (base of hole) in WS202 during the ground investigation.
- 6.8.17 Evidence of 'strong organic odours' were encountered associated with natural strata from 2.40m to 3.80m bgl in TP203 associated with soft silt (alluvium).

- 6.8.18 Localised inclusions have been encountered within the made ground, such as ash, clinker and tarmacadam which have the potential to give rise to contaminants being present.

#### *Designated Geological Features*

- 6.8.19 No protected geological features have been identified within the Scheme or within 500 m of it.

#### *Hydrogeology*

- 6.8.20 The following aquifer classifications have been identified for the superficial deposits and shallow bedrock strata beneath the Scheme and within 500m from the Envirocheck Report and British Geological Survey <sup>7</sup> website:

**Table 6.7 Aquifer Designations**

Strata	Aquifer Designation	Descriptions
Devensian Till Cambrian and Ordovician (undifferentiated) bedrock	Secondary undifferentiated	Secondary undifferentiated aquifer is assigned in cases where it has not been possible to attribute either category Secondary A or B to a rock (or soil) type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
Nant Ffrancon (bedrock)	Secondary B	Secondary B aquifers are predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
Tidal Flat Deposits Storm Beach Deposits Alluvium	Secondary A	Secondary A aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

- 6.8.21 The Envirocheck Report does not indicate the site is not located within groundwater abstraction Source Protection Zones (SPZ) and none have been identified within 1km.
- 6.8.22 The British Geological Survey<sup>2</sup> website does not show any records of water wells within 500m.
- 6.8.23 The Envirocheck Report does not contain any records of groundwater abstractions within 500m of the Scheme.

#### *Field Evidence of Groundwater*

- 6.8.24 Groundwater strikes were encountered during the Geotechnics ground investigation site works as follows:

**Table 6.8: Groundwater Strikes**

Monitoring Well	Depth (m bgl)	Strata of Groundwater Strike
BH201	4.45	Gravelly clay
BH203	5.00 (3.50 after 840 minutes, inflow overnight)	Gravelly clay
BH204A	5.50 (3.30 after 840 minutes, inflow overnight)	Sandy clay

Monitoring Well	Depth (m bgl)	Strata of Groundwater Strike
	8.50 (7.90)	Clay
BH205C	8.10 (7.80)	Gravel
	12.00 (10.20)	Sandy clay
BH207	11.30 (6.50)	Sand
	11.80 (artesian)	Diorite (bedrock)
BH209	5.80 (artesian inflow overnight noted)	Gravelly clay
	6.00 (artesian inflow to 2m above ground level)	Gravelly clay
BH210	1.40 (1.10)	Made ground
	6.50 (3.30)	Sand
BH213	17.50	Gravel / Cobbles / Boulders
BH216A	2.00 (1.50)	Sandy clay
BH217	6.30 (5.90)	Sandy gravel
BH218	7.00	Silty sand
BH219	10.50 (7.00 after 840 minutes, inflow overnight)	Very silty sand
BH220A	11.10	Sandy gravelly clay
BH221	4.00 (2.40)	Sand
BH228	8.60 (7.40)	Clay
TP203	3.30 (3.00)	Silt
TP205	2.50 (2.20)	Very silty sand
TP207	2.40 (2.30)	Gravel
TP211	2.00	Clay / base of made ground
	3.70	Silt
TP212	1.20	Clay / base of made ground
	2.70 (land drain)	N/A
	3.30	Gravelly silt
WS203	5.45	Clay
WS207	2.45	Made ground
	4.00	Made ground
<p>Figures in brackets relates to water levels (m bgl) after 20 minutes unless otherwise indicated.</p> <p>No change in water level was recorded in BH203, BH204A and BH219 at the end of the shift, records for water levels after 840 minutes relate to readings at the start of the following day.</p>		

6.8.25 Groundwater level monitoring has been undertaken by Geotechnics following the ground investigation site works with the following depths recorded:

**Table 6.9: Groundwater Level Monitoring Depths (m bgl)**

<b>Monitoring Well</b>	<b>Response Zone (m bgl)</b>	<b>08/07/19</b>	<b>24/07/19</b>	<b>06/08/19</b>	<b>14/08/19</b>	<b>28/08/19</b>
BH201	1.0-6.5	1.33	1.35	1.30	1.30	1.30
BH202	11.0-14.7	9.15	9.30	9.25	9.40	9.30
BH204A	8.0-10.0	4.80	4.55	4.40	4.35	4.30
BH210	5.0-8.0	N/R	2.65	2.70	2.70	2.45
BH212	6.0-12.0	N/R	N/R	N/R	N/R	N/R
BH213	15.0-20.0	9.8	10.60	10.05	9.25	9.15
BH216A	10.0-15.0	7.46	7.60	7.45	7.20	7.15
BH217	3.0-8.0	N/R	N/R	N/R	N/R	N/R
BH218	6.0-8.0	2.75	2.80	2.55	2.65	2.55
BH219	5.0-9.0	1.90	1.90	1.95	1.95	1.95
BH220A	10.0-12.70	N/R	N/R	N/R	11.05	N/R
BH221	1.0-6.0	0.91	3.00	3.05	3.00	2.90
BH228	7.0-9.0	3.63	3.80	3.80	3.70	3.60
WS201	1.5-4.5	1.05	0.95	0.90	0.70	0.65
WS202	1.0-3.5	N/R	3.05	3.05	3.10	3.50
WS203	1.0-5.0	N/R	4.00	3.90	3.85	2.80
WS204	1.0-5.0	2.50	2.70	2.90	1.65	1.60
WS205A	1.0-3.0	DRY	DRY	DRY	DRY	DRY
WS207	1.0-5.0	N/R	4.00	4.00	3.90	3.80
N/R = Not recorded						
N/R* = Not recorded as water level data logger installed						

### *Historical Records – Groundwater*

- 6.8.26 Ground investigations undertaken between 1979 and 1983, prior to the construction of the current A55 alignment, include information regarding groundwater encountered within the Scheme.
- 6.8.27 Historical exploratory hole records obtained from the ground investigation undertaken in 1979 by Ground Engineering Ltd on behalf of R. Travers Morgan & Partners to inform the upgrade of the A55. Exploratory holes were installed throughout the current Scheme, between Dwygyfylchi and Penmaenbach.
- 6.8.28 The records indicate that groundwater was typically encountered within the 'North Welsh Boulder Clay' (Devensian Till) at an elevation of 2.3 m above ordnance datum (the actual depth to groundwater was not provided). The geological setting was interpreted as suggesting that the groundwater was perched, with artesian conditions recorded in the area surrounding the current roundabout and Penmaenmawr.

- 6.8.29 In the north eastern part of the Scheme, alluvium deposits were encountered, with perched water in the overlying peat.
- 6.8.30 In 1982 an additional ground investigation was undertaken by Norwest Holst Soil Engineering Ltd on behalf of R. Travers Morgan & Partners to further inform the upgrade of the A55. Site works were undertaken to the west of the Scheme, close to Penmaenmawr.
- 6.8.31 Groundwater was encountered within the superficial deposits at 1.6 – 8m bgl. In exploratory holes located on the beach, artesian conditions were encountered, with heads of water up to 1.5m bgl. Artesian conditions were generally encountered after approx. 10m of boring had occurred.
- 6.8.32 A ground investigation in the area surrounding the former gas works in Dwygyfylchi was undertaken in 1983 by Terresearch Ltd on behalf of R. Travers Morgan & Partners. Groundwater seepages were encountered at the base of the made ground (approx. 4m bgl), which was later excavated as part of the A55 upgrade.

### *Historical Land Uses*

- 6.8.33 A summary of the historical land uses has been provided within Table 6.10 from a review of the Ordnance Survey (OS) maps provided with the Envirocheck report for the Scheme and main features or changes within 500m.

**Table 6.10: Junction 16 Historical Site Uses**

Date	Scale	On Site	Surrounding area (within 500m)
1888 / 1889	1:2,500 1:10650	<p>Much of the Scheme comprises Conwy Road, fields, farms and hedgerows.</p> <p>A Gas works is shown, with 1 no. gasholder</p> <p>A spring is shown to the north eastern end of the site, adjacent to Ship Cottage, and a well is shown between the gas works and Pont y Tywyn.</p>	<p>The village of Dwygyfylchi lies approximately 350m south east of the Scheme, with Penmaenmawr 200m to the south west. Both villages comprise dwellings, roads, chapels, schools and farm land.</p> <p>The existing railway is directly to the north of the Scheme, with Penmaenmawr Station approximately 500m to the west. Beyond the railway is a beach and the sea.</p> <p>To the north west / west of the Scheme, a 'Brick Field' and dwelling (Brickfield Cottage) are shown connected at the eastern end to a road south of the railway lines by an overbridge. Approx. 500m south of the Scheme, a gravel pit is shown to be located between Trwyn yr Wylfa and Cae Main.</p> <p>To the east of the Scheme a lodge and pond are shown, with trees shown at Coed Pendyffryn.</p> <p>The Afon Gyrrach flows from the Carneddau mountains in the south, through Dwygyfylchi to the sea, crossing the Scheme at Pont y Tywyn.</p>

Date	Scale	On Site	Surrounding area (within 500m)
1900 / 1901	1:2,500 1:10650	Limited changes are shown within the Scheme such as changes to field boundaries.  Further buildings are shown within the Gas Works, including a second circular feature (records suggest it was a tar holder).	Further dwellings have been constructed within Dwygyfylchi and Penmaenmawr, otherwise only limited changes observed.  A pond is shown to the east of the spring.  A reservoir is shown adjacent to Tan-y-Foel, Penmaenmawr.
1913 / 1915- 1920	1:2,500 1:10650	Limited changes are shown within the Scheme such as changes to field boundaries.	Further dwellings and hotels have been constructed within Dwygyfylchi and Penmaenmawr,  The pond and spring near Ship Cottages are no longer shown.  An additional building has been constructed east of the brickfield.  Further dwellings have been constructed within Dwygyfylchi and Penmaenmawr. Penmaenmawr Golf Links is shown to be approx. 380m to the south of the Scheme.
1938	1:10650	Sgubor-Wen Road constructed which connects to Conwy Road.  No further changes except alterations to field boundaries.	Construction of Sgubor-Wen Road. Further houses constructed within Dwygyfylchi and Penmaenmawr. The closest houses to the Scheme include Groesffordd Lane, Mona Avenue and Gogarth Road which lie off Sgubor-Wen Road in Dwygyfylchi, and Bron Wylfa and Conwy Road, Penmaenmawr.
1953	1:10650	Another circular feature shown at the Gas Works (likely to be a further gas holder).  No other significant changes.	No significant changes except the construction of further houses and hotels in Penmaenmawr and Dwygyfylchi.
1964 / 1966	1:2,500 1:10650	Second gasholder shown at the gas works.  No significant changes made to Conwy Road.  Petrol filling station shown at 'Rosecroft', with a car park between the road and the railway.  Refuse tip shown to the east of the football ground, which partially encroaches into the site area.	Maes y Llan housing estate constructed directly to the south of the Scheme. Further houses constructed in both Dwygyfylchi and Penmaenmawr.  Caravan sites shown surrounding Pendyffryn Farm.  At the former brick field, a pond is shown to the southwest, and the building to the east is shown as Penmaenbach Youth Hostel.  The football ground and playing field shown in their current location in Penmaenmawr.
1975 / 1977	1:2,500 1:10,000	Car Park opposite the petrol filling station has extended in to the Scheme  No other significant changes	No significant changes except the construction of further houses and campsites in both Dwygyfylchi and Penmaenmawr.

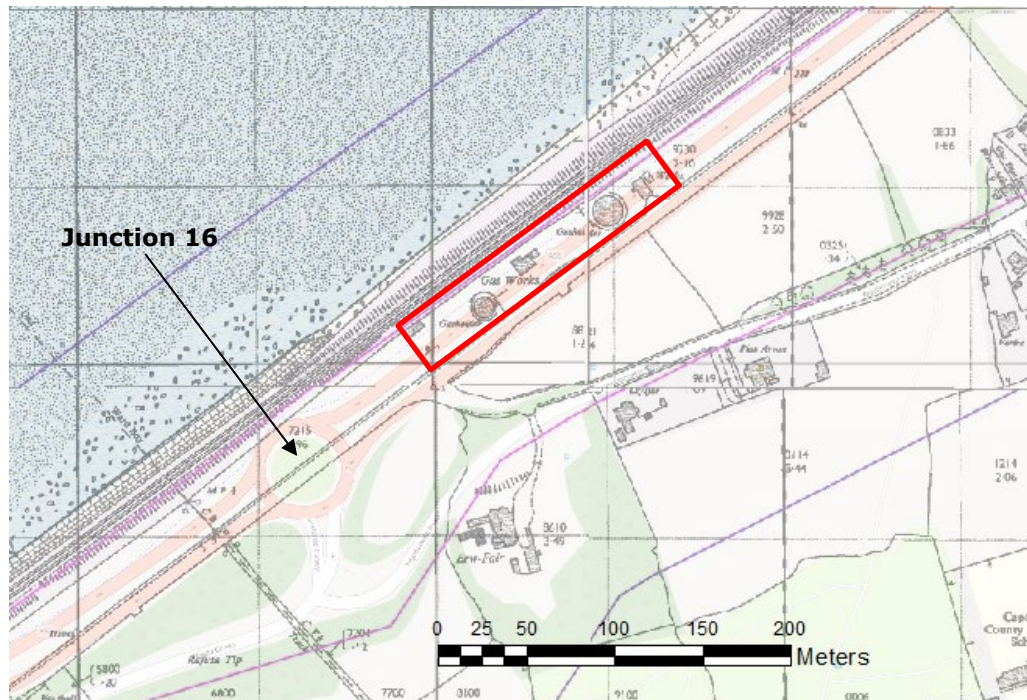
Date	Scale	On Site	Surrounding area (within 500m)
1990 / 1991 / 1992	1:2,500 1:10,000	The A55 expressway including the roundabout and slip roads is now shown with a dashed outline along its current alignment.  The gas works is no longer shown and Erw Fawr farm has been demolished.	The A55 expressway is now shown with a dashed outline along its current alignment.  The A55 crosses the railway line to the north of Penmaenmawr.
1995	1:2,500	Construction of A55 completed. No other significant changes.	Construction of A55 completed. No other significant changes.
2000	1:10,000	No significant changes.	No significant changes.
2006	1:10,000	No significant changes.	A Sewage Treatment Works is shown at the site of the former brick field and the Youth Hostel has been demolished. Ship Cottages have also been demolished.
2006	Aerial Image	No significant changes.	A Caravan Park shown to the south of Puffin Hotel.
2015	Aerial Image	No significant changes.	No significant changes.
2018	1:10,000 Aerial Image	No significant changes.	No significant changes except the construction of Gwel y Môr housing estate between Ysguborwen Road and the Petrol Station in Dwygyfylchi.

### *Historical Site Plans*

- 6.8.34 A number of drawings relating to ground investigations undertaken prior to the construction of the current alignment of the A55 have been obtained for review.
- 6.8.35 Historical maps identified that the location of the former gas works is within the footprint of the eastbound carriageway of the A55, approximately 100m north east of the existing roundabout, as seen on the 1966 OS map of Dwygyfylchi (Figure 6.3).

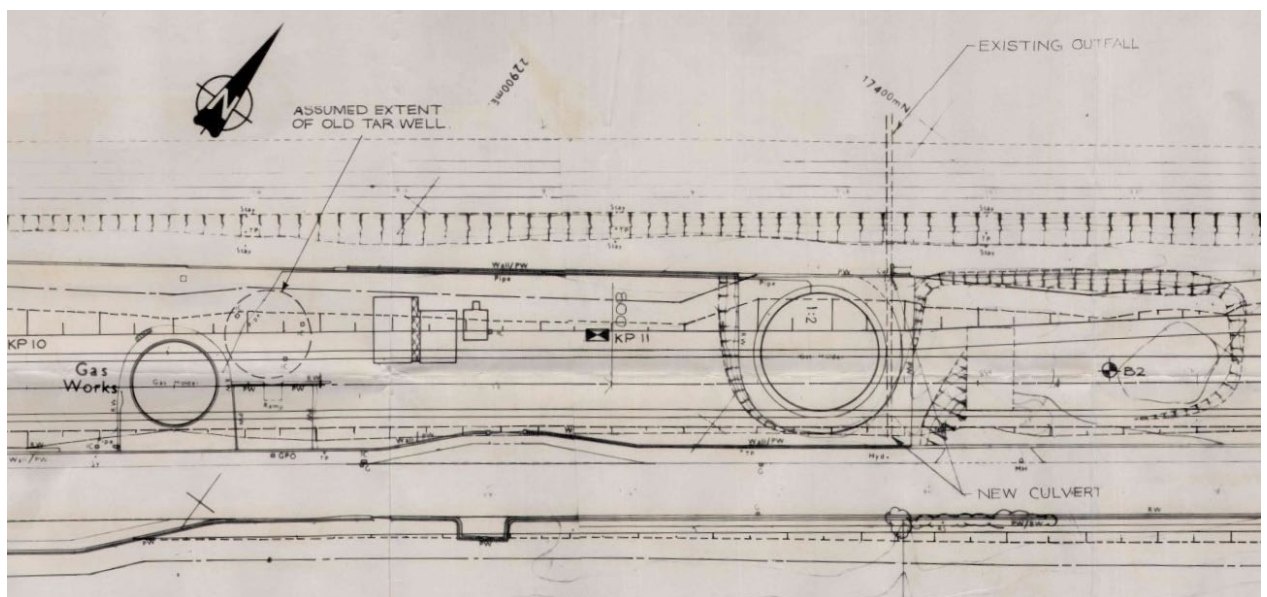


**Figure 6:3: Approximate location of the former gas works with the current alignment of the A55.**



- 6.8.36 The construction work for the dualling of the A55 along its current alignment was undertaken during the early 1990s, with ground investigations undertaken during the 1970s and 1980s.
- 6.8.37 The 1983 Ground investigation was undertaken by R. Travers Morgan & Partners, on behalf of the Welsh Office transport and highways group. The plan (Ref: 6110/IR/1) shows the location of the gas works which was cleared to make way for the expansion of the A55. The site is shown to comprise 2 no. gas holders, a number of small buildings and a former tar pit.

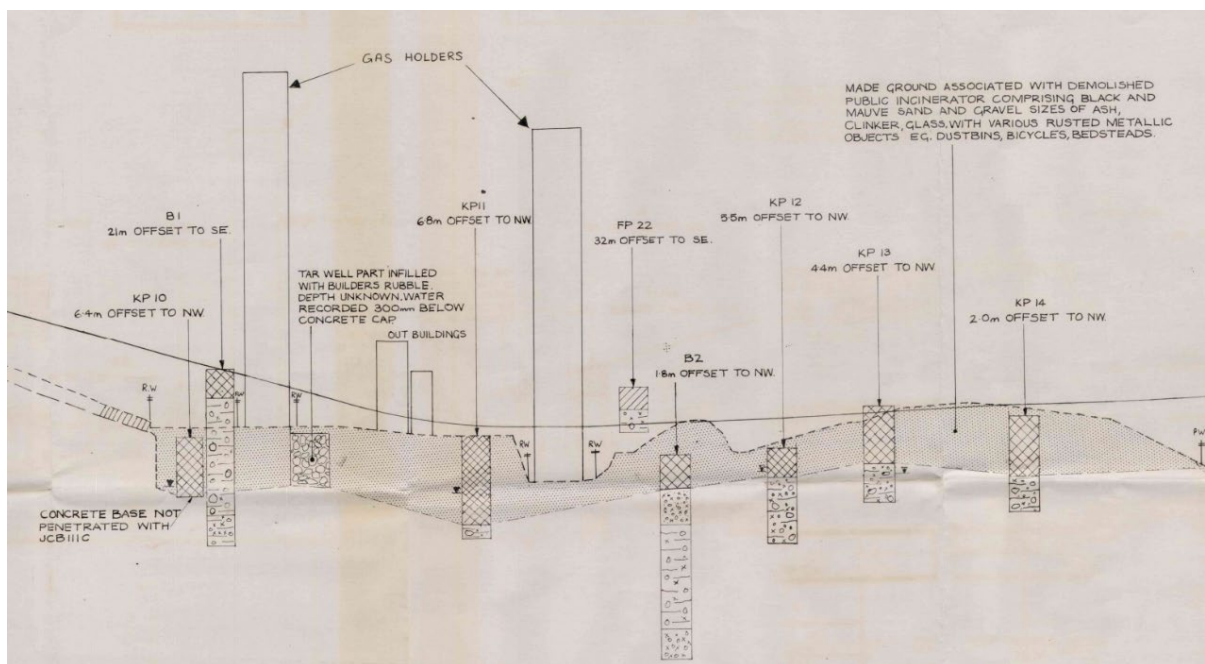
**Figure 6:4: Drawing from 1983 GI showing layout of the gas works including 2 no. gas holders and the former tar well and is overlain with the layout of the A55 eastbound carriageway.**





- 6.8.38 A further drawing from the 1983 ground investigation includes a cross section (Ref: 6110/IR/2), which shows that the tar pit associated with the former gas works had been infilled with 'builders' rubble'. The drawing also makes reference to 'made ground associated with demolished public incinerator', although no plans or drawings relating to the incinerator have been identified. Observations from the 1983 ground investigation indicates that foundations associated with the former incinerator were visible to the east of the former gas works, and that it was understood that the plant was operated by Penmaenmawr District Council to incinerate domestic refuse until 1972/73. Prior to the construction of the gas works during the 1870s, the site was occupied by a school<sup>8</sup>.

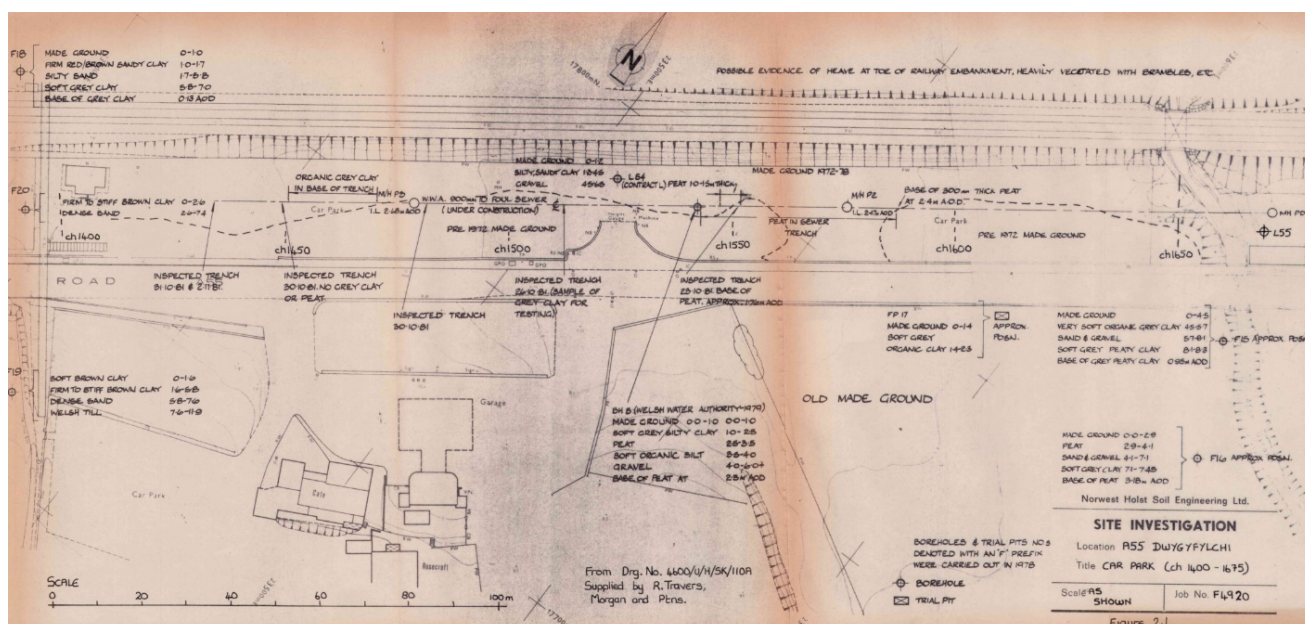
Figure 6:5: Drawing from 1983 GI showing cross section within the gas works site



<sup>8</sup> <https://archiveshub.jisc.ac.uk/search/archives/211177c5-f12d-347e-83eb-f671290fa6e7> (accessed 13/9/19)

- 6.8.39 The existing petrol filling station located directly south of the A55 is outside the Scheme. This is first shown on the 1966 OS Map. The ground investigation report prepared by NHW in 1982 included a drawing of the petrol station (shown as 'garage') and the car park which is shown below although the location of the fuel tanks is not indicated.

**Figure 6:6: Drawing from 1982 GI showing plan of petrol station.**



- 6.8.40 The drawing above identifies an area of 'old made ground' to the east of this garage from a previous investigation in 1978 by Ground Engineering Ltd which shows a greater thickness of made ground towards an existing water course (Afon Gyrach) to the east.
- 6.8.41 Exploratory hole records indicate the made ground comprised 0.4m of ash and glass over 4.0m bgl of sandy gravel fill to 4.50m bgl in F15, and 1.95m of household waste, glass and ashes over 0.65m of silty clay with traces of small stones and ash to 2.90m bgl in F16.
- 6.8.42 No further plans relating to the petrol station layout have been obtained.

### Historical Potentially Contaminating Land Uses

- 6.8.43 The historical OS maps obtained with the Envirocheck Report and previous reports show a number of historical potentially contaminating land uses on or within 500m of the site compounds which have been summarised below:

### Table 6.11: Historical Potentially Contaminating Land Uses

<b>Feature</b>	<b>Location</b>
Petrol Station	Offsite – directly to the south of the Scheme / existing A55
Area of Fill	On-site – east of the Puffin Petrol Station (extends beyond works area)
Former Gas Works	Onsite – to the east of the existing roundabout, beneath the current A55 carriageway alignment

<b>Feature</b>	<b>Location</b>
Railway	Earliest historical maps to present, adjacent to the northern site boundary, Penmaenmawr Station approx.. 650m to the west of the site.
Electricity Substations	Various within 500m (none within site area)
Sewage Treatment Works and former brick field	Offsite – approx. 30m to the north of the scheme
Existing Road Network	Onsite and offsite.

- 6.8.44 Although not shown on historical plans, a former Council landfill is also present which extends into Scheme to the southwest of Junction 16 and up to the A55. Further information has been provided below under Landfill and Waste Management.

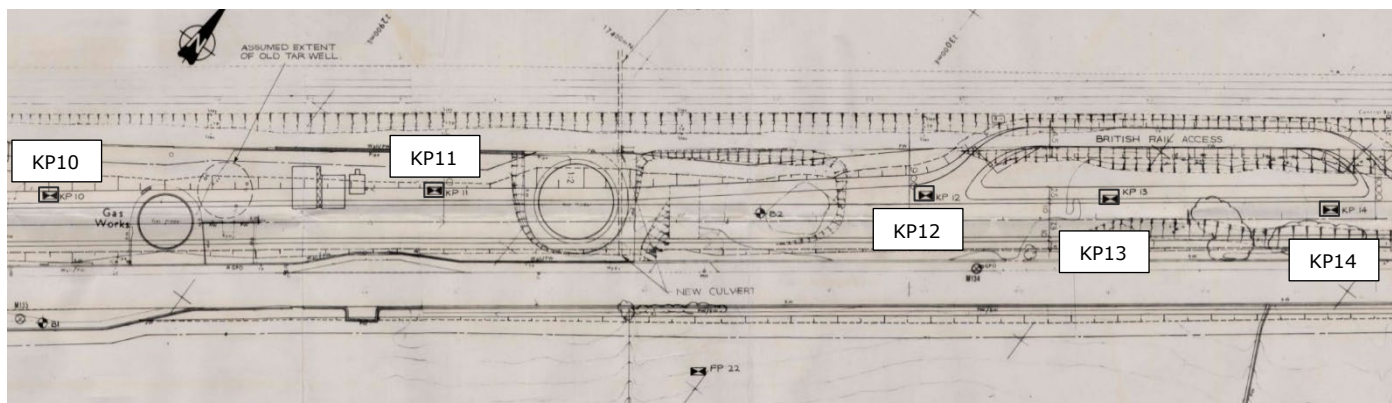
#### *Current Potentially Contaminating Land Uses*

- 6.8.45 Existing potential contaminating land uses identified on or within 500 m of the Scheme comprise the Sewage Treatment Works, Petrol Filling Station and the railway lines.
- 6.8.46 However, made ground / fill is likely to be present associated with the construction of the A55 and other roads within the Scheme.

#### *Previous Ground Investigation – Contamination*

- 6.8.47 A number of ground investigations were undertaken during the 1970s and 1980s for the upgrade of the A55 to its current alignment, although only the GI undertaken by Terresearch Ltd, on behalf of R. Travers Morgan & Partners, in 1983 included environmental testing.
- 6.8.48 The environmental testing comprised 1 no. water sample and 3 no. soil samples from the area surrounding the former gas works in Dwygyfylchi. The additional GI was undertaken because the former gas works and incinerator site were in an area of cut for the upgrade of the A55.
- 6.8.49 The factual report produced following the GI stated that the soil encountered at exploratory hole KP13 (located to the east of the gas works, within the area where made ground from the former incinerator was identified) was 'heavily contaminated with copper (3,460 mg/kg)'. However, this is less than the current assessment criteria for residential development without homegrown produce (7,100 mg/kg).
- 6.8.50 Lead (520 mg/kg) at KP13 was also considered 'contaminated' at the time, but this would not exceed the current assessment criteria for 'Public Open Space – Parks. No further information regarding contaminant concentrations have been obtained.
- 6.8.51 A groundwater sample was obtained and the Terresearch factual report indicated that 'no significant contamination was detected in the water sample'.

**Figure 6:7: Drawing from 1983 GI showing locations of exploratory holes in relation to the former gas works.**



### *Contaminated Land – 2019 Ground Investigation*

6.8.52 The results of the testing for soil and groundwater have been screened against the following:

#### Assessment Criteria:

- a) Human Health: Assessment criteria derived using data from S4ULs prepared by LQM/CIEH (2015) and DEFRA C4SLs (2014)<sup>9</sup>. The 'commercial' land is based on the low sensitivity of the Scheme and guidance in Series NG 600 Earthworks (Volume 2) for general fill which considers there is a very low risk of exposure to the public from any contaminants in the fill. Assessment criteria for a 'public open space - park' land use have also been considered should materials be used near surface in areas of soft landscaping (within c.0.25m to 0.5m of the ground surface) to protect future site users, although this would be conservative for roadside areas where access is limited.
- b) Water Quality: Environmental Quality Standards (EQS) for 'saltwater' and 'other surface waters' have been adopted as the primary criteria for assessing water quality due to the proximity of the site to the Menai Straights and surface water features which flow into the Menai Straights. Comparison has also been made against the Drinking Water Standards based on the presence of aquifers beneath the Scheme and where EQS have not been published.
- c) Phytotoxicity (toxicity to plants): Criteria provided for metals (copper, nickel and zinc) within BS3882 2015 'Specification for topsoil' and BS 8601:2013 'Specification for subsoil and requirements for use' have been used to consider risk to plants within landscaping areas based on soil with pH>7 (from soil testing results for pH); and
- d) Ground Gas: Health and Safety Executive in Workplace Exposure Limits HSE EH40/2005.

6.8.53 The assessment criteria outlined above for human health and water quality (soil leachate and groundwater) have been used to provide an initial screen of chemical test results and it is likely these assessment criteria would be conservative, particularly the EQS for surface waters.

### *Ground Investigation - Contamination Assessment*

6.8.54 The Geotechnics 2019 ground investigation included sampling and analysis for soils and water for the presence of contamination. The following summary is based on the information obtained from the ground investigations in 2019 which is included as Appendix 6.1.

<sup>9</sup> Based on a sandy soil comprising 1% soil organic matter converted from total organic carbon (TOC results).



### *Soil Contamination Results*

- 6.8.55 A review of the chemical testing results for the soil samples has identified exceedances of the assessment criteria for a public open space land use for individual PAHs (benzo(a)pyrene, benzo(b)fluoranthene and dibenzo(ah)anthracene) in made ground from WS202 at 3.50m bgl and also when using benzo(a)pyrene as a surrogate marker for potentially genotoxic PAHs.
- 6.8.56 The results for naphthalene and dibenzo(ah)anthracene in WS202 at 3.50m exceed the commercial assessment criteria. The exploratory hole log shows that 'slight hydrocarbon odours' were present within the made ground at this depth. The material associated with the sample from WS202 at 3.50m bgl is unlikely to be excavated as part of the Scheme.
- 6.8.57 No asbestos was identified within the samples tested by the laboratory.
- 6.8.58 A number of VOCs and SVOCs were identified by the laboratory in samples of made ground from WS202 at 3.50m with lower concentrations of VOCs in WS207 0.2m, 1.0m and 1.85m. None of the results exceed the assessment criteria where derived. The highest concentration of SVOCs obtained relates to 140 mg/kg of 2-methylnaphthalene in WS202 at 3.50m, although no assessment criteria have been derived. VOCs and SVOCs encountered within the sample from WS202 at 3.50m are consistent with those typically encountered at gas works.
- 6.8.59 Generic assessment criteria have not been published for construction workers for soil contaminants. The presence of contaminants could represent a risk to construction workers during excavations given their proximity to soils although the overall concentrations of contaminants in soils encountered are considered low.

### *Road Cores – Coal Tar*

- 6.8.60 Samples from two of the road cores (PC101 at 0.04-0.1m, 0.1-0.25m, 0.25-0.33m, and PC104 at 0.1-0.18m, 0.18-0.25m, 0.25-0.34m) have been tested for PAHs to provide an indication as to whether coal tar binder could be present.
- 6.8.61 The results obtained for total PAHs(as sum of USEPA 16 compounds) are below the lower analytical detection limit except for 63 mg/kg within PC204 at 0.0-0.04m. The results for benzo(a)pyrene were all below the lower analytical detection limit (<2 mg/kg).
- 6.8.62 All of the road cores were sprayed with PAK aerosol marker spray which has been used as a screen for coal tars as it discolours in the presence of PAHs above 125 mg/kg (as sum of the USEPA 16 compounds) as indicated within guidance provided by ADEPT<sup>10</sup>. No reaction / colour change was observed on any of the cores indicating that PAHs are low. The results of the PAK marker testing are provided within the Geotechnics Factual Ground Investigation Report in Appendix 6.2.
- 6.8.63 Based on guidance provided by ADEPT<sup>10</sup>, the results from chemical testing and PAK marker testing do not indicate that coal tar is likely to be present.

<sup>10</sup> ADEPT, August 2019. ~Managing Reclaimed Asphalt – Highways and Pavements

### *Phytotoxicity*

- 6.8.64 Exceedances of criteria for potentially phytotoxic metals (copper, nickel and zinc) has been obtained for:
- a) Copper and zinc in made ground from TP211 at 0.2m and 1.0m associated with ash.
  - b) Copper and zinc in made ground from WS202 at 3.50m

### *Soil Leachate Contamination Results*

- 6.8.65 Zinc (9.3 µg/l) in made ground from WS201 at 0.5m bgl exceeds the saltwater EQS of 7.9 µg/l (which is based on 6.8 µg/l + ambient background concentration of 1.1 µg/l).
- 6.8.66 Localised exceedances of EQS have been obtained for PAHs in the following samples:
- a) Made ground in WS202 at 2.0m and 3.50m: Naphthalene (at 3.50m), anthracene (at 3.50m), fluoranthene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene and benzo(ghi)perylene
  - b) Made ground in WS203 at 1.0m and 2.0m: Fluoranthene (at 1.0m), benzo(b)fluoranthene, benzo(k)fluoranthene (at 2.0m), benzo(a)pyrene and benzo(ghi)perylene
  - c) Made ground in WS204 at 1.0m: Benzo(b)fluoranthene, benzo(a)pyrene and benzo(ghi)perylene
  - d) Made ground in WS207 at 1.0m: Fluoranthene, benzo(b)fluoranthene, benzo(a)pyrene and benzo(ghi)perylene
  - e) Made ground in TP203 at 1.0m: Benzo(b)fluoranthene, benzo(k)fluoranthene and benzo(ghi)perylene
  - f) Made ground in BH205C at 1.0m: Benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene and benzo(ghi)perylene
  - g) Made ground in BH210 at 1.0m: Benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene and benzo(ghi)perylene
- 6.8.67 Many of the exceedances obtained from the samples listed above were marginal. However, more significantly elevated concentrations (1400 µg/l) of total PAHs (as the sum of the 16 compounds) were obtained from WS202 at 3.5m. The majority of this relates to naphthalene (1300 µg/l). This sample also recorded the overall highest concentrations of PAHs in soils.
- 6.8.68 High concentrations of monohydric phenols (480 µg/l) were also obtained from in WS202 at 3.5m which exceed the long (7.7 µg/l) and short term (46 µg/l) saltwater EQS for phenol. SVOC testing also identified the presence of 4-nitrophenol (14 µg/l), dibenzofuran (15 µg/l), di-n-butylphthalate (1.7 µg/l) and di-n-octylphthalate (1.0 µg/l) within the sample from WS202 at 3.5m bgl, although no water quality criteria have been published for these contaminants.
- 6.8.69 Petroleum hydrocarbons have been encountered in the sample of made ground tested from WS202 at 3.5m at 410 µg/l from the C6-10 aliphatic, C5-8 aromatic and C10-C21 fractions. Lower concentrations of petroleum hydrocarbons (28 µg/l) were also obtained from made ground in BH210 at 1.0m from the C12-C35 aliphatic fractions.
- 6.8.70 No UK water quality standards have been published for petroleum hydrocarbons, although the results would not exceed the World Health Organization (WHO) guide values for TPHCWG fractions in drinking water (300 µg/l published for EC10-12 and EC12-16 aliphatic fractions).
- 6.8.71 A 'slight hydrocarbon odour' was noted in WS202 from 3.0-3.5m (base of hole).

- 6.8.72 Ammoniacal nitrogen in made ground from BH205C at 1.0m (3.3mg/l) and exceeds the saltwater EQS of 0.02 mg/l when converted to unionised ammonia.

#### *Groundwater Contamination Results*

- 6.8.73 Results have been obtained for metals in groundwater which exceed the water quality criteria.
- 6.8.74 Elevated concentrations of zinc have been obtained from WS203, BH221, BH204, BH210 and BH213 which exceed the saline EQS. One exceedance has been obtained for copper in WS201 which is based on dissolved organic carbon.
- 6.8.75 PAHs were encountered above the lower detection limit in WS203 and BH204, although none of the results exceed the MAC-EQS where published.
- 6.8.76 The results for petroleum hydrocarbons, SVOCs and VOCs are below the lower analytical detection limits.
- 6.8.77 Groundwater samples could not be obtained from WS202 as only limited water was present within the base of the well.

#### *Ground Gas Results*

- 6.8.78 Five rounds of ground gas monitoring has been undertaken by Geotechnics from the 8th July to the 28th August 2019 on monitoring wells installed during the ground investigation in 2019.
- 6.8.79 Barometric pressure during the monitoring period ranged from 1001 to 1021 millibars.
- 6.8.80 The results of the gas monitoring have been assessed using guidance provided in the Health and Safety Executive Workplace Exposure Limits HSE EH40/2005 to consider the risks to workers in confined spaces and also the lower explosive limit for methane. As the Scheme comprises a road scheme it is not considered appropriate to derive a gas screening value to determine the 'characteristic situation' for gas in accordance with BS8485:2015 as this guidance is based on considering risks to new buildings.
- 6.8.81 A summary of the results obtained from the monitoring has been provided below:

**Table 6.12: Ground Gas Monitoring Results Summary**

Monitoring Well	Response Zone (m bgl)	Strata	Flow (litres / hour) - Peak	Flow (litres / hour) - Steady	Methane (%) Peak	Methane (%) Steady	Carbon Dioxide (%) Peak	Carbon Dioxide (%) Steady
BH201	1.0-6.5	Made Ground / Clay	-0.3-0.0	-0.3-0.0	0.0	0.0	0.1-1.1	0.1-1.1
BH202	11.0-14.7	Gravelly Clay / Gravel	-0.2-0.0	-0.2-0.0	0.0	0.0	0.1-1.7	0.1-0.3
BH204A	8.0-10.0	Gravelly Clay	-0.2-0.0	-0.2-0.0	0.0	0.0	0.0-2.0	0.0-2.0

Monitoring Well	Response Zone (m bgl)	Strata	Flow (litres / hour) - Peak	Flow (litres / hour) - Steady	Methane (%) Peak	Methane (%) Steady	Carbon Dioxide (%) Peak	Carbon Dioxide (%) Steady
BH210	5.0-8.0	Clay, Sand and Gravel	-0.2-0.0	-0.2-0.0	0.0	0.0	0.0-2.9	0.0-2.5
BH212	6.0-12.0	Sand	-0.1-0.0	-0.1-0.0	0.0	0.0	0.0	0.0
BH213	15.0-20.0	Gravel, Cobbles, Boulders	-0.2-0.0	-0.2-0.0	0.0	0.0	0.0-3.0	0.0-0.8
BH216A	10.0-15.0	Very gravelly Clay	-0.2-0.0	-0.2-0.0	0.0-0.1	0.0-0.1	0.0-3.1	0.0-3.0
BH217	3.0-8.0	Sandy Clay and Gravel						
BH218	6.0-8.0	Sand	-0.2-0.0	-0.2-0.0	0.0-0.2	0.0-0.2	0.0-2.6	0.0-2.6
BH219	5.0-9.0	Clay	-0.2-0.0	-0.2-0.0	0.0-0.1	0.0-0.1	0.3-2.1	0.1-2.1
BH220A	10.0-12.70	Sand and Clay						
BH221	1.0-6.0	Gravelly Clay	-0.2-0.0	-0.2-0.0	0.0	0.0	0.1-1.0	0.1-0.3
BH228	7.0-9.0	Gravelly Clay	-0.2-0.0	-0.2-0.0	0.0-0.1	0.0-0.1	0.1-1.0	0.1-0.4
WS201	1.5-4.5	Made Ground	-0.2-0.0	-0.2-0.0	0.0	0.0	0.1-0.5	0.0-0.5
WS202	1.0-3.5	Made Ground	-0.2-0.0	-0.2-0.0	0.0	0.0	0.2-1.9	1.2-1.9
WS203	1.0-5.0	Made ground and Clay	-0.2-0.0	-0.2-0.0	0.0-0.1	0.0-0.1	0.3-1.2	1.0-1.2
WS204	1.0-5.0	Made Ground	-0.2-0.0	-0.2-0.0	0.0-0.1	0.0-0.1	0.0-2.2	0.0-2.2
WS205A	1.0-3.0	Made Ground	-0.3-0.0	-0.3-0.0	0.0	0.0	0.1-0.5	0.1-0.5
WS207	1.0-5.0	Made Ground and Clay	-0.1-0.0	-0.1-0.0	0.0	0.0	0.3-1.8	0.3-1.6



- 6.8.82 The gas monitoring results for carbon dioxide, carbon monoxide and hydrogen sulphide have been assessed against the short term and long-term workplace exposure limits as indicated by the Health and Safety Executive in Workplace Exposure Limits HSE EH40/2005. The results of this assessment are summarised in the table below:

**Table 6.13: Comparison of Ground Gas Results to Workplace Exposure Limits**

Substance	Long Term Workplace Exposure Limit (8-Hour TWA Reference Period - ppm)	Short Term Workplace Exposure Limit (15-minute reference period - ppm)	No. of wells with long term exceedances	No. of wells with short term exceedances	Peak Concentration
Carbon Monoxide	30	200	3	2	>500 ppm in BH204A
Hydrogen Sulphide	5	10	1	1	15 ppm (peak) in WS207
Carbon Dioxide	5000 (0.5%)	15000 (1.5%)	14	10	3.1% (peak) in BH216A
ppm: parts per million					

- 6.8.83 Results have been obtained from the made ground and natural strata for carbon dioxide and carbon monoxide which exceed both the short (BH110, BH109, BH111, BH106) and long term (BH110 and BH111) workplace exposure assessment limits.
- 6.8.84 No exceedances of the lower explosive limit (5%) for methane were obtained.
- 6.8.85 The methane and carbon dioxide encountered during gas monitoring is likely to be associated with presence of carbonate minerals and / or organic material within the made ground and superficial deposits. Such deposits are capable of generating small levels of gas but the soil descriptions do not indicate that significant amounts of degradable materials are present which could generate large volumes of gas.
- 6.8.86 The source of the carbon monoxide encountered in BH201 (292 ppm), BH202 (175 ppm) and BH204A (>500 ppm) in particular is not known, although the results are unlikely to be representative of the gas regime as the monitoring well screens in BH202 and BH204A were flooded by groundwater with only a small section of unsaturated well screen in BH201.
- 6.8.87 Screening of soil arisings during the ground investigation for volatile vapours using a photo-ionisation detector (PID) indicates the majority of results were low (<1 ppm) except for WS202 and WS207 where results >1ppm were obtained:

**Table 6.14: Results for Volatile Vapours >1ppm**

Exploratory Hole	Depth (m bgl)	PID Results (ppm)	Strata
WS207	0.2	11.8	Made ground: slightly sandy gravels of mudstone
	0.5	11.3	
	1.0	15.3	
	1.85	1.5	Made ground: slightly sandy slightly gravelly clay. Gravels of limestone, sandstone and mudstone

Exploratory Hole	Depth (m bgl)	PID Results (ppm)	Strata
	3.25	1.5	Made ground: slightly sandy gravelly clay with low cobble content. Gravels of limestone, mudstone, sandstone and tarmacadam
<b>WS202</b>	0.5	6.5	Made ground: slightly sand gravels of limestone
	2.0	2.6	Made ground: slightly sandy gravelly clay with low cobble content. Gravels of sandstone, limestone, mudstone and quartzite
	3.0	3.6	Sandy slightly gravelly clay. Gravels of sandstone, limestone, mudstone and quartzite. Slight hydrocarbon odour
	3.5	115.2	

- 6.8.88 The highest results of 115 ppm was obtained from made ground in WS202 in strata from 3.0-3.5m bgl where a 'slight hydrocarbon odour' was encountered. Chemical testing also identified a number of VOCs and SVOCs within the soil sample from 3.50m bgl.

#### *Environmental Database Records*

- 6.8.89 The following information has been obtained from the Envirocheck report on Environmental Permits, Incidents and Registers for the Scheme and surrounding area:
- There are no sites determined as Contaminated Land under Part 2A EPA (1990) within 500m;
  - There are no authorised industrial sites or hazardous substance facilities within 500m;
  - There are 2 no. records of pollution incidents to controlled waters within 500m of the scheme. Both were Category 3 (Minor Incidents), relating to a release of farm effluent/slurry at Iron Bridge Penmaenmawr in May 1995, and to a spillage of diesel oils at Penmaenmawr Train Station in 1996 due to mechanical failure;
  - There is one record of a substantiated pollution incident, relating to a Category 2 (Significant Impact) to Land in April 2008, located within the Scheme between the Orme View Petrol Station and the Afon Gyrrach. No information has been obtained regarding the pollutant involved; and
  - There are 15 no. records of discharge consents within 500m. Four of the records are located within the Scheme and were operated by the 'Welsh Office – Highways Group' for the A55, discharging into culverts which eventually flow into Conwy Bay. Four further discharge consents were operated by 'Welsh Office – Highways Group'. Dŵr Cymru Welsh Water operated 6 no. discharge consents relating to the Dwygyfylchi sewage treatment works, and Natural Resources Wales operate a consent to discharge sewage storm overflow in to the Afon Gyrrach.
- 6.8.90 The Envirocheck Report recorded 2 no. current industrial land uses (contemporary trade director entries) within 500m of the Scheme, although none of these are located within the Scheme boundary. They relate to the Orme View petrol filling station, which is surrounded by the scheme boundary, and a mechanical engineers on Treforris Road, Dwygyfylchi, and Garreg Lwyd Garage on Paradise Road, Penmaenmawr. A further 11 no. inactive trade directory entries were recorded, relating to garages, haulage services, marine engineers, a petrol station supplies company and chemical products.

#### *Landfill and Waste Management*

- 6.8.91 The Envirocheck Reports identified an historical landfill which extends within the site area. The former refuse tip was operated by Penmaenmawr Urban District Council between 1949 and

1969, and accepted inert, commercial and household waste. The refuse tip occupies an area of approximately 4.2 hectares (42,000m<sup>2</sup>), and is located beneath Penmaenmawr Football Club ground, Conway Road and the current alignment of the A55.

- 6.8.92 Three large areas of potentially infilled land have been identified within 500m of the site. The first is located between the A55 westbound carriageway and Orme View Services, and is classed as 'Unknown Filled Ground (Pond, Marsh, river, stream etc.)'. The second relates to the former brickworks, located to the north of the A55, where the current Dwygyfylchi Sewage Treatment Works. The potentially infilled area is therefore classed as 'Unknown Filled Ground (Pit, quarry, etc.)'. A further area of infilled land has been encountered to the east of the Scheme, at the exit of the eastbound Penmaenbach Tunnel, and relates to a former pond.

### *Geohazards*

- 6.8.93 The Envirocheck Report shows the site and areas within 250 m have the following potential ground stability hazards:
- a) Potential for collapsible ground – no hazard to very low;
  - b) Potential for compressible ground – no hazard to very low;
  - c) Potential for ground dissolution – no hazard;
  - d) Potential for landslide –no hazard to very low;
  - e) Potential for running sands – no hazard to moderate; and
  - f) Potential for shrinking/swelling clays – no hazard to low.
- 6.8.94 The moderate hazard identified above for running sand relate to the area approximately 60m to the north of the site, and is likely to relate to the beach deposits.
- 6.8.95 The Coal Authority website<sup>11</sup> and information provided within the Envirocheck Report indicates the study area is not located within a coal mining reporting area.
- 6.8.96 The Envirocheck Report indicates the potential for non-coal mining as being 'highly unlikely' and there are no records provided for man-made mining cavities or natural cavities.

### *Radon and Ground Gas*

- 6.8.97 The Public Health England website<sup>12</sup> indicates the radon potential for properties in the area ranges from <1% up to a maximum radon potential of 5-10%.
- 6.8.98 The Envirocheck Reports identified an historical landfill which extends within the site area. The former refuse tip was operated by Penmaenmawr Urban District Council between 1949 and 1969, and accepted inert, commercial and household waste. Three areas of potentially infilled land have been identified within 500m of the Scheme. The first is located between the A55 westbound carriageway and Orme View Services, and is classed as 'Unknown Filled Ground (Pond, Marsh, river, stream etc.)'. The second relates to the former brickworks, located to the north of the A55, where the current Dwygyfylchi Sewage Treatment Works is situated. The potentially infilled area is therefore classed as 'Unknown Filled Ground (Pit, quarry, etc.)'. A further area of infilled land has been encountered to the east of the Scheme, at the exit of the eastbound Penmaenbach Tunnel, and relates to a former pond. There is potential for encountering further areas of localised filled or made ground.

<sup>11</sup> <http://mapapps2.bgs.ac.uk/coalauthority/home.html>

<sup>12</sup> <https://www.ukradon.org/information/ukmaps>

- 6.8.99 The site is not located within a coal mining area and there are no known coal workings or shafts within the study area.

*Unexploded Ordnance (UXO)*

- 6.8.100 The Zetica Regional Unexploded Bomb Risk map for Isle of Anglesey encompasses the site area. This map shows the site is located in a low bomb risk area.

*Contaminated Land Risk Assessment*

- 6.8.101 A qualitative risk assessment for contaminated land has been undertaken for the construction and operational phase. The risk assessment is based on the assumption that standard best practice measures would be implemented during the works, and has been used to identify where additional mitigation measures would be required.
- 6.8.102 The contaminated land risk assessment for the Scheme has been provided in Technical Appendix 6.3.
- 6.8.103 Where risks have been identified that may result in potentially significant environmental effects these have been brought forward into the effect assessment.

## **6.9 Potential Construction and Operational Effects**

***Identified Sensitive Receptors***

- 6.9.1 The ground conditions have the capability to affect a range of receptors, for the purposes of this assessment the following have been considered as potential receptors:
- a) Designated geological sites;
  - b) Controlled waters - groundwater resources;
  - c) Human health (construction / maintenance workers, future site users, local residents / general public); and
  - d) Flora and fauna.
  - e) Buried concrete;
  - f) Buried services; and
  - g) Structures, buildings or roads.
- 6.9.2 Surface waters could also be considered as a receptor for ground contamination. The main assessment for impacts to surface waters is dealt with under Chapter 7: Road Drainage and The Water Environment; however, reference is made in this chapter where directly relevant to ground conditions.

***Assessment of Effects***

- 6.9.3 A full description of the proposed works has been provided in Chapter 2: The Scheme. Those features and assumptions relevant to this chapter are summarised as follows, including best practice methods.
- 6.9.4 The following key points which bear relevance to the geology and soils chapter are as follows:

### *Construction Phase*

- 6.9.5 Activities that are likely to be occurring at the site compounds during the construction stage which could involve dealing with the ground or which could affect the ground are as follows:
- a) Establishment of a temporary construction compound/s, storage and use of fuels / chemicals – the establishment stage sits prior to the installation of appropriate bunds and other pollution control measures and as such represents the highest risk. All storage areas for fuels and oils would be appropriately bunded in line with best practice guidance;
  - b) Movement of plant and machinery within the Scheme and to and from the compound/s;
  - c) Wheel washing facilities would be provided during construction for plant and vehicles;
  - d) Where waste material is to be disposed of off-site this would be to a licensed waste facility in accordance with the Materials Management Plan (MMP);
  - e) Vehicles moving across soils within the Scheme;
  - f) Re-use of excavated material within construction works where possible in order to minimise off site material movements, including excavated soils, roads and demolition materials;
  - g) Shallow foundations and / or ground improvement would be required;
  - h) Soil stripping and excavation/exposure of underlying materials;
  - i) Topsoil and subsoils would be segregated during construction;
  - j) Excavations for foundations, drainage works or services; Standard open trenching techniques would be used for excavations;
  - k) Dewatering of excavations (if required);
  - l) Storage of materials and stockpiling of excavated soils within the Scheme;
  - m) People working within excavations;
  - n) Processing of material to render it suitable for particular uses; and
  - o) Site won material would be re-used on site wherever possible, subject to relevant geotechnical testing. Imported materials will also be required to provide engineered fill as part of the construction of structures and embankments.

- 6.9.6 These activities have been considered during the construction stage effect assessment.

### *Operational Phase*

- 6.9.7 Reasonably foreseeable activities or factors during the operational stage which could affect or be affected by the ground are as follows:
- a) Periodic maintenance which could involve small scale excavations;
  - b) Areas of soft landscaping and planting; and
  - c) Drainage and storm water attenuation - no planned infiltration into the ground.

- 6.9.8 Further information on the operation phase has been provided in Chapter 2: The Scheme.

### *Incorporated Mitigation*

- 6.9.9 Mitigation measures to protect the general public and site workers during the works would be detailed in the Construction Environmental Management Plan (CEMP) to be prepared prior to the construction works commencing and developed to ensure full compliance with relevant and current policy, guidelines and best practice.
- 6.9.10 The following list presents the assumptions that have been made for the purposes of this ES in terms of incorporated mitigation, with the proviso that the list is not exhaustive:
- a) A CEMP will be prepared which would be compliant with all relevant construction best practice and codes of practice. This would include impacts associated with compound establishment and activities such as use of fuels/oils which would be minimised by prioritising establishment

of designated areas for fuels and materials storage and construction of pollution control measures;

- b) Health and safety measures to protect workers during construction works;
- c) Measures would be adopted during the construction works to mitigate environmental effects of ground works such as preventing run-off or dust, including if any temporary excavation and stockpiling of soils were to be required. Where material could be contaminated this is likely to involve the construction of temporary bunds and use of sheeting; and
- d) Relevant pollution control measures would be observed during construction in line with current legislation and best practice.
- e) Construction would be compliant with the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, in order to protect soil quality during excavation right through to reinstatement

6.9.11 The following tables provide the effects assessments assuming that mitigation measures have been adopted.

## Effect Assessment - Construction Stage

6.9.12 The following assessment has been undertaken to determine potentially significant effects for the construction stage.

**Table 6.15: Categorisation of Effects – Construction Stage**

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Effect	Category of Effect	Significant Effect?	Commentary
Physical damage to designated geological sites	Adverse	Long Term	Permanent	Direct	Negligible	No Change	Neutral	No	No impact as no designated geological sites within 500m.
Impacts on soil or groundwater from construction establishment activities such as use of fuels/oils.	Adverse	Short Term	Temporary	Direct	Medium	Negligible	Neutral or Slight	No	Once the construction compounds are established and management procedures are in place then it is considered that the risk of pollution events would be low, but there is a greater risk during the establishment phase. This would be minimised by prioritising establishment of designated areas for fuels and materials storage and construction of pollution control measures
Impacts from activities such as material storage, processing, and stockpiling to construction workers or local residents	Adverse	Short Term	Temporary	Direct	Medium	Negligible	Neutral or Slight	No	Overall, the level of soil contamination identified is low, although localised exceedances of assessment criteria have been identified. Contamination identified at depth in WS202 is unlikely to be excavated during construction.  Risk minimised by standard practice such as bunds, not storing of stockpiled materials within 10m of water courses, and damping down / sheeting during dry windy periods. If contaminated material were to be encountered, this would be segregated prior to treatment (if required) and / or removal to minimise migration of contaminants during excavation works and / or stockpiling (in particular for airborne dust / vapours / odours or run-off). No access to the site by the general public during construction works.

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Effect	Category of Effect	Significant Effect?	Commentary
Exposure of construction workers to contaminated land during excavations	Adverse	Short Term	Temporary	Direct	Medium	Minor	Slight	No	Overall, the level of soil contamination identified is low. Although localised exceedances of assessment criteria have been identified in WS202 at the former gas works although this is unlikely to be disturbed during the works. Risks during excavations minimised by adopting standard best practice and control measures along with personal protective equipment for workers if required. Watching brief and protocols for dealing with unexpected contamination during the construction works.
Exposure of construction workers to ground gas in confined spaces	Adverse	Short Term	Temporary	Direct	Medium	Moderate	Moderate	Yes	Overall concentrations of ground gas are low, although exceedances of workplace exposure limits have been obtained along with a number of volatile contaminants. Monitoring and PPE will be required for workers in confined spaces and deep excavations (if these are introduced). Works would not increase potential for gas migration off-site.
Migration of contaminants due to construction works	Adverse	Long term	Permanent	Direct	Medium	Negligible	Neutral or Slight	No	Made ground present but only localised contamination has been identified in particular from WS202 at the former gas works. Construction works unlikely to result in preferential pathways or increase risk of contaminant migration, including at the former gas works where only shallow excavations are required.  Risk minimised by standard construction practice. Mitigation should still be required if unexpected contamination were to be encountered during construction works. A remediation strategy would be developed if necessary.
On-site movement of soils – risk of spreading contamination	Adverse	Long term	Permanent	Direct	Medium	Negligible	Neutral or Slight	No	Excavated soils be re-used onsite where possible. Presence of fill / made ground but overall low levels of soil contaminants identified within shallow soils.



Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Effect	Category of Effect	Significant Effect?	Commentary
Impacts on groundwater from dewatering during excavations	Adverse	Short Term	Temporary	Direct	Medium	Negligible	Neutral or Slight	No	Shallow groundwater encountered during ground investigation within the made ground and superficial deposits. Majority of excavations, including the area of the former gas works, will be shallow and / or limited in extent and dewatering (if required) would be temporary. Significant impacts to groundwater therefore not anticipated. Risk minimised by standard construction practice such appropriate storage and disposal of any water removed from excavations.
Risk of encountering ground instability during construction	Adverse	Short Term	Temporary	Direct	Medium	Low	Neutral or Slight	No	Site underlain by deposits with no hazard to low potential for collapsible or compressible deposits and running sands. Potential for landslides identified as no hazard to low hazard. Risk minimised through appropriate design during construction works. No evidence of mining within the Scheme.
Direct contact with UXO during excavations or during installation of foundations	Adverse	Short Term	Temporary	Direct	High	Negligible	Slight	No	The potential for encountering UXO is considered low. Watching brief by Contractor during excavations.

## Effect Assessment - Operation Stage

6.9.13 The following assessment has been undertaken to determine potentially significant effects for the operation stage.

**Table 6.16: Categorisation of Effects – Operational Phase**

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Effect	Category of Effect	Significant Effect?	Commentary
Impacts on ground conditions and groundwater during operational activities	Adverse	Long Term	Temporary	Direct	Medium	No change	Neutral	No	Limited potential for impacts associated with activities onsite during the operation stage. Potential for foundations introducing preferential pathways for contaminant migration is low. It is assumed standard best practice measures would be employed for activities and on this basis the Scheme would not have a long term impact or when compared to the existing layout.
Exposure of ground maintenance workers or local residents to contaminated land during excavations	Adverse	Long Term	Temporary	Direct	Medium	Minor	Slight	No	Overall, the level of soil contamination identified is low, although localised exceedances of assessment criteria have been identified within the former gas works area this is located at depth so is unlikely to be disturbed. Risks during excavations minimised by adopting standard best practice and control measures along with personal protective equipment for workers if required. Watching brief and protocols for dealing with unexpected contamination during excavations. No significant effects identified to the general public.
Exposure of ground maintenance workers to ground gas in confined spaces	Adverse	Long Term	Temporary	Direct	Medium	Moderate	Moderate	Yes	Overall concentrations of ground gas are low, although exceedances of workplace exposure limits have been obtained along with a number of volatile contaminants. Monitoring and PPE will be required for workers in confined spaces and deep excavations (if these are introduced). Works would not increase potential for gas migration off-site in the longer term.
Direct contact with UXO during excavations	Adverse	Long Term	Temporary	Direct	High	Negligible	Slight	No	The potential for encountering UXO is considered low. Watching brief by Contractor during excavations.
Damage to buried structures and services from aggressive ground conditions	Adverse	Long Term	Permanent	Direct	Medium	Minor	Neutral or Slight	No	Overall levels of aggressive contaminants in soils are low. Buried concrete design and service diversions would take account of aggressive ground conditions.

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Sensitivity of Receptor	Magnitude of Effect	Category of Effect	Significant Effect?	Commentary
Risk of ground instability during operation	Adverse	Short Term	Temporary	Direct	Medium	Low	Neutral or Slight	No	Site underlain by deposits with no hazard to low potential for collapsible or compressible deposits and running sands. Potential for landslides identified as no hazard to low hazard. Risk minimised through appropriate design during construction works. No evidence of mining within the Scheme.

## 6.10 Effects with Mitigation

- 6.10.1 The only potentially significant effect identified for the Scheme with regards to Geology and Soils relates to workers in confined spaces (if introduced) during the construction and operation stages. This would require mitigation in order to reduce the potential effects. Following implementation of the mitigation by the Contractor these would no longer be considered potentially significant effects.
- 6.10.2 As described above, a number of standard best practice measures would be adopted during construction and operation of the site in order to ensure that the contamination identified at the site does not result in any significant environmental effects.
- 6.10.3 The following sections provide further description and detail of mitigation measures in addition to standard best practice measures that would be employed at the site in order to avoid potentially significant effects arising from the construction and operation of the Scheme.

### *Construction Phase*

#### Dewatering

- 6.10.4 If it is necessary to remove water from excavations, this would be stored in a controlled way before disposal. Only limited exceedances of the water quality criteria have been obtained for contaminants in groundwater, although prior to discharge confirmation would be obtained as to whether any water treatment is required for disposal in addition to de-silting.
- 6.10.5 Deep excavations should not be required within the former gas works area.
- 6.10.6 Mitigation measures would be implemented if shallow groundwater is encountered during excavations or from stockpiling of excavated materials from below the water table to minimise the potential for surface run-off during the construction phase. These would comprise lining of bunds and pumping to remove groundwater from excavations.
- 6.10.7 If it is necessary to remove greater than 20m<sup>3</sup> per day of groundwater from excavations then consultation would be undertaken with Natural Resources Wales (NRW) and a permit obtained if required for dewatering. Discharge of groundwater back into the ground or into surface water would not be undertaken without prior consent from the NRW.
- 6.10.8 Dewatering of excavations, if required, may have a temporary effect on the shallow local hydrogeological regime but should not have any permanent effect on groundwater flow.

#### Contaminated Land

- 6.10.9 Overall, only limited evidence of contamination has been encountered within the Scheme. However, contamination has been identified in made ground from WS202 at c.3.0m to 3.5m (base not proved) which is located immediately north of the A55. This contamination appears to be associated with the former gas works identified in this part of the site which is located beneath more recent fill material. Contamination has not been identified within other exploratory holes in this area.

- 6.10.10 The contamination in WS202 is not likely to be disturbed during the construction works as only shallow excavations are required in this area so the Scheme should not increase the risks from contamination. Therefore, no specific remediation measures should be required during the construction works for the Scheme.
- 6.10.11 Storm beach deposits are present to the north of the former gas works and beyond this is the sea, both of which are potential receptors for contamination. However, Devensian Till has been encountered with exploratory holes in this area underlying the made ground in this area. The Till comprises predominately clay which should limit the potential for migration of contaminants.
- 6.10.12 Notwithstanding this there would be a need to manage materials as they are excavated and, where appropriate, re-used. A Materials Management Plan (MMP) in accordance with the CL:AIRE Definition of Waste: Development Industry Code of Practice would be implemented as part of the CEMP to address this requirement.
- 6.10.13 The majority of existing materials would remain in-situ during the construction works and would be covered by the road construction and soft landscaping which would limit infiltration and potential for exposure to underlying soils. Materials excavated from the Scheme would be re-used onsite where possible or otherwise removed off site for recycling, disposal would only be used as a last resort if no beneficial use can be found. If any localised contamination were to be encountered during excavations, this material would need to be delineated and may require treatment before for re-use or removal off-site.
- 6.10.14 It would be necessary to prepare a specification for existing site won materials or imported new fill material for use as part of the construction works to provide acceptability criteria for geotechnics and contamination. This specification would form part of the MMP.
- 6.10.15 The potential for the Scheme to cause significant lateral migration of gas is considered low. The hard cover introduced as road surfacing during construction would be of limited lateral extent and largely similar to the existing road layout, and only very low flow rates above the lower instrument detection limit have been obtained during gas monitoring indicating there is only a limited volume of gas within shallow strata and this is being generated at a very low rate.

#### CEMP

- 6.10.16 An overarching mitigation measure which would contribute towards addressing the construction phase impacts is the development of a project specific CEMP. These would need to incorporate specific measures to address the significant impacts identified for the construction and operation phases.
- 6.10.17 It would be necessary to ensure that mitigation measures are implemented to prevent off-site migration of contaminants as dust / vapours or run-off during excavations and soil stockpiling. Sheeting of lorries would be undertaken for material importing and exporting materials offsite to mitigate risks from dust. No specific mitigation is considered to be required for asbestos in soil, although the implementation of mitigation measures for dust would also ensure the risks from asbestos remain low.
- 6.10.18 A protocol would be prepared to address unexpected contamination, should this be encountered, during excavations for the construction works and this would need to be incorporated into the CEMP.

- 6.10.19 As noted above a MMP would be put in place and this would include details of how excavated soils would be managed on site including, where appropriate their re-use on site.
- 6.10.20 Following the implementation of mitigation, the significance of the effect is considered to be negligible or low.

#### Foundations

- 6.10.21 Where piled foundations or penetration ground improvement are required during the construction works, this would take account of the following guidance:
- a) Environment Agency (2001) Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention. NC/99/73.
- 6.10.22 Where there is a requirement to install concrete in contact with the ground, this would take account of guidance provided within the following document:
- a) BRE, 2005. Special Digest 1 Concrete in Aggressive Ground.
- 6.10.23 Following the implementation of mitigation, the significance of the effect is considered to be negligible.

#### Decommissioning of Existing Wells

- 6.10.24 Any existing monitoring wells which are no longer required would need to be decommissioned in accordance with the following document, and particularly where this has the potential to result in preferential pathways through low permeability strata:
- a) Environment Agency, October 2012. Good Practice for Decommissioning Redundant Boreholes and Wells (LIT 6478 / 657\_12)

#### Construction Workers and General Public

- 6.10.25 Concentrations of soil contamination are low, although slightly elevated concentrations of ground gas have been encountered which could represent a risk to workers in confined spaces.
- 6.10.26 Potential risks to workers from exposure to contaminants and ground gas would need to be managed through the health and safety plan which could involve the implementation of safe working procedures to prevent exposure to contaminated soils and / or personal protective equipment during the construction works.
- 6.10.27 Potential risks to general public during excavations would be managed through the implementation of standard best practice measures to prevent off-site migration of dust or run-off during excavations and soil stockpiling along with dust monitoring and sheeting of lorries importing and exporting materials offsite. There should be no direct exposure to soil contamination by the general public during the construction works.

#### Operational Phase

- 6.10.28 Following implementation of the mitigation measures outlined above there are considered to be no residual significant effects during the operational phase. The Scheme would provide an inherent level of protection, covering underlying soils with suitable materials used near surface in areas of landscaping and reducing infiltration into the ground due to hard cover and drainage.

- 6.10.29 Potential risks to workers during excavations would need to be managed through the health and safety plan which could involve the implementation of safe working procedures to prevent exposure to contaminated soils and / or personal protective equipment.
- 6.10.30 Risks to buried concrete from aggressive ground conditions would be mitigated during the construction works through use of an appropriate concrete mix for foundations.
- 6.10.31 Mitigation would be incorporated within the road and drainage design through the use of appropriate engineering and drainage measures based on standard best practice to address the potential risk of contaminants entering the infiltration pond.
- 6.10.32 Following the implementation of mitigation, the significance of these effects are considered to be negligible.

#### Residual Significant Effects

- 6.10.33 Following implementation of the mitigation measures outlined above, there are considered to be no residual significant effects during the construction or operational phase.

### **6.11 Cumulative Effects**

#### Intra-Project Effects

- 6.11.1 Intra-project effects are considered as those that "occur between different environmental topics within the same proposal, as a result of that development's direct effects" (IEMA <sup>13</sup>).
- 6.11.2 The following potential direct and indirect intra-project cumulative effects have been considered along with mitigation:
  - a) Chapter 6: Road Drainage and Water Environment – No potentially significant effects have been identified to the water environment from contamination, including where foundations are proposed. The Scheme would provide an inherent level of protection, covering underlying soils with suitable materials used near surface in areas of landscaping and reducing infiltration into the ground due to hard cover and drainage. Potential for foundations resulting in preferential pathways being introduced increasing the risk from contaminant migration is considered low. Majority of excavations will be shallow and / or limited in extent and if any dewatering were to be required during excavations this would be temporary with impacts minimised by standard construction practice. The requirement has been identified for mitigation to prevent to prevent run-off during excavations and soil stockpiling.
  - b) Chapter 8: Nature Conservation – No potentially significant soil contamination has been identified and the requirement for mitigation has been identified during construction to prevent run-off and dust when excavating and stockpiling materials. In addition, there should not be any cumulative effects to the water environment following mitigation which could significantly impact on habitats or species.
  - c) Chapter 12: Air Quality – The requirement for mitigation has been identified to prevent off-site migration of dust during excavations and soil stockpiling along with the movement of soils during construction.
  - d) Chapter 15: Materials – The proposal is to re-use excavated materials and no potentially significant soil contamination has been encountered. There is still a potential that

<sup>13</sup> Institute of Environmental Management & Assessment (IEMA), 2011. Special Report – The State of Environmental Impact Assessment Practice in the UK

unexpected contamination could be encountered during construction and this would be managed via a protocol incorporated into the CEMP. If unexpected contamination were to be encountered, and depending on the risks identified, this could result in additional material being removed offsite. However, based on the findings from the ground investigation and previous land uses identified within the Scheme, along with the construction proposals, this is unlikely to be significant.

- 6.11.3 Following the implementation of mitigation, no potentially significant intra-project cumulative effects have been identified.

#### Inter-Project Effects

- 6.11.4 Inter-project effects have been considered as those where “cumulative effect occurs as a result of the likely impacts of the proposed development interacting with the impacts of other developments in the vicinity” (IEMA <sup>13</sup>).
- 6.11.5 Chapter 19 sets out the known schemes that could be considered to have a cumulative effect in combination with the Scheme.
- 6.11.6 In terms of Geology and Soils, the potential for significant cumulative effects in combination with the Scheme, including the proposals for Junction 15, is considered low.

### **6.12 Conclusions**

- 6.12.1 A number of potential effects have been identified and assessed. However, with the implementation of the incorporated mitigation measures and additional mitigation measures as outlined above it is considered that there would be no residual significant environmental effects as a result of the Scheme.
- 6.12.2 There would be no long-term significant effect on the groundwater beneath the site from the Scheme and it is considered that the risks associated with the ground conditions can be adequately managed.



Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 7 DRAINAGE AND WATER**

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## 7. ROAD DRAINAGE & THE WATER ENVIRONMENT

### 7.1 Chapter Introduction

- 7.1.1 This chapter reports on the likely significant effects with respect to road drainage and the water environment associated with the construction and operation of the Junction 16 Scheme (the 'Scheme').
- 7.1.2 This chapter is supported by the following figures and appendices:
- a) Volume 2, Figure 7.1 – Water Environment: Site Features
  - b) Volume 2, Figure 7.2 – Water Environment Designated Sites
  - c) Volume 2, Figure 7.3 - NRW Risk of Flooding from Rivers and Sea
  - d) Volume 2, Figure 7.4 – NRW Risk of Flooding from Surface Water (3.3 % annual chance)
  - e) Volume 2, Figure 7.5 - NRW Risk of Flooding from Surface Water (1 % annual chance)
  - f) Volume 2, Figure 7.6 - NRW Risk of Flooding from Surface Water (0.1 % annual chance)
  - g) Volume 3, Appendix 7.1 – Assessment of Effects on Water Framework Directive (WFD) Water Bodies
  - h) Volume 3, Appendix 7.2 – Flood Consequences Assessment
  - i) Volume 3, Appendix 7.3 - Water Quality Assessment
  - j) Volume 3, Appendix 7.4 - Hydrological Calculations Record
  - k) Volume 3, Appendix 7.5 - Flood Modelling Report
  - l) Volume 3, Appendix 7.6 - Correspondence with NRW on Water Quality

### 7.2 Relevant Legislation, Policy and Guidance

- 7.2.1 The assessment has been informed by the legislation, policy and published guidance detailed below.

#### *Water Framework Directive<sup>1</sup>*

- 7.2.2 The Water Framework Directive (WFD) (2000/60/EC) was published in December 2000 and transposed into Welsh law in December 2003 (see 7.2.6). The intention of the WFD is to provide a more holistic approach to protection of the water environment than had previously been in place, addressing a wide range of aspects of the water environment, including physico-chemical, chemical, hydromorphological and ecological. For further details of this piece of legislation see Appendix 7.1.

#### *The Groundwater Directive<sup>2</sup>*

- 7.2.3 The Groundwater Directive (2006/118/EC) was created out of Article 17 of the WFD and establishes a framework to prevent the input of hazardous substances and to manage the input of non-hazardous pollutants into groundwater. The Directive was translated into Welsh law through the Groundwater (England and Wales) Regulations 2009<sup>3</sup>, which is now revoked and the provisions it included now incorporated into the Environmental Permitting Regulations (England and Wales) (Amendment) Regulations 2010<sup>4</sup>. Measures in the Directive include the criteria by which good groundwater chemical status is assessed and the criteria for the identification of

<sup>1</sup> [https://eur-lex.europa.eu/resource.html?uri=cellar:5c835afb-2ec6-4577-bdf8-756d3d694eeb.0004.02/DOC\\_1&format=PDF](https://eur-lex.europa.eu/resource.html?uri=cellar:5c835afb-2ec6-4577-bdf8-756d3d694eeb.0004.02/DOC_1&format=PDF)

<sup>2</sup> <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006L0118&from=EN>

<sup>3</sup> <http://www.legislation.gov.uk/ukxi/2009/2902/contents>

<sup>4</sup> <https://www.legislation.gov.uk/ukxi/2010/676/contents>

significant and sustained upward trends in groundwater quality. It allows for water quality standards to be set at a national level and take into account the effects of natural geology on groundwater characteristics.

#### *The Environmental Quality Standards (EQS) Directive<sup>5</sup>*

- 7.2.4 The Environmental Quality Standards Directive (2008/105/EC, as amended by 2013/39/EU) was also created as a result of the WFD (Article 16) and sets out the standards (EQSs) for certain priority and priority hazardous substances considered to be at a European level to be of concern. The aim of the Directive is to reduce or cease/phase out altogether, their presence in the water environment in order to achieve good surface water chemical status in accordance with the provisions and objectives of Article 4 of the WFD. This Directive was translated into Welsh law through The Water Environment (WFD) (England and Wales) (Amendment) Regulation 2015<sup>6</sup>.

#### *Floods Directive*

- 7.2.5 The Floods Directive (2007/60/EC) implements the requirement for assessment and management of flood risks across the European Union. It requires member states to assess if all watercourses and coast lines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. The Directive requires that work be carried out in co-ordination with that undertaken as part of member states' obligations under the WFD.

#### *Water Environment (Water Framework Directive) (England and Wales) Regulations<sup>7</sup>*

- 7.2.6 The Water Framework Directive (2000/60/EC) was transposed into Welsh law in December 2003 through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003<sup>8</sup>, later being updated through The Water Environment (WFD) (England and Wales) (Amendment) Regulation 2015<sup>9</sup> and most recently The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017<sup>10</sup>.
- 7.2.7 European and national standards for surface water quality have been implemented under these regulations in Wales through The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015<sup>11</sup>, whilst those for groundwater have been through The Environmental Permitting Regulations 2010 and onwards<sup>12</sup> and the supporting Groundwater (Water Framework Directive) (Wales) Direction 2016<sup>13</sup>.

#### *Flood and Water Management Act<sup>14</sup>*

- 7.2.8 This 2010 act sets out the roles and responsibilities of all risk management authorities in Wales (the Welsh Government, Natural Resources Wales (NRW), Lead Local Flood Authorities and water and sewerage companies), encompassing integrated management of flood risk to help protect homes, people and businesses. It requires flood and coastal erosion risk authorities to

<sup>5</sup> <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0105&from=EN>

<sup>6</sup> <https://www.legislation.gov.uk/ukxi/2015/324/contents/made>

<sup>7</sup> <http://www.legislation.gov.uk/ukxi/2003/3242/contents/made>

<sup>8</sup> <http://www.legislation.gov.uk/ukxi/2003/3242/contents/made>

<sup>9</sup> <http://www.legislation.gov.uk/ukxi/2015/1623/resources>

<sup>10</sup> [http://www.legislation.gov.uk/ukxi/2017/407/pdfs/ukxi\\_20170407\\_en.pdf](http://www.legislation.gov.uk/ukxi/2017/407/pdfs/ukxi_20170407_en.pdf)

<sup>11</sup> [http://www.legislation.gov.uk/ukxi/2015/1623/pdfs/ukxi0d\\_20151623\\_en\\_auto.pdf](http://www.legislation.gov.uk/ukxi/2015/1623/pdfs/ukxi0d_20151623_en_auto.pdf)

<sup>12</sup> <https://www.legislation.gov.uk/ukdsi/2010/9780111491423/contents>

<sup>13</sup> <https://gov.wales/docs/legislation/inforcenonsi/environmental/160526-groundwater-direction-en.pdf>

<sup>14</sup> <https://www.legislation.gov.uk/ukpga/2010/29/contents>

contribute towards sustainable development as part of their duties and makes provision for the establishment of the Flood and Coastal Erosion Committee for Wales, which was created in 2017 following implementation of The Environment (Wales) Act<sup>15</sup> in 2016 which enacted the committee's creation.

*Flood Risk Regulations*<sup>16</sup>

- 7.2.9 These regulations transpose the requirements of the Floods Directive into Welsh law, placing duties on NRW and local authorities to prepare flood risk assessment, flood risk maps and flood risk management plans.

*The Bathing Water Regulations*<sup>17</sup>

- 7.2.10 These 2013 regulations update earlier (2008) regulations and implement the requirements of the Bathing Water Directive (2006/7/EC)<sup>18</sup>, including specifying water quality requirements at locations identified under the regulations as being bathing waters. It also places duties upon local authorities to manage said water bodies and take measures where, for example, water pollution incidents occur.

*Planning Policy Wales*<sup>19</sup>

- 7.2.11 Planning Policy Wales (PPW) provides the overall framework for planning policy in Wales. It outlines the planning approach to development and flood risk and places a requirement for planning authorities to consider the potential impacts of proposed development on the water environment, the impacts of flooding and to take a catchment-based approach to flood risk management.

*Water Strategy for Wales*<sup>20</sup>

- 7.2.12 This strategy, issued by the Welsh Government, sets out the government's strategy for long term management of Wales' water resources in a sustainable manner whilst supporting the needs of nature, community and business. It places an expectation upon highways authorities to "facilitate the use of natural systems in infrastructure developments and to reinstate or create aquatic features, such as wetlands and natural river channels, where there are benefits for wildlife, communities and customers".

<sup>15</sup> <https://www.legislation.gov.uk/anaw/2016/3/contents>

<sup>16</sup> <http://www.legislation.gov.uk/ukxi/2009/3042/contents/made>

<sup>17</sup> <https://www.legislation.gov.uk/ukxi/2013/1675/contents/made>

<sup>18</sup> <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006L0007&from=EN>

<sup>19</sup> <https://gov.wales/sites/default/files/publications/2019-02/planning-policy-wales-edition-10.pdf>

<sup>20</sup> <https://gov.wales/docs/desh/publications/150521-water-strategy-for-wales-en.pdf>

*Conwy Local Development Plan 2007-2022*<sup>21</sup>

- 7.2.13 This Local Development Plan (LDP) was adopted in October 2013 and includes the following policies that relate to the water environment:

*Policy DP/3: Promoting Design Quality and Reducing Crime. This policy states that development will only be permitted where they provide sustainable urban drainage systems to limit waste water and water pollution and reduce flood risk in line with national guidance and Policy NTE/8 – 'Sustainable Drainage Systems'.*

*Policy DP/4: Development Criteria. This policy states that development not be permitted where it would have an adverse impact on the quality of ground or surface water.*

*Policy NTE/1: The Natural Environment. This strategic policy aims to prevent, reduce or remedy all forms of pollution, including that to water, in line with policy DP/6 (which requires all planning applications to be in compliance with national policy and guidance).*

*Policy NTE/5: The Coastal Zone. This policy requires that coastal development does not adversely affect nature conservation values (which may be part of the aquatic environment) of the zone or interfere with natural coastal processes (which it notes includes flooding).*

*Policy NTE/8: Sustainable Drainage Systems (SuDS). This policy requires the use of SuDS wherever practicable, with drainage to surface water bodies, surface water sewer or combined sewer (in this order of preference) where this is not the case.*

*Policy NTE/9: Foul drainage. This policy requires that where development includes hard surface areas used by vehicles it "must include measures such as trapped gullies and petrol / oil interceptors or other suitable methods of pollution control to safeguard against pollution of the water environment". Additionally, it states that the Council will not give planning permission for "any development where it may prejudice the quality of ground or surface water, watercourses or sites of biodiversity importance unless measures are undertaken to mitigate the harm".*

*Technical Advice Note 15 (TAN 15): Development and Flood Risk*<sup>22</sup>

- 7.2.14 TAN 15 supports PPW and provides technical guidance in relation to development and flood risks. It provides a means by which the risks associated with river and coastal flooding, as well as flooding caused by additional runoff from development, can be assessed, taking into account the possible effects of climate change and the sustainability aims of the Welsh Government. It allows planning authorities to require developers to assess the suitability of sustainable drainage systems (SuDS) as part of a planning applications and condition their use should they be found to be appropriate.

<sup>21</sup> [http://spp.conwy.gov.uk/upload/public/attachments/629/Conwy\\_Adopted\\_LDP\\_2007\\_2022\\_English\\_.pdf](http://spp.conwy.gov.uk/upload/public/attachments/629/Conwy_Adopted_LDP_2007_2022_English_.pdf)

<sup>22</sup> <https://gov.wales/technical-advice-note-tan-15-development-and-flood-risk>

*Design Manual for Roads and Bridges LA113 Road Drainage and the Water Environment*<sup>23</sup>

- 7.2.15 This standard sets out the requirements for assessment and management of the impacts that road projects can have on the water environment for all regions within the UK, including Wales. It provides a stepped process for the assessment of effects associated with surface water, groundwater, flood risk and associated water dependent terrestrial ecosystems.

*Environment Agency Protocol for WFD Assessments of Projects in the Estuarine and Coastal Environment*<sup>24</sup>

- 7.2.16 Natural Resources Wales (NRW) require that the protocol with this Environment Agency (EA) guidance be followed when completing WFD assessments for marine licensing for activities within one nautical mile of the mean low water mark. Although the Scheme does not fall under the requirements of marine licensing, given its location adjacent to the coastal environment and the fact that the highway runoff from it will drain into the coastal environment, this guidance is of direct relevance to the Scheme. The WFD assessment that supports this chapter has been completed utilising the EA protocol, adapted to take account of its terrestrial setting. The assessment is presented in Appendix 7.1.

## **7.3 Study Area**

### **Spatial Scope**

- 7.3.1 The study area that has been adopted for the Scheme is an approximate 500 m radius from the junction alignments. This allows consideration of surrounding land use and drainage patterns as well as encompassing potential impacts on water bodies designated under the WFD.<sup>25</sup>

### **Temporal Scope**

- 7.3.2 The temporal scope of this assessment covers the existing baseline, to construction (enabling works to completion) plus operational effects, which are considered against the opening year.

### **Technical Scope**

- 7.3.3 The technical scope of the assessment has been informed by information available on the proposed development, including design elements as described in Chapter 2.
- 7.3.4 It has also been informed by the Environmental Impact Assessment (EIA) scoping report<sup>26</sup>.

<sup>23</sup> <http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section3/LA%20113%20Road%20drainage%20and%20the%20water%20environment-web.pdf>

<sup>24</sup> <https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters>

<sup>25</sup> The WFD assessment in Appendix 7.1 utilises a 2 km radius to ascertain if receptors are significantly close or not. All receptors discussed within the WFD assessment are included within this chapter.

<sup>26</sup> Ramboll, February 2019, A55 Junction 15 EIA Scoping Report

## 7.4 Baseline Conditions

### Surface Water Environment

- 7.4.1 The Scheme passes over the Afon Gyrach which flows in a general northerly direction, discharging into Conwy Bay approximately 500 m to the north northeast of the village of Dwygyfylchi (see Plate 1 and Plate 2). The river was designated under the WFD for the Cycle 1 of the Directive (i.e. 2009 to 2015) but is no longer designated. This is anticipated to be due to its small size. For the purposes of Cycle 1 reporting, it was classified by NRW as having a mid-altitude catchment of extra small size, running through underlying siliceous geology<sup>27</sup>. For the period of 2009-2015 it was classified as having good overall status, with good chemical and ecological statuses as well as good hydromorphology and flow characteristics.



**Plate 1 - Afon Gyrach on Downstream Side of A55**



**Plate 2 - Afon Gyrach at Location of Discharge onto the Beach**

- 7.4.2 Toward the northeast end of the Scheme, at approximate chainage 2350 (approximately 425 m southwest of the Penmaen-bach tunnels), there is a small unnamed watercourse herein referred to as Watercourse 425 (Plate 3). The location of the watercourse is shown on the figures within Appendix 2.5. This watercourse crosses the fields below the Penmaen-bach hillside before and is culverted beneath the A55. The watercourse is approximately 300m in length. The watercourse is not designated under the WFD presumably because of its small size.
- 7.4.3 At approximate chainage 1050 another small watercourse is culverted under the A55 (shown on figures within Appendix 2.5). This watercourse appears to be an often-dry ditch crossing a field to the south of the road (Plate 4) and is traced no further than Ysguborwen Road on mapping. The river is not designated under the WFD presumably because of its small size.

<sup>27</sup> For definition see: <https://cdn.naturalresources.wales/media/684352/annex-chapter-3-final-for-publication.pdf>





**Plate 3 - Watercourse 425 at chainage 2350**



**Plate 4 – Ephemeral watercourse at chainage 1050**

- 7.4.4 Ordnance Survey maps indicate the presence of a number of springs and wells within 500 m of the Scheme, located to the south and southeast, at elevations ranging from 20 m to 90 m above Ordnance Datum (AOD) (see Figure 7.1). These features indicate the presence of groundwater close to the surface.
- 7.4.5 To the west and north of the Scheme, shingle and rock beaches line the coast of Conwy Bay (see Plate 5). With respect to classification under the WFD, Conwy Bay currently has overall moderate status (i.e. displaying characteristics that show moderate signs of distortion from those expected under undisturbed conditions as a result of human activity), due to the presence of mercury, trichlorobenzenes and the quality of invertebrate populations.



**Plate 5 - Coastline Looking North-eastwards**



**Plate 6 – View Southwards at Southern-end of Scheme**

## Groundwater Environment

- 7.4.6 The British Geological Survey 'Geology of Britain Viewer' and 1:50,000 geological map (Sheet 94) show that the solid geology beneath the Scheme comprises mudstones and siltstones of the Nant Ffrancon Subgroup which are Ordovician in age. The Nant Ffrancon Subgroup are classified by NRW as a Secondary B aquifer<sup>28</sup>. With respect to the WFD, the aquifer is classified as having overall poor status. This is due to failure of the classification tests related to its chemical input into related surface water bodies and also on groundwater dependant terrestrial ecosystems.

<sup>28</sup> Predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers

- 7.4.7 The near surface superficial deposits under the Scheme comprise mainly Devensian Till (glacial till) which is Quaternary in age, although storm beach deposits (predominantly gravels) and coastal zone deposits (predominately clay and silt) are located to the north of the Scheme, between the road and Conwy Bay. These strata are collectively classified as a Secondary (undifferentiated) aquifer<sup>29</sup>.

## **Flooding**

- 7.4.8 The majority of the Scheme is in Flood Zone 1 with less than a 0.1 % annual probability of flooding from fluvial or tidal flooding (see Figure 7.3). Land adjacent to the Afon Gyrach is within Flood Zone 2 and Flood Zone 3<sup>30</sup>. The extent of the Afon Gyrach flood zone is constrained to a narrow strip of land (approximately 50 m wide) along the river due to the relatively steep topography on either side. Approximately 300 m upstream from where the A55 crosses the Afon Gyrach, a small residential area (Gardd Eryri) lies to the east of the river within Flood Zones 2 and 3.
- 7.4.9 Flood risk mapping (see Figures 7.4 to 7.6) indicates that surface water flooding may be expected on the A55 carriageway during extreme rainfall events. However, the mapping is based only on topography and does not account for the highway drainage system which, if working as designed, would restrict the flooding on the carriageway to the degree permitted by the Design Manual for Roads and Bridges (DMRB). Within the Scheme boundary, part of a field to the southeast of the A55 between the Afon Gyrach and the Puffin Café is shown to be at risk of surface water flooding. Toward the northeast end of the Scheme, approximately 425 m southwest of the Penmaen-bach tunnels, there is another field shown to be at risk of surface water flooding – a low lying area associated with a small unnamed watercourse.

## **Drainage**

### *Catchment Drainage*

- 7.4.10 A site walkover was undertaken in October 2018. This indicated that the Afon Gyrach crosses beneath the Scheme in a moderate sized channel.

<sup>29</sup> Classification allocated to strata where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

<sup>30</sup> Flood Zone 2 has a more than 0.1 % annual probability of flooding from rivers or the sea. Flood Zone 3 has a 1 % or greater annual probability of river flooding in any given year or 0.5 % or greater annual probability of flooding from the sea in any given year.





**Plate 7 – Afon Gyrach Upstream of A55**



**Plate 8 – Afon Gyrach Flow Across the Beach**

- 7.4.11 The road pavement at Junction 16 is currently drained from the site mostly using a kerb and gully drainage system, discharging directly into Conwy Bay via seven drainage outfalls off the beach to the north of the Scheme (see Figure 7.1).



**Plate 9: Surface Water Outfall B**



**Plate 10: Surface Water Outfalls D and E, Afon Gyrach**

#### *Road Drainage*

- 7.4.12 Most of the runoff from the existing A55 within the Scheme boundary drains directly to Conwy Bay via a series of sea outfalls. Some runoff drains to the Afon Gyrach where it is crossed by the A55 and also to Watercourse 425. There is not believed to be any attenuation of flow rates prior to discharge. Watercourse 425 passes under both the A55 and the adjacent railway in a culvert which discharges directly to the beach, i.e. downstream of the A55 there is no further 'natural' part of the watercourse. Highway drainage is discharged to Watercourse 425 within the culvert, not upstream nor downstream of it.

7.4.13 Further details of the highway drainage are given in the Junction 16 Drainage Strategy Report.

## **7.5 Assessment of Effects**

### **Outline Methodology**

- 7.5.1 The assessment contained within this report:
- a) Reviews existing information on the water environment in which the site and its surroundings are located, focussed on:
    - a. The WFD quality criteria that apply to the designated water bodies that are located within the study area; and
    - b. The context of the site with respect to flooding;
  - b) Identifies potential receptors (be they properties, residents, water bodies themselves or ecology/resources dependent upon them);
  - c) Assesses the Scheme in terms of how it may interact with the water environment both during construction and operation;
  - d) Discusses how changes in flood risk may result; and
  - e) Analyses the significance of the potential environmental risks identified in the context of the proposed development.
- 7.5.2 A site walkover was undertaken in October 2018 in order to inform the discussions within this report and to visually confirm the site setting.

### **Assessment Criteria**

- 7.5.3 The criteria used to assess if an effect is significant or not is set out in subsequent sections. This is determined by consideration of the importance of the receptor and magnitude of change.

#### *Importance of Receptor Criteria*

- 7.5.4 For the purposes of this chapter, the level of importance of a given water body is defined as low, medium, high or very high based upon the definitions presented in Table 7:1 to Table 7:3.

Table 7.1: Importance Criteria Examples for Surface Water

Importance*				
Criteria Examples – Surface Water Body				
	Low	Medium	High	Very High
Ecological Value	Has no or minimal ecosystem present	Has an ecosystem that has low sensitivity to water quality or quantity changes	Has an ecosystem that has moderate sensitivity to water quality or quantity changes	Has an ecosystem that has high sensitivity to water quality or quantity changes
	Does not form or supply water to a designated site	Forms or supplies water to a locally designated site (e.g. LNR** or SINC**) where quality of aquatic environment is factor in designation	Forms or supplies water to a nationally designated site (e.g. SSSI**, National Park) where quality of aquatic environment is factor in designation	Forms or supplies water to a European or internationally designated site (e.g. SPA**, Ramsar site) where quality of aquatic environment is factor in designation
	Does not support any protected aquatic flora or fauna	Supports protected aquatic flora and/or fauna of regional/national importance	Supports protected aquatic flora and/or fauna of national importance	Supports protected aquatic flora and/or fauna of European/international importance
Amenity Value	Provides low/no amenity value	Provides amenity value on a local basis (where water immersion sports are rarely practiced)	Is regularly used for recreation (where water immersion sports are practiced regularly)	Function of water body (at location of interest) is for recreation (where water immersion sports are practiced regularly)
	Does not form or supply a designated bathing water	Is a bathing water of local importance/scale	Is a designated bathing water of regional importance/economic significance	Is a designated bathing water of greater than regional importance/economic significance
	Does not support navigation	Supports navigation on a local/small scale basis	Supports commercial navigation, important on a regional basis	Is a major commercially significant navigational water body
Resource Value	Is not used as a commercial or private water supply	Is used as a private water supply for potable water supply purposes	Is used as a local water supply for potable water supply purposes	Is used as a regional water supply for potable water supply purposes
		Is used as a water supply for small scale industrial, commercial or agricultural purposes	<i>Is used as a water supply for regionally important industrial, commercial or agricultural purposes</i>	Is used as a water supply for commercially significant/nationally important industrial, commercial or agricultural purposes

<b>Importance*</b>				
<b>Criteria Examples – Surface Water Body</b>				
<b>Replaceability for substitution</b>	Has potential for substitution in short term	May be substitutable in long term	Is not substitutable in short or long term	
<b>Water Quality</b>	Water bodies not having a WFD classification shown in a RBMP** and $Q_{95} \leq 0.001\text{m}^3/\text{s}$ or $Q_{95} < 1.0\text{m}^3/\text{s}$	Water body not having a WFD classification shown in a RBMP and $Q_{95}^{**} > 0.001\text{m}^3/\text{s}$	Water body having a WFD classification shown in a RBMP and $Q_{95} < 1.0\text{m}^3/\text{s}$	Water body having a WFD classification shown in a RBMP and $Q_{95} \geq 1.0\text{m}^3/\text{s}$
		Shows a downward trend in hazardous substances;	Does not show an upward trend in hazardous substances;	Shows an upward trend in hazardous substances;
<b>Economic Value</b>	Does not form part of a designated fishery	Is or forms part of a cyprinid fishery	Is or forms part of a salmonid fishery	Is or forms part of a salmonid fishery Is a designated Shellfish water

\* Classifications are based on a combination of the following:

- Welsh Transport, Planning and Appraisal Guidance (Wettag) (2017)
- Department for Transport, Transport Analysis Guidance (TAG) Unit A3, Environmental Impact Assessment (December 2015)
- Highways England, Design Manual for Roads and Bridges LA113 - Road Drainage and the Water Environment (2019)
- Professional experience

\*\* LNR – Local Nature Reserve, RBMP - River Basin Management Plan, SINC – Site of Importance for Nature Conservation, SPA – Special Protection Area, SSSI – Site of Special Scientific Interest,  $Q_{95}$  - the flow rate equalled or exceeded for 95% of the time.

Table 7.2: Importance Criteria Examples for Groundwater

Importance*				
Criteria Examples – Groundwater Body				
	Low	Medium	High	Very High
Classification	Unproductive strata	Is a Secondary A or B aquifer	Is a Principal aquifer	Is a Principal aquifer
	Is classified as having low aquifer vulnerability	Is a Secondary aquifer classified as having low or intermediate aquifer vulnerability	Is a Secondary Aquifer with high vulnerability or Principal Aquifer with low vulnerability	Is Principal aquifer with high aquifer vulnerability
	Is classified by NRW as not being at risk	Is classified by NRW as probably not being at risk	Is classified by NRW as being probably at risk.	Is classified by NRW as being at risk.
Water Balance	Does not supply baseflow to local rivers	Contributes some baseflow to locally important rivers	Contributes some baseflow to regionally important rivers	Provides significant baseflow to local rivers
	Has poor classification for water balance or effects on groundwater dependent terrestrial ecosystems		Has good classification for water balance or effects on groundwater dependent terrestrial ecosystems	
	Has a poor water balance	Has moderate water balance	Has good water balance	Has high water balance
Resource Value	Is not located within a groundwater Source Protection Zone (SPZ)	Is located within a groundwater SPZ 3 (source catchment area)	Is located within a groundwater SPZ 2 (outer catchment)	Is located within a groundwater SPZ 1 (inner catchment)
	Is not used as a commercial or private water supply	Is used as a private water supply for potable water supply purposes	Is used as a local water supply for potable water supply purposes	Is used as a regional water supply for potable water supply purposes
		Is used as a water supply for small scale industrial, commercial or agricultural purposes	Is used as a water supply for regionally important industrial, commercial or agricultural purposes	Is used as a water supply for commercially significant/nationally important industrial, commercial or agricultural purposes
Ecological Value	Does not supply a groundwater dependent terrestrial ecosystem (GWDTE).	Supplies a GWDTE that has species that are not protected or listed. They are abundant / common and not critical for GWDTE functions. Sites of local biodiversity value but not intact, fragile or unique.	Supplies a GWDTE that has species that are not globally common species that are rare in UK, or important to GWDTE functioning. Habitats of high species number or habitat diversity or 'naturalness'.	Supplies a GWDTE that has regionally significant populations of globally threatened or endangered species or species that are important to GWDTE functioning, such as predator or prey species.

Importance*				
Criteria Examples – Groundwater Body				
		Habitats that recover quickly following disturbance (i.e. habitats comprising marine species that readily recolonise disturbed areas).	Habitats that are capable of unassisted recovery to natural conditions following disturbance, although this may require several years (habitats where growing conditions are favourable).	Habitats that are unlikely to return to natural conditions without some intervention, but which are capable of assisted recovery.
Replaceability for substitution	Has potential for substitution in short term	May be substitutable in long term	Is not substitutable in short or long term	

\* - see notes below Table 7:1

**Table 7.3: Importance Criteria Examples for Flooding**

Importance*				
Criteria Examples – Flooding				
	<b>Low</b>	<b>Medium</b>	<b>High</b>	<b>Very High</b>
	Floodplain with limited constraints and a low probability of flooding of residential and industrial properties.	Floodplain or defence protecting 10 or fewer industrial properties from flooding.	Floodplain or defence protecting between 10 and 100 residential properties or industrial premises from flooding.	Floodplain or defence protecting more than 100 residential properties from flooding.



### *Magnitude of Change*

- 7.5.5 The overarching requirements of the WFD, which have guided the water quality assessment and the separate WFD Assessment are to prevent the deterioration of any water body (regardless of its classification) and to avoid actions that prevent (or contribute to the prevention of) a water body achieving its requirement of 'Good status'. Accordingly, the magnitude of change for effects associated with the operation of the Scheme has been defined according to the following criteria:

**Table 7.4: Criteria for Determining Magnitude of Effects\***

<b>Magnitude</b>	<b>Criteria</b>	<b>Examples</b>
Major (adverse)	Results in loss of feature	<ul style="list-style-type: none"> <li>• Non-compliance with water quality/quantity UK standards on a long-term basis;</li> <li>• Measurable changes in groundwater levels or quality in wider groundwater regime with significant impact on local private or public water supplies;</li> <li>• Changes in quantity or quality that result in a reduction in WFD status;</li> <li>• Large scale change to hydrological receptor. Change likely to be permanent/long term;</li> <li>• Loss/deterioration of regionally or nationally important potable water supply;</li> <li>• Significant measurable changes in riverine flow regime hydrodynamics or erosion and deposition patterns;</li> <li>• Significant damage to or loss of aquatic ecosystem which relies on the surface water;</li> <li>• Loss of important fishery;</li> <li>• Changes put at risk protected species or designation status of the water body;</li> <li>• Loss of flood storage/Increase in peak flood level (1% annual probability) &gt;100 mm;</li> <li>• Failure of both acute-soluble and chronic-sediment related pollutants in HEWRAT and compliance failure with EQS values;</li> <li>• Potential high risk of pollution to groundwater from routine runoff - risk score &gt;250 (Groundwater quality and runoff assessment);</li> <li>• Calculated risk of pollution from a spillage <math>\geq 2\%</math> annually (spillage assessment);</li> <li>• Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies;</li> <li>• Loss or significant damage to major structures through subsidence or similar effects.</li> </ul>
Moderate (adverse)	Results in adverse impact on integrity of feature or loss of part of feature	<ul style="list-style-type: none"> <li>• Non-compliance with water quality/quantity UK standards on a short-term basis.</li> <li>• Localised changes in groundwater levels or quality with small-scale measurable changes in wider groundwater regime but no significant impact on local private water supplies.</li> <li>• Change in water body but not enough to change its WFD status.</li> <li>• Evident change to hydrological conditions resulting in temporary or long-term changes to baseline.</li> <li>• Loss/deterioration of local water supply.</li> <li>• Moderate measurable change in riverine flow regime, hydrodynamics or erosion and deposition patterns.</li> <li>• Measurable change to aquatic ecosystem which relies on the surface water.</li> </ul>

Magnitude	Criteria	Examples
		<ul style="list-style-type: none"> <li>Failure of both acute-soluble and chronic-sediment related pollutants in HEWRAT but compliance with EQS values.</li> <li>Potential medium risk of pollution to groundwater from routine runoff - risk score 150-250.</li> <li>Calculated risk of pollution from spillages <math>\geq 1\%</math> annually and <math>&lt; 2\%</math> annually.</li> <li>Partial loss of the integrity of GWDTE.</li> <li>Reduced productivity of fishery.</li> <li>Reduction in the economic value of the feature.</li> <li>Damage to major structures through subsidence or similar effects or loss of minor structures.</li> <li>Increase in peak flood level (1% annual probability) <math>&gt; 50</math> mm.</li> </ul>
Minor (adverse)	Results in minor adverse impact on feature	<ul style="list-style-type: none"> <li>Water quality/quantity within UK standards and unlikely to affect most sensitive receptors.</li> <li>Localised changes in groundwater levels or quality but no appreciable change in wider groundwater regime.</li> <li>Short term changes that will recover in the short to medium term.</li> <li>Detectable but modest change to hydrological conditions from baseline. Likely to be temporary.</li> <li>Loss/deterioration of private water supply.</li> <li>Small measurable change in riverine flow regime, hydrodynamics or erosion and deposition patterns.</li> <li>Failure of either acute soluble or chronic sediment related pollutants in HEWRAT.</li> <li>Calculated risk of pollution from spillages <math>\geq 0.5\%</math> annually and <math>&lt; 1\%</math> annually.</li> <li>Potential low risk of pollution to groundwater from routine runoff - risk score <math>&lt; 150</math>.</li> <li>Minor effects on an aquifer, GWDTEs, abstractions and structures.</li> <li>Increase in peak flood level (1% annual probability) <math>&gt; 10</math> mm.</li> </ul>
Negligible	Results in an impact on feature but of insufficient magnitude to affect the use/integrity	<ul style="list-style-type: none"> <li>No or little change from baseline conditions.</li> <li>Impact/beneficial change occurs but is insufficient to affect the attribute or to change WFD status.</li> <li>No risk identified by HEWRAT (pass both acute-soluble and chronic-sediment related pollutants).</li> <li>Risk of pollution from spillages <math>&lt; 0.5\%</math>.</li> <li>Negligible change in peak flood level (1% annual probability) <math>&lt; +/- 10</math> mm.</li> </ul>
Minor Beneficial	Results in minor beneficial impact on feature or a reduced risk of adverse effect occurring	<ul style="list-style-type: none"> <li>HEWRAT assessment of either acute soluble or chronic-sediment related pollutants becomes pass from an existing site where the baseline was a fail condition.</li> <li>Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is <math>&lt; 1\%</math> annually).</li> <li>Reduction of groundwater hazards to existing structures.</li> <li>Reductions in waterlogging and groundwater flooding.</li> <li>Reduction in peak flood level (1% annual probability) <math>&gt; 10</math> mm.</li> </ul>

Magnitude	Criteria	Examples
Moderate Beneficial	Results in moderate improvement of feature	<ul style="list-style-type: none"> <li>Enhanced productivity of a fishery.</li> <li>Reduction in a significant proportion of the effluent in a receiving river, but not sufficient to change its WFD classification.</li> <li>HEWRAT assessment of both acute-soluble and chronic-sediment related pollutants becomes pass from an existing site where the baseline was a fail condition.</li> <li>Calculated reduction in existing spillage by 50% or more (when existing spillage risk &gt;1% annually).</li> <li>Support to significant improvements in damaged GWDTE.</li> <li>Reduction in peak flood level (1% annual probability) &gt;50 mm.</li> </ul>
Major Beneficial	Results in major improvement of feature	<ul style="list-style-type: none"> <li>Improvement in water body WFD classification.</li> <li>Removal of major existing polluting discharge to a watercourse.</li> <li>Reduction in peak flood level (1% annual probability) &gt;100 mm.</li> </ul>
No Change		<ul style="list-style-type: none"> <li>No loss or alteration of characteristics, features or elements; no observable impact in either direction.</li> </ul>

\* Classifications are based on a combination of the following:

- a) Welsh Transport, Planning and Appraisal Guidance (Weltag) (2017)
- b) Department for Transport, Transport Analysis Guidance (TAG) Unit A3, Environmental Impact Assessment (December 2015)
- c) Highways England, Design Manual for Roads and Bridges LA113 - Road Drainage and the Water Environment (2019)
- d) Professional experience

### Significance Criteria

- 7.5.6 The significance of effect, which is dependent on the importance of the receptor and the magnitude of change, is determined using the matrix presented below. Only effects shown in bold are considered to be significant for the purposes of this assessment.

**Table 7.5: Significance of Effects**

		Magnitude of Effect				
		No change	Negligible	Minor	Moderate	Major
Importance of Receptor	Very High	Neutral	Slight	<b>Moderate or Large</b>	<b>Large or very large</b>	<b>Very large</b>
	High	Neutral	Slight	Slight or moderate	<b>Moderate or Large</b>	<b>Large or very large</b>
	Medium	Neutral	Neutral or slight	Slight	<b>Moderate</b>	<b>Moderate or Large</b>
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate

## 7.6 Identification of Potential Effects

- 7.6.1 The DMRB standard for the assessment of impacts of road drainage and the water environment<sup>23</sup> requires that the following principal types of potential impact be evaluated:

**Table 7.6: Assessment Methods**

	Method of Assessment	Relevant to Scheme?
<b>Impacts on surface waters</b>		
Water quality (routine runoff and spillage)	Routine runoff and surface water quality assessment, spillage assessment (see Appendix 7.3).	Yes – the Scheme will be subject to routine surface water runoff and at risk of spillage incidents.
Hydromorphology	Site specific initial assessment.	Yes – the Scheme involves the extension of two existing culverts and the construction of a new structure to allow for embankment construction. Flow rates at the existing outfalls would be maintained.
<b>Impacts on groundwater</b>		
Water quality (routine runoff and spillage)	Routine runoff and groundwater quality assessment, spillage assessment (see Appendix 7.3).	Yes – while discharge will be to surface water (including the sea), parts of the road drainage system will be unlined with potential for infiltration to groundwater

	Method of Assessment	Relevant to Scheme?
Groundwater levels and flows	Groundwater level and flow assessment.	No – the Scheme is largely above existing ground level with few cuttings or below ground structures. The most significant cutting is into the hillside south of the existing Junction 16 roundabout to provide space for the slip roads to join the proposed Link Road. The proximity to the coast and the lack of groundwater receptors (GWDTEs, groundwater abstractions, surface watercourses relying on groundwater for baseflow) means that an assessment of the impact on groundwater levels and flows has been scoped out.
Groundwater dependent terrestrial ecosystems (GWDTE)	GWDTE assessment.	No - no GWDTEs are present such that an assessment of the impact on GWDTEs has been scoped out.
Flood impacts		
To the Scheme	Flood Consequences Assessment (FCA).	Yes – The Scheme is mostly located in Flood Zone 1 but the proposed Link Road crosses Flood Zones 2 and 3 where it crosses the Afon Gyrach. It is proposed that a new structure will be constructed at this location to allow the Link Road to cross the Afon Gyrach. The Scheme will also require the extension of two existing culverts for unnamed watercourses. The additional impermeable area of the scheme is also relevant to flood risk.
Resulting from Scheme		
Others		
Construction phase impacts		Yes – construction would be undertaken under the control of a Construction Environmental Management Plan, which would ensure protection of the water environment.
Cumulative effects		Yes
Contravention of WFD		Yes

### Surface Water Quality (Routine Runoff and Spillage)

- 7.6.2 In order to assess the potential quality of water being discharged from the operational Scheme, a water quality assessment has been completed utilising Highways England's Water Risk Assessment Tool (HEWRAT) within LA113. This is the tool adopted by the Welsh Government for such purposes.
- 7.6.3 Further details of this assessment and its outcome are presented in Appendix 7.3, and a discussion as to the implications of the results is included within the WFD assessment in Appendix 7.1. The details of the assessment are summarised in the following paragraphs.

- 7.6.4 Runoff from the Scheme would be discharged into Conwy Bay via existing outfalls to sea and via discharges to the Afon Gyrach and an unnamed watercourse which is culverted under the A55 approximately 425 m west of the Penmaen-bach Tunnels (referred to as 'Watercourse 425' in Appendix 7.3). The runoff has the potential to affect:
- a) The chemical quality of Conwy Bay, the Afon Gyrach and Watercourse 425;
  - b) Aquatic ecosystems within Conwy Bay, the Afon Gyrach and the Watercourse 425; and
  - c) Bathing water quality along the beach.

#### *Chemical Quality - General*

- 7.6.5 It is normal for runoff from trunk roads to rely on a degree of dilution and dispersal in the receiving waterbody to achieve acceptable concentrations. The HEWRAT assessment concludes that, with respect to dissolved contaminants, the respective quality thresholds are met for almost 90% of rainfall events without the need for the dilution that would occur upon discharge to the sea.
- 7.6.6 For the remaining rainfall events, routine runoff from the Scheme which discharges direct to the sea requires only a small volume of seawater to dilute dissolved contaminants to concentrations below the thresholds given in HEWRAT/LA113. Dilution of runoff is anticipated to take place within a short distance of each sea outfall. Following this, the runoff would be subject to further, significant, dispersion within the coastal water body. Taking the above into account, the sea water volume with contaminant concentrations above the HEWRAT thresholds is considered to be insignificant (see Appendix 7.3 for details).
- 7.6.7 The HEWRAT tool is also used to identify potential risks associated with sediment-bound contaminants found in runoff during the intermittent discharges from highway outfalls (see Appendix 7.3 for details). With respect to the Conwy Bay water body, the coastal environment where runoff would discharge is dynamic and subject to currents, waves and tides which would disperse the intermittently discharged fine sediments such that they would not be sufficiently concentrated to be toxic to aquatic organisms living in or near bed sediments.
- 7.6.8 For discharges to the Afon Gyrach and the unnamed watercourse (Watercourse 425), the HEWRAT assessment concludes that the dilution and dispersal of the dissolved and sediment-bound contaminants is sufficient for the assessment to pass.
- 7.6.9 A spillage risk assessment has been completed and is presented in Appendix 7.3. The assessment concludes that the annual probability of a spillage that could cause a Category 1 or 2 incident is less than 0.5 % and thus that no specific pollution control measures would be required<sup>31</sup>. It should be noted that the removal of the roundabout will decrease the risk of spillage when compared to the current situation and thus will provide betterment in that respect.

<b>Importance</b>	<b>Magnitude of Effects</b>	<b>Significance</b>
Very high	Negligible	Slight

#### *Chemical Quality – Shellfish Waters*

- 7.6.10 The Conwy designated shellfish water commences upstream of the town of Conwy within the Afon Conwy, and, at the mouth of the river, widens in both easterly and westerly directions for

<sup>31</sup> Highways England, Design Manual for Roads and Bridges LA113 Road Drainage and the Water Environment

several kilometres along the coast. Part of this shellfish water is located adjacent to the northern half of the Scheme (see Figure 7.2).

- 7.6.11 Surface water from the Scheme would be discharged into this area from four outfalls. As discussed in Appendix 7.1, any effects associated with this are not considered to be significant.

<b>Importance</b>	<b>Magnitude of Effects</b>	<b>Significance</b>
Very high	Negligible	Slight

### *Aquatic Ecosystems*

- 7.6.12 Chapter 8 discusses the potential effects of the Scheme on the adjacent SPAs and Special Area of Conservation (SAC) in terms of the protected habitats and species within them. The assessment within that chapter concludes that any effects associated with surface water runoff from the Scheme would be neutral.

<b>Importance</b>	<b>Magnitude of Effects</b>	<b>Significance</b>
Very high	No change	Neutral

### *Bathing Water Quality*

- 7.6.13 With respect to bathing water quality, faecal content and turbidity are the main parameters of concern. Road runoff should not contain any faecal content so the Scheme would not result in any change in that context. Increased runoff from the Scheme during periods of high rainfall could contribute to the turbidity of the sea on a very localised basis during such events, but inclusion of flow attenuation within the Scheme drainage design would assist in negating that.

<b>Importance</b>	<b>Magnitude of Effects</b>	<b>Significance</b>
Medium	Negligible	Neutral

- 7.6.14 It is therefore concluded that overall the operational discharge of surface water runoff from the Scheme into the Conwy Bay water body results in a negligible magnitude of change with respect to chemical quality, effects on aquatic ecosystems and bathing water quality. There would be betterment (due to there being betterment over the current situation in terms of both routine surface water runoff quality and spillage risk) but the scale of this change, particularly in the context of the size of the receiving water, means that the overall effect is likely to be negligible.
- 7.6.15 The **overall significance** of the resultant effect is therefore **slight**.

### **Hydromorphology**

- 7.6.16 The Scheme involves the extension of two existing culverts on unnamed watercourses to allow for embankment construction as well as a new structure for the Afon Gyrach to pass under the new link road. The Scheme design would incorporate an arch profile for the structure of the same dimensions as the existing A55 structure (8 m downstream) and which would retain the existing river bed beneath it. During normal, in-bank, flow conditions the flow velocity regime would not be different to existing and thus not result in any impact on fish moving within the

river. During out-of-bank flood conditions, the new structure would constrict the flow creating higher flow velocities than at present, however, these velocities are predicted to be similar to the velocities experienced at the existing A55 structure and the structure carrying the railway. The impact of the new structure on flow velocities and scour should be examined in greater detail at the detailed design stage to determine whether scour protection is required.

- 7.6.17 A macroinvertebrate survey has been completed for the lower portion of the Afon Gyrach<sup>32</sup>. This indicates that the river bed both upstream and downstream of the current A55 consists mainly of boulders and cobbles and is structurally complex, supporting good to high quality macroinvertebrate populations. The retention of the existing river bed beneath the structure would minimise any changes in the hydromorphology of this portion of the Afon Gyrach (and thus the populations that rely on it).
- 7.6.18 Installation of the structure at the Afon Gyrach would result in loss of riparian and bankside habitat, however, the channel is currently overshadowed by vegetation (see Plate 11) and the length of the structure will be limited (approximately 15 m). Nonetheless there will be loss of in-channel aquatic vegetation due to shading. Given the closeness of the structure location to the point at which the river discharges across the beach (approximately 70 m) any downstream effects, should any occur, would be limited.



**Plate 11 – Afon Gyrach Upstream of A55**

- 7.6.19 The Scheme requires the extension of existing culverts at Watercourse 425 and the unnamed watercourse at chainage 1050. Once Watercourse 425 enters the existing culvert it does not daylight again until it discharges to the sea. Any impact would be limited to the extended section. The watercourse at chainage 1050 appears to be ephemeral in nature, supporting few if any aquatic species such that the proposed culvert extension would be unlikely to have

<sup>32</sup> Richards, Moorehead and Laing, A55 Junction 16 Improvements: Survey of the Macroinvertebrate Community of the Lower Reach of the Afon Gyrach, October 2019



significant impacts.

- 7.6.20 With respect to construction, the survey report<sup>32</sup> identifies the main risks to macroinvertebrate populations as being introduction of silt and also the risks of spillage during construction. The pre- Construction Environmental Management Plan (CEMP) that accompanies the Environmental Statement (ES) provides a baseline of the standards and controls required for construction of the project. The chosen contractor would need to develop the pre-CEMP into a full CEMP to include robust management procedures. With the implementation of these, negligible magnitude of effects are considered likely and thus overall would be considered to be insignificant.

<b>Importance</b>	<b>Magnitude of Effects</b>	<b>Significance</b>
Medium	Minor	Slight

### **Groundwater Quality (Routine Runoff)**

- 7.6.21 While the drainage strategy is to discharge road runoff to surface water (including direct to the sea), elements of the drainage system may be unlined and give rise to the potential for runoff to infiltrate into the ground. Based on the baseline groundwater conditions and the criteria for importance set out above, the groundwater/aquifer underlying the Scheme is considered to be of medium importance. An assessment was made of the potential impact on groundwater quality and is presented in Appendix 7.3. Due to site-specific factors, notably the proximity to the coast and the lack of groundwater abstractions within 500 m of the Scheme, the risk of impacting the groundwater and any receptors that might rely upon groundwater is negligible such that the magnitude of effects is considered 'no change' and the significance 'neutral'.

<b>Importance</b>	<b>Magnitude of Effects</b>	<b>Significance</b>
Medium	No change	Neutral

### **Flood Impacts to and Resulting from the Scheme**

- 7.6.22 The A55 and Junction 16 are in Flood Zone 1, at low risk of flooding from rivers or the sea. The Afon Gyrach passes under the A55 approximately 1 km northeast of the existing Junction 16 roundabout. A narrow strip of land (approximately 50 m wide) along this river lies within Flood Zones 2 and 3. Approximately 300 m upstream from the A55 a small residential area (Gardd Eryri) lies next to the river within Flood Zones 2 and 3.
- 7.6.23 The proposed Scheme includes a new link road running parallel with the A55 which would cross the Afon Gyrach immediately upstream of the existing A55 crossing. To ensure the new structure for the crossing would not increase the risk of flooding to residential receptors, a hydraulic modelling exercise has been carried out. The modelling report forms Appendix 7.5 and the flood consequences assessment is Appendix 7.2. The modelling concluded that the structure carrying the link road over the Afon Gyrach should have an opening size (shape, width and height) the same or larger than the existing A55 arch structure. The modelling also concluded that there would be a minor afflux (increase) of flood water levels immediately upstream of the new structure in extreme rainfall events: 0.13 m in a 1-in-1000 year event and 0.01 m in a 1-in-100 year event (with the latter including a 30% allowance for climate change). The afflux is predicted to extend no further than 28 m upstream of the new structure. This land is currently used for pasture only and, as part of the Scheme, would be within the ownership of Welsh

Government. Given that the land that would experience afflux in flood level would be wholly owned by the Welsh Government, and that no residential receptors or other buildings would be affected, the afflux is considered acceptable. This principle has been discussed with and accepted by NRW.

- 7.6.24 The modelling also concluded that floating debris would be able to pass under and through the new structure as the freeboard during a 1-in-1000 year flood would be more than 600 mm.
- 7.6.25 The Scheme itself would have drainage systems designed to DMRB requirements such that the extent of surface water flooding on the carriageway would be restricted to the degree permitted by the DMRB. Where the proposed link road would pass through areas at risk of surface water flooding the road itself would be raised above the original ground level on a low embankment.
- 7.6.26 The Scheme would result in a larger area of impermeable road surface with the potential to increase discharge rates and exacerbate flooding elsewhere. To prevent this the Scheme would include attenuation systems to reduce the runoff rate so that it is no greater than at present.
- 7.6.27 In terms of flood risk to the surrounding area, the mitigation measures are considered to negate the potential adverse impacts such that there is no change.
- 7.6.28 In terms of flood risk vulnerability, under current DMRB standards (LA113<sup>31</sup>), the A55 is classified as 'essential infrastructure' which gives it a very high level of importance. No increase in flood risk to the A55 has been identified such that the magnitude of impact is no change and the significance neutral.

<b>Importance</b>	<b>Magnitude of Effects</b>	<b>Significance</b>
Very high	No change	Neutral

- 7.6.29 The pasture adjacent to the new A55 structure is of low importance. Based on the criteria that increased flooding levels on the pasture during extreme rainfall events would "*Results in effect on attribute, but of insufficient magnitude to affect the use or integrity*".<sup>33</sup> the magnitude of the impact is classified as negligible and the impact slight.

<b>Importance</b>	<b>Magnitude of Effects</b>	<b>Significance</b>
Low	Negligible	Slight

### Contravention of WFD

- 7.6.30 A detailed WFD assessment is provided in Appendix 7.1. The assessment concludes that, with implementation of the noted design measures plus environmental management during construction, the proposed Scheme would not result in deterioration of the adjacent coastal water bodies (of very high importance). Any changes would be of negligible magnitude of change. The Scheme is thus in compliance with the requirements of the WFD, supports the Western Wales River Basin Management Plan.

<b>Importance</b>	<b>Magnitude of Effects</b>	<b>Significance</b>
Very high	Negligible	Slight

<sup>33</sup> <http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section2/la104.pdf>

## 7.7 Mitigation Measures

- 7.7.1 The Scheme design includes the following elements that are associated with water or have an interaction with the water environment:
- a) Interception of drainage from road runoff into existing drainage network by measures including drainage ditches, filter drains and pipes/culverts;
  - b) Extension of two existing culverts and the construction of a third, including construction of headwalls, to facilitate widening of road embankments;
  - c) Addition of one drainage outfall into the Afon Gyrach; and
  - d) Discharge of drainage from the existing network into seven existing drainage outfalls on Penmaenmawr beach, discharging surface water drainage into the sea.
- 7.7.2 Detailed Scheme design would take place following submission of the ES, however, the design would be likely to include the following: a range of measures intended to meet the requirements of the statutory standards for sustainable drainage systems (SuDS). These include attenuation measures to receive water from the Scheme and from areas where there are risks of surface water flooding. These would act to attenuate flows to existing rates (allowing for climate change) during the operation of the Scheme prior to discharge to existing outfalls (including those which outfall to the sea).
- 7.7.3 Completion of construction works would be undertaken under the management of a CEMP which would include measures protective of the water environment such as management of surface water runoff from exposed earthworks and construction compounds, provision of spills kits and emergency spill procedures. Further details are provided in the pre-CEMP document.

### Monitoring Requirements

- 7.7.4 During the construction phase, monitoring of the works to identify impacts on the water environment would be undertaken. Full details would be included in the pre-CEMP. Monitoring would include, but would not be limited to:
- a) Regular visual inspection of all discharges into the existing drainage system and into the sea;
  - b) Regular inspection of surface water runoff control measures to ensure that sediment is not transported off site; and
  - c) Regular inspection of plant that contain fuels or chemicals to ensure there is no risk of spillage.

## 7.8 Significance of Effects

- 7.8.1 The assessment included within this chapter concludes that the Scheme will not result in any significant effects on the water environment.

## 7.9 Cumulative Effects

### Intra-Projects Effects

- 7.9.1 Intra-project effects are considered as those that *"occur between different environmental topics within the same proposal, as a result of that development's direct effects"* (IEMA<sup>34</sup>).

<sup>34</sup> Institute of Environmental Management & Assessment (IEMA), 2011. Special Report – The State of Environmental Impact Assessment Practice in the UK

- 7.9.2 The following potential direct and indirect intra-project cumulative effects have been considered along with mitigation:
- a) Chapter 6: Geology and Soils - No potentially significant effects have been identified to geology and soils from changes to the water environment. Potential impacts to groundwater quality have been assessed negligible.
  - b) Chapter 8: Nature Conservation - The impact of the scheme on surface water quality, including that of the adjacent Special Protection Areas (SPA) and Special Area of Conservation (SAC) has been assessed in terms of the protected habitats and species within them. The assessment within that chapter concludes that any effects associated with surface water runoff from the Scheme would be neutral.
- 7.9.3 Following the implementation of mitigation no potentially significant intra-project cumulative effects have been identified.

### **Inter-Project Effects**

- 7.9.4 Inter-project effects have been considered as those where *"cumulative effect occurs as a result of the likely impacts of the proposed development interacting with the impacts of other developments in the vicinity"* (IEMA<sup>34</sup>).
- 7.9.5 Chapter 19 sets out the known schemes that could be considered to have a cumulative effect in combination with the Scheme.
- 7.9.6 In terms of Drainage and Water, the potential for significant cumulative effects in combination with the Scheme, including the proposals for Junction 15, is considered low.

## **7.10 Conclusions**

- 7.10.1 The Scheme will result in an increase in impermeable area and thus the amount of surface water runoff being produced, however, the drainage design will include measures to attenuate flow such that no increase in runoff rate would occur. Where the proposed link road crosses the Afon Gyrach there would be a minor increase in flood water levels immediately upstream of the structure in extreme events. As this would impact land wholly owned by Welsh Government, and no buildings would be affected, the impact is considered slight.
- 7.10.2 Water quality assessments for routine runoff and spillage risk conclude that the impact of the Scheme is negligible such that no net deterioration in water quality would occur.
- 7.10.3 Assessment of the impacts of extending culverts on two minor watercourses, and the inclusion of an additional structure for the Afon Gyrach, concluded that the impact would be slight.
- 7.10.4 It is concluded that, overall, the operational discharge of surface water runoff from the Scheme into the Menai Strait water body would result in a negligible magnitude of effect with respect to chemical quality, effects on aquatic ecosystems and bathing water quality. The Scheme would thus be in compliance with the WFD.

### **Indication of any Difficulties Encountered**

- 7.10.5 The water quality assessment has utilised methods designed for a freshwater environment. This places limitations on the conclusions of that assessment, so it has been utilised to calculate end-of pipe concentrations, the interpretation of which has been undertaken outside of the HEWRAT model.
- 7.10.6 Further consideration of the need for scour protection at the proposed Afon Gyrach structure will be required during detailed design.

### **NRW Correspondence**

- 7.10.7 A draft of this document and its appendices were submitted to NRW for comment. Initially, NRW expressed concerns over the method of assessment for potential water quality impacts. Further information was provided to address these concerns. The correspondence is attached as Appendix 7.6.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 8 NATURE CONSERVATION**

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## 8. NATURE CONSERVATION

### 8.1 Chapter Introduction

- 8.1.1 This chapter of the Environmental Statement (ES) sets out the assessment of significant effects of the J16 Scheme, on habitats, species and ecosystems. A 'Significant effect' either supports or undermines biodiversity conservation objectives for important ecological features<sup>1</sup>.
- 8.1.2 The Scheme involves changes to both Junction 16 and 16A and these are described in detail in Chapter 2. At Junction 16 the existing roundabout at the eastern approach to Penmaenmawr would be replaced by westbound on and off-slip roads. The new at-grade junction would require additional land take to the south of A55 and to the south of Conwy Road to facilitate the west bound on and off slips and connections to Conway Road and Ysguborwen Road.
- 8.1.3 A new grade-separated junction would be constructed further east at Junction 16A, at Dwygyfylchi, with a new overbridge and with on and off east and west bound slip roads that would provide four-way movement. The slip-roads would rise on embankments to a height of 7 m above the dual-carriageway, to meet an overbridge across the A55.
- 8.1.4 There would also be access off the eastbound off slip road to the Dwr Cymru/ Welsh Water (DCWW) water treatment works. A new link road running roughly parallel to the A55 on the south side would form a new junction with Ysguborwen Road in the west. Extending east it would pass close to the north side of houses in Maes-y-Llan and then loop round the south side of Puffin Café and Service Station to meet the new grade separated Junction 16A. Glan-Yr-Afon Road, to Dwygyfylchi and Capellulo, would meet with the link road at a 'T' junction close to Junction 16A. The General Arrangement drawings are shown in Volume 2, Appendix 2.5, sheets 1 to 3.
- 8.1.5 There are a number of areas of potential effect pathways from the Scheme that are relevant, and which are considered within this chapter. These include, but are not limited to, the following:
- A. Construction activities – ground investigations, vegetation clearance, site preparation; demolition, noise and vibration, habitat loss from land take, pollution incidents; and
  - B. Operational phase – wildlife casualties, land use change, change in hydrology, lighting, maintenance, road run-off.
- 8.1.6 This chapter considers the significant ecological effects of each phase of the Scheme in the light of relevant planning policies and legislation.
- 8.1.7 The baseline has been established through a combination of desk study and field work carried out in 2018 and 2019.
- 8.1.8 At each stage of the design process the hierarchical principles of 'avoid, mitigate, compensate and enhance' have been assessed as part of the process. The design approach and assessment of alternatives is described in Chapter 3.
- 8.1.9 An Assessment of Implications on European Sites (AIES) Screening Assessment has been prepared in accordance with the provisions of the Conservation of Habitats and Species Regulations 2017 and following the guidance of the Design Manual for Roads and Bridges (DMRB)

<sup>1</sup> CIEEM (September 2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Coastal and Marine*. ([https://www.cieem.net/data/files/Guidelines\\_for\\_Ecological\\_Impact\\_Assessment\\_in\\_the\\_UK\\_and\\_Ireland\\_2018.pdf](https://www.cieem.net/data/files/Guidelines_for_Ecological_Impact_Assessment_in_the_UK_and_Ireland_2018.pdf))



Volume 11, Section 4, Part 1 (HD44/09) (Highways Agency, 2009)<sup>2</sup> and this is reported separately.

- 8.1.10 The first stage of the Habitats Regulations Assessment (HRA) process is to undertake a Test of Likely Significance Effect (TLSE). The TLSE has identified that likely significant effects on qualifying features of European Sites could not be ruled out. It is therefore considered necessary for an Appropriate Assessment to be carried out for this project on the qualifying features of these European Sites, in line with DMRB HD44/09 guidance. This is reported as a Habitat Regulations Assessment, a standalone document outside the content of the ES. A Statement to Inform an Appropriate Assessment (SIAA) has been prepared.

## 8.2 Relevant Guidance and Legislation

### Relevant Legislation

- 8.2.1 The following relevant UK legislation has been considered within this assessment:

- A. The Conservation of Habitats and Species Regulations 2017<sup>3</sup>
- B. Wildlife and Countryside Act 1981 (as amended)<sup>4</sup>
- C. The Environment (Wales) Act 2016<sup>5</sup>
- D. Salmon and Freshwater Fisheries Act 1975<sup>6</sup>
- E. The Eels (England and Wales) Regulations 2009<sup>7</sup>
- F. The Protection of Badgers Act 1992<sup>8</sup>
- G. Well-being of Future Generations (Wales) Act 2015<sup>9</sup>
- Flood and Water Management Act 2010<sup>10</sup>
- H. The Hedgerow Regulations 1997<sup>11</sup>

- 8.2.2 European Community (EC) Directives 2009/147/EC on the Conservation of Wild Birds (the Birds Directive) and 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) are also relevant. These are implemented in the UK principally through the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017. The Regulations cover the designation and protection of European sites (Special Protection Areas (SPA) and Special Areas of Conservation (SAC)) and the protection of European protected species.

- 8.2.3 The Birds Directive provides a framework for the conservation and management of, and human interactions with, all wild birds in Europe. It sets broad objectives for a wide range of activities, although the precise legal mechanisms for their achievement are at the discretion of each Member State (in the UK delivery is via several different statutes). The Directive applies to the UK and to its overseas territory of Gibraltar. The main provisions of the Directive relevant to the Scheme include:

<sup>2</sup> It should be noted that during the preparation of this document, this guidance has now been withdrawn and replaced with LA 115 Habitat Regulations Assessment

<sup>3</sup> The Conservation of Habitats and Species Regulations 2017 <http://www.legislation.gov.uk/ukxi/2017/1012/contents/made>

<sup>4</sup> Wildlife and Countryside Act 1981 (<http://www.legislation.gov.uk/ukpga/1981/69>)

<sup>5</sup> Environment (Wales) Act 2016 (<http://www.legislation.gov.uk/anaw/2016/3/contents>)

<sup>6</sup> Salmon and Freshwater Fisheries Act 1975 (<https://www.legislation.gov.uk/ukpga/1975/51>)

<sup>7</sup> The Eels (England and Wales) Regulations 2009 (<http://www.legislation.gov.uk/ukxi/2009/3344/made>)

<sup>8</sup> Protection of Badgers Act 1992 (<http://www.legislation.gov.uk/ukpga/1992/51/contents>)

<sup>9</sup> Well-being of Future Generations (Wales) Act 2015 (<https://gov.wales/topics/people-and-communities/people/future-generations-act/?lang=en>)

<sup>10</sup> Flood and Water Management Act 2010 (<https://www.legislation.gov.uk/ukpga/2010/29/schedule/3>)

<sup>11</sup> <http://www.legislation.gov.uk/ukxi/1997/1160/contents/made>

- A. The maintenance of the populations of all wild bird species across their natural range (Article 2) with the encouragement of various activities to that end (Article 3). Article 3 requires Member States to preserve, maintain and re-establish sufficient diversity and area of habitats for all wild birds.
- B. The identification and classification of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex I of the Directive, as well as for all regularly occurring migratory species, paying particular attention to the protection of wetlands of international importance (Article 4). (Together with Special Areas of Conservation (SAC) designated under the Habitats Directive, SPAs form a network of European protected areas known as Natura 2000). Member States are obliged to take special action for a range of species, which are listed on Annex 1, taking account of their likely extinction, vulnerability to changes in their habitats and their rarity.
- C. The establishment of a general scheme of protection for all wild birds (Article 5).
- D. Article 6.2 of the Habitats Directive provides a general protection provision for SPAs. Member States must take appropriate steps to avoid habitat deterioration and the disturbance of species for which the site has been designated (insofar as such disturbance would prove significant). Articles 6.3 and 6.4 provide more detailed procedures in relation to plans and projects, which are aimed at ensuring the objective of Article 6.2 is met. Only those plans and projects (or parts thereof) that are considered connected with, or necessary for, site management of the SPA, are exempt. Where a plan or project – either alone or in combination with other ‘plans and projects’ – is likely to have a significant effect on the SPA, then an appropriate assessment must be undertaken.
- E. Encouragement of certain forms of relevant research (Article 10 and Annex V).

- 8.2.4 Birds listed in Annex 1 are afforded special protection. Member States must designate Special Protection Areas (SPA) for their survival and all migratory bird species.
- 8.2.5 The Habitats Directive ensures the protection of those habitats listed in Annex I, as well as Annex II species, animal and plant species of community interest whose conservation requires the designation of Special Areas of Conservation. Core areas of their habitat are designated and included in the Natura 2000 network. These sites must be managed in accordance with the ecological needs of the species. A strict protection regime must be applied across the entire natural range of Annex IV species within the European Union (EU), both within and outside Natura 2000 sites.
- 8.2.6 The EU Regulation (1143/2014) on invasive alien (non-native) species entered into force on 1 January 2015. The Regulation imposes restrictions on a list of species known as “species of Union concern”. These are species whose potential adverse impacts across the European Union are such that concerted action across Europe is required. This list is drawn up by the European Commission and managed with Member States using risk assessments and scientific evidence.
- 8.2.7 A network of nationally designated sites has been established through the designation of Sites of Special Scientific Interest (SSSIs) under the Wildlife and Countryside Act 1981 (as amended). The protection afforded under the Act means it is an offence to carry out or permit to be carried out any operation listed within the notification without the consent of the Statutory Nature Conservation Organisation (Natural Resources Wales (NRW)). The protection afforded to SSSIs is used to underpin the designation of areas at a European level.
- 8.2.8 The Welsh Government has particular responsibilities with respect to SSSIs under Section 28G of the Wildlife and Countryside Act 1981. An authority to which this section applies has the duty of

exercising its functions to take reasonable steps, consistent with the proper exercise of those functions, to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is notified as being of special scientific interest.

- 8.2.9 All wild birds, their nests and eggs are protected under Part 1, Section 1 of the Act. Birds listed in Schedule 1 of the Act are subject to special protection. Wild animals listed in Schedule 5 are protected under Section 9. Plants listed in Schedule 8 are protected under Section 13 of the Act.
- 8.2.10 The Act also includes provisions for the control of invasive non-native species (INNS). Under these provisions it is an offence to:
- A. Release or allow to escape into the wild any animal which is not ordinarily resident or a regular visitor to Great Britain, or is included in Schedule 9 of the Act;
  - B. Plant or otherwise cause to grow in the wild any plant which is included in Schedule 9 of the Act.
- 8.2.11 The Environment (Wales) Act introduces a new, enhanced Biodiversity and Resilience of Ecosystem Duty on public bodies to ensure that biodiversity is an integral part of decision making. Public authorities will be required to report on the actions they are taking to improve biodiversity and promote ecosystem resilience. The resilience of ecosystems is the main driver for Biodiversity Net Gain (BNG) in Wales.
- 8.2.12 Section 6 of the Act places a duty on public authorities to seek to maintain and enhance biological diversity (referred to as biodiversity). All public bodies, statutory undertakers, Ministers of the Crown and other public office holders are required to apply the duty when they are carrying on any functions in Wales, or in relation to Wales.
- 8.2.13 Section 7 of the Act is similar to the duty in section 42 of the Natural Environment and Rural Communities (NERC) Act 2006 which it replaces. It places a duty on the Welsh Ministers to publish, review and revise lists of living organisms and types of habitat in Wales, which they consider are of key significance to sustain and improve biodiversity in relation to Wales.
- 8.2.14 The Well-being of Future Generations (Wales) Act 2015 includes a number of well-being goals (Part 2 Section 4), the second of which is 'A resilient Wales' described as:
- 'A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change).'
- 8.2.15 Schedule 3 of the Flood and Water Management Act 2010 makes Sustainable Urban Drainage Schemes (SuDS) a mandatory requirement for all new developments. The legislation will ensure resilient drainage systems for new developments in both urban and rural areas and came into force from 7 January 2019. Within the regulations is a specific requirement for biodiversity (Standard S5) which states:
- 'The design of the surface water management system should maximise biodiversity benefits'.

- 8.2.16 Standard S5 addresses the design of SuDS development and enrich biodiversity value by linking networks of habitats and ecosystems together.
- 8.2.17 Chapter 5: Legislative and Policy provides the overarching and strategic policy for the Scheme. This section details those which are relevant to ecology and nature conservation.

#### **Planning Policy Wales (Edition 10, 2018)**

- 8.2.18 Edition 10 of Planning Policy Wales (PPW)<sup>12</sup> was published on the 5 December 2018. Chapter 6 of PPW 10: Distinctive and Natura Places details objective in relation to nature conservation, as well as a number of other environmental topics. These include but are not limited to:
  - A. Integrating Green Infrastructure and Development;
  - B. Biodiversity and Resilience of Ecosystems Duty (Section 6 Duty);
  - C. Protection and Management of Designated Sites;
  - D. Protection for Non-statutory Designations;
  - E. Maintaining and Enhancing Biodiversity;
  - F. Protection of Species;
  - G. Protection of Trees, Woodlands and Hedgerows; and
  - H. Protection of undeveloped coastlines.

#### **Technical Advice Note 5**

- 8.2.19 Technical Advice Note (TAN) 5 relates to nature conservation and planning (Welsh Assembly Government 2009)<sup>13</sup> and provides advice about how the land use planning system should contribute to protecting and enhancing biodiversity and geological conservation. The TAN provides advice for local planning authorities on:
  - A. The key principles of positive planning for nature conservation;
  - B. Nature conservation and Local Development Plans (LDP);
  - C. Nature conservation in development management procedures;
  - D. Development affecting protected internationally and nationally designated sites and habitats; and
  - E. Development affecting protected and priority habitats and species.

#### **Action Plan for Pollinators in Wales**

- 8.2.20 The Action Plan for Pollinators (APP) was set up in 2013. The plan aims to reduce and reverse the decline in wild and managed pollinator populations. A review of the APP was update in 2018.<sup>14</sup>. The Action Plan sets out four key outcomes, these are:
  - A. Outcome 1: Wales has joined up policy, governance and a sound evidence base for action for pollinators;
  - B. Outcome 2: Wales provides diverse and connected flower-rich habitats to support our pollinators;
  - C. Outcome 3: Wales' pollinator populations are healthy;
  - D. Outcome 4: Wales' citizens are better informed and aware of the importance and management of pollinators.

<sup>12</sup> Planning Policy Wales (PPW) Edition 10 December 2018 (<http://www.mobileuk.org/planning-policy-wales-edition-10.pdf>)

<sup>13</sup> Technical Advice Note 5: Nature Conservation and Planning (<https://gov.wales/docs/desh/policy/100730tan5en.pdf>)

<sup>14</sup> Welsh Government Action Plan for Pollinators Review 2013-2018 and Future Actions (<https://gov.wales/docs/desh/publications/180921-action-plan-for-pollinator-review-future-actions-en.pdf>)

### **Green Corridors Initiative**

- 8.2.21 This initiative<sup>15</sup> will deliver against “Prosperity for All” the Economic Action Plan, contributing to the Welsh Government’s commitment to create a sustainable economy and promote the economic, social and environmental wellbeing and enhance people’s quality of life in Wales. Actions which could be implemented under the initiative include:

- A. Tree planting;
- B. Introducing wildflower areas;
- C. Identifying opportunities for measures to enhance a sense of place;
- D. Installing ‘gateway features;’ such as impact planting.

### **Local Planning Policy: Conwy County Borough Council Local Development Plan, 2013**

- 8.2.22 The Conwy Local Development Plan 2007-2022<sup>16</sup>, adopted in October 2013 guides planning and development in the county, excluding the area of the county within Snowdonia National Park. The following policies are relevant to nature and conservation:

- A. Policy NTE/1 – The Natural Environment;
- B. Policy NTE/2 – Green Wedges and Meeting the Development Needs of the Community; Policy
- C. NTE/3 – Biodiversity
- D. NTE/5 – Coastal Zone

- 8.2.23 The Conwy LDP is supplemented by non-statutory planning guidance documents. Relevant guidance documents include LDP5 – Biodiversity in planning, Adopted November 2014<sup>17</sup>.

- 8.2.24 A full review of the LDP commenced in 2017. The Replacement Local Development Plan 2018-2033 is at a Pre-Deposit stage of participation, calling for candidate sites and reviewing the evidence base.

### **Snowdonia National Park Authority (SNPA) Policies**

- 8.2.25 The Snowdonia National Park Authority is the only neighbouring planning authority and the boundary of the National Park lies at the eastern limit of the Scheme adjacent to Penmaenbach Tunnel. A small section of the Scheme is located just within the boundary of the National Park, the Afon Gyrach flows within the National Park.
- 8.2.26 The revised Eryri Local Development Plan (2016-2031)<sup>18</sup> was adopted by Snowdonia National Park Authority on the 6 of February 2019. The relevant policy for nature and conservation is Strategic Policy D: - Natural Environment (D)
- 8.2.27 It is considered unlikely that the Scheme would have any significant effects on the nature conservation interest or natural environment within the SNPA due the extent of the Scheme that lies within in.

<sup>15</sup> <https://gov.wales/newsroom/transport/2018/180724-green-corridors-improve-gateways-into-wales/?lang=en>

<sup>16</sup> Conwy Local Development Plan 2007 – 2022 Adopted October 2013  
[http://spp.conwy.gov.uk/upload/public/attachments/629/Conwy\\_Adopted\\_LDP\\_2007\\_2022\\_English\\_.pdf](http://spp.conwy.gov.uk/upload/public/attachments/629/Conwy_Adopted_LDP_2007_2022_English_.pdf)

<sup>17</sup> Supplementary Planning Guidance LDP5: Biodiversity in Planning  
[https://spp.conwy.gov.uk/upload/public/attachments/621/LDP5\\_Biodiversity\\_Adopted\\_Nov\\_2014.pdf](https://spp.conwy.gov.uk/upload/public/attachments/621/LDP5_Biodiversity_Adopted_Nov_2014.pdf)

<sup>18</sup> Eryri Local Development Plan 2016 -2031 Written Statement. Snowdonia National Park Authority

## **Biodiversity Policy**

- 8.2.28 Wales Biodiversity Partnership has produced biodiversity checklists for local authority and public authority staff in Wales. The checklists will assist public and local authorities to take account of biodiversity in their operational activities and will help organisations to remain legal under the Environment (Wales) Act 2016 Biodiversity Duty, Habitats Regulations and other biodiversity related legislation. In addition, the implementation of the checklists and guidance will help build towards the biodiversity outcomes contained in the Environment Strategy for Wales.

## **Natural Capital and Biodiversity**

- 8.2.29 Natural capital refers to the stock of natural resources that the ecosystem provides, such as water, air, soil and biodiversity that are essential to the functioning of the planet and human well-being and include soil formation, food, climate regulation and renewable energy, often referred to as ecosystem services.
- 8.2.30 The aim of the ecosystems approach is to ensure the value of these essential services is taken into account when economic decisions are made so that the true cost of decisions are assessed. The Environment (Wales) Act, 2016 sets a duty on public authorities to take account of the resilience of ecosystems and the services they provide.
- 8.2.31 This chapter can provide information on biodiversity as a resource to support the assessment of ecosystem services. However, it is a complex subject and involves placing a monetary value on such stock, including biodiversity. In general, the maintenance and enhancement of biodiversity is important in terms of the ecosystem service it provides as well as its interaction with other policies, for example in PPW10 Biodiversity and Resilience of Ecosystems Duty (Section 6 Duty) and the Well-being of Future Generations (Wales) Act. A loss of biodiversity can have consequences for human well-being and for the services that people rely on as well as a decline in species diversity, genetic diversity and habitat quality and quantity.

## **Neighbouring Authorities**

- 8.2.32 A small section of the Scheme is located just within the boundary of the National Park, and the Afon Gyrach flows within the National Park. It has its source at an altitude of approximately 300 m and runs generally north for a length of 4.6 km. At its lower reach it passes along the eastern edge of Dwygyfylchi before passing under the A55 (grid ref SH 73578 77762) and then the immediately adjacent and parallel railway line before discharging into the sea.

## **Relevant Guidance**

- 8.2.33 In addition to the legislation and policy, the following guidance, initiatives and plans are relevant and would be considered during the assessment:
- A. Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater, Coastal and Marine September 2018 (Chartered Institute of Ecology and Environmental Management)<sup>19</sup>;
  - B. Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 4: Ecology and Nature Conservation (Highways Agency)<sup>20</sup>;

<sup>19</sup> Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater, Coastal and Marine September 2018 CIEEM <https://www.cieem.net/data/files/ECIA%20Guidelines.pdf>

<sup>20</sup> Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 4: Ecology and Nature Conservation (<http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section3.htm>)

- C. DMRB Volume 11, Section 4, Part 1: Assessment of Implications (of Highways and/or Roads Projects) on European Sites (Including Appropriate Assessment)<sup>21</sup>;
- D. DMRB Volume 11, Section 2, Part 5, HA 205/08: Assessment and Management of Environmental Impacts (Highways Agency, 2008a)<sup>22</sup>;
- E. Interim Advice Note 116/08 (W) Nature Conservation in Relation to Bats<sup>23</sup>;
- F. Interim Advice Note 130/10 Ecology and Nature Conservation: Criteria for Impact Assessment<sup>24</sup>; and
- G. Green Corridors Initiative (Welsh Government, 2018)<sup>25</sup>.

8.2.34 Other relevant documents referred to include the following:

- A. Phase 1 Habitat Survey – a technique for Environmental Audit (JNCC, 2010);<sup>26</sup>
- B. Bat Surveys for Professional Ecologists (2016).<sup>27</sup>.

8.2.35 References above, to DMRB Volume 11, are made, despite the DMRB (2008) being withdrawn, because the guidance provided is a relevant and useful basis for the assessment method and approach. New DMRB chapters have been published in mid-2019, and further documents and standards are yet to be published, including for biodiversity. However, this assessment was completed before new biodiversity guidance was published and so the withdrawn DMRB was implemented because it is still relevant and provides a useful basis for the assessment method and approach. In the process of reviewing and updating this document, LA108 was published<sup>28</sup>. As such, a review of this against the existing assessment methodology used within this report has been made. The conclusion is that the outcomes of significance of effects would not alter.

## 8.3 Study Area

### Zone of Influence

- 8.3.1 The 'Zone of Influence' (ZoI) has been established based on the features of interest and how they may be affected by biophysical changes as a result of the proposed Scheme and associated activities during construction, operation and restoration.
- 8.3.2 The ZoI to inform the desk study for the Scheme extended to:
  - A. 30 km for SAC designated for bats,
  - B. 10 km for other internationally designated sites,
  - C. 5 km for nationally designated sites such as SSSIs and Local Nature Reserves (LNR), and
  - D. 2 km for locally designated Wildlife Sites.

<sup>21</sup> Design Manual for Roads and Bridges (DMRB) Volume 11, Section 4, Part 1: Assessment of Implications (of Highways and/or Roads Projects) on European Sites  
(<http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section4/hd4409.pdf>)

<sup>22</sup> DMRB Volume 11, Section 2, Part 5, HA 205/08: Assessment and Management of Environmental Effects  
(<http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section2/ha20508.pdf>)

<sup>23</sup> IAN 116/08(W) nature conservation advice in relation to bats (<https://beta.gov.wales/interim-advice-note-11608w-nature-conservation-advice-relation-bats>)

<sup>24</sup> Interim Advice Note 130/10 Ecology and Nature Conservation: Criteria for Impact Assessment  
(<http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian130.pdf>)

<sup>25</sup> (<https://gov.wales/newsroom/transport/2018/180724-green-corridors-improve-gateways-into-wales/?lang=en>)

<sup>26</sup> JNCC (2010) Handbook for Phase 1 Survey – a technique for environmental audit  
([http://jncc.defra.gov.uk/PDF/pub10\\_handbookforphase1habitatsurvey.pdf](http://jncc.defra.gov.uk/PDF/pub10_handbookforphase1habitatsurvey.pdf))

<sup>27</sup> Collins, J. (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3<sup>rd</sup> Edn). The BAT Conservation Trust, London.

<sup>28</sup> DMRB (Nov 2019) LA108 Biodiversity – Revision 0

- 8.3.3 For protected and notable species, the desk study area extends to 2 km and includes records within the last 10 years.
- 8.3.4 The proposed study area for ecological field surveys included all land affected by the Scheme and immediately adjacent areas where accessible. For the assessment of ponds, aerial photography and Ordnance Survey (OS) base mapping up to a buffer of 500 m was used.
- 8.3.5 The majority of habitat and species have been considered within a ZoI comprising the footprint of the Scheme and its immediate surroundings. However, bat transect surveys included all habitat to be affected by the Scheme, as well as potential connecting habitats and areas surveyed for wintering birds included a wider area to include the intertidal zones. The design of the study areas and ZoI are such so that an assessment of direct impacts on species and habitats within the proposed Scheme footprint during construction and indirect impacts in relation to pollution or disturbance during both the construction and operation of the Scheme can be carried out.

## **8.4 Baseline Conditions – Approach**

### **Approach to the Identification of Baseline Conditions**

- 8.4.1 In accordance with the relevant guidance (CIEEM 2018), an ecology desk study was undertaken initially in September 2017 and was updated in July 2019. Records were obtained from Cofnod (the biological records centre for north Wales) to identify designated sites and protected habitats or species within 2 km.
- 8.4.2 Survey data from previous bat surveys which were carried out as part of the early Scheme options were reviewed. These were:
  - A. TACP (October 2015) A55 Junctions 15 and 16 Improvements Ecological Statement<sup>29</sup>
  - B. Atkins (January 2009) A55 Junctions 15 and 16 Study Environmental Report<sup>30</sup>
- 8.4.3 The following sections summarise the surveys that have been undertaken to identify the baseline conditions and the assessment of the Scheme to date. The normal validity period for ecology surveys is two years and so surveys completed during Key Stage 3 study may require further updating or re-validation during subsequent Scheme stages.

### **Extended Phase I Habitat Survey**

- 8.4.4 An extended Phase 1 habitat survey was undertaken by an experienced ecologist on 19 October 2017, which was updated in June 2018 and again in June and July in 2019 to include additional areas and when access permissions were gained.
- 8.4.5 A Phase 1 habitat survey is a standardised method of recording habitat types and characteristic vegetation, as set out in the Handbook for Phase 1 Habitat Survey – a technique for Environmental Audit (JNCC 2010). The Phase 1 survey method is 'extended' through the additional recording of specific features indicating the presence, or likely presence, of protected species or other species of nature conservation significance (also referred to as 'notable' species). The extent of each observed habitat is mapped in Figure 8.3.
- 8.4.6 The presence of any Invasive Non Native Species (INNS) was also noted and marked up on the

<sup>29</sup> TACP (October 2015) A55 Junctions 15 and 16 Improvements Ecological Statement

<sup>30</sup> Atkins (January 2009) A55 Junction 15 and 16 Study Environmental Report



Phase 1 habitat plan.

### **Hedgerow Survey**

- 8.4.7 An assessment of hedgerows located within the Scheme footprint was carried out in terms of its wildlife and landscape criteria under the Hedgerow Regulations 1997<sup>31</sup>. The assessment was conducted in July 2019. The methodology followed that outlined within the Hedgerow Survey Handbook (Defra 2007)<sup>32</sup>. This involved surveying a 30 m section of the hedge and counting the number of woody species within each section (as detailed within Schedule 3 of the Regulations). Woodland flora was recorded within the 30 m section. Other features noted included:

- A. Adjacent land use;
- B. Connecting features;
- C. Bank height and type; and
- D. Management.

### **Great Crested Newt and other Amphibians Habitat Appraisal**

- 8.4.8 The location of ponds on and within 500 m of the Scheme were searched for via aerial photography and OS mapping. If ponds were noted, then these were assessed for their proximity to the Scheme and habitat connectivity which could be used for dispersal, including hedgerows, woodlands, grassland, ditches and scrub.

### **Preliminary Roost Assessment – Bats**

- 8.4.9 Trees were assessed, from the ground, for the presence of potential roosting features (PRF) including holes in the trunk and lifted bark, and signs of bat presence including staining and scratch marks. The survey was conducted as part of the extended Phase 1 habitat surveys. Surveyors were equipped with close focus binoculars, high-powered torch and endoscope.
- 8.4.10 No existing structures would be directly affected by the Scheme, as such no roost assessment to structures was necessary.
- 8.4.11 The Bat Conservation Trust (BCT) Bat Survey Good Practice Guidelines (BCT, 2016<sup>33</sup>) were used as a basis to evaluate the site features for their potential to support bats during summer and winter. Table 8.1 gives an indication of the value of a variety of features for bats and has been compiled using the BCT Bat Survey Guidelines and from the experience of RML Ecologists. Structures and trees were assigned a value of between negligible – confirmed.
- 8.4.12 Wray *et al* (2010)<sup>34</sup> developed a method for the evaluation of bats in environmental assessment which considers various factors including: the rarity of the bat species, number of passes, number of roosts or potential roosts within the proximity and the surrounding habitat. This methodology has been taken into consideration during the assessment and assigning a value to this receptor.

<sup>31</sup> The Hedgerow Regulations 1997 <http://www.legislation.gov.uk/ukxi/1997/1160/contents/made>

<sup>32</sup> Defra, 2007. *Hedgerow Survey Handbook*. A standard procedure for local surveys in the UK. Defra, London.

<sup>33</sup> Collins, J (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3<sup>rd</sup> Edn). The Bat Conservation Trust, London.

<sup>34</sup> Wray *et al* (December 2010) *Valuing Bats in Ecological Impact Assessment* CIEEM IN practice.

**Table 8.1 Assessment of Potential Roost Features and Habitat**

<b>Suitability</b>	<b>Description of Roosting Habitat</b>	<b>Commuting and Foraging Habitats</b>
Negligible	Negligible habitat features on site likely to be used by roosting bats	Lack of vegetation and foraging habitat within vicinity of the site and no connections to semi-natural habitats. Site located in a highly urbanised environment.
Low	No visible features within tree structure such as crevices, holes in trunk, hazard beam splits. However, it may have ivy cladding and hidden features due to the size and age of the tree.	Small amount of isolated habitat on site providing a potential foraging resource i.e. a single tree or a patch of introduced shrub. Maybe linked to small amount of adjacent semi-natural habitat surrounding site, however there are no distinct links to habitat further away.
Moderate	A tree with one or more potential roost features that could be used by a larger number of bats but unlikely to support a roost of high conservation concern.	Suitable continuous habitat with good connectivity to the wider landscape such as trees, scrub, hedgerow, grassland.
High	A tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and offers more long-term security and likely to support a roost of high conservation concern.	Site is close and connected to known roosts. The site habitat is of high quality for foraging bats and includes features such as woodland, tree lined water courses, field margins and hedgerows. The site is well connected within the landscape to surrounding habitats and strong linear features such as hedgerows and tree lines extend from the site to the wider landscape.
Confirmed	Presence of field signs indicative of a bat roost including staining and scratch marks around a potential roost entry point combined with the following: urine staining, droppings clustered beneath a potential roosting feature and the presence of live or dead bats.	N/A

### **Bat Activity Surveys - Transects**

- 8.4.13 Bat activity surveys were conducted which included five transect surveys between June 2018 to September 2018 (inclusive) and three transects conducted between May to September 2019 (to land not accessible during the surveys conducted in 2018). The survey effort was based on the habitat being of low suitability (due to the Schemes largely urban nature), following best practice guidance (Table 8.3 BCT 2016) this involves one survey visit per season (Spring: April/May, summer: June/July/August, autumn: September/October). Each transect route was initially scoped during daylight hours.
- 8.4.14 The transects were walked slowly by the surveyors using visual observations and recordings from bat detectors to identify bat activity and species. Surveyors stopped for 5 minutes at locations

along the route so as to gain additional information at 'high risk' locations, i.e. those where suitable habitats would be affected.

#### *Bat Activity Surveys – Emergence and Return to Roost Surveys*

- 8.4.15 No emergence return to roost surveys were conducted to any trees or structures. No structures were identified which have the potential to support bats. No emergence return to roost surveys were conducted to any trees as trees which may be affected were categorised as having negligible – low potential. Based on Table 7.1 of BCT guidelines, no further activity surveys are required, however this would need to be re-assessed as the Scheme progresses and further surveys undertaken if necessary.

#### **Deployment of Static Bat Detectors**

- 8.4.16 Anabat Swift Detectors were deployed, placed at areas of higher value for bats (i.e. hedgerows, watercourses) which would be affected by the Scheme where suitable locations could be accessed, and detectors were not at risk from theft. The detectors were left in situ for a minimum of five days, between the months of June to September in 2018 and July to October in 2019 to areas not previously accessible in 2018.
- 8.4.17 Generally, the habitat within the Scheme area is considered to be of low value based on the guidance provided in Table 8.1. Following guidance as set out within the BCT Guidelines (Table 8.3) static detector deployment used in conjunction with transect surveys should be conducted at one location per transect with data to be collected over five nights per season (spring: April/May, summer: June/July/August and autumn: September/October). For the 2018 surveys, due to access constraints, the spring surveys season was missed. This was supplemented by three surveys conducted over the summer and autumn period.
- 8.4.18 Further details on the method and findings are presented in the bat survey report provided at Appendix 8.1 and Figures 8.6 to 8.9, Volume 2.

#### **Otter Habitat Appraisal**

- 8.4.19 An appraisal of habitat and habitat connectivity which could be used by otters *Lutra* and which may be affected by the Scheme was undertaken. This involved conducting a walkover of the site on the 20 August 2018 surveying areas which were considered to have potential for otters, in particular the Afon Gyrach. During the appraisal features<sup>35</sup> were searched for which included:
- A. Holts: where a female gives birth and raises cubs;
  - B. Pathways and slides: Obvious signs where otters have entered into a watercourse, i.e., depressions in vegetation or within banks;
  - C. Couches; depression, usually in grass where an otter has rested in the same place over a number of occasions;
  - D. Spraints: otter dropping, usually found in prominent places, i.e. exposed rock boulders and
  - E. Footprints.
- 8.4.20 Two further surveys were conducted on the 27 June and 2 September 2019 which included a 2 km section from the new road intersection where it crosses the Afon Gyrach. Surveys were

<sup>35</sup> Based on guidance in Chanin P (2003). Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.

based on guidance produced by the DMRB guidelines<sup>36</sup>. The area surveyed was mapped along with the positions and densities of spraint, holts, couches, and other field signs.

### Water Vole Habitat Appraisal

8.4.21 An appraisal of watercourses and habitat connectivity which could be used by water voles *Arvicola amphibious* and which may be affected by the Scheme was undertaken during the extended phase 1 habitat surveys in October 2017, which was updated in June 2018. The methodology used was taken from Cheshire Wildlife Trust<sup>37</sup>, adapted from Harris *et al.*, 2009<sup>38</sup>. Ten habitat features favoured by water voles are scored for presence/ absence (1/0):

- A. Well developed (>60%) bankside and aquatic vegetation that provides suitable food and cover;
- B. A good variety of food plants including favoured plants and winter food sources;
- C. Suitable refuge areas above extremes in water levels;
- D. Soft, earth banks suitable for burrowing (30° to 60° slope);
- E. Water permanently present (water levels stable and does not dry up);
- F. Open water available for swimming;
- G. Ledge or berm present at or close to water level;
- H. Lack of damage or erosion to the banks;
- I. Slow flowing current or static water;
- J. Invasive non-native plant species absent (Japanese Knotweed, Himalayan Balsam).

8.4.22 The scores are then combined into a 'habitat score' which corresponds with water vole habitat suitability:

- A. >3 = unsuitable
- B. 3 – 6 = Sub - optimal
- C. 7 – 10 = Optimal

8.4.23 During the appraisal, field signs were searched for which include footprints, feeding remains, latrines, burrows and evidence of predators (i.e. mink, cats, foxes).

### Badger Survey

8.4.24 Badger *Meles* surveys were undertaken during the Phase 1 habitat surveys conducted on the 19 October 2017, updated in June 2018 and again in June and July in 2019 to include additional areas and when access permissions were gained. Surveys were within the proposed Scheme boundary and adjacent areas including an area of search extending 30 m from the Scheme, where access was permissible and possible, following guidance as set out within Harris *et al* (1989)<sup>39</sup>. Within this search area all habitats were systematically surveyed for evidence of badgers, in the form of:

- A. Latrines;
- B. Setts;
- C. Pathways;

<sup>36</sup> DMRB (May 2005) Volume 10 Environmental Design and Management Section 4 Nature Conservation Part 4 HA 81/99 Nature Conservation Advice in Relation to Otters

<sup>37</sup> Cheshire Wildlife Trust. (2016). Water vole Habitat survey assessment guidelines. Adapted from Harris *et al.*, 2009).

<sup>38</sup> Harris, J., Markwell, H. and Raybould, B. (2009), A Method for Assessing Water Vole Habitat Suitability, *In Practise, CIEEM*, 65, Sept 2009.

<sup>39</sup> Harris S, Cresswell P and Jefferies D (1989) *Surveying Badgers*, Mammal Society

- D. Scratch marks;
- E. Snuffle holes;
- F. Footprints;
- G. Guard hairs.

8.4.25 The surveys were undertaken as part of the extended Phase 1 habitat survey. Any evidence observed was marked on the Phase 1 habitat plan.

#### **Dormice Habitat Appraisal**

8.4.26 An appraisal of habitat and habitat connectivity which could be used by dormice and which may be affected by the Scheme was undertaken during the extended phase 1 habitat surveys on the 19 October 2017, which was updated in June 2018 and again in June and July in 2019 to include additional areas and when access permissions were gained. An assessment was made based whether habitat within the Scheme footprint included the following (based on Table 4 of the Dormouse Conservation Handbook)<sup>40</sup>:

- A. Proximity to habitat with known populations of dormice;
- B. Large woodlands within the wider landscape and connectivity to these;
- C. Proximity to ancient woodland;
- D. Species rich hedgerows and woodlands; and
- E. Thick, wide hedgerow connections.

#### **Hedgehog Habitat Appraisal**

8.4.27 An appraisal of habitat and habitat connectivity which could be used by hedgehogs *Erinaceus europaeus* and which may be affected by the Scheme was undertaken during the extended phase 1 habitat surveys on the 19 October 2017, which was updated in June 2018 and again in June and July in 2019 to include additional areas and when access permissions were gained. Any incidental observations noted during bat activity transects was noted.

#### **Wintering and Breeding Birds**

8.4.28 Overwintering bird surveys have been conducted by Biome Consulting. The survey programme consisted of six 'Through The Tide Counts' (TTTC) with monthly surveys between October 2017 and March 2018 (inclusive). Each survey encompassed one complete tidal cycle during daylight hours, starting at either high or low tide. During each survey, three full counts were completed (i.e. counts around low, mid and high tide). Surveys took place utilising vehicles or vegetation/structures (e.g. hedgerows, buildings, sea walls etc.) as a hide or screen to avoid unnecessary disturbance to waders as far as possible.

8.4.29 All waders and wildfowl were recorded, with their locations recorded on a map. Further details on the method and findings are presented in the wintering bird survey report provided at Appendix 8.5.

8.4.30 No site-specific breeding bird surveys have been conducted. However, structures and vegetation within the Scheme footprint would support breeding birds.

<sup>40</sup> Bright, P. Morris, P, Mitchell-Jones, T (2006) The Dormouse Conservation Handbook (2<sup>nd</sup> Edition) English Nature.

## Reptile Habitat Appraisal

- 8.4.31 An appraisal of habitats with the potential to support reptiles was assessed during the extended phase 1 habitat surveys carried out in October 2017 and updated in June 2018. The survey was based on guidance produced by DMRB<sup>41</sup>. Habitat was assessed based on the following features:
- A. Location in relation to species range as assessed from existing records obtained from COFNOD;
  - B. Vegetation structure: ideal reptile habitat has a variable structure with a mixture of vegetation heights, scrub, bare patches etc;
  - C. Insolation and basking sites: reptiles need warm areas on which to bask, these include south facing slopes and/ or walls or bare ground;
  - D. Aspect and topography: undulating topography, banks, hummocks, hollows, south-facing slopes are all important for reptiles;
  - E. Connectivity to nearby good quality habitat: essential to allow colonisation;
  - F. Prey abundance and foraging opportunity: areas which contain relatively high concentrations of prey species, generally associated with B, C and D;
  - G. Refuge opportunity: places of shelter such as dense scrub, dry stone walls, logs, tree roots;
  - H. Hibernation habitat potential: free draining structures, often in south facing banks, which gaps, i.e. dry-stone walls and log piles; and
  - I. Disturbance.
- 8.4.32 The site was then categorised as to whether it provides poor, good or exceptional habitat for reptiles, based on the extent of and occurrence of these features.

### *Reptile Presence/ Absence surveys*

- 8.4.33 Reptile presence/ absence surveys were then conducted based on guidance provided in DMRB<sup>42</sup> to those areas which were found to support good reptile habitat. No 'exceptional' habitat was noted.
- 8.4.34 Two areas were identified, land to the south of Puffin Café and land to the north of Ysguborwen Road. The locations of these are provided on Figures 8.10 and 8.11, Volume 2.
- 8.4.35 Land to the south of Puffin Café is 0.93 ha, land to the north of Ysguborwen Road is 1.2 ha. Twenty-four refugia (constructed from 0.5 m x 0.5 m roofing felt) were deployed within land to the south of Puffin Café, whilst thirty-four were deployed in land to the north of Ysguborwen Road. These were deployed on the 16 July and left to 'bed down' for one month. Only one size of refugia was utilised as natural refugia occurs on site in the form of dry-stone walls which supplemented the refugia. Five presence/ absence surveys were conducted, in suitable weather conditions over the period 15 August 2019 to 12 September 2019 a minimum of two days apart.
- 8.4.36 Full survey methods are provided in the reptile survey report provided in Appendix 8.2.

<sup>41</sup> DMRB (May 2005) Volume 10 Environmental Design and Management Section 4 The Good Roads Guide – Nature Conservation Part 7 HA 116/05 Nature Conservation Advice in Relation to Reptiles and Roads

<sup>42</sup> DMRB (May 2005) Volume 10 Environmental Design and Management Section 4 The Good Roads Guide – Nature Conservation Part 7 HA 116/05 Nature Conservation Advice in Relation to Reptiles and Roads.

## Aquatic Invertebrate Surveys

- 8.4.37 An Aquatic Invertebrate survey has been undertaken of the Afon Gyrach over two seasons; spring (24 May 2019) and summer (2 August 2019).
- 8.4.38 Aquatic macroinvertebrates were collected from the in-stream substrate using a standard kick-netting technique. At each of the sampling positions a 3-minute kick netting transect across all in-stream habitat types (including differing substrate and flow characteristics) was undertaken. Additionally, sampling included a search of larger riverbed boulders and sweeping along submerged and overhanging riparian vegetation where it was present. This method followed standard practice for sampling shallow lotic habitats<sup>43</sup> (Murry-Bligh, 1999)<sup>44</sup> and is in line with requirements for analysis using the River Invertebrate Classification Tool RICT.
- 8.4.39 All macroinvertebrates were sorted from sediment and debris and preserved in 70% ethanol. Identification was undertaken with a low-power light microscope to species where possible. Difficult to identify taxa were either taken to family or genera level.
- 8.4.40 Further details on the method and findings are presented in the report provided at Appendix 8.3.

## Baseline Lighting Assessment

- 8.4.41 A baseline lighting assessment was conducted along the Afon Gyrach based on CIE 126 (1997) Institute of Lighting Professionals – Guidance Notes for the Reduction of Obtrusive Light GN01:2011 and CIE 150 (2017) guidance. This involved taking light readings (illuminance levels at lux) on the evening of the 28 May 2019 after commencement of Nautical Twilight<sup>45</sup>.
- 8.4.42 Further details on the method and findings are presented in the report provided at Appendix 8.4.

## Habitat Loss vs Habitat Gain

- 8.4.43 In order to quantify Biodiversity Net Gain (BNG) the metric provided in CEEQUAL<sup>46</sup> has been used. This involves measuring the percentage area of habitat created relative to the habitat affected using the formula:

$$\frac{A2 - A1}{A1} \times 100$$

Where:

*A1 = area of ecologically valuable habitat within total area of influence of Scheme site at the start of the construction (ha).*

*A2 = area of ecologically valuable habitat within total area of influence of Scheme site at the end (upon opening) of the construction (ha).*

<sup>43</sup> A lotic ecosystem can be any kind of moving water.

<sup>44</sup> Murry-Bligh, J.A.D., (1999) Procedure for collecting and analysing macroinvertebrate samples. Quality management systems for environmental monitoring. Biological techniques BT001. Version 2.0. Bristol Environment Agency.

<sup>45</sup> The term 'Nautical twilight' means when the sun has gone down and is usually the time when artificial lighting is turned on. The survey commences after this time and beyond into full darkness.

<sup>46</sup> CEEQUAL (December 2015) CEEQUAL Version 5.2 Assessment Manual for Projects UK & Ireland Edition.

- 8.4.44 Professional judgement has been applied where habitat created is considered to be more diverse, for example species rich grassland is more valuable than poor semi-improved grassland.

### **Survey Limitations**

- 8.4.45 The initial phase 1 habitat survey was conducted outside the optimum period which is considered to be between April to September. However, the initial survey was supplemented by surveys conducted in June 2018 and over the summer period of 2019.
- 8.4.46 Species records obtained from COFNOD are based on surveyor effort and availability, and so a lack of records may be due to lack of survey work in that particular area rather than the absence of the species. However, desk study data was supported by on the ground field surveys.
- 8.4.47 Initially, ecology field surveys were carried out in 2018 were from publicly accessible locations for the majority of the initial surveys. However, as the Scheme progressed, land access was obtained and repeat, or additional surveys were carried out to ensure adequate coverage.
- 8.4.48 Due to late access provisions in 2018, bat surveys were not conducted within April/May as such the lack of April/May surveys may have missed some early season behaviours/ activities. However, two transect surveys were conducted in June and static deployment was supplemented by three surveys conducted over the summer or autumn period. It is unlikely that species encountered, or numbers would alter the assessment of effects upon bats.
- 8.4.49 The time during the evening that the transect routes are surveyed would inevitably lead to a bias in relation to the time at which surveyors are positioned in the transect and the bats that are recorded. To limit this bias, the starting point of the transect survey was alternated on each survey round.
- 8.4.50 Locations for the deployment of statics was constrained by access and the potential for theft or interference from locals. However, it is considered that all representative habitats within the Scheme footprint have been adequately surveyed.
- 8.4.51 Only one night of recording was possible in September 2018 at ST4 located upstream of the Afon Gyrach due to the memory card being full. There was a lot of recorded 'noise' due to its position near some riffles in the river which used up the card memory. In total, along the Afon Gyrach, there are fifteen nights of survey data which is considered adequate to gain an understanding of use of the river corridor by bats for commuting and foraging. However, these surveys are concentrated within the summer period, and as such does not account for activity within the early season and only one night within the autumn period.
- 8.4.52 Three otter surveys were conducted between August 2018 to September 2019. This is not the recommended frequency of one survey every 3 months over a period of one year (which is four surveys in total). However, it is considered proportionate to inform upon the effects of the Scheme upon otters. Otters were recorded upon the first, initial survey, with a large proportion of spraints recorded. It is an obvious corridor used by otters, an additional fourth survey would not alter the assessment. Additional surveys would be conducted prior to the Scheme commencing as part of the pre-commencement ecology surveys.
- 8.4.53 Limitations encountered during the wintering bird surveys were that although efforts were made to avoid double counting, due to the size of the survey area it is possible that, if birds moved within the survey area during a tidal state survey, double-counting may have occasionally



occurred.

- 8.4.54 Limitations to reptile surveys were that one refugia was moved. Sheep graze the field to the north of Ysguborwen Road. Horses graze the field to the south of Puffin Café. However, this did not influence the results significantly, none were lost.
- 8.4.55 Limitations encountered during the aquatic invertebrate surveys were that identification of caddis fly species was not possible at the larval stage.

### Consultations

- 8.4.56 The first Environment Liaison Group (ELG) meeting was held in May 2018 with the second held in May 2019 and another on the 20 November 2019. These meetings were attended by representatives of Natural Resources Wales (NRW), Conwy County Borough Council (CCBC), Cadw, Welsh Government and North and Mid Wales Trunk Road Agency (NMWTRA).
- 8.4.57 Natural Resources Wales (NRW) and the County Council Ecologist have been engaged in discussions over the methods and extent of ecological surveys (13 June 2018).
- 8.4.58 Consultation responses have been received from CCBC Ecologist on the 20 January 2020 and NRW on the 23 January 2020. A summary of these subsequent consultations relating to ecology and nature conservation is set out in Table 8.2.

**Table 8.2 Summary of consultation responses**

Consultee and Date	Comment
CCBC Ecologist 02/01/2020	Comments in regard to impacts on wintering birds which are a feature of the designated sites and potential cumulative effects.
	Clarity on inclusion of the otter ledge and provision of otter fencing.
	Agrees that the bridge design should be of a design which allows free passage of commuting bats and otters.
	The dark corridor of the Afon Gyrach must be maintained.
	Clarity on provision of number of reptile mats for translocation purposes.
	Requires clarification of ornamental shrub planting.
	The length of hedge planting should be revisited.
NRW 23/01/2020	Broadly satisfied with the conclusions and recommendations within the chapter.
	Concur with the assessment and conclusions in respect of Great crested newt
	Generally satisfied with the assessment and conclusion in respect of bats. Highlighted that sensitive lighting plans should include an improvement for bats, i.e. creation and retention of dark corridors, especially along the Afon Gyrach. NRW agree with the use of planting for screening effect, there should be clear separation or distinction in respect of planting for screening, and the habitat to be utilised by bats Advised to seek an alternative location for bat bricks other than suggested.

Consultee and Date	Comment
	<p>Concur with the assessment and conclusions in respect of otters and state that banksides should be retained as 'natural' and passage retained. NRW would require dark zones for the Afon Gyrach and there is an opportunity for betterment in lighting at this location. NRW would require the installation of an otter ledge/dry route and also to look at the scope of the provision of dry route/dry pipe/dry ledges through the three structures (the two existing and the new bridge/culvert).</p> <p>NRW would not support reduced height fencing, if there is no provision of dry route through the three structures as mentioned above.</p>
	Concur with the assessment and conclusions in respect of water vole.
	Concur with the assessment and conclusions in respect of dormice.
	Concur with the assessment and conclusions in respect of INNS.
	Note and concur with sections in respect to Invasive non-native species
	<p>In agreement that impact on Liverpool Bay SPA and Menai Strait and Conwy Bay SAC need to be assessed taking account of the requirements and conservation objectives of the features especially the mobile species both inside and outside of the designated site boundary and will provide comment on the Assessment of Implications of European Sites (AIES) and a Statement to Inform an Appropriate Assessment (SIAA) once it has been submitted.</p> <p>In agreement that pollution incidents are likely to be one of the key potential impacts on the designated sites and features of interest. However, this is not sufficiently addressed within the draft Environmental Statement. Specifically, the potential impact of the drainage scheme given the discharge points to the sea within/in close proximity to the designated sites.</p>
	NRW would require betterment with regards to drainage and the implementation of mitigation measures, these should be detailed within the site-specific drainage plan.
	Do not recognise SuDS as a recognised form of ecological mitigation/enhancement, we require that the ecological enhancement element is kept separate. We appreciate the ecological benefit, however, during a pollution incident that benefit is at risk.
	NRW would look favourably on the alternatives to gully pots.
	Concur with what has been outlined in respect of monitoring and aftercare.

## **8.5 Baseline Conditions – Results**

- 8.5.1 This section provides a summary of the key findings of the desk study and surveys undertaken to provide the baseline data for the Scheme.

### **Statutory Designated Sites**

- 8.5.2 Information on statutory designated sites within distances of 30.0 km for Special Area of Conservation (SAC) designated for bats, 10.0 km for other internationally designated sites, 5.0 km for nationally designated sites such as SSSIs and LNRs was obtained through desk study.
- 8.5.3 Internationally designated sites are shown on Figure 8.1. Nationally designated sites and Wildlife Sites are shown on Figure 8.2.
- 8.5.4 Twenty-two sites have been identified within the search area. The Menai Strait and Conwy Bay SAC, the Liverpool Bay Special Protection Area (SPA) are located within 350 m proximity to the Scheme and encompass the coastal waters directly north of the junction. The nearest terrestrial designated site is Sychnant Pass SSSI located approximately 317 m east of Junction 16. A summary of these designated sites is provided in Table 8.2.

### **Non-statutory Designated Sites**

- 8.5.5 Four Local Nature Reserves are present within 5 km. These are Traeth Lafan LNR, Nant-y-Coed LNR, Great Ormes Head LNR and Bodlondeb woods. The closest of these is Traeth Lafan LNR which is located 2.8 km due west and is a component of the SPA and SSSI.
- 8.5.6 Eight Candidate Local Wildlife Sites (LWS) are present within 2 km of the survey area. A summary of these Candidate LWS is provided in Table 8.3.

**Table 8.2: Statutory Designated Sites**

Site Name	Qualifying Features	Distance from Site
<b>International – Special Protection Areas</b>		
Liverpool Bay/ Bae Lerpwl (Wales) SPA UK9020294	<p>Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC:</p> <ul style="list-style-type: none"> <li>• A065 Common scoter <i>Melanitta nigra</i> 56,679 individuals representing at least 10.31% of the wintering NW Europe population (2004/05 – 2010/11);</li> <li>• A193 Common tern <i>Sterna hirundo</i> (breeding 360 individuals representing 1.80% of the breeding population in Great Britain (2011 – 2015);</li> <li>• A195 Little tern <i>S. albigrons</i> (breeding 260 individuals representing 6.84% of the breeding population in Great Britain (2010 – 2014);</li> <li>• A001 Red throated diver <i>Gavia stellata</i> (North-western Europe - wintering) 5.4% of the GB population 5-year peak mean 2001/02 - 2006/07. Population in the SPA 1171;</li> <li>• A177 Little gull <i>Hydrocoloeus minutus</i> (non-breeding 319 individuals (2004/05 – 2010/11). Population in the SPA 319.</li> </ul> <p>Over winter, the area regularly supports 69,687 individual waterbirds (5 year peak mean 2004/05 - 2010/11) including species exceeding 1% of the GB total or 2,000 individuals: common scoter <i>Melanitta nigra</i>, red-throated diver <i>Gavia stellata</i>, little gull <i>Hydrocoloeus minutus</i>, red- breasted merganser <i>Mergus serrator</i> and great cormorant <i>Phalacrocorax carbo</i>.</p> <p>(less than 1% GB or less than 2000 Individuals) black headed gull <i>Chroicocephalus ridibundus</i>, common gull <i>Larus canus</i>, common eider <i>Somateria mollissima</i>, Northern fulmar <i>Fulmarus glacialis</i>, great black-backed gull <i>Larus marinus</i>, great crested grebe <i>Podiceps cristatus</i>, common murre <i>Uria aalge</i>, Northern gannet <i>Morus bassanus</i>, Atlantic puffin <i>Fratercula arctica</i>, European herring gull <i>Larus argentatus</i>, black-legged kittiwake <i>Rissa tridactyla</i>, lesser black-baked gull <i>Larus fuscus</i>, great Northern diver <i>Gavia immer</i>, European shag <i>Phalacrocorax aristotelis</i>, razor bill <i>Alca torda</i>, velvet scoter <i>Melanitta fusca</i>.</p>	Approximately 250 m due north
Traeth Lafan/ Lavan Sands, Conwy Bay SPA UK9013031	<p>Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC:</p> <ul style="list-style-type: none"> <li>• A130 Oystercatcher <i>Haematopus ostralegus</i>, 4,931 individuals representing at least 0.5% of the wintering Europe &amp; Northern/Western Africa population (5-year peak mean 1991/2 - 1995/6);</li> <li>• A069 Red-breasted Merganser <i>Mergus serrator</i>;</li> <li>• A160 Curlew <i>Numenius arquatus</i>, (Europe - breeding) 1.1% of the population in Great Britain 5-year peak mean 1991/92-1995/96;</li> <li>• A005 Great crested grebe <i>Podiceps cristatus</i> (North-western Europe - wintering);</li> </ul>	Approximately 3 km west

Site Name	Qualifying Features	Distance from Site
	<ul style="list-style-type: none"> <li>A162 Redshank <i>Tringa totanus</i></li> </ul>	
Puffin Island SPA UK9020285	<p>During the breeding season the site regularly supports:</p> <ul style="list-style-type: none"> <li>A107 Cormorant <i>Phalacrocorax carbo</i>, 556 pairs representing 1.35% of the NW European breeding population (5-year mean 1996 to 2000).</li> </ul>	Approximately 7.3 km north across the sea
Anglesey Terns SPA (Marine Component) UK9013061	<p>During the breeding season the site regularly supports:</p> <ul style="list-style-type: none"> <li>Roseate tern <i>Sterna dougallii</i>, 3 pairs representing 5% of the GB breeding population (5-year mean 1992 to 1996);</li> <li>Common tern <i>Sterna hirundo</i>, 189 pairs representing 1.5% of the GB breeding population (5-year mean 1992 to 1996);</li> <li>Arctic tern <i>Sterna paradisaea</i>, 1,290 pairs representing 2.9% of the GB breeding population (5-year mean 1992 to 1996);</li> <li>Sandwich tern <i>Sterna sandvicensis</i>, 460 pairs representing 3.3% of the GB breeding population (5-year mean 1993 to 1997).</li> </ul>	Approximately 7.8 km north across the sea
<b>International – Special Areas of Conservation</b>		
Y Fenai a Bae Conwy / Menai Strait and Conwy Bay SAC UK0030202	<p>Annex I habitats that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>1110: Sandbanks which are slightly covered by sea water all the time;</li> <li>1140: Mudflats and sandflats not covered by seawater at low tide;</li> <li>1170: Reefs.</li> </ul> <p>Annex I habitats present as a qualifying feature, but not a primary feature for site selection:</p> <ul style="list-style-type: none"> <li>1160: Large shallow inlets and bays;</li> <li>8330: Submerged or partially submerged sea caves.</li> </ul>	Approximately 250m due north
Coedydd Aber SAC UK0030118	<p>Annex I habitats that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>91A0 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles</li> </ul> <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>91E0 Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)</li> </ul> <p>Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC:</p> <ul style="list-style-type: none"> <li>1355 Otter <i>Lutra</i>;</li> <li>1106 Salmon <i>Salmo salar</i>.</li> </ul>	Approximately 6 km due south west

Site Name	Qualifying Features	Distance from Site
Eryri / Snowdonia SAC UK0012946	<p>Eryri comprises three upland massifs separated by roads, the Carneddau, Glyderau and Yr Wyddfa. All three host a number of biological and geological SSSI features and SAC features:</p> <p>Annex I habitats that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>• 3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/ or of the Isoëto-Nanojuncete;</li> <li>• 6150 Siliceous alpine and boreal grassland;</li> <li>• 6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine level;</li> <li>• 8110 Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani;</li> <li>• 8210 Calcareous rocky slopes with chasmophytic vegetation;</li> <li>• 8220 Siliceous rocky slopes with chasmophytic vegetation;</li> <li>• Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site;</li> <li>• 4010 Northern Atlantic wet heaths with Erica tetralin;</li> <li>• 4030 European dry heath;</li> <li>• 4060 Alpine and Boreal heath;</li> <li>• 6170 Alpine and subalpine calcareous grassland;</li> <li>• 6230 Species-rich Nardus grasslands, on silicious substrates in mountain areas (and sub mountain areas in Continental Europe) * Priority feature;</li> <li>• 7130 Blanket bogs (* if active bog) * Priority feature;</li> <li>• 7150 Depressions on peat substrates of the Rhynchosporio;</li> <li>• 7220 Petrifying springs with tufa formation (Cratoneurion) * Priority feature;</li> <li>• 7230 Alkaline fen;</li> <li>• 7240 Alpine pioneer formations of the Caricion bicoloris-atrofuscae * Priority feature;</li> <li>• 91A0 Old sessile oak woods with Ilex and Blechnum in the British Isle;</li> <li>• Annex II species that are a primary reason for selection of this site;</li> <li>• 1393 Slender green feather-moss Drepanocladus (Hamatocaulis) vernicosus;</li> <li>• 1831 Floating water-plantain <i>Luronium natans</i>;</li> <li>• 1106 salmon salmo salar.</li> </ul>	Approximately 5.5 km due south
Great Orme's Head / Pen y Gogarth SAC UK0014788	<p>Annex I habitats that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>• 4030 European dry heaths;</li> <li>• 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites);</li> </ul>	Approximately 5.2 km north

Site Name	Qualifying Features	Distance from Site
	<p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>1230 Vegetated sea cliffs of the Atlantic and Baltic Coasts.</li> </ul>	
<p>Coedwigoedd Penrhyn Creuddyn/ Creuddyn Peninsula Woods SAC UK0030124</p>	<p>Annex I habitats that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>9180 Tilio-Acerion forests of slopes, screes and ravines * Priority feature.</li> </ul> <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites);</li> <li>91J0 Taxus baccata woods of the British Isles * Priority feature.</li> </ul>	<p>Approximately 5.7 km east</p>
<p>Mwyngloddiau Fforest Gwydir/ Gwydyr Forest Mines SAC UK0030161</p>	<p>This SAC is a composite of numerous sites to the south of the site.</p> <p>Annex I habitats that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>6130 Calaminarian grasslands of the Violetalia calaminariae.</li> </ul> <p>Annex II species present as a qualifying feature at this site, but is not a primary reason for site selection:</p> <ul style="list-style-type: none"> <li>1303 Lesser horseshoe bat Rhinolophus hipposideros.</li> </ul>	<p>Approximately 16.8 km south</p>
<p>Coedydd Derw a Safleoedd Ystlumod Meirion/ Meirionnydd Oakwoods and Bat Sites SAC UK0014789</p>	<p>This large composite site includes most of the known maternity roosts in Meirionnydd and some hibernacula and comprises the centre of distribution for lesser horseshoe bats in Wales. The sheltered river valleys provide excellent tree cover and numerous suitable maternity roosts. The presence of Lesser horseshoe bats at this site is a primary reason for its selection as a SAC.</p> <p>Annex I habitats that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>91A0 Old Sessile oak woods with Ilex and Blechnum in the British Isles;</li> <li>91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Ano-Padion, Alnion incanae, Salicion alba).</li> </ul> <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:</p> <ul style="list-style-type: none"> <li>3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation;</li> <li>4010 North Atlantic wet heaths with Erica tetralix;</li> <li>4030 European dry heaths;</li> <li>9180 Tilio-Acerion forests of slopes, screes and ravines;</li> <li>91D0 Bog woodland.</li> </ul> <p>Annex II species that are a primary reason for selection:</p>	<p>Approximately 25 km south</p>

Site Name	Qualifying Features	Distance from Site
	<ul style="list-style-type: none"> <li>1303 Lesser horseshoe bat <i>Rhinolophus hipposideros</i>.</li> </ul>	
<b>National – Site of Special Scientific Interest</b>		
Sychnant Pass SSSI	<ul style="list-style-type: none"> <li>A large area of heath is the dominant vegetation of this site with smaller, areas of bracken and acid grassland of considerable entomological interest.</li> </ul>	Approximately 300 m due east
Coedydd Aber SSSI	<p>Coedydd Aber is of special interest for its botanical and ornithological interest as well as other species groups including:</p> <ul style="list-style-type: none"> <li>Alluvial forests with alder and ash, and old sessile oak woods;</li> <li>Lower plant communities;</li> <li>Woodland birds;</li> <li>Brown trout, salmon and eel;</li> <li>Fungi;</li> <li>Invertebrate communities;</li> <li>Reptiles;</li> <li>Mammals.</li> </ul>	Approximately 6 km due south west
Aber Afon Conwy SSSI	<p>Aber Afon Conwy is of special interest for its marine and terrestrial invertebrate biology. Other features include a high number of waders and migratory salmon <i>Salmo salar</i>, which spawn in upstream regions of the River Conwy.</p>	Approximately 3.6 km due east
Eryri SSSI	<p>This site has been selected for its features of geological, geomorphological and biological interest including:</p> <ul style="list-style-type: none"> <li>Lichen and bryophyte heath;</li> <li>Montane heat;</li> <li>Dry heath;</li> <li>Wet heath;</li> <li>Blanket bog;</li> <li>Flush and spring;</li> <li>Calcareous grassland;</li> <li>Tall herb and fern ledges;</li> <li>Vegetated scree;</li> <li>Broadleaved woodland communities;</li> <li>Inland rock exposures with crevice vegetation;</li> <li>Low nutrient lakes;</li> </ul>	Approximately 3.5 km due south



Site Name	Qualifying Features	Distance from Site
	<ul style="list-style-type: none"> <li>Rivers and streams;</li> <li>Chough, peregrine and merlin;</li> <li>Invertebrates;</li> <li>Schedule 8 plants.</li> </ul>	
Cadnant SSSI	Cadnant is of special interest for its geology.	Approximately 3.8 km due east
Traeth Lafan SSSI	<ul style="list-style-type: none"> <li>Eel Grass (<i>Zostera noltei</i>);</li> <li>Moderately exposed sand;</li> <li>Rockpools (pools and depressions in the mussel bed supporting hydroids or sea firs);</li> <li>Running water;</li> <li>Saltmarsh;</li> <li>Oystercatcher;</li> <li>Curlew;</li> <li>Redshank;</li> <li>Red-breasted merganser;</li> <li>Great crested grebe.</li> </ul>	Approximately 3 km west
Benarth Wood SSSI	A mixed deciduous woodland on Silurian rocks adjacent to the Conwy Estuary and receiving a low rainfall. The wood is ungrazed and has a diverse ground flora and adequate tree regeneration.	Approximately 4.3 km east
Chwareli a Glaswelltir Degannwy SSSI	Chwareli a Glaswelltir Degannwy is of special interest for its geological and biological features: exposures of fossiliferous late Ordovician mudstone and sandstone rocks, maiden pink <i>Dianthus deltoides</i> , small-leaved sweet briar <i>Rosa agrestis</i> and a rare vascular plant assemblage.	Approximately 4.3 km east
Bwlch Mine SSSI	It is the only recorded Welsh locality for the lead-antimony-sulphides semseyite, zinkenite and heteromorphite along with stibnite, jamesonite, galena, pyrites and blende.	Approximately 4.9 km east
Great Orme's Head/ Pen y Gogarth SSSI	Pen y Gogarth/ Great Ormes Head is of special interest for its geological, botanical, entomological, ornithological and marine biological features.	Approximately 5.2 km north
<b>National – National Nature Reserve</b>		
Coedydd Aber NNR	A component of the SSSI and SAC. Habitats include: <ul style="list-style-type: none"> <li>Old sessile oak woodland;</li> <li>Alluvial forest;</li> </ul>	Approximately 6 km west

Site Name	Qualifying Features	Distance from Site
	<ul style="list-style-type: none"> <li>Wet woodland;</li> <li>Upland oak and ash woodland;</li> <li>Lichens;</li> <li>Woodland breeding birds;</li> <li>Geological features.</li> </ul>	

**Table 8.3: Non- Statutory Designated Sites (Candidate Wildlife Sites)**

Site Name	Qualifying Feature	Distance from Site
Orme View Vegetated Shingle	Vegetated shingle	Approximately 73 m due north
Orme View Reedbed	Reedbed	Approximately 73 m due north
Penmaen Woods	Ancient semi-natural woodland covering approximately 15 hectares	Approximately 1.30 km west
Ty'n-y-ffrith	Dry dwarf shrub heath; acid grassland	Approximately 1.35 km south
Craig Hafodwen	Acid grassland/ dry heath mosaic; dry dwarf shrub heath	Approximately 1.5 km south
Coed Cwm Graig Llwyd	Broadleaved woodland	Approximately 1.58 km south
Cefn Coch	Acid grassland/ dwarf shrub heath mosaic	Approximately 1.75 km due south
Graig Llwyd Heath	Acid grassland	Approximately 1.90 km south west

### **Ancient Semi-natural woodland**

- 8.5.7 There are twenty-two Ancient Semi-natural woodland sites, including Restored Ancient Woodland and Plantation on Ancient Woodland within 2 km of the survey area. The closest of which is located to the east of the Scheme behind the caravan park approximately 260 m from the Scheme and at the base of the headland near to Penmaenbach tunnel approximately 50m east of the Scheme.

### **Habitats**

- 8.5.8 The roundabout at Junction 16 consists of poor semi-improved grassland with the adjacent verges of a similar species composition. Broadleaved and mixed plantation woodland occurs around the slip roads to the west and east adjacent to Conway Road and Ysgubowen Road with scrub planting to the north of the A55 associated with the railway and cycle path. Heading east, the grassland is a mixture of improved pasture and poor semi-improved grassland. The Afon Gyrach crosses the Scheme area and flows under the A55 to the east of the Scheme. Two Local Wildlife Sites are located on the seaward side of the A55, beyond the railway. These are Orme View Vegetated Single and Orme View Reedbed.
- 8.5.9 The village of Penmaenmawr is located to the west of the Junction, whilst Dwygyfylchi is located to the east beyond which is a caravan park. A sewage works is located on the seaward side of the A55, beyond the railway, to the east of the Junction. The wider environs consist of improved pasture, woodland and heathland.
- 8.5.10 The Scheme would traverse areas of improved and poor semi-improved grassland to the east of the Scheme, a new road is routed across the Afon Gyrach, in fields behind the shell garage through areas of scrub planting and grazed fields where it would join the existing slipway.
- 8.5.11 The habitats recorded within the site and adjacent areas are described in the following paragraphs. The location and extent of habitats present are shown on Figure 8.3 to Figure 8.5. The main habitats identified (with their Phase 1 classification code) were:
- A. Mixed plantation woodland A1.3.2;
  - B. Parkland/ scattered trees – broadleaved A3.1 and coniferous A3.2;
  - C. Neutral grassland – semi-improved B2.2;
  - D. Poor semi-improved grassland B6 and improved grassland B4;
  - E. Amenity grassland J1.2;
  - F. Running water G2;
  - G. Vegetated shingle H.3;
  - H. Marginal vegetation (reedbed) F2.1;
  - I. Coastland H;
  - J. Scrub dense and continuous A2.1 and scattered A2.2;
  - K. Tall ruderal C3.1;
  - L. Boundaries – hedge intact species poor J2.1.2;
  - M. Boundaries – hedge defunct species poor J2.2.2;
  - N. Boundaries – hedge intact species rich J2.1.1;
  - O. Built up areas – buildings J3; and
  - P. Boundaries – wall J2.5, fence J2.4

### **Mixed Plantation Woodland A1.3.2**

- 8.5.12 Mixed plantation woodland occurs as part of the landscaping mix planted around Junction 16, particularly to the south and west of this Junction. Species present include abundant maritime pine *Pinus pinaster*, dogwood *Cornus sanguinea*, Sycamore *Acer pseudoplatanus*, oak *Quercus robur* and ash *Fraxinus excelsior*. The ground flora was limited in these areas owing to the dense planting of the tree species and a leaf litter comprised of fallen pine needles.

### **Parkland/ Scattered Trees – Broadleaved A3.1 and coniferous A3.2**

- 8.5.13 Scattered trees are largely confined to the fields to the south of Junction 16 and within the landscape planting on the northern edge of the east bound carriageway. With mature ash, maritime pine and Pinus species present within the fields and maritime pine being the dominant tree species within the landscape planting on the northern edge of the east bound carriageway. A line of pine trees, including maritime pine, have been planted adjacent to Ysguborwen Road where a small footpath offers a welcome break from the road and provides a seating area (Target Note 5). Other isolated and scattered trees occur along field boundaries and along the Afon Gyrach and within the most easterly field, adjacent to the caravan park.

### **Neutral Grassland – Semi-Improved B2.2**

- 8.5.14 To the south of Puffin Café is an area of unmanaged semi-improved neutral grassland (Target Notes 2) which is grazed by horses. Species recorded include frequent to abundant red fescue *Festuca rubra*, cock's-foot *Dactylis glomerata*, false-oat grass *Arrhenatherum elatius*, meadow vetchling *Lathyrus pratensis*, zigzag clover *Trifolium medium*, red clover *T. pratense*.

### **Poor Semi-Improved Grassland B6, Improved Grassland B4**

- 8.5.15 The majority of the pasture fields within the survey area all comprise poor-semi improved grassland or improved grassland, with perennial ryegrass *Lolium perenne*, common bent *Agrostis capillaris* being the dominant grass species. The majority is maintained as a short sward by grazing, though some is cut for hay/ silage whilst some is left unmanaged allowing Yorkshire fog to co-dominate with cock's-foot, common birds-foot trefoil *Lotus corniculatus* and ribwort plantain *Plantago lanceolata*.

### **Amenity Grassland J1.2**

- 8.5.16 There is a small area of grassland which is managed for amenity located between Maes Y Llan and the Shell garage. The edges of this field are bound by scrub. Species present within these areas include dominant to abundant perennial rye-grass, white clover *Trifolium repens* and crested dog's-tail *Cynosurus cristatus*.

### **Running Water G2**

- 8.5.17 There are two main watercourses in the area, the Afon Pabwyr and the larger Afon Gyrach (Target Note 3). The Afon Pabwyr flows north from Cwm Graiglwyd south of Penmaenmawr for about 1.2 kms, initially in an elevated and steep-sided upland valley before passing under the town centre, railway and A55 before discharging into the sea. The Afon Gyrach has a wider catchment area and flows generally north west from the elevated slopes of Tal-y-fan through Fairy Glen and the villages of Capelulo and Dwygyfylchi. The river continues north across the coastal plain before passing through a culvert under the A55 and railway and discharging onto the beach south-west of the water treatment works. Much of the coastal plain north of Dwygyfylchi is used

as pasture, with caravan parks and residential encroaching northwards towards the A55.

- 8.5.18 The Afon Gyrach river channel is approximately 3 m in width with steep and undercut banks, some exhibiting scouring and erosion. There was a moderate flow but very little water with a depth of approximately 0.1 m with some deeper pools which contained young salmonids. The substrate consisted of gravel, sand and cobble. No in channel vegetation was noted.
- 8.5.19 The adjacent land use consists of grazed fields. The fields to the east are open to camping in the summer period. Noted tree species along the river include alder *Alnus glutinosa* and sycamore (dominant) with oak *Quercus robur*, holly *Ilex aquifolium* and ash. Dense areas of bramble scrub with hedge woundwort *Stachys sylvatica*, red fescue, cocksfoot, false oat grass, great willowherb *Epilobium hirsutum*, common nettle *Urtica dioica* and field horsetail *Equisetum arvense* line the banks. Stands of Himalayan balsam *Impatiens glandulifera* (Target Note 1) and Japanese knotweed *Fallopia japonica* (Target Note 4) occurs along the river corridor including a dense stand where it emerges to the north of the railway line.
- 8.5.20 The current Water Framework Directive (WFD) Biological Status on the lower reach of the Afon Gyrach is generally HIGH to GOOD as stated within the Macroinvertebrate survey report (Appendix 8.3). The river was designated under the WFD for the Cycle 1 of the Directive (i.e. 2009 to 2015) but is no longer designated. This is anticipated to be due to its small size.

### **Vegetated shingle H.3**

- 8.5.21 There is a small strip of vegetated shingle due east and west of the footbridge which crosses the A55. The survey area does not support significant amounts of vegetation with only sea kale *Crambe maritima*, yellow horned-poppy *Glaucium flavum* and sea beet *Beta vulgaris subsp. maritima* occurring sparsely along the section of habitat surveyed.

### **Marginal vegetation (reedbed) F2.1**

- 8.5.22 There is a small strip of marginal vegetation due east of the footbridge which crosses the A55. The dominant species is common reed *Phragmites australis* (*P. Communis*) with areas of bramble scrub. To the east, where the Afon Gyrach discharges, there is a large stand of Japanese knotweed (Target Note 4).

### **Coastland H**

- 8.5.23 To the north of the site beyond the railway line is the coastline. A detailed survey was not carried out at this location as access was restricted. To the west of Junction 16 are hard sea defences and the railway line beyond which is the rocky shore and sand. Due east the habitat becomes more naturalised. To the west of the Afon Gyrach is a sewage treatment works. The tide rises to cover most of the rocky shoreline.

### **Scrub dense and continuous 2.1 and scattered A2.2**

- 8.5.24 The landscape planting along the northern edge of the east bound carriageway comprise planting with the tree species stunted by the exposed environment adjacent to the sea. A varied species mix, with neither one species being dominant is present although trees have occasionally been planted in single species groups which may cover several metres. Species present include Escallonia sp., sea buckthorn *Hippophae rhamnoides*, maritime pine, sycamore, Italian alder *Alnus cordata*, common gorse *Ulex europaeus*, hawthorn *Crataegus monogyna* and bramble *Rubus fruticosus* agg. Plant density is high so that there are limited ground flora species present. A

dense area of landscape planting/scrub of a similar mix occurs between the residential area of Maes y Llan and the A55.

- 8.5.25 Adjacent to the south edge of the west bound carriageway is a further area of scrub which is comprised of co-abundant holm oak *Quercus ilex* and blackthorn *Prunus spinosa*.
- 8.5.26 Other areas of dense and scattered scrub are associated with field boundaries.

#### **Tall ruderal C3.1**

- 8.5.27 Tall ruderal habitat is associated with the less managed areas adjacent to the railway line and field edges. Dominant species include common nettle, willowherb and Japanese knotweed.

#### **Boundaries – Hedge Intact Species Poor J2.1.2, Defunct Hedge Species Poor J2.2.2 and Hedgerows Intact Species Rich J2.1.1**

- 8.5.28 All hedgerows to be affected by the Scheme were subject to an assessment in terms of its wildlife and landscape criteria as described in Section 8.4.
- 8.5.29 Some hedgerows meet the criterial of 'important' based on nature conservation. However, based on historic mapping<sup>47</sup> it is not known as to how old these hedges are, they need to be >30 years old to be classified as 'important' under the Hedgerow Regulations. The boundaries are shown on the historical mapping (circa 1888 – 1913) but as to whether the hedgerow was there prior to 1989 is unknown. The hedgerow also needs to be located within a fully rural setting, which one could argue they are not as they are located in close proximity to a major road. The following hedgerows fall into this category and/or are considered to be species rich (i.e. five or more native woody species within a 30 m section):
  - A. HR2 which was found to have six woody species within a 30 m section surveyed and one feature (<10% gaps). It should be noted that the existing A55 road Scheme at Junction 16a was constructed circa 1989 which may have affected HR2.
  - B. HR3 which is adjacent to a footpath has 4 woody species and 3 associated features;
  - C. HR5 which has seven woody species;
  - D. HR11 which is adjacent to a footpath, has five woody species and two features; and
  - E. HR6 and HR9 which have five woody species
- 8.5.30 A hedgerow may also be classed as 'important' due to the presence or recorded presence of a protected animal and plant species (Schedule 5 and 8) within the last five years.
- 8.5.31 The full survey results of the hedgerow assessment can be seen in Table 8.4 and Table 8.5. The locations of the hedges subject to the assessment are provided in Figure 8.3 to Figure 8.5 (HR 1 to HR 11)

<sup>47</sup> Tithe Maps of Wales- accessed 24<sup>th</sup> October 2019

**Table 8.4: Hedgerow Assessment -HR1 – HR6**

Criteria	Criteria Met/ Justification					
	HR1	HR2	HR3	HR4	HR5	HR6
Important? <sup>48</sup>	Yes – hedgerow used by bats for foraging and commuting based on survey results and likely to be used by nesting birds.	Yes – hedgerow used by bats for foraging and commuting based on survey results and likely to be used by nesting birds.	Yes – hedgerow used by bats for foraging and commuting based on survey results and likely to be used by nesting birds.	Yes – hedgerow used by bats for foraging and commuting based on survey results and likely to be used by nesting birds.	Yes – hedgerow used by bats for foraging and commuting based on survey results and likely to be used by nesting birds.	Yes – hedgerow used by bats for foraging and commuting based on survey results and likely to be used by nesting birds.
Bridleway/ path	No	No	Yes	Yes	No	No
Black Poplar <i>Populus nigra ssp. betulifolia</i> /Large-leaved Lime <i>Tilia platyphyllos</i> /Small-leaved Lime <i>Tilia cordata</i> /Wild Service-tree <i>Sorbus torminalis</i>	No	No	No	No	No	No
Number of woody spp.. <sup>49</sup> /30 m	2	7	4	3	7	5
Bank/wall	No	No	No	No	No	No

<sup>48</sup> Presence of protected animal and plant species within the last 5 years (archaeological features were not assessed)<sup>49</sup> Woody species 'recognised' by the Hedgerow Regulations (1997)

Criteria	Criteria Met/ Justification					
	HR1	HR2	HR3	HR4	HR5	HR6
Intact (<10% gaps along its length)	Yes	Yes	Yes	Yes	Yes	Yes
Trees (have a diameter of at least 20 cm, or 15 cm for multi-stemmed trees)	No	No	No	No	No	No
3 flora spp. <sup>50</sup>	No	No	Yes	Yes	No	No
Ditch	No	No	No	No	No	No
Connect >4 points (e.g. adjoining hedgerows, ponds, woodlands)	No	No	No	No	No	No
Parallel hedge (within 15 m)	No	No	Yes	Yes	No	No
Woody spp. Present	<ul style="list-style-type: none"> <li>Blackthorn</li> <li>Hawthorn</li> </ul>	<ul style="list-style-type: none"> <li>Blackthorn</li> <li>Hawthorn</li> <li>Ash</li> <li>Hazel</li> <li>Rowan</li> <li>Oak</li> </ul>	<ul style="list-style-type: none"> <li>Blackthorn</li> <li>Hawthorn</li> <li>Ash</li> <li>Elder</li> </ul>	<ul style="list-style-type: none"> <li>Holly</li> <li>Hawthorn</li> <li>Ash</li> </ul>	<ul style="list-style-type: none"> <li>Yew</li> <li>Rowan</li> <li>Hazel</li> <li>Blackthorn</li> <li>Field maple</li> <li>Hawthorn</li> <li>Dogwood</li> </ul>	<ul style="list-style-type: none"> <li>Rowan</li> <li>Hazel</li> <li>Field maple</li> <li>Hawthorn</li> <li>Guelder rose</li> </ul>

<sup>50</sup> Valuable ground flora species within the Hedgerow Regulations (1997)



Criteria	Criteria Met/ Justification					
	HR1	HR2	HR3	HR4	HR5	HR6
Ground flora (notable species in <b>bold</b> )	No notable species recorded. • Common Nettle • Cleavers • Dock • Bramble - climber • Ribwort plantain • Yarrow	One notable species recorded. • Common Nettle • Cleavers • Dock • Bramble – climber • Ivy - climber • Yarrow • <b>Lords-and-ladies</b>	Three notable species recorded. • Common Nettle • Cleavers • Dock • Bramble – climber • Ivy - climber • Yarrow • <b>Lords-and-ladies</b> • <b>Herb-Robert</b> • <b>Male Fern</b>	Three notable species recorded. • Common Nettle • Cleavers • Dock • Bramble – climber • Ivy - climber • Yarrow • <b>Lords-and-ladies</b> • <b>Herb-Robert</b> • <b>Male Fern</b>	One notable species recorded. • Common Nettle • Cleavers • Bramble – climber • Ivy - climber • <b>Lords-and-ladies</b>	No notable species recorded. • Common Nettle • Cleavers • Bramble – climber • Ivy - climber

Table 8.5: Hedgerow Assessment -HR7 – HR11

Criteria	Criteria Met/ Justification				
	HR7	HR8	HR9	HR10	HR11
Important? <sup>51</sup>	Yes – hedgerow used by bats for foraging and commuting based on survey results and likely to be used by nesting birds.	Yes – hedgerow used by bats for foraging and commuting based on survey results and likely to be used by nesting birds.	Yes – hedgerow used by bats for foraging and commuting based on survey results and likely to be used by nesting birds.	Yes – hedgerow used by bats for foraging and commuting based on survey results and likely to be used by nesting birds.	Yes – hedgerow used by bats for foraging and commuting based on survey results and likely to be used by nesting birds.
Bridleway/ path	No	No	No	Yes	Yes

<sup>51</sup> Presence of protected animal and plant species within the last 5 years (archaeological features were not assessed)

Criteria	Criteria Met/ Justification				
	HR7	HR8	HR9	HR10	HR11
Black Poplar <i>Populus nigra ssp. betulifolia</i> /Large-leaved Lime <i>Tilia platyphyllos</i> /Small-leaved Lime <i>Tilia cordata</i> /Wild Service-tree <i>Sorbus torminalis</i>	No	No	No	No	No
Number of woody spp.. <sup>52</sup> /30 m	4	3	5	2	5
Bank/ wall	No	No	No	No	No
Intact ( <10% gaps along its length)	Yes	Yes	Yes	No	Yes
Trees (have a diameter of at least 20 cm, or 15 cm for multi-stemmed trees)	No	No	No	No	No
3 flora spp.. <sup>53</sup>	No	No	No	No	No

<sup>52</sup> Woody species 'recognised' by the Hedgerow Regulations (1997)

<sup>53</sup> Valuable ground flora species within the Hedgerow Regulations (1997)

Criteria	Criteria Met/ Justification				
	HR7	HR8	HR9	HR10	HR11
Ditch	No	No	No	No	No
Connect >4 points (e.g. adjoining hedgerows, ponds, woodlands)	No	No	No	No	No
Parallel hedge (within 15 m)	Yes	No	No	Yes	Yes
Woody spp. present	<ul style="list-style-type: none"> <li>• Hawthorn</li> <li>• Ash</li> <li>• Willow</li> <li>• Oak</li> </ul>	<ul style="list-style-type: none"> <li>• Blackthorn</li> <li>• Hawthorn</li> <li>• Hazel</li> </ul>	<ul style="list-style-type: none"> <li>• Blackthorn</li> <li>• Hawthorn</li> <li>• Hazel</li> <li>• Field maple</li> <li>• Gorse</li> </ul>	<ul style="list-style-type: none"> <li>• Blackthorn</li> <li>• Gorse</li> </ul>	<ul style="list-style-type: none"> <li>• Gorse</li> <li>• Blackthorn</li> <li>• Field maple</li> <li>• Hawthorn</li> <li>• Guelder rose</li> </ul>
Ground flora (notable species in <b>bold</b> )	<p>Two notable species recorded.</p> <ul style="list-style-type: none"> <li>• Common Nettle</li> <li>• Cleavers</li> <li>• Dock</li> <li>• Bramble – climber</li> <li>• Hawkweed sp.</li> <li>• Orache sp.</li> <li>• <b>Lords-and- ladies</b></li> <li>• <b>Herb-Robert</b></li> </ul>	<p>One notable species recorded.</p> <ul style="list-style-type: none"> <li>• Common Nettle</li> <li>• Cleavers</li> <li>• Bramble – climber</li> <li>• Ivy – climber</li> <li>• Garlic mustard</li> <li>• Hawkweed sp.</li> <li>• Red campion</li> <li>• <b>Herb-Robert</b></li> </ul>	<p>No notable species recorded.</p> <ul style="list-style-type: none"> <li>• Common Nettle</li> <li>• Cleavers</li> <li>• Bramble - climber</li> </ul>	<p>One notable species recorded.</p> <ul style="list-style-type: none"> <li>• Bramble – climber</li> <li>• Bracken</li> <li>• Cleavers</li> <li>• Creeping thistle</li> <li>• Creeping cinquefoil</li> <li>• Hedge bindweed</li> <li>• <b>Herb-Robert</b></li> </ul>	<p>One notable species recorded.</p> <ul style="list-style-type: none"> <li>• Common Nettle</li> <li>• Cleavers</li> <li>• Bramble – climber</li> <li>• Ivy – climber</li> <li>• Dock</li> <li>• Bracken</li> <li>• <b>Herb-Robert</b></li> </ul>

### Built up Areas – Buildings J3

- 8.5.32 The built environment around Junction 16 consists of the Oasis Christian Centre and Gladstone pub, the remainder area consists of open fields. To the east between Junction 16 and 16A is the village of Dwygyfylchi and a caravan site. The Scheme is routed behind the shell garage located on the A55 west bound and in close proximity to the properties Located within Maes y Llan. A sewage treatment works is located on the north of the A55 accessed from the east bound carriageway across the railway bridge.

### Boundaries – Wall J2.5 and Fence J2.4

- 8.5.33 Dry stone walls bound the field adjacent to Ysguborwen Road and a remnant dry stone wall crosses the same field, these have the potential to support reptiles, small mammals and nesting birds. Fence lines which have no ecological value bound the fields.

### Priority Habitats

- 8.5.34 Table 8.6 lists the main habitats found within and adjacent to the site and whether these habitats are listed as Priority Habitats in Section 7 of the Environment (Wales) Act 2016. A value for their ecological significance has also been assigned based on Table 8.11, Section 8.6.

**Table 8.6: Summary of Habitats and Value of Receptors**

Habitat Ref	Habitat Description	Priority Habitat	Value/ Justification
A1.3.2	Mixed plantation woodland	x	<b>Lower - Local/</b> although not classified as a Priority habitat, this habitat has been classified as of local significance due to its situation adjacent to a road network and provides cover and protection for a number of species as well as meeting other planning biodiversity objectives.
A3.1, A3.2	Parkland/ scattered trees broadleaved	P	<b>Lower - Local/</b> There are few scattered mature trees within the Scheme footprint. Those to be affected have negligible potential to support bats.
B2.2	Neutral grassland semi-improved	x	<b>Lower - Local/</b> although not classified as a Priority habitat, this habitat has been classified as of local significance due to its situation within a largely urban landscape as well as meeting other planning biodiversity objectives.
B6, B4	Poor semi-improved and improved grassland	x	<b>Lower - Local/</b> although not classified as a Priority habitat, this habitat has been classified as of local significance as it provides habitat for reptiles, foraging bats and birds as well as providing habitat for birds which are a feature of the SPA as well as meeting other planning biodiversity objectives.
J1.2	Amenity grassland	x	<b>Lower - Local/</b> although not classified as a priority habitat, this habitat has been classified as of local significance as it provides some habitat value.

Habitat Ref	Habitat Description	Priority Habitat	Value/ Justification
G2	Running water	P	<b>Medium - Regional/</b> the Afon Gyrach is a Priority habitat and provides supports Section 7 species . as well as meeting other planning biodiversity objectives.
H.3	Vegetated shingle	P	<b>Medium - Regional/</b> Coastal vegetated shingle is a Priority habitat as well as being a candidate wildlife site.
F2.1	Marginal vegetation	P Reedbed	<b>Medium - Regional/</b> Reedbeds is a Priority habitat. A strip of reedbed located to the north of the A55 is a candidate wildlife site.
H	Coastland	P Subtidal sands and gravels	<b>International - Very high/</b> coastal habitats including subtidal sands and gravel and sandflats occur within close proximity to the Scheme and are features of interest of the Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC and Traeth/ Lafan SSSI.
A2.1, A2.2	Scrub	x	<b>Lower - Local/</b> although not classified as a priority habitat, this habitat has been classified as of local significance as it provides some habitat value.
C3.1	Tall ruderal	x	<b>Lower - Local/</b> although not classified as a priority habitat, this habitat has been classified as of local significance as it provides some habitat value.
J2.1.2, J2.2.2 and J2.1.1	Hedgerows	P	<b>Medium - Regional/</b> Hedgerows are a Priority habitat, defined as any boundary line of trees or shrubs over 20 m long and less than 5 m wide and includes HR1 – HR11 some of which are species rich and may meet the criteria of 'important hedgerows based on their nature conservation value.
J3	Built up areas – buildings	x	<b>None/</b> scoped out of further assessment. Structures with the potential to support bats are assessed under the species section.
J2.5	Stone wall	x	<b>Lower - Local/</b> although not classified as a priority habitat, this habitat has been classified as of local significance as it provides some habitat value.

### Species (Flora)

- 8.5.35 The desk study identified thirty notable or protected plant species within a 2.0 km search radius within the last ten years. These are detailed in Table 8.7. None are located within the footprint of the Scheme

**Table 8.7: Summary of Notable Flora within 2.0 km**

Species Name	Closest Proximity	Level of Protection
Small toadflax <i>Chaenorhinum minus</i>	201 m	Category 3 - LBAP species Gwynedd
Tree-mallow <i>Malva arborea</i>	201 m	Category 3 - LBAP species Conwy
Sea fern-grass <i>Catapodium marinum</i>	303 m	Category 3 - LBAP species Conwy
Spotted medick <i>Medicago arabica</i>	450 m	Category 3 - LBAP species Gwynedd
Grey-leaved Whitebeam <i>Sorbus porrigentiformis</i>	478 m	Category 2 - Red data book
Common juniper <i>Juniperus communis</i> subsp. <i>communis</i>	938 m	Category 1 – Section 7
Pillwort <i>Pilularia globulifera</i>	940 m	Category 1 – Section 7
Suffocated clover <i>Trifolium suffocatum</i>	1.1 km	Category 2 - Red data book
Meadow saxifrage <i>Saxifraga granulata</i>	1.1 km	Category 3 - LBAP species Gwynedd
Lanceolate spleenwort <i>Asplenium obovatum</i>	1.1 km	Category 2 - Red data book
Upright chickweed <i>Moenchia erecta</i>	1.2 km	Category 3 - LBAP species Conwy
Yellow Starry Feather-moss <i>Campylium stellatum</i>	1.2 km	Category 2 - Red data book (Wales)
Chalk Comb-moss <i>Ctenidium molluscum</i>	1.2 km	Category 3 - LBAP species Conwy
Broad-leaved Helleborine <i>Epipactis helleborine</i>	1.2 km	Category 3 - LBAP species Gwynedd
Shining Hookeria <i>lucens</i>	1.2 km	Category 2 - Red data book
Western Gorse <i>Ulex gallii</i>	1.2 km	Category 3 - LBAP species Conwy
Bluebell <i>Hyacinthoides non-scripta</i>	1.2 km	Category 1 – Schedule 8
Welsh poppy <i>Meconopsis cambrica</i>	1.4 km	Category 2 - Red data book
Oak Fern <i>Gymnocarpium dryopteris</i>	1.4 km	Category 3 – Locally important
Shepherd's cress <i>Teesdalia nudicaulis</i>	1.4 km	Category 2 - Red data book
Black poplar <i>Populus nigra</i> subsp. <i>betulifolia</i>	1.4 km	Category 3 - LBAP species Conwy
Mountain Male-fern <i>Dryopteris oreades</i>	1.5 km	Category 3 – Locally important
Box <i>Buxus sempervirens</i>	1.5 km	Category 2 - Red data book
Lombardy-Poplar <i>Populus nigra</i> 'Italica'	1.5 km	Category 3 - LBAP species neighbouring authority SNPA
White willow <i>Salix alba</i>	1.5 km	Category 3 – Locally important
Sweet-briar <i>Rosa rubiginosa</i>	1.5 km	Category 3 - LBAP species Gwynedd
Small cudweed <i>Filago minima</i>	1.6 km	Category 3 - LBAP species Conwy
<i>Ramalina fastigiata</i>	1.6 km	Category 3 - LBAP species Conwy

Species Name	Closest Proximity	Level of Protection
Sea bindweed <i>Calystegia soldanella</i>	1.7 km	Category 3 - LBAP species Conwy
Field Maple <i>Acer campestre</i>	1.8 km	Category 3 – Locally important
Moonwort <i>Botrychium lunaria</i>	1.9 km	Category 3 - LBAP species Gwynedd
Chamomile <i>Chamaemelum nobile</i>	2 km	Category 1 – Section 7
<b>Key (as taken from COFNOD):</b> <b>Category 1:</b> Species with European and/or UK legal protection, Section 7 Species. <b>Category 2:</b> Global Red list, British Red Data Book, Nationally Rare & Scarce, Welsh Vascular Plant Red Data List, where these are not identified in Category 1. <b>Category 3:</b> Locally important species as identified by local experts		

- 8.5.36 No notable plants were recorded during the phase 1 surveys with the exception of field maple which was recorded within the landscape planting.
- 8.5.37 Protected and notable flora within the Scheme area is considered to be of **Local** significance based on the value of ecological receptors provided in Table 8.11, Section 8.6.

### Species (Fauna)

- 8.5.38 The presence of faunal species within and adjacent to the Scheme has been gathered via desk study (records within 2.0 km and within the last ten years) and from surveys conducted in 2018 - 2019. Detailed accounts of those species for which surveys were considered necessary to inform the EIA are presented in the following paragraphs. A value of each ecological receptor has been assigned based on Table 8.11, Section 8.6.

### Great Crested Newts and other Amphibians

- 8.5.39 Great crested newts *Triturus cristatus* have been recorded approximately 1500 m east of the Scheme location, with the common frog *Rana temporaria* Common toad *Bufo bufo* and palmate newt *Lissotriton helveticus* recorded approximately 2 km due east within Pensychnant.
- 8.5.40 A Phase 1 habitat survey and initial protected species survey was conducted by TACP in September 2015 in respect of J15 and J16. Their report states that given the lack of suitable aquatic and terrestrial habitat within the surveyed area it is unlikely that this species (great crested newts) is present.
- 8.5.41 There are no ponds within 500 m of Junction 16 or 16A or the wider survey area which could support this species. Habitats within the Scheme footprint are mostly unsuitable and considering their isolation and lack of suitable breeding habitat within 500 m and also of records, it is considered that the Scheme is not likely to be detrimental to the maintenance of the favourable conservation status of great crested newts (or other amphibians) at a local, county, regional or UK spatial scale. For these reasons, amphibians are not considered an ecological receptor and have been **scoped out from further assessment**.

## Bats

- 8.5.42 A number of bats including noctule *Nyctalus noctula*, lesser horseshoe *Rhinolophus hipposideros*, soprano and common pipistrelle *Pipistrellus pygmaeus* and *P. pipistrellus* and whiskered/ brandts *Myotis mystacinus/brandtii* agg have been recorded within 2 km of the survey area. The nearest roost is in Dwygyfylchi located within 300 m in a property off of Glanyrafon Road. In addition, a large maternity roost for the lesser horseshoe bat is located approximately 1.4 km due east in Pensychnant.
- 8.5.43 A Phase 1 habitat survey and initial protected species survey was conducted by TACP in September 2015 in respect of J15 and J16. Their report states that, in general, the surveyed area is of local ecological value for roosting and foraging bats.
- 8.5.44 No roosts have been identified from the surveys conducted to date. No existing structures would be affected by the Scheme proposals.
- 8.5.45 Trees which would be affected by the Schemes proposal were subject to a preliminary roost assessment. This included trees adjacent to Glan-Yr-Afon Road (BRP 1 – BRP 5 on Figure 8.5) and two groups of pine located along the field boundary to the south of Puffin Café (BRP 7 and BRP 8 on Figure 8.4). No emergence surveys were deemed necessary at this stage based on their current roost status of low or negligible. Table 7.3 of BCT guidance<sup>54</sup> states that where trees were found to have low roost potential, no further surveys are required. However, it is advised that trees are re-assessed as the Scheme progresses.

### Bat Activity Surveys – Transects

- 8.5.46 Five species of bat were recorded during the walked transects conducted in 2018 and 2019 as shown of Figures 8.6 to 8.9. These are common and soprano pipistrelle, noctule, whiskered/ brandts and Daubentons *Myotis daubentonii*. The majority of activity was recorded along the Afon Gyrach and to the west of the Scheme area near to Junction 16 and to the east adjacent to the woodland.
- 8.5.47 The areas of mixed plantation woodland support foraging and commuting bats as do the hedgerow field boundaries. By far the most important feature within the Scheme area is the Afon Gyrach. This provides a commuting and foraging route for a number of bat species.

### Deployment of Static Bat Detectors

- 8.5.48 Static detectors were deployed in 2018 and 2019. In 2018 one was positioned on a fence post within an area of scrub and tree planting off the Ysguborwen Road opposite the Oasis Christian Centre (ST3, Figure 8.6) and along the Afon Gyrach (ST1, ST2 and ST4, Figure 8.7). In 2019, when more areas were available for access, statics were positioned along HR1 (ST1 and ST2 on Figure 8.8) and HR8 and HR9 (ST3 and ST4 respectively, Figure 8.9).
- 8.5.49 The follow species were recorded on the statics located along the Afon Gyrach:

- A. Whiskered/ Brandts;
- B. Daubentons;

<sup>54</sup> Collins, J (Ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition). The Bat Conservation Trust



- C. Natterers;
- D. Myotis sp;
- E. Noctule;
- F. Common pipistrelle; and
- G. Soprano pipistrelles.

- 8.5.50 A total of seven species were recorded, the majority of activity was from the soprano pipistrelle with a large number of passes recorded in June. Only one night of recording was possible at ST4 located upstream due to the memory card being full.
- 8.5.51 Only common and soprano pipistrelles were recorded within the area of scrub and tree planting off the Ysguborwen Road opposite the Oasis Christian Centre (ST3), with all but one of the passes from the common pipistrelle.
- 8.5.52 Noctule, common pipistrelle and soprano pipistrelle were recorded along HR1 over the periods July, September and October. The majority of recordings were from the noctule and common pipistrelle bat. Noctules forage and fly in open habitats as such, they may not be as heavily reliant on linear features such as hedgerows.
- 8.5.53 The following species were recorded along HR8 and HR9 over the periods June, September and October 2019; noctule, common and soprano pipistrelles, lesser horseshoe bat and myotis a total of five species.
- 8.5.54 Further information is provided in the Bat Survey Report (Appendix 8.1) and on Figures 8.6 to 8.9
- 8.5.55 When valuing commuting and foraging routes, the following are taken into consideration:
- A. The rarity of the species;
  - B. The approximate number of bats (from survey data);
  - C. The proximity of known roosts; and the nature and complexity of linear features in the landscape.
- 8.5.56 There are limited areas of foraging habitat north of the A55, with foraging habitat limited to small areas of landscape planting which is quite exposed to the coast. However, areas to the south include the Afon Gyrach, hedgerows and tree lines.
- 8.5.57 Utilising the scoring system detailed within Wray et al (2010, Table 3 to Table 5) the commuting and foraging routes associated with the Afon Gyrach were classified as being of **Medium-Regional** significance for whiskered/ Brandts and noctule and of **Low – County** significance for Daubentons, natterers (and other Myotis sp) and Pipistrelles. Based on this classification system, noctule and whiskered/ Brandts species are categorised as rare in Wales.
- 8.5.58 Other commuting and foraging habitats within the Scheme, hedgerows and treelines, scrub etc are of **Local** significance for common and soprano pipistrelles, Daubentons and lesser horseshoe bats and of **Medium – Regional** significance for whiskered/ Brandts and noctule.
- 8.5.59 The state of UK bats<sup>55</sup> latest trends indicate that populations of the bat species noted at the site, are, in general, stable or recovering. Field Survey data for the UK show statistically significant population increases for both the common and soprano pipistrelle species since 1999. Both roost

<sup>55</sup> The State of UK bats 2017 National Bat Monitoring Programme Population Trends JNCC BCT.  
[https://cdn.bats.org.uk/pdf/State\\_of\\_UKs\\_Bats\\_2017-2.pdf?mtime=20181101151557](https://cdn.bats.org.uk/pdf/State_of_UKs_Bats_2017-2.pdf?mtime=20181101151557)

and hibernation surveys show significant population increases of the lesser horseshoe bat since 1999. The noctule and natterers all show increases and whiskered/ Brandts<sup>56</sup> is stable. The long-term trend for Daubenton's bat shows a significant increase since 2013.

- 8.5.60 The results of the National Bat Monitoring Programme (NBMP) up to summer 2018<sup>57</sup> states that in Wales, the long-term trend for Daubenton's bat, natterers and the lesser horseshoe bat shows a significant increase since 2013. Whilst for whiskered/ Brandt the trend is not significantly different. There are insufficient data to calculate population trends for noctules in Wales, though throughout Great Britain, this species is considered to be stable. The common and soprano trend in Wales is showing a decline in roost counts but an upward trend in field survey data. However, it is likely that these species' frequent roost switching results in a negative bias in the roost count trend and this trend is not therefore considered a reliable measure of population change for soprano and common pipistrelles.
- 8.5.61 Little information could be found on the status of bats within Conwy. However, in general, it is considered that the current conservation status of bats within Conwy and within the Scheme footprint is stable and that the scheme would not be detrimental to the favourable conservation status of bats within a local, regional or UK wide spatial context.
- 8.5.62 All bats are afforded protection under European legislation and the results of the surveys identified seven species of bat across the Scheme.

### **Otter**

- 8.5.63 Otters have been recorded within 1.4 km of the Scheme associated with Pensynchant and Sychnant pass.
- 8.5.64 A Phase 1 habitat survey and initial protected species survey was conducted by TACP in September 2015 in respect of J15 and J16. Their report states that, in general, the surveyed area is of local ecological value for otters (this is mainly in respect of Junction 16 and not Junction 15).
- 8.5.65 Numerous field signs of the otter were recorded along the Afon Gyrach including fresh otter spraints on ledges and boulders in the culvert which takes the Afon Gyrach under the A55 and also up stream on boulders. No otter dens/ couches were noted during the survey; however, it is obvious that otters are frequently using the Afon Gyrach as a corridor of movement and may also use areas under tree roots and bankside vegetation/cover for rest up areas. No other suitable habitat occurs within the Scheme location.
- 8.5.66 Previous monitoring surveys for otters in Wales have shown a continued trend of recovery for the otter<sup>58</sup>. In North Wales the otter has continued to consolidate its range and is now widespread in the Hydrometric areas of Glaslyn/Lleyn, Conwy/Clwyd and Dee with the Conwy Hydrometric Area (66A) showing the largest expansion.

<sup>56</sup> Trends for whiskered/Brandt's bat combine data from two species with differing ecological requirements and potentially differing conservation status.

<sup>57</sup> National Bat Monitoring Programme, Annual Report 2018. JNCC, BCT  
<https://cdn.bats.org.uk/pdf/Our%20Work/NBMP/National-Bat-Monitoring-Programme-Annual-Report-2018.pdf?mtime=20190509100258>

<sup>58</sup> NRW (2015) Otter Survey of Wales 2009 – 2010. <https://naturalresources.wales/media/4590/osw-5-english-24-06-2015.pdf>

- 8.5.67 As otters have been recorded along the Afon Gyrach otters are considered to be of **Medium - Regional** significance.

#### **Water vole**

- 8.5.68 No records of water voles were received during the desk study.
- 8.5.69 A Phase 1 habitat survey and initial protected species survey was conducted by TACP in September 2015 in respect of J15 and J16. Their report states that the survey area has negligible value for water voles.
- 8.5.70 The Afon Gyrach is not considered suitable to support water voles owing to its relatively fast flow, lack of suitable bankside habitat or features as described in section 8.4.20 which value the habitat as >3 (unsuitable). No other suitable habitat, including ditches and drains which could support this species are present within the survey area. As such, this species has been **scoped out** from further assessment.

#### **Badger**

- 8.5.71 Badgers have been recorded within 1.4 km due south of the survey area within woodland at Pensychnant and also roadkill on the A55 adjacent to the Scheme.
- 8.5.72 A Phase 1 habitat survey and initial protected species survey was conducted by TACP in September 2015 in respect of J15 and J16. Their report states that, in general, the surveyed area is of local ecological value for badgers.
- 8.5.73 No evidence of badgers was found during the extended Phase 1 habitat survey. The railway corridor provides suitable habitat for badgers, other suitable habitat includes the open fields to the south which connect to the wider landscape which includes woodland and open fields and includes the field to the north of Penmaen Park.
- 8.5.74 Badgers are afforded protection under the Protection of Badgers Act. This protection is mainly concerned with welfare and preventing cruelty rather than conservation. As there is suitable habitat to support badgers, mainly within the fields to the north of Penmaen Park, badgers are considered to be of **Local** significance.

#### **Dormice**

- 8.5.75 No records of dormice were received from the desk study.
- 8.5.76 A Phase 1 habitat survey and initial protected species survey was conducted by TACP in September 2015 in respect of J15 and J16. Their report states that, in general, the surveyed area is of local ecological value for dormice.
- 8.5.77 Dormice can be found in every Welsh county except Anglesey, in low-density populations. Their numbers have fallen by around 20% between 1991 and 2000<sup>59</sup>. The largest known population of dormice in North Wales is within Bontuchel, near Ruthin within the country of Denbighshire which is subject to ongoing monitoring under the National Dormice Monitoring Project. This is located approximately 42 km due east (as the crow flies).

<sup>59</sup> <https://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/european-protected-species/dormouse/?lang=en>

- 8.5.78 The areas of plantation woodland/scrub is small in extent with virtually no connectivity to larger areas of woodland which could support this species with the exception of the most easterly section, to the east of Junction 16A which includes an area of ancient woodland which would not be affected by the Scheme. The Scheme is not in close proximity to known populations of dormice. It is highly unlikely that dormice would be affected by the Scheme. As such, this species is considered to be of **Local** significance.

### Hedgehog

- 8.5.79 Hedgehog *Erinaceus europaeus* have been recorded from within the survey area, a Road traffic Accident (RTA) on Conway Road to the west of Junction 16. The hedgehog is listed on Section 7 of the Environment (Wales) Act 2016.
- 8.5.80 The main habitat of interest for this species within the Scheme area is the existing landscape planting and scrub. Given the available potential habitat for this species within the Scheme and records within a close proximity to the Scheme, hedgehogs are considered to be of **Local** significance.

### Wintering and Breeding Birds

- 8.5.81 A large number of bird records were received during the desk study, the majority of which relate to species associated with the adjacent SPAs. Records of notable woodland and farmland bird species were also received. Table 8.8 provides a list of Category 1 species (species with European and/ or UK legal protection, Section 7 Species) noted within a 2.0 km search radius within the last ten years.

**Table 8.8: Summary of notable birds within 2km**

Species Name	Closest Proximity	Level of Protection
Chough <i>Pyrrhocorax pyrrhocorax</i>	0 m	Category 1
Kestrel <i>Falco tinnunculus</i>	0 m	Category 1
Oystercatcher <i>Haematopus ostralegus</i>	0 m	Category 1
Barn owl <i>Tyto alba</i>	47 m	Category 1
House sparrow <i>Passer domesticus</i>	83 m	Category 1
Black-headed gull <i>Chroicocephalus ridibundus</i>	140 m	Category 1
Curlew <i>Numenius arquata</i>	140 m	Category 1
Purple sandpiper <i>Calidris maritima</i>	140 m	Category 1
Ringed plover <i>Charadrius hiaticula</i>	140 m	Category 1
Herring gull <i>Larus argentatus</i>	336 m	Category 1
Brent Goose <i>Branta bernicla</i>	530 m	Category 1
Common Crossbill <i>Loxia curvirostra</i>	530 m	Category 1
Dunnock <i>Prunella modularis</i>	530 m	Category 1
Common scoter <i>Melanitta nigra</i>	530 m	Category 1
Long-tailed duck <i>Clangula hyemalis</i>	530 m	Category 1
Red-breasted Merganser <i>Mergus serrator</i>	530 m	Category 1
Slavonian grebe <i>Podiceps auritus</i>	530 m	Category 1
Song thrush <i>Turdus philomelos</i>	530 m	Category 1
Velvet scoter <i>Melanitta fusca</i>	530 m	Category 1

Species Name	Closest Proximity	Level of Protection
Baleraic shearwater <i>Puffinus mauretanicus</i>	530 m	Category 1
Osprey <i>Pandion haliaetus</i>	530 m	Category 1
Cuckoo <i>Cuculus canorus</i>	665 m	Category 1
Ring ouzel <i>Turdus torquatus</i>	670 m	Category 1
Dartford warbler <i>Sylvia undata</i>	676 m	Category 1
Lesser redpoll <i>Carduelis cabaret</i>	676 m	Category 1
Hen harrier <i>Circus cyaneus</i>	676 m	Category 1
Red Kite <i>Milvus</i>	676 m	Category 1
Reed bunting <i>Emberiza schoeniclus</i>	676 m	Category 1
Skylark <i>Alauda arvensis</i>	676 m	Category 1
Starling <i>Sturnus vulgaris</i>	676 m	Category 1
Whimbrel <i>Numenius phaeopus</i>	676 m	Category 1
Northern Lapwing <i>Vanellus vanellus</i>	1 km	Category 1
Spotted flycatcher <i>Muscicapa striata</i>	1.4 km	Category 1
Goldeneye <i>Bucephala clangula</i>	1.4 km	Category 1
Snow bunting <i>Plectrophenax nivalis</i>	1.8 km	Category 1
<b>Key (as taken from COFNOD):</b>		
<b>Category 1:</b> Species with European and/ or UK legal protection, Section 7 Species.		

- 8.5.82 The over wintering bird surveys<sup>60</sup> conducted between October 2017 and March 2018 (inclusive) recorded a maximum of 120 oystercatchers *Haematopus ostralegus* occurring during the mid-tide survey in January 2018. Numbers within the survey area were typically fairly consistent during each survey during each month. At high tide Oystercatcher moved from the intertidal area to forage within nearby pasture and recreational areas including fields to the east of the Scheme. Oystercatcher are a feature of interest of the Traeth Lafan / Lavan Sands, Conway Bay SPA.
- 8.5.83 Red-throated Diver *Gavia stellata* were recorded during two survey months (October and November 2017) with a maximum of seven birds recorded during any survey (high tide, November 2017). Red-throated diver are a feature of interest of the Liverpool Bay/ Bae Lerpwl (Wales) SPA.
- 8.5.84 Other species noted during the wintering bird surveys (those in bold are features of the SPAs) were Eider *Somateria mollissima* (BOCC4.<sup>61</sup> Amber list), **great crested grebe *Podiceps cristatus*, red-breasted merganser *Mergus serrator*, curlew *Numenius arquata***, ringed plover *Charadrius hiaticula* (BOCC4 Red list, Section 7) and turnstone *Arenaria interpres*.
- 8.5.85 Eider was recorded on the sea during three survey months (October 2017, November 2017 and February 2018), with a maximum of ten birds present (mid-tide, November 2018).
- 8.5.86 Great Crested Grebe were logged on the sea during four of six surveys (no records in December 2017 and February 2018), with a maximum of nine birds present at high tide in November 2017.

<sup>60</sup> Martyn Owen (2018) A55 Junctions 15 and 16 Wintering Bird Survey 2017/2018 Biome Consulting

<sup>61</sup> Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746. Available online at britishbirds. co.uk/wp-content/uploads/2014/07/BoCC4.pdf

- 8.5.87 Red-breasted Merganser were solely recorded at mid-tide in November 2017, when three birds were present in the west of the survey area.
- 8.5.88 Curlew were logged during four of six surveys (no records in February or March 2018). A maximum of 40 birds were observed at mid-tide in January 2018, just to the east of the survey area within pasture.
- 8.5.89 Ringed Plover were logged in October 2017 (ten birds at high tide) and November 2017 (six birds at mid-tide).
- 8.5.90 Turnstone were logged at high tide (three birds) and mid-tide (ten birds) in October 2017 just above the high-tide line in the centre of the survey area. Three birds were also observed at high tide in February 2018.
- 8.5.91 Full details of the over wintering bird surveys are provided in Appendix 8.5.
- 8.5.92 No breeding bird surveys were conducted to inform the Scheme as it is felt that desk study data provides sufficient coverage and information to inform the assessment.
- 8.5.93 A Phase 1 habitat survey and initial protected species survey was conducted by TACP in September 2015 in respect of J15 and J16. Their report states that, in general, the surveyed area is of local ecological value for breeding birds.
- 8.5.94 Aside from the SPA habitats, those within the Scheme area which provide suitable foraging, roosting and nesting habitat for breeding and overwintering birds include the plantation woodland, trees, hedgerows, scrub and grassland.
- 8.5.95 The peak maximum counts of those species recorded which are features of the Traeth Lafan/ Lavan Sands, Conwy Bay SPA relative to the SPA and GB population estimates, as well as the value of these populations, are summarised in Table 8.9. No WeBS data was available for the Liverpool Bay/ Bae Lerpwl (Wales) SPA, as such an evaluation based on the above method was not possible. Species which are features of this SPA recorded within the Scheme area during the TTTC were red breasted merganser and great crested grebe, each of these were recorded in low numbers as such not in significant numbers.
- 8.5.96 The value of the population of each qualifying species within the study area has been calculated according to the peak TTTC recorded during the 2017-2018 wintering bird surveys, relative to the estimated population size of the SPAs. The general rules of classification were as follows:
- A. Named qualifying species and those named in the SPA assemblage where the maximum count represented >5% of the SPA population were classified as being of **Very High/High – International/National** significance;
  - B. Species where the study area maximum count represented 1-5% of the SPA population were classified as being of **Medium/Low Value – Regional/County** significance;
  - C. **Negligible Value – Local** significance was assigned to species whose maximum count in the study area represented 0 -1% of the SPA population;
  - D. Where no species were encountered, no value was assigned.

**Table 8.9: Internationally Important Populations of Regularly Occurring Species within the Traeth Lafan/ Lavan Sands, Conway Bay SPA**

Species Name	Peak Count	SPA Wintering Population (5 yr mean)	% SPA Population in Study Area Peak Count	GB Wintering Population Estimate <sup>62</sup>	Value (Sensitivity of Site)
Oystercatcher	137 (high tide – December 2017)	6306 (exceeds British National Importance threshold)	2.1%	320,000	<b>Medium - Regional</b>
Red-breasted Merganser	3 (mid tide count November 2017)	76	4%	8,400	<b>Medium - Regional</b>
Curlew	40 (mid tide count January 2018)	1,990	2%	140,000	<b>Medium - Regional</b>
Great crested grebe	9 (high tide count January)	168	5.3%	19,000	<b>High – National</b>
Redshank	0	1,367	0%	120,000	<b>Lower - Local -</b>

8.5.97 The over winter qualifying species for the designated site, oystercatcher and curlew, utilise the fields to the south of Junction 16 for refuge and foraging. Approximately 2.1% of the SPA population of oystercatcher were recorded (137 individuals) and 2% of the SPA population of curlew (40 individuals).

8.5.98 The Scheme is considered to be of **High - National significance** (great crested grebe), **Medium – Regional significance** (Oystercatcher, red-breasted merganser, curlew) and **Local importance** (redshank) for wintering bird assemblages due to the populations recorded within the study area and of **Local** significance for breeding birds.

### Reptiles

8.5.99 Records for the grass snake *Natrix helvetica* and slow worm *Anguis fragilis* were recorded 300 m due south within a caravan park adjacent to the golf course.

8.5.100 A Phase 1 habitat survey and initial protected species survey was conducted by TACP in September 2015 in respect of J15 and J16. Their report states that, in general, the surveyed area is of local ecological value for reptiles mainly due to the presence of un- managed grassland, hedgerows.

8.5.101 There is limited suitable habitat to support reptiles present within the survey area, although

<sup>62</sup> Musgrove et al 2013 Population estimates of birds in Great Britain and the United Kingdom  
<https://www.britishbirds.co.uk/wp-content/uploads/2010/12/APEP3.pdf>

reptiles may be present within the rail corridor, which would remain unaffected by the Scheme proposals and marginal habitat, which is somewhat isolated or heavily grazed.

- 8.5.102 Two areas were identified which were considered to provide 'good' reptile habitat; land to the south of Puffin Café and land to the north of Ysguborwen Road. The locations of these are provided on Figure 8.10 and 8.11.
- 8.5.103 Land to the south of Puffin Café is 0.93 ha, land to the north of Ysguborwen Road is 1.2 ha. No reptiles were recorded within land to the south of Puffin Café. A peak count of eleven slow worms were recorded within land to the north of Ysguborwen Road. This area is less intensively managed and has a varied structure including dry stone walls, bracken and gorse scrub. The majority of slow worms were recorded along the field boundaries to the east, adjacent to the properties, the locations are highlighted on Figure 8.10.
- 8.5.104 No detailed population estimate was undertaken as it is considered unnecessary to inform upon the effects of the Scheme. The DMRB states that:
- 'given the large survey effort necessary for population estimates to be made for any species, this should be restricted to those situations where, on the basis of the magnitude of the predicted impacts and the importance of the population, it is clearly warranted'.
- 8.5.105 In many cases a detailed population estimate is not necessary to gauge an assessment of effects and to advise upon mitigation. It is useful though to obtain an assessment of the population in broad terms, i.e. small, medium or large. This is based on peak count and habitat suitability and gives an indication of a population which can be used in assessments. Based on Table 9 of the Reptile Mitigation Guidelines<sup>63</sup> the site falls within the category of a medium population size class (a peak count of between 10 – 40 plus good habitat suitability).
- 8.5.106 Although the assessment is based on reduced survey effort (i.e. not a population estimate), it should be noted that a peak count of 11 slow worms only just puts the site into the class of medium. Further survey effort would unlikely to have encountered a peak count of 40 or more. As such, the assessment is the same, as would be the effects and recommendations.
- 8.5.107 Slow worms are a Section 7 species; taking into consideration the wider site and its low potential to support reptiles, the Scheme is considered to be of **Local** importance for reptiles in general with land to the north of Ysguborwen Road being of **Medium - Regional** significance owing to the presence of a medium population of slow worms.

### **Invertebrates**

- 8.5.108 The desk study identified twenty-eight notable or protected invertebrates within a 2.0 km search radius within the last ten years, eleven of which are Category 1 species (Species with European and/ or UK legal protection, Section 7 Species), all of which are Lepidoptera, these are detailed in Table 8.10.

<sup>63</sup> Natural England (2011) Technical Information Note TIN102 Reptile Mitigation Guidelines



**Table 8.10: Summary of Notable Invertebrates within 2.0 km**

Species Name	Closest Proximity	Level of Protection
Wall brown <i>Lasiommata megera</i>	760 m	Category 1 - Section 7
Small heath <i>Coenonympha pamphilus</i>	941 m	Category 1 - Section 7
Grayling <i>Hipparchia semele</i>	1 km	Category 1 - Section 7
Garden tiger <i>Arctia caja</i>	1.1 km	Category 1 - Section 7
Dot moth <i>Melanchra persicariae</i>	1.4 km	Category 1 - Section 7
Oak Hook-tip <i>Watsonalla binaria</i>	1.4 km	Category 1 - Section 7
Ashworth's Rustic <i>Xestia ashworthii</i>	1.4 km	Category 1 - Section 7
Small Phoenix <i>Ecliptopera silaceata</i>	1.4 km	Category 1 - Section 7
Broom moth <i>Ceramica pisi</i>	1.9 km	Category 1 - Section 7
White Ermine <i>Spilosoma lubricipeda</i>	1.9 km	Category 1 - Section 7
Buff Ermine <i>Spilosoma lutea</i>	1.9 km	Category 1 - Section 7
<b>Key (as taken from COFNOD):</b>		
<b>Category 1:</b> Species with European and/or UK legal protection, Section 7 Species.		

- 8.5.109 A Phase 1 habitat survey and initial protected species survey was conducted by TACP in September 2015 in respect of J15 and J16. Their report states that, in general, the surveyed area is of local ecological value for invertebrates.
- 8.5.110 No site specific surveys have been conducted for the purpose of this Scheme with the exception of macroinvertebrate surveys of the lower reaches of the Afon Gyrach.
- 8.5.111 All but one species listed in the Macroinvertebrate Survey Report (Appendix 3, Table 6) are classed as of Least Concern LC under the IUCN threat category column. Invertebrates of concern because of their GB Rarity Status recorded within the Afon Gyrach are the caddis fly *W. mediana* and *W. subnigra*, as well as the mayfly *R. germanica*. Identification of these two species was not possible at the larval stage. However, the possibility exists that they are present.
- 8.5.112 The aquatic macroinvertebrate community as a whole is not particularly special or unique with the exception of the species listed above which are of national note - **High** significance.
- 8.5.113 Due to the type and extent of habitats which mostly consist of landscape planting and grazed pasture, with the exception of the Afon Gyrach other protected and notable invertebrates within the Scheme area are considered to be of **Local** significance.
- 8.5.114 Full details of the macroinvertebrate surveys are provided in Appendix 8.3.

### Fisheries

- 8.5.115 Eel *Anguilla* and brown /sea trout *Salmo trutta*<sup>64</sup> have been recorded within the Afon Gyrach upstream from the Scheme location. Eel were also observed during the otter and macroinvertebrate surveys within the Afon Gyrach.

<sup>64</sup> Sea trout and brown trout are the same species (*Salmo trutta*). A combination of genetics and environmental factors (principally lack of food) will mean that some trout will go to sea to feed before returning to spawn. This is called an 'anadromous' lifestyle.

- 8.5.116 Natural resources Wales were contacted in September 2019 for any electro-fishing data they may have of the Afon Gyrach. No salmon have been recorded in the electro-fishing surveys carried out although they may be able to access the river. A good population of trout were recorded within the river (Grade A (Excellent) for Trout).
- 8.5.117 Due to the presence of a good population of trout and the presence of Eel within the Afon Gyrach, Migratory fish are considered to be of **Medium Regional** significance.

### **Invasive Non-Native Species (INNS)**

- 8.5.118 Three-cornered garlic *Allium triquetrum*, Japanese knotweed *Fallopia japonica*, cherry laurel *Prunus laurocerasus*, Portugal laurel *Prunus lusitanica*, Himalayan cotoneaster *simonsii* and Rhododendron *ponticum* were highlighted during the desk study. Those closest to the Scheme include the three-cornered garlic which occurs along the cycle path and Japanese knotweed recorded on the seaward side where the Afon Gyrach discharges.
- 8.5.119 INNS noted during the phase 1 habitat surveys include Montbretia *Crocasmia x crocosmiiflora* which forms extensive patches within areas of landscaping planting adjacent to the A55. Japanese knotweed (Target Note 4, Figure 8.4 and 8.5) and Himalayan balsam *Impatiens glandulifera* (Target Note 1 Figure 8.4) occur along the Afon Gyrach with a large stand of Japanese knotweed occurring at the seaward side of the Gyrach as noted previously and within the fields to the east of the Scheme. Three cornered garlic/ leek was noted along the cycle path, as highlighted within the desk study.

## **8.6 Assessment of Effects**

### **Assessment Criteria and Assignment of Significance**

- 8.6.1 The Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2018) are the current industry standard for ecological assessment and are therefore considered to be current good practice. The assessment of effects on ecological receptors and the assessment of the significance of effects was therefore undertaken in line with the CIEEM guidance.
- 8.6.2 The assessment of the significant effects of the Scheme focuses on those ecological features identified through desk study and field surveys as being important. The value of an ecological feature has been determined based on professional judgement and the role of the ecological feature within the landscape, as well as considering its importance within a defined geographical context. Various characteristics contribute to the importance of ecological features including whether it is internationally, nationally, or locally important, the size of habitat or species population, habitat connectivity, rarity and robustness. This includes, for European protected species, consideration of both the current conservation status (CCS) and favourable conservation status (FCS) where this information is available. In cases of reasonable doubt, where it has not been possible to justify a conclusion of no significant effect robustly, a significant effect has been assumed and where uncertainty exists, this is acknowledged.
- 8.6.3 Table 8.11 categorises the value of ecological features within the defined geographical context.

**Table 8.11: Value of Ecological Receptors**

<b>Value (Sensitivity)</b>	<b>Typical Descriptors</b>
<b>Very High – International and European</b>	<p>An internationally designated site or candidate site (SPA, pSPA, SAC, cSAC, pSAC, Ramsar site).</p> <p>A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat which are essential to maintain the viability of a larger whole.</p> <p>Any regularly occurring population of an internationally important species, which is threatened or rare in the UK. i.e. it is a UK Red Data Book species or listed as occurring in 15 or fewer 10.0 km squares in the UK.</p> <p>A regularly occurring, nationally significant population/number of any internationally important species.</p>
<b>High – UK or National</b>	<p>A nationally designated site (SSSI, ASSI, NNR, Marine Conservation Zones and Marine Protected Areas).</p> <p>A viable area of a priority habitat identified in Section 7 of the Environment (Wales) Act 2016, or of smaller areas of such habitat which are essential to maintain the viability of a larger whole.</p> <p>Any regularly occurring population of a nationally important species which is threatened or rare in the region or county.</p> <p>A regularly occurring significant population/number of any nationally important species, including Schedule 8 plant species.</p>
<b>Medium – Regional</b>	<p>Viable areas of key habitat identified in in Section 7 of the Environment (Wales) Act 2016 or other plans or smaller areas of such habitat which are essential to maintain the viability of a larger whole.</p> <p>Viable areas of key habitat identified as being of Regional value.</p> <p>Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10.0 km squares in the UK or occurs on Section 7 or is relevant account of its regional rarity or localisation.</p> <p>A regularly occurring, locally significant number of a regionally important species.</p> <p>Sites which exceed the County-level designations but fall short of SSSI selection guidelines, where these occur.</p>
<b>Low - County</b>	<p>Semi-natural ancient woodland greater than 0.25 ha.</p> <p>County/ District sites and other sites which the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves.</p> <p>Any regularly occurring, locally significant population of a species which is listed in a County “red data book” or similar on account of its regional rarity or localisation.</p> <p>A regularly occurring, locally significant number of a County important species.</p>
<b>Lower - Local</b>	Semi-natural ancient woodland smaller than 0.25 ha.

Value (Sensitivity)	Typical Descriptors
	<p>Local sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Wildlife Sites.</p> <p>Sites/ features that are scarce within the locality or which appreciably enrich the habitat resource.</p> <p>A diverse and/ or ecologically valuable hedgerow network.</p> <p>A regularly occurring, locally significant number of an important species during a critical phase of its life cycle.</p>

- 8.6.4 Where a feature has value at more than one level, its overriding value is that of the highest level. For example, a site designated as a SPA for internationally important features and as a SSSI for nationally important features will be considered as being internationally important.
- 8.6.5 In carrying out the assessment, a general method for the grading of the significance of effects has been adopted to ensure consistency. A significant effect is an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the consequences of the Scheme on the ecology and nature conservation interest. The assessment of potential and significant residual effects has utilised the following five level magnitude of effects as shown in Table 8.12.

**Table 8.12: Magnitude of Effect and Descriptors**

Magnitude of Effect	Typical Descriptors
Major	<p>The change is likely to restore an ecological receptor to favourable conservation status, or to create a feature of recognisable value within an international or national context – <b>major beneficial effect</b>.</p> <p>The change is likely to cause a permanent (irreversible) effect on the integrity of an ecological receptor– <b>major adverse effect</b>.</p>
Moderate	<p>The change is likely to restore an ecological receptor to favourable conservation status, or to create a feature of recognisable value within a regional or county context – <b>moderate beneficial effects</b>.</p> <p>The change adversely affects the valued ecological receptor, but there would probably be no permanent effect on its integrity with appropriate mitigation and is reversible – <b>moderate adverse effect</b>.</p>
Minor	<p>The change is likely to restore an ecological receptor to favourable conservation status, or to create a feature of recognisable value within a local context <b>minor beneficial effect</b>.</p> <p>The change adversely affects the valued ecological receptor in the short term but there would be no permanent effect (reversible) – <b>minor adverse effect</b>.</p>
Negligible/Slight	<p>The change is likely to restore or retain the status of an ecological receptor – <b>slight beneficial effect</b>.</p> <p>The change affects the valued ecological receptor in the short term but there would be no permanent effect (reversible) – <b>slight adverse effect</b>.</p>

Magnitude of Effect	Typical Descriptors
No change/Neutral	The change has no significant effect on the ecological receptor, either beneficially or adversely.

8.6.6 In addition to the magnitude and whether the effects are beneficial or adverse, the effects would also be assessed for:

- A. Extent – the spatial or geographical area over which the effects may occur;
- B. Duration – to be characterised in ecological characteristics as well as human time frames;
- C. Frequency and timing – e.g. how often an activity occurs and at what times;
- D. Reversibility – whether or not the effect on the receptor can be reversed within a reasonable timescale or not.

8.6.7 When undertaking an EIA, environmental impacts are classified as either permanent or temporary, as appropriate. 'Permanent' changes are those which cannot be reversed (e.g. permanent land take) or would last for the foreseeable future (e.g. noise from generated road traffic). 'Temporary' are short term impacts that can be reversed. Within the assessments the following has been used as a guide:

- A. Short-term: one to three years (i.e. opening year);
- B. Medium-term: four to nine years; and
- C. Long-term: greater than nine years (i.e. Design year – 15 years).

8.6.8 In order to provide consistency across the Environmental Statement, a matrix approach has been adopted. However, the CIEEM EcIA guidelines avoid and discourage the use of the matrix approach in ecological assessment as it is considered to have a number of disadvantages for assessing the significance of residual effects<sup>65</sup>. Consideration has been given to the matrix in Chapter 4 using the tables above to assign a category of significant residual effect after mitigation, to ensure consistency across all the topics of the Environmental Statement.

### Summary Evaluation of Ecological Baseline

- 8.6.9 It is impractical for an assessment of the ecological effects of the Scheme to consider every species and habitat that would be affected; instead it should focus on 'Valued Ecological Receptors' (VERs) based on their legal protection, designation, rarity etc and whether they are significantly affected by the Scheme.
- 8.6.10 Species and habitats which are considered to be widespread, not threatened and resilient to the Scheme effects and which would remain viable and sustainable have been scoped out of the assessment. However, where a species or habitat has been 'scoped out' consideration would still be given to safeguarding biodiversity in general in order to comply with relevant plans, policies and initiatives. For example, all habitats listed in Table 8.6 which are not Priority habitats but are of local importance, flora, badger and invertebrates are not considered to be VERs but are considered important in terms of their biodiversity value and so general mitigation measures are recommended in Section 8.8 where necessary. In addition, measure to control INNS are provided as part of tertiary mitigation.

<sup>65</sup> Box, J, Dean M& Oakley, M (2017) *An alternative approach to the reporting of categories of significant residual effects in Environmental Impact Assessment*. In Practice – Bulletin of the Chartered Institute of Ecology and Environmental Management 97: 47-50.

8.6.11 Table 8.13 provides a summary of the VERs identified through desk study and site visit, their assigned value and justification for inclusion or exclusion.

**Table 8.13:Summary of Valuable Ecological Receptors**

Receptor	Value	Justification	VER
<b>Statutory Designated Sites</b>			
Liverpool Bay/ Bae Lerpwl (Wales) SPA	International - Very high	Due to its assemblages of waterfowl and wetland birds and habitats. None of the key areas used by the wetland birds would be directly affected. In addition, it is considered that the associated effects from the Scheme would not significantly disturb the aggregations of roosting, loafing or feeding waterfowl.	P
Traeth Lafan/ Lavan Sands, Conwy Bay SPA/SSSI	International - Very high	Due to its assemblages of waterfowl and wetland birds and location adjacent to the Scheme area. None of the key areas used by the wetland birds would be directly affected. However, there may be direct and indirect effects to associated habitats which are used including the grassland to the south of the A55, affecting their foraging and refuge habitat. Noise from construction may temporarily displace birds and there would be a loss of grassland habitat. Oystercatcher and curlew have been recorded within the fields.	P
Puffin Island SPA	International - Very high	Due to its assemblages of breeding cormorant. None of the key areas used by breeding cormorant would be directly affected as the site is located 7.3 km from the Scheme.	x
Anglesey Terns SPA	International - Very high	Due to its assemblages of breeding birds. None of the key areas used by the breeding birds would be directly affected as the site is located 7.8 km from the Scheme.	x
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC	International - Very high	No significant effects on the features of the Annex I habitats that are a primary reason for selection of this site are envisaged, however the site is in close proximity to the Scheme.	P
Coedydd Aber SAC/SSSI/NNR	International - Very high	No significant effects on the features of the Annex I habitats that are a primary reason for selection of this site are envisaged due to the distance of the site from the Scheme (6 km). However, otter have been recorded on the coast and also along the Afon Gyrach and salmon are likely to occur in the Afon Gyrach. This watercourse would be crossed by the Scheme.	P otters and salmon
Eryri/ Snowdonia SAC/SSSI	International - Very high	No significant effects on the features of the Annex I habitats that are a primary reason for selection of this site are envisaged due to the distance of the site from the Scheme (5.5 km). Otters have been recorded on the Afon Gyrach and salmon are likely to occur in the Afon Gyrach. This watercourse would be crossed by the Scheme.	P Otters and salmon
Great Orme's Head/ Pen y Gogarth SAC/SSSI	International - Very high	No significant effects on the features of the Annex I habitats that are a primary reason for selection of this site are envisaged due to the distance of the site from the Scheme (5.2 km).	x

Receptor	Value	Justification	VER
Coedwigoedd Penrhyn Creuddyn/ Creuddyn Peninsula Woods SAC	International - Very high	No significant effects on the features of the Annex I habitats that are a primary reason for selection of this site are envisaged due to the distance of the site from the Scheme (5.7 km).	x
Mwyngloddiau Fforest Gwydir/ Gwydyr Forest Mines SAC	International - Very high	No significant effects on the features of the Annex I habitats that are a primary reason for selection of this site are envisaged due to the distance of the site from the Scheme (16.8 km). Lesser horseshoe bats have been recorded on site, in small numbers, i.e. (one or two individuals). However, within a landscape scale, it is more likely that the LH bats occurring on site are from nearby roosts, the closest of which is approximately 1.4 km due east in Pensychnant and not commuting from the SAC. The main commuting route for LH bats occurring within this SAC is likely to be along the Conwy Valley.	x
Coedydd Derw a Safleoedd Ystlumod Meirion/ Meirionnydd Oakwoods and Bat Sites SAC UK0014789	International - Very high	Lesser horseshoe bats have been recorded on site, in small numbers, i.e. (one or two individuals). However, within a landscape scale, it is more likely that the LH bats occurring on site are from nearby roosts and not commuting from the SAC. The SAC is 25 km from the Scheme and habitat connectivity is fragmented.	x
Sychnant Pass SSSI	National - High	The site is located 317 m due east. None of the habitats or species which are a feature of the SSSI would be significantly affected by the Scheme.	x
Aber Afon Conwy SSSI	National - High	The site is located 3.6 km due east from the Scheme. None of the habitats or species which are a feature of the SSSI would be significantly affected by the Scheme though birds which occur within the SSSI including curlew and oystercatcher have been recorded within the Scheme area. These have been included in the designated sites listed above.	x
Cadnant SSSI	National - High	No effects envisaged due to distance from the Scheme (3.8 km due east)	x
Benarth Wood SSSI	National - High	No effects envisaged due to distance from the Scheme (4.3 km due east)	x
Chwareli a Glaswelltir Degannwy SSSI	National - High	No effects envisaged due to distance from the Scheme (4.3 km due east)	x
Bwlch Mine SSSI	National - High	No effects envisaged due to distance from the Scheme (4.9 km due east)	x
<b>Non - Statutory Designated Sites (Local Nature Reserves)</b>			
Nant-y-Coed	Low – County	No effects envisaged due to distance from the Scheme (4 km due west)	x



Receptor	Value	Justification	VER
Bodlondeb woods	Low – County	No effects envisaged due to distance from the Scheme (4 km due east)	x
Great Ormes Head	Refer to SPA/SSSI	This site is a component of the SPA/SSSI as such the higher designation value is awarded. No significant effects envisaged.	x
Traeth Lafan	Refer to SPA/SSSI	This site is a component of the SPA/ SSSI as such the higher designation value is awarded.	P
<b>Non- Statutory Designated Sites (Candidate Wildlife Sites)</b>			
Orme View Vegetated Shingle	Medium – Regional	This site is located in close proximity (73 m due north) to the Scheme and may be subject to indirect effects.	P
Orme View Reedbed	Medium – Regional	This site is located in close proximity (73 m due north) to the Scheme and may be subject to indirect effects.	P
Penmaen Woods	Lower - Local	Not affected by the Scheme due to distance (1.3 km due west)	x
Ty'n-y-ffrith	Lower - Local	Not affected by the Scheme due to distance (1.35 km due south)	x
Craig Hafodwen	Lower - Local	Not affected by the Scheme due to distance (1.5 km due south)	x
Coed Cwm Graig Llwyd	Lower - Local	Not affected by the Scheme due to distance (1.58 km due south)	x
Cefn Coch	Lower - Local	Not affected by the Scheme due to distance (1.75 km due south west)	x
Penmaenmawr Old Quarry	Lower - Local	Not affected by the Scheme due to distance (1.85 km due west)	x
Graig Llwyd Heath	Lower - Local	Not affected by the Scheme due to distance (1.9 km due south west)	x
<b>Ancient Woodland</b>			
Ancient Semi-natural woodland sites, including Restored Ancient Woodland and Plantation on Ancient Woodland	Lower - Local	Not affected by the Scheme.	x

Receptor	Value	Justification	VER
<b>Priority Habitats</b>			
Parkland/ scattered trees broadleaved	Lower – Local	There are few scattered mature trees within the Scheme footprint. Those to be affected have negligible potential to support bats. Mature scattered trees including those at Target Note 5 would be retained and protected.	P
Running water	Medium – Regional	<p>The Afon Gyrach is crossed by the Scheme and as such may be directly and indirectly affected as a result of pollution incidences.</p> <p>A WFD assessment for J16 has been completed as part of the aquatic invertebrate surveys, this stated that the current WFD Biological Status on the lower reach of the Afon Gyrach is generally HIGH to GOOD.</p> <p>The river was designated under the WFD for the Cycle 1 of the Directive (i.e. 2009 to 2015) but is no longer designated. This is anticipated to be due to its small size. For the purposes of Cycle 1 reporting, it was classified by NRW as having good overall status, with good chemical and ecological statuses as well as good hydromorphology and flow characteristics.</p> <p>The river supports Eel, trout, otters and bats.</p>	P
Vegetated shingle	Medium – Regional	Coastal vegetated shingle is a Priority habitat as well as being a candidate wildlife site.	P
Marginal vegetation - Reedbed	Medium – Regional	Reedbeds is a Priority habitat. A strip of reedbed located to the north of the A55 is a candidate wildlife site.	P
Coastland	International - Very High	Coastal habitats including subtidal sands and gravel and sandflats occur within close proximity to the Scheme and are features of interest of the Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC and Traeth/Lafan SSSI.	P
Hedgerows	Medium – Regional	Hedgerows are a Priority habitat, defined as any boundary line of trees or shrubs over 20m long and less than 5m wide and includes HR1 – HR11.	P
<b>Species (Fauna)</b>			
Bats	Low County – Medium Regional	Recognising that all bats are afforded protection under European legislation and taking into consideration the results of the surveys, which identified seven species of bats and one roost, the Scheme corridor in general is considered to be of <b>Medium – Regional</b> significance for noctule and Whiskered/Brandts bats and of <b>Local</b> importance for common and soprano	P

Receptor	Value	Justification	VER
		pipistrelles, Daubentons, natterers, lesser horseshoe. The Afon Gyrach is considered to be of <b>Medium- Regional</b> significance for Whiskered/Brandts and noctule and of <b>Low – County</b> significance for Daubentons, natterers (and other Myotis sp) and Pipistrelles. .	
Otter	Medium – Regional	<p>This species may be directly and indirectly affected as a result of pollution events which may affect the habitats upon which they rely, in particular where works are proposed across the Afon Gyrach.</p> <p>A WFD assessment for J16 has been completed as part of the aquatic invertebrate surveys, this stated that the current WFD Biological Status on the lower reach of the Afon Gyrach is generally HIGH to GOOD.</p>	P
Wintering birds	High National - Local	The Scheme is considered to be of <b>High - National</b> significance (great crested grebe), <b>Medium – Regional</b> significance (Oystercatcher, red-breasted merganser, curlew) and <b>Local</b> significance (redshank) for wintering bird assemblages due to populations recorded within the study area.	P
Breeding birds	Lower Local	Loss of and disturbance to habitat used for nesting and foraging.	P
Reptiles	Lower Local – Medium Regional	Loss of and disturbance to habitat.	P
Aquatic Invertebrates	High – National	<p>The aquatic macroinvertebrate community as a whole is not particularly special or unique with the exception of the species which have a GB status of rare, these are the caddis fly <i>W.mediana</i> and <i>W.subnigra</i>, as well as the mayfly <i>R. germanica</i>. Identification of these two species was not possible at the larval stage which may all occur within the Afon Gyrach</p> <p>A WFD assessment for J16 has been completed as part of the aquatic invertebrate surveys, this stated that the current WFD Biological Status on the lower reach of the Afon Gyrach is generally HIGH to GOOD.</p> <p>The river was designated under the WFD for the Cycle 1 of the Directive (i.e. 2009 to 2015) but is no longer designated. This is anticipated to be due to its small size. For the purposes of Cycle 1 reporting, it was classified by NRW as having good overall status, with good chemical and ecological statuses as well as good hydromorphology and flow characteristics.</p>	P
Fisheries	Medium Regional	Eel and trout occur within the Afon Gyrach. This species group may be directly and indirectly affected as a result of pollution events which may affect the habitats upon which they rely.	P

Receptor	Value	Justification	VER
		<p>A WFD assessment for J16 has been completed as part of the aquatic invertebrate surveys, this stated that the current WFD Biological Status on the lower reach of the Afon Gyrach is generally HIGH to GOOD.</p> <p>The river was designated under the WFD for the Cycle 1 of the Directive (i.e. 2009 to 2015) but is no longer designated. This is anticipated to be due to its small size. For the purposes of Cycle 1 reporting, it was classified by NRW as having good overall status, with good chemical and ecological statuses as well as good hydromorphology and flow characteristics.</p>	
<b>INNS</b>			
Montbretia <i>Crocasmia x crocosmiiflora</i> , Japanese knotweed, Himalayan balsam	N/A	All of these species occur within the Scheme footprint. Not a VER but mitigation required so as not to spread this species.	x

### Future Baseline Conditions

- 8.6.12 Rapid, large changes in global temperatures (4°C or more above the pre-industrial temperature by the end of this century) and changes in rainfall patterns would increase the vulnerability of many species to climate change and may lead to the extinction of entire species. Even with smaller amounts of warming, many species would be placed at greater risk. The animals and plants most at risk would be those that:
- A. Have no new habitats to move to;
  - B. Can't move quickly to new habitats;
  - C. Are already under threat from other factors, such as overharvesting or habitat loss and degradation because of human activity.
- 8.6.13 Climate change affects biodiversity because species tend to evolve to a specific range of environmental factors such as temperature, moisture, etc. As these factors alter due to climate change, species need to migrate to stay in their optimum environment. Some species are more adaptive, but, for others, a changing environment is a threat to their ability to survive and therefore increases extinction rates and reduces biodiversity.
- 8.6.14 The ability of species to respond to this climate-enforced migration is also limited by human activity, which has changed land-use and fragmented habitats. When roads, urban areas and agricultural land stand in their way, many species would find it almost impossible to migrate across the landscape. There is therefore a need to facilitate this natural adaptation process by, for example, creating migration corridors of natural habitats and reducing fragmentation.
- 8.6.15 Extinctions and changes in the number of species in a population would have large but unpredictable effects on food chains. Most ecosystems would struggle to function as they currently do, if large changes in climate happen rapidly within a century or so.
- 8.6.16 There is the potential for change in the baseline conditions in the medium to long term as a result of climate change. The climate change risk assessment for Wales (January 2012).<sup>66</sup> identified the main potential results of climate change significant to the natural environment to be:
- A. Reduction in soil moisture and lower river flows, and an increase in the frequency and magnitude of droughts;
  - B. Changes in soil organic carbon, although the ways in which it might be affected are not adequately understood at present;
  - C. Changes in climate space and species migration patterns, which could result in significant changes to biodiversity;
  - D. Increases in pests and diseases;
  - E. Changes to coastal and estuarine habitats and species, including a reduction in intertidal area; and
  - F. Changes to the marine environment, including an increase in disease hosts and pathogens, harmful algal blooms and invasive species. The effects of ocean acidification include adverse effects on shellfish.

<sup>66</sup> UK 2012 Climate Change Risk Assessment (Defra Project Code GA0204) A climate change risk assessment for Wales January 2012.

- 8.6.17 The first sector-based chapter of the Draft Climate Change Adaptation Plan for Wales<sup>67</sup> focuses on the actions needed to ensure our natural environment remains resilient against the impacts of climate change. This document highlighted the following urgent risks:
- A. Risks to habitats due to the inability to respond, and opportunities from new species colonisations;
  - B. Risks to soils from increased aridity/ wetness;
  - C. Risks to agriculture and wildlife from water scarcity and flooding; and
  - D. Risks to freshwater species from higher water temperatures.
- 8.6.18 Poleward and upward shifts in species' distribution have been recorded in the UK and on a global scale. In some cases, changes in migration, breeding and flowering dates have resulted in species having difficulties finding food<sup>68</sup>.
- 8.6.19 Within a Scheme concept, measures can be adopted which can assist, even within a small scale context, biodiversity. For example, by implementing Biodiversity Net Gain (BNG). Biodiversity must be retained, restored and enhanced both for its intrinsic value and for the tangible benefits that it has for society and economy (ecosystem services). Habitats must remain connected and landscape designs must aim to enhance and restore connectivity. The reduction of barriers to movement of species allow species to move as the climate changes.
- 8.6.20 Other potential effects on the future baseline are the link with the coastal areas and sea level rise, species migration patterns including fish and migratory bird species, increases in INNS, stress to native species therefore decreasing resistance to invasion of INNS, reduction in intertidal habitats including those which are a feature of the designated sites and important habitat for breeding and over wintering bird assemblages. Fisheries including shellfish (mussel beds) could also be affected by an increase in water temperature and changes in water quality. Localised sea level rises and inundation of saltwater upon freshwater habitats (i.e. the Afon Gyrach) could have a significantly detrimental effect upon the freshwater invertebrate community. There may also be implications on the status of the designated sites and degradation in ecological functionality.
- 8.6.21 In grassland habitats, reduced summer rainfall and increased evaporation and transpiration could affect species composition. Areas created as wetland/ SuDs would have less input and become dry more often/ for greater periods. In the future baseline these water features could be permanently dry outside extreme rainfall events.
- 8.6.22 Overall, climate change and the effects on the natural environment are hard to predict due to a range of interrelated factors, i.e. economic growth, new developments and technologies and the actions which Welsh Government and key organisations are taking to minimise climate risks at present.
- 8.6.23 Whilst in the long term, rising sea levels may cause a loss of intertidal habitats (which are hard to predict), it is considered that this would not influence the effects of the Scheme on biodiversity within the timescale of construction and opening of the new road Scheme and layout. The A55 would still be in operation as a major traffic route, with the revised layout of J15 not significantly affecting the future baseline of species and habitats, within a local, regional, national, international and global context in comparison to extensive deforestation which occurs on a global scale.

<sup>67</sup> Welsh Government Consultation Document. (Number: WG35911). Draft Climate Change Adaptation Plan for Wales 03 December 2018)

<sup>68</sup> Climate Emergency and Biodiversity Crisis: The Facts and Figures CIEEM Briefing Paper September 2019

- 8.6.24 Chapter 16 states that effects on climate include increased frequency and intensity of rainfall events could exacerbate contaminants entering watercourses by causing overwhelming of drainage systems and higher temperatures could lead to a change in species composition and or the introduction of invasive species which could compromise the ecological design. However, both of these potential effects are considered to be not significant due to the consideration of climate change allowances and SuDs specified in the Drainage Design (Report Ref: A55J15J16-YGC-05-15-RP-D-0001) and with the consideration of planting design in the Outline Ecological Management Plan to include species which can adapt to potential climate change effects. Further information is provided in Chapter 16.

## **8.7 Identification of Potential Effects**

### **Effects Resulting from Changes in Air Quality**

- 8.7.1 The effects of changes in air quality as a result of the construction and operation of the Scheme are described in Chapter 12: Air Quality. The main air pollutants of concern related to construction are dust and particulate matter with an aerodynamic diameter of less than 10 µm (PM<sub>10</sub>), and for road traffic are nitrogen dioxide (NO<sub>2</sub>) and PM<sub>10</sub>. The air quality effects are assessed in isolation of other general construction and operation effects due to the complexity of potential effects on habitats including those which are located within designated sites. For the assessment of road schemes, the Highways Agency requires an assessment of the impacts of roads traffic emissions on nature conservation Sites (Designated Sites) within 200 m of a road (ARN). When pollutant concentrations exceed a critical level, it is considered that there is a risk of harmful effects.
- 8.7.2 The only designated site which falls within 200 m of the ARN is Sychnant Pass SSSI which is located within 200 m of the A55 centreline.
- 8.7.3 Effects at ecological receptors relating to NO<sub>x</sub> concentrations and nitrogen deposition have been assessed. Road traffic is not a significant source of other pollutants that vegetation may be sensitive to, such as ammonia (NH<sub>3</sub>) and sulphur dioxide (SO<sub>2</sub>), and as such an assessment of these pollutants has been scoped out of this assessment.
- 8.7.4 Habitats within 200 m of the ARN which could be affected by Air Pollution include those within Sychnant pass SSSI (Lowland Heath – (Dry Heath) Dwarf Shrub Heath and the following:
- A. Moderately exposed sand (including sandbanks);
  - B. Running water;
  - C. Saltmarsh;
  - D. Mudflats and sandflats not covered by seawater at low tide;
  - E. Hedgerows;
  - F. Semi-improved neutral grassland, and
  - G. Broadleaved trees/ woodland.
- 8.7.5 The recommended values within nutrient nitrogen deposition critical load ranges for use in air pollution impact assessment (kgN/ha/yr) and for NO<sub>x</sub> µg and sulphur as defined by the Air Pollution information System (APIS) are detailed in Table 8.14:

**Table 8.14: APIS Critical Loads**

<b>Habitat</b>	<b>N Dep (kgN/ha/yr)</b>	<b>Acid Deposition (kegN/ha/yr)</b>	<b>Sulphur (keqS/ha/yr)</b>	<b>NO<sub>x</sub> (µg)</b>
Lowland Heathland - (Dry Heath)/Dwarf shrub heath	10-20 kgN/ha/yr	1.50	0.46	-
Moderately exposed sand	Not sensitive	-	-	Not sensitive
Running water	No estimate available	-	-	No estimate available
Saltmarsh	upper saltmarsh – 20, lower saltmarsh 30 kgN/ha/yr	-	-	30 ug
Mudflats and sandflats not covered by sea water at low tide	No estimate available	-	-	30 ug
Hedgerows	10-20 kgN/ha/yr	-	-	30 µg NO <sub>x</sub> (as NO <sub>2</sub> ) m <sup>-3</sup>
Semi-improved neutral grassland	No estimate available, (for unimproved grassland this is set at 20 kgN/ha/yr	-	-	-
Broadleaved trees/ woodland	10 kgN/ha/yr	-	-	No estimate available

- 8.7.6 The baseline nitrogen deposition and acid deposition (sulphur) background deposition rates (2015-2017) exceed the relevant critical loads with N dep at 12.7 kgN/ha/yr and Sulphur at 0.66 (keqS/ha/yr). More information is provided in Chapter 12 Air Quality.

### **Construction Effects – Air Quality**

- 8.7.7 The Scheme is within close proximity to designated sites, as such, there may be a risk that the habitats and features of interest of the sites could be affected by dust. Dust sources from works close to the designated sites include concrete dust during the demolition of existing buildings, and dust from other man-made materials. Earthworks causing silts to be displaced and enter the environment, site clearance and haulage of materials etc.
- 8.7.8 The Institute of Air Quality Management (IAQM) guidance states that the aim would be to prevent significant effects on receptors through the use of effective mitigation.



- 8.7.9 Overall, without mitigation, the highest risk of dust soiling impacts is likely to be medium for earthworks and construction activities. The risk of from PM<sub>10</sub> and ecological effects is likely to be low to negligible for all activities. Further details are provided in Chapter 12.

### **Operational Effects – Air Quality**

- 8.7.10 The NO<sub>x</sub> critical level is not exceeded within 200 m from the J16 Scheme. The nitrogen and acid deposition critical loads are predicted to be exceeded within 200 m from the Scheme due to the exceeding background deposition rates. However, the increase in nitrogen and acid deposition is below 1% and therefore not significant.
- 8.7.11 During the operational phase, although traffic flows could change because of external factors, the scheme itself is considered likely to result in no overall additional traffic or resulting emissions. Similarly, although the replacement of the roundabout with slip roads could result in minor fluctuations in local emissions, these are considered likely to have a negligible regional effect. In this instance, it is therefore considered that operational regional emissions would be negligible, and therefore would have no significant effect on ecological receptors. Further details are provided in Chapter 12.

### **Mitigation for Air Quality Effects**

- 8.7.12 The control of dust emissions from construction sites is provided in Chapter 12. These measures would be set out within a Dust Management Plan which would form part of the Construction Environmental Management Plan (CEMP) that would accompany the application for the J16 Scheme or be secured through an appropriately worded planning condition.
- 8.7.13 The effects of development traffic on local air quality are judged to be not significant. No additional traffic mitigation is therefore required to reduce the direct effects of the development on local air quality.

### **Conclusions from Changes in Air Quality**

- 8.7.14 The increase in nitrogen and acid deposition is below 1% and therefore not significant. Overall, it is concluded that there are no air quality constraints to the proposed Scheme. The increase in NO<sub>x</sub> concentrations and nitrogen deposition on ecological receptors is unlikely to have a significant effect on the integrity of the receptors given the magnitude of the predicted changes and the limited areas of the habitats affected. The operational air quality effects of the J16 Scheme are judged to be not significant for ecological receptors

### **Assessment of Construction Effects**

- 8.7.15 The assessment of construction effects include land take effects e.g. site clearance and land taken for construction of the Scheme, including site access, service diversions, demolition and topsoil stripping and would be both permanent and temporary. Temporary working space would be required outside the permanent land take for the Scheme and this land would be identified and included within the draft Compulsory Purchase Order (CPO).
- 8.7.16 Land required on a temporary basis would be taken to allow efficient, safe construction and to minimise the environmental impacts and would be used for the contractors compound, materials storage areas, haul roads and to provide adequate space to erect boundary fences, divert services and install drains and culverts. The total land take required for the Scheme (including land take

required temporarily) is approximately 29.18 ha hectares in total area (291.777 m<sup>2</sup>). The extent of land-take for the scheme is shown in Figures 2.5 General Arrangement and 2.6 EMP, Volume 2

8.7.17 The possible effects arising from construction include increased siltation, noise, release of pollutants and increased temporary lighting. The construction activities associated with the Scheme include:

- A. Construction of the main site compounds;
- B. Construction of main site access points;
- C. Temporary and permanent fencing;
- D. Construction of temporary diversions to existing footpath and cycleways.
- E. Development of site haul roads;
- F. Statutory Undertakers service diversions;
- G. Topsoil stripping and stockpiling with archaeological monitoring;
- H. Earthworks operations to form embankments and cuttings;
- I. Drainage operations;
- J. Haulage of materials to and from the site on the existing road network;
- K. Construction of the carriageways;
- L. Side road works; and
- M. Accommodation works.

8.7.18 The construction activities are summarised in Chapter 2 of this ES.

8.7.19 The construction would be anticipated to commence in 2021, with work programmed to take place over a period of approximately 24 months. The construction would be completed, and the scheme opened in 2023, followed by a 3 year period of environmental maintenance and aftercare extending until 2026.

8.7.20 Some activities would extend beyond substantial completion. These would include demobilisation of works compounds and seasonally constrained activities such as aftercare landscaping.

8.7.21 In this section, the potential effects of the construction (including land take) on each of the VERs as detailed within Table 8.13 are identified and assessed, in the absence of mitigation then with mitigation (Section 8.8) in order to determine the significance of residual effects.

### **Statutory Designated Sites**

8.7.22 There would be no direct land take effects upon habitats within the designated sites as listed in Table 8.13. However, habitats outside of the designated sites are used by birds which are features of interest of the Traeth Lafan/ Lavan Sands, Conwy Bay SPA Lavan Sands (oystercatcher and curlew).

8.7.23 Other SPA species noted during the wintering bird surveys are great crested grebe and red-breasted merganser. However, these species have not been recorded on site and are unlikely to utilise land within the Scheme footprint as they are aquatic/coastal specialists and unlikely to utilise grassland habitats for foraging and refuge.

8.7.24 The main potential effect upon designated sites and their features of interest would be indirect disturbance as a result of potential pollution incidences and noise due to the proximity of the designated sites and mobility of species which are features of the SPA. Those sites most at risk are Traeth Lafan/ Lavan Sands, Conwy Bay SPA/SSSI, Liverpool Bay/ Bae Lerpwl (Wales) SPA and

Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC.

- 8.7.25 An assessment of the impact on water quality has been made in relation to both routine runoff from the proposed Scheme and the risk of potential spillages. The Highways England Water Risk Assessment Tool (HEWRAT) has been used for this purpose. This is reported in Chapter 7.
- 8.7.26 The assessments states that the impact of routine runoff on the water environment of the Afon Gyrach and Conwy Bay is considered to be negligible from routine-runoff (both from dissolved and sediment-bound contaminants).
- 8.7.27 The assessment also concluded that likelihood of a serious pollution incident resulting from a spillage on the Scheme is considered to be acceptably low and would be lower than the existing situation.
- 8.7.28 The coastal environment where runoff would discharge is dynamic and subject to currents, waves and tides which would disperse fine sediments such that they would not be sufficiently concentrated to be toxic to aquatic organisms living in or near bed sediments.
- 8.7.29 It is assumed that vibratory compaction and sheet steel piling would be utilised during the construction phase. Compaction of aggregates using rollers and sheet steel piling can result in perceptible vibration at nearby sensitive receptors. Chapter 13, Noise and Vibration states that no significant vibration levels are predicted with sheet steel piling. The assessment is based on human receptors and not species. However, the conclusion is that increases in noise levels from construction activities are not significant.
- 8.7.30 Those habitats which are features of the Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC are not evident in close proximity to the Scheme. Annex I Habitats which are a feature of interest generally tend to occur to the west towards the Menai Strait as such, no construction effects are envisaged.
- 8.7.31 The over winter qualifying species for the designated site, oystercatcher and curlew, utilise the fields to the east of Junction 16 for refuge and foraging. Approximately 2.1% of the SPA population of oystercatcher were recorded (137 individuals) and 2% of the SPA population of curlew (40 individuals). A proportion of this habitat would be lost and/or temporarily disturbed to land take though adjacent areas to the south would remain intact. Only a small percentage of oystercatcher were recorded within these areas which would be affected by the scheme up to 41 individuals. However, these areas are unlikely to be utilised during the construction of the new junction due to noise and potentially lighting which would displace and/or deter birds which are a feature of the SPA's from the construction area.
- 8.7.32 Designated sites are considered to be of **International - Very high** significance.
- 8.7.33 In the absence of mitigation, construction effects upon the designated sites and features of interest are considered to be a **Moderate Adverse** effect.
- 8.7.34 A Statement to Inform an Appropriate Assessment would be carried out for these sites.

#### **Non Statutory Designated Sites**

- 8.7.35 There would be no land take effects upon the features of interest of the non-statutory designated sites.

- 8.7.36 Those non statutory sites which have a hydrological link to the Scheme, either via rivers or the marine environment may be at risk from pollution events during construction, including spillages which may encroach upon these habitats in the absence of control measures. The sites most at risk are considered to be Traeth Lafan LNR (which is a component of the SPA and SSSI and as such is considered above) and Orme View Vegetated Shingle and Orme View Reedbed Candidate Wildlife Sites.
- 8.7.37 These County Wildlife sites are located 73 m from the Scheme, north of the A55. The Afon Gyrach forms a direct hydrological link to these. The main potential effects from construction include airborne pollutants, chemicals and oil spillages and increased silt which could be discharged into the watercourse, which, without adequate control measures and pollute coastal habitats.
- 8.7.38 An assessment of the impact on water quality has been made in relation to both routine runoff from the proposed Scheme and the risk of potential spillages. The Highways England Water Risk Assessment Tool (HEWRAT) has been used for this purpose and is reported in Chapter 7.
- 8.7.39 The assessments states that the impact of routine runoff on the water environment of the Afon Gyrach and Conwy Bay is considered to be negligible from routine-runoff (both from dissolved and sediment-bound contaminants).
- 8.7.40 The assessment also concluded that likelihood of a serious pollution incident resulting from a spillage on the Scheme is considered to be acceptably low and would be lower than the existing situation.
- 8.7.41 In the absence of mitigation, construction effects upon Orme View Vegetated Shingle and Orme View Reedbed (a receptor of **Medium-Regional** significance as it is also a Priority Habitat) are considered to be a **Moderate Adverse** effect.

#### **Parkland/ Scattered Trees Broadleaved A3.1**

- 8.7.42 The Scheme involves the loss of or disturbance to circa sixteen mature trees. These are located along the field boundary to the south of Puffin Café (Groups BRP 7 and BRP 8 which are two groups of pine species) and to the east of the Scheme near the entrance to the caravan park (BRP 1 – 7 which are broadleaved trees). Other trees to be removed are associated with the mixed plantation woodland. A tree retention and protection plan has not been produced at this stage, as such, the full extent of tree removal, in respect of individual trees is unknown.
- 8.7.43 Other in direct construction effects to retained habitat may occur from increased dust from demolition and construction, and haulage operations and disturbance during earthworks, and utility diversions where works encroach upon the root protection zones of retained habitat.
- 8.7.44 Within this habitat, the extent of habitat lost vs habitat created is shown in Table 8.15.
- 8.7.45 Scattered trees (broadleaved and coniferous) are considered to be of **Lower – Local Value**. The loss of these mature trees is a conflict of local and government Biodiversity Objectives and policies and cannot be replaced in the short-term. In the absence of mitigation, the effect is considered to be a **Minor Adverse Effect**.

## Running Water G.2

- 8.7.46 The Afon Gyrach is crossed by the Scheme via the proposed new road and also by the existing A55 and Railway. There would be no direct land take effects upon this Priority habitat, however, there would be works along the banks in order to construct the new bridge. The activity of machines disturbing soils on and around the site could increase the amount of fine sediments entering the flow and settling into the streambed causing pollution effects and smothering. The use of heavy machinery on site could also result in the spillage of toxic fuels and oils etc. into the river.
- 8.7.47 The Afon Gyrach is a VER of **Medium – Regional** significance and is currently of High – Good Biological Status. In the absence of mitigation, effects upon this water course could potentially be **Major Adverse**.

## Vegetated Shingle and Marginal Vegetation

- 8.7.48 The potential effects upon these habitats are discussed in non-statutory designated sites Orme View Reedbed and Orme View Vegetated Shingle (refer to non-statutory sites).

## Coastland H

- 8.7.49 Coastal habitats including subtidal sands and gravel and sandflats occur within close proximity to the Scheme and are features of interest of the Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC and Traeth/ Lafan SSSI. There would be no land take effects upon any coastal habitats. Other construction effects to coastal habitats are discussed under Designated Sites.

## Boundaries - Hedge Intact Species Poor J2.1.2, Defunct Hedge Species Poor J2.2.2 and Hedgerows Intact Species Rich J2.1.1

- 8.7.50 Hedgerows are a Priority habitat, defined as any boundary line of trees or shrubs over 20 m long and less than 5 m wide and includes HR1 – HR11.
- 8.7.51 HR2, HR3, HR5, HR6, HR9 and HR11 meet the criterion of 'important' based on nature conservation.
- 8.7.52 The following hedgerows would be lost to the Scheme, HR1, HR2, HR5, HR7, HR8 and HR9, sections of HR3 and HR4, HR6 would be retained. The extent of hedgerow to be lost is 2990 m in length. This habitat provides commuting and foraging habitat for bats as well as providing refuge for nesting birds and other small mammals, the potential effects on these species has been discussed under their relevant headings.
- 8.7.53 Within this habitat, the extent of habitat lost vs habitat created is shown in Table 8.15.
- 8.7.54 Due to its classification as a Priority habitat, this VER is considered to be of **Medium – Regional Value**. The majority of this habitat would be lost as a result of land take in order to make way for the Scheme. In the absence of mitigation, the effect is considered to be a **Moderate Adverse Effect**.

## Bats

- 8.7.55 Effects of land take on bats include loss of habitat, and habitat fragmentation. There would be the permanent loss of foraging and commuting habitat with the removal of hedgerows and landscape

planting which currently occurs across the Scheme and also effects to the Afon Gyrach which is currently used by a number of bat species for foraging and commuting.

- 8.7.56 No structures would be demolished.
- 8.7.57 Seven species of bat were recorded during the transects and static deployment conducted in 2018 and 2019. These are common and soprano pipistrelle, noctule, Daubentons, whiskered/ Brandts, lesser horseshoe, Myotis sp (including Natterers), Pipistrelle sp, noctule. The majority of activity was recorded along the Afon Gyrach, the southern field boundaries (located away from the A55) and also the woodland to the east of the Scheme.
- 8.7.58 No bats were seen crossing over the A55 and very few bats were noted commuting along the cycle path to the north of the A55 and adjacent to the A55.
- 8.7.59 Bats currently utilising the hedgerows adjacent to the A55 for commuting and foraging would be displaced, and alternative routes and foraging habitat would need to be utilised. The more suitable habitat, which is less affected by light spill occurs to the southern boundaries of the fields which include exiting hedgerows and treelines.
- 8.7.60 The construction of the new bridge across the Afon Gyrach would potentially affect commuting and foraging bats which utilise the watercourse. Affects would be greatest during the bats main active period (April to September).
- 8.7.61 Displacement and disturbance would occur throughout the construction period as a result of noise, and lighting if construction is required outside of the normal hours.
- 8.7.62 In the absence of mitigation, construction effects upon bats are considered to be a **Moderate Adverse** effect

#### **Otter**

- 8.7.63 Numerous field signs of otter were recorded along the Afon Gyrach and under the existing underpass. no holts were identified, however potential 'rest up' areas were noted.
- 8.7.64 Potential construction effects include disturbance and disruption of movement and disturbance of the bankside. The activity of machines disturbing soils on and around the site could increase the amount of fine sediments entering the flow and settling into the streambed causing pollution effects and smothering potential prey and affecting the quality of the water. The use of heavy machinery on site could also result in the spillage of toxic fuels and oils etc. into the river, again having an indirect effect on water quality and prey abundance. Increased lighting may also disrupt otter movement.
- 8.7.65 In addition, there may also be the requirement for vibratory compaction and sheet steel piling utilised during the construction phase, though this is not certain. Compaction of aggregates using rollers and sheet steel piling could result in perceptible vibration which may disturb otters.
- 8.7.66 Otters are a VER of **Medium – Regional** significance. In the absence of mitigation, effects upon otters could potentially be **Major Adverse**.

#### **Wintering Birds**

- 8.7.67 There would be no direct land take effects upon habitats within the designated sites as listed in

Table 8.13. However, habitats outside of the designated sites are used by birds which are features of interest of the Traeth Lafan/ Lavan Sands, Conwy Bay SPA Lavan Sands (oystercatcher and curlew).

- 8.7.68 These species utilise the fields to the south of Junction 16 and 16A for refuge and foraging. Approximately 12.1% of the SPA population of oystercatcher were recorded (137 individuals) and 2% of the SPA population of curlew (40 individuals).
- 8.7.69 Within the wider context of the extent of available habitats, the proportion of habitat lost from land take from the Scheme is minimal and the species mentioned above are not heavily reliant on the habitats offered within the Scheme area.
- 8.7.70 Construction activities including noise, lighting, pollutants would all displace and deter birds from utilising these fields and areas along the coast in close proximity the Scheme. The majority of over wintering birds, including those recorded on site, utilise the sandbanks during mid and low tide and as such are less likely to be disturbed.
- 8.7.71 In the absence of mitigation, construction effects upon wintering birds a receptor of **High - National** significance (great crested grebe), **Medium – Regional** significance (Oystercatcher, red-breasted merganser, curlew) and **Local** significance (redshank) is considered to be a **Minor Adverse** effect.

#### **Breeding Birds**

- 8.7.72 Breeding birds would be affected by construction and land take in the form of loss of suitable habitat including plantation woodland, scrub and hedgerows and disturbance and displacement from noise and human presence during construction activities. The effects would be greatest where land take occurs during the breeding bird season (generally considered to be March to August inclusive but the season can be extended or occur earlier depending upon current climatic conditions).
- 8.7.73 In the absence of mitigation, land take and construction effects upon breeding birds (a receptor of **Lower Local** importance) is considered to be a **Minor Adverse** effect.

#### **Reptiles**

- 8.7.74 A medium population of slow worms were recorded within land to the north of Ysguborwen Rd. There is the potential for other reptiles (e.g. common lizard) to occur in small numbers across the Scheme, though in general, habitat within the Scheme is subject to regular management and/ or grazing.
- 8.7.75 The potential effects to reptiles (common lizard and slow worm specifically) from construction include direct loss of habitat through land-take, which would be more significant to the populations located within land to the north of Ysguborwen Road. This area of land is 1.2 ha, 0.66 ha of which would be lost and or disturbed to land take.
- 8.7.76 As the habitat is quite isolated and fragmented, the Scheme would not fragment existing populations. There could be the risk of increased mortality from the new slip road which runs adjacent to the population at Ysguborwen Road and also mortality during site clearance and preparation.
- 8.7.77 Other habitat which could support reptiles include planted areas of scrub adjacent to the

population at Ysguborwen Road.

- 8.7.78 The Scheme is considered to be of **Local** significance for reptiles in general with land to the north of Ysguborwen Road being of **Medium Regional** significance owing to the presence of a medium population of slow worms.
- 8.7.79 In the absence of mitigation, land take and construction effects upon reptiles is considered to be a **Minor Adverse effect**.

### **Invertebrates**

- 8.7.80 The main potential effects to the whole aquatic macroinvertebrate community from construction works are loss of habitat, the addition of fine sediments into the flow and spillage of toxic fuels and oils etc.
- 8.7.81 The construction of a bridge to span the Afon Gyrach may have the following potential effects, replacement of the structurally complex streambed and disturbance to the bankside which would result in the loss of in-stream and riparian habitats for that section of stream.
- 8.7.82 Construction activities may disturb soils on and around the site could increase the amount of fine sediments entering the flow and settling into the streambed causing detrimental effects on invertebrates. The use of heavy machinery on site could also result in the spillage of toxic fuels and oils etc. into the waters causing pollution events.
- 8.7.83 The surface substrate of the Afon Gyrach is composed of mainly boulders and cobbles. In addition, the subsurface substrate also includes a complex mixture of silt, sand, gravels. The arrangement of these is influenced by the flow regime, topography, geology and riparian vegetation to create a diverse set of physical meso-habitats both across the stream and along it. Each invertebrate species is adapted to use a particular or set of these habitats in order to find food and refuge resources. When the complexity of these habitats is reduced by the use of hard engineering, the capacity of the stream to support a diverse range of invertebrates is also reduced within the affected section of stream.
- 8.7.84 The movement of fine sediments downstream is a natural process and its extent is different for each stream according to the catchment it flows through. The addition of extra fine sediments through agricultural and construction activities can act to fill up the interstices between larger substrate. This would reduce the surface area of the habitat, eliminate refuge zones, bury sedentary species and reduce primary production by hindering the attachment of benthic algal; the food source of grazing invertebrates. Fine sediments can also have a direct effect on the invertebrates themselves by abrasion of their soft tissues and the clogging up of filter feeding apparatus and gills (Jones *et. al.* (2012)<sup>69</sup>.
- 8.7.85 Smith (2009)<sup>70</sup> found that spillage of diesel into a stream could reduce abundance of invertebrates by over 90% and almost half the diversity of families present. Green and Trett (1989)<sup>71</sup> reported that recovery of invertebrate communities from such a pollution event was slow and could take many months with impacts on the whole freshwater stream community.

<sup>69</sup> Jones, J.I., Murphy, J.F., Collins, A.L., Sear, D.A. (2012) The impact of fine sediments on macroinvertebrates. *Rivers Research and Applications* 28(8), 1055-1071

<sup>70</sup> Smith, P. (2009) The effects of a diesel spill on freshwater macroinvertebrates in UK Invertebrate sampling and analysis procedure for STAR project (2004) <http://www.eu-star.at/pdf/RivpacsMacroinvertebrateSamplingProtocol.pdf>

<sup>71</sup> Green, J. & Trett, A.W. (1989) The fate and effects of oil in freshwater. Elsevier Applied Science. London, UK



- 8.7.86 As the proposed construction site is positioned at the end of the Afon Gyrach, the spillage of toxic fluids into and around the stream would have impacts in both the remaining freshwater habitat and the marine habitat that it enters. This could also have implications for marine species and anadromous species such as Eel and Sea Trout, both of which occur with the river.
- 8.7.87 The Afon Gyrach is considered to be of **High – National** significance for aquatic invertebrates due to its population of species which have a GB status of rare.
- 8.7.88 In the absence of mitigation, land take and construction effects upon the aquatic invertebrate community is considered to be a **Moderate Adverse** effect.

### **Fisheries**

- 8.7.89 Eel and trout occur within the Afon Gyrach. The potential effects to this species group from construction include those detailed above for aquatic invertebrates, the addition of fine sediments into the flow and spillage of toxic fuels and oils etc leading to the pollution of the water course and potentially temporary disruption of movement.
- 8.7.90 There may be the requirement for vibratory compaction and sheet steel piling utilised during the construction phase, though it is not certain if this would be required for the construction of the new bridge.
- 8.7.91 Compaction of aggregates using rollers and sheet steel piling in close proximity or within the river could result in perceptible vibration which may disrupt the movement of fish, with low frequency sounds from construction causing avoidance reactions.
- 8.7.92 There is little information on the effects of vibration and noise upon fisheries within riparian habitats. However, studies for offshore wind turbine installation state that underwater noise from impact piling is known to result in substantial peak pressure levels and sound exposure levels and is distinguishable above ambient noise over distances of several tens of kilometres from the source (Nedwell *et al.*, 2007<sup>72</sup>). It has been reported<sup>73</sup> that based on measurements in published literature that levels above 90 dB<sub>ht</sub> caused strong avoidance reaction by virtually all species.
- 8.7.93 In the absence of mitigation, construction effects to fisheries (a species of **Medium - Regional** value) is considered to be a **Moderate Adverse** effect.

### **Assessment of Operational Effects**

- 8.7.94 In this section the potential effects of operation of the Scheme, once open to traffic (year one) and the design year (fifteen years after opening), on each of the VERs as detailed within Table 8.13 are identified and assessed, first without mitigation and then with mitigation (section 8.8) in order to determine the significance of residual effects.
- 8.7.95 Effects from the operation of the road include (but are not limited to) highway drainage, winter salting, potential increase in public access and vehicles, highway lighting, highway and landscape maintenance works.

<sup>72</sup> Nedwell, J. R., Parvin, S. J., Edwards, B., Workman, R., Brooker, A. G., & Kynoch, J. E., 2007. Measurement and interpretation of underwater noise during construction and operation of offshore windfarms in UK waters. Subacoustech Report to COWRIE Ltd.

<sup>73</sup> Collett, A.G & Mason T.I (December 2011) MEP Impacts of Underwater Piling Noise on Migratory Fish Subacoustech Environmental

- 8.7.96 The effects of air quality on VERs during the operation of the road have been considered in sections 8.7.1 to 8.7.14 and Chapter 12 and are not repeated in this section.

### **Statutory Designated Sites**

- 8.7.97 Upon completion of the Scheme potential operational effects upon habitats and features of the designated sites include pollution incidences and noise. It is anticipated that these would not be significant in normal circumstances during the operation of the road.
- 8.7.98 The design includes a range of measures intended to meet the requirements of the statutory standards for SuDS. These include attenuation measures to receive water from the new roads and from areas where there are risks of surface water flooding. The scheme would use conventional piped drainage to remove water from the carriageway designed to store surface water and then slowly discharge it to the existing watercourses (including the Afon Gyrach) or into the sea. The drainage measures are set out in Chapter 7, Road Drainage and Water Environment. Details of the drainage for the Scheme are set out in Chapter 7 Road Drainage and Water Environment.
- 8.7.99 An assessment of the impact on water quality has been made in relation to both routine runoff from the proposed Scheme and the risk of potential spillages. HEWRAT has been used for this purpose. This is reported in Chapter 7.
- 8.7.100 The assessments states that the impact of routine runoff on the water environment of the Afon Gyrach and Conwy Bay is considered to be negligible from routine-runoff (both from dissolved and sediment-bound contaminants).
- 8.7.101 The assessment also concluded that likelihood of a serious pollution incident resulting from a spillage on the Scheme is considered to be acceptably low and would be lower than the existing situation.
- 8.7.102 The coastal environment where runoff would discharge is dynamic and subject to currents, waves and tides which would disperse fine sediments such that they would not be sufficiently concentrated to be toxic to aquatic organisms living in or near bed sediments.
- 8.7.103 Anticipated noise levels and vibration would be greater along the new bypass road but would decrease along the A55, which is in closer proximity to the designated sites, due to the diversion of traffic from Glan-Yr-Afon Rd in Dwygyfylchi into a new bypass road as described in Chapter 13, Noise and Vibration.
- 8.7.104 Within the design year of the road, and also after opening, there is a risk of a major accident which could significantly affect habitats and species which are features of the designated sites. Considering the use of the A55 as a major transport route there is always the risk of major accident which could lead to pollutants entering the coastal habitats, as well as an explosion causing species which are a feature of the designated site to temporarily disperse. These effects have been discussed in more detail in Chapter 18 Risk of Major Accident or Disaster. It is worth noting that accidents (and therefore spillages) are  $\times 3$  more likely at roundabouts than slip roads, so by removing the existing roundabouts the scheme itself is reducing the risk.
- 8.7.105 The assessment in Chapter 7 (Road Drainage and Water Environment) concluded that likelihood of a serious pollution incident resulting from a spillage on the Scheme is considered to be acceptably low and would be lower than the existing situation.

- 8.7.106 In the absence of mitigation, operational effects upon the designated sites and features of interest are considered to be a **Moderate Adverse** effect.
- 8.7.107 A Statement to Inform an Appropriate Assessment will be carried out for these sites and would be provided separately.

### **Non-Statutory Designated Sites**

- 8.7.108 Potential operational effects upon non-statutory designated sites which have been highlighted as VERs would be the same as those discussed for designated sites. Orme View Vegetated Shingle and Orme View Reedbed Candidate Wildlife Sites are located 73 m from the Scheme, north of the A55 and could be affected by increased road run-off, indirectly, for the Afon Gyrach. However, reedbeds also provide a natural 'buffer' to filter pollutants which may enter the Afon Gyrach or from road surfaces, so in their natural states offer some form of mitigation, as well as being of biodiversity value.
- 8.7.109 In the absence of mitigation, operational effects upon the upon Orme View Vegetated Shingle and Orme View Reedbed (a receptor of **Medium-Regional** significance) are considered to be a **Minor Adverse** effect in the opening and Design year.

### **Parkland/ Scattered Trees Broadleaved A3.1**

- 8.7.110 During the construction of the Scheme, trees would be lost to land take, the majority of which forms the existing soft estate and as such would be replaced in the form of ornamental tree and shrub planting and native shrubs with trees linear (as shown on the EMP). Individual trees would also be planted.
- 8.7.111 Upon opening of the Scheme, this would be immature and may be susceptible to lack of water and pollution during the establishment phase which may lead to failure, as such, in the absence of mitigation, the effect is still considered to be a **Minor Adverse Effect**.
- 8.7.112 Within the design year, this habitat would have established, and as such, in the absence of mitigation, is considered to be **Slight Adverse** effect.

### **Running Water G.2**

- 8.7.113 The main potential operational effects upon the Afon Gyrach include the potential for increased run-off from the new road affecting the water quality and its biological status (currently high to good), dust and emissions from cars, as well as road salt.
- 8.7.114 The Scheme design includes a range of measures intended to meet the requirements of the statutory standards for SuDS. These include attenuation measures to receive water from the new roads and from areas where there are risks of surface water flooding, this is proposed in land to the west of the Afon Gyrach. The scheme would use conventional piped drainage to remove water from the carriageway designed to store surface water and then slowly discharge it to the existing watercourses (including the Afon Gyrach) or into the sea.
- 8.7.115 An assessment of the impact on water quality has been made in relation to both routine runoff from the proposed Scheme and the risk of potential spillages. HEWRAT has been used for this purpose. This is reported in Chapter 7.
- 8.7.116 The assessments states that the impact of routine runoff on the water environment of the Afon

Gyrach is considered to be negligible (both from dissolved and sediment-bound contaminants).

- 8.7.117 The assessment also concluded that likelihood of a serious pollution incident resulting from a spillage on the Scheme is considered to be acceptably low and would be lower than the existing situation.
- 8.7.118 In the absence of mitigation, pollution effects during the operation of the road are considered to be **Moderate Adverse** upon opening and **Slight Adverse** in the Design year.
- 8.7.119 Considering the use of the A55 as a major transport route there is always the risk of major accident which could lead to pollutants entering the coastal and riparian habitats. These effects have been discussed in more detail in Chapter 18 Risk of Major Accident or Disaster. However, the assessment in Chapter 7 also concluded that likelihood of a serious pollution incident resulting from a spillage on the Scheme is considered to be acceptably low and would be lower than the existing situation. It is worth noting that accidents (and therefore spillages) are x3 more likely at roundabouts than slip roads, so by removing the existing roundabouts the scheme itself is reducing the risk

#### **Coastland H**

- 8.7.120 Potential operational effects upon coastal habitats would be the same as those discussed for statutory designated sites.

#### **Boundaries - Hedge Intact Species Poor J2.1.2, Defunct Hedge Species Poor J2.2.2 and Hedgerows Intact Species Rich J2.1.1**

- 8.7.121 As stated in Sections 8.7.48 – 8.7.51 the majority of this Priority habitat would be lost and replaced with a mixture of species rich grassland, grassland with bulb planting, native and ornamental shrubs and hedgerows with trees, some of which would be specifically managed for biodiversity (as shown on the EMP, Chapter 2, Appendix 2.6).
- 8.7.122 Upon opening of the Scheme, this would be immature and may be susceptible to lack of water and pollution during the establishment phase which may lead to failure, as such, in the absence of mitigation, the effect is still considered to be a **Moderate Adverse Effect**. Within the design year, this habitat would have established, and as such, in the absence of mitigation is considered to be **Slight Adverse** effect.

#### **Bats**

- 8.7.123 The main operational effects to bats from the Scheme include the potential effects of lighting required for the new junctions and footpaths and in particular along the Afon Gyrach and the requirement to navigate under an additional bridge. There would also be the time required to adapt to new habitats.
- 8.7.124 The existing road scheme is subject to lighting, which does spill onto the adjacent fields to the south and also the Afon Gyrach, with darker zones retained closer to the hedge/ tree lines and to the southern boundaries of the fields and adjacent to the woodland to the east of the Scheme as well as upstream of the Afon Gyrach. Both Junction 16 and 16A are very well lit as is the Shell Garage. As such, any additional lighting close to the existing A55 may not have a significant effect.
- 8.7.125 Lux levels which were measured along the Afon Gyrach are provided in the Baseline Lighting

Report (Appendix 8.4). This showed a maximum peak vertical measured Illuminance (lux @ 1.5 m) of 4.05. This was recorded circa 5 m from the existing A55 (as shown on Figure X.3 of the Baseline Lighting Assessment), upstream from this point the lighting effects dissipate to 0.06 within 100 m from the A55 culvert.

- 8.7.126 Full details of the lighting proposals are unknown. However, any lighting installed for the Scheme would spill onto adjacent vegetation and also onto the Afon Gyrach (which is considered to be the more sensitive habitat). Lighting may deter bats from using the Afon Gyrach and other planted landscaping disturbing access to commuting routes and foraging habitat. As vegetation becomes established, in the design year, the proposed planting would have a screening effect and reduce light spill upon habitat used by bats, including the Afon Gyrach.
- 8.7.127 In the absence of mitigation, lighting effects upon bats are considered to be **Moderate Adverse** upon opening and **Slight Adverse** in the Design year.
- 8.7.128 The design of the new bridge for the new road would be arched with a span of 4.88 m and rise of 2.21 m. The installation of this across the Afon Gyrach, may initially have a negative effect on bats utilising the watercourse for commuting and foraging. The new bridge needs to be of a sufficient height so as to allow continued use of the watercourse. Bats currently utilise the existing culvert which is 2.1 m in height and 5 m width, with good habitat connectivity.
- 8.7.129 In the absence of mitigation, the installation of the new bridge upon commuting and foraging bats which utilise the Afon Gyrach are considered to be **Moderate Adverse** upon opening and **Slight Adverse** in the Design year once habitat has established and bats have become accommodated to the new structure. There may be the potential for installing bat bricks within or on the new or existing structure.
- 8.7.130 It is thought that once operational, the new road layout would not increase noise or pollution effects significantly from the existing.
- 8.7.131 Upon the opening of the Scheme, habitat planting would not have established. Within the design year, this would have established and would provide cover and foraging habitat for local bat populations comparable to that which was there pre-construction. Passage along the Scheme would be maintained, and habitat connectivity would not be significantly disrupted, once planting has established. In the absence of mitigation, operational effects upon the local bat population within the wider Scheme bats are considered to be **Moderate Adverse** upon opening and **Slight Adverse** in the Design year.

#### **Otter**

- 8.7.132 The main potential operational effects upon otters would be indirect as a result of pollution incidences to habitats upon which they rely (Afon Gyrach/ Coastal habitats) which contain refuge, corridors of movement and a foraging resource; disruption to movement by the installation of the new bridge across the Afon Gyrach, and disturbance from lighting and the potential for collision of traffic from the new road.
- 8.7.133 An assessment of the impact on water quality has been made in relation to both routine runoff from the proposed Scheme and the risk of potential spillages. HEWRAT has been used for this purpose. This is reported in Chapter 7.

- 8.7.134 The assessments states that the impact of routine runoff on the water environment of the Afon Gyrach and Conwy Bay is considered to be negligible from routine-runoff (both from dissolved and sediment-bound contaminants).
- 8.7.135 The assessment also concluded that likelihood of a serious pollution incident resulting from a spillage on the Scheme is considered to be acceptably low and would be lower than the existing situation.
- 8.7.136 The coastal environment where runoff would discharge is dynamic and subject to currents, waves and tides which would disperse fine sediments such that they would not be sufficiently concentrated to be toxic to aquatic organisms living in or near bed sediments.
- 8.7.137 In the absence of mitigation, pollution effects upon otters are considered to be **Moderate Adverse** upon opening and **Slight Adverse** in the Design year.
- 8.7.138 The existing road scheme is subject to lighting, which does spill onto the Afon Gyrach. Lux levels were measured along the Afon Gyrach are provided in the Baseline Lighting Report. Full details of the lighting proposals are unknown. However, any lighting installed for the Scheme would spill onto adjacent vegetation and also onto the Afon Gyrach. Lighting may deter otters from using the Afon Gyrach for foraging and commuting. As vegetation becomes established, in the design year, the proposed planting would have a screening effect and reduce light spill upon habitat used by otters, including the Afon Gyrach, lighting would also be designed so as to not illuminate the riparian habitat of the Afon Gyrach beyond that which is currently experienced.
- 8.7.139 In the absence of mitigation, lighting effects upon otters are considered to be **Moderate Adverse** upon opening and **Slight Adverse** in the Design year.
- 8.7.140 The design of the new bridge for the new road is not known however, it would be of an arch construction and the width is 4.88 m and the rise is 2.21 m. However, the installation of this across the Afon Gyrach, may initially have a negative effect on otters utilising the watercourse for commuting and foraging. The new bridge needs to be of a sufficient design so as to allow continued use of the watercourse.
- 8.7.141 With the addition of a new road which crosses the Afon Gyrach, there is the potential for otters to traverse onto the road and collide with oncoming traffic. This risk would be greatest upon opening as otters would not be accustomed to the new bridge, but may reduce in the design year, once vegetation has re-established and otters become habituated to the new additional bridge. It is also highly likely that otters will continue to use the river as it is their familiar route, and this route would not be obstructed.
- 8.7.142 In the absence of mitigation, the installation of the new bridge and new road upon commuting and foraging otters which utilise the Afon Gyrach are considered be **Major Adverse** upon opening and **Slight Adverse** in the Design year once habitat has established and otters have become accommodated to the new bridge . Otter ledges would be installed onto the new bridge.
- 8.7.143 It is thought that once operational, the new road layout would not increase noise or pollution effects significantly from the existing.
- 8.7.144 Considering the use of the A55 as a major transport route there is always the risk of major accident which could lead to pollutants entering the coastal and riparian habitats. These effects have been discussed in more detail in Chapter 18 Risk of Major Accident or Disaster. However, the

assessment in Chapter 7 concluded that likelihood of a serious pollution incident resulting from a spillage on the Scheme is considered to be acceptably low and would be lower than the existing situation. It is worth noting that accidents (and therefore spillages) are ×3 more likely at roundabouts than slip roads, so by removing the existing roundabouts the scheme itself is reducing the risk

### Wintering Birds

- 8.7.145 Operational effects upon wintering bird assemblages are unlikely to significantly affect the assemblages of birds utilising the fields or adjacent habitats within the designated sites.
- 8.7.146 It is thought that once operational, the new road layout would not increase noise or pollution effects significantly from the existing.
- 8.7.147 Abundant similar habitat occurs within close proximity to the scheme and includes areas to the East of Junction 16A and to the south of Puffin Café which would not be affected, and habitats associated with the designated sites. In the absence of mitigation operational effects upon wintering birds, within the opening and Design year are considered to be **Neutral**.
- 8.7.148 However, as stated previously considering the use of the A55 as a major transport route there is always the risk of major accident which could lead to pollutants entering the coastal habitats, as well an explosion causing species which are a feature of the designated site to temporarily disperse. Where this to happen, effects are considered to be **Moderate Adverse**. These effects have been discussed in more detail in Chapter 18 Risk of Major Accident or Disaster.

### Breeding Birds

- 8.7.149 The main operational effect upon breeding birds is similar to that of bats and include loss of nesting/ foraging habitat until such time that it becomes established and light spill, this effect would be greatest during the opening year and in the absence of mitigation, is considered to be **Minor Adverse** effect.
- 8.7.150 It is thought that once operational, the new road layout would not increase noise significantly from the existing.
- 8.7.151 As vegetation becomes established, in the design year, this would provide suitable alternative nesting and foraging habitat for breeding birds. In the absence of mitigation effects upon birds in the design year are considered to be **Neutral**.

### Reptiles

- 8.7.152 The main potential operational effects to reptiles could be the time required to adapt to new habitat until such time that it becomes established, lack of management of created habitats and mortality from the new road.
- 8.7.153 In the absence of mitigation, effects upon reptiles in the operational and design year are considered to be **Slight Adverse**.

### Invertebrates

- 8.7.154 The main potential effect to the whole aquatic macroinvertebrate community from the operation of the Scheme include the potential for increased run-off from the new road affecting the water

quality and its biological status (currently high to good). This in turn may affect the existing aquatic communities.

- 8.7.155 An assessment of the impact on water quality has been made in relation to both routine runoff from the proposed Scheme and the risk of potential spillages. The Highways England Water Risk Assessment Tool (HEWRAT) has been used for this purpose. This is reported in Chapter 7.
- 8.7.156 The assessments states that the impact of routine runoff on the water environment of the Afon Gyrach is considered to be negligible (both from dissolved and sediment-bound contaminants).
- 8.7.157 The assessment also concluded that likelihood of a serious pollution incident resulting from a spillage on the Scheme is considered to be acceptably low and would be lower than the existing situation.
- 8.7.158 The Scheme design would incorporate an arch construction for the bridge and would retain the existing riverbed beneath it. The retention of the existing riverbed beneath the bridge would minimise any changes in the hydromorphology of this portion of the Afon Gyrach (and thus the populations that rely on it).
- 8.7.159 In the absence of mitigation, operational effects upon the aquatic invertebrate community is considered to be a **Minor Adverse** effect.

### **Fisheries**

- 8.7.160 The main potential operational effects upon fish would be indirect as a result of pollution incidences to the Afon Gyrach as described for the Afon Gyrach river habitat.
- 8.7.161 An assessment of the impact on water quality has been made in relation to both routine runoff from the proposed Scheme and the risk of potential spillages. The Highways England Water Risk Assessment Tool (HEWRAT) has been used for this purpose. This is reported in Chapter 7.
- 8.7.162 The assessments states that the impact of routine runoff on the water environment of the Afon Gyrach is considered to be negligible (both from dissolved and sediment-bound contaminants).
- 8.7.163 The assessment also concluded that likelihood of a serious pollution incident resulting from a spillage on the Scheme is considered to be acceptably low and would be lower than the existing situation.
- 8.7.164 The Scheme design would incorporate an arch construction for the bridge and would retain the existing riverbed beneath it. The retention of the existing riverbed beneath the bridge would minimise any changes in the hydromorphology of this portion of the Afon Gyrach (and thus the populations that rely on it).
- 8.7.165 In the absence of mitigation, pollution effects upon fish are considered to be **Moderate Adverse** upon opening and **Slight Adverse** in the Design year.
- 8.7.166 The existing road scheme is subject to lighting, which does spill onto the Afon Gyrach.
- 8.7.167 Lux levels were measured along the Afon Gyrach are provided in the Baseline Lighting Report. Full details of the lighting proposals are unknown. However, any lighting installed for the Scheme would spill onto the Afon Gyrach. Lighting may influence a behavioural response to fish within the



Afon Gyrach which may deter passage, in the short term and or foraging strategies. As vegetation becomes established, in the design year, the proposed planting would have a screening effect and reduce light spill upon habitat the riparian habitat lighting would also be designed so as to not illuminate the riparian habitat of the Afon Gyrach beyond that which is currently experienced.

8.7.168 The design of the new bridge for the new road is not known. However, the installation of this across the Afon Gyrach, may initially have a negative effect on fish passage. The new bridge needs to be of a sufficient design so as to allow continued use of the watercourse.

8.7.169 In the absence of mitigation, the installation of the new bridge and new road upon fish which utilise the Afon Gyrach are considered be **Moderate Adverse** upon opening and **Slight Adverse** in the Design year once habitat has established

8.7.170 It is thought that once operational, the new road layout would not increase noise significantly from the existing.

8.7.171 Considering the use of the A55 as a major transport route there is always the risk of major accident which could lead to pollutants entering the coastal and riparian habitats. These effects have been discussed in more detail in Chapter 18 Risk of Major Accident or Disaster. It is worth noting that accidents (and therefore spillages) are ×3 more likely at roundabouts than slip roads, so by removing the existing roundabouts the scheme itself is reducing the risk

## 8.8 Mitigation Measures

8.8.1 DMRB Volume 11 Section 1 Part 7 (HA 218/08) defines mitigation measures as follows; '*Measures intended to avoid, reduce and, where possible, remedy significant adverse environmental effects.*' Legislation also provides the Overseeing Organisation with powers to: '*acquire land for the purpose of mitigating any adverse effect which the existence or use of a highway constructed or improved by them, or proposed to be constructed or improved by them, has or will have on the surroundings of the highway.*' (Highways Act 1980 (as amended), Part XII, Section 246)

8.8.2 DMRB (HA 205/08 para 1.41) states that the:

'mitigation of significant adverse environmental effects should be dealt with as an iterative part of the option choice, planning and design stage. Failure to do so may result in failure to deliver the project; and failure to avoid, reduce or remedy significant adverse environmental effects, particularly where land is not secured to allow delivery or future maintenance.'

8.8.3 The DMRB (HA 218/08) defines two types of mitigation measures as essential and desirable mitigation:

- A. **Essential mitigation:** Mitigation which the Overseeing Organisation has the statutory power to achieve;
- B. **Desirable mitigation:** A measure considered to be environmentally beneficial but that cannot usually be achieved using statutory powers. For example, third party agreement may be required.

8.8.4 It also includes a description of enhancement as:

- A. **Enhancement:** A measure that is over and above what is required to mitigate the adverse

effects of a project. This could also be interpreted as desirable mitigation.

- 8.8.5 The development of mitigation and monitoring measures is part of an iterative EIA process. The 'mitigation hierarchy' of avoid, mitigate/ reduce, compensate/ remediate and enhance has been adopted as part of the process.
- 8.8.6 Essential mitigation measures can include the following, from IEMA<sup>74</sup>:
- A. **Primary mitigation:** measures incorporated within the Scheme design. These are often intended to avoid or minimise adverse effects considered in the design process and that may not readily be recognisable as mitigation. These measures are a fundamental part of the design and incorporated within the scheme shown on the Environmental Masterplans (EMP).
  - B. **Secondary mitigation:** additional measures identified during the EIA process to further prevent, reduce and, where possible, offset any adverse effects on the environment. These measures are supplementary to those measures in A. above and are also shown on the EMP and best managed through the environmental management plan and is recorded in the REAC.
  - C. **Tertiary mitigation:** good practice measures to be adopted during construction to avoid and minimise environmental effects, such as pollution control measures identified in a CEMP and monitoring to ensure that is effective Handover Environmental Management Plan (HEMP).
- 8.8.7 Following this guidance, the mitigation measures relevant to this assessment of the ecological effects of the Scheme are outlined in this section. As set out in Chapter 2 the specific ecological mitigation measures incorporated into the Scheme design, together with other proposed mitigation (such as construction good practice) are indicated in the lists below. In assessing the effects of the Scheme, these are assumed to be in place as intrinsic elements of the Scheme and that these would be set out in the CEMP. A Pre-Construction Environmental Management Plan (Pre-CEMP) is provided as an appendix to this ES, included in the Pre-CEMP would be a section detailing and Outline Ecological Management Plan. This outline plan sets out the measures and procedures for reducing impacts on ecological receptors. It outlines the procedures for preconstruction surveys, vegetation clearance, and temporary or permanent measures for protected species.
- 8.8.8 Some forms of mitigation require a controlling mechanism or legal undertaking to be implemented but are under the control of the 'Overseeing Organisation' and therefore are regulated and have greater certainty of delivery.

### **Primary Mitigation**

- 8.8.9 Measures to reduce adverse effects include the following mitigation which are integral to the Scheme:
- A. Planting design which allows movement of species, i.e. linear habitats including shrub and tree planting which provide cover and shelter;
  - B. Planting species rich grassland;
  - C. Sensitive design of lighting to avoid lighting of the river channels and banks of the Afon Gyrach;
  - D. The implementation of SuDs;

<sup>74</sup> IEMA Delivering Quality Development-Annex A: Classifying the three types of Environmental Impact Assessment mitigation

- E. Minimise light spill along existing and proposed landscape planting;
- F. Where reasonably practicable, adopt quiet working methods, using plant with lower noise emissions;
- G. Use silenced and well-maintained plant conforming with the relevant EU directives relating to noise and vibration;
- H. Avoid unnecessary revving of engines and switch off equipment when not required; and
- I. Use rubber linings for chutes and dumpers to reduce impact noise.

### **Secondary Mitigation**

8.8.10 Secondary mitigation includes:

- A. Removal of vegetation outside of the breeding bird season (generally considered to be March to August inclusive but can commence earlier or extend later in the season dependent upon current climatic conditions);
- B. Installation of otter ledges within the new bridge;
- C. Installation of otter exclusion fencing to deter otters from entering onto the new road;
- D. Installation of reptile exclusion fencing;
- E. Installation of environmentally friendly gully pots or alternative measures to the use of gully pots;
- F. Installation of bat boxes;
- G. Installation of bee bricks within south facing masonry walls; and
- H. Removal of and safe disposal of any Invasive Non Native plants.

### **Tertiary Mitigation**

8.8.11 Tertiary mitigation includes:

- A. Toolbox talks to contractors;
- B. Pre-commencement site walkovers and surveys as detailed within the CEMP to include surveys to any trees which need to be removed for their potential to support bats roosts;
- C. Nesting bird checks if vegetation removal is within the nesting bird season;
- D. Reasonable Avoidance Measures as detailed within the CEMP to include pollution control measures and for the control of INNS;
- E. Minimise overnight working so as to avoid disturbance to nocturnal mammals, for example bats.

8.8.12 There is the potential to restore some of the habitat lost, by the installation of the SuDS pond. Although its main function would be for drainage, sensitive design elements including planting could be incorporated, to enhance the area for biodiversity in line with Schedule 3 of the Flood and Water Management Act 2010 (Standard S5).

8.8.13 Further surveys would be conducted as the Scheme progresses, where required, to confirm and/or update the baseline survey. Works are not expected to commence before Mid-2021, and so some surveys conducted in 2018/19 may be out of date by the time of commencement. Surveys to be conducted include, pre-construction surveys for bats and nesting bird checks if potential habitat is disturbed during the nesting bird season.

8.8.14 Site clearance would take into account the seasonal environmental constraints; in particular the clearance of trees, shrubs and hedgerows would be undertaken outside the bird nesting season (typically March to August but can be earlier or later depending on current climatic conditions). Where protected species or their habitats would be likely to be affected, the works would be

carried out in accordance with the methods laid out in the CEMP and agreed with an ecologist.

- 8.8.15 In order to minimise the potential effects of INNS, biosecurity measures designed to manage and control the spread of INNS would be a contractual requirement for construction. Information set out within presented within the CEMP. Contractors to be made aware of INNS which may be encountered on site by way of 'toolbox' talks and posters.

### **Statutory Designated Sites**

- 8.8.16 The main potential effect to designated sites and features of interest would be as a result of pollution incidences and noise.
- 8.8.17 Mitigation measures to control air pollution are described in Chapter 12 Air Quality.
- 8.8.18 Mitigation measures to control noise and vibration are described in Chapter 13. None are required to mitigate the effects of noise upon bird assemblages due to the existing noise associated with the road network to which birds have become accustomed.
- 8.8.19 A noise barrier would be considered for the properties at Maes y Llan. Such a barrier, together with an introduction of a low-noise rolling surface on both A55 carriageways, would be an opportunity to reduce the noise level below 65 dBLA10 below which no further action would be required. The noise barrier would be specified on top of the retaining wall and along the crest of the earth bund as shown graphically in Figure 13.5, Chapter 13.
- 8.8.20 Those habitats which are features of the Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC are not evident in close proximity to the Scheme due to the hightide. Annex I Habitats which are a feature of interest generally tend to occur to the west towards the Menai Strait.
- 8.8.21 Chapter 7 Road Drainage and Water Environment describes the pollution control for works associated with the Scheme to avoid contamination to water courses and the marine environment. Information is also given in the CEMP, identifying the measures proposed to minimise risks of contamination. The pre-CEMP details the Outline Ground and Surface Water Management Plan which would be developed in consultation with Natural Resources Wales (NRW). It describes the design of each element of surface water management system required to manage surface water run-off during construction and potential risks to surface waters. It would include, consideration of temporary storage and settlement requirements to manage waterborne sediment, water quality criteria to ensure any discharge to receiving watercourses and marine environments meets regulatory requirements. The mitigation to alleviate potential effects to the watercourse and the marine environment include:
- A. Following best practice guidelines including Guidance for Pollution Protection (GPPS) and Construction Industry Research and Information Association (CIRIA) guidance;
  - B. The installation of pre-earthworks drainage ditches which would be installed along the periphery of excavated slopes. These would ensure that surface run-off entering the site is directed away from the construction operations to suitable discharge points (one of which is out to sea);
  - C. Pollution control and containment measures to limit the spread of pollution and reduce the risk of harm to biodiversity in the case of accidents which could result in spillages of pollutants such as fuels or bulk loads and the use of fire-fighting chemicals. This would apply for both new road elements and to existing drainage infrastructure, which would undergo retrofitting; and

- D. Construction of permanent attenuation ponds which would be carried out as part of the pre-earthworks process in order to serve as temporary settlement lagoons, to reduce the volume of silt entering watercourses or marine/coastal habitats.

8.8.22 Additional measures to protect the Afon Gyrach and to prevent pollution to the marine environment would include:

- A. Works within and adjacent to the watercourse would be monitored by an Environmental Clerk of Works (ECoW). If discolouration of the watercourse is noted, works would stop and working practices reviewed;
- B. An impermeable coffer dam would be placed between any concreting works and the river. Any water that comes into contact with wet concrete would be treated as contaminated and would not be discharged into the watercourse;
- C. Silt would be managed by the use of cut-off drains, silt curtains, straw bales as necessary, placed downstream of the works area to minimise transfer of any excess sediments downstream;
- D. All fuel, oil and chemicals used on site would be stored away in a locked store which would be bunded to 110% capacity of the volume stored;
- E. Concrete pouring for the construction of the new bridge would not take place if heavy rain is forecast;
- F. No contaminants, e.g. concrete mixings, would be washed out within 10 m of any trees or watercourses unless contained; and
- G. An oil spill kit would be available on site, and all relevant staff trained in its use.

8.8.23 With the proposed mitigation construction effects on the designated sites are considered to be a **Neutral**.

8.8.24 The design includes a range of measures intended to meet the requirements of the statutory standards for SuDS. These include attenuation measures to receive water from the new roads and from areas where there are risks of surface water flooding. Details of the drainage for the Scheme are set out in Chapter 7. These would act as attenuation during the operation of the road prior to discharge to existing outfalls (including those which outfall to the sea).

8.8.25 While accidents could result in major spillages of pollutants such as fuels or bulk loads and the use of fire-fighting chemicals, there would be containment measures incorporated into the road drainage system to contain the spread of pollution and reduce the risk of harm to biodiversity. This has been discussed in more detail in Chapter 17.

8.8.26 Mitigation during the operation of the Scheme (upon opening and the Design year) includes advanced planning of emergency response developed in liaison with emergency services and civil emergency planners to ensure good access and egress from site for police, fire brigade and ambulance to recover vehicles, casualties and reopen road efficiently. The application of measures to contain and control spillages would be implemented so as to avoid pollutants coming into contact with potential pathways to the marine/ coastal environment (via outfalls, drainage systems or water courses).

8.8.27 Chapter 7 states that the impact of routine runoff on the water environment of the Afon Gyrach and Conwy Bay is considered to be negligible from routine-runoff (both from dissolved and sediment-bound contaminants).

- 8.8.28 The assessment also concluded that likelihood of a serious pollution incident resulting from a spillage on the Scheme is considered to be acceptably low and would be lower than the existing situation.
- 8.8.29 The coastal environment where runoff would discharge is dynamic and subject to currents, waves and tides which would disperse fine sediments such that they would not be sufficiently concentrated to be toxic to aquatic organisms living in or near bed sediments.
- 8.8.30 With the proposed mitigation, operational effects on the designated sites are considered to be a **Neutral**.

#### Non-Statutory Designated Sites

- 8.8.31 Those non statutory sites which have a hydrological link to the Scheme, either via rivers or the marine environment may be at risk from pollution events during construction and operation, including spillages which may encroach upon these habitats in the absence of control measures. The sites most at risk are considered to be Traeth Lafan LNR (which is a component of the SPA and SSSI and as such is considered above). Orme View Vegetated Shingle and Orme View Reedbed Candidate Wildlife Sites are located 73 m from the Scheme.
- 8.8.32 Control measures would be the same as those described for designated sites section 8.8.16 – 8.8.30.
- 8.8.33 With the proposed mitigation, construction and operational effects on non-statutory designated sites are considered to be a **Neutral**.

#### Parkland/ Scattered Trees Broadleaved A3.1

- 8.8.34 Mitigation measures to protect retained trees include demarcating and fencing off the Root Protection Zone (RPZ) prior to the commencement of the Construction Period in accordance with BS 5837:2012<sup>75</sup>. With the advised mitigation, construction effects upon this habitat is **Slight Adverse**.
- 8.8.35 The proposed landscape planting includes individual trees. The extent of habitat lost vs habitat created is shown in Table 8.15.

**Table 8.15: Habitat Lost vs Habitat Gain**

Habitat Ref	Phase 1 Habitat	Lost/ Disturbed (A1)	Created Habitat (A2)	Estimated BNG (%)
J2.1.2, J2.2.2 and J2.1.1	Hedgerows	2067 m	644 m in length*1	N/A
B.2.2, B.6, J1.2, B.4	Grassland	152700 m <sup>2</sup> 15.27 ha	Grassland - 3585 m <sup>2</sup> 0.3585 ha Species rich grassland – 60315 m <sup>2</sup> *3 6.0315 ha Grassland with bulbs – 9704 m <sup>2</sup> 0.9704 ha, total ha = 7.3604	-51%

<sup>75</sup> BS 5837:2012 Trees in relation to design, demolition and construction. Recommendations

Habitat Ref	Phase 1 Habitat	Lost/ Disturbed (A1)	Created Habitat (A2)	Estimated BNG (%)
A3.1	Individual trees	16 nr. (approx.)	123 nr *5	N/A
A2.1, A2.2, C3.1	Scrub and tall ruderal	19,500 m <sup>2</sup> 1.95 ha	Ornamental shrubs – 7795 m <sup>2</sup> 0.7795 ha Groundcover 2336 m <sup>2</sup> 0.2336 ha Native shrubs *4 14272 m <sup>2</sup> 1.4272 ha Total ha = 2.4403	+25%
A1.3.2 & A1.1.1	Mixed Plantation woodland and semi natural woodland	13000 m <sup>2</sup> 1.3 ha	8547 m <sup>2</sup> *2 0.8546 ha	-34%
F2.1	Marginal vegetation - Reedbed	500 m <sup>2</sup> 0.05 ha	Wet grassland (SuDS) *6 - 1353 m <sup>2</sup> 0.1353 ha	+63%
<b>Total BNG</b>				+3%
<b>Notes:</b> *1 includes native species and ornamental hedges, proposed native hedges would probably have at least 5 different species in it whereas ornamental hedges would be more uniform; *2 includes linear belts and amenity trees and shrubs; *3 includes species rich grassland, rock and scree, heath and moorland; *4 includes shrubs with intermittent trees; *5 includes trees on drawing, may change significantly during detail design not included in calculation as individual trees not ha; *6 does not include banks and ditches, as overlapping areas of species-rich grassland; * Area of hedgerows not calculated as these are a linear feature.				

- 8.8.36 In consideration of the estimated BNG with the proposed landscape planting and the number of trees lost to those planted and hedgerows lost the residual effects is **Slight beneficial** in the long term.

### Running Water G.2

- 8.8.37 Control measures would be the same as those described for designated sites, section 8.8.16 – 8.8.30.
- 8.8.38 Efforts should be made in all phases of works to limit habitat loss, reduce additional loading of silt and fine sediments from site works and road run-off and stop chemical spillage into and around the affected watercourse.

8.8.39 With the proposed mitigation construction effects on the Afon Gyrach are considered to be a **Neutral**, no significant effect upon the VER.

8.8.40 With the proposed mitigation operational effects on the Afon Gyrach are considered to be a **Neutral**, no significant effect upon the VER.

#### **Coastland H**

8.8.41 Control measures would be the same as those described for designated sites, section 8.8.16 – 8.8.30.

8.8.42 With the proposed mitigation construction and operational effects on coastal habitats (a receptor of **Very High/ International** importance) are considered to be a **Neutral**, no significant effect upon the VER.

#### **Boundaries - Hedge Intact Species Poor J2.1.2 and Hedgerows Intact Species Rich J2.1.1**

8.8.43 As stated in Section 8.7.48 – 8.7.51 the majority of this Priority habitat would be lost and replaced with a mixture of species rich grassland, grassland with bulb planting, native and ornamental shrubs and hedgerows with trees, some of which would be specifically managed for biodiversity.

8.8.44 The extent of hedgerow to be lost vs habitat created is provided in Table 8.15. In consideration of the estimated BNG, the residual effects of the Scheme upon this Priority Habitat is **Moderate Adverse** as a large proportion of hedgerow is to be lost.

8.8.45 Overall, in terms of habitat to be created, there is a Biodiversity Net Gain of nearly 50%. However, this calculation does not account for the types of habitats replaced (i.e. hedgerows vs grassland) and does not take account of the number of trees to be planted (which is greater than that being removed). The maximum number of woody species noted within the hedgerows ranged from five to seven species, generally with a limited ground flora. Landscape planting would include a greater diversity of species as well as linear belts of species rich wildflower verges and areas managed for biodiversity. The linear belt created would be wider and more diverse than the existing hedgerows and would provide foraging and commuting habitat for nesting birds and bats as well as being beneficial for invertebrate species. Over time, when habitats have become established, the overall Biodiversity Net Gain could be positive.

8.8.46 The EMP (Appendix 2.6) show the landscape elements. Selection of species for planting and seeding is based on those locally indigenous species noted to grow in the area and on a small selection of non-native species or ornamental varieties to serve particular purposes including those which attract invertebrates. The lists of species that are considered appropriate are included in Chapter 9 Landscape and Visual.

#### **Bats**

8.8.47 Highway lighting is already provided along this length of the A55 and at each Junction (Junction 16 and 16A). Luminaires would be designed to emit no light above the horizontal level. LED Luminaires are proposed because these can be more directional and so reduce light spill beyond the road. Lighting would be designed so as to avoid any additional lighting beyond that is required for health and safety. The lighting design would aim to retain 'dark corridors' and also to



avoid light spill on the Afon Gyrach, following guidance as set out by BCT<sup>76</sup>.

- 8.8.48 Lighting proposed along the new road would need to retain the darker areas and not be above that which is currently experienced along the Afon Gyrach (which is 4.05 Lux at its maximum, which is experienced 5 m from the existing road). Consideration also needs to be given to the cumulative lighting effect of the additional road.
- 8.8.49 In order to retain the Afon Gyrach as a dark corridor, the recommended lux is 0.2 lux on the horizontal plane and 0.4 on the vertical these levels are currently met (or are less than this) for the majority of the length of the watercourse. Where lighting is required on the road section with traverses the Afon Gyrach, this would have minimal UV, with a warm colour temperature – 3000 K or 2700 K with light sources that peak higher than 550 nm. Vegetation would be planted in order to shade the river from proposed lighting. Lighting would also be required around the main construction compounds to secure against theft and vandalism. This would not be on constantly and activated by sensors.
- 8.8.50 Those trees which cannot be retained and assessed as having bat roost potential would be surveyed before their removal or pruning.
- 8.8.51 If a bat roost is found within any of the trees, a licence would be obtained from NRW to allow their removal.
- 8.8.52 Where tree roosts are lost a replacement roost would be provided, we would recommend that three bat boxes could be placed on the adjacent mature trees.
- 8.8.53 The proposed habitat to be created would, once established, support foraging and commuting habitat for bats.
- 8.8.54 The design of the new bridge for the new road is not known, however it would be of an arch construction and width would be 4.88 m and the rise is 2.21 m and would match the existing in size and as such would continue be passable for bat species currently utilising the water course.
- 8.8.55 Integrated or external bat boxes would be placed on new and existing structures (for example the culverts and bridges which pass over the Afon Gyrach) and, where possible on existing trees along the Afon Gyrach.
- 8.8.56 With the proposed mitigation construction effects bats are considered to be a **Minor Adverse**.
- 8.8.57 With the proposed mitigation, operational effects upon bats would be **Minor Adverse** upon opening and **Neutral** within Design Year, once habitat has been established. With the proposed installation of the bat boxes (secondary mitigation) the effect could be slight beneficial on local bat populations.

### **Otter**

- 8.8.58 Effects on otters may occur as a result of pollution incidences. Control measures described in section 8.8.16 – 8.8.30. would mitigate for the potential degradation of watercourses and coastal habitats used by otters.

<sup>76</sup> Bat Conservation Trust Guidance Note 08/18: Bats And artificial lighting in the UK Bats and the Built Environment Series (2018 ILP)

- 8.8.59 Chapter 7 states that the impact of routine runoff on the water environment of the Afon Gyrach and Conwy Bay is considered to be negligible from routine-runoff (both from dissolved and sediment-bound contaminants).
- 8.8.60 The assessment also concluded that likelihood of a serious pollution incident resulting from a spillage on the Scheme is considered to be acceptably low and would be lower than the existing situation.
- 8.8.61 The coastal environment where runoff would discharge is dynamic and subject to currents, waves and tides which would disperse fine sediments such that they would not be sufficiently concentrated to be toxic to aquatic organisms living in or near bed sediments.
- 8.8.62 The new bridge span is 4.88 m and the rise is 2.21 m and would be of an arch construction and as such would continue be passable for otters currently utilising the water course. Otter ledges would be installed. In addition, an otter ledge would be installed within the new bridge either constructed of solid concrete or as a bolt on design. The ledge would be at least 500 mm wide and accessible from the banks. The ledge should be sited at least 150 mm above highest water level and allow for 600 mm headroom. Final designs would be discussed and agreed with NRW and NMWTRA.
- 8.8.63 Fencing would be installed to ensure that otters keep to the watercourse and do not stray onto the new road. Fencing would be as specified within DMRB (installed on both sides of the road for at least 100 m and to include fencing around attenuation ponds).
- 8.8.64 The height of the fence would be 1500 mm, with an overhang of 300 mm angled at 45° at the top and 90° at the bottom, underground. The fence would continue underground for 500 mm angled at 90° by 300 mm. The fence would be installed on both sides of the new road for at least 100 m from the watercourse and attenuation pond. Final designs would be discussed and agreed with NRW and NMWTRA.
- 8.8.65 Lighting proposed along the new road would need to retain the darker areas and not be above that which is currently experienced along the Afon Gyrach, as described for bats.
- 8.8.66 The proposed habitat to be created along the Afon Gyrach would, once established, support foraging and commuting habitat for otters.
- 8.8.67 Consideration was given to the requirement for a derogation licence. However, with the advised mitigation, the works would be organised such that no offences would be committed. There would be no disturbance or damage to a breeding site or resting place. No works would be conducted overnight which would disturb otters, egresses would be left in any trenches left open overnight and there would be no obstruction to movement along the Afon Gyrach. An Ecological Clerk of Works would assess the situation as the scheme progresses.
- 8.8.68 With the proposed mitigation, operational effects upon otters would be **Minor Adverse** upon opening and **Neutral** within Design Year, once habitat has been established.

### **Wintering Birds**

- 8.8.69 The main potential effect upon wintering birds would be as a result of pollution incidences which would impact upon habitats utilised by wintering birds and the temporary loss of grassland habitat to the south of the A55.

- 8.8.70 Control measures described in section 8.8.16 – 8.8.30 would mitigate for the potential degradation of associated coastal habitats used by wintering birds.
- 8.8.71 The new road layout would not increase noise or pollution effects significantly from the existing, as such, no mitigation is proposed.
- 8.8.72 Abundant similar habitat occurs within close proximity to the scheme and includes the habitats associated with the designated sites and retained grassland to the south, which displaced birds could use.
- 8.8.73 With the proposed mitigation, construction and operational effects upon wintering birds would be **Neutral** no significant effect on the VER.

### **Breeding Birds**

- 8.8.74 The main effect to breeding birds would be where vegetation would be removed within the nesting bird season. In order to mitigate for this, vegetation would be cleared outside of the nesting bird season which is generally considered to be March to August inclusive (but the season can be extended or occur earlier depending upon current climatic conditions). Where this is not possible, then an ecologist would conduct an inspection to make sure that no nesting activity is present. If an active nest is found, then a buffer zone would need to be set up (the extent of which would depend upon species affected but as a minimum could be a 10 m radius) works in that area would need to stop until such time that birds have fledged.
- 8.8.75 The proposed habitat to be created would, once established, support foraging and nesting habitat for birds. The created wildflower grassland is a primary mitigation measure and would be an enhancement to the poor semi-improved grazed grassland and may increase foraging potential.
- 8.8.76 With the proposed mitigation construction effects nesting birds are considered to be a **Neutral**.
- 8.8.77 With the proposed mitigation, operational effects upon nesting birds would be **Slight Adverse** upon opening and **Neutral** within Design Year, once habitat has been established.

### **Reptiles**

- 8.8.78 Reptiles would be captured and excluded from land to the north of Ysguborwen Rd prior to works commencing. The area would be fenced off in the presence of the project ecologist and reptiles relocated to the same habitat, outside of the construction zone. Fencing to be used should be made from recycled material such as herpetosure® panels, which is a more sustainable product than that specified in the DMRB and the panels can be reused. The fence would be 375 mm high above ground with a 75 mm 90-degree top curl and buried 300 mm below ground and backfilled. The total area to be utilised as reptile receptor area is approximately 0.66 ha, which is equivalent to that lost or disturbed.
- 8.8.79 The capture and relocation of reptiles would be conducted spring/early-summer period (April to June) when captures are at their most efficient. Reptiles would not be relocated later than mid- to late-September depending upon weather conditions. Refugia would be deployed at a greater density to that which was deployed for the presence/ absence surveys, a minimum of 340/per ha would be deployed based on the DMRB guidance which recommends that refugia used for capture and relocation projects needs to be at least ten times greater than that used for the surveys, thirty four refugia were deployed for the survey. NE guidance stipulates a maximum of 1000 refugia per ha (where conditions indicate this is merited), however this quantity is considered

excessive for the populations of slow worms involved and the scale of the site to be cleared. Capture would continue until such time that there are five clear day with no capture. Refugia would be left in situ for a minimum of two weeks.

- 8.8.80 A medium population of slow worms was encountered, based on TIN102 (Natural England), a minimum of fifteen capture days would be conducted. After this period, capture would continue until there are five days with no reptile captures or observation, conducted within good survey conditions (i.e. within appropriate survey months and weather conditions).
- 8.8.81 No removal of reptile habitat would be conducted over the winter months (between November to February or within frosty conditions) when reptiles are in hibernation, this includes the stone walls and dense scrub/ grassland located within this field (as shown on Figure 8.10).
- 8.8.82 Once a 'reasonable capture effort' has been expended, ideally once capture rates have declined towards zero, a final 'destructive search' would be undertaken by hand, in particular along the dry stone wall, just before and then in parallel with the first elements of site clearance.
- 8.8.83 In areas where reptiles have been captured and excluded (land to the north of Ysguborwen Road) habitat manipulation would be carried out after the relocation of reptiles has been carried out. Any vegetation to be removed would be strimmed or flailed down to 15 cm, then left for a day and checked by the ecologist as part of the Ecological Clerk of Works Role and then taken to ground level (stage strimmed). Trees and scrub would be taken down to stumps prior to uplifting. No uplifting of stumps would be conducted over the winter months (between November to February or within frosty conditions) when reptiles are in hibernation.
- 8.8.84 Methodologies would be agreed in advance with the LPA and NMWTRA.
- 8.8.85 Once the Scheme is complete, reptile fencing would be removed in the presence of an ecologist. Habitats on the receptor site would be retained and enhanced for reptiles. Landscape planting would include ornamental shrubs, grassland with bulbs, open grassland and scattered trees. The dry-stone wall would be retained. A total area of circa 1.8 ha would be available for reptiles, in the same location which consists of trees, scrub, south facing slopes, stone walls and grassland. Circa 0.3 ha of this would be specifically enhanced for reptiles.
- 8.8.86 With the proposed mitigation, operational effects upon reptiles would be **Slight Adverse** upon opening and **Neutral** within Design Year, once habitat has been established.

### **Invertebrates**

- 8.8.87 The main potential effects to aquatic invertebrates would be because of pollution incidences. Control measures described in section 8.8.16 – 8.8.30 would mitigate for the potential degradation of watercourses (Afon Gyrach).
- 8.8.88 An assessment of the impact on water quality has been made in relation to both routine runoff from the proposed Scheme and the risk of potential spillages. The Highways England Water Risk Assessment Tool (HEWRAT) has been used for this purpose. This is reported in Chapter 7.
- 8.8.89 The assessments states that the impact of routine runoff on the water environment of the Afon Gyrach is negligible (both from dissolved and sediment-bound contaminants).
- 8.8.90 The assessment also concluded that likelihood of a serious pollution incident resulting from a

spillage on the Scheme is acceptably low and would be lower than the existing situation.

- 8.8.91 The Scheme design would incorporate an arch construction for the bridge and would retain the existing riverbed beneath it. The retention of the existing riverbed beneath the bridge would minimise any changes in the hydromorphology of this portion of the Afon Gyrach (and thus the populations that rely on it).
- 8.8.92 With the proposed mitigation construction effects on the aquatic invertebrates within the Afon Gyrach are considered to be a **Neutral**, no significant effect upon the VER.
- 8.8.93 With the proposed mitigation operational effects on the aquatic invertebrates Afon Gyrach are considered to be a **Neutral**, no significant effect upon the VER.

### **Fisheries**

- 8.8.94 The main potential effect to migratory fish would be as a result of pollution incidences. Control measures described in section 8.8.16 – 8.8.30 would mitigate for the potential degradation of watercourses used by fish.
- 8.8.95 An assessment of the impact on water quality has been made in relation to both routine runoff from the proposed Scheme and the risk of potential spillages. The Highways England Water Risk Assessment Tool (HEWRAT) has been used for this purpose. This is reported in Chapter 7.
- 8.8.96 The assessments states that the impact of routine runoff on the water environment of the Afon Gyrach is considered to be negligible (both from dissolved and sediment-bound contaminants).
- 8.8.97 The assessment also concluded that likelihood of a serious pollution incident resulting from a spillage on the Scheme is considered to be acceptably low and would be lower than the existing situation.
- 8.8.98 The Scheme design would incorporate an arch construction for the bridge and would retain the existing riverbed beneath it. The retention of the existing riverbed beneath the bridge would minimise any changes in the hydromorphology of this portion of the Afon Gyrach (and thus the populations that rely on it).
- 8.8.99 With the proposed mitigation, construction and operational effects upon fish would be **Neutral** no significant effect on the VER.

### **Significance of Residual Effects**

- 8.8.100 The Scheme includes works adjacent to European and nationally- designated sites and would affect habitats which support protected and notable species including bats, aquatic invertebrates, otters and birds.
- 8.8.101 The effects on European Sites have also been assessed separately in an Assessment of Implications of European Sites and an Statement to Inform an Appropriate Assessment (SIAA) has been produced.
- 8.8.102 The summary of effects on VERs, described in the preceding sections taking account of mitigation are summarised in Table 8.16.

**Table 8.16: Summary of Effects on Valuable Ecological Receptors**

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
<b>Land-take and Construction</b>					
Liverpool Bay/ Bae Lerpwl (Wales) SPA	International - Very high	<p>No direct land takes envisaged.</p> <p>Pollution effect – increased dust and increased silt etc during construction. Increased noise displacing birds.</p>	Moderate Adverse	<p>Pollution control measures as outlined within the CEMP.</p> <p>Mitigation measures to control air pollution are described in Chapter 12 and include measures recommended within the IAQM guidance. These measures include a Dust Management Plan which would form part of the CEMP.</p> <p>Mitigation measures to control noise and vibration are described in Chapter 13 and include those set out within A CEMP which would be prepared in advance of construction which would define all mitigation measures to be adopted to minimise noise and vibration emissions at surrounding sensitive receptors.</p> <p>Mitigation measures to control pollution to waterbodies and the marine environment are described in Chapter 7, these include the completion of construction works undertaken under the management of the CEMP which would include measures protective of the water environment such as management of surface water run-off from exposed earthworks and construction compounds, provision of spills kits and emergency spill procedures.</p>	Neutral

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
Traeth Lafan/ Lavan Sands, Conwy Bay SPA/SSSI/LNR	International - Very high	Pollution effect – increased dust and increased silt etc during construction. Increased noise displacing birds.	Moderate Adverse	<p>Pollution control measures as outlined within the CEMP.</p> <p>Mitigation measures to control air pollution are described in Chapter 12 and include measures recommended within the IAQM guidance. These measures include a Dust Management Plan which would form part of the CEMP.</p> <p>Mitigation measures to control noise and vibration are described in Chapter 13 and include those set out within A CEMP which would be prepared in advance of construction which would define all mitigation measures to be adopted to minimise noise and vibration emissions at surrounding sensitive receptors.</p> <p>Mitigation measures to control pollution to waterbodies and the marine environment are described in Chapter 7, these include the completion of construction works undertaken under the management of the CEMP which would include measures protective of the water environment such as management of surface water run-off from exposed earthworks and construction compounds, provision of spills kits and emergency spill procedures.</p>	Neutral

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC	International - Very high	Those habitats which are features of the Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC are not evident in close proximity to the Scheme. Annex I Habitats which are a feature of interest generally tend to occur to the west towards the Menai Strait as such, no construction effects are envisaged.	Neutral	<p>Pollution control measures as outlined within the CEMP.</p> <p>Mitigation measures to control air pollution are described in Chapter 12 and include measures recommended within the IAQM guidance. These measures include a Dust Management Plan which would form part of the CEMP.</p> <p>Mitigation measures to control noise and vibration are described in Chapter 13 and include those set out within A CEMP which would be prepared in advance of construction which would define all mitigation measures to be adopted to minimise noise and vibration emissions at surrounding sensitive receptors.</p> <p>Mitigation measures to control pollution to waterbodies and the marine environment are described in Chapter 7, these include the completion of construction works undertaken under the management of the CEMP which would include measures protective of the water environment such as management of surface water run-off from exposed earthworks and construction compounds, provision of spills kits and emergency spill procedures.</p>	Neutral
Coedydd Aber SAC/SSSI/NNR	International - Very high	Pollution effect – increased dust and	Moderate Adverse	Management Plan which would form part of the CEMP.	Neutral



VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
		increased silt etc during construction affecting otters and salmon which occur in the Afon Gyrach and are features of interest of the site.		<p>Mitigation measures to control air pollution are described in Chapter 12 and include measures recommended within the IAQM guidance. These measures include a Dust Management Plan which would form part of the CEMP.</p> <p>Mitigation measures to control noise and vibration are described in Chapter 13 and include those set out within A CEMP which would be prepared in advance of construction which would define all mitigation measures to be adopted to minimise noise and vibration emissions at surrounding sensitive receptors.</p> <p>Mitigation measures to control pollution to waterbodies and the marine environment are described in Chapter 7, these include the completion of construction works undertaken under the management of the CEMP which would include measures protective of the water environment such as management of surface water run-off from exposed earthworks and construction compounds, provision of spills kits and emergency spill procedures.</p>	
Eryri/ Snowdonia SAC/ SSSI	International - Very high	Pollution effect – increased dust and increased silt etc during construction affecting otters and salmon which	Moderate Adverse	<p>Management Plan which would form part of the CEMP.</p> <p>Mitigation measures to control air pollution are described in Chapter 12</p>	Neutral

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
		occur in the Afon Gyrach and are features of interest of the site.		<p>and include measures recommended within the IAQM guidance. These measures include a Dust Management Plan which would form part of the CEMP.</p> <p>Mitigation measures to control noise and vibration are described in Chapter 13 and include those set out within A CEMP which would be prepared in advance of construction which would define all mitigation measures to be adopted to minimise noise and vibration emissions at surrounding sensitive receptors.</p> <p>Mitigation measures to control pollution to waterbodies and the marine environment are described in Chapter 7, these include the completion of construction works undertaken under the management of the CEMP which would include measures protective of the water environment such as management of surface water run-off from exposed earthworks and construction compounds, provision of spills kits and emergency spill procedures.</p>	
Orme View Vegetated Shingle Candidate WS	Medium – Regional	Pollution effects from construction include airborne pollutants, chemicals and oil spillages, increased silt which could be discharged into the	Moderate Adverse	<p>Management Plan which would form part of the CEMP.</p> <p>Mitigation measures to control air pollution are described in Chapter 12 and include measures recommended within the IAQM guidance. These</p>	Neutral

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
		watercourse, without adequate control measures and could pollute coastal habitats.		<p>measures include a Dust Management Plan which would form part of the CEMP.</p> <p>Mitigation measures to control noise and vibration are described in Chapter 13 and include those set out within A CEMP which would be prepared in advance of construction which would define all mitigation measures to be adopted to minimise noise and vibration emissions at surrounding sensitive receptors.</p> <p>Mitigation measures to control pollution to waterbodies and the marine environment are described in Chapter 7, these include the completion of construction works undertaken under the management of the CEMP which would include measures protective of the water environment such as management of surface water run-off from exposed earthworks and construction compounds, provision of spills kits and emergency spill procedures.</p>	
Orme View Reedbed	Medium Regional	Pollution effects from construction include airborne pollutants, chemicals and oil spillages, increased silt which could be discharged into the watercourse, without adequate control	Moderate Adverse	<p>Management Plan which would form part of the CEMP.</p> <p>Mitigation measures to control air pollution are described in Chapter 12 and include measures recommended within the IAQM guidance. These measures include a Dust Management Plan which would form part of the CEMP.</p>	Neutral

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
		measures and could pollute coastal habitats.		<p>Mitigation measures to control noise and vibration are described in Chapter 13 and include those set out within A CEMP which would be prepared in advance of construction which would define all mitigation measures to be adopted to minimise noise and vibration emissions at surrounding sensitive receptors.</p> <p>Mitigation measures to control pollution to waterbodies and the marine environment are described in Chapter 7, these include the completion of construction works undertaken under the management of the CEMP which would include measures protective of the water environment such as management of surface water run-off from exposed earthworks and construction compounds, provision of spills kits and emergency spill procedures.</p>	
Parkland/ scattered trees broadleaved	Lower – Local	<p>Loss as circa eight trees as a result of land take.</p> <p>Potential disturbance during construction activities.</p>	Minor Adverse	Working within accordance with BS 5837:2012.	Slight Adverse
Running water – Afon Gyrach	Medium – Regional	Increased silt or pollutants during construction activities, which discharge into the watercourse.	Major Adverse	<p>Mitigation measures to control air pollution are described in Chapter 12 Air Quality.</p> <p>Mitigation measures to control pollution to waterbodies and the marine</p>	Neutral

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
				<p>environment are described in Chapter 7. These include consideration of temporary storage and settlement requirements to manage waterborne sediment, water quality criteria to ensure any discharge to receiving watercourses and marine environments meets regulatory requirements.</p> <p>Other mitigation includes:</p> <p>a) Works within and adjacent to the watercourse would be monitored by an Environmental Clerk of Works (ECOW). If discolouration of the watercourse is noted, works would stop and working practices reviewed;</p> <p>b) An impermeable coffer dam would be placed between any concreting works and the river. Any water that comes into contact with wet concrete would be treated as contaminated and would not be discharged into the watercourse;</p> <p>c) Silt would be managed by the use of cut-off drains, silt curtains, straw bales as necessary, placed downstream of the works area to minimise transfer of any excess sediments downstream;</p> <p>d) All fuel, oil and chemicals used on site would be stored away in a locked store which would be bunded to 110% capacity of the volume stored;</p>	

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
				<p>e) Concrete pouring for the construction of the new bridge would not take place if heavy rain is forecast;</p> <p>f) No contaminants, e.g. concrete mixings, would be washed out within 10m of any trees or watercourses unless contained; and</p> <p>g) An oil spill kit would be available on site, and all relevant staff trained in its use.</p>	
Coastland	International - Very High	Pollution effect – increased dust and increased silt etc during construction which could spill onto and affect coastal habitats.	Moderate Adverse	<p>Mitigation measures to control air pollution are described in Chapter 12 Air Quality.</p> <p>Mitigation measures to control pollution to waterbodies and the marine environment are described in Chapter 7, these include consideration of temporary storage and settlement requirements to manage waterborne sediment, water quality criteria to ensure any discharge to receiving watercourses and marine environments meets regulatory requirements and those detailed above.</p>	Neutral
Hedgerows	Medium – Regional	<p>The majority of hedgerows would be lost as a result of land take.</p> <p>Potential disturbance to retained hedgerows</p>	Moderate Adverse	Working within accordance with BS 5837:2012.	Slight Adverse

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
		during construction activities.			
Bats Afon Gyrach - foraging and commuting common and soprano pipistrelles, Daubentons, natterers <i>Myotis sp.</i>	Low County	Effects of land take on bats using the Afon Gyrach include the include loss of habitat along the banks, risks of mortality and habitat fragmentation. Displacement and disturbance would occur through the construction period as a result of noise, and lighting if construction is required outside of the normal hours and where works are required within the bats active period.	Moderate Adverse	Sensitive lighting Maintenance of 'dark corridors' Replacement habitat Pre-construction surveys to mature trees if removed Design of bridge to maintain access for bats.	Minor Adverse
Bats foraging and commuting Afon Gyrach and Scheme wide (noctule and whiskered/Brandts)	Medium – Regional	. Effects of land take on bats include loss of habitat and, possibly, risks of mortality and habitat fragmentation. Displacement and disturbance would occur through the construction period as a result of noise, and lighting if construction is required outside of the normal hours and where works	Moderate Adverse	Sensitive lighting Maintenance of 'dark corridors' Pre-construction surveys to mature trees if removed Design of bridge to maintain access for bats.	Minor Adverse

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
		are required within the bats active period.			
Scheme wide commuting and foraging habitat for common and soprano pipistrelles, Daubentons, natterers, lesser horseshoe	Local	As above	Moderate Adverse	Sensitive lighting Maintenance of 'dark corridors' Replacement habitat Pre-construction surveys to mature trees if removed	Minor Adverse
Otter	Medium Regional	Effects from construction activities include pollution which, uncontrolled, could pollute the Afon Gyrach or coastal habitats used by otters.  Potential construction effects include disturbance, disruption of movement and disturbance of the bankside.  Increased noise and human presence.  Death or injury  Increased lighting	Major Adverse	Mitigation measures to control pollution to waterbodies and the marine environment are described in Chapter 7 and also for the Afon Gyrach as described above.  Design of the bridge so as to allow continued use by otters.  Installation of otter ledges  Retention of naturalised banks.  Restoration of and creation of habitats.  Fencing so as to deter otters from entering on to the new road. Sensitive lighting so as not to illuminate the riparian habitat along the Afon Gyrach.	Minor Adverse upon opening and Neutral within Design Year, once habitat has been established
Wintering birds – Great crested Grebe	International - Very High	Disturbance and displacement during construction, potential	Minor Adverse	Control measures as described in the CEMP would mitigate for the potential	Neutral



VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
		pollution of associated coastal habitats		degradation of associated coastal habitats used by wintering birds.  The new road layout would not increase noise or pollution effects significantly from the existing, as such, no mitigation is proposed.	
Wintering birds - Oystercatcher, red-breasted merganser, curlew	Medium – Regional	Disturbance and displacement during construction, potential pollution of associated coastal habitats	Minor Adverse	Control measures as described in the CEMP would mitigate for the potential degradation of associated coastal habitats used by wintering birds.  The new road layout would not increase noise or pollution effects significantly from the existing, as such, no mitigation is proposed.	Neutral
Wintering birds – Redshank	Local	Disturbance and displacement during construction, potential pollution of associated coastal habitats	Minor Adverse	Control measures as described in the CEMP would mitigate for the potential degradation of associated coastal habitats used by wintering birds.  The new road layout would not increase noise or pollution effects significantly from the existing, as such, no mitigation is proposed.	Neutral
Breeding birds	Lower Local	Land take and in the form of loss of suitable habitat including plantation woodland, scrub and hedgerows, disturbance and displacement from noise and human presence	Minor Adverse	Site clearance would take into account the seasonal constraints; in particular the clearance of trees, shrubs and hedgerows would be undertaken outside the bird nesting season (typically March to August but can be earlier or extend later in the season). Where this is not possible, then an ecologist would	Slight Adverse upon opening and Neutral within Design Year, once habitat has been established.

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
		during construction activities		conduct an inspection to make sure that no nesting activity is present. If an active nest is found, then works in that area would need to stop until such time that birds have fledged.	
Reptiles	Local – Scheme wide Medium Regional (Ysguborwen Road)	Direct loss of habitat through land-take, which would be more significant to the populations located within land to the north of Ysguborwen Road. Risk of injury and death	Minor Adverse	<p>Reptiles would be captured and excluded from land to the north of Ysguborwen Rd prior to works commencing.</p> <p>Any vegetation to be removed would be trimmed or flailed down to 15 cm, then left for a day checked by the ecologist and then taken to ground level (stage trimmed). Trees and scrub would be taken down to stumps prior to uplifting.</p> <p>No removal of reptile habitat would be conducted over the winter months (between November to February or within frosty conditions) when reptiles are in hibernation.</p> <p>Habitats on the receptor site would be retained and enhanced for reptiles.</p> <p>Methodologies would be agreed in advance with the LPA and NMWTRA.</p>	Slight Adverse upon opening and Neutral within Design Year, once habitat has been established.
Aquatic Invertebrates	High – National	The main potential effects to the whole aquatic macroinvertebrate community from construction works are	Moderate Adverse	Mitigation measures to control pollution to waterbodies are described in Chapter 7, and as described for the Afon Gyrach.	Neutral

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
		loss of habitat, the addition of fine sediments into the flow and spillage of toxic fuels and oils etc			
Fisheries	Medium Regional	Pollution from construction activities which, uncontrolled, could pollute the Afon Gyrach as detailed above. Vibration and lighting.	Moderate Adverse	Mitigation measures to control pollution to waterbodies are described in Chapter 7, and as described for the Afon Gyrach. No works overnight which could illuminate the water course. Further assessment to assess effects of piling operations of fish populations if piling is used, appropriate mitigation instigated in consultation with NRW.	Neutral
Operation – Opening Year and Design Year					
Liverpool Bay/ Bae Lerpwl (Wales) SPA	International - Very high	Pollution and noise disturbance	Moderate Adverse (opening and design year)	The design includes a range of measures intended to meet the requirements of the statutory standards for SuDS. These include attenuation measures to receive water from the new roads and from areas where there are risks of surface water flooding. Details of the drainage for the Scheme are set out in Chapter 7. These would act as attenuation during the operation of the road prior to discharge to existing outfalls (including those which outfall to the sea). The coastal environment where runoff would discharge is dynamic and subject	Neutral

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
				<p>to currents, waves and tides which would disperse fine sediments such that they would not be sufficiently concentrated to be toxic to aquatic organisms living in or near bed sediments.</p> <p>No mitigation required in terms of noise or air pollution.</p>	
Traeth Lafan/ Lavan Sands, Conwy Bay SPA/SSSI/LNR	International - Very high	Pollution and noise disturbance	Moderate Adverse (opening and design year)	<p>The design includes a range of measures intended to meet the requirements of the statutory standards for SuDS. These include attenuation measures to receive water from the new roads and from areas where there are risks of surface water flooding. Details of the drainage for the Scheme are set out in Chapter 7. These would act as attenuation during the operation of the road prior to discharge to existing outfalls (including those which outfall to the sea).</p> <p>The coastal environment where runoff would discharge is dynamic and subject to currents, waves and tides which would disperse fine sediments such that they would not be sufficiently concentrated to be toxic to aquatic organisms living in or near bed sediments.</p> <p>No mitigation required in terms of noise or air pollution.</p>	Neutral

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC	International - Very high	Pollution and noise disturbance	Moderate Adverse (opening and design year)	<p>The design includes a range of measures intended to meet the requirements of the statutory standards for SuDS. These include attenuation measures to receive water from the new roads and from areas where there are risks of surface water flooding. Details of the drainage for the Scheme are set out in Chapter 7. These would act as attenuation during the operation of the road prior to discharge to existing outfalls (including those which outfall to the sea).</p> <p>The coastal environment where runoff would discharge is dynamic and subject to currents, waves and tides which would disperse fine sediments such that they would not be sufficiently concentrated to be toxic to aquatic organisms living in or near bed sediments.</p> <p>No mitigation required in terms of noise pollution.</p>	Neutral
Coedydd Aber SAC/SSSI/NNR	International - Very high	Pollution to receptors otters and salmon.	Moderate Adverse (opening and design year)	<p>The design includes a range of measures intended to meet the requirements of the statutory standards for SuDS. These include attenuation measures to receive water from the new roads and from areas where there are risks of surface water flooding. Details of the drainage for the Scheme are set</p>	Neutral

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
				<p>out in Chapter 7. These would act as attenuation during the operation of the road prior to discharge to existing outfalls (including those which outfall to the sea).</p> <p>The coastal environment where runoff would discharge is dynamic and subject to currents, waves and tides which would disperse fine sediments such that they would not be sufficiently concentrated to be toxic to aquatic organisms living in or near bed sediments.</p> <p>No mitigation required in terms of noise or air pollution.</p>	
Eryri/ Snowdonia SAC/SSSI	International - Very high	Pollution to receptors otters and salmon.	Moderate Adverse (opening and design year)	<p>The design includes a range of measures intended to meet the requirements of the statutory standards for SuDS. These include attenuation and infiltration measures to receive water from the new roads and from areas where there are risks of surface water flooding. Details of the drainage for the Scheme are set out in Chapter 7. These would act as attenuation during the operation of the road prior to discharge to existing outfalls (including those which outfall to the sea).</p> <p>The coastal environment where runoff would discharge is dynamic and subject to currents, waves and tides which</p>	Neutral

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
				would disperse fine sediments such that they would not be sufficiently concentrated to be toxic to aquatic organisms living in or near bed sediments.  No mitigation required in terms of noise or air pollution.	
Orme View Vegetated Shingle Candidate WS	Medium – Regional	Pollution from road run-off	Minor Adverse (opening and design year)	The design includes a range of measures intended to meet the requirements of the statutory standards for SuDS. These include attenuation measures to receive water from the new roads and from areas where there are risks of surface water flooding. Details of the drainage for the Scheme are set out in Chapter 7. These would act as attenuation during the operation of the road prior to discharge to existing outfalls (including those which outfall to the sea).	Neutral
Orme View Reedbed	Medium Regional	Pollution from road run-off	Minor Adverse (opening and design year)	The design includes a range of measures intended to meet the requirements of the statutory standards for SuDS. These include attenuation measures to receive water from the new roads and from areas where there are risks of surface water flooding. Details of the drainage for the Scheme are set out in Chapter 7. These would act as attenuation during the operation of the road prior to discharge to existing	Neutral

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
				outfalls (including those which outfall to the sea).	
Parkland/ scattered trees broadleaved	Lower – Local	Alteration of habitat	Minor Adverse upon opening during the establishment phase.  Within the design year, this habitat would have established, and as such, in the absence of mitigation, is considered to be Slight Adverse effect.	Replacement habitat.	In consideration of the estimated BNG with the proposed landscape planting and the number of trees lost to those planted the residual effects of the Scheme is Slight Beneficial.
Running water – Afon Gyrach	Medium – Regional	The potential for increased run-off from the new road affecting the water quality and its biological status (currently high to good), dust and emissions form from cars, as well as road salt.	In the absence of mitigation, pollution effects during the operation of the road are considered to be Moderate Adverse upon opening and Slight Adverse in the Design year.	The Scheme design includes a range of measures intended to meet the requirements of the statutory standards for SuDS. These include attenuation measures to receive water from the new roads and from areas where there are risks of surface water flooding, this is proposed in land to the west of the Afon Gyrach. The scheme would use conventional piped drainage to remove water from the carriageway designed to store surface water and then slowly discharge it to the existing watercourses (including the Afon Gyrach) or into the sea.	Neutral



VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
Coastland	International - Very High	Pollution from road run off	Moderate Adverse (opening and design year)	The design includes a range of measures intended to meet the requirements of the statutory standards for SuDS. These include attenuation measures to receive water from the new roads and from areas where there are risks of surface water flooding. Details of the drainage for the Scheme are set out in Chapter 14. These would act as attenuation during the operation of the road prior to discharge to existing outfalls (including those which outfall to the sea).	Neutral
Hedgerows	Medium – Regional	This habitat would be lost/ altered.	Moderate Adverse – opening year Design year – slight adverse	Replacement with a mixture of species rich grassland, grassland with bulb planting, native and ornamental shrubs and hedgerows with trees, some of which would be specifically managed for biodiversity (as shown on the EMP).	In consideration of the estimated BNG, the residual effects of the Scheme upon this Priority Habitat is Moderate Adverse
Bats Afon Gyrach foraging and commuting common and soprano pipistrelles, Daubentons, natterers, lesser horseshoe	Low County	The main operational effects to bats using the Afon Gyrach from the Scheme include the potential effects of lighting required for the new road and footpaths which may spill onto the riparian corridor and disrupt movement.	Moderate Adverse upon opening and Slight Adverse in the Design year.	Sensitive lighting design so as not to illuminate the Afon Gyrach Maintenance of landscape planting Installation of bat boxes within or on the new and/or existing culverts/bridge The installation of bat boxes on trees.	Minor Adverse upon opening and Neutral within Design Year. With the proposed installation of the bat boxes (secondary mitigation) the effect could be slight beneficial on local bat populations

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
		<p>The requirement to navigate under an additional bridge.</p> <p>There would also be the time required to adapt to new riparian habitats.</p>			
Bats - Afon Gyrach and Scheme wide - foraging and commuting (noctule and whiskered/ Brandts)	Medium – Regional	<p>As above and the potential effects of lighting required for the new junctions and footpaths.</p> <p>There would also be the time required to adapt to new habitats.</p>	As above	As above	As above
Scheme wide commuting and foraging habitat for common and soprano pipistrelles, Daubentons, natterers, lesser horseshoe	Local	<p>The main operational effects to bats from the wider Scheme include the potential effects of lighting required for the new junctions and footpaths.</p> <p>There would also be the time required to adapt to new habitats.</p>	As above	As above	As above
Otter	Medium Regional	Indirect pollution effecting habitat.	Moderate Adverse upon opening and Slight Adverse in the Design year.	<p>Pollution control measures</p> <p>Otter proof fencing</p> <p>Installation of otter ledges</p> <p>Sensitive lighting</p> <p>Habitat enhancement</p>	Minor Adverse upon opening and Neutral within Design Year, once habitat has been established.

VER	Value	Description of Effect	Effect without Mitigation	Mitigation	Significance of Residual Effects
Wintering birds – Great crested Grebe	Medium – Regional	It is thought that once operational, the new road layout would not increase noise or pollution effects significantly from the existing	Neutral	Pollution control measures	Neutral
Wintering birds - Oystercatcher, red-breasted merganser, curlew	Local	It is thought that once operational, the new road layout would not increase noise or pollution effects significantly from the existing	Neutral	As above	Neutral
Breeding birds	Lower Local	Loss of nesting/foraging habitat until such time that it becomes established and light spill.	Minor Adverse – opening year Neutral – Design year	Replacement habitat. As vegetation becomes established, in the design year, this would provide suitable alternative nesting and foraging habitat for breeding birds	Neutral within Design Year, once habitat has been established
Reptiles	Lower Local – Medium Regional	Adaptation to new habitat, lack of management of created habitats and mortality from the new road.	Slight Adverse	Management and maintenance of reptile habitat	With the proposed mitigation, operational effects upon reptiles would be Slight Adverse upon opening and Neutral within Design Year, once habitat has been established.

<b>VER</b>	<b>Value</b>	<b>Description of Effect</b>	<b>Effect without Mitigation</b>	<b>Mitigation</b>	<b>Significance of Residual Effects</b>
Aquatic Invertebrates	High – National	Increased run-off from the new road affecting the water quality and its biological status (currently high to good).	Minor Adverse	Pollution control measures	Neutral
Fisheries	Medium Regional	Indirect pollution effecting habitat.	Moderate Adverse (opening year) and Slight Adverse (Design year)	Pollution control measures	Neutral

## 8.9 Monitoring and Aftercare

- 8.9.1 Aftercare would be carried out by the Contractor for a period of 3 years, as required under the contract. This is known as the aftercare period. During that time the contractor would carry out tasks such as grass cutting, weed control, replacement of dead plants, watering, repair of fences, cleaning out ditches, and repair or replacement of bat boxes or other environmental measures. These tasks would be performed to ensure that the seeding and planting survive and successfully establish as new vegetation. At the end of the aftercare period the contractor would hand over the now established and healthily growing landscape and environmental mitigation to the Welsh Governments maintenance organisation the North and Mid Wales Trunk Road Agency (NMWTRA).
- 8.9.2 Throughout the aftercare period, and for as long as is necessary to fulfil commitments, the contractor and then NMWTRA would monitor the mitigation measures to:
- A. Ensure that it continues to develop properly to meet commitments and functions (e.g. trees should grow as planned);
  - B. Review if it would achieve the commitment and function in the required time period;
  - C. Check for adverse or changing conditions that might compromise the effectiveness of mitigation;
  - D. Advise on maintenance interventions that might be required if a failure to meet commitments is identified in a to c above; and
  - E. Once the mitigation achieves full effectiveness monitoring would continue to ensure that it continues to perform its proposed function.
- 8.9.3 These measures are set out in more detail in Chapter 20 Management of Environmental Effects.
- 8.9.4 Details of the monitoring required would be established at the detailed design stage in consultation with NRW and NMWTRA and incorporated into the CEMP and carried through to the HEMP. Monitoring would include but is not limited to:
- A. Water quality status along the Afon Gyrach should be maintained and monitored during the construction works and post works period. Regular visual inspection of all discharges into the existing drainage system and into the sea would be carried out;
  - B. Regular inspection of surface water runoff control measures to ensure that sediment is not transported off site;
  - C. Regular inspection of plant that contain fuels or chemicals to ensure there is no risk of spillage;
  - D. Requirements for monitoring of protected species (for example otters) would be set out in any required Method Statements. This would include surveys of the watercourse post construction and during the aftercare period to ensure continued use by otters and to advise upon any adaptations which would be required;
  - E. Monitoring of the otter proof fence every six months throughout the aftercare period;
  - F. Monitoring of the otter ledges every six months throughout the aftercare period;
  - G. Monitoring of habitat created would be conducted to see if continues to be used for foraging by bats noted during the baseline surveys for foraging. Three transect surveys per year for three years to cover each survey season (Spring/Summer/Autumn) would be conducted along predetermined transect routes to include the planting and also the Afon Gyrach (as this was the area of most activity). The measure of success would be continued use by the species recorded during the surveys, if not more.;
  - H. Monitoring of the new bridge to ensure that it is still being used by bats for passage which

would be carried out in conjunction with the activity survey detailed above;

- I. Monitoring of the light spill on the Afon Gyrach by conducting an assessment once works are complete;
- J. Monitoring of any installed bat boxes between the months of May to September for the first three years during the aftercare period. This would involve an inspection of the bat boxes and one emergence survey conducted between the months of May to August. The measure of success would be uptake of bat boxes by local bat populations;
- K. Monitoring of the reptile relocation area and habitat created for reptiles to if it continues to support local reptile populations by conducting a presence absence surveys once habitat has established with the area cleared of reptiles as part of the mitigation. Suggest year three of the three-year aftercare period; and
- L. Monitoring for birds which are a feature of the SPAs would be undertaken during construction by the appointed ECoW and any occurrences and behaviour would be noted and reported. It is likely that birds would be deterred by and displaced from utilising the fields due to construction activities. Key habitats associated with the designated sites would be retained and left undisturbed, and as such these would not be subject to monitoring. It is recommended that the disturbed areas are subject to monitoring based on six 'Through The Tide Counts' (TTTC) with monthly surveys between October and March during the three year aftercare period.

8.9.5 During the contractor's aftercare period regular monitoring visits would be undertaken to monitor the performance of the mitigation, including the establishment of tree, shrub and hedgerow planting.

8.9.6 Reports would be prepared for the Project Manager giving the results of each visit, any requirements for additional maintenance work and indicating how the scheme of mitigation is performing against agreed indicators. An annual report would bring these together at the end of each year of aftercare. At the end of the aftercare period a Handover Environmental Design Performance Report (HEDPR) would be prepared. The HEDPR would accompany the Handover Environmental management Plan to assist NMWTRA in taking on the long-term maintenance.

## 8.10 Assessment of Cumulative Effects

8.10.1 Cumulative effects result from multiple actions on receptors and resources over time and are generally additive or interactive (synergistic) in nature. Cumulative effects can also be considered as:

'...impacts resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the project<sup>77</sup>.'

8.10.2 Two principal types of cumulative effects are considered: *interrelationships* between effects generated by the Scheme, and the addition or *interaction* of effects generated by one or more other schemes *in combination* with the project being assessed. The cumulative effects of the Scheme have been considered in Chapter 19. Cumulative effects on European Designated Sites would also be addressed in the SIAA.

### In-combination Effects

8.10.3 When considering in-combination effects in the assessments, the potential effects of the measure on the feature is the key consideration. A plan or project could have an effect on water quality which in isolation would not be a significant effect but in combination with other effects, could be

<sup>77</sup> European Commission, 1999.

significant.

- 8.10.4 The assessment of in-combination effects with 'other development' was identified through a systematic approach consisting of searching and identifying 'reasonably foreseeable' projects and proposals which could have in-combination effects. Other developments are primarily identified within the ZOI identified for the Scheme. Development sites at the margins of the ZOIs could be included and then excluded at a later stage, as the likely effects of the proposed Scheme were more clearly defined.
- 8.10.5 For ecology and nature conservation, the ZOIs as set out in Section 8.3 have been considered for the in-combination assessment.
- 8.10.6 In consultation with the Local Planning Authorities, a short-list of sites was subsequently agreed. The short list includes the following sites, the locations of these are provided on Figure 19.1, appendix to Chapter 19:
  - A. Land on north westerly edge of Dwygyfylchi.
  - B. Orme view filling station, adjoins easterly lane of A55.
  - C. Phase 1 Y Bluen Goch.
  - D. Phase 2 Y Bluen Goch.
  - E. Conwy Road.
  - F. Land at Cambrian Court/ Dyffryn, Penmaenmawr.
  - G. Extension to burial ground.
  - H. Pennant Hall Bach.
  - I. A55 Junction 16 improvements.
  - J. Abergwyngregyn to Tair Meibion A55 improvements.
- 8.10.7 Each of these in context of these are discussed in Table 8.17.
- 8.10.8 Of the Schemes listed in Table 8.17 in-combination effects may occur with six out of the nine.

### **Inter-relationships**

- 8.10.9 Consideration of inter-relationships have also been discussed in Chapter 19. Inter-relationships refer to the combined effect on individual (or groups of) receptors or resources from more than one source or type of environmental effect (e.g. noise, Land-take, air quality, hydrology) for example, a small area of habitat loss coupled with increased noise disturbance in remaining habitat could together reduce the foraging or refuge habitat available to a species sufficiently to reduce the local population.
- 8.10.10 In identifying and assessing the likely impacts of the proposed Scheme on ecology and nature conservation, the inter-relationships with the environmental impacts identified in other ES chapters has been considered. These include:
  - A. **Chapter 6: Geology and Soils** – Discharge of contaminated or sediment laden groundwater to the marine and/ or riparian ecosystems following dewatering of excavations or foundations works. Contamination of soils, groundwater and surface water from accidental spills and leaks relating to construction plant and fuels/ oils. A number of measures have been highlighted within this chapter as being suitable for mitigating the potential effects. These include the protection of soil structure and quality, the protection of controlled water from both general site works, and foundation works and to manage

- contamination risks.
- B. **Chapter 7: Road Drainage and Water Environment** – This chapter focused on the construction and operational effects of the proposed Scheme on the water quality on nearby watercourses and marine habitats and associated habitats and species, including those listed as features of interest of the designated sites. Chapter 7 states that the impact of routine runoff on the water environment of the Afon Gyrach and Conwy Bay is considered to be negligible from routine-runoff (both from dissolved and sediment-bound contaminants). The assessment also concluded that likelihood of a serious pollution incident resulting from a spillage on the Scheme is considered to be acceptably low and would be lower than the existing situation. The coastal environment where runoff would discharge is dynamic and subject to currents, waves and tides which would disperse fine sediments such that they would not be sufficiently concentrated to be toxic to aquatic organisms living in or near bed sediments. The Scheme design would incorporate an arch construction for the bridge and would retain the existing riverbed beneath it. The retention of the existing riverbed beneath the bridge would minimise any changes in the hydromorphology of this portion of the Afon Gyrach (and thus the populations that rely on it).
  - C. **Chapter 9: Landscape and Visual** – The Environmental Masterplan (EMP) and proposed landscaping has been informed by the potential ecological effects of the Scheme on the Valued Ecological Receptors. Net gains and losses in biodiversity have been assessed and sensitive landscaping proposed which creates/ maintains connectivity and enhances existing biodiversity or creates new habitat with biodiversity value.
  - D. **Chapter 12: Air Quality** – The modelling of changes in air quality has informed the assessment of the ecological effects on sensitive receptors, in particular the features associated with the designated sites. A qualitative assessment of potential dust effects for the proposed Scheme has been undertaken, based on the effects of receptors within 200 m of the ARN. Potential dust impacts would be suitably controlled using best practice mitigation measures. Effects are not predicted to be significant.
  - E. **Chapter 13: Noise and Vibration** – The noise and vibration effects upon receptors has been informed by assessments carried out in this Chapter. This includes the assessment of construction vibration. The approach for controlling construction noise would be to reduce source levels where possible. In some circumstances it may be preferable to use plant which generates a high level of noise if this significantly reduces the construction time. Effects are not considered to be significant.
  - F. **Chapter 15: Materials** - During the construction and operational phase, materials and waste would be present close to the outfall system linked to the marine ecosystem, with potential for run off which could have ecological impacts on species and habitats and on water quality. Working methods to manage and limit these risks are set out in Chapter 21 Environmental Management.



**Table 8.17: Developments Considered for In-combination Effects**

<b>Development type</b>	<b>Location / Distance from Scheme</b>	<b>Planning Status</b>	<b>Potential in-combination effects</b>	<b>Potential Magnitude (in the Absence of Mitigation)</b>
A. Land allocated for housing	On-site	Within the current LDP allocation map	<p>The potential in-combination effects would result from land take and disturbance during construction. This area is important due to containing a medium population of reptiles (slow worms) which are a species listed on Section 7 of the Environment (Wales) Act.</p> <p>The Junction 16 Scheme already affects this habitat and further development would have a cumulative effect, in particular were more habitat was lost to development thereby squeezing the population into smaller areas.</p> <p>This habitat is also used by foraging bats.</p> <p>There may also be additional stress on ecosystems via pollution incidences during construction and operation including air quality and drainage.</p>	<b>Major Adverse</b>
B. Orme view filling station, adjoins easterly lane of A55	Adjacent to Scheme	Within LDP Employment allocation	<p>There is an existing service station and café on this site. If this land were to be developed there may also be additional stress on ecosystems via pollution incidences during construction and operation including air quality and drainage.</p>	<b>Moderate Adverse</b>
C. & D. Phase 1 and 2 Y Bluen Goch	150 m due south	CCCBC Planning code 0/44685 and 0/44691 Approved	<p>Taken cumulatively phases 1 and 2 include 18 dwellings.</p> <p>The main potential adverse cumulative effect would be the potential affects to the Afon Gyrach and the associated species, including otters, bats, aquatic invertebrates and fish which the nearby developments may have.</p>	<b>Major Adverse</b>
E. Conwy Road Housing Contingency	30 m due west of J16	Within the current LDP allocation map housing	<p>If this land were to be developed there may also be additional stress on ecosystems via pollution incidences during construction and operation including air quality and drainage.</p>	<b>Minor Adverse</b>

Development type	Location / Distance from Scheme	Planning Status	Potential in-combination effects	Potential Magnitude (in the Absence of Mitigation)
		contingency for 15 dwellings		
F. Land at Cambrian Court/ Dyffryn, Penmaenmawr	450 m due west	CCCBC Planning code 0/30397 Planning permission for 33 apartments	If this land were to be developed there may also be additional stress on ecosystems via pollution incidences during construction and operation including air quality and drainage. Located in close proximity to the coast.	<b>Minor Adverse</b>
G. Extension to burial ground	220 m due west	Site would be considered as part of the LDP review process.	Potential disturbance during the construction of any proposed facilities.	<b>Minor Adverse</b>
H. Pennant Hall Bach	900 m due west	Approved planning permission for 14 flats.	Demolition and construction has commenced. No cumulative effects envisaged.	<b>Neutral</b>
I. A55 Junction 15 improvements	5 km due west	Key Stage 3 WeITAG	<p>In-combination effects between this Scheme and Junction 16 improvements would occur were both Schemes to be implemented at the same time. These are considered to be the potential increase in pollution affecting air and water quality which could arise both during the construction and operation of the Scheme(s), especially where there are outfalls into the marine environment.</p> <p>However, significant cumulative effects are unlikely to occur as each development is anticipated to employ similar mitigation techniques such that the individual construction and operational phase effect was not significant, alone or in combination.</p> <p>Both Schemes result in land-take of habitat utilised by over wintering birds which are a feature of the designated sites.</p>	<b>Moderate Adverse</b>

Development type	Location / Distance from Scheme	Planning Status	Potential in-combination effects	Potential Magnitude (in the Absence of Mitigation)
			In terms of habitat connectivity, these Schemes are isolated from each other by Penmaenmawr Quarry, as such effects to habitat connectivity between these two Schemes are considered to be Neutral.	
J. Abergwyngregyn to Tair Meibion A55 improvements	8.46 km due west	Approved	<p>Works have commenced on this Scheme. An Environmental Statement and Statement to Inform an Appropriate Assessment has been produced for this Scheme. The ES stated that in the long-term the Scheme would have a beneficial effect on biodiversity provided the mitigation and enhancement measures as set out in the reports was adhered to. Likewise, the Assessment of Implications on European Sites concluded that no significant effects on the Natura 2000 sites were likely provided mitigation measures were followed.</p> <p>It is likely that this Scheme would be completed prior to the commencement on site of the Junction 15 Scheme.</p>	<b>Neutral</b>

## Natural Capital and Biodiversity

- 8.10.11 Natural capital refers to the stock of natural resources that the ecosystem provides, such as water, air, soil and biodiversity that are essential to the functioning of the planet and human well-being and include soil formation, food, climate regulation and renewable energy, often referred to as ecosystem services. The aim of the ecosystems approach is to ensure the value of these essential services is taken into account when economic decisions are made so that the true cost of decisions are assessed. The Environment (Wales) Act, 2016 sets a duty on public authorities to take account of the resilience of ecosystems and the services they provide. Cumulative effects from the inter-relationships of each discipline in turn can affect biodiversity and ecosystems and the resilience of ecosystems to recover and adapt to change (for example climate change).
- 8.10.12 The mitigation, management and control of each of the potential cumulative effects of air and water quality, noise and landscape set out within the relevant chapters along with those detailed within this chapter, all go towards protecting biodiversity and replacing that which is lost, which in turn helps to maintain resilient ecosystems.
- 8.10.13 Overall, in terms of habitat to be created, there is a Biodiversity Net Gain of nearly 50%. However, this calculation does not account for the types of habitats replaced (i.e. hedgerows vs grassland) and does not take account of the number of trees to be planted (which is greater than that being removed). Over time, when habitats have become established, the overall Biodiversity Net Gain could be positive.

## 8.11 Summary

- 8.11.1 The summary of effects on VERs, described in the preceding sections of this chapter, are summarised in Table 8.16.
- 8.11.2 The effects on European Sites will also be assessed separately in an Assessment of Implications of European Sites and an SIAA would be produced.
- 8.11.3 This Chapter has assessed the impacts of the Scheme on VERs, taking into consideration mitigation which is an integral part of the Scheme and proposed additional mitigation, compensation or enhancements which would be incorporated into the Scheme.
- 8.11.4 In the short term there would be a loss of and disturbance to habitat which supports reptiles, otters, aquatic specialists, fish, bats and birds. Over time, replacement planting would establish and provide continued connectivity and habitat for a range of species, in line with the Green Corridors Initiative. Over time, when habitats have become established, the overall Biodiversity Net Gain could be positive. which is in line with Acts and Policies to retain/ create/ enhance resilient ecosystems and retain connectivity.
- 8.11.5 The proposed species rich grassland is an enhancement to that which was lost which consists of poor semi-improved grassland this complies with the Action Plan for Pollinator, in particular with Outcome 2.
- 8.11.6 Protected species licences would be required for works affecting roosting bats. The license would be obtained from NRW prior to the commencement of demolition works to the bat roost.
- 8.11.7 The mitigation which is considered to be integral to the Scheme includes standard pollution and noise and vibration control measures during construction as well as sensitive lighting, to be

implemented through a CEMP. These documents would ensure that design and mitigation measures would be implemented on-site by the Contractor. The CEMP would identify those responsible for implementing the various management plans. These management plans would complement and inform one another as well as require regular updates and revisions. Outline versions of these management plans have been prepared at Key Stage 3 and are provided as Annexes to the Pre-CEMP in ES Chapter 2, Appendix 2.2.

- 8.11.8 An Environmental Co-ordinator (ECO) would be responsible for the interface between the environmental specialists and engineers. The Environmental Clerk of Works (ECOW) would support the ECO during construction and aftercare. Details of Environmental Management are provided in Chapter 20.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 9 LANDSCAPE**

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## 9. LANDSCAPE

### 9.1 Introduction

- 9.1.1 This chapter presents the findings of the Landscape and Visual Impact Assessment (LVIA) that has been undertaken for the Scheme.
- 9.1.2 The Scheme is described in the Environmental Statement (ES) Chapter 2. The Project. Key issues, impacts and effects considered within this chapter include:
- Permanent and temporary, long term and short term direct physical changes to the existing road corridor and adjacent landscape in terms of landform and surface elements, removal or damage to landscape elements, protected or designated areas;
  - Indirect effects on the character and quality of the landscape in terms of encroachment or effects on the landscape setting of key features and elements, changes in the perception of the landscape through the introduction of new landscape elements;
  - Direct effects on the amenity of visual receptors in terms of changes in views;
  - Indirect effects on views and visual receptors in terms of an altered view leading to changes in public attitude, behaviour and how they value or use a place or area of public open space.
- 9.1.3 This chapter presents the legislation and planning context, describes and evaluates the baseline landscape resource, views and visual amenity of visual receptors within a defined study area. The likely changes and effects arising brought about by the Scheme during construction and operation, during day and night have been assessed. The significance of the effect is identified in terms of change to landscape character, land use, loss of landscape features and the visibility, scale and appearance of the Scheme. This includes any associated road infrastructure and predicted traffic movement within existing views.
- 9.1.4 The LVIA includes a combination of desk study review and field work undertaken during 2018 and updated in 2019. Field work was carried out when deciduous trees and plants were in leaf during July 2019 and when the trees and hedgerows were leafless in winter 2018/9. Further site visits were made to review specific receptor impacts during both summer and winter months from key representative viewpoints.
- 9.1.5 Mitigation was assessed as part of an iterative design and assessment process. The design approach is described in section 9.8 of this chapter. This chapter should be read together with Figures 9.1 to 9.10 in Volume 2 and Appendix 9.1 to Appendix 9.5 in Volume 3 of this ES. The Environmental Master Plans (EMPs) are presented in Appendix 2.8.

### 9.2 Relevant Guidance

#### Guidance

- 9.2.1 The assessment of landscape and visual effects was carried out in accordance with the following guidance:
- a) Interim Advice Note 135/10 (W), · Landscape and Visual Effects (Wales Only) (Welsh Government, 2014), which replaces guidance in the Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 5 (Highways Agency, 1993).



- b) Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA3), published by the Landscape Institute and the Institute of Environmental Management and Assessment, 2013.
- c) LA104 Environmental assessment and monitoring (formerly HA 205/08, HD 48/08, IAN 125/15 and IAN 133/10).
- d) LA 107 Landscape and visual effects.

### **Welsh Government and National Assembly for Wales Circulars**

9.2.2 Procedural guidance relevant to LVIA is given in Welsh Office and National Assembly for Wales Circulars including:

- a) Welsh Office Circular 64/78 – Trees and Forestry (Department of the Environment, Welsh Office 1978 - Advice on tree planting and the preservation of trees and woodlands;
- b) Welsh Office Circular 5/93 – Public Rights of Way (Department of the Environment, Welsh Office 1993) – Advice and guidance on recording, maintaining, protecting and modifying the rights of way network;
- c) Welsh Office Circular 60/96 – Planning and the Historic Environment: Archaeology (Welsh Office 1996) – The Circular sets out advice on legislation and procedures relating to historic building and conservation areas; and
- d) National Assembly for Wales (2002) Circular 31/2001 – Countryside and Rights of Way Act 2000 – Provides guidance on access for open air recreation to open country and restricted byways amongst other provisions for public rights of way.

9.2.3 Other relevant guidance documents include the following;

- a) LANDMAP a formally adopted approach for landscape assessments, devised and maintained by Natural Resources Wales (NRW), and is available to view online at <http://landmap-maps.naturalresources.wales/>;
- b) Photography and Photomontage in Landscape and Visual Impact Assessment Advice Note 01/11 (Landscape Institute, 2011);
- c) Roads in Lowland Areas Design Guide (Welsh Office, 1993);
- d) Natural Resources Wales Guidance Notes on LANDMAP including GN4 LANDMAP and the Cultural Landscape (2016), and GN5 LANDMAP and the Geological Landscape (2016); and
- e) The Green Corridors on the Welsh Government Trunk Road and Motorway Network Initiative (2018).

### **Legislation**

9.2.4 Relevant legislation to the assessment of landscape and visual effects is set out in Article 3 of European Directive 2011/92/EU as amended by 2014/52/EU and advises the need for Environmental Impact Assessment to identify, describe and assess the direct and indirect significant effects of a project on the landscape.

9.2.5 Clause 16 of Directive 2014/52/EU further notes:

*"For the protection and promotion of cultural heritage comprising urban historical sites and landscapes ...the Union is committed to respecting and promoting ...the definitions and principles developed in ...the European Landscape Convention of 20 October 2000"; and*  
*"to better preserve historical and cultural heritage and the landscape, it is important to address the visual impact of projects, namely the change in the appearance or view of the built or natural landscape and urban areas, in environmental impact assessments."*

9.2.6 The following legislation is considered relevant to the Scheme in relation to this LVIA. Other policies not specific to landscape and visual amenity are covered in Chapter 5:

- a) National Parks and Access to the Countryside Act 1949;
- b) The Countryside and Rights of Way (CROW) Act 2000;
- c) Wildlife and Countryside Act 1981;
- d) The Natural Environment and Rural Communities (NERC) Act 2006; and
- e) Hedgerows Regulations 1997.

### **Planning Policy Context**

9.2.7 Chapter 5 Policy and Plans sets out the overarching and strategic legislative and policy context for the Scheme from an environmental perspective. The following section is a review of specific landscape policies and guidance that was carried out to inform this LVIA.

### **National Planning Policy: Planning Policy Wales**

9.2.8 Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales.

9.2.9 Landscape policy considerations and guidance are included in Planning Policy Wales (PPW) Edition 10 (December 2018) under the theme "Distinctive and Natural Places". PPW identifies that places which are distinctive and natural, can contribute to the seven goals of the Well-Being of Future Generations Act.<sup>1</sup> It recognises the contribution that landscape can make to the seven goals and that through collaboration, landscapes can be protected and enhanced as well as addressing environmental risks.

### **Technical Advice Notes (TAN's)**

9.2.10 TAN's relevant to the LVIA and the environmental design of the Scheme and mitigation strategy include the following:

- a) TAN 6 – Planning for Sustainable Rural Communities (2010) which provides guidance on how the planning system can support sustainable rural communities;
- b) TAN 10 – Tree Preservation Orders (1997), which provides guidance on where local planning authorities are to make adequate provision for the preservation and planting of trees when granting planning permission through the process of making Tree Preservation Orders (TPOs);
- c) TAN 12 – Design (2016), which provides guidance on how good design should be achieved through the planning process.

### **Local Planning Policy: Conwy County Borough Council Local Development Plan, 2013**

9.2.11 The Junction 16 improvements lie wholly within the jurisdiction of Conwy County Borough Council (CCBC) and the local planning context is set out within the Conwy Local Development Plan (LDP) 2007 – 2022. The LDP states that "*The Plan Area is an area of outstanding landscape ranging from sandy beaches and headlands to sheltered valleys, open moors and natural woodland which borders the mountains of Snowdonia National Park*"<sup>2</sup>, a description that

<sup>1</sup> Planning Policy Wales Edition 10 Chapter 6

<sup>2</sup> Conwy County Borough Council Local Development Plan, 2013 – Paragraph 1.9.2

that can be applied to the study area of this LVIA. The following policies relate to aspects of landscape and visual amenity and have been considered in this LVIA:

- Strategic Policy DP/1 – Sustainable Development Principles: Development will only be permitted where it is demonstrated that it is consistent with the principles of sustainable development and should also where appropriate *"Conserve and enhance the quality of valued open spaces, the character and quality of local landscapes and the wider countryside"*;
- Policy DP/4 – Development Criteria: Development proposals, where appropriate and in accordance with the policies of the Plan and Council's Standards provide assets such as open space and safe access from the highway network and enhancement of cycling and pedestrian infrastructure. Planning permission will not be granted where the proposed development would have an unacceptable adverse impact on aspects such as residential amenity, archaeological interests, environmental conditions such as noise, lighting, noxious emissions, wildlife interests and landscape character;
- Policy DP/5 – Infrastructure and New Developments: All new development, where appropriate will be expected to make adequate contributions towards new infrastructure to meet the additional social, economic, physical and/or environmental infrastructure requirements;
- Strategic Policy NTE/1 – The Natural Environment: The Council will seek to regulate development so as to conserve and, where possible, enhance the Plan Area's natural environment, countryside and coastline including Special Protection Areas (SPA) and Special Areas of Conservation (SACs);
- Strategic Policy NTE/2 – Green Wedges and Meeting the Development Needs of the Community: The policy aims to prevent coalescence of the settlements and retain the open character of the area. Of particular relevance to the Junction 16 Scheme is Green Wedge 1 between Dwygyfylchi and Penmaenmawr that extends south and to the east and west of the existing roundabout;
- Policy NTE/3 – Biodiversity: New development should aim to conserve and enhance biodiversity through avoidance of impacts and creating, enhancing and managing wildlife habitats and natural landscapes including connectivity and integration of biodiversity into the built environment;
- Policy NTE/4 – The Landscape and Protecting Special Landscape Areas: The Policy recognises the visual character of the landscapes, seascapes and townscapes is highly valued by residents and visitors and that high priority is given to the protection, conservation and enhancement of this landscape character;
- Policy NTE/5 – The Coastal Zone: The Policy aims to maintain and enhance the attractiveness of the area by only permitting development that does not affect the open character of the zone and does not detract from areas of nature conservation or tourism value;
- Policy CTH/1 – Cultural Heritage: The council is committed to protecting and, where appropriate, enhancing its cultural and heritage assets such as conservation areas, historic landscape parks and gardens, listed buildings and Scheduled Ancient Monuments (SAM's);

- Policy CTH/2 – Development Affecting Heritage Assets: Development proposals which affect a heritage asset, or its setting shall preserve or enhance that asset.

### **Neighbouring Local Planning Authorities**

- 9.2.12 The Snowdonia National Park Authority (SNPA) is the only neighbouring planning authority and the boundary of the National Park lies at the eastern limit of the Scheme adjacent to Penmaenbach Tunnel. The existing A55 road corridor lies partially within and adjacent to the National Park boundary and therefore it is considered unlikely that the Scheme would have a significant effect over and above that already experienced on land within the SNPA. Therefore, none of the policies have been considered further.

## **9.3 Study Area**

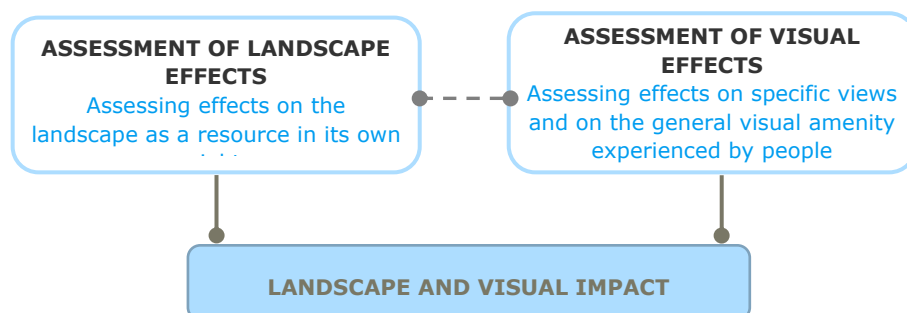
- 9.3.1 The study area was established at a radius of 2 km from the centreline of the existing A55 road corridor and Junction 16 roundabout (refer to Figure 9.1). This was considered a sufficient area of search to establish baseline landscape conditions given that the Scheme is likely to be limited to within or close to the existing A55 road corridor alignment.
- 9.3.2 In accordance with Interim Advice Note (IAN) 135/10 (W), an initial study area was identified for the assessment of visual effects that included the whole area from which the Scheme with traffic would theoretically be visible. This initial study area was based on a digital Zone of Theoretical Visibility (ZTV) created using Geographical Information System (GIS) software and Ordnance Survey (OS) Terrain 50 height data, based on a 50m resolution Digital Terrain Model (DTM) and is presented in Figure 9.2.
- 9.3.3 A site survey in July 2019 was carried out to refine this initial study area to identify where potentially significant effects upon the existing landscape resource, views and visual amenity are likely to occur as a result of the Scheme. This resulted in a more focussed area being identified for landscape and visual receptors potentially affected by the Scheme proposals.
- 9.3.4 The methodology for undertaking the LVIA is described in Section 9.5 and described in more detail within Appendix 9.1. The photographic methodology is included within Appendix 9.2.

## **9.4 Assessment Methodology**

- 9.4.1 The assessment of landscape and visual effects was carried out in accordance with the methodology described within Interim Advice Note 135/10 (W), · Landscape and Visual Effects (Wales Only) (Welsh Government, 2014), which replaces guidance in the Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 5 (Highways Agency, 1993). IAN 135/10 (W) refers to Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA3), published by the Landscape Institute and the Institute of Environmental Management and Assessment, 2013.
- 9.4.2 Highways England published updated guidance LA107 in September 2019 (and that has been subsequently updated in February 2020) that replaces DMRB Volume 11 Section 3 Part 5 and IAN135/10. The new guidance that also applies to Wales has not been followed in this landscape and visual assessment as this had been prepared prior to the publication of LA107. The previous guidance as described in IAN 135/10 (W) has therefore been followed. Further explanation of the reasons for this approach are set out in Chapter 1 at Paragraph 1.3.7.

9.4.3 The assessment of landscape and visual effects are two separate but related processes and should be clearly distinguished between each other as follows:

- Assessment of landscape effects: assessing effects on the landscape as a resource in its own right; and
- Assessment of visual effects: assessing effects on specific views and on the general visual amenity experienced by people.<sup>3</sup>



**Figure 9.1: Landscape and Visual Impact Assessment**

9.4.4 To summarise with guidance from IAN 135/10<sup>4</sup>; “The assessment of landscape and visual effects must address both effects on landscape as a resource in its own right as well as effects on views and visual amenity”.

9.4.5 A detailed description of the methodology used for undertaking the landscape and visual impact assessment is set in Appendix 9.1.

#### **Approach to Identification of Landscape Baseline Conditions**

9.4.6 A review of the landscape resource and topography within the study area was carried out as part of the desk study with reference to the following relevant published sources to establish the national and regional landscape character:

- a) Landscape Character Map for Wales (Countryside Council<sup>5</sup> for Wales and Land Use Consultants);
- b) LANDMAP data system published by Countryside Council for Wales and maintained by Natural Resources Wales;
- c) National and Local Planning Policy as outlined in Section 9.2;
- d) Ordnance Survey 1:25,000 Explorer and 1:50,000 Landranger maps; and
- e) Aerial photography.

9.4.7 Information contained within LANDMAP’s 5 aspect layers forms the basis for LCA’s. This is combined with fieldwork assessment to define the LCA’s boundaries. Local LCA’S within the study area are identified by:

- a) Organising the landscape into areas of distinct, consistent and recognisable character;
- b) Describing the key characteristics such as landcover and pattern, scale and appearance, human interaction and tranquillity, sense of place and scenic quality, seasonal interest and night-time activities;

<sup>3</sup> Interim Advice Note 135/10 (W) para 2.4

<sup>4</sup> Interim Advice Note 135/10 (W) para 2.4

<sup>5</sup> Countryside Council for Wales is now called Natural Resources Wales

- c) Assessing their condition and quality using criteria described in the methodology;
- d) Considering their importance or value using criteria described in the methodology which considers any landscape, ecological or cultural heritage designations, and any assets of local significance without designation that may be valued by the local community;
- e) Considering their ability to accommodate the Scheme without unjustifiable change to the baseline condition and/or the achievement of landscape strategies and policies.

9.4.8 The relevant LANDMAP character areas, including each of the five aspect layers, were reviewed with the landscape and visual aspect layer considered to be most relevant. Following a review of LANDMAP, Local Character Areas (LCA's) were prepared and presented in Appendix 9.4. The LCA's were verified by fieldwork assessments were undertaken in July and August 2019 to validate the findings of the desk study.

### **Approach to Identification of Visual Baseline Conditions**

9.4.9 The visual baseline assessment describes and analyses people that may have specific or general views of the study area, which may be changed by the Scheme.

9.4.10 A desk study was carried out, with reference to the following technical sources:

- a) Ordnance Survey 1:25,000 and 1:50,000 small scale maps;
- b) Ordnance Survey 1:1,250 and 1:2,500 large scale maps; and
- c) Aerial photography.

9.4.11 The following features were identified during this process:

- a) Potential screening features, including substantial vegetation associated with the existing soft estate including roadside plantations, buildings and urban areas; and
- b) Potential visual receptors such as residential properties, business properties, Public Rights of Way and recreation areas.

9.4.12 Field work was carried out during winter 2018 and summer of 2019. This identified various receptors such as residential properties, users of long-distance footpaths and cycleways, users of the public realm and coastal areas. The number and type of properties from which people would experience a change in view, the nature of the view and the activity and sensitivity of the viewer is recorded in the Visual Effects Schedule in Appendix 9.5.

9.4.13 To assess the change in view from locations without public access, a combination of desktop aerial photography and field survey was undertaken and professional judgement used to assess the magnitude of change and likely visual effect.

### **Approach to identification of mitigation measures**

9.4.14 Legislation provides the Overseeing Organisation with powers to: *"acquire land for the purpose of mitigating any adverse effect which the existence or use of a highway constructed or improved by them or proposed to be constructed or improved by them, has or will have an impact on the surroundings of the highway"*<sup>6</sup>

9.4.15 The DMRB<sup>7</sup> identifies two types of mitigation; essential or desirable and defines them as follows<sup>8</sup>:

<sup>6</sup> Highways Act 1980 (as amended) Part XII, Section 246

<sup>7</sup> DMRB Volume 11 Section 2 Part 5 HA 205/08 Paragraph 1.64

<sup>8</sup> DMRB Volume 11 Section 2 Part 7 HA 218/08 Glossary of Terms

**Table 9.1: Essential and Desirable Mitigation**

Essential Mitigation	Desirable Mitigation
Mitigation which the Overseeing Organisation has the statutory power to achieve	A measure considered to be environmentally beneficial but that cannot usually be achieved using statutory powers. For example, third party agreement may be required e.g. off site planting

- 9.4.16 Determining whether mitigation is essential or desirable is recognised in the DMRB as being reliant on professional judgement of the topic specialist<sup>9</sup>. If mitigation is defined as essential, it can be provided for under the relevant legislation i.e. The Highways Act 1980 (as amended) and acquired under Compulsory Purchase Order (CPO) usually subject to Public Local Inquiry.
- 9.4.17 Essential mitigation can therefore be guaranteed as part of the Scheme proposals and is taken into consideration during the assessment process. The assessment process will define how significant the impact of the Scheme is and can be either beneficial or adverse. Significance is therefore assigned with mitigation in place *"allowing for the positive contribution of all mitigation that is deliverable and committed"*<sup>10</sup>. However, DMRB also requires that (in Wales) *"the assignment of significance before the consideration of the effectiveness of the design and mitigation measures should also be undertaken, allowing for the case or reason for the effectiveness of mitigation to be described."*<sup>10</sup> Therefore an assessment of significance is required without mitigation in place and with mitigation that can be delivered and justified as part of the Scheme proposals.
- 9.4.18 Land identified in the Draft Orders will include areas required for essential mitigation including land for various engineering purposes and some further land required for environmental mitigation. Where possible mitigation has been provided within that permanent land take and is therefore within the Compulsory Purchase Order as 'Title'. All of the mitigation provided on land taken as 'Title is essential for mitigation for landscape integration, visual screening or ecological purposes.
- 9.4.19 Land may also be included within the CPO in several locations to provide some further environmental enhancement; this is taken as title for mitigation. Principally this would be as extra land required as essential mitigation to provide compensation for areas of suitable habitat for biodiversity or additional visual screening or landscape integration. Wherever possible this land is taken from severed portions of fields.

### **Assessment of Potential Effects without Mitigation**

- 9.4.20 The current guidance set out in IAN 135/10 (W)<sup>11</sup> states that *'Effects on landscape character should be assessed by considering the components that define character and their sensitivity to the type, scale and duration of the proposed change, taking into account any mitigation measures. In Wales, the assignment of significance before the consideration of the effectiveness of the design and committed mitigation measures should also be undertaken, allowing for the case or reason for and the effectiveness of mitigation to be described'*.
- 9.4.21 New guidance set out in LA104 Environmental assessment and monitoring (formerly HA 205/08, HD 48/08, IAN 125/15 and IAN 133/10) states that the *'Significance of an effect shall be*

<sup>9</sup> DMRB Volume 11 Section 2 Part 5 HA 205/08 Paragraph 1.64

<sup>10</sup> DMRB Volume 11 Section 2 Part 5 HA 205/08 Paragraph 2.9

<sup>11</sup> IAN 135/10 (W) Paragraph 3.4

*reported after an assessment of the effectiveness of the design and mitigation measures (the residual effect)'.<sup>12</sup>* However, the new guidance does not specifically denounce the advice set out in IAN 135/10 (W) that requires an assessment to be made both prior to and following mitigation as outlined above.

- 9.4.22 For the purposes of this landscape and visual assessment, the assessment of significant effects without mitigation is taken as Year 1 of opening when landscape mitigation measures such as planting have not had time to establish and therefore not deliver any effective mitigation. These will be considered as essential mitigation measures.
- 9.4.23 Embedded mitigation measures are reported in the project description and not repeated in each environmental topic or factor assessment as advised in LA104 Environmental assessment and monitoring (Paragraph 3.24.1).
- 9.4.24 An initial assessment of likely landscape and visual effects was undertaken during the design process and has identified potential mitigation measures for avoidance and prevention of potential impacts. This has been fed into the design process and used to identify mitigation measures that are embedded into the design of the Scheme and essential mitigation measures that are specific to addressing adverse landscape and visual effects. Mitigation measures are identified in Section 9.8 and the assessment of landscape and visual effects in Section 9.9 and Section 9.10 respectively.

#### **Consultations**

- 9.4.25 During the LVIA process, consultation has taken place with stakeholders and Statutory Environmental Bodies (SEB's) such as CADW and Natural Resources Wales. Consultation includes the agreement of LVIA methodology, the extent of the LVIA study area, the identification of visual receptors, location of representative viewpoints and photomontages, and the requirements for mitigation.
- 9.4.26 During the consultation period no request for specific viewpoints were received. All viewpoint locations were based on professional judgment and are at locations accessible to the public.

#### **Limitations of the Assessment**

- 9.4.27 The landscape and visual assessment was carried out from publicly accessible areas such as the local road network, Public Rights of Way and other public areas such as promenades and recreational areas. Individual properties were not visited or inspected during the fieldwork assessment.
- 9.4.28 There has been no consideration of night-time visual effects as the existing road corridor is lit and the Scheme is located within the existing road corridor. It is therefore considered that there is likely to be no significant change to night-time effects as a result of the Scheme.

<sup>12</sup> LA104 Environmental assessment and monitoring Paragraph 3.25



## 9.5 Baseline Conditions

### Landscape Baseline

#### *Landscape Character Areas*

- 9.5.1 LANDMAP is an all-Wales landscape resource where landscape characteristics, qualities and influences on the landscape are recorded and evaluated. In reviewing the LANDMAP datasets (Figure 9.3), it was considered that the character areas were set at too broad a scale and did not take sufficient consideration of the significance of the A55 road transport corridor. Further analysis of the landscape character areas within an initial 2 km radius of the Scheme was therefore undertaken and the key landscape elements of the area recorded as part of the baseline assessment.

#### *Landscape Elements*

- 9.5.2 The character areas that fall within (and extend beyond) the 2 km Study Area are shown on Figure 9.4 Landscape Character Areas (LCA's) and a description of their physical, perceptual and cultural/social characteristics are included in Appendix 9C. Note that the Landscape Character Area Map also covers a 2 km radius for the adjacent Junction 16 Scheme proposals and associated character areas. As the two Schemes are conjoined, the LCA map covers both study areas. LCA's are generally different for each of the Schemes although there is some limited overlap. The landscape components and elements which contribute to the LCA's potentially affected by the A55 Junction 16 Scheme are described under the headings below.

- Physical Characteristics:
  - Settlements and Built Environment;
  - Landform, Geology and Hydrology; and
  - Land cover, vegetation and land use.
- Perceptual Characteristics:
  - Scale and Appearance;
  - Scenic Quality;
  - Tranquillity;
  - Discordant/Intrusive Features; and
  - Night-time light sources.
- Cultural and Social Characteristics
  - Historic Features and Elements; and
  - Human Interaction.

- 9.5.3 The key characteristics and elements contained within the study area are described below and also described in more detail under the same headings for each of the LCA's identified in Appendix 9.3.

#### **Physical Characteristics: Settlements and the Built Environment**

- 9.5.4 The two principal settlements in the conjoined Study area are Llanfairfechan (Junction 15) and Penmaenmawr (Junction 16), approximately 4 km apart. Both are connected by the main arterial A55 road and rail corridor that runs along the North Wales Coast.

- 9.5.5 Penmaenmawr is a former quarry town that developed in 1830 as a result of quarrying the igneous rock diorite. The stone was widely used in the industrial towns of northern England as cobblestones and was quarried out of the nearby Penmaenmawr mountain. Graiglwyd Quarries have over time greatly reduced the height of the mountain that was once much higher with a rounded top and crowned with an old hillfort.
- 9.5.6 There are a wide range of community facilities in the town of Penmaenmawr including schools, care homes, health centre, public halls, public parks and recreation areas, shops, public houses, places of worship and a seaside promenade. The Wales Coastal Path and National Cycle Route run along the promenade and follow the A55 and the coast to the east and west.
- 9.5.7 Further east of Penmaenmawr lie the villages of Dwygyfylchi and Capellulo. These villages are accessible from the A55 at Junction 16A, which lies further east of Penmaenmawr and Junction 16. Junction 16A provides west bound access only. The only other means of access to the two villages is via the Sychnant Pass Road, an unclassified local road with steep gradients and tight bends that connects the two villages to the town of Conwy.
- 9.5.8 Buildings within the immediate vicinity of the Scheme are primarily residential and lie on the north and eastern fringes of Dwygyfylchi including:
- Properties along Ysguborwen Road (east of Junction 16 roundabout) are detached and semi-detached and include the Oasis Christian Centre and the Gladstone Hotel and public house. Tyddyn Ddu Caravan Park lies off Ysguborwen Road on rising land to the south;
  - Detached two storey properties along Ysguborwen Road on the western approaches to Dwygyfylchi;
  - The residential area of Maes y Llan comprising of two-storey semi-detached and terraced properties on the northern fringe of Dwygyfylchi;
  - The residential area of Groesffordd off Ysguborwen Road comprising of two-storey semi-detached and terraced properties on the northern fringe of Dwygyfylchi;
  - Gwel-y-Mor new housing development off Ysguborwen Road containing semi-detached and detached two storey properties on the northern fringe of Dwygyfylchi;
  - Residential area of Cae Gwynan on the northern fringe of Dwygyfylchi;
  - Residential area of Gardd Eryri off Glan-yr-Afon Road on the north and eastern fringes of Dwygyfylchi;
  - Pendyffryn Hall Caravan Park off Glan-yr-Afon Road on the north and eastern fringes of Dwygyfylchi; and
  - Shell Garage and Puffin Café adjacent to the existing A55 road corridor approximately mid-way between Junction 16 and Junction 16A.

### **Physical Characteristics: Landform, Geology and Hydrology**

- 9.5.9 The physical landform has had a significant effect on the built environment, settlement patterns and historic features within the study area.
- 9.5.10 The town of Penmaenmawr extends up the hillside towards Penmaen Mawr with a series of terrace properties set on the northern slopes overlooking the sea. More recent developments of Pen-y-Coed and Pen-y-Cae occupy the lower slopes of Craig Hafodwen and the coastal plain to the east.
- 9.5.11 The village of Dwygyfylchi has developed on the coastal plain at the foothills of Foel Lus and Allt Wen while Capellulo nestles on the inland fringes of the coastal plain and at the foot of the incised valley Fairy Glen through which flows the Afon Gyrach.

- 9.5.12 Inland the mountains of Snowdonia rise to open moorland and upland mountain pastures continue to rise south beyond the Study area within Snowdonia National Park to the south and east and towards the peaks of Moelfre (435 AOD), Foel Lus (362), Maen Esgob (300 AOD and Allt Wen (255 AOD).
- 9.5.13 These landmarks together with Penmaenmawr mountain, reflect the underlying geology of igneous microdiorite (diorite), an extremely hard intrusive igneous rock used in prehistoric times to manufacture stone age axes. Diorite is often described and referred to as granite. More recently and commencing in 1830, the stone was quarried for cobblestones exported to the industrial towns of the north west of England and crushed stone for use as railway ballast.

### **Physical Characteristics: Land Cover, Vegetation and Land Use**

- 9.5.14 Landcover within the Study Area varies considerably and reflects the diverse landform previously described above. Detailed descriptions of the landcover, vegetation and land use are included for each of the LCA's in Appendix 9B but are summarised below for the study area (Junction 16 only):
- Coastal and intertidal areas comprising mudflats and sand/ shingle beaches on the coast of Conwy Bay;
  - Lowland coastal plain of predominantly pastoral land with small pockets of mixed woodland;
  - Caravan parks of Tyddyn Ddu, Tyddyn Llan and Lyons Dyffryn Hall and other camping sites;
  - Penmaenmawr Golf Course;
  - Mountainous headland of Penmaen-bach and surrounding mountain peaks of Snowdonia;
  - Hillside slopes of Penmaen-bach and Alltwn with wooded slopes, rocky outcrops, scree and heath vegetation (Gorse, bracken and heather) which provide a colourful yellow and purple display during the summer months;
  - Roadside plantations along the A55 around the existing Junction 16 have matured and are now an important landscape element integrating the road corridor and junction onto the localised landscape;
  - Patchwork of lowland fields forming a mosaic of patterns defined by dry stone walls. with pockets of woodland, hedgerows and relic hedgerows and mature hedgerow trees along field boundaries and scattered trees within fields;
  - Wooded valley of Fairy Glen and river valley of Afon Gyrach; and
  - Upland areas within the Snowdonia National Park – tree cover is sparse in this open and exposed landscape. Vegetation largely comprises of heather moorland and scrub and with the land use primarily upland grazing.
- 9.5.15 The vegetation within the immediate vicinity of the existing roundabout comprises roadside plantations planted during the construction of the road to integrate the road into the localised landscape. The vegetation is located to the north and south of the existing A55 (T) and to the east and west of the existing Junction 16 roundabout and on the southern verges of Conwy Road and Ysguborwen Road. This roadside plantation is on a cutting and is particularly dense with a large percentage of pines that have now matured and screen the Junction 16 roundabout and local road network from elevated locations to the south and east.
- 9.5.16 There is also a roadside plantation north of Maes y Llan of mixed tree and shrub planting that screen views of the A55 from adjacent properties. The planting consists of a mix of trees and semi-ornamental shrubs which have now reached maturity. Vegetation and landcover is shown on Figure 9.5.

### **Perceptual Characteristics: Scale and Appearance**

- 9.5.17 The study area contains several landscape character areas that differ in scale and appearance in a relatively small area. The coastal setting of Penmanenmawr is open and attractive and contrasts in spectacular fashion with the mountainous backdrop of Snowdonia to the south. Manmade features punctuate the landscape in similarly spectacular fashion, with the A55 road and rail corridor forging an urban barrier between the town and coast and with quarrying activity visible on the hillside above the town.
- 9.5.18 East of Penmaenmawr town the landscape character is more rural but fragmented by a number of different land uses and influenced by the presence of the A55 road corridor.
- 9.5.19 Further south and inland the influences of the A55 road corridor diminish and the landscape becomes more intimate and enclosed primarily due to topography with steep sided mountain slopes and river valley of Fairy Glen and Sychnant Pass. Mature woodland and tree cover also is more prevalent along the riverbank of the Afon Gyrach and valley bottom of Capelulo and Dwygyfylchi.

### **Perceptual Characteristics: Scenic Quality**

- 9.5.20 The scenic quality of the study area is generally good but the A55 road and rail corridor is a detractor generating noise with moving traffic and in particular large high sided vehicles highly visible. The scenic quality within the A55 corridor is therefore low and contains other visual detractors such as lighting (leading up to Junction 16 and Junction 16A), signage, overhead gantries and bridges, concrete and metal barriers and parapets.
- 9.5.21 To the south and towards Snowdonia National Park the scenic quality increases with the exception of the areas blighted by quarrying activity. The northern slopes and incised river valley of the Afon Gyrach are of high scenic quality that continues south towards the upland valleys and open moorlands of Snowdonia.

### **Perceptual Characteristics: Tranquillity**

- 9.5.22 The A55 and railway have a significant effect on the audible tranquillity in the area impacting on the coastal tranquillity for users of Penmaenmawr promenade and nearby residents in Dwygyfylchi. Visual effects on tranquillity are experienced at greater distances on elevated ground as a result of constant movement of traffic and high sided vehicles. These effects are apparent both day and night with vehicle headlights and lighting at Junctions.
- 9.5.23 In general terms, the further south and more distant, and the higher the elevation, tranquillity increases. The extensive upland moorland area of Moelfre and secluded valley of Fairy Glen, are considered to have significant levels of tranquillity.

### **Perceptual Characteristics: Discordant/Intrusive Features**

- 9.5.24 The A55 is the most discordant and intrusive of features within the study area together with the railway line. Overhead gantries lighting columns and illuminated road signage all add to the discord and intrusiveness of the road corridor. Road traffic, particularly high sided vehicles are also highly visible and audible elements and vary in intensity depending on number of road traffic movements and Annual Average Daily Traffic (AADT).

### **Perceptual Characteristics: Night-time Light Sources**

- 9.5.25 Night-time light sources are primarily the A55 road corridor that is visible for some distance at night together with headlights from moving vehicles and the adjacent road network. The overall effect is a ribbon of light stretching along the coast between the towns of Penmaenmawr and Llanfairfechan. Lights within the town of Penmaenmawr and village of Dwygyfylchi are from residential properties, street lighting and cars using the local road network.

### **Cultural and Social Characteristics: Historic Features and Elements**

- 9.5.26 There are several historic features and elements designated as heritage assets within the Study area. Full details of the heritage assets are recorded in Appendix 10.1. The most significant in landscape terms are described below. The designated sites may be wholly or partially located within individual landscape character areas.

#### **World Heritage Sites**

- 9.5.27 There are no World Heritage Sites (WHS) within the study area of Junction 16. However, the WHS, The Castle and Town Walls of Edward 1 in Gwynedd, including Conwy, Caernarfon and Beaumaris Castles, lie in the wider region. Conwy and Beaumaris respectively lie around 8 km and 11.5 km to the east, whilst Caernarfon lies 30 km to the west. None of these sites fall within or close to the study area and would be unaffected due to being a significant distance away from the Scheme.

#### **Scheduled Ancient Monuments (SAM)**

- 9.5.28 There are several Scheduled Ancient Monuments (SAMs) within the study area primarily on the Carneddau upland areas above the town of Penmaenmawr. There are a minimum of eight SAMs within 3 km of Junction 16 all of which are historic and include;
- Hut circles at Clip yr Orsedd (CN 283 Penmaenmawr SJ 71091 75018); ; (LCA 31)
  - Penmaenmawr Stone Circle (CN024 Penmaenmawr SJ 72114 74606); (LCA 35)
  - Ring Cairn north west of Llyn y Wrach (CN260 Henryd SJ 74633 75802); (LCA 32)

#### **Listed Buildings**

- 9.5.29 There are eight listed buildings within 1 km of the junction and A55 corridor. All are listed at Grade 2 and are post-medieval in date. They include Penmaenmawr Railway Station (16520); Horeb Chapel (3155) and the Church of St Seriol (22854). There are also ten buildings on a draft Local list maintained by Conwy Borough Council.

#### **Conservation Areas**

- 9.5.30 There are four Conservation Areas within the community of Penmaenmawr:
- i. The Penmaenmawr Town Centre area;
  - ii. Pen y Cae;
  - iii. St David's Road and Bell Cottages and;
  - iv. Penmaen Conservation area.
- 9.5.31 The Penmaenmawr Town Centre and Pen y Cae extend east of the town centre and fall within 1 km of Junction 16 with the town centre area covering part of Conwy Road and Pen y Cae part of Colwyn Old Road. Neither of the two areas are directly affected by the Scheme.

## **Parks and Gardens**

- 9.5.32 There are no Registered Parks and Gardens within 1 km of Junction 16 and A55 corridor and none within the wider area.

## **Historic Landscapes**

- 9.5.33 North Arllechwedd Historic Landscape is listed on The Register of Landscapes of Outstanding Historic Interest in Wales by CADW. The designation covers an extensive area south of Penmaenmawr, rising above the hillside slopes south of the town and extending towards the upland areas of Carneddau ridge in north Snowdonia. The northern boundary of the area lies within 0.3 km of the existing Junction 16 roundabout along Conwy Old Road.
- 9.5.34 The area contains a rich wealth of upstanding remains from the prehistoric, medieval and later periods, most notably a Neolithic axe factory site (located at Graiglwyd) and one of the most important concentrations of Bronze Age funerary and ritual monuments in western Britain. The sites, often occurring in groups or cemeteries, include cairns of various forms, stone circles, cists and standing stones.
- 9.5.35 Evidence of the hut settlements, enclosures and field systems of the succeeding Iron Age and Romano-British periods has survived in an almost unbroken pattern in the valleys and on the intermediate slopes throughout the area. The largest of the Iron Age settlements, Braich y Ddinas hillfort on Penmaenmawr, was destroyed by quarrying earlier this century, but two smaller forts have survived, one at Maes y Gaer above the mouth of the Aber valley and the other, Dinas, sited on a prominent spur above Llanfairfechan.

## **Long Distance Routes and Public Rights of Way (PRoW)**

- 9.5.36 National Cycle Route 5 (NCR 5) is a long-distance cycle route that runs between Reading and Holyhead, a distance of 381 miles and along the North Wales Coast between Penmaenmawr and Llanfairfechan. The route runs between the main Chester Holyhead railway line and the A55 road corridor as a segregated route. There is currently no direct route to the village of Dwygyfylchi or the town of Penmaenmawr.
- 9.5.37 The Wales Coast Path is a recreational route that covers a total of 870 miles with the Chester to Bangor section covering 80 miles. The route approaches NCR 5 is also used as alternative coastal route for the Wales Coast Path. The path runs along the NCR 5 route and also inland across the upland areas above the town of Penmaenmawr and lowland areas close to Dwygyfylchi.
- 9.5.38 North Wales Path runs from Bangor in the west to Prestatyn in the east and overlaps the more recent Wales Coast Path in some sections. The route runs along some scenic upland paths above Penmaenmawr and Dwygyfylchi and forms circular routes with other public rights of way using the local road network in places.
- 9.5.39 There are few Public Rights of Way (PRoW) within the Study area and these are generally localised around the village of Dwygyfylchi and connect to the wider network in the upland areas. The PRoW in the vicinity of the Scheme proposals are summarised below.
- Penmaenmawr Footpath 29/08 runs north from Ysguborwen Road and passes through the residential areas of Dwygyfylchi before crossing the existing A55 on a footbridge west of the Shell Garage and Puffin Café;

- Penmaenmawr Footpath 29/09 runs from the centre of Dwygyfylchi and Glan-yr-afon Road south along the wooded river valley of the Afon Gyrach towards Capelulo; and
- Penmaenmawr Footpath 29/10 is a short length of footpath that runs from St Gwynan's Church east towards the Afon Gyrach river valley where it connects to footpath 29/09.

### Cultural and Social Characteristics: Human Interaction

- 9.5.40 The study area encompasses a wide variety of landscapes that have an equally varied degree and type of human interaction. This interaction has evolved from the prehistoric times with evidence of settlements on the upland moorland (described above) to the present day, with the busy A55 road and rail corridor a major commuting route and the beach and promenade a popular area with the local community and tourism destination. Types and degrees of human intervention are described for each of the LCA's in Appendix 9.3 with the principal areas for human interactions within public areas summarised in Table 9.2.

**Table 9.2: Areas of Human Interaction**

Area of Human Interaction	Nature of Human Interaction
A55 road and rail corridor	Commercial traffic and daily commuters; seasonal visitor traffic; emergency vehicles.
Local road network	Local community on daily journeys to and from employment and accessing community and private assets such as schools and places of work.
Public Rights of Way	Local community and visitors using footpaths for informal recreation and for connections to recreational trails and long-distance paths; accessing community and private assets such as schools and places of work; residential areas.
Recreational Trails/Long Distance Paths /Cycle Paths	Local community and visitors using the North Wales Path, Cycle Route 5 and the Wales Coast Path.
Penmaenmawr Promenade	Local community using formal recreational facilities such as paddling pool, skatepark and play areas; public realm for general amenity.
Penmaenmawr Beach and Intertidal Area	Local community and seasonal visitors for general recreation, sailing; fishing; bird watching and commercial bait digging.
Penmaenmawr Town Centre; villages of Dwygyfylchi and Capelulo	Local community accessing local public and private assets. Historic Church of St Gwynan's in Dwygyfylchi.
Lowland Farmland	Caravan and camping, golf course and special events such as Circus.
Landfill Sites	Debris in fields to the south of existing Junction 16 (Field 4) and south east of Puffin Roundabout. (Field 13) Buried debris range in date from late 19 <sup>th</sup> Century.

### Landscape Character

- 9.5.41 The physical, perceptual, cultural and social characteristics of the Study area have been outlined above and all contribute to help understand and define the landscape character of the area. Landscape character types are defined as '*distinct types of landscape that are relatively*

*homogenous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they do occur they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern', whilst landscape character areas are 'single unique areas and are the discrete geographical areas of a particular landscape type' <sup>13</sup>.*

### **National Landscape Character Areas (NLCA's)<sup>14</sup>**

- 9.5.42 NLCA's are defined at a broad landscape scale throughout Wales. The descriptive profiles for the 48 individual character areas highlight what distinguishes one landscape from another, with reference to their regionally distinct natural, cultural and perceptual characteristics.
- 9.5.43 The Study area falls primarily within the NLCA03 Arfon with NLCA06 Snowdon to the south east. Arfon is an extensive area stretching south west from Llanfairfechan along the coastal plain to Bangor, Caernarfon and south to Penygroes and beyond to Bryncir in Gwynedd. The summary description describes the area as *"being the lowland area bounded on the one side by the Menai Strait and on the other by the Snowdonia foothills and the adjacent glaciated valleys that open into it. Extending from Penmanen-bach Point in the north east to Bryncir in the south, it includes the Anglo-Norman boroughs of Caernarfon and the cathedral and university city of Bangor."*
- 9.5.44 There is no specific reference to Penmaenmawr in the NLCA03 Arfon although there is reference to *"a dramatic inland panorama of steeply rising mountains"* as being one of the key characteristics of the area. The NLCA provides a very broad description of the area and focusses on the landscape further west of the Arfon plateau, Menai Strait and extensive slate quarries of Nantlle.

### **LANDMAP**

- 9.5.45 LANDMAP described below and how the Visual and Sensory dataset is considered the most relevant of the five datasets in LANDMAP for consideration in evaluating landscape character. Although LANDMAP has been considered too broad a scale and did not take sufficient consideration of the significance of the A55 road transport corridor or other distinct character areas on a more local level, it is worth noting the Visual and Sensory datasets that cover the Study area.
- 9.5.46 The main LANDMAP Visual and Sensory Aspect that covers the Study area is the SNPVS07Llanfairfechan/Penmaenmawr. The summary description for this area is extracted as follows:

*'A narrow coastal area, tightly hemmed in by steeply rising mountains to the south (Snowdonia) and the sea to the north (Conwy Bay) providing inherently attractive views out, and the basis for a strong sense of place. Spectacular rocky headlands plunge into the sea at Penmaenbach and Penyclip, dissecting the area but for the A55/railway corridor that forms a dramatic and changing travel experience through the area. Between headlands there are large suburban village settlements: Llanfairfechan, Penmaenmawr and Dwygyfylchi. Historic stone and brick-built cores and wooded suburbs contrast with modern housing estates that are indifferent to natural or historic character. Long-established granite quarries on mountains above Penmaenmawr have resulted in industrial elements (workers cottages, old workings, railhead) some of which are now experienced as heritage. Promenades abut adjacent sandy beaches, but access points and tranquillity are notably eroded by the A55 road.'*

<sup>13</sup> IAN 135/10 Paragraph 2.9

<sup>14</sup> Natural Resources Wales NLCA03 Arfon



9.5.47 Other adjacent to the above and Study area are LANDMAP Visual and Sensory areas as follows:

**Table 9.3: LANDMAP Visual and Sensory Dataset**

Area Unique ID	Area Name	Classification/ Evaluation	Summary Description
SNPVS 075	Penmaen Mawr quarry	Excavation	"Slate quarry on hillside - grey monotone with borrowed view of coast"
SNPVS072	Carneddau Uplands	Upland Grazing/High	"Rough upland heath / grass / rocky outcrops / tranversed by rough tracks & paths. Scattered scrub & trees, with some drystone walls. Impressive borrowed view to sea & Snowdon Massif. Overhead pylon corridor in northern area is major visual detractor."
SNPVS078	Penmaenbala	Upland Moorland	"Upland moorland, gorse / bracken / heather (colour in summer impressive yellow & purple) with good views of coast provide sense of place. Ancient hill fort & standing stones add to sense of place "

#### **National Marine Character Areas (MCA's)**

9.5.48 Seascapes, like landscapes, reflect the relationship between people and place and the part it plays in forming the setting to our everyday lives. Marine Character Areas highlight the key natural, cultural and perceptual influences that make the character of each seascape distinct and unique.

9.5.49 The marine character area that applies to this section of coast is the Red Wharf and Conwy Bays (MCA 03). The area stretches from the Great Orme's Head in the east to the Moelfre headland on the eastern coast of Anglesey to the west and includes Penmon Point and Puffin Island. It covers the three main bays of Red Wharf, Dulas and Conwy and its tidal stretches. Some of the key characteristics of the MCA relevant to the coastal towns of Penmaenmawr and Llanfairfechan are:

- Broad sand flats and low-lying beaches punctuated by rugged cliffs and prominent limestone headlands;
- Extensive intertidal area around the mouth of Conwy Estuary extending westwards and including Lavan Sands;
- Significant area within the Liverpool Bay SPA, designated for overwintering populations of red-throated diver and common scoter. Lavan Sands (SPA/SSSI) is also designated for its wintering birdlife, especially the oystercatcher;
- Popular tourist destination evidenced by several coastal settlements. Activities include swimming, angling and diving, jet-skiing and pleasure trips. There are a number of recreational dive sites along the coast;
- Rich evidence for a long history of human occupation, with large sections of the adjacent coast designated as Landscapes of Outstanding Historic Interest;
- The 12th Century Conwy and Beaumaris Castles (World Heritage Sites) overlook the MCA;
- The Wales Coast Path follows much of the coastline in this MCA. Most of the adjacent Anglesey coastline is AONB-designated, reflecting its nationally important scenic qualities. Snowdonia National Park rises up dramatically to the south; and
- Puffin island a key feature of the seascape setting in views north, with Great Orme being a

distinctive feature to the east; forming gateway features into Conwy Bay.

- 9.5.50 The MCA acknowledges Llanfairfechan as a historically important seaside resort and the quarry workings at Penmaenmawr being visible as levels and inclines on the mountainside. It also acknowledges the tunnelling required for the A55 coast road and the mountainous backdrop of Snowdonia. The mountainous backdrop is considered one of the important aspects of the MCA, providing a spectacular landscape setting when viewed from the sea. It makes no reference to the existing A55 road corridor as being a key characteristic or detractor of the area.
- 9.5.51 The MCA acknowledges Llanfairfechan as a historically important seaside resort and the quarry workings at Penmaenmawr being visible as levels and inclines on the mountainside. It also acknowledges the tunnelling required for the A55 coast road and the mountainous backdrop of Snowdonia. The mountainous backdrop is considered one of the important aspects of the MCA, providing a spectacular landscape setting when viewed from the sea. It makes no reference to the existing A55 road corridor as being a key characteristic or detractor of the area.

### **Landscape and Ecological Designations**

- 9.5.52 The following is a list of sites within the Study area which have been designated for their landscape and ecological value. A note of which LCA the designated areas fall within has been added for ease of reference:

#### **Sites of Special Scientific Interest (SSSI)**

- Sychnant Pass SSSI (LCA 34);
- Aber Afon Conwy SSSI (LCA 02, 04);
- Special Area of Conservation (SAC); and
- Menai Strait and Conwy Bay SAC (LCA 01,02, 04)

#### **Special Protection Area (SPA)**

- Liverpool Bay SPA (LCA 02)

#### **Local Nature Reserves (LNR)**

- None within Study Area

#### **Ancient Woodland Sites**

- East of Junction 16A: Ancient Semi Natural Woodland;
- Fairy Glen, Capelulo: Restored Ancient Woodland Site (LCA 23);
- Old Mill Road, Capellulo: Ancient Semi Natural Woodland (LCA 27); and
- Coed Pendyffryn – Restored Ancient Woodland Site (LCA 34)

- 9.5.53 More details on the ecological designations are described in ES Chapter 8 Nature Conservation.

#### **Local Character Areas**

- 9.5.54 A more detailed appraisal of the local landscape character areas (using LANDMAP as a basis) was undertaken that covered the Study areas of the conjoined Junction 15 and 16 Schemes. The Landscape Character Areas (LCA's) are presented in Appendix 9.3 each with a description and accompanying map inset and representative photograph. Note that the numbering for each LCA is not sequential for the Junctions 15 or Junction 16 as this covers both study areas in separate Environmental Statements.

9.5.55 The LCA's relevant to Junction 16 are presented in Table 9.4.

**Table 9.4: A55 Junctions 15 and 16: Landscape Character Areas (LCA's)**

LCA Ref	LCA Name	Junction 15	Junction 16
LCA 1	Traeth Lafan and Dutchman Bank	✓	
LCA 2	Penmaenmawr Beach	✓	✓
LCA 3	Conwy Estuary		✓
LCA 4	Aber and Felin-fach Salt Marsh	✓	
LCA 5	Aber Farmland	✓	
LCA 6	Tyddyn-coed - Mosaic	✓	
LCA 7	A55 Abergwyngregyn to Llanfairfechan	✓	
LCA 8	A55 Llanfairfechan to Pen-y-Clip	✓	
LCA 9	A55 Pen-y-clip to Penmaenbach		✓
LCA 10	Pendyffryn Pasture and Parkland		✓
LCA 11	Llanfairfechan Promenade	✓	
LCA 12	Llanfairfechan Town Centre	✓	
LCA 13	Llanfairfechan Drycin	✓	
LCA 14	Llanfairfechan Uchaf	✓	
LCA 15	Penmaenmawr Penmaenan		✓
LCA 16	Penmaenmawr Pant-yr-afon		✓
LCA 17	Dwygyfylchi		✓
LCA 18	Llanfairfechan Parkland	✓	
LCA 19	Penmaen Park	✓	
LCA 20	Penmaenmawr Quarries (active)	✓	✓
LCA 21	Penmaenmawr Quarries (disused)	✓	
LCA 22	Y Teiryd Valley	✓	
LCA 23	Fairy Glen Valley		✓
LCA 24	Nant-y-Felin Pasture	✓	
LCA 25	Nant-y-pandy Pasture	✓	
LCA 26	Pant-yr-Afon Pasture		✓
LCA 27	Capelulo Pasture		✓
LCA 28	Coed y Rhiwiau	✓	
LCA 29	Cae'r Haid Mountain Pasture	✓	
LCA 30	Y Teiryd Mountain Pasture	✓	
LCA 31	Graig Lwyd Mountain Pasture	✓	✓
LCA 32	Maen Crwn Mountain Pasture		✓
LCA 33	Foel Wen Moorland		✓
LCA 34	Allt Wen Moorland		✓
LCA 35	Moelfre Upland Moorland	✓	✓

## Landscape Character Assessment

- 9.5.56 A total of 35 landscape character areas were identified for the conjoined scheme proposals with sixteen identified as being within the study area for Junction 16. Each landscape character area is fully described in Appendix 9.3 with supporting plan and indicative photograph. Each character area has been assigned measures of Landscape Value that when combined with Susceptibility to Change combined, give a measure of Landscape Sensitivity.
- 9.5.57 A summary of the landscape character areas relevant to the A55 Junction 16 study area and their value is shown in Table 9.5. Landscape value is assigned using a five point scale ranging from Very High, High, Medium, Low and Poor.

**Table 9.5: Landscape Character Areas (LCA's) for Junction 15 and Junction 16**

LCA Ref	LCA Name	Landscape Value				
		Very High	High	Moderate	Low	Poor
LCA 2	Penmaenmawr Beach		✓			
LCA 3	Conwy Estuary	✓				
LCA 9	A55 Pen-y-clip to Penmaenbach				✓	
LCA 10	Pendyffryn Pasture and Parkland			✓		
LCA 15	Penmaenmawr Penmaenan			✓	✓	
LCA 16	Penmaenmawr Pant-yr-afon			✓		
LCA 17	Dwygyfylchi			✓		
LCA 20	Penmaenmawr Quarries (active)					✓
LCA 23	Fairy Glen Valley		✓			
LCA 26	Pant yr Afon Pasture			✓		
LCA 27	Capelulo Pasture		✓			
LCA 31	Graig Lwyd Mountain Pasture			✓		
LCA 32	Maen Crwn Mountain Pasture		✓			
LCA 33	Foel Wen Moorland	✓				
LCA 34	Allt Wen Moorland	✓				
LCA 35	Moelfre Upland Moorland	✓				

## Sensitivity of the Landscape Receptors

- 9.5.58 IAN 135/10 (W) recommends that as part of the landscape baseline description, "the sensitivity of the landscape should be established by combining judgements of the landscape receptors susceptibility to the type of change proposed and the value attached to the landscape".<sup>15</sup>

<sup>15</sup> IAN 135/10 (W) para 3.10

- 9.5.59 Susceptibility to change means “*the ability of the landscape receptor to accommodate the proposed development without undue consequences for the maintenance of the baseline situation*” and is described using a three point scale of high, medium and low as set out in Appendix 9A (Table 3) but repeated here for ease of reference.

**Table 9.6: Landscape Susceptibility to Change**

<b>High</b>	Effects from the type of scheme proposed are likely to cause a major change to the baseline landscape
<b>Medium</b>	Effects from the type of scheme proposed are likely to lead to a moderate change in the baseline landscape
<b>Low</b>	Effects from the type of scheme proposed can be accommodated with only a minor, or no, change to the baseline landscape

- 9.5.60 Detailed landscape character area descriptions are set in Appendix 9C but are summarised below.

#### **LCA2 – Penmaenmawr Beach**

- 9.5.61 Extensive coastal and intertidal area stretching from Penmaenmawr east to Penmaenbach headland with mainline Holyhead to Chester railway and A55 road corridor defining the southern edge. Large scale landscape with an open and exposed aspect. Organised pattern determined by tide levels with a moderate texture. Penmaenmawr beach and promenade are highly valued by the local community and used for general amenity and recreation. Tourism use during the summer months with beach café and play areas popular venues. The inter-tidal area is valued as a recreational and designated for nature conservation. The area is of good scenic quality and well maintained. Overall landscape value is detracted by proximity of road and rail corridor. The area is already heavily influenced by the A55 and effects from the type of scheme proposed are likely to lead to a moderate change to the landscape baseline/character. Therefore, susceptibility is considered overall to be medium resulting in medium landscape sensitivity.

<b>Landscape Value</b>	<b>Susceptibility to Change</b>	<b>Landscape Sensitivity</b>
High	Medium	Medium

#### **LCA3 – Conwy Estuary**

- 9.5.62 Conwy Estuary is an extensive inter-tidal area encompassing Conwy Estuary as it enters into Conwy Bay. The area is a dynamic environment with high tidal range with exposed sand banks and mussel banks at low tide. The setting of the area is open with a backdrop of hills to the south and West Shore and the Great Orme to the north and east. Distant views across open sea west towards Anglesey and Puffin Island. The estuary contains international ecological and maritime designations. The area would have a high susceptibility to change from any form of development including the type of highway improvement scheme proposed.

<b>Landscape Value</b>	<b>Susceptibility to Change</b>	<b>Landscape Sensitivity</b>
Very High	High	High

**LCA9 – A55 Pen-y-clip to Penmaenbach**

- 9.5.63 The road corridor within this LCA is highly urban in character with some significant engineering features and structures such as overbridges, signs and gantries. The road corridor sits within the context of Penmaenmawr, a former quarry town with clear evidence of quarrying as a previous industry. The road corridor is elevated and is a dominant element above the Penmaenmawr beach frontage that is highly valued by the local community as an area for amenity and recreation. East of Junction 16 roundabout and towards Penmaenbach headland and junction 16A, the road and rail corridor is at a more even level as it runs across the coastal plain before skirting the headland and entering the Penmaenbach tunnels. This is a landscape of low sensitivity with the road corridor containing several detracting elements.

Landscape Value	Susceptibility to Change	Landscape Sensitivity
Low	Low	Low

**LCA10 – Pendyffryn Pasture and Parkland**

- 9.5.64 This character area lies to the north of Dwygyfylchi and south of the A55 and Junction 16A (Dwygyfylchi) to the west of Penmaenbach headland. Glan-Yr-Afon road runs in a south west direction from the A55 flanked by hedgerows towards Dwygyfylchi. The area is predominantly open lowland set to pasture with seasonal caravan and camping land uses and a field used for events such as circuses and fairgrounds. The overall landscape value of Pendyffryn pasture and parkland is considered to be medium due to its lack of cohesiveness and the erosion of its rural character due to the encroachment of residential development. The proximity of the A55 road corridor, although concealed by localised topography and hedgerow boundaries in some place, is a detractor with noise of passing vehicles and lighting a detractor. However, away from the road corridor, the setting to the south and east remains of good scenic quality.

Landscape Value	Susceptibility to Change	Landscape Sensitivity
Moderate	Medium	Medium

**LCA15 – Penmaenmawr Penmaenan**

- 9.5.65 Penmaenan is a residential area west of Penmaenmawr set on a series of streets above the High Street and on the lower slopes of Penmaenmawr mountain. The area lies to the south of the A55 road and rail corridor and either side of the High Street, a wide road and formerly the main A55 coast road. Pen-y-Clip Tunnel lies to the west of Penmaenan with steep rock and scree rising above the eastern portal. To the east is Penmaenmawr Town Centre. The High Street forms the spine of the character area and runs parallel and above the railway and A55. Located on the High Street are several businesses including a garage, hotel and St Paul's Church. Residential areas are interconnected by steep roads and boundaries are predominantly constructed of traditional stone. Overall the landscape value of this area is low and heavily influenced by the existing road corridor and quarrying activities.

Landscape Value	Susceptibility to Change	Landscape Sensitivity
Low	Low	Low

**LCA16 – Penmaenmawr Pant-yr-Afon**

- 9.5.66 Penmaenmawr town centre is centred around Conwy Road, the former north Wales Coast Road prior to the A55 being constructed in the 1990's. This is the hub of the town with several shops and community facilities lining the street, some have been refurbished with ornate glass canopies contributing to the streetscene and public realm. Station Road runs north and downhill to Penmaenmawr train station and an underpass beneath the A55 road corridor connects to the promenade. South of Conwy Road, a series of roads lead uphill to residential areas and beyond to a caravan park and isolated farms. The town centre is designated as a Conservation Area and is of good landscape value with a medium susceptibility to change.

Landscape Value	Susceptibility to Change	Landscape Sensitivity
Moderate	Medium	Medium

**LCA17 – Dwygyfylchi**

- 9.5.67 Village of Dwygyfylchi set on coastal plain at foothills of Allt Wen and Foel Lus in Snowdonia National Park with A55 road corridor to the north and north west. The village is predominantly residential with caravan sites and a golf course on land to the west and south. The centre of the village lies St Gwynan's Church, an attractive church with an elegant spire and a local landmark. Adjacent to the church lies a cemetery of Commonwealth War Graves. The landscape within this area varies in quality but is generally in good condition. There are no designations, but it is located adjacent to the Snowdonia National Park and the surrounding areas is highly scenic. There are elements of the landscape that are valued by the local community and some visitors have long associations with the area through use of the caravan parks. Recent development has led to fragmentation of settlement edge.

Landscape Value	Susceptibility to Change	Landscape Sensitivity
Moderate	High	Medium

**LCA20 – Penmaenmawr Quarries**

- 9.5.68 Penmaenmawr Quarry is an operational quarry managed by Hanson Aggregates. It is an extensive open cast quarry set on a series of levels and inclines that remain largely hidden from view from the town and surrounding area of Penmaenmawr. The most significant period of historical connections is seen to relate to quarrying activity and the development of the town during the 19<sup>th</sup> century. The physical landscape value of the quarry is distinct to quarrying activities. The scale of the operation and the resultant landform is spectacular, an illustration of mans' interaction (or exploitation) with the natural environment. The social and cultural associations between the quarry and town are hugely significant and are important on both a local and regional scale. Therefore, the overall landscape value is considered to be medium due to the significance of the social and cultural associations.

Landscape Value	Susceptibility to Change	Landscape Sensitivity
Poor	Low	Low

**LCA23 – Fairy Glen Valley**

- 9.5.69 Fairy Glen Valley is a steep sided narrow wooded valley south of the village of Capelulo and set within the foothills of Snowdonia National Park. The upper reaches of Afon Gyrach flow through

the valley that is known for its waterfalls. The valley is popular with ramblers and walkers with a series of circular walks passing through the valley. The North Wales Path skirts the upland areas above the valley and is a highly scenic area and popular with walkers and ramblers. The valley is sheltered and peaceful, enclosed and secluded but is popular during peak holiday periods.

Landscape Value	Susceptibility to Change	Landscape Sensitivity
High	High	High

#### **LCA 26 Pant-yr-Afon Pasture**

- 9.5.70 The Pant-yr-afon pasture lies between Penmaenmawr and Dwygyfylchi on the lower hillside slopes of Foel Lus and Craig Hafodwen and the coastal plain adjacent to the A55 road corridor. There are a variety of land uses in this area outside and on the fringes of the two settlement boundaries. Camping and caravan parks occupy the elevated ground and overlook the coastal plain and A55 road corridor. Other land uses include a cemetery, recreation and sports ground with some areas of rough grazing. The landscape character of this area is fragmented with several different land uses falling between the two settlement boundaries of Penmaenmawr and Dwygyfylchi. While there are some open views across the coastal plain to the open sea, these are compromised and heavily influenced by the A55 road corridor. The area holds no statutory designations, but some landscape elements may be valued by the local community.

Landscape Value	Susceptibility to Change	Landscape Sensitivity
Moderate	Low	Low

#### **LCA27 – Capelulo Pasture**

- 9.5.71 The area lies adjacent to the village of Capelulo at the base of Sychnant Pass and forms part of the coastal plain that extends east from the village of Dwygyfylchi. The area is defined by Old mill Road to the north and Sychnant Pass Road to the south. The area is sheltered and heavily wooded alongside the valley of the Afon Gyrach. The North Wales path runs alongside the river connecting the two roads to the north and south. Adjacent fields are small scale and used for grazing. The landscape elements of the woodland and river combine to form an attractive landscape within a sheltered landscape setting at the eastern most part of the coastal plain.

Landscape Value	Susceptibility to Change	Landscape Sensitivity
High	High	High

#### **LCA31 - Graig Lwyd Mountain Pasture**

- 9.5.72 The area lies on the northern slopes of Moelfre above the town of Penmaenmawr and immediately east and adjacent to the active quarry. North Wales Path and Wales Coast Path pass along southern and upper reaches of area close to the peak of Moelfre. The landscape value of this area is heavily influenced by the adjoining quarry, some of which remains operational, other parts are now disused. There remain signs of man's interaction with the area through the evidence of hut circles and stone circles. The area falls outside Snowdonia National Park and is considered to be of medium importance and rarity. The overall landscape value is



therefore considered to be of good value but with a low susceptibility to change due to the proximity of quarrying activity.

Landscape Value	Susceptibility to Change	Landscape Sensitivity
Moderate	Low	Low

#### **LCA32 – Maen Crwn Mountain Pasture**

- 9.5.73 The area is composed of an upland plateau and western slopes of Foel Lus and Craig Hafodwen set above the town and village of Penmaenmawr and Dwygyfylchi. The Wales Coast Path traverses the mid slope of Foel Lus and passes through the area to the south. The area is primarily of rough pasture and used for rough grazing sheep and ponies. It is a popular area for informal recreation and lies along the route of the Wales Coast Path that connects to several other public rights of way and open access land. The area lies within and on the fringes of Snowdonia National Park and is a high-quality upland landscape with qualities of remoteness and tranquillity.

Landscape Value	Susceptibility to Change	Landscape Sensitivity
High	High	High

#### **LCA33 – Foel Wen Moorland**

- 9.5.74 This LCA is located on the around the peak of Foel Lus hillside to the south of Dwygyfylchi and above the village of Capelulo. The landcover occupies an exposed upland position around the peak of Foel Lus with steeply side slopes with upland heath, grass, rocky outcrops, and scattered scrub and trees. The landscape is open and exposed with boundaries comprising drystone walls. The area is part of the wider Carneddau upland landscape, a highly scenic area with expansive panoramic views across mountains and sea. The area is remote and tranquil and lies within Snowdonia National Park. This is a nationally valued landscape with no potential for substitution, it is therefore considered a landscape of high value.

Landscape Value	Susceptibility to Change	Landscape Sensitivity
Very High	High	High

#### **LCAS 34 - Allt Wen Moorland**

- 9.5.75 The area extends from the rocky headland of Penmaenbach south to include the peak of Allt Wen, Sychnant Pass and the upland area of Maen Esgob above the village of Capelulo. The area is extremely scenic and of outstanding quality. It has a coastal setting and is also part of the wider Carneddau upland landscape, a highly scenic area with expansive panoramic views across mountains and sea. The area is remote and tranquil and lies within Snowdonia National Park. It is a popular area for residents and visitors enjoying walking and rambling activities. This is a nationally valued landscape with no potential for substitution, it is therefore considered a landscape of very high value with a high susceptibility to change and therefore of very high sensitivity.

Landscape Value	Susceptibility to Change	Landscape Sensitivity
Very High	High	High

### LCA35 – Moelfre Upland Moorland

- 9.5.76 The area is part of the wider Carneddau upland landscape, a highly scenic area with expansive panoramic views across mountain range. The area is remote and tranquil and lies within Snowdonia National Park. There is a wealth of historic features and elements. This is a nationally valued landscape with no potential for substitution, it is therefore considered a landscape of very high value and could not accommodate any type of development such as a highway scheme.

Landscape Value	Susceptibility to Change	Landscape Sensitivity
Very High	High	High

The landscape sensitivity of the LCA's is summarised in the table below. There is a strong correlation between the highly sensitive upland and coastal areas that are highly protected with statutory designations and the landscape of lower sensitivity adjacent to the existing A55 road and rail corridor.

**Table 9.7: Summary of Landscape Sensitivity**

LCA Ref	LCA Name	Landscape Sensitivity		
		High	Medium	Low
LCA 2	Penmaenmawr Beach		✓	
LCA 3	Conwy Estuary	✓		
LCA 9	A55 Pen-y-clip to Penmaenbach			✓
LCA 10	Pendyffryn Pasture and Parkland		✓	
LCA 15	Penmaenmawr Penmaenan			✓
LCA 16	Penmaenmawr Pant-yr-Afon		✓	
LCA 17	Dwygyfylchi		✓	
LCA 20	Penmaenmawr Quarries (Active)			✓
LCA 23	Fairy Glen Valley	✓		
LCA 26	Pant-yr-Afon Pasture			✓
LCA 27	Capelulo Pasture	✓		
LCA 31	Graig Lwyd Mountain Pasture			✓
LCA 32	Maen Crwn Mpountain Pasture	✓		
LCA 33	Foel Wen Moorland	✓		
LCA 34	Allt Wen Moorland	✓		
LCA 35	Moelfre Upland Moorland	✓		

## Visual Baseline

- 9.5.77 This section describes the baseline visual conditions, identifying specifically:
- The extent of possible visibility;
  - The different groups or types of people (receptors) who may experience views of the development;
  - The viewpoints where they will be affected; and
  - The nature of the views at those points.
- 9.5.78 The baseline landscape conditions consider various aspects of perceptual characteristics: such as scale and appearance; scenic quality and tranquillity and records any discordant or intrusive features and night-time light sources.
- 9.5.79 These are useful observations that aid with establishing the visual quality of an area and how this can contribute to the landscape quality and value.
- 9.5.80 The visual baseline conditions establish the existing visual receptors using the following measures:
- Use of a digital terrain model to establish a potential Zone of Theoretical Visibility (ZTV) that takes into account basic landform with no other visual barriers plotted and potential. The ZTV will be used to identify potential visual receptors and to define representative viewpoints for consideration in the assessment process;
  - Use of large-scale OS maps and aerial photography to determine where a straight line of sight may be available to the Scheme, taking into account topography and large intervening features such as substantial vegetation and buildings;
  - Site surveys to verify the ZTV, and to assess the views available from footpaths, bridleways, local roads, open space and land with public access; and
  - Recording seasonal and night-time variations.
- 9.5.81 The study area is characterised by its generally high scenic quality due to its spectacular coastal setting at the foothills of Snowdonia. To the north and north west there are far reaching and expansive views from the existing Junction 16 and surrounding area across Conwy Bay to Penmon Point Lighthouse and Puffin Island (approximately 9.5 km distant). To the north east there are far reaching views across Conwy Bay towards the Great Orme, approximately 6.5 km distant. The views are extensive and highly scenic, especially when seen against the mountainous backdrop of the Carneddau Mountains and Penmaen-bach Headland.
- 9.5.82 Visibility varies considerably due to the weather conditions, not only seasonally but also daily and at times from hour to hour.
- 9.5.83 To the east, Penmaen-bach is a prominent rocky headland that descends steeply to the coast as a visual barrier preventing views towards Conwy and further east. Views to the south east and south are similarly contained by the steeply rising land of the mountains Allt Wen (255 AOD), Craigfyfedwen (252 AOD) and Foel Lus (362 AOD). To the west views are contained by Penmaenmawr Mountain and Graiglwyd Quarry that rise steeply above the former quarry town of Penmaenmawr.
- 9.5.84 Overall, the Zone of Theoretical Visibility is limited and contained due to the low-lying nature of the coastal plain and the surrounding hills and mountains of northern Snowdonia.

- 9.5.85 The key visual characteristic of the area are the open scenic vistas across Conwy Bay to Anglesey, Puffin Island and the Great Orme. The view of the sea and these landmarks is compulsive and unique and the focus for many visual receptors within the wider area.
- 9.5.86 The main and highly significant visual detractor in the area is the A55 road corridor, a ribbon of transport infrastructure with a collection of unsightly elements assembled as a continuous linear man-made feature. The road corridor is also highly visible during night-time particularly around Junction 16 and the coastal strip either side with vehicles also adding to the lighting levels during night-time.

### **Representative Viewpoints**

- 9.5.87 Several photographs have been taken from viewpoints surrounding the extents of the Scheme proposals and have informed the visual baseline. The representative viewpoints were selected:
- From publicly accessible areas; and
  - To represent a typical range of visual receptors.
- 9.5.88 A total of 11 of representative viewpoints have been taken during the summer and winter months to help inform the visual baseline and identify potential visual receptors. A detailed description of the nature of the view towards the Scheme proposals is described for each of the viewpoints on the representative viewpoint sheets which are included within Appendix 9.4. The viewpoint photographs have been taken in accordance with the photographic methodology included within Appendix 9.2.
- 9.5.89 The key views from the representative viewpoints are described below.

#### **Viewpoint A: Penmaenmawr Promenade**

- 9.5.90 View east along Penmaenmawr Promenade towards Penmaen-bach headland with West Shore and the Great Orme in the distance. The A55 road corridor runs immediately south of and elevated above the promenade supported on concrete structures visible in the middle distance. Roadside planting obscures the A55 on the eastern approaches to Junction 16 roundabout. Residential properties in Penmaenmawr (Conway Road) appear elevated above the A55 road and rail corridor with the mountainous backdrop of Foel Lus and Allt Wen beyond.

#### **Viewpoint B: Ysguborwen Road**

- 9.5.91 View north east from Ysguborwen Road opposite the Gladstone public house across Conwy Bay towards the Great Orme. The road corridor of the A55 appears in the middle distance characterised with lighting and signage and moving traffic. The road is partially obscured by roadside hedgerows and plantation adjacent to Maes-y-Llan residential area towards the east with the backdrop of Penmaen-bach headland rising above. Fields of rough grazing/pasture with remnant dry stone wall boundaries and fragmented hedgerows are visible in the foreground.

#### **Viewpoint C: Maes y Llan**

- 9.5.92 The residential properties of Maes-y-Llan lie immediately south of the A55 on elevated land overlooking the A55 road corridor with open views from first floors across Conwy Bay and open sea with the Great Orme to the north east. From street level and the ground floor of properties views of the A55 road corridor are screened by dense roadside plantations of mixed native and

ornamental trees and shrubs. The mountainous hillside of Penmaenmawr appears on the horizon to the west.

#### **Viewpoint D: Puffin Café Pedestrian Footbridge**

- 9.5.93 View east of the A55 road and rail corridor from the existing pedestrian footbridge west of the Shell Garage and Puffin Café. The A55 dual carriageway appears as a wide corridor with a grassed central reserve characterised by moving traffic, lighting columns and signage. The Shell Garage and forecourt and car parking area of the Puffin Café lie adjacent to the A55 and are further detracting elements from the scenic views of Penmaen-bach and wooded mountainside of Allt Wen in the background.

#### **Viewpoint E: Gwel y Mor Public Open Space**

- 9.5.94 The view is north eastwards towards Conwy Bay and the Great Orme across an area of informal recreation adjacent to the residential area of Maes-y-Llan and the recent residential development of Gwel-y-Mor. The pedestrian footbridge that crosses the A55 road corridor west of Shell Garage is clearly visible with the A55 road corridor obscured by localised topography and roadside vegetation. Lighting columns along the A55 are visible together with signage at Puffin Café and fascias of the Shell Garage.

#### **Viewpoint F: A55 Road Corridor West of Junction 16A**

- 9.5.95 This viewpoint is west of Junction 16A and along the A55 road corridor towards the mountain of Penmaenmawr. The road corridor is characterised by lighting, signage and vehicle restraint barriers, the footpath along the southern verge appears narrow and immediately adjacent to the carriageway. Roadside hedgerow planting defines the southern verge of the road corridor. The roadside environment is hostile for non-motorised users being exposed to fast moving traffic and high sided vehicles causing significant noise and sudden gusts of wind.

#### **Viewpoint G: Pendyffryn Farmland**

- 9.5.96 The viewpoint is in similar location and aspect to Viewpoint F but south of the A55 road corridor and roadside hedgerow. The view is across open pastoral fields towards the A55 road corridor with the pedestrian overbridge west of Puffin Café clearly visible in the middle distance. The residential areas in Dwygyfylchi are also clearly visible, most notably the areas of Cae Gwynan, Maes-y-Llan and Gwel-y-Mor on slightly elevated land overlooking the fields south of the A55. Properties on Conwy Old Road are also visible on the hillside at the foot of the mountain Foel Lûs. Beyond Dwygyfylchi and the town of Penmaenmawr, the Graig Lwyd Quarries and Penmaen Mawr rise to form a spectacular backdrop.

#### **Viewpoint H: Glan-yr Afon Field**

- 9.5.97 The view is across the fields of low lying coastal plain adjacent to Glan-y-Mor road towards Junction 16A and Penmaen-bach headland with distant views of the Great Orme. Elements of the A55 road corridor and railway are visible in the middle distance with a collection of lighting columns, roadside masts and signage and walls indicative features of the road corridor. Roadside vegetation obscures views of the carriageway with the woodland of Coed Pendyffryn running along the base of the scree and rocky hillsides of Penamen-bach and Allt Wen.

#### **Viewpoint I: Allt Wen**

- 9.5.98 The view from Allt Wen is open and expansive across the coastal plain and village of Dwygyfylchi and Conwy Bay towards Beaumaris and Puffin Island and beyond to Point Lynas on

the north-eastern coast of Anglesey. The view is representative of that experienced by walkers and ramblers and users of the North Wales Path although the viewpoint lies some distance off the official route. The viewpoint illustrates the context of the A55 road corridor and land use of Dwygyfylchi, Penmaenmawr and the surrounding area.

#### **Viewpoint J: Treforris Road**

- 9.5.99 The viewpoint is located at the junction of Treforris Road with Conwy Old Road close to Ysgol Capellulo and overlooks Dwygyfylchi and the A55 road corridor with extensive open views beyond across Conwy Bay to the north and north east towards the Great Orme. The touring caravan park of Tyddyn Du appears in the middle distance together with the Gladstone public house that lies on Ysguborwen Road. Mature pines east of the Gladstone along Ysguborwen Road are distinctive landscape features.

#### **Viewpoint K: Trwyn-y-Wylfa**

- 9.5.100 This representative viewpoint is from the public footpath network on the lower slopes of Foel Lûs that leads to the Wales Coast Path and Jubilee Walk. The view is across the residential area of Dwygyfylchi and Penmaenmawr Golf Course with the A55 road corridor visible north of the coastal plain towards the coastal strip. The road corridor disappears from view in places due to localised topography and roadside vegetation.

### **9.6 Identification of Potential Effects**

#### **Defining Project Characteristics**

- 9.6.1 The preferred route (Option A) was announced on 5 April 2019 and was subsequently refined following Public Information Events (PIE's) held in June 2019.
- 9.6.2 The designers followed an iterative design and assessment process, to meet the Scheme objectives. At all stages, as the design was developed and refined to futureproof the Scheme against future predictable circumstances and to support Welsh Government objectives, including the need to encourage active travel and support the sustainability objectives of the Well-being of Future Generations (Wales) Act 2015. The design team sought to avoid and reduce the potential impacts of the landscape and visual effects, and to incorporate measures required by other environmental disciplines.
- 9.6.3 The key components of the proposed Scheme are described below. Full details of the Scheme are described in Chapter 2 'The Project'. Mitigation measures identified as part of the Scheme development are identified and illustrated in the Environmental Masterplan (EMP) in Appendix 2.6. A preliminary assessment of potential effects was undertaken without the mitigation measures in place, this assessment is effectively Year One of opening when planting has not had chance to establish. Other mitigation measures such as earthworks have been developed and incorporated as part of the Scheme proposals.

#### **General Arrangement**

- 9.6.4 The Scheme involves changes to both Junction 16 and Junction 16A. At Junction 16 that lies approximately 0.5 km north east of the town, the existing roundabout will be replaced by westbound on and off-slip roads. The new arrangement at Junction 16 will only be used by westbound vehicles for access to Penmaenmawr and by vehicles leaving Penmaenmawr to travel west towards Bangor. The new at-grade junction will require additional land take and the

removal of some roadside plantations to the south of A55 and to facilitate the west bound on and off slips and connections to the new roundabout at Conway Road and Ysguborwen Road.

- 9.6.5 A new grade-separated junction would be constructed further east at Junction 16A, at Dwygyfylchi, with a new overbridge and with on and off east and west bound slip roads that would provide four-way movement. The slip-roads would rise on embankments to a height of 7 m above the dual-carriageway, to meet an overbridge across the A55. There will also be access off the eastbound off slip road to the Dwr Cymru /Welsh Water (DCWW) water treatment works.
- 9.6.6 A new link road running roughly parallel to the A55 on the south side will form a new junction with Ysguborwen Road in the west. Extending east it will pass close to the north side of houses in Maes-y-Llan and then loop round the south side of Puffin Café and Service Station to meet the new grade separated junction 16A. Glan-Yr-Afon Road, to Dwygyfylchi and Capellulo, will meet with the link road at a 'T' junction close to Junction 16A.
- 9.6.7 In summary the Junction 16 improvements include:
- Removal of Junction 16 roundabout and construction of a replacement junction (16) with westbound on and off slip roads only and new roundabout junction for the local road network;
  - Removal of existing Junction 16A and replacement with grade separated junction and overbridge with slip roads in both directions;
  - A new link road will be constructed running roughly parallel with the A55 from Junction 16A to the south of the Puffin Café linking back into the local road network at Ysguborwen Road, near the Gladstone Hotel;
  - On the south side of the A55 a corridor of green infrastructure will be created separating the A55 and the new link road to the north from the residential and agricultural areas to the south. Within the green corridor a large earthwork, known as a false cutting, will be formed with tree and shrub planting to provide visual separation of the A55 and the new link road to the north from the existing residential areas and Ysguborwen Road to the south.
  - The green corridor would incorporate links to existing facilities such as the football field by Maes-y-Llan and the Puffin Café and provide a naturalistic landscape barrier of woodland and meadows as a setting for circular cycle and walking routes to connect to the wider network. A new footbridge would replace the existing and provide improved ramped and more accessible access to the foreshore.

### **Site Compounds**

- 9.6.8 Site compounds and lay down areas are important during the construction period to facilitate storage of materials and provide offices and welfare facilities for site staff and visitors. Two areas have been earmarked for these purposes namely:
- Land north west off Glan-y-Mor Road south of proposed link road; and
  - Land north of Ysguborwen Road adjacent to existing roundabout.

### **Accommodation Works**

- 9.6.9 Maintenance routes for construction access and future maintenance operations have been identified in a number of locations:

- Private Means of Access (PMA) and maintenance track for fields south of junction with Conwy Road & Ysguborwen Road;
- Maintenance/construction access south of link road and false cutting between Junction 16 and Maes-y-Llan;
- Maintenance/construction access south of link road and false cutting between Maes-y-Llan (CH 100) and land east of Shell Garage (450) with access required to attenuation ponds;
- Maintenance/construction access south of link road and false cutting between Afon Gyrach (CH500) to Junction 16A (CH 900); and
- Maintenance/construction access south of new junction and overbridge of Junction 16A to Penmaenbach Tunnel (CH 2750).

### **Site Clearance**

- 9.6.10 The scheme proposals necessitate the removal of the existing roadside plantations to the east and west of the existing Junction 16 roundabout along the northern verges of Ysguborwen Road and Conwy Road respectively. The existing roadside plantation on the cutting south of the roundabout and along the southern verge of Ysguborwen Road and Conwy Road would be largely retained and protected. Other areas of existing vegetation to be removed include:

- Roadside vegetation along Ysguborwen Road (northern verge);
- Roadside vegetation to the north and west of Maes-y-Llan;
- Roadside hedgerow south of A55 and west of Junction 16A;
- Central reservation west of existing Junction 16A; and
- Roadside trees and hedgerows along western verge of Glan-y-Mor road from A55 to Gardd Eryri.

### **Vegetation to be Retained**

- 9.6.11 There is a significant roadside plantation on the limit of the Scheme extents to the west of Junction 16 along the southern verge of Conwy Road and to the north of the existing ground of Penmaenmawr Phoenix Football Club. This is a well-established and mature roadside plantation containing a variety of pines and deciduous trees and shrubs and would be retained and protected during the Construction Phase subject to detailed design proposals. There would be some selective pruning and crown lifting along the southern verge of Conwy Road to enable the construction of the proposed shared use route/non-motorised way.
- 9.6.12 Where retention is feasible to support the long-term health and vigour of the plantation or individual trees (and does not encroach within the Root Protection Area), the area would be fenced off and protected prior to the commencement of the Construction Period using fencing in accordance with BS 5837. The tree protection fencing would be inspected on a regular basis for damage and maintained throughout the Construction Period.

### **Construction Phasing**

- 9.6.13 The Construction Phase is anticipated to be in the order of 18 months to 24 months and it would be the responsibility of the appointed Contractor to programme and sequence the works.

### **Summary of Project Characteristics**

- 9.6.14 The Scheme proposals lie within and immediately adjacent to, the existing A55 road corridor. The existing Junction 16 and Junction 16A would effectively be modified and extended to accommodate the new junction arrangements and standards. The new link road that runs



parallel and south of the A55 between Junction 16 and Junction 16A is effectively a widening of the existing A55 road and rail corridor.

- 9.6.15 The realignment of Junction 16 and associated earthworks extends the existing road corridor south by approximately 60 m with the new junction at 16A requiring additional land take to the south of the existing by approximately 170 m.
- 9.6.16 The link road and associated earthworks extends the existing road corridor southwards by approximately 55 m to 60 m, this also applies where the Scheme skirts southwards of the Puffin Café and Shell Garage.
- 9.6.17 In landscape and visual terms, it is considered that the scale of the road corridor widening represents a localised change to the existing landscape and visual baseline. The potential landscape and visual receptors in relation to the specific proposals for the Scheme can now be identified and will become the focus of the landscape and visual assessment process.

### Potential Landscape Receptors

- 9.6.18 Following the preparation of the landscape baseline, a preliminary assessment on the likely landscape receptors affected by the Scheme can be made. This has been undertaken following an appraisal of the project characteristics and proposals above that have been developed in more detail. Potential landscape receptors identified within the baseline assessment have been scoped out due to a variety of reasons but primarily due to topography, distance, scale and context and the localised nature of the Scheme extents.
- 9.6.19 The eight Landscape Character Areas (LCA's) identified as being potential landscape receptors that the Scheme that lie within 1 km of the Scheme and may have significant effects are:
- i. LCA 02 – Penmaenmawr Beach;
  - ii. LCA 09 – A55 Pen-y-clip to Penmaenbach;
  - iii. LCA 10 – Pendyffryn Pasture and Parkland;
  - iv. LCA 16 – Penmaenmawr Pant-yr-Afon;
  - v. LCA 17 – Dwygyfylchi;
  - vi. LCA 26 – Pant-yr-Afon Pasture;
  - vii. LCA 33 – Foel Wen Moorland; and
  - viii. LCA 34 – Allt Wen Moorlands
- 9.6.20 These Landscape Character Areas will be the focus of the landscape assessment. Other areas that were described in the baseline assessment will not be taken forward for further assessment and have been scoped out.

**Table 9.8: Scoped In/Out Landscape Receptors**

LCA Ref	LCA Name	Landscape Receptors Scoped In/Out		
		In	Out	Commentary
LCA 2	Penmaenmawr Beach	✓		Adjacent to Scheme
LCA 3	Conwy Estuary		✓	East of Penmaen-bach
LCA 9	A55 Pen-y-clip to Penmaenbach	✓		Existing road corridor
LCA 10	Pendyffryn Pasture and Parkland	✓		Within Scheme extents
LCA 15	Penmaenmawr Penmaenan		✓	West of Penmaenmawr

LCA Ref	LCA Name	Landscape Receptors Scoped In/Out		
		In	Out	Commentary
LCA 16	Penmaenmawr Pant-yr-Afon	✓		Within Scheme extents
LCA 17	Dwygyfylchi	✓		Adjacent to Scheme
LCA 20	Penmaenmawr Quarries (active)		✓	West of Penmaenmawr
LCA 23	Fairy Glen		✓	Unaffected/distant
LCA 26	Pant-yr-Afon Pasture	✓		Within Scheme extents
LCA 27	Capelulo Pasture		✓	South of Dwygyfylchi
LCA 31	Graig Lwyd Mountain Pasture		✓	Unaffected/distant
LCA 32	Maen Crwn Mountain Pasture		✓	Unaffected/distant
LCA 33	Foel Wen Moorland	✓		Close to Scheme extents
LCA 34	Allt Wen Moorland	✓		Close to Scheme extents
LCA 35	Moelfre Upland Moorland		✓	Unaffected/distant

- 9.6.21 The initial assessment of potential landscape effects has identified the Landscape Character Areas that are likely to be significantly affected by the Scheme. The landscape assessment deals with the effects of change and development on landscape as a resource.
- 9.6.22 The first step in landscape assessment is to identify the components of the landscape that are potentially affected by the Scheme, referred to as the 'landscape receptors', and assess the sensitivity of those receptors to the type of development proposed.
- 9.6.23 The second step is to identify interactions between these landscape receptors and the different components of the development during construction and operation stages to derive the magnitude of change.
- 9.6.24 Judgements about the sensitivity of the receptor and about the magnitude of the change are then linked to arrive at conclusions about the significance of effects. The landscape sensitivity of each LCA is set out in the Table 9.9.

**Table 9.9: Sensitivity of Landscape Character Areas (LCA's)**

LCA Ref	LCA Name	Landscape Sensitivity		
		High	Medium	Low
LCA 02	Penmaenmawr Beach		✓	
LCA 09	A55 Pen-y-clip to Penmaenbach			✓
LCA 10	Pendyffryn Pasture and Parkland		✓	
LCA 16	Penmaenmawr Pant-yr-Afon		✓	
LCA 17	Dwygyfylchi		✓	
LCA 26	Pant-yr-Afon Pasture			✓
LCA 33	Foel Wen Moorland	✓		
LCA 34	Allt Wen Moorland	✓		

- 9.6.25 The significance of a landscape effect is assessed through professional judgement combining the sensitivity of a landscape receptor with the magnitude of the landscape change.

#### Potential Landscape Effects

- 9.6.26 The potential effects of the proposed Scheme on each of the identified landscape receptors is undertaken below. The assessment of potential effects is considered without mitigation measures in place and is considered equivalent to Winter Year 1 of opening.

##### *LCA02 – Penmaenmawr Beach*

- 9.6.27 The Scheme will have no potentially significant effects on LCA02 as the area lies on the seaward side of the A55 road and rail corridor. There are no works proposed north of the road and rail corridor apart from improvements to the approaches to the pedestrian footbridge and minor works near to the sewage treatment works. This is not considered to have a potentially significant effect on the landscape character area of Penmaenmawr Beach.

**Table 9.10: Assessment of Potential Effects on LCA 02**

Landscape Sensitivity	Magnitude of Effect	Significance of Effect
Medium	No Change	Neutral
No direct impact. Extents of the Scheme adjacent to Penmaenmawr Beach area limited to minor works in the vicinity of Puffin Café pedestrian footbridge and Sewage Treatment Works near Junction 16A		

##### *LCA09 – A55 Pen-y-Clip to Penmaenbach*

- 9.6.28 The existing A55 road corridor is of low scenic quality with some significant engineering features such as Penmaenbach tunnel and structures such as overbridges, signs and gantries. The road is heavily trafficked particularly during the summer months with large quantities of traffic including high sided HGV's and other commercial vehicles. The Scheme will effectively widen the road corridor and result in the removal of roadside vegetation that, combined will result in an urbanising effect. The effects would however be localised and would be seen as an encroachment further south of and adjacent to the existing road corridor.

**Table 9.11: Assessment of Potential Effects on LCA 09**

Landscape Sensitivity	Magnitude of Effect	Significance of Effect
Low	Moderate	Moderate Adverse
A slight adverse change in landscape character associated with a road widening Scheme. Extensive earthworks and false cutting would integrate Scheme into the localised landscape. Roadside vegetation that would be removed would be replaced with similar mitigation planting, but the overall effects would be the extension of the existing corridor.		

##### *LCA10 – Pendyffryn Pasture and Parkland*

- 9.6.29 The overall landscape value of this LCA that includes Pendyffryn pasture and parkland, is considered to be medium due to its lack of cohesiveness and the erosion of its rural character due to the encroachment of residential development. The Scheme has a direct effect on land take in this area, extending further south east from the A55 with the proposed link road and

new Junction 16 and Junction 16A. The Scheme would further erode the remaining rural character of the area, parts of which still remains with some good scenic qualities.

**Table 9.12: Assessment of Potential Effects on LCA 10**

Landscape Sensitivity	Magnitude of Effect	Significance of Effect
Medium	Moderate	Moderate Adverse
The potential effects of the Scheme would be a moderate adverse change in landscape character of the area. Areas of remaining pasture would be lost due to the encroachment of the Scheme between Junction 16 and Junction 16A south from the existing road corridor towards the settlement boundary of Dwygyfylchi.		

#### *LCA 16 - Penmaenmawr Pant-yr-Afon*

- 9.6.30 LCA 16 centres around the town centre of Penmaenmawr much of which is designated as a Conservation Area. The Scheme extents lie approximately 1 km to the east of the town centre and approximately 450 m east from the eastern limits of the Settlement Boundary and residential properties along Conwy Road.

**Table 9.13: Assessment of Potential Effects on LCA 16**

Landscape Sensitivity	Magnitude of Effect	Significance of Effect
Medium	No Change	Neutral
The potential effects of the Scheme would cause no change to the landscape/townscape character of Penmaenmawr Pant-yr-Afon. The area is sufficiently distant from the Scheme proposals to not be affected during any stage of the Scheme including the Construction Period.		

#### *LCA 17 – Dwygyfylchi*

- 9.6.31 LCA 17 centres around the village of Dwygyfylchi and lies adjacent to LCA 10 Pendyffryn Pasture and Parkland. The Scheme would have similar effects to those predicted for LCA10, namely encroachment of the existing A55 road corridor southwards towards the settlement boundary of Dwygyfylchi. Some parts of the area (east of the existing Junction 16) are allocated in the Local Development Plan as Green Wedge to prevent further coalescence of the settlements Penmaenmawr and Dwygyfylchi.

**Table 9.14: Assessment of Potential Effects on LCA 17**

Landscape Sensitivity	Magnitude of Effect	Significance of Effect
Moderate	Minor	Slight Adverse
The potential effects of the Scheme would be a slight adverse change in landscape character of the area with the encroachment of the Scheme towards the settlement boundary and residential areas of Dwygyfylchi. The Scheme takes greenfield land required for the construction of earthworks and new link road between the extended Junction 16 and Junction 16A resulting in the loss of remnant rural landscape character.		

*LCA 26 – Pant-yr-Afon Pasture*

- 9.6.32 The potential effects on some localised parts of this landscape character area would be potentially significant where the Scheme has a direct physical impact. The realignment of Junction 16 would encroach into part of the LCA and require the removal of some existing roadside vegetation.. However, the encroachment of the Scheme to the south has a localised impact and the retention of the larger roadside plantations along the southern verge of Conwy and Ysguborwen Roads together with landscape mitigation measures in the form of earthworks would lessen adverse landscape effects.

**Table 9.15: Assessment of Potential Effects on LCA 26**

Landscape Sensitivity	Magnitude of Effect	Significance of Effect
Moderate	Minor Adverse	Slight Adverse
The potential effects of the Scheme would be a moderate adverse change in landscape character of the area with the encroachment of the Scheme south from the existing Junction 16. However, this is localised to the existing junction and would be seen as a widening of the road corridor that is already a prominent man-made landscape element within the area.		

*LCA 33 – Foel Wen Moorland*

- 9.6.33 This landscape character area extends southwards into the open uplands of the Carneddau mountains south of Dwygyfylchi. The Scheme would have no potential effects on this area that is distanced from the Scheme. The existing A55 road corridor is visible from some points within the area and also audible at certain times but the Scheme would not change the existing baseline conditions and therefore is not considered to have any significant potential effects.

**Table 9.16: Assessment of Potential Effects on LCA 26**

Landscape Sensitivity	Magnitude of Effect	Significance of Effect
High	No Change	Neutral
No change to existing baseline conditions		

*LCA 34 – Allt Wen Moorland*

- 9.6.34 Allt Wen Moorland is an upland area within Snowdonia National Park lying to the east of the Scheme and Junction 16A above Pendyffryn farmland and parkland and includes the headland of Penmaen-bach headland and Penmaenbach Tunnel. The upland area is highly scenic and of outstanding quality and a popular area for rambling and walking activities along the North Wales Path. The area has high landscape perceptual values associated with peace and tranquillity.

**Table 9.17: Assessment of Potential Effects on LCA 34**

Landscape Sensitivity	Magnitude of Effect	Significance of Effect
High	Negligible	No Change

Landscape Sensitivity	Magnitude of Effect	Significance of Effect
There would be no direct impact on the landscape character of the area as a result of the Scheme proposals. There is considered potential for temporary adverse effects during the Construction period caused by noise during the construction of the new Junction 16A. This would be partly dependant on the construction methodologies proposed for the Scheme but is considered to be negligible given the current background noise associated with the existing A55 road corridor.		

### Summary of Potential Landscape Effects

- 9.6.35 The assessment of potential landscape effects indicates that the most significant effects would be local to the existing road corridor. The widening of the road corridor to form new junctions at 16 and 16A would have little effects on the surrounding landscape character that is already heavily influenced by the existing A55 road corridor. There would be localised changes to the character of the existing road corridor and immediate surroundings during the construction phase. This phase would be disruptive with significant construction activities over an 18-24-month period that would be difficult to mitigate against. However, following the construction phase, the potential landscape effects would be associated with the widening of the existing road corridor that would represent a low magnitude of change compared to the construction of a new section of road through open countryside. A full assessment of the Scheme and its landscape effects are described in Section 9. A summary of landscape sensitivity, magnitude of change and potential significant effects is set out in Table 9.17.

**Table 9.18: Summary of Landscape Sensitivity, Magnitude and Significance of Potential Effects in Year 1 (without mitigation)**

LCA Ref	LCA Name	Potential Effects		
		Sensitivity	Magnitude	Significance of Effects
LCA 02	Penmaenmawr Beach	Moderate	No Change	Neutral
LCA 09	A55 Pen-y-clip to Penmaenbach	Low	Moderate	Moderate Adverse
LCA 10	Pendyffryn Pasture and Parkland	Moderate	Moderate	Moderate Adverse
LCA 16	Penmaenmawr Pant-yr-Afon	Moderate	No Change	Neutral
LCA 17	Dwygyfylchi	Moderate	Minor	Slight Adverse
LCA 26	Pant-yr-Afon Pasture	Moderate	Minor Adverse	Slight Adverse
LCA 33	Foel Wen Moorland	High	No Change	Neutral
LCA 34	Allt Wen Moorland	High	Negligible	Neutral

- 9.6.36 Landscape Character Areas that have been identified as potentially having significant effects of slight to moderate adverse or worse as a result of the Scheme will be assessed in Section 9.8 Assessment of Significant Effects. These are:

- LCA 09 - A55 Pen-y-clip to Penmaenbach;
- LCA 10 - Pendyffryn Pasture and Parkland;

- LCA 17 – Dwygyfylchi; and
- LCA 26 Pant-yr-Afon Pasture

### Visual Receptors

- 9.6.37 The results of the ZTV indicate that visual receptors are likely to be limited due to the physical characteristics of the area, namely topography, landform and landcover. From the initial baseline assessment and consideration of the detailed proposals, the potential visual receptors are considered to be as follows:

**Table 9.19: Potential Visual Receptors**

Aspect from Existing J16 Roundabout	Potential Visual Receptors
North west	<ul style="list-style-type: none"> <li>• Mariners, sailors, fisherman and kayakers at sea in Conwy Bay; and</li> <li>• People and community frequenting Penmaenmawr Beach for recreation and amenity.</li> </ul>
North east	<ul style="list-style-type: none"> <li>• Mariners, sailors, fisherman and kayakers at sea in Conwy Bay;</li> <li>• A55 west bound motorists;</li> <li>• Rail passengers on Holyhead to Chester Mainline;</li> <li>• Pedestrians and cyclists using Wales Coast Path and overbridge;</li> <li>• People using public open space adjacent to Maes-y-Llan and Gwel-y-Mor;</li> <li>• People in residential properties at Maes-y-Llan, Gwel-y-Mor and Gogarth Avenue;</li> <li>• People in residential properties on Ysguborwen Road;</li> <li>• Residential properties in eastern Dwygyfylchi;</li> <li>• People resident or staying in Pendyffryn Caravan/Camping site; and</li> <li>• Ramblers and walkers using upland footpaths around Allt Wen and Maen Esgob.</li> </ul>
South east	<ul style="list-style-type: none"> <li>• People in elevated residential properties in Dwygyfylchi;</li> <li>• People in Tyddyn Du caravan park;</li> <li>• People in Ysgol Capelulo; and</li> <li>• People using Public Rights of Way and Wales Coast Path in and around Trwyn-y-Wylfa.</li> </ul>
South west	<ul style="list-style-type: none"> <li>• Rail passengers on Holyhead to Chester Mainline;</li> <li>• A55 east bound motorists;</li> <li>• People in residential properties in Pen-y-Cae;</li> <li>• People using Conwy Road and Conwy Old Road;</li> <li>• People and players at Penmaenmawr Phoenix Football Club; and</li> <li>• People visiting the Cemetery off Conwy Old Road.</li> </ul>

- 9.6.38 The potential visual receptors outlined above have been categorised in terms of their sensitivity and for the purposes of the visual assessment are referenced and described below.
- 9.6.39 Adapted from IAN 135/10 (W), visual receptors are categorised in terms of their sensitivity as follows:

**Table 9.20: Receptor Sensitivity and Typical Descriptors**

<b>Sensitivity</b>	<b>Type of Visual Receptor</b>
High	<ul style="list-style-type: none"> <li>Permanent residential properties;</li> <li>Users of Public Rights of Way or other long-distance recreational trails (e.g. Coastal Paths, Cycle Routes, footpaths, bridleways etc);</li> <li>Users of Public Open Space (e.g Promenade and Beach areas) for general amenity (e.g dog walking, picnicking, bird watching);</li> <li>People undertaking informal recreation and enjoyment of the open countryside (e.g. rambling on open access land); and</li> <li>Visitors to Scheduled Ancient Monuments and other areas of historic interest and value.</li> </ul>
Medium	<ul style="list-style-type: none"> <li>Caravan Parks and temporary accommodation;</li> <li>Users of outdoor recreational facilities and tourist attractions (eg golf courses) where setting and surroundings is important;</li> <li>Outdoor workers such as farmers;</li> <li>Users of scenic roads, railways or waterways or users of designated tourist routes;</li> <li>Schools and other institutional buildings, and their outdoor spaces; and</li> <li>Sailors, mariners and users of private watercraft.</li> </ul>
Low	<ul style="list-style-type: none"> <li>Indoor workers;</li> <li>Users of main roads (e.g. trunk roads), or passengers in public transport on main arterial routes; and</li> <li>Users of recreational facilities where the purpose of that recreation is not related to the view (e.g. sports facilities).</li> </ul>

9.6.40 The potential visual receptors identified for Junction 16 that will form part of the visual assessment are set out below. The assessment is recorded in a Visual Effects Schedule (VES) as required by IAN 135/10 (W) and presented in Appendix 9.5. Visual receptors have been divided into the following typical receptors:

- a) Residential Properties (RP);
- b) Non-Residential Properties (NRP);
- c) Public Rights of Way (PRW);
- d) Land with Public Access (LPA); and
- e) Roads and Transport Routes (RTR).

### **Residential Properties**

9.6.41 There are several residential properties that are potentially significant visual receptors and these have been identified using ZTV mapping and grouped into geographical areas in Table 9.21.

**Table 9.21: Identification of Potential Significant Visual Receptors**

<b>Residential Properties (RP) East to West</b>		<b>Sensitivity: High</b>
<b>RP Ref</b>	<b>Post Code</b>	<b>Property Reference/Description</b>
RP 01	LL34 6BH	Properties north off Conwy Road (approximately 12 No)
RP 02	LL34 6BL	Properties south off Conwy Road (approximately 11 No)



<b>Residential Properties (RP) East to West</b>		<b>Sensitivity: High</b>
RP 03	LL34 6PR	Bron Wylfa south off Conwy Road
RP 04	LL34 6BU	1-4 Cemlyn Close, Conwy Old Road
RP 05	LL34 6BW	Cemlyn Park off Conwy Old Road
RP 06	LL34 6YF	Gwysfa and Trewen
RP 07	LL34 6SF	Trwyn y Wylfa and Cri'r Wylan, Conwy Old Road
RP 08	LL34 6RE	Tyddyn-du Farm and Caravan Park, Conwy Old Road
RP 09	LL34 6RB	Properties on Conwy Old Road
RP 10	LL34 6SN	Cae-glas Crescent
RP 11	LL34 6RA	Properties on Treforris Road
RP 12	LL34 6PY	Properties on Gogarth Avenue
RP 13	LL34 6PS	Properties on Ysguborwen Road (South)
RP 14	LL34 6PT	Properties on Ysguborwen Road (North)
RP 15	LL34 6PU	Ysguborwen Road/Mona Drive
RP 16	LL34 6SA	Properties 1-20 Maes-y-Llan
RP 17	LL34 6RY	Properties 02-58 Maes-y-Llan
RP 18	LL34 6RY	Properties 37-67 Maes-y-Llan
RP 19	LL34 6RU	Properties 68-78 Maes-y-Llan
RP 20	LL34 6SB	Properties 1-40 Gwel-y-Mor
RP 21	LL34 6TR	Properties 1-38 Cae Gwyn
RP 22	LL34 6UD	Properties on Glanyrafon Road
RP 23	LL34 6UD	Y Bluen Goch
RP 24	LL34 6UE	Gardd Eryri and The Gardene
RP 25	LL34 6UF	Pendyffryn Hall and Farm

## Non-Residential Properties

- 9.6.42 There are four non-residential properties that would be potential visual receptors, and these are located adjacent to the A55 and along Ysguborwen Road. The Gladstone Public House on Ysguborwen Road is also a Non-Residential property but has been considered under RP13.

**Table 9.22: Non-residential Properties**

Non-Residential Properties			Sensitivity: Low
NRP Ref	Post Code	NRP Reference	Location
NRP01	LL34 6UN	Noddfa	Conwy Old Road
NRP02	LL34 6UL	Ysgol Capelulo	A55
NRP03	LL34 6UN	Shell Garage & Puffin Cafe	Penmaenmawr Road
NRP4	LL34 6PS	The Oasis Christian Centre	Ysguborwen Road

## Public Rights of Way

- 9.6.43 The users of Public Rights of Way are potential visual receptors and there is a small network of footpaths that connect Penmaenmawr and Dwygyfylchi to the lower slopes of Snowdonia. The most significant Public Right of Way in the area provides access to the beach from the village of Dwygyfylchi via a pedestrian footbridge that crosses the A55. The footbridge also connects to the National Cycle Route (5) and the Wales Coast Path that runs parallel to the A55.

**Table 9.23: Public Rights of Way**

Public Rights of Way (PRoW)		Sensitivity: High
PRoW Ref	PRoW Reference	Location
29/07	Penmaenmawr Footpath 07 (Lower slopes of Foel Lûs)	South off Conwy Old Road
29/08	Penmaenmawr Footpath 08 Crosses A55 on footbridge	Dwygyfylchi across A55 to coast
29/19	Penmaenmawr Footpath 19 (Lower slopes of Foel Lûs)	South off Conwy Old Road
29/20	Penmaenmawr Footpath 20 (Lower slopes of Foel Lûs)	South off Conwy Old Road
29/09	Penmaenmawr Footpath 09 Dwygyfylchi	Off Glan-yr Afon Road
29/10	Penmaenmawr Footpath 09 Dwygyfylchi	Off Glan-yr Afon Road

Public Rights of Way (PRoW)		Sensitivity: High
PRoW Ref	PRoW Reference	Location
29/13	Penmaenmawr Footpath 13 Pendyffryn Dwygyfylchi	Off Old Mill Road
N/A	Wales Coast Path and National Cycle Route (5)	Parallel to the A55

### Land with Public Access (LPA)

- 9.6.44 There are three areas of land with public access that have been identified as potential visual receptors. The recreation ground adjacent to Maes-y-Llan and Gwel-y-Mor is valued by the local community as an area of informal recreation. There are also two football pitches to the west of Junction 16 and the Tan y Foel Cemetery off Conway Old Road. Public access is also open along the foreshore and intertidal areas of Penmaenmawr Beach. Although this is distant from the Scheme and separated by the railway line.

**Table 9.24: Land with Public Access**

Land with Public Access		Sensitivity: Medium
LPA	LPA Reference	Location
LPA1	Tan y Foel Cemetery	Off Conwy Old Road
LPA2	Football Pitches (Phoenix FC)	South off Conway Road
LPA3	Maes y Llan Football Pitch	East of Maes y Llan

### Local Road Network and Bus Routes (LRN)

- 9.6.45 There are few local roads in the area close to the Scheme from which visual receptors are likely to be affected by the proposals. Conwy Road is the main entrance into Penmaenmawr from the east and is also a local bus route and therefore the users of the road are potential visual receptors. Other bus routes run along Ysguborwen Road and Glan yr Afon Road.

**Table 9.25: Local Road Network and Bus Routes**

Local Road Network and Bus Routes		Sensitivity: Low
POS	POS Reference/Description	Location
LRN/1	Conwy Road	West of Junction 16
LRN/2	Ysguborwen Road	East of Junction 16
LRN/3	Glan yr Afon Road	South west of Junction 16A

### Potential Visual Effects

- 9.6.46 Potential visual effects have been assessed using the representative viewpoints presented in Appendix 9.4. These are considered representative of the potential visual receptors described above and that will be considered in the assessment of significant effects in Section 9.8.

- 9.6.47 The representative viewpoints identified in the landscape baseline have been used to identify likely visual effects and potential mitigation measures. This is considered to be proportionate to the extent of the Scheme as these are junction improvements and form part of an incremental change to the existing road corridor. The initial assessment without mitigation on the representative viewpoints is summarised in Table 9.25.
- 9.6.48 The most and potentially significant visual effects associated with the scheme proposals is four-fold:
- i. The removal and loss of the well-established existing vegetation and roadside plantations alongside the A55 and the northern verge of Conwy Road/Ysguborwen Road to the east and west of the existing roundabout;
  - ii. The construction of a new Junction 16 with Conwy/Ysguborwen Road;
  - iii. The construction of a new link road between Junction 16 and Junction 16A with false cutting; and
  - iv. The construction of a new Junction 16A including overbridge and slip roads.
- 9.6.49 Due to the nature of the Scheme, effectively a widening of the existing A55 road corridor, the removal of the existing roadside plantations is largely unavoidable. Additional mitigation measures are also restricted due to the amount of available space constrained by topography, the existing road corridor and local road network.
- 9.6.50 The integration of a false cutting into the Scheme has the potential; to reduce the visual impact from sensitive visual receptors to the south. The effects of the false cutting on receptors such as these will be reported in Section 9 and recorded in the Visual Effects Schedule in Appendix 9.5.

**Table 9.26: Summary of Potential Visual Effects**

Ref	Representative Viewpoint	Description of Potential Effect (generally/overall)	Visual Receptor Sensitivity	Magnitude of Change	Significance of Visual Effect
A	Penmaenmawr Promenade	There would be no change in the view as a result of the Scheme that commences approximately 600 m further east from the viewpoint. The roadside vegetation to the north of the existing A55 and Junction 16 roundabout would be retained and remain in view. Some upper sections of the new footbridge may be visible above the roadside vegetation but will be largely obscured from view particularly during the summer months when the vegetation is in leaf.	High	Negligible	Neutral
B	Ysguborwen Road	The anticipated change in view would be significant during the construction period and would form a noticeable feature in the view. The new link road to the south of the A55 would run through the fields used for rough grazing but would be screened by a false cutting. The false cutting would be a significant earthwork in the middle distance but would screen the link road and A55 from the view while retaining views across the sea towards the Great Orme. The earthworks would be planted with ornamental shrubs to further screen traffic including high sided vehicles	High	Major	Very Large Adverse/ Moderate Beneficial
C	Maes-y-Llan	It is anticipated that the view would change significantly. The existing roadside vegetation would be removed in order to construct the new link road that would pass at a lower level (approximately 2 m) than the existing residential street. Views would be open and exposed across the A55 road corridor during the construction period. New noise attenuation fencing would be erected and screen views of the new link road and A55 from street level and ground floor windows. The overall change in the view would revert to a similar aspect to the existing following completion of the Scheme.	High	Minor	Slight/ Moderate Adverse
D	Puffin Café Pedestrian Footbridge	The anticipated change in view would be significant and effectively widen the existing road corridor from approximately 25 m wide to 50 m wide to include the link road parallel and south of the A55 road corridor. The new link road would pass to the south (right in picture) of the existing Shell Garage and a false cutting would take additional land to the south as mitigation. The false cutting would be planted to provide visual separation between the link road and main A55 carriageway. The new overbridge at Junction 16A would be visible but seen against the backdrop of Penmaen-bach headland approximately 1 km to the east.	High	Moderate	Slight/ Moderate Adverse
E	Gwel-y-Mor Public Open Space	The view would change significantly during the initial site clearance and construction period. Earthmoving operations required for the construction of the new link road would be clearly visible close to the existing pedestrian footbridge. However, by Winter Year 1 the false cutting would be in place and views of the new link road and A55 would be screened by the earthworks that would subsequently be planted with trees and shrubs and seeded on the southern bank adjacent to the recreation ground. The pedestrian footbridge would remain visible retained at the existing location with improved and ramped approaches.	High	Minor	Slight/ Moderate Adverse

Ref	Representative Viewpoint	Description of Potential Effect (generally/overall)	Visual Receptor Sensitivity	Magnitude of Change	Significance of Visual Effect
F	A55 west of J16A	The anticipated change in view would be major with the road corridor much wider in this area (approximately 90 m) compared to the existing (25 m to 30 m) due to the construction of the Junction 16A interchange that extends southwards to form the westbound slip road and also form a junction between the link road and Glan-yr-Afon Road. The existing roadside vegetation would be lost and the southern verge of the link road and new junction arrangement planted with trees, shrubs and hedgerows. Some of the verges would be sown with species rich grassland and some planted with scattered trees. Although the view would change significantly, it would be replaced with a similar scene of a wide road corridor with roadside elements such as lighting, signs, overhead gantries and vehicle restraint barriers.	Low	Major	Slight moderate Adverse
G	Pendyffryn Farmland	The position of the viewpoint would be located within the footprint of the new Scheme on the northern verge of the westbound on slip. The hedgerow (right in picture) would be removed and replaced with new to provide visual separation between the main carriageway and the link road. The link road would be 7.3 m wide with a 2.5 m shared use route along the southern verge. The southern verge and false cutting would be seeded on the north side and planted to the south Approximately 50 m of the field in view would be lost left of the existing hedgerow with views towards the residential areas partially lost and screened by the false cutting as part of the Scheme .	Medium	Major	Moderate/ Large Adverse
H	Glan-yr-Afon Field	It is anticipated that the character of the view would not change significantly. Views of the sea would be lost due to the construction of the new junction elevated on embankment above the existing A55 to form the overbridge and associated slip roads. View towards the lower sections of the Great Orme would be lost but views to the upper sections would remain. Planting the embankments of the new junction would integrate the Scheme into the localised landscape and provide continuous tree cover from the foot of Penmaen-bach headland further west to the base of the new Junction 16A.	Medium	Moderate	Moderate Adverse
I	Allt Wen	The view would remain largely as it is now with the A55 road corridor appearing much as it is now albeit wider to the south with the link road running parallel. The combined distance of view from the A55 and landscape mitigation measures along the southern edge of the Scheme would result in a negligible change in the view. Views during the construction period would be more discernible due to the extensive earthworks and plant and machinery operating in the area.	High	Negligible/ No Change	Neutral
J	Treforris Road	The view is not anticipated to change significantly due to the intervening topography and landscape elements. Existing trees in the view would remain and the link road would be in false cutting and southern embankment planted either side of the Gladstone Hotel .It is anticipated that there would be some additional screening of traffic on the A55 as part of the Scheme and the link road would be hidden from view.	High	Negligible/ No Change	Neutral

Ref	Representative Viewpoint	Description of Potential Effect (generally/overall)	Visual Receptor Sensitivity	Magnitude of Change	Significance of Visual Effect
K	Trwyn-yr-Wylfa	The view would not be anticipated to change significantly from this distance of approximately 1 km. The link road to the south of the A55 road corridor would be obscured by the false cutting as would traffic on the main east and westbound carriageways of the A55. Earthworks west of the Afon Gyrach and south of the link road would be visible during the construction period but would be seeded and planted within the first available season. Further east the trees and shrubs would also be planted along the southern verge. It is anticipated that high sided vehicles on the main A55 would be less visible in sections due to the false cutting and planting along the southern bank.	High	No Change/ Negligible	Neutral

## 9.7 Mitigation Measures

### Approach to Identification of Mitigation Measures

- 9.7.1 Legislation provides the Overseeing Organisation with powers to: *"acquire land for the purpose of mitigating any adverse effect which the existence or use of a highway constructed or improved by them or proposed to be constructed or improved by them, has or will have an impact on the surroundings of the highway"*<sup>16</sup>
- 9.7.2 The designers followed an iterative design and assessment process, to meet the Scheme objectives. The design was developed and refined to support Welsh Government objectives, including the need to encourage active travel and support the sustainability objectives of the Well-Being of Future Generations (Wales) Act 2015. The design team sought to avoid and reduce the impacts of the landscape and visual effects, and to integrate the measures required by other environmental disciplines.
- 9.7.3 The mitigation design aims to avoid or reduce the impacts on the landscape and the visual effects on views, while also integrating the other physical mitigation measures that are proposed by other environmental disciplines within the project team.

### Transport Planning Objectives and Statutory Duties

- 9.7.4 The measures described in this section are intended to satisfy Welsh Government duties and to meet high level Welsh Government objectives and the Scheme Transport Planning Objectives.
- a) Encourage Active Travel in accordance with the Active Travel Act;
  - b) Supports Welsh Government's Well-Being Duty;
  - c) Assisting in achieving the seven Well-Being Goals of the Well-Being of Future Generations (Wales) Act 2015;
  - d) Meeting the Welsh Governments duty under Section 6 of the Environment (Wales) Act 2016.
- 9.7.5 The relevant Transport Planning Objectives (TPO) for the Scheme also take into consideration the views of stakeholders and aim to reflect the problems of the existing road (refer to Chapter 2). Those TPOs that influence landscape and environmental design are:
- O3 Reduce community severance and provide health and amenity benefits.
  - O5 Promote active travel by cycling, horse riding and walking to provide opportunities for healthy lifestyles.
  - O7 Deliver a project that is sustainable in a globally responsible Wales, taking steps to reduce or offset waste and carbon.
  - O8 Give due consideration to the impact of transport on the environment and provide enhancement when practicable.

### Scheme Design Principles

- 9.7.6 The objectives set out above have guided the approach to design and mitigation and have been used as the basis for the Scheme Environmental Objectives. These have been agreed with the Statutory Environmental Consultees. These objects, listed in ES Chapter 2 The Project, provide the basis for the following design principles:

<sup>16</sup> Highways Act 1980 (as amended) Part XII, Section 246



9.7.7 The design principles are to:

**i. Protect the Existing Landscape**

- a) To respect the historic fabric of the landscape so that, where possible, existing landscape features (e.g. hedges/hedgerows/hedge banks, individual and veteran trees, woodland, water features, public-rights-of-way and field systems) it would be retained for future generations;
- b) Protect the Penmaenmawr Conservation Areas, Listed Buildings (LB), Scheduled Ancient Monuments (SAM) and other known cultural heritage sites and their settings;
- c) To optimise mitigation for nearby houses or public areas to minimise adverse effects by providing visual screening, noise attenuation earthworks, planting and boundary treatments in critical locations, and to integrate these measures within the landscape design;
- d) To, where possible, protect existing views to the sea;
- e) Integrate the road and its structures with the setting by refining the road alignment, earthworks, footpaths and cycleways and cuttings, planting and boundary treatments to reflect the character and quality of the surrounding landscape;
- f) To, where possible, retain and make best use of existing vegetation, considering translocation of suitable coppiced vegetation wherever a suitable donor site within the Scheme is available at the appropriate time.

**ii. Introduce New and Appropriate Landscape Features**

- a) To prioritise the early establishment of new planting and vegetation using species that can survive in the local conditions;
- b) To use locally appropriate boundary treatments such as masonry walls and hedges;
- c) Integrate road drainage measures for attenuation and pollution control within the landscape to reduce the risk of pollution and associated impacts on local hydrology and habitats.

**iii. Protecting and Enhancing Biodiversity**

- a) Protect designated Marine Nature Conservation sites;
- b) Enhance terrestrial biodiversity;
- c) Reduce terrestrial habitat fragmentation; and;
- d) To make the best use of bridges, underpasses and culverts to maintain connectivity across the road for people and wildlife.

**iv. Protecting and Improving Connectivity**

- a) Enhance terrestrial habitat connectivity and species dispersal, and so;
- b) Improve connectivity for pedestrians, cyclists and horse-riders for local trips and commuting as well as improved circular routes for recreation and pleasure;
- c) To design for safe maintenance, giving due consideration to access arrangements, costs and liabilities for all mitigation.

**Scheme Mitigation and Enhancements**

9.7.8 Multidisciplinary working has allowed the designers to develop the design principles and then to apply them to develop appropriate integrated environmental mitigation measures and

enhancements within the design. The main components of the design are described in the following paragraphs and are set out in the Environmental Masterplans (EMP) in Figure 2.6.

### **The Environmental Masterplan**

- 9.7.9 The proposed link road, which would extend along the south side of the dual-carriageway from the proposed A55 Grade-separated Junction at Junction 16A to Ysguborwen Road beside Junction 16, would bypass Dwygyfylchi, but bring traffic closer to some residential areas, in particular to properties on the northern edge of Maes-y-Llan. The A55 is recognised locally as a source of traffic noise and as an intrusion into popular views to the sea. The design strategy has been developed to address these concerns, and others associated with the piecemeal expansion of suburban development on the coastal plain to the south of the A55. The strategy is based on the provision of a high-quality linear Green Infrastructure forming a landscape corridor on the south side of the expressway and the proposed link road, and extending from Penmaenmawr in the east to the Penmaenbach tunnel portal in the west. The corridor would include retained existing roadside vegetation and public green space, dedicated Public Open Space, new mass planting of roadside trees, shrubs and grassland and new Public Open Space<sup>17</sup>. The corridor would include cycleways and footpaths and would connect with existing public rights of way and crossings over the A55. An additional crossing over the Expressway would be provided at the Junction 16A with the junction overbridge.
- 9.7.10 A key feature of the green corridor would be noise mitigation from Junction 16 to east of Orme Services. The noise mitigation takes the form of an earth bank, or false cutting, although at Maes y Llan a vertical barrier with tree and shrub planting is used due to the lack of space. The false cutting will rise to around 5 m in height to provide screening to all or most vehicles on the proposed link road and the existing A55 from residential properties within Dwygyfylchi. The north side of the false cutting, facing towards the A55, will be formed at a gradient of 1:2, in keeping with typical roadside cutting and embankments. These slopes would be planted with native coastal trees and shrubs. Slopes on the south side will be formed to a shallower and more natural slope to blend with the natural ground. In some places a wall will be added along the crest of the false cutting to integrate it with some local landscape features.
- 9.7.11 The landscape corridor should provide permanent separation of the transport corridor from residential areas. In accordance with the Welsh Minister's Green Corridor Initiative the green space provided as part of the scheme would be developed to provide connectivity and habitat, and link with the habitats provided by the Afon Gyrach, to enhance local biodiversity in accordance with the requirements of the Environment Act.
- 9.7.12 In summary the Environmental Masterplan shows measures that will:
- A. Protect the quality of views, minimise and mitigate any adverse impacts and, where physically achievable, providing some enhancement on the existing situation.
  - B. Provide visual screening of the link road and traffic (also serving to screen traffic on the existing A55).
  - C. Reduce traffic noise for many residential properties and public areas and provide mitigation with a noise barrier to traffic noise for those properties where existing conditions would be adversely affected.
  - D. Retain views from residential areas over the false cutting to the sea.

<sup>17</sup> An area of replacement Public Open Space is required to address an designated area that will be taken for the proposed scheme.

- E. Protect landscape/scenic quality for residents and visitors to Penmaenmawr, Dwygyfylchi and for viewers within Snowdonia National Park.
- F. Adopt distinctive forms, patterns, and landscape characteristics from the surrounding coastal landscape: to be retained or reinstated within the Scheme using appropriately located hedges, hedge banks, walls, replacement trees, woodland, scrub and grassland, and by selecting species suited to the setting.
- G. Protect cultural heritage features and their settings on the mountains and within settlements: and mitigate adverse impacts where opportunities fall within the boundary of the Scheme.
- H. Provide landscape separation of a minimum of 15 m, but up to 70 m between high-speed traffic on the A55 dual carriageway and existing and future housing to the south.
- I. Accommodate east to west cycleways and footpaths connecting with existing and proposed new crossings over the A55 to the shoreline and existing footpaths and roads. These would collectively form a network of routes for Active Travel and for leisure.
- J. Settlement 'Gateways' and other Green Corridor Initiative measures including wildflower rich grassland, and seasonally wet basins.
- K. Provide a linear public open space parallel with, and connected to the shoreline for informal recreation, active travel and local recreational cycling and walking and circuits connecting to footpaths and roads in Dwygyfylchi.
- L. Enhance connectivity requirements of indigenous native species and habitat in accordance with the Environment Act 2016: using design of the carriageway, structures, earthworks, boundaries, and landscape to maintain existing safe routes across the new road so that natural patterns of movement are not unduly interrupted and casualties from collisions with vehicles are minimised:
  - i. An east-west wildlife corridor for connectivity between established woodland and scrub on the two headlands and the Afon Gyrach corridor;
  - ii. Protecting the Afon Gyrach wildlife corridor and route under the A55 and railway; and
  - iii. Specific habitat for relevant local species including birds, bats and otter.

9.7.13 Some further environmental aspects were also considered within the design:

- M. Dark Skies: to avoid or minimise lighting, where possible, using products that minimise light spillage. This was particularly important at the Afon Gyrach Bridge.
- N. Minimising changes to existing watercourses, with new crossings designed to retain the existing water course channels capacity and avoid realignment.
- O. Enhancements of the public realm around the junctions to integrate the Scheme and minimise and mitigate for adverse impacts of the Scheme on the townscape and the Penmaenmawr Conservation Area; and
- P. New structures: consideration to the design and integration into the sensitive landscape with careful selection of materials, planting treatments and associated earthworks.

### **Landform**

- 9.7.14 Cuttings and embankments are formed to allow the required vertical and horizontal alignments of the carriageway to be accommodated within the existing terrain. In the development of a suitable arrangement for the junction, the need for cuttings and embankments is considered alongside a range of other engineering and environmental criteria.
- 9.7.15 The design of earthworks allows for some flexibility during detailed design and construction to assist in achieving the optimum use of excavated materials within the Scheme. This approach

should minimise the need for removal of surplus from site, or the import of extra to make up a shortfall.

### **Embankment**

- 9.7.16 Placing a road on an embankment means that it will be raised above the landscape and so would be visible from the surroundings. The existing A55, which is on land that slopes north to the sea, already has embankments, particularly at the eastern end, which are unlikely to change significantly in height. The slip roads for the proposed grade separated junction will be on embankments to raise them to the height of the overbridge.
  
- 9.7.17 Typically, road embankment slopes are formed using locally available material with stable side slopes of around 1:2. These slopes can be very wide and require large areas of land and so a balance has to be struck between taking enough land for purely engineering purposes and taking extra land to widen the embankment and allow the formation of shallower slopes.
  
- 9.7.18 To integrate an embankment with its setting the slopes would be formed to mimic natural profiles to blend better with the surrounding topography. Where there is enough space for an embankment, additional soil can be used to form a more naturalistic 'S' profile to avoid angular transitions from natural to made-made gradients. Planting and boundary features would be used to reinstate the pattern of hedges, grassland and planting across the embankment slopes. The planting on the slopes would take up to 5 years for the trees and shrubs to have grown sufficiently to reduce the visual impact of the embankment slope. Replacement of the existing noise barrier along the existing road, and any additional length of barrier that is required, would provide around 2 m of visual screening to the view of traffic. Planting would need 15 years to achieve effective visual screening of the road, traffic and noise barrier.

### **Cutting**

- 9.7.19 Placing a road in a cutting means that the carriageway is below surrounding ground level and traffic can potentially be screened by the cutting slopes in views from the surroundings. A cutting 2 m deep would conceal cars in most views, while a 5 m deep cutting would screen high-sided vehicles in the same way (assuming high-sided vehicles are approximately 4 m in height). The A55 dual-carriageway is on sidelong ground and so it is in cutting for much of the western end of the Scheme between the Puffin Café to a point just to the west of the existing Junction 16. The existing dual-carriageway will be moved north and into the slope over this section and so will be in a deeper cutting.
  
- 9.7.20 The landscape treatment of cuttings varies depending upon the character of the rock or soils from which it is excavated. Softer soil-like material would be cut to a shallow gradient similar to an embankment slope (approximately 1:2). The cuttings on the Scheme are expected to be predominantly into soft materials. Cuttings in rock will be excavated to form a stable slope which could be steeper than 1:2. Normally, rock will lie under a depth of soils so the upper slopes, in soft material can be formed to a shallower gradient than the rock below. To better mimic a natural profile, the upper slopes, formed in soily materials can be 'rolled-over' to give the side slope a flowing 'S' profile.
  
- 9.7.21 Where ground conditions allow, cutting slopes can be left as a natural exposure of rock or scree that will weather naturally and develop self-sown vegetation cover that can include grasses, wildflowers, mosses and lichen. These areas can be of ecological interest. Soil-like granular material will be seeded to develop as grassland.

## **False Cutting**

- 9.7.22 Some of the screening benefits of a cutting could be provided by forming a raised bank alongside the road. This is known as a 'false cutting' and looks like a cutting when seen from the road but is formed to look like a natural landform from the surrounding landscape. A false cutting is proposed at Junction 16 along the south side of the proposed link road, extending east from the existing roundabout at Junction 16 to the Shell filling station. The false cutting would be overlooked from the residential areas of Dwygyfylchi and would be formed so that it was high enough to screen views of the proposed link road and traffic using it. Sometimes the false cutting is topped by a hedge, tree planting or a wall to further raise the height. For Junction 16 the false cutting would be designed to offer views from residential areas, which are more elevated than the road, to the sea. An additional benefit is that views of the A55 expressway, and most vehicles on it would be screened as well. The false cutting would provide a degree of noise attenuation as well and these benefits are set out in the Noise and Vibration Chapter 13.

## **Boundaries and Other Linear Features**

- 9.7.23 In the rural landscape of the study area boundary walls, hedgerows and overgrown hedges with mature trees are the most visible component of the rural coastal plain, while there are few boundaries visible on the surrounding hills. Hedges and wall are important in providing visual containment of local views, and in creating landscape character. Towards the coast, field hedges are less prominent, but along the coastal strip there is a masonry wall that extends from Penmaenbach Tunnels to the existing Junction 16A. Historically, masonry walls were also to be found as field, road and coastal boundaries, probably constructed possibly by the Darbishire family who owned local quarries and the local Pendyffryn Estate.
- 9.7.24 The effect of the existing A55 has been to sever the coastal strip from the coastal plain and disrupt the pattern of boundaries. A few field boundaries have been lost to create the existing large pastures. For effective landscape integration it is appropriate to consider reinstating local styles of boundary to define the edge of the road and areas of land taken for mitigation. Traditional field walls and hedges are a useful form of landscape and ecological mitigation, providing a low-level visual screen and connectivity for mobile species. Where hedges or walls are not required, simple agricultural stock-proof post and wire fences is proposed. Timber post and wire stock-proof fences have a light appearance, have no visual screening effect and so can be used to create the appearance of an open boundary. Ecological mitigation will include mammal fencing intended to exclude animals from the road.
- 9.7.25 Noise attenuation fences would be installed where required and would consist of a vertical post set into the ground and solid panels up to the required height. These could be used as boundary fences, or in combination with other fences to serve multiple functions.

## **Habitat Mitigation, Connectivity and Protected Species**

- 9.7.26 Chapter 8 Nature Conservation sets out proposed biodiversity mitigation on land taken for embankments, cuttings and plantations to assist in achieving biodiversity objectives.
- 9.7.27 The following points would be adopted where possible in the design of landscape mitigation:
- a) Measures would be developed to meet the aims of the Green Corridors Initiative including the establishment of a new wildlife corridor west from the woodland, scrub and upland habitats on Penmaenbach, connecting with the tree lined Afon Gyrach, woodland in the quarries,

garden vegetation in Penmaenmawr and roadside vegetation west of the existing Junction 16 roundabout;

- b) Planting and seeding to provide woodland, hedge, scrub, and species-rich grassland should, where appropriate, be carried out using local provenance native species;
- c) Measures would be developed to meet the aims of the Green Corridors Initiative including the creation of colourful species rich meadow grassland and the development of gateway features at junctions;
- d) Opportunities to enhance the Scheme for the benefit of insects and other invertebrates will be incorporated, including species that encourage pollinators;
- e) Specific measures to replace habitat for reptiles will be provided, including refugia that will also serve amphibians;
- f) Maintain and enhance the Afon Gyrach wildlife corridor which is known to be used by otter and bat species. This will require a new bridge for the proposed link road to match the span of the adjacent Pont Tywyn on the existing A55, and habitat improvements on the banks of the watercourse.
- g) Mammal fencing is recommended in the vicinity of the Afon Gyrach to ensure that species such as otter and badger do not enter the road corridor and are directed to the crossing point at the Afon Gyrach. Refer to Chapter 8 Nature Conservation for more details.

**Routes for Pedestrians, Cyclists and Horse Riders**

- 9.7.28 Chapter 14 All Travellers sets out how the Scheme will address the impact on pedestrians, cyclists and horse riders and will set out Active Travel measures would be connected across the Scheme. Active travel routes as well as existing footpaths and cycleways would be incorporated within the Scheme and within the proposed landscape design to provide an attractive and interesting route.

**Invasive Non-native Plants**

- 9.7.29 Where Japanese Knotweed and other Invasive Non-Native Species (INNS) is found within the scheme extents, an eradication programme would be implemented where it falls within or immediately adjacent to the scheme boundary. Areas of INNS are indicated on the Phase I Habitat plans in Chapter 8 and indicated on the EMP's in Appendix 2.6.

**Planting Density, Layout and Design for Future Maintenance**

- 9.7.30 Planting would be designed to meet required Landscape Functions (as set out in DMRB Vol 10). In some cases, an area of mitigation would serve multiple functions, such as Visual Screening and Nature Conservation, and the design reflects this. A more critical factors in plantation design is achieving a naturalistic appearance that suits the setting. In many cases the natural appearance is enhanced by vegetation management tasks to diversify the canopy using techniques such as selectively coppicing of shrubs and trees on the edges of the plantations to create variety and density in the height of the canopy or irregularity in the margin.

Table 9.27: Landscape Functions as Set Down in DMRB Vol 10

Reference	Function	Description
EFA	Visual Screening	Dense, consistently spaced trees and shrubs with some use of evergreen plants or faster-growing plants to provide an adequate screen or filter to views by the Design Year (Year 15 after construction).

Reference	Function	Description
EFB	Landscape Integration	Low density and irregularly placed planting that would grow to adopt the character of existing vegetation in the surrounding landscape over a period of 15 or more years.
EFD	Nature conservation	Planting carried out with a particular nature conservation function.
Two or more of these together		The priority would be to satisfy both functions with the most important function given priority.

9.7.31 In the interests of the sustainability of the roadside landscape, the cost and ease of maintenance and vegetation management have been considered. Maintenance of the roadside landscape cannot be reduced to nil without the quality of vegetation deteriorating. The greatest costs are grass cutting, hedge cutting and the thinning of established plantations. Measures included in this Scheme should reduce the cost of maintenance by:

- Reducing the frequency of grass cutting by using low fertility soils;
- Avoiding vegetated central reserves and isolated strips of verge between roads;
- By including access to vegetated roadside areas to reducing the need for traffic management and lane closures on the A55 Expressway;
- Avoiding, where possible, areas of vegetation that require intensive maintenance, difficult access or costly tasks;
- Planting trees at wide spacing, where there is no need for dense screening to be formed, so that thinning of plantations is less intensive;
- Providing hedges as mitigation only where essential and where safe access for mechanical maintenance is possible;
- Grazing of large areas of grass where conditions allow this to be achieved safely within secure parcels of land;
- Providing easements for access to maintain fences and walls; and
- Providing vehicular access to balancing ponds and flood attenuation areas for routine inspection, maintenance and removal of debris.

### **The Selection of Species for New Planting and Seeding**

9.7.32 The selection of species for planting and seeding is based on those locally-indigenous species noted to grow in the area and on a small selection of non-native species or ornamental varieties to serve particular purposes. The lists of species that are considered appropriate are included in Table 9.27.

9.7.33 In some locations fast-growing trees and bulky evergreens, will be considered to achieve visual screening, wind breaks or as nurse species. Nurse species will grow quickly to provide early visual screening and shelter for the other species and will then be removed when other species achieve adequate height and bulk.

### **Ash Dieback Disease**

9.7.34 During autumn 2012 confirmed cases of Ash Dieback Disease were discovered in Britain. A number of these cases were in Wales. Ash forms a significant proportion of native woodland in Pembrokeshire and is also important as a component of hedges. In 2017, Ash Dieback had been found in over 70% of 10 km grid squares in Wales. With the potential for around 98% of ash

trees in Britain to die, it is likely that any proposed Ash planting undertaken in the next few years will suffer a similar fate. Until disease-resistant varieties of the species are found planting of Ash trees is inadvisable and so none are included in the proposed planting mixes.

### **Specific Mitigation Measures**

- 9.7.35 Mitigation measures have been developed for the Junction 16 Scheme in consultation with the design team. This has been an iterative process following the announcement of the preferred route option and more detailed design considerations following the Public Information Events held at the end of June 2019. The mitigation measures are illustrated in the Environmental Masterplans (EMP's) in Figure 2.6.

### **Junction 16**

- 9.7.36 New westbound off and on slip roads would be constructed south of the existing roundabout and form a new roundabout junction with Conwy Road and Ysguborwen Road. The new junction arrangement would result in the loss of roadside vegetation to the east and west.

### **New Junction at 16A**

- 9.7.37 A new grade-separated junction would be constructed further east at Junction 16A Dwygyfylchi, with a new overbridge and with on and off east and west bound slip roads that would provide four-way movement. The slip-roads would rise on embankments to a height of 7 m above the dual-carriageway, to meet an overbridge across the A55. Landscape mitigation planting would be planted around the embankment slopes on the southern side of the junction.

### **Link Road**

- 9.7.38 A new link road running roughly parallel to the A55 on the south side will form a new junction with Ysguborwen Road in the west. Extending east it will pass close to the north side of houses in Maes-y-Llan and then loop round the south side of Puffin Café and Service Station to meet the new grade separated junction 16A. Glan-Yr-Afon Road, to Dwygyfylchi and Capellulo, will meet with the link road at a 'T' junction close to Junction 16A. The link road will be in false cutting to the south that will help screen the road from elevated properties to the south and integrate the road into the localised landscape.



**Table 9.28: Proposed Species as a Basis for Selection for Landscape Planting**Non-UK natives listed are underlined | **Bold** locally indigenous | \*\*\*front line salt tolerance | \*\*Second line salt tolerant | \*nurse species

Species	Wind and Salt Tolerant Shelter	Mixed Woodland	Linear Belts or Screening	Rural Hedges	Woodland Edge	Coastal Scrub	Urban and Suburban Planting	
							Mass Planting	Urban Trees
<b>Alder</b> <i>Alnus glutinosa</i>	Yes**	Yes*	Yes					
<b>Aspen</b> <i>Populus tremula</i>	Yes				Yes			
<u>Austrian Pine</u> <i>Pinus nigra maritima</i>	Yes***							Yes***
Beech <i>Fagus sylvatica</i>	Yes*	Yes						Yes*
<b>Birch</b> <i>Betula pubescens</i>	Yes	Yes*	Yes					
<b>Blackthorn</b> <i>Prunus spinosa</i>	Yes***		Yes	Yes	Yes	Yes***		
<b>Cherry</b> <i>Prunus avium</i>		Yes	Yes	Yes	Yes		Yes	Yes
<b>Crab Apple</b> <i>Malus sylvestris</i>	Yes	Yes	Yes	Yes	Yes		Yes	
Dog Rose <i>Rosa canina</i>					Yes	Yes**		
Dogwood <i>Cornus sanguinea</i>	Yes**		Yes	Yes	Yes		Yes**	
<b>Elder</b> <i>Sambucus nigra</i>	Yes				Yes	Yes		
<b>Field Maple</b> <i>Acer campestre</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
<b>Goat Willow</b> <i>Salix cinerea</i>	Yes***		Yes			Yes***		
<b>Hawthorn</b> <i>Crataegus monogyna</i>	Yes***	Yes	Yes	Yes	Yes	Yes***	Yes***	
<b>Hazel</b> <i>Corylus avellana</i>	Yes	Yes	Yes	Yes			Yes	
<b>Heather</b> <i>Erica cinerea</i> / <i>Calluna vulgaris</i>						Yes	Yes	
<b>Holly</b> <i>Ilex aquifolium</i>	Yes**	Yes	Yes	Yes	Yes		Yes	
<u>Monterey Pine</u> <i>Pinus radiata</i>	Yes***							Yes***
<u>Norway Maple</u> <i>Acer platanoides</i> (&varieties)	Yes**							Yes**
<b>Oak</b> (Sessile) <i>Quercus petraea</i>	Yes	Yes	Yes	Yes				Yes

Species	Wind and Salt Tolerant Shelter	Mixed Woodland	Linear Belts or Screening	Rural Hedges	Woodland Edge	Coastal Scrub	Urban and Suburban Planting	
							Mass Planting	Urban Trees
<b>Osier</b> <i>Salix viminalis</i>			Yes				Yes	
<b>Rowan</b> <i>Sorbus aucuparia</i>	Yes**	Yes	Yes				Yes**	Yes**
Scots Pine <i>Pinus sylvestris</i>	Yes**	Yes*	Yes					Yes**
<b>Sea Buckthorn</b> <i>Hippophae rhamnoides</i>	Yes***					Yes***		
<u>Sycamore</u> <i>Acer pseudoplatanus</i> (&varieties)	Yes***							
<b>Whitebeam</b> <i>Sorbus aria</i>	Yes**		Yes		Yes		Yes**	Yes**
<b>Yew</b> <i>Taxus baccata</i>		Yes	Yes				Yes	

## **Tree Retention**

- 9.7.39 It has been established in the LVIA that the existing soft estate is an important landscape element that contributes to the landscape character of the area and screens the A55 from many sensitive visual receptors. Where retention is feasible to support the long-term health and vigour of the plantation or individual trees (and does not encroach within the Root Protection Area), the area should be fenced off and protected prior to the commencement of the Construction Period using fencing in accordance with BS 5837 Trees in relation to design, demolition and construction. The tree protection fencing would be inspected on a regular basis for damage and maintained throughout the Construction Period.

## **Site Clearance**

- 9.7.40 There are significant areas of soft estate that would need to be cleared outside the bird nesting period (March to August inclusive depending on seasonality and checks by suitably qualified ecologist). These areas are primarily:

- South of the A55 between Chainage 500 and Chainage 800;
- North of Conway Road/Ysguborwen Road between Chainage 00 and Chainage 300;
- South of A55 between Chainage 1150 and Chainage 1350; and
- Central reserve and roadside vegetation between Chainage 2050 and Chainage 2500 (Junction 16A).

- 9.7.41 Existing topsoil remaining would be tested to establish suitability for re-use and or suitable amendments recommended. If unsuitable as a growing medium the excavated topsoil would be removed off site or used as subsoil elsewhere within the scheme extents or as part of the Junction 15 proposals.

- 9.7.42 During construction, existing features to be retained would be protected through the implementation of the Construction Environmental Management Plan (CEMP).

- 9.7.43 The proposed planting areas, together with other landscape and environmental mitigation measures, are shown on the EMP's in Appendix 2.6.

## **9.8 Assessment of Significant Effects**

### **Assessment of Significant Landscape and Visual Effects**

- 9.8.1 The assessment of landscape and visual effects is undertaken for the following scenarios in accordance with IAN 135/10 (W)<sup>18</sup>;
- a) During the construction period assuming a maximum visibility and or maximum perceived change and over what period of time;
  - b) A winter's day in the year the project would be open to traffic and be fully operational and a reflection of the operationally non-fully mitigated/maximum visibility scenario; and
  - c) A summer's day in Year 15 after opening – note that the existing soft estate has taken approximately 30 years to establish.
- 9.8.2 For the purposes of this visual assessment with no mitigation in place, Scenario b) is considered appropriate as it can be seen as a reflection of the operationally non-fully mitigated/maximum

<sup>18</sup> IAN 135/10 (W) Annex 2 para 3.1

visibility scenario. All three scenarios are considered below with the effectiveness of mitigation demonstrated between Scenarios b) and c).

### Landscape Effects

- 9.8.3 The significance of a landscape effect is assessed through professional judgement combining the sensitivity of a landscape receptor with the magnitude of the landscape change. For the purposes of this assessment, categories of moderate to very large (beneficial and adverse) are considered to be significant.

### Effects on Landscape Elements: Physical Characteristics

- 9.8.4 There would be no significant effects on the physical characteristics of the landscape elements identified within the baseline but some significant effects on the existing roadside vegetation planted as mitigation for the A55. These are summarised in Table 9.29 to Table 9.31.

**Table 9.29: Effects on Landscape Elements: Physical Characteristics**

<b>Effects on Landscape Elements: Physical Characteristics</b>	
Settlements and the Built Environment	No significant effects. The Scheme does not directly affect the towns of Penmaenmawr or Dwygyfylchi. There are no direct impacts on any properties although the Scheme does pass close to residential properties at Maes-y-Llan. There is a direct impact on the existing A55 road corridor.
Landform, Geology and Hydrology	No significant effects on geology and Hydrology but significant effects on landform. The scheme does not have any significant effects on landform, geology or hydrology. The Afon Gyrach remains within the same location and is culverted beneath the A55 as per the existing. There would be a significant quantity of fill required for the construction of the false cutting. The false cutting proposed between the A55 and new link road will require imported or site won material for its construction and would be a significant man-made element within the coastal plain together with the embankments required for Junction 16A.
Land Cover, Vegetation and Land Use	No significant effects on vegetation or land use. Some significant effects on existing roadside vegetation The removal of the existing roadside vegetation planted as part of the A55 scheme in the late 1980's represents a significant loss of an important landscape element. However, this is unavoidable due to the nature of the Scheme as a road widening project

**Table 9.30: Effects on Landscape Elements: Perceptual Characteristics**

<b>Effects on Landscape Elements: Perceptual Characteristics</b>	
Scale and Appearance	No significant effects. The Scheme is a widening and junction improvement project to the existing A55 road corridor. The scale and appearance would be of a compatible scale and of similar landscape elements to those that exist within the existing road corridor.
Scenic Quality	No significant effects The Scheme does not have any significant adverse effects on the surrounding landscape character areas or Snowdonia National Park that are areas of high scenic quality. The existing A55 and junction improvement Scheme occupies low lying areas along the coastal plain at the foot of the Snowdonia Mountain range. The areas of high scenic quality generally correlate with these more scenic upland areas to the south. The A55 road corridor is seen as a major detractor to an area of high scenic quality.
Tranquillity	No significant effects on tranquillity. The A55 is audible from the upland areas to the south and has an adverse effect

<b>Effects on Landscape Elements: Perceptual Characteristics</b>	
	on tranquillity. There would be no significant change to the noise of the A55 or any other detracting factor as part of the Scheme.
Discordant/Intrusive Features	No significant effects due to introduction or removal of discordant/intrusive features The Scheme would be an extension to the existing road corridor that is a discordant and intrusive feature along the North Wales coast. The Scheme would not significantly change this baseline condition.
Night-time Light Sources	No significant effects on night-time light sources. The existing A55 road corridor is a major source of light pollution along the North Wales Coast. There is lighting along most sections of the carriageway including Junctions. There are also several illuminated signs and gantries that contribute to lighting levels at night. The A55 also carries significant amounts of cars and commercial traffic with headlights that are highly visible at night. Additional lighting as a result of the Scheme is not considered to cause a significant change to the night-time lighting levels as these are junction improvements to sections of road that are already lit.

**Table 9.31: Effects on Landscape Elements: Cultural and Social Characteristics**

<b>Effects on Landscape Elements: Cultural and Social Characteristics</b>	
Historic Features and Elements	No significant effects. The Scheme does not affect any World Heritage Sites, Scheduled Ancient Monuments or Listed Buildings. It does not directly affect any Conservation Areas or their setting or any listed parks and gardens or sites of archaeological interest.
Human Interaction	Significant beneficial effects. The Scheme brings some significant benefits for cyclists and pedestrians through enhanced routeways and connections to the wider public footpath network and long-distance cycle route (5).

### Effects on Landscape Character

- 9.8.5 The potential effects of the proposed scheme on each of the identified landscape character areas is undertaken below.

#### *LCA 02 – Penmaenmawr Beach - Landscape Sensitivity Medium*

- 9.8.6 The Scheme will have no significant effects on LCA02 as the area lies on the seaward side of the A55 road and rail corridor. There are no works proposed north of the road and rail corridor apart from improvements to the approaches to the pedestrian footbridge and minor works near to the sewage treatment works. This is not considered to have a potentially significant effect on the landscape character area of Penmaenmawr Beach.
- 9.8.7 Construction Phase: There would be potential adverse indirect effects during the construction period through noise disturbance caused by construction operations but limited to the eastern section of the LCA. However, these are not considered likely to be significant and would be minor adverse and result in a negligible magnitude of change and a slight adverse effect on the landscape character.
- 9.8.8 Operational Phase Year 1: The new junction with associated traffic and lighting would be more visually prominent in the eastern section of the LCA. The extended and elevated road corridor would have an urbanising effect but within a limited area resulting overall in a slight adverse effect on the wider LCA.

- 9.8.9 Operational Phase Year 15: No change from Year 1. as there is no opportunity for landscape mitigation to substantially reduce effects in Year 1 as the landscape character area falls outside and beyond the Scheme extents.

**Table 9.32: LCA 02 – Penmaenmawr Beach -Summary of Landscape Effects**

Phase	Magnitude of Landscape Effect	Significance of Landscape Effect
Construction	Minor Adverse	Slight Adverse
Year 1 Opening	Minor Adverse	Slight Adverse
Year 15	Minor Adverse	Slight Adverse

*LCA09 – A55 Pen-y-Clip to Penmaen-bach - Landscape Sensitivity Low*

- 9.8.10 The existing A55 road corridor is of low scenic quality with some significant engineering features such as Penmaen-bach tunnel and structures such as overbridges, signs and gantries. The road is heavily trafficked particularly during the summer months with large quantities of traffic including high sided HGV's and other commercial vehicles. The Scheme will effectively widen the road corridor and result in the removal of roadside vegetation that, combined will result in an urbanising effect. The effects will however be localised and would be seen as an encroachment further south of and adjacent to the existing road corridor.
- 9.8.11 Construction Phase: The two-year construction period would commence with site clearance and removal of the existing roadside plantations, a key landscape element within the LCA resulting in a major direct impact. Construction activities with plant and earthmoving machinery would, inevitably, be highly disruptive and the established road corridor would undergo a major change resulting in a moderate adverse landscape effect.
- 9.8.12 Operational Phase Year 1: The new junctions and link road would effectively be a modification of the existing road corridor and have a further urbanising effect on the LCA due to the width of the road corridor and the scale of the overbridge at Junction 16A, slip roads and junction with Glan-yr-Afon Road and the link road. Extensive earthworks forming the false cutting would become a significant feature and enclose the road corridor to the south. This would represent a minor adverse degree of change within the context of the existing road corridor to an area of low sensitivity resulting in a neutral landscape effect.
- 9.8.13 Operational Phase Year 15: Landscape mitigation measures applied to the earthworks such as cuttings and false cutting would integrate the resulting landform into the adjacent landscape and restore the landscape character of the road corridor to a similar character as the existing baseline effectively replacing the areas of existing roadside plantations lost during the construction period. However, the existing roadside plantations are 30 years old and after 15 years the landscape mitigation would not have reached the same maturity and therefore would not represent a like for like replacement.

**Table 9.33: LCA09 – A55 Pen-y-Clip to Penmaen-bach – Summary of Landscape Effects**

Phase	Magnitude of Landscape Effect	Significance of Landscape Effect
Construction	Major Adverse	Moderate Adverse
Year 1 Opening	Minor Adverse	Neutral
Year 15	Negligible Adverse	Neutral

*LCA10 – Pendyffryn Pasture and Parkland - Landscape Sensitivity Medium*

- 9.8.14 The overall landscape value of this LCA that includes Pendyffryn pasture and parkland, is considered to be medium due to its lack of cohesiveness and the erosion of its rural character due to the encroachment of residential development. The Scheme has a direct effect on land take in this area, extending further south east from the A55 with the proposed link road and new Junction 16 and Junction 16A. The Scheme would further erode the remaining rural character of the area, parts of which still remain with some good scenic qualities.
- 9.8.15 Construction Phase: The landscape character would be significantly affected during the construction period causing direct physical impact through site clearance of roadside vegetation, adjacent hedgerows and earthworks operations. The Scheme requires a significant amount of land within this area for the construction of the link road and false cutting. Land is also earmarked for a site compound in the fields west of Glan-yr-Afon Road. Additional land may also be acquired by the Contractor by agreement with landowners, but this cannot be considered as part of this assessment
- 9.8.16 Operational Phase Year 1: The Scheme involves extensive earthworks including the construction of a false cutting and replanting of the lost roadside vegetation and hedgerows removed south of the existing road corridor. The landscape mitigation would restore much of the existing landscape elements between Shell Garage and Junction 16A but with reduced areas of fields between Ysguborwen Road and the southern verge of the new link road.
- 9.8.17 Operational Phase Year 15: By Year 15 the landscape mitigation would be established and would integrate the overbridge, link road and associated structures and landform into the localised landscape. Overall, the landscape effect caused by the Scheme on LCA10 by Year 15 would represent no change to the landscape character of the area and with the soft estate well established would have a neutral effect.

**Table 9.34: LCA10 – Pendyffryn Pasture and Parkland – Summary of Landscape Effects**

Phase	Magnitude of Landscape Effect	Significance of Landscape Effect
Construction	Major Adverse	Large Adverse
Year 1 Opening	Negligible Adverse	Neutral
Year 15	No Change	Neutral

*LCA 17 – Dwygyfylchi - Landscape Sensitivity Medium/Low*

- 9.8.18 LCA 17 centres around the village of Dwygyfylchi and lies adjacent to LCA 10 Pendyffryn Pasture and Parkland. The Scheme would have similar effects to those predicted for LCA10, namely encroachment of the existing A55 road corridor southwards towards the settlement boundary of Dwygyfylchi close to the residential areas of Maes-y-Llan and Gwel-y-Mor and west of the Shell Garage and Puffin Café. This is on the periphery of the landscape character area and the sensitivity in this particular location adjacent to the A55 road corridor is considered low compared to other areas within the village.
- 9.8.19 Construction Phase: There would inevitably be some adverse effects on the LCA during the construction period but these would be minor and limited to within the boundary of the Scheme extents and outside the settlement boundary of Dwygyfylchi. Therefore there would be a limited and minor adverse change to the landscape character resulting in a slight adverse landscape effect during the 18 month to 24 month construction period.

9.8.20 Operational Phase Year 1: There would be no change to the landscape character of the area as a result of the Scheme due to its close proximity to the existing A55 road corridor.

9.8.21 Operational Year 15: No change to Operational Phase Year 1.

**Table 9.35: LCA 17 – Dwygyfylchi – Summary of Landscape Effects**

Phase	Magnitude of Landscape Effect	Significance of Landscape Effect
Construction	Minor Adverse	Slight Adverse
Year 1 Opening	No Change	Neutral
Year 15	No Change	Neutral

*LCA 26 – Pant-yr-Afon Pasture - Landscape Sensitivity Low*

9.8.22 The potential effects on some localised parts of this landscape character area would be potentially significant where the Scheme has a direct physical impact. The realignment of Junction 16 would encroach into part of the LCA and require the removal of existing roadside vegetation and excavation of a large cutting. However, the encroachment of the Scheme south only has a localised impact immediately south of the A55. Elsewhere to the south east of Penmaenmawr and the lower slopes of Criag Hafodwen and Foel Lûs the landscape character of the area would remain unaffected.

9.8.23 Construction Phase: The Scheme would have a minor adverse change on a very small area of the LCA south east of the existing Junction 16. This area is localised and immediately adjacent to the existing road corridor and therefore not considered significant.

9.8.24 Operational Phase Year 1: No Change, the Scheme is effectively a widening of the existing road corridor and does not affect the wider area of the LCA to the south.

9.8.25 Operational Year 15: No change to Year 1.

**Table 9.36: LCA 26 – Pant-yr-Afon Pasture – Summary of Landscape Effects**

Phase	Magnitude of Landscape Effect	Significance of Landscape Effect
Construction	Minor Adverse	Slight Adverse
Year 1 Opening	No Change	Neutral
Year 15	No Change	Neutral

**Summary of Significant Landscape Effects**

9.8.26 The most significant impact on the landscape character of the area is confined to landscape character areas immediately adjacent to the existing A55 road corridor between Junction 16 and Junction 16A. The existing road corridor is already a significant man-made landscape element that crosses the coastal plain between Penmaenmawr and Penmaen-bach headland. It has a detrimental effect on the overall landscape quality of the surrounding area that lies close to Snowdonia National Park and within a highly scenic coastal setting.

9.8.27 The significant effects of the Scheme are localised and do not result in a much wider impact usually associated with a new section of road. However, as a result of the Scheme, the road corridor would become significantly wider and encroach towards the settlement of Dwygyfylchi. There would be some loss of the existing soft estate plantations alongside the existing road



corridor, but these will be replaced with a similar treatment of earthworks and planting that would effectively replicate that which exists as the current landscape baseline conditions.

- 9.8.28 There would inevitably be some initial changes of large magnitude during the construction period to the existing landscape character of the area, but this would be over relatively short period of time currently estimated at between 18 months to 24 months. Compare this time to the 30-year period over which the existing landscape has taken to mature and to integrate the road into the localised landscape.
- 9.8.29 Landscape mitigation measures have been described in Section 9.7 and are illustrated on the Environmental Masterplans Plans (EMP's) in Appendix 2.6.

### Visual Effects

- 9.8.30 The representative viewpoints identified in the landscape baseline have been used to identify likely visual effects and the effectiveness of mitigation measures. This is considered to be proportionate to the extent of the Scheme as these are junction improvements and form part of an incremental change to the existing road corridor.

#### *Viewpoint A: Penmaenmawr Promenade – Visual Receptor Sensitivity High*

- 9.8.31 There would be no change in the view as a result of the Scheme that commences approximately 600 m further east from the viewpoint. The roadside vegetation to the north of the existing A55 and Junction 16 roundabout would be retained and remain in view. Some upper sections of the new footbridge may be visible above the roadside vegetation but will be largely obscured from view particularly during the summer months when the vegetation is in leaf.
- 9.8.32 Construction Phase: Plant and machinery are likely to be visible in the vicinity of the proposed new footbridge and western elements of the new Junction 16. This would not be substantial and only part of the Scheme visible and not alter the overall balance of features and elements that comprise the existing view.
- 9.8.33 Operational Phase Year 1: There would be glimpsed views of the upper sections of the proposed footbridge, but this would be viewed in the context of other roadside elements such as lighting columns and therefore cause a negligible change in the view.
- 9.8.34 Operational Year 15: No Change to significance of effect in Year 1 as there are no landscape mitigation measures identified for the post operational years to mitigate views of the footbridge. However, existing roadside vegetation in view may continue to develop in height and reduce the visibility of the footbridge resulting in a neutral effect.

**Table 9.37: Viewpoint A: Penmaenmawr Promenade – Summary of Visual Effects**

Phase	Magnitude of Visual Impact	Significance of Visual Effect
Construction	Minor	Slight/Moderate Adverse
Year 1 Opening	Negligible	Slight Adverse
Year 15	Negligible	Neutral Effect

#### *Viewpoint B: Ysguborwen Road - Visual Receptor Sensitivity High*

- 9.8.35 The change in view would be significant during the construction period and would form a noticeable feature in the view. The new link road to the south of the A55 would run through the fields used for grazing but would be screened by a false cutting. The false cutting up to 7.5 m higher than the new link road would be a significant earthwork feature in the middle distance but

would screen the link road and A55 from the view while retaining views across the sea towards the Great Orme. The false cutting would be crowned with a masonry wall that would also increase the screening effect. The earthworks would be planted with ornamental shrubs to further screen traffic including high sided vehicles.

- 9.8.36 Construction Phase: During construction the Scheme would become the dominant feature and cause a major adverse degree of change in the view with large earthworks operations during the 18-24 month construction period. Existing vegetation west of Maes-y-Llan visible in the middle distance would also be lost. The visual effects for the receptors would be large/very large adverse and it is anticipated that the use of Ysguborwen Road for construction access would further diminish the general amenity of the area.
- 9.8.37 Operational Phase Year 1: The visual impact would lessen in the post construction period with less activity and the completion of the earthworks. The false cutting would screen views of the new link road and re-aligned A55 carriageways whilst retaining views of the open sea and Great Orme. Views of cars and high-sided commercial vehicles would also be screened from view. Lighting along the main carriageway would remain in the view but night-time effects of headlights and glare would also be screened from view.
- 9.8.38 Operational Year 15: The planting of ornamental shrubs on the northern face of the false cutting and the regrading and seeding of the southern embankment would be established and integrate the earthworks into the adjacent landscape. This would improve the visual appearance of the earthworks but would make little or no further contribution to the screening function and therefore would remain as moderate beneficial effect.

**Table 9.38: Viewpoint B: Ysguborwen Road – Summary of Visual Effects**

Phase	Magnitude of Visual Impact	Significance of Visual Effect
Construction	Major Adverse	Large/ Very Large Adverse
Year 1 Opening	Moderate Beneficial	Moderate/Large Beneficial
Year 15	Moderate Beneficial	Moderate/Large Beneficial

*Viewpoint C: Maes-y-Llan: Visual Receptor Sensitivity High*

- 9.8.39 The view would change significantly during the early construction phase. The existing roadside vegetation would be removed in order to construct the new link road that would pass at a lower level (approximately 2 m) than the existing residential street. Views would be open and exposed across the A55 road corridor during the construction period. New noise attenuation fencing 3 m high would be erected and screen views of the new link road and A55 from street level and ground floor windows. The overall change in the view would revert to a similar aspect to the existing following completion of the Scheme.
- 9.8.40 Construction Phase: The Scheme would cause a major adverse change in the view with the removal of the existing roadside vegetation and as a result expose the existing A55 road corridor in the view. There would be major deterioration in the view over the 18-24 month construction period to residential properties in Maes-y-Llan that overlook the existing road corridor. General construction activity would cause a significant impact on the general amenity of the residential area.
- 9.8.41 Operational Phase Year 1: The Scheme would be completed and the northern verge of Maes-y-Llan defined by a 3.5 m high acoustic barrier fence. The fence would effectively replace the

screening function of the existing roadside vegetation and provide additional benefits of noise reduction. The view would not change significantly but be more urban in appearance, there may be opportunities to soften the appearance of the acoustic barrier with planting along the base of the fence and verge of the road.

- 9.8.42 Operational Year 15: Planting along the base of the fence and along the verge of the road would reduce the urban appearance of the acoustic barrier fence resulting in no perceptible change in the view.

**Table 9.39: Viewpoint C: Maes-y-Llan – Summary of Visual Effects**

Phase	Magnitude of Visual Impact	Significance of Visual Effect
Construction	Major Adverse	Large/Very Large Adverse
Year 1 Opening	Minor	Slight/Moderate Adverse
Year 15	Negligible	Neutral

*Viewpoint D: Puffin Cafe Pedestrian Footbridge – Visual Receptor Sensitivity High*

- 9.8.43 The change in view would be moderate adverse and effectively widen the existing road corridor from approximately 25 m to 50 m wide to include the link road parallel and south of the A55 road corridor. The new link road would pass to the south (right in picture) of the existing Shell Garage and a false cutting would take additional land to the south as mitigation. The false cutting would be planted to provide visual separation between the link road and main A55 carriageway. The new overbridge at Junction 16A would be visible but seen against the backdrop of Penmaen-bach headland approximately 1 km to the east.
- 9.8.44 Construction Phase: The Scheme under construction would cause a dominant feature in the view with large scale construction activities within the main carriageway and to the south adjacent to Shell Garage and Puffin Café.
- 9.8.45 Operational Phase Year 1: The Scheme would remain a noticeable change in the view with the new link road and earthworks to the south of the A55 and behind Shell Garage. The overall road corridor would appear wider than the existing with additional lighting and signage visible elements in the view. The view of these elements would be difficult to mitigate.
- 9.8.46 Operational Year 15: No change to Operational Phase Year 1 from this elevated viewpoint. Landscape mitigation measures would aid in the integration of the Scheme but not provide significant mitigation of views from this viewpoint

**Table 9.40: Viewpoint D: Puffin Cafe Pedestrian Footbridge – Summary of Visual Effects**

Phase	Magnitude of Visual Impact	Significance of Visual Effect
Construction	Major	Large/Very Large Adverse
Year 1 Opening	Moderate	Slight/Moderate Adverse
Year 15	Moderate	Slight/Moderate Adverse

*Viewpoint E: Gwel-y-Mor Public Open Space - Receptor Sensitivity High*

- 9.8.47 The view would change significantly during the initial site clearance and construction period. Earthmoving operations required for the construction of the new link road would be clearly visible close to the existing pedestrian footbridge. However, by Winter Year 1 the false cutting would be in place and views of the new link road and A55 would be screened by the earthworks that would subsequently be planted with trees and shrubs and seeded on the southern bank adjacent to the recreation ground. The pedestrian footbridge would remain visible retained at the existing location with improved and ramped approaches. The kickabout area would be re-positioned to accommodate the false cutting.
- 9.8.48 Construction Phase: The Scheme would cause a moderate change in the view with earthworks visible in the middle distance close to the existing footbridge. Some existing roadside vegetation would be lost but changes on the view would not alter the overall balance of features and elements that comprise the existing view.
- 9.8.49 Operational Phase Year 1: The open views to the pedestrian footbridge and beyond to the open sea and the Great Orme would remain. Earthworks of the false cutting at 4 m high would screen views of the new link road and associated traffic from view. Some elements of the Scheme such as lighting and signage would be perceptible but not alter the overall balance of the view.
- 9.8.50 Operational Year 15 Landscape mitigation.: Landscape mitigation on the faces of the false cutting would integrate the earthworks into the adjacent landscape resulting overall in a slight adverse/neutral visual effect.

**Table 9.41: Viewpoint E: Gwel-y-Mor Public Open Space – Summary of Visual Effects**

Phase	Magnitude of Visual Impact	Significance of Visual Effect
Construction	Moderate Adverse	Moderate Adverse Effect
Year 1 Opening	Minor Adverse	Slight /Moderate Adverse Effect
Year 15	Negligible	Slight Adverse/Neutral Effect

*Viewpoint F: Penmaenmawr Road (west): A55 West of Junction 16A Receptor Sensitivity High*

- 9.8.51 The change in view would be major with the road corridor much wider in this area (approximately 90 m) compared to the existing (25 m to 30 m) due to the scale of the Junction 16A interchange that extends southwards to form the westbound slip road and also form a junction between the link road and Glan-yr-Afon Road. The existing roadside vegetation would be lost and the southern verge of the link road and new junction arrangement planted with trees, shrubs and hedgerows. Some of the verges would be sown with species rich grassland and some planted with scattered trees. Although the view would change significantly, it would be replaced with a similar scene of a wide road corridor with roadside elements such as lighting, signs, overhead gantries and vehicle restraint barriers.
- 9.8.52 Construction Phase: Site clearance would cause a major change to the view with the removal of existing roadside hedgerow along the southern verge of the A55. There would be major change in the view as a result of the Scheme that encompasses the entire view that lies approximately 200 m west of the Junction 16A overbridge. Although the change in view is major, the receptor is of low sensitivity within the existing A55 road corridor the change in view is not considered significant. It does however provide an indication of the anticipated change to the road user who is likely to experience major adverse visual effects during the 18-24 months construction period.

9.8.53 Operational Phase Year 1: The viewpoint would lie within the Scheme extents on the verge of the new link road west of Junction 16A. The scale of the road corridor would be significantly larger than the existing footprint and from this viewpoint location would be difficult to mitigate. The magnitude of change and visual effects would therefore remain similar to the Construction Phase.

9.8.54 Operational Year 15: No change to Operational Year 1.

**Table 9.42: Viewpoint F: Penmaenmawr Road (west) – Summary of Visual Effects**

Phase	Magnitude of Visual Impact	Significance of Visual Effect
Construction	Major	Slight/Moderate Adverse Effect
Year 1 Opening	Major	Slight/Moderate Adverse Effect
Year 15	Major	Slight/Moderate Adverse Effect

*Viewpoint G: Pendyffryn Farmland and Parkland: Receptor Sensitivity Medium*

9.8.55 Under the Scheme the hedgerow would be removed and replaced with new to provide visual separation between the main carriageway and the link road. The link road would be 7.3 m wide with a 2.5 m shared use route along the southern verge. The southern verge and false cutting would be seeded on the north side and planted to the south. Approximately 50 m of the field in view would be lost left of the existing hedgerow with views towards the residential areas partially lost and screened by the false cutting as part of the Scheme.

9.8.56 Construction Phase: The Scheme would cause a major change in the view from users of the permissive path that crosses from Glan yr Afon Road towards the A55. The scale of impact as a result of the Scheme would be extensive and become the dominant feature on the view. The field would also be used as a Construction Compound. The resulting effect would be very a large adverse visual impact from this viewpoint as it falls within the Scheme extents. The path would be closed as part of the Scheme proposals during the construction phase.

9.8.57 Operational Phase Year 1: The position of the viewpoint would be located within the footprint of the new Scheme on the northern verge of the westbound on slip. Views in the same direction would be along the new link road with views contained by grassland verges on embankments with tree and shrub planting along the south. Existing trees that run along the course of the Afon Gyrach would remain in view. The overall visual effect of the Scheme would be a widening of the road corridor and loss of rural views towards Dwygyfylchi. The overall effect would be a major change in the view and a moderate/large adverse visual effect that given the location of the viewpoint would be difficult to mitigate.

9.8.58 Operational Year 15: Planting along the southern edge of the link road would become established and create a soft edge to the southern boundary of the link road. The landscape mitigation would re-introduce a rural element in the view and integrate the Scheme into the adjacent farmland landscape. The Scheme would still form a noticeable but minor change in view but the backdrop to the view would remain largely the same as existing.

**Table 9.43: Viewpoint G: Pendyffryn Farmland and Parkland – Summary of Visual Effects**

Phase	Magnitude of Visual Impact	Significance of Visual Effect
Construction	Major	Very Large Adverse Effect
Year 1 Opening	Major/Moderate	Moderate/Large Adverse Effect
Year 15	Moderate	Moderate Adverse

*Viewpoint H: Glan -yr- Afon Field: Receptor Sensitivity Medium*

- 9.8.59 The Scheme would not change the character of the view significantly. Views of the sea would be lost due to the construction of the new junction elevated on embankment above the existing A55 to form the overbridge and associated slip roads. View towards the lower sections of the Great Orme would be lost but views to the upper sections would remain. Planting the embankments of the new junction would integrate the Scheme into the localised landscape and provide continuous tree cover from the foot of Penmaen-bach headland further west to the base of the new Junction 16A.
- 9.8.60 Construction Phase: There would be a major change in the view with removal of the existing hedgerow and plant and machinery operating close to the existing A55 road corridor and east of Glan-yr-Afon Road during the construction of the new Junction 16A overbridge and junction to the south. There would be extensive earthworks required around the southern flanks of the junction that would extend into the Pendyffryn farmland.
- 9.8.61 Operational Phase Year 1: The earthworks would be formed on the approaches to the junction that would appear on low embankment in the view. This would remain as a noticeable feature and cause a moderate degree of change in the view.
- 9.8.62 Operational Year 15: The earthworks would be grass seeded and planted with trees and shrubs planted along the upper and lower sections of the embankment to the newly constructed Junction 16A. Planting would help to integrate the Scheme into the localised landform and tie in to other vegetation patterns resulting in an overall slight adverse visual effect.
- 9.8.63 Operational Year 15: No significant change to the existing view.

**Table 9.44: Viewpoint H: Glan -yr- Afon Field – Summary of Visual Effects**

Phase	Magnitude of Visual Impact	Significance of Visual Effect
Construction	Major Adverse	Moderate/Large Adverse
Year 1 Opening	Moderate Adverse	Slight Adverse
Year 15	Minor Adverse	Slight Adverse

*Viewpoint I: Allt Wen High - Receptor Sensitivity High*

- 9.8.64 The Scheme would appear in context with the existing A55 road corridor appearing much as it is now albeit wider to the south with the link road running parallel. The combined distance of view from the A55 and landscape mitigation measures along the southern edge of the Scheme would result in a negligible change in the view. Views during the construction period would be more discernible due to the extensive earthworks and plant and machinery operating in the area.
- 9.8.65 Construction Phase: There would be some change in the view during the construction activity, but this would be seen at distance (approximately 1 km) and not alter the overall balance of the view. It would therefore represent a minor magnitude of change and a moderate adverse visual effect.
- 9.8.66 Operational Phase Year 1: Negligible due to distance and existing road and rail corridor.
- 9.8.67 Operational Year 15: Negligible due to distance and existing road and rail corridor.

**Table 9.45: Viewpoint I: Allt Wen High – Summary of Visual Effects**

Phase	Magnitude of Visual Impact	Significance of Visual Effect
Construction	Minor Negative	Moderate Adverse
Year 1 Opening	Negligible	Slight Adverse
Year 15	Negligible	Slight Adverse

*Viewpoint J: Trefforis Road*

9.8.68 The Scheme would not change the view significantly due to the intervening topography and landscape elements. Existing trees in the view would remain and the link road would be in false cutting and southern embankment planted either side of the Gladstone Hotel. It is anticipated that there would be some additional screening of traffic on the A55 as part of the Scheme and the link road would be hidden from view.

9.8.69 Construction Phase: No discernible change.

9.8.70 Operational Phase Year 1: As above. No discernible change.

9.8.71 Operational Year 15: As above. No discernible change.

**Table 9.46: Viewpoint J: Trefforis Road – Summary of Visual Effects**

Phase	Magnitude of Visual Impact	Significance of Visual Effect
Construction	Negligible	Neutral Effect
Year 1 Opening	Negligible	Neutral Effect
Year 15	Negligible	Neutral Effect

*Viewpoint K: Trwyn y Wylfa*

9.8.72 The view would not be anticipated to change significantly from this distance of approximately 1 km. The link road to the south of the A55 road corridor would be obscured by the false cutting as would traffic on the main east and westbound carriageways of the A55. Earthworks west of the Afon Gyrach and south of the link road would be visible during the construction period but would be seeded and planted within the first available season. Further east the trees and shrubs would also be planted along the southern verge. It is anticipated that high sided vehicles on the main A55 would be less visible in sections due to the false cutting and planting along the southern bank.

9.8.73 Construction Phase: No discernible change.

9.8.74 Operational Phase Year 1: As above. No discernible change.

9.8.75 Operational Year 15: As above. No discernible change.

**Summary of Significant Landscape Effects from Representative Viewpoints**

9.8.76 The most significant adverse effects of the Scheme would be during the construction period. Although this would be temporary and for a duration of a 18-24-month period, the visual effects caused during the site clearance and earthworks operations, would have very large adverse effects on a localised population of highly sensitive receptors primarily within the Dwygyfylchi area. There are limited methods to mitigate against these temporary impacts during the



construction period from a landscape and visual perspective that can be included within the proposals for the Scheme.

### **Residential Properties-Summary of Visual Effects and the VES Appendix 9.5.**

- 9.8.77 The baseline of the existing visual amenity along with an assessment of the visual effects of the Scheme at each group of properties is described in the Visual Effects Schedule (VES) Appendix 9.5 The assessment makes an assessment based on groups of properties rather than individual dwellings. The assessment focuses on the most significant effects for any properties within that group and reports these effects only. It does not assess the impact on individual properties but rather the overall impact and worst case scenario. For example, in a group of properties where some have no visible connection with the Scheme and some have views of the Scheme, those that would have views were assessed and significance of impacts recorded.
- 9.8.78 Twenty-five groups of properties were identified as potential visual receptors within 0.5 km of the Scheme proposals through a combination of desk-based studies and field work assessments. Of the 25 groups two located along either side of Ysguborwen Road would experience Very Large Adverse effects during the Construction Period with others that overlook the Scheme extents on the western fringes of Dwygyfylchi experiencing Moderate or Slight Adverse Effects. Properties on the fringes of Penmaenmawr would be largely unaffected by any stages of the Scheme.
- 9.8.79 Year 1 and the impacts experienced during the construction period would have ceased although there may remain some minor works to complete. The creation of a false cutting with a masonry wall along its crest along the south side of the new link road would have some immediate screening effects for properties on Ysguborwen Road and on the northern fringes of Dwygyfylchi. There would be beneficial effects to the properties that currently overlook the existing A55 road corridor to the north and north east with the combined height of the false cutting and masonry wall concealing traffic, including high sided vehicles, from view.
- 9.8.80 Year 15 and the planting on the cut faces and embankments would have become established and disguise the engineered profile of the earthworks. The planting would enhance the screening effect of the earthworks and false cutting and in some cases further reduce adverse visual effects. A summary of the significant effects on residential properties is summarised in Table 9.47 and described in more detail in the VES in Appendix 9.5 and the Visual Effects Drawing at Figures 9.11 and 9.12.

**Table 9.47: Residential Properties (RP): Summary of Significant Effects**

	<b>Construction Period</b>	<b>Year 1 Winter</b>	<b>Year 15</b>
Very Large Adverse Effect	RP13, RP14, RP16, RP17		
Large Adverse Effect	RP25		
Moderate Adverse Effect	RP12 RP19, RP20, RP21`	RP21, RP25	
Slight Adverse Effect	RP01, RP07, RP08, RP09, RP10, RP11,	RP01, RP17.	RP16
Neutral Effect	RP02, RP03, RP04, RP05, RP06, RP15, RP18, RP22, RP23, RP24	RP02, RP03, RP04, RP05, RP06, RP07, RP08, RP09, RP15, RP19, RP23, RP24	RP03, RP04, RP05, RP06, RP07, RP08, RP14, RP18
Slight Beneficial		RP10	RP01, RP02



	Construction Period	Year 1 Winter	Year 15
Moderate Beneficial		RP11, RP12, RP13, RP14, RP18, RP20, RP22	RP17, RP21
Large Beneficial		RP16	RP10, RP11, RP12, RP13, RP15, RP19,

### Non-residential Properties (NRP)

- 9.8.81 There are few residential properties that are significantly affected by the Scheme. The Noddfa Retreat Centre close to the existing Junction 16 roundabout and Ysguborwen Road is heavily screened by mature trees within its grounds but may experience some adverse effects during the construction period during the winter months when the trees surrounding the property are not in leaf. Ysgol Capelulo would experience open views from an elevated position of the new Junction 16 with moving earthworks plant visible during operations. There would be no significant effects on either of these properties on completion or during the operational phase of the Scheme.
- 9.8.82 Shell Garage and Puffin Café are non-residential properties located immediately adjacent to the westbound carriageway of the A55. The northern aspect of these properties will remain largely the same with some Slight Adverse effects predicted for the construction phase that would improve the approaches to the pedestrian overbridge immediately to the west and the construction of the link road to the south. Users of both facilities are classified as being of low sensitivity and with the existing carriageway running past the frontage of both properties the overall effect is considered to be Neutral.

### Public Rights of Way

- 9.8.83 The Scheme would provide some overall benefits to the users of the National Cycle Network and the Wales Coastal Path through improvements to the network by providing a new shared use route across the A55 alongside the new link road. There would also be improved access through the provision of ramped access at the existing footbridge west of Shell Garage and Puffin Café that would improve accessibility and connectivity.
- 9.8.84 There would be no significant change to the visual amenity of the existing network apart from some disruption caused by plant operating close by during the construction period.

### Land with Public Access

- 9.8.85 Land with public access such as the Tan y Foel Cemetery and the football pitches south of Conwy Road to the west of Junction 16 would experience no visual effects as a result of the Scheme. Maes y Llan football/kick about area would be significantly affected by the Scheme with approximately a third of the area lost due to the Scheme. The effect during construction would be Very Large Adverse as a result of the Scheme footprint and earthmoving operations, although it is possible that the whole area would be closed during the construction period and therefore no users would have access to experience the visual effects of the Scheme.
- 9.8.86 On completion of the Scheme and by Year 15 there would be no significant change to the existing view and some beneficial effects depending on the exact location of the user within what would be a significantly smaller area. The new link road would be screened by the false cutting and planting to the north and north east, otherwise the views would remain the same as existing.

## **Local Road Network and Bus Routes**

- 9.8.87 Users of the local road network and bus routes are classified as receptors of low sensitivity. The Scheme would change the use of the local road network and views from the existing highway network would remain largely the same as this is not significantly affected by the Scheme. The new link road would result in users of the road experiencing new views of the area, in particular towards Dwygyfylchi and hills beyond from the road network adjacent to Junction 16A.

## **Residual Landscape Effects**

- 9.8.88 The key residual landscape effects would be as follows:

- a) The widening of the road corridor would result in the loss of remnant coastal plain and pastoral land to the south of the existing road corridor. This would have a detrimental effect on the landscape character of Pendyffryn Pasture that encompasses the coastal plain at the foot of the Penmaen-bach headland and north east of Dwygyfylchi;
- b) The link road would substantially widen the existing A55 road corridor between Junction 16 and Junction 16A, a distance of approximately 2 km. This would not represent a significant change to the existing landscape character of the road corridor as the built elements would be of a similar character to the baseline conditions. The Scheme would encroach into the area south and towards Dwygyfylchi and have a detrimental effect on the landscape character as described above but this is not considered to be significant.
- c) The Scheme would provide potential opportunities for the further development of land between the A55 road corridor and the settlement boundary of Dwygyfylchi. This would be an indirect impact and consequence of the Scheme rather than a specific impact. This would have the potential of further encroachment towards the settlement boundary of Dwygyfylchi that has progressively expanded towards the existing A55 road corridor with new residential development at Gwel-y-Mor and further residential development consented at Y Bluen Goch.

## **Residual Visual Effects**

- 9.8.89 The most significant visual effects following the successful establishment of the landscape mitigation measures would be as follows:

- a) There would be beneficial effects to residential receptors of high sensitivity on the outskirts of Dwygyfylchi afforded by the landscape mitigation that would screen views of the A55 road corridor and link road while retaining views north across open sea towards Conwy Bay and the Great Orme. Views of passing traffic at night would also be screened all year round by the false cutting topped with a masonry wall;
- b) Views south from the A55 road corridor would be contained by the roadside planting and earthworks between Junction 16 and Junction 16A while retaining distant views of landmarks to the east and west and the mountainous backdrop to the south. This green corridor would create a continuous band of value to the visual amenity experienced by motorists and non-motorised users of the link road with added benefits to biodiversity;
- c) Planting around Junction 16 and Junction 16A would integrate the structure and associated earthworks into the localised landscape while creating areas of visual amenity for users of the local road network and attractive entrance at the gateways to the town of Penmaenmawr and village of Dwygyfylchi.

## 9.9 Cumulative Effects

9.9.1 Cumulative effects are 'the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments, taken together.'<sup>19</sup>

9.9.2 Cumulative effects assessment recognises two major sources of cumulative effects:

- Type 1 or Intra-project effects – These effects occur where a single receptor is affected by more than one source of impact arising from different aspects of the proposed development; and
- Type 2 or Inter-project effects – These effects occur because of several developments, which individually might not be significant, but when considered together could create a significant cumulative effect on a shared receptor and will include developments separate from and related to the proposed development.

### Methodology

9.9.3 The assessment of cumulative effects draws on the methodology and guidance set out in GLVIA3.

9.9.4 The focus of this assessment of cumulative effects is on likely significant cumulative effects, which are likely to influence decision making and the design of the Scheme, rather than an assessment of every potential cumulative effect.

### Scope

9.9.5 The assessment of Type 1 cumulative effects considers other elements of the Scheme detailed in the environmental factors considered in other Chapters of the ES.

9.9.6 The assessment of Type 2 cumulative effects includes:

- a) Schemes with planning consent;
- b) Schemes that are the subject of a valid planning application that has not yet been determined<sup>20</sup>; and
- c) Schemes that are the subject of consideration under the Highways Act.

9.9.7 The schemes to be considered in this assessment of cumulative effects have been agreed with the Local Planning Authority and are described in more detail in Chapter 19.

### Type 1 Intra – Project Effects

9.9.8 The assessment of landscape and visual effects takes into account direct impacts on landscape and visual receptors and also potential effects on the perceptual qualities of the landscape such as scenic quality and tranquillity. The baseline landscape describes such qualities and has recorded noise from the existing A55 as a particular factor affecting the perceptual qualities of the surrounding landscape.

9.9.9 Noise is considered a potential cumulative effect that could change the perceptual qualities of the landscape, in particular areas that have tranquil qualities such as the inter-tidal areas of Penmaenmawr Beach and the upland areas such as Allt Wen Moorland and other moorland areas.

<sup>19</sup> 'Assessing the Cumulative Impact of Onshore Wind Energy Development', Scottish Natural Heritage, March 2012.

<sup>20</sup> GLVIA3 Paragraph 7.13

- 9.9.10 Noise mitigation is required adjacent to the carriageway that involves the construction of 2 m to 3 m high noise barrier fencing. This would appear as another roadside element associated with the road corridor and in the context of the Scheme not likely to represent a significant cumulative effect.

### **Type 2 or Inter-project Effects**

- 9.9.11 Chapter 19 sets out known schemes that could be considered to have a cumulative effect in combination with the Junction 16 Scheme and are summarised for ease of reference below.
- 9.9.12 In terms of cumulative landscape and visual effects, these other known proposed developments are not considered to have a significant effect in combination with the Scheme proposals.
- 9.9.13 The Scheme for Junction 16 have also been considered in combination with Junction 15. The two Schemes, although geographically not distant from each other, are considered to have no cumulative landscape or visual effects. Effects are very localised and visually not connected due to the intervening landform of Penmaenmawr Mountain.

## **9.10 Summary and Conclusions**

- 9.10.1 The existing A55 road corridor is a significant man-made feature that traverses the highly scenic plain of the North Wales coast at the foot of the Snowdonia mountain range. It is a strategic long-distance route that connects towns and coastal communities in the region including the former quarry towns of Llanfairfechan and Penmaenmawr. The existing road corridor at Penmaenmawr was constructed in the late 1980's and involved extensive planting along its length to screen the road from nearby properties and to integrate the road into the localised landscape.
- 9.10.2 The A55 Junction 16 Scheme would result in the widening of the existing road corridor with the removal of the existing roundabout at Junction 16 and a new overbridge at Junction 16A Dwygyfylchi with grade separated junctions and slip roads in both east and west directions. A new link road would be constructed running roughly parallel with the A55 to the south of the Puffin Café linking back into the local road network near the Gladstone Hotel.
- 9.10.3 The Scheme would result in significant land take of primarily agricultural land parallel to and south of the existing A55 for its construction. The result would be that the new link road extends further south towards existing residential areas on the eastern outskirts of Penmaenmawr and the village of Dwygyfylchi. Much of the existing roadside vegetation between Junction 16 and Junction 16A would be lost leading to open views of the A55 road corridor and associated traffic for some properties. There would be significant short-term disruption to landscape and general amenity of the area and nearby residential properties during the construction period due to the extensive earthworks and construction of the new junctions and link road.
- 9.10.4 The Scheme includes mitigation measures to reduce the landscape and visual impact in the form of extensive earthworks that would be planted with trees and shrubs. There would be a false cutting south of the A55 and new link road between Junction 16 and Junction 16A. Junction 16A would also involve extensive earthworks that would be planted and grass seeded to the south where it connects to Glan yr Afon Road and Dwygyfylchi. The tree and shrub planting would take some time to establish but over time would integrate the Scheme into the localised landscape.
- 9.10.5 The result of the mitigation measures would mean that the A55 and link road would be screened from the views of nearby residential areas such as those along Ysguborwen Road, Gwel y Mor and Cae Gwynan while keeping open views of the sea beyond. The Scheme would pass closer to the

residential properties at Maes y Llan but existing views north across the open sea from the properties would be retained.

- 9.10.6 The landscape and visual impact of the Scheme on the wider area would not be significant. The highly scenic qualities of the surrounding upland areas to the south including the Snowdonia National Park would remain intact. There would be no significant change to the wider landscape character or perceptual qualities such as the tranquility of the surrounding area.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 10 CULTURAL HERITAGE**

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## 10. CULTURAL HERITAGE

### 10.1 Chapter introduction

- 10.1.1 This chapter considers the direct and indirect impact of the proposed Scheme on cultural heritage assets, including buried archaeological features, historic buildings, ancient monuments, historic landscapes and Conservation Areas. It identifies the likely impacts on these heritage assets in terms of the potential for direct physical disturbance and changes within the settings of the assets and assesses the overall significance of effect.
- 10.1.2 The following stages of the Scheme are likely to affect the historic environment:
- a) **Construction (including land take):** this is the phase where direct, physical impacts on built heritage assets and buried archaeological remains are most likely to occur.
  - b) **Operation:** this is the phase during which nearby heritage assets may experience impacts due to visual and acoustic changes within their settings, and there would be changes to the character of the historic landscape.
- 10.1.3 Physical assets were considered within a 1km study area on either side of the Scheme boundary. Within this corridor 126 assets were identified, 93 from the Historic Environment Record (HER), 1 from Field Survey 3 from the National Primary Record Number (NPRN) and 29 from the Geophysical survey. Of this total 4 assets are found within the Scheme boundary and are potentially directly physically impacted. The remaining 115 assets are outside of the Scheme and should not be directly impacted. The assets are listed in Appendix 1. Of these 11 are designated sites with further designated sites between the 1km boundary and 5km. These sites consisted of a total of 28 scheduled ancient monuments (SAM) and 5 listed buildings (LB).
- 10.1.4 Appendix 10.1 shows the location of all the designated sites, Appendix 10.2 show the effects on cultural heritage assets.

### 10.2 Methodology

- 10.2.1 Historic Environment Technical Advice Note (TAN) 24, (Welsh Government, 2017) replaces *Circular 60/96 Planning and the Historic Environment: Archaeology; 61/96 Planning and the Historic Environment; Historic Buildings and Conservation Areas; and 1/98 Planning and the Environment: Directions by the Secretary of State for Wales*. TAN 24 forms a single document giving guidance for the planning system as it considers the historic environment during development plan preparation and decision making planning and listed building applications.
- 10.2.2 The historic environment is defined as: *'All aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past activity, whether visible, buried or submerged, and deliberately planted or managed.'* A historic asset is: *'An identifiable component of the historic environment. It may consist or be a combination of archaeological site, a historic building or area, historic park and garden or a parcel of historic landscape. Nationally important historic assets will normally be designated.'*
- 10.2.3 Taken together, and set within their cultural context, historic assets contribute to the character and sense of place of different parts of Wales. (TAN 24 section 1.7). TAN 24 uses the *Conservation Principles for the Sustainable Management of the Historic Environment in Wales* (Conservation Principles), published in 2011 as a basis upon which Cadw discharges its statutory duties. Conservation Principles should be used to assess the potential impacts of a development proposal on the significance of any historic asset/assets and to assist in decision-making where



the historic environment is affected by the planning process (TAN 24 section 1.10).

10.2.4 Six principles are used:

1. Historic assets would be managed to sustain their values
2. Understanding the significance of historic assets is vital
3. The historic environment is a shared resource
4. Everyone will be able to participate in sustaining the historic environment
5. Decisions about change must be reasonable, transparent and consistent
6. Documenting and learning from decisions is essential

10.2.5 TAN 24 shows that heritage impact assessment is a structured process to enable the significance of a designated asset to be taken into account when considering proposals for change. Information on historic assets in Wales is included in TAN 24. This describes the sources of information on designated historic assets (scheduled monuments, listed buildings and protected wrecks) and areas on the register of historic parks and gardens and the register of historic landscape in Wales. Most historic assets are not designated and the largest comprehensive set of data on all known archaeological sites, historic buildings and other components of historic landscape is found in the Historic Environment Records (HERs), maintained by the four Welsh archaeological trusts.

10.2.6 TAN 24 describes the importance of archaeological assets and their fragility and vulnerability to damage. The development management process maintains a presumption that preservation in situ is the preferred option for the management of assets that may be affected by development. TAN 24 outlines the procedures to be followed for the preservation, or where considered appropriate, the excavation and recording of archaeological features. This includes defining the scope of work and monitoring performance. The need to provide a contingency to deal with unexpected archaeological discoveries by the developer is also emphasised.

10.2.7 *Setting of Historic Assets in Wales* (Cadw 2017) gives guidance on measures to assess the potential visual impact of developments. The introduction to this makes it clear that all individual historic assets, irrespective of their designation, are affected by this guidance.

10.2.8 Section 4 of *Setting Historic Assets in Wales* lays out the stages of assessment that are to be followed:

**Stage 1:** *Identify the historic assets that might be affected by a proposed change or development.*

**Stage 2:** *Define and analyse the settings to understand how they contribute to the significance of the historic assets and, in particular, the ways in which the assets are understood, appreciated and experienced.*

**Stage 3:** *Evaluate the potential impact of a proposed change or development on that significance.*

**Stage 4:** *If necessary, consider options to mitigate or improve the potential Impact of a proposed change or development on that significance.*

10.2.9 The document identifies criteria for the setting of a scheduled monument on which Cadw must be consulted regarding a planning application. Fieldwork has demonstrated that the Scheme is a 'Development likely to be visible from a scheduled monument'. It also meets the criteria that 'it is within a distance of 5 kilometres from the perimeter of a scheduled monument and is 100 metres or more in height, or has an area of 1 hectare or more.' On that basis this assessment considers the setting of designated assets within 5km of the project boundary.

- 10.2.10 The overall assessment of impacts and effects presented in this assessment is in line with the *Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5* (HA205/08) (Highways Agency et al., 2008).
- 10.2.11 DMRB guidance specific to the historic environment is provided in the DMRB Volume 11, Section 3, Part 2 Cultural Heritage (HA208/07) (Highways Agency et al., 2007). This splits the cultural heritage resource into three related sub-topics: Archaeological Remains; Historic Buildings and Historic Landscape. Annex 8 of HA208/07 provides guidance on how the processes described within this section of the DMRB may need to be adapted within the devolved administrations.
- 10.2.12 Whilst the DMRB guidance has been withdrawn, a replacement chapter addressing cultural heritage has not yet been published. Because the original DMRB provides useful guidance on the assessment and management of environmental effects, including advice on determining the magnitude of impacts and the significance of effects, it is considered to be a valuable and relevant method for this Scheme.
- 10.2.13 In addition to the above, the following Chartered Institute for Archaeologists' Standard and Guidance documents were utilised within the programme of baseline data gathering:
- a) Standard and guidance for historic environment desk-based assessment.
  - b) Standard and guidance for archaeological geophysical survey<sup>1</sup>.

### 10.3 Relevant guidance

#### *Legislation*

- 10.3.1 The primary legislation applicable to this chapter comprises the Ancient Monument and Archaeological Areas Act 1979 and the Planning (Listed Buildings and Conservation Areas) Act 1990.
- 10.3.2 **Ancient Monuments and Archaeological Areas Act 1979:** Scheduled Monuments are designated by the Welsh Ministers on the advice of Cadw as selective examples of nationally important archaeological remains. Under the terms of Part 1 Section 2 of the Ancient Monuments and Archaeological Areas Act 1979 it is an offence to damage, disturb or alter a Scheduled Monument either above or below ground without first obtaining permission from the Welsh Ministers. This Act does not allow for the protection of the setting of Scheduled Monuments.
- 10.3.3 **Planning (Listed Buildings and Conservation Areas) Act 1990:** outlines the provisions for designation, control of works and enforcement measures relating to Listed Buildings and Conservation Areas. Section 66 of the Act states that the planning authority must have special regard to the desirability of preserving or enhancing the character or appearance of Conservation Areas.
- 10.3.4 **The Historic Environment (Wales) Act 2016** was passed by the Assembly for Wales on 9<sup>th</sup> February 2016. The Act makes changes to the Ancient Monument and Archaeological Areas Act 1979 and the Planning (Listed Buildings) Act 1990. It also incorporates stand-alone provisions establishing: statutory historic environment records (HERs), a list of historic place names and an advisory panel for the historic environment.

<sup>1</sup> Standard and guidance for archaeological geophysical survey, Chartered Institute for Archaeologists, 2014a

- 10.3.5 The Act amends the two pieces of UK legislation — the *Ancient Monuments and Archaeological Areas Act 1979* and the *Planning (Listed Buildings and Conservation Areas) Act 1990* — that currently provide the framework for the protection and management of the Welsh historic environment. It also contains new stand-alone provisions relating to historic place names; historic environment records and the Advisory Panel for the Historic Environment in Wales. It has three main aims:
- a) To give more effective protection to listed buildings and scheduled monuments;
  - b) To improve the sustainable management of the historic environment; and
  - c) To introduce greater transparency and accountability into decisions taken on the historic environment.
- 10.3.6 **Well-being of Future Generations (Wales) Act 2015** requires public bodies in Wales to think about the long-term impact of their decisions, to work better with people, communities and each other, and to prevent persistent problems such as poverty, health inequalities and climate change. There are seven well-being goals which includes 'A Wales of vibrant culture and Welsh Language' and 'A resilient Wales'. The Act promotes 'A society which promotes and protects culture and the Welsh language...'

#### *Planning Policy*

- 10.3.7 **Planning Policy Wales Edition 10 Chapter 6 (Distinctive and Natural Places - Historic Environment) December 2018 (PPW10)** sets out the policies with regards to the historic environment and planning. The policies also contain guidance for local authorities to consider when developing local plans, including the effect of the re-use or new developments on historic areas and buildings. The policies outline the Welsh Government's objectives to protect, conserve, promote and enhance the historic environment as a resource for the general well-being of present and future generations. Specifically, this aims to:
- a) Protect the Outstanding Universal Value of the World Heritage Sites in Wales;
  - b) Conserve archaeological remains, both for their own sake and their role in education, leisure and the economy;
  - c) Safeguard the character of historic buildings and manage change so that their special architectural and historic interest is preserved;
  - d) Preserve or enhance the character or appearance of conservation areas, whilst the same time helping them remain vibrant and prosperous;
  - e) Preserve the special interest of sites on the register of historic parks and gardens in Wales;
  - f) Protect areas on the register of historic landscapes in Wales.
- 10.3.8 The duties of the Welsh Ministers to the historic environment of Wales are exercised through the Welsh Government's historic environment service (Cadw).
- 10.3.9 Section 6.1 of PPW 10 contains advice on development management policies for making informed decisions on any proposed developments that may impact the historic environment. If development is likely to impact archaeological remains, throughout the guidance, the need for early consultation between developers and planning authorities, plus the need for an archaeological assessment to be carried out early in the process is heavily stressed.
- 10.3.10 The historic environment refers to all surviving physical remains of past human activity. The conservation of archaeological remains is a material consideration in determining a planning application. Where nationally important archaeological remains and listed buildings and their settings are likely to be affected by the proposed development, there should be a presumption in favour of their physical protection in situ. In cases involving less significant archaeological

remains, local planning authorities will need to weigh the relative importance of the archaeological remains and their settings against other factors, including the need for the proposed development. The needs of archaeology and development may be reconciled if development discuss their proposal with the local planning authority at an early stage in pre-application discussions. Where it is not feasible to preserve remains in situ, an acceptable alternative may be to arrange prior excavation and recording of archaeological remains and the publication of the results by means of granting planning permission subject to a negative condition.

- 10.3.11 There should be a general presumption in favour for the preservation of Listed Buildings and their settings that may be affected by the proposed development. The primary material consideration is to the statutory requirement to have special regard to the desirability of preserving the building, its setting or any features of special architectural or historic interest it possesses. The continuation or reinstatement of the original use should be the first option, but there should be flexibility in order to secure a building's survival or provide it with a sound economic future. Justification for alteration or demolition of Listed Buildings should be provided with applications. Conditions may be imposed for the recording of historic buildings.
- 10.3.12 There should be a presumption in favour for the preservation or enhancement of the character or appearance of Conservation Areas or their setting. Consideration of proposed developments in a conservation area should be made on the basis of a full application. There will be a strong presumption against the granting of planning permission for proposed developments, including advertisements, which damage the character or appearance of a conservation area or its setting. Preservation or enhancement of a conservation area can be achieved by a development which either makes a positive contribution to an area's character or appearance or leaves them unharmed.
- 10.3.13 World Heritage Sites and their settings (including their buffer zone, if applicable) are a material consideration in determining applications and the impacts of proposals. Cadw is a statutory consultee on planning applications likely to have an impact on the Outstanding Universal Value of a World Heritage Site.
- 10.3.14 When the local planning authority has identified historic assets of local interest and included a policy in its development plan for their preservation and enhancement, any supporting supplementary planning guidance will be a material consideration when determining a planning application.
- 10.3.15 In relation to Parks, Gardens, on the first part of the Register of Landscapes, Parks and Gardens of Special Historic Interest, local planning authorities should protect and conserves parks and gardens and their settings included on this register. Cadw must be consulted on all planning applications where the proposed development is likely to affect the site of a historic park or garden or its setting, and the effect of the proposed development should be a material consideration in the determination of a planning application.
- 10.3.16 In relation to Historic Landscapes, on the second part of the register, should be considered by local planning authorities in considering the implications of developments which meet the criteria for EIA. Cadw must be consulted on development within a registered historic landscape area that requires an Environmental Impact Assessment.

10.3.17 **Technical Advice Note (TAN) 24, The Historic Environment (2017)**<sup>2</sup> underlines PPW10 and a series of best practice guidance documents which cover the following issues:

1. Heritage Impact Assessment in Wales
2. Managing Change in World Heritage Sites in Wales
3. Managing Change to Listed Buildings in Wales
4. Managing Change to Registered Historic Parks and Gardens in Wales
5. Managing Conservation Areas in Wales
6. Managing Historic Character in Wales
7. Managing Listed Buildings at Risk in Wales
8. Managing Lists of Historic Assets of Special Local Interest in Wales
9. Setting of Historic Assets in Wales

#### *Local Policy and Guidance*

10.3.18 **Conwy Local Development Plan 2007 -2022 (LDP)** was adopted in October 2013 and is currently beginning the process of review. The current LDP states in 'STRATEGIC POLICY CTH/1 – CULTURAL HERITAGE, that *the council is committed to protecting and, where appropriate, enhancing its cultural and heritage assets. This will be achieved by:*

- a. *Ensuring that the location of new development on both allocated and windfall sites within the Plan Area will not have a significant adverse impact upon heritage assets in line with Policies CTH/2 – 'Development Affecting Heritage Assets', DP/3 – 'Promoting Design Quality and Reducing Crime' and DP/6 – 'National Planning Policy and Guidance';*
- b. *Recognising and respecting the value and character of heritage assets in the Plan Area and publishing Supplementary Planning Guidance to guide development proposals;*
- c. *Seeking to preserve and, where appropriate, enhance conservation areas, Conwy World Heritage Site, historic landscapes, parks and gardens, listed buildings, scheduled ancient monuments and other areas of archaeological importance in line with Policy DP/6;*
- d. *Protecting buildings and structures of local importance in line with Policy CTH/3 – 'Buildings and Structures of Local Importance';*
- e. *Enhancing heritage assets through heritage and regeneration initiatives;*
- f. *Preserving and securing the future of heritage assets by only permitting appropriate enabling development in line with Policy CTH/4 – 'Enabling Development'; g) Ensuring that development is compatible with the long-term viability of the Welsh Language in line with Policy CTH/5 – 'The Welsh Language'.*

10.3.19 Policy CTH/2 'DEVELOPMENT AFFECTING HERITAGE ASSETS' states that proposals which affect a heritage asset listed below (a-f), and/or its setting, shall preserve or, where appropriate, enhance that asset. Development proposals will be considered in line with Policy DP/6, where applicable and Policy DP/7.

- a) *Conservation Areas*
- b) *Conwy World Heritage Site*
- c) *Historic Landscapes, Parks and Gardens*
- d) *Listed Buildings*
- e) *Scheduled Ancient Monuments*
- f) *Sites of archaeological importance'*

10.3.20 Policy CTH/3 of the LDP, relating to buildings, states that '*BUILDINGS AND STRUCTURES OF LOCAL IMPORTANCE Development proposals affecting buildings or structures which make an important contribution to the character and interest of the local area will only be permitted where the building's distinctive appearance, architectural integrity and its setting would not be*

<sup>2</sup> <https://gweddiill.gov.wales/topics/planning/policy/tans/tan-24/?lang=en>

*significantly adversely affected.'*

- 10.3.21 **Supplementary Planning Guidance (SPG):** associated with the Conwy LDP are a number of supplementary planning guides which set out, in greater detail, the approach to be taken with particular areas of interest. LDP8 (adopted February 2014) relates to Buildings and Structures of Local Importance and the development of a Register of locally important buildings and structures. The SPG provides the criteria for selection of sites which appear on the Register: [http://spp.conwy.gov.uk/upload/public/attachments/629/Conwy\\_Adopted\\_LDP\\_2007\\_2022\\_English\\_.pdf](http://spp.conwy.gov.uk/upload/public/attachments/629/Conwy_Adopted_LDP_2007_2022_English_.pdf)
- 10.3.22 **SPG LDP14 Conservation Areas** was adopted in July 2015. This document provides generic guidance relating to the approach to development in Conservation Areas and will be itself supplemented by detailed individual Conservation Area Management Plans. [https://spp.conwy.gov.uk/upload/public/attachments/645/LDP14\\_Conservation\\_Areas\\_SPG.pdf](https://spp.conwy.gov.uk/upload/public/attachments/645/LDP14_Conservation_Areas_SPG.pdf)
- 10.3.23 SPG LDP42 gives detailed guidance for the approach to be taken to development within the World Heritage Site of The Castles and Town Walls of King Edward in Gwynedd and effectively adopts the World Heritage Site (WHS) Management Plan and Action Plan as SPG. <https://spp.conwy.gov.uk/2017doc.asp?cat=12368&doc=38661>

## 10.4 Study area

- 10.4.1 The study area for historic asset collection was the proposed land take itself and a corridor 1 km beyond the proposed boundary of the Scheme. Where linear or historic landscape features extend beyond the 1 km area, the study area was extended in order to provide sufficient context for the understanding of such features. The desk-based assessment for the Scheme is presented in Appendix 10.3.
- 10.4.2 For designated heritage assets (e.g. scheduled ancient monuments and listed buildings), whose setting could be affected as a result of change, a further study area was identified to include all such assets within a zone of 5km. The location of designated assets are shown in Appendix 10.1 and listed in Appendix 10.4.

## 10.5 Baseline conditions

- 10.5.1 A desk based assessment of the Scheme was prepared using various sources of data including a walk through survey. Full coverage of the regional HER for the main study area was acquired from the Gwynedd Archaeological Trust (GAT), together with details of defined Historic Landscape Character Areas. Information regarding scheduled monuments, listed buildings and Registered Parks, Gardens and Landscapes of Special Historic Interest was obtained from Cadw and published sources.
- 10.5.2 A walkthrough survey was conducted in June 2019, and a geophysical survey in late May 2019. Additional visits were undertaken during the summer of 2019 to assess visual and noise impacts on designated sites. The degree to which designated sites could be seen from the project boundary, or views from the designated sites affected were assessed during the site visits.
- 10.5.3 Geophysical survey in the form of a fluxgate gradiometer survey was undertaken in open and accessible areas alongside the carriageway and in areas proposed for alteration. The areas were selected for survey on the basis of Scheme design and impact; effect of land use on the magnetic survey and overall archaeological potential. A report on the results of this programme

of magnetometer survey is presented as Appendix 10.5.

- 10.5.4 LiDAR information contained in the Lle website ([www.lle.gov.wales](http://www.lle.gov.wales)) was examined and used to provide information on earthworks and topography across the study area.
- 10.5.5 Available satellite imagery covering the Scheme was acquired from commercial suppliers and examined along with other historic aerial photographs.
- 10.5.6 The archaeological and cultural heritage assets contained within the area covered by the route option is varied. Many of the assets are from the last two hundred years, with a range of features stretching back through the medieval to the Prehistoric period. A Gazetteer of historical assets in the 1km study area is shown in Appendix 10.6. Designated sites within a wider 2km study area are presented in Appendix 10.4. It should be remembered that there are effectively two study areas: the 1km study area that includes all known assets and the 2km study area that lists designated sites only.
- 10.5.7 Assets identified in both study areas are discussed below. Each asset in the 1km study area is identified by an ID reference number in brackets, e.g. (63). Those identified in the 2km study area are not given a project specific number.

### *Designations*

- 10.5.8 **World Heritage Sites** - There are no World Heritage Sites within the immediate environment of Junction 16, however the WHS, The Castle and Town Walls of Edward 1 in Gwynedd, includes Conwy Castle which is around eight kilometres to the east, Beaumaris 12.5km west and Caernarfon, 30km to the west.
- 10.5.9 **Scheduled Ancient Monuments** - There are no scheduled monuments within the 1km study area. A further 28 scheduled monuments (SAM) are within a 5 km distance of the proposed junction changes at Junction 16. All but one are prehistoric in date with one dating to the Roman period. (Appendix 10.4)
- 10.5.10 **Listed Buildings** - There are eight listed buildings within 1km of the junction proposals. All are graded Grade II. All date to the Post Medieval period or later. There are ten buildings noted on a local list maintained by Conwy County Borough Council (CCBC), again all are Post Medieval in date. Within a 2km distance of Junction 16 are five further listed buildings. All are listed as Grade II, three relate to agricultural activity and two to industrial quarrying activity. (Appendix 10.4)
- 10.5.11 **Conservation Areas** - There are four Conservation areas in Penmaenmawr, two of which are within the 1km study area. The Town Centre Conservation Area and Pen y Cae Conservation Area are within the study area. Many of the buildings in the Town Centre Conservation area date to the mid 19<sup>th</sup> and early 20<sup>th</sup> century, reflecting the period when Penmaenmawr developed with an industrial and holiday-based economy. (Appendix 10.6)
- 10.5.12 **Parks and Gardens** - There are no Registered Parks and Gardens within the study area and none within the 2km wider area.
- 10.5.13 **Historic Landscapes** - The Creuddyn and Conwy Registered Historic Landscape runs eastwards from the eastern end of the Penmaenmawr tunnels and the North Arllechwedd Registered Historic Landscape surrounds the settlement of Penmaenmawr. The northern boundary of the

Historic Landscapes includes the upland areas which surround Penmaenmawr to the south. (Appendix 10.6) The Historic Landscape Register describes the North Arllechwedd area as *'This area comprises the narrow coastal strip, uplands and dissected northern flanks of the Carneddau ridge in north Snowdonia. The topography is markedly varied with the south west half of the area deeply dissected by the valley of the Rivers Anafon and Aber up to the watershed summits of Gyrn, Drosgol, Garnedd Uchaf, Foel Fras and Drum which rise to between 580 and 926m above OD. In the east half, the narrow coastal strip gives way to coastal slopes and headlands that rise steeply to an upland plateau between 250 and 450m above OD, extending from the Aber valley to Dwygyfylchi. In the south east, the Bwlch y Ddeufaen pass provides a natural route to the Conwy valley which is outside the area (pp. 81–83), whilst Lavan Sands (Traeth Lafan), crossed by the line of the historic route from Anglesey, has been included on the north west of the area. The area contains a rich wealth of upstanding remains from the prehistoric, medieval and later periods, most notably a Neolithic axe factory site and one of the most important concentrations of Bronze Age funerary and ritual monuments in western Britain. Abergwyngregyn was the commotal centre of Arllechwedd Uchaf, and a favourite residence of the princes of Gwynedd in the 13th century.'* While the description for the Creuddyn and Conwy Historic Landscape concentrates particularly on the Great and Little Orme, Conwy and Llandudno.

- 10.5.14 **HER Data** - A total of 72 undesignated sites are known within 1km of Junction 16. These range in date from the Neolithic to the Modern period, with nine sites of unknown date and one recognised as a natural feature.

*Palaeolithic, Mesolithic, Neolithic (to 2200 BC)*

- 10.5.15 Two assets ( 22,23) in the HER data date to this period, both to the Neolithic and both relate to the Graig Lwyd Neolithic axe factory and are either finished axes. The Graig Lwyd axe factory is sited on the high ground south of Llanfairfechan/Penmaenmawr where extensive 19<sup>th</sup> century quarrying took place.

*Bronze Age (2500 BC to 700 BC)*

- 10.5.16 Two sites are dated to the Bronze Age period. One is a findspot (24) of a socketed axe and the other is a burnt mound (25) located on the slopes of Allt Wen, above Penmaenmawr.

*Iron Age (800 BC to AD 43)*

- 10.5.17 Three assets are currently identified as Iron Age, all relate to the hillfort of Dinas Allt Wen (26,27,29) which is located on the high land to the east of Dwygyfylchi and are a hut circle, the hillfort itself and an entranceway to the hillfort. No longer surviving but once located on upland to the west of Penmaenmawr was the hillfort of Braich y Dinas. Now completely destroyed by quarrying it appeared to have had excellent preservation of the houses within the settlement.

*Prehistoric*

- 10.5.18 One site is noted as 'prehistoric', this is the findspot of a flint core (28) which is now in the collection of the National Museum Wales.

*Roman (AD 43 to AD 410)*

- 10.5.19 The Roman route from Chester Deva) to Caernarfon (Segontium) runs along the coastal area but from Conwy to Bangor it follows the higher land to the south of the coastal strip. The only Roman artefact noted in the HER is the findspot of a coin (30) at Dwygyfylchi.



### *Early Medieval (AD 410 to AD 1066)*

- 10.5.20 Possible early Medieval period long huts have been identified on the upland to the east of the hillfort of Dinas Allt Wen (31).

### *Medieval (1066 to 1540)*

- 10.5.21 Seven assets date to the Medieval period within the 1km study area. Dwygyfylchi Church, field systems in this area and a deserted rural settlement on Allt Wen (35, 36, 37) indicate that Dwygyfylchi is a settlement of some age while Penmaenmawr is relatively modern in development.

### *Post-medieval (1540-1901)*

The majority of sites noted on the HER are Post Medieval in date, forty two assets are listed and include religious buildings (Churches and Chapels (40, 44)); structures associated with the quarries (42); domestic buildings and several agricultural features identified on the slopes of Allt Wen following a large wildfire in June 2016.

### *Modern*

- 10.5.22 Three assets are noted as Modern in date, post 1901. These include a Prisoner of War (POW) camp (83) and the findspot of a ring (81).

### *Unknown Date*

- 10.5.23 There are nine assets identified as 'unknown' date. These include Ridge and Furrow (89,90,93), possible cairns (92) and a mill (85). The Ridge and Furrow is likely to date to either the late Medieval or to the Post Medieval period, while the Mill is most likely to be Post Medieval.

### *Natural*

- 10.5.24 One feature (93) listed on the HER as a possible hut circle has since been identified as a natural feature.

### *Geophysical Survey*

- 10.5.25 Twenty Six anomalies were identified during the geophysical survey. These are spread over 16 fields (Appendix 10.5). Several anomalies appear to relate to modern services, others to agricultural activity, including Ridge and Furrow all on the eastern side of Penmaenmawr and closer to Dwygyfylchi which is a known Medieval township as well as linear features, possible field boundaries. Areas of landfill have been identified (94, 96, 106) some of which were already known to exist.

### *Field Walkover*

- 10.5.26 In June 2019 open areas adjacent to the A55 and Junction 15 were examined by walkover survey. Access was possible predominantly through using public rights of way. A total of 9 features were identified which all date to the post medieval period. The field survey results includes tracks (111, 112) and drains (114, 115) among other features noted in Appendix 10.6.

## 10.6 Assessment of effects

### *Value (sensitivity) of resource*

- 10.6.1 The assessment of impacts and effects on cultural heritage receptors was undertaken in accordance with the methodology described in DMRB Volume 11, Section 3, Part 2 (HA208/07) (Highways Agency et al., 2007). This is a Detailed Assessment as described in paragraph 3.9 of HA208/07, which is the level required when there is the potential for significant effects on cultural heritage resources.
- 10.6.2 The overall approach to the assessment of the significance of effects is in line with DMRB Volume 11, Section 2, Part 5 (HA205/08) (Highways Agency et al., 2008). This provides guidance on the assessment and management of environmental effects, including advice on determining the magnitude of impacts and the significance of effects.

### *Receptor Value*

- 10.6.3 In order to reach an understanding of the level of any effect that a Scheme may have on a heritage asset, it is necessary to understand the importance of that asset. For example, is it important at a national level or at a local level?
- 10.6.4 HA208/7 (Highways Agency et al., 2007) provides the following tables for assessing the value (significance) of heritage assets.

**Table 10.1: Factors for Assessing the Value of Archaeological Assets**

<b>Value (sensitivity)</b>	<b>Factors</b>
Very High	World Heritage Sites (including nominated sites). Assets of acknowledged international importance. Assets that can contribute significantly to acknowledged international research objectives.
High	Scheduled Ancient Monuments (including proposed sites). Undesignated assets of schedulable quality and importance. Assets that can contribute significantly to acknowledged national research objectives.
Medium	Designated or undesignated assets that contribute to regional research objectives.
Low	Designated and undesignated assets of local importance. Assets compromised by poor preservation and/or poor survival of contextual associations. Assets of limited value, but with potential to contribute to local research objectives.
Negligible	Assets with very little or no surviving archaeological interest.
Unknown	The importance of the resource has not been ascertained.

**Table 10.2: Criteria for Establishing Value of Historic Buildings**

<b>Value (sensitivity)</b>	<b>Criteria</b>
Very High	Structures inscribed as of universal importance as World Heritage Sites. Other buildings of recognised international importance.
High	Scheduled Ancient Monuments with standing remains. Grade I and II* Listed Buildings. Other listed buildings that can be shown to have exceptional qualities in their fabric or historical associations not adequately reflected in the listing grade. Conservation Areas containing very important buildings. Undesignated structures of clear national importance.
Medium	Grade II Listed Buildings. Historic (unlisted) buildings that can be shown to have exceptional qualities in their fabric or historical associations. Conservation Areas containing buildings that contribute significantly to its historic character. Historic Townscape or built-up areas with historic integrity in their buildings or built settings (e.g. including street furniture and other structures).
Low	'Locally Listed' buildings. Historic (unlisted) buildings of modest quality in their fabric or historical association. Historic Townscape or built-up areas of limited historic integrity in their buildings or built settings (e.g. including street furniture and other structures).
Negligible	Buildings of no architectural or historic note; buildings of an intrusive character.
Unknown	Buildings with some hidden (i.e. inaccessible) potential for historic significance.

10.6.5 Of the 126 assets identified within the Study Area, one is valued as High, 22 as of Medium value and eight are of unknown value. The remaining 95 assets are valued at Low.

10.6.6 Asset 19, the North Arllechwedd Historic Landscape is valued as High.

10.6.7 Eight (1-8) assets noted as of Medium value are Grade II listed buildings within the settlements of Penmaenmawr and Dwygyfylchi. The remaining assets noted as of Medium value (20, 21, 25-27, 29, 31, 35-38, 42, 44 and 84) are the two Conservation Areas of Pen y Cae, Penmaenmawr and Penmaenmawr Town Centre (20, 21), predominantly prehistoric features associated and including Dinas Allt Wen hillfort (25-27, 29, 31), the Medieval township of Dwygyfylchi and associated Medieval features (35, 36 and 38) as well as the church of St Gwynan in Dwygyfylchi (37) which although late Victorian in age is on the site of an older church.

10.6.8 All of the assets noted as of unknown value are features identified through the geophysical survey (96, 100, 102, 107, 109 and 110).

## **10.7 Identification of potential effects**

10.7.1 The magnitude of an impact is assessed without regard to the value of the heritage asset. In terms of the judgement of the magnitude of impact, this is based on the principle that preservation of the asset is preferred, and that total physical loss of the asset is least preferred.

- 10.7.2 With regard to buried archaeological remains, it is not always possible to assess the physical impact in terms of percentage loss, and therefore it can be important in such cases to try to assess the capacity of the heritage asset to retain its character and significance following any impact. Impacts resulting from changes within the settings of buried archaeological remains may also be more difficult to assess as they do not involve physical loss of the resource – further information regarding the methodology for assessment of impacts and effects resulting from change within the settings of heritage assets is provided in Table 10.3 which is derived from HA208/07 (Highways Agency et al., 2007).

**Table 10.3: Factors in the Assessment of Magnitude of Impact - Archaeological Remains**

Impact magnitude	Factors
Major	Change to most or all key archaeological materials, such that the resource is totally altered. Comprehensive changes to setting.
Moderate	Changes to many key archaeological materials, such that the resource is clearly modified. Considerable changes to setting that affect the character of the asset.
Minor	Changes to key archaeological materials, such that the asset is slightly altered. Slight changes to setting.
Negligible	Very minor changes to archaeological materials, or setting.
No change	No change.

- 10.7.3 For impacts on historic buildings, the following table for the assessment of magnitude of impacts on historic buildings from HA208/07 (Highways Agency et al., 2007), Table 10.4.

**Table 10.4: Factors in the Assessment of the Magnitude of Impact – Historic Buildings**

Impact magnitude	Factors
Major	Change to key historic building elements, such that the resource is totally altered. Comprehensive changes to setting.
Moderate	Changes to many key historic building elements, such that the resource is significantly modified. Changes to the setting of an historic building, such that it is significantly modified.
Minor	Change to key historic building elements, such that the asset is slightly different. Change to setting of an historic building, such that it is noticeably changed.
Negligible	Slight changes to historic building elements or setting that hardly affect it.
No change	No change to fabric or setting.

- 10.7.4 HA208/07 (Annex 7, para. 7.12.1) (Highways Agency et al., 2007) explains that historic landscapes cannot be destroyed, but that impacts on them can change their character. Impacts should be assessed using evaluated historic landscape character units, not the elements/parcels/components that contribute towards that character. There may be impacts resulting from changes within the settings of identified units, especially with regard to designated historic landscapes. Factors to be used in the assessment of magnitude of change are identified in Table 10.5.

**Table 10.5: Factors in the Assessment of Magnitude of Impact – Historic Landscape**

<b>Impact magnitude</b>	<b>Factors</b>
Major	Change to most or all key historic landscape elements, parcels or components; extreme visual effects; gross change of noise or change to sound quality; fundamental changes to use or access; resulting in total change to historic landscape character unit.
Moderate	Changes to many key historic landscape elements, parcels or components; visual change to many key aspects of the historic landscape; noticeable differences in noise or sound quality; considerable changes to use or access; resulting in moderate changes to historic landscape character.
Minor	Changes to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; limited changes to noise levels or sound quality; slight changes to use or access; resulting in limited changes to historic landscape character.
Negligible	Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes in noise levels or sound quality; very slight changes to use or access; resulting in a very small change to historic landscape character.
No change	No change to elements, parcels or components; no visual or audible changes; no changes arising from amenity or community factors.

## 10.8 Physical impact

- 10.8.1 In the 1km buffer zone on either side of the Scheme boundaries, identified as the study area, 126 assets were identified. Of these 27 have a major impact, 6 a moderate impact, 8 a minor impact, 40 with a negligible impact, 45 with No change. Of these 45 have a Neutral significance, 40 have a Neutral/Slight significance, while 12 have a Slight significance, 22 a |moderate/Slight significance, none a Moderate/Large significance and 7 are of unknown significance. (Appendix 10.6).
- 10.8.2 There is a major impact on 27 features, predominantly identified through the geophysical survey, (94-99,101,106-122). The assets range from Ridge and Furrow, old landfill sites, possible field drains and structural debris. Asset 112 is likely to be the remains of the working compound associated with the construction of the roundabout at Junction 16 in the late 1980s early 1990s and 117 may relate to a circus which uses a field adjacent to Junction 16a. The circus was present during a field visit on July 21<sup>st</sup> 2019. A programme of evaluation trenching is required to identify the significance of these features. Three of these assets which are majorly impacted are features identified by the Royal Commission on the Ancient and Historic Monuments of Wales (RCAHMW) and on early OS maps (124-126) and are all features demolished as part of earlier improvement works along the line of the A55. A programme of evaluation trenching is required to identify whether these assets still exist and the significance of them.
- 10.8.3 Moderate impacts on 6 assets, of which all but one are assets identified during the geophysical survey (100,102-105) and are not directly within the land take of the proposals but are close. One asset (45) is a shell midden noted on the HER. This is in the coastal area, to the north of the railway line, it is unlikely to be directly within the land take of the proposals.
- 10.8.4 There are Minor impacts on 8 assets (20, 25-27,29,36, 38 and 93). 20 is the Conservation area of Pen y Cae, not directly physically impacted but potentially will be impacted by changes in

noise levels. Asset 36 is the Medieval Township of Dwygyfylchi. Dwygyfylchi has its origins in the Medieval period with a possible medieval church in the area. The current Church of St Gwynan's was built in the late Victorian period but replaced an earlier church of the 1760s. The remaining six assets noted as having minor impacts all relate to the upland area of Allt Wen to the east of Junction 16 and looking down on Junction 16a. They include the hillfort and features relating to it and a deserted medieval settlement on Allt Wen (38).

10.8.5 Forty assets demonstrate a negligible impact, none of this is a direct physical impact but a negligible impact on setting.

10.8.6 Forty five assets demonstrate no change in impact.

**Table 10.6: Summary of impacts on assets**

<b>Impact</b>	<b>No.</b>
<b>Major</b>	<b>27</b>
Moderate	6
Minor	8
Negligible	40
No Change	45
Total	126

## 10.9 Significant effects

10.9.1 The level or significance of an effect is a combination of the importance or value of the heritage asset and the magnitude of impact on that asset. Effects can be adverse or beneficial. Beneficial effects are those that mitigate existing impacts and help to restore or enhance heritage assets, therefore allowing greater understanding and appreciation.

10.9.2 HA208/07 (Highways Agency et al., 2007) provides the following matrix (Table 10.7 and 10.8) for use within all three sub-topics. As explained within HA208/07 (paragraph 5.38 and Annex 5, paragraph 5.13.3), the matrix is not intended to 'mechanise' the process of assessment of the significance of the effect but rather to act as a check that can ensure judgements of importance (value), impact magnitude and significance of effect are balanced. Where the matrix produces a level of effect significance that is clearly unreasonable, the judgements of importance (value) and impact magnitude should be reassessed to ensure that they can be justified.

10.9.3 Within this chapter of the ES, effects of moderate or greater significance are considered to be 'Significant'.

Table 10.7: Significance of Effects Matrix

		MAGNITUDE OF IMPACT				
		No change	Negligible	Minor	Moderate	Major
VALUE	Very High	Neutral	Slight	Moderate/ Large	Large or Very Large	Very Large
	High	Neutral	Slight	Moderate/ Slight	Moderate/ Large	Large/ Very Large
	Medium	Neutral	Neutral/ Slight	Slight	Moderate	Moderate/ Large
	Low	Neutral	Neutral/ Slight	Neutral/ Slight	Slight	Slight/ Moderate
	Negligible	Neutral	Neutral	Neutral/ Slight	Neutral/ Slight	Slight

Table 10.8: DMRB Descriptors of Significance of Effect Categories

Significance category	Typical Descriptors of Effect
Very large	Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
Large	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision- making process.
Moderate	These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
Slight	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

- 10.9.4 Although HA208/07 (Highways Agency et al., 2007) does not provide definitions of the significance of effects specific to the Cultural Heritage topic, the guidance set out in Table 2.3 of HA205/08 (Highways Agency et al., 2008) was taken into account, see Table 10.8

### *Impacts on Settings*

- 10.9.5 As described above, HA208/07 (Highways Agency et al., 2007) refers to effects on the settings of heritage assets and explains (paragraph 4.19) that setting is a material consideration in government policy relating to the historic environment. This has recently been set out in the Welsh Government Guidance *The Setting of Historic Assets in Wales* (May 2017).
- 10.9.6 The existence of direct lines of sight between the heritage asset and a Scheme is an important factor in judging the visual impact of the development. However, it is possible for changes within the setting to occur even when such a relationship does not exist. For example, views towards a listed building from a frequently visited location, such as a park or a public footpath,

may be affected by the presence of a larger development, even if the development is not directly visible from the building itself.

- 10.9.7 Consideration has also been given to the sensitivity to change of the setting of a heritage asset. This is done through examination of the current setting with regard to identifying elements that contribute to the significance of the asset, elements that make a neutral contribution to the significance of the asset and elements that make a negative contribution (i.e. detract from) the significance of the asset.
- 10.9.8 Once the impact on the significance of the heritage asset was examined, this was then related to the magnitude of impact scales defined below. These are closely linked to the magnitude of impact scales used in HA208/07 (Highways Agency et al., 2007).
1. Major: Substantial change within the setting leading to considerable loss or enhancement of significance of the asset.
  2. Moderate: Change within the setting leading to some loss or enhancement of significance of the asset.
  3. Minor: Slight change within the setting leading to a slight loss or enhancement of significance of the asset.
  4. Negligible: Very minor changes within the setting that hardly affect the significance of the asset.
  5. No change: No substantive change within the setting.
- 10.9.9 The magnitude of impact was considered with the value/sensitivity of the asset within the overall matrix for identifying significance of effects (see Table 10.7 and 10.8).

## 10.10 Limitations of the Assessment

- 10.10.1 All readily available data required for the assessment were acquired and examined. Remote sensing methodologies (LiDAR, satellite imaging and geophysical survey) were utilised in order to gain as much potential evidence as possible.
- 10.10.2 No intrusive archaeological investigation within the Scheme boundary has been undertaken to date. It is proposed that this will follow on, where indicated, following on from the results of the geophysical survey. The assessment of impact and value of any historical asset may change once additional information has been collected by evaluation trenching work. Remote sensing has identified a number of locations that potentially contain buried archaeological evidence. Some appear to be of natural or very recent origin. These will need to be examined by a programme of evaluation trenching, the details of which need to be agreed with the regional curator.
- 10.10.3 As there is not a construction contractor in place for the Scheme, it has not been possible to determine additional work areas, compounds etc. outside the boundary of the Scheme. These will require additional assessment as these are identified.

### *Significance*

- 10.10.4 Seven assets of unknown significance are noted and are all features identified through the geophysical survey (96,100,102, 107, 109-10 and 117) and will be directly impacted by the proposed development. The significance of all seven is derived from the potential to enhance archaeological knowledge of this area.



- 10.10.5 Other assets (, predominantly noted through the geophysical survey are of Slight/Moderate significance (94, 95, 97-99, 101, 106, 108, 111-116 and 118-122) are likely to be directly impacted by the Scheme. Three assets (124-126) which have been identified through map research area also of Slight/Moderate significance and have the potential to be directly impacted if any features remain in the area of the current carriageway of the A55.
- 10.10.6 The vast majority of assets (85 in total) are noted as of Neutral or Neutral/Slight significance and the impact of the proposed Scheme are deemed de minimis, limited perhaps to changes in noise levels.
- 10.10.7 Twelve assets (19, 20, 25-27, 29, 35, 38, 45 and 103-105) are identified as of Slight significance and although not directly physically impacted by the proposals have the potential to have their setting affected. These are predominantly features located on the hill Allt Wen which directly overlooks Junction 16a and is at around 250m OD, and include the hillfort and associated features including a deserted rural settlement (25-27,29 and 38); The Historic Landscape of North Arllechwedd (19) where the character are of Penmaenmawr includes the upland areas surrounding Penmaenmawr and Dwygyfylchi; The Penmaenmawr, Pen y Cae, Conservation Area (20); the coastal shell midden (45) and three assets identified through the geophysical survey (103-105) all of which are thought to be modern day services.
- 10.10.8 The assessment includes the entire Scheme footprint for permanent construction. Information is not available for areas of temporary land take, which will need to be assessed once they are identified once a construction contractor is appointed. Once identified this may result in a direct physical impact on further assets.

#### *Hedgerow Regulations 1997*

- 10.10.9 The majority of hedgerows on site formed parts of a field system shown on the Tithe maps of the mid 19<sup>th</sup> century, there are no Inclosure maps for this area. Therefore, it is considered that they meet the archaeology and history criteria of the Hedgerow Regulations 1997, as important hedgerows (Criterion 5). The exact length of hedgerows to be affected by the proposed development is unclear as sections of several, at varying lengths, will be removed as part of the proposed Junction 16 alterations, this will largely relate to current boundaries in roadside locations. No hedgerow will be totally removed, so the look of the fieldscape will largely remain intact.

#### *Undiscovered Archaeology*

- 10.10.10 There is always a potential that intrusive works on the Scheme may uncover previously unrecognised archaeological deposits. The potential for previously unrecorded archaeology has not been quantified at this stage but is likely to be adverse.
- 10.10.11 A construction contractor has not yet been appointed to the Scheme. Therefore, additional areas of temporary works that may have an impact such as construction yards, haul roads and borrow pits have not been identified. As these works will be contiguous to the Scheme, a preliminary view can be given once they are identified from the information in the 1km study area. Detailed assessment of any proposed temporary works will be conducted once they are identified.
- 10.10.12 Several assets identified through the geophysical survey (94, 96, 106 and 120) have been identified as landfill areas. This was corroborated by the test pitting carried out for geotechnical purposes. These have been identified as of slight/moderate significance. However at this stage it is impossible to know whether the landfill areas were dumped onto an existing ground surface,

thus protecting and masking potential archaeology beneath, or whether areas were cleared prior to dumping. The mitigation strategies will reflect this unknown element.

**Table 10.9: Summary of significance of assets**

Significance	No.
Unknown	7
Moderate/Slight	22
Slight	12
Neutral/Slight	45
Neutral	40
Total	126

### *Designated Sites*

- 10.10.13 Designated sites with a minimum 2km distance of Junction 16 have also been examined to assess the significance of impact upon them caused by proposed alterations to Junction 16. Within 2km there are a further 8 scheduled ancient monuments and 5 listed buildings, all of which are listed Grade II.
- 10.10.14 Of the 7 scheduled monuments (CN283, CN024, CN340, CN339, CN353, CN124, CN 116 and CN260) all show a negligible impact with a slight significance. All are separated from Junction 16 by a large distance, have minimal intervisibility with the Junction and in many cases are shielded by higher land separating the Junction from the SAMs. All of the SAMs are Prehistoric. Appendix 10.4
- 10.10.15 The further 5 listed buildings (16521, 16523, 3554, 16519, 16518) within 2km of Junction 16 are all Grade II and are either Industrial structures linked to the quarrying or Post Medieval buildings. They demonstrate Negligible impact from proposed changes and Neutral/Slight significance. Appendix 10.4

## **10.11 Mitigation**

- 10.11.1 Mitigation and enhancement measures are proposed for a number of sites affected either resulting from direct impact or from an impact on the setting. This is based on guidance given in DMRB Section 5.11.

### *Scheduled Monuments*

- 10.11.2 There are no scheduled monuments within 1km of the proposals. However there are a number within 5km of the proposals at Junction 16. These are listed in the table below (Appendix 10.4).
- 10.11.3 None of these has a direct line of site of the Junction and noise pollution is lessened the greater the distance from the Junction, particularly in relation to those scheduled sites, such as the stone circle, Bryn y Derwydd (CN 339) and Maen Crwn standing stone (CN 340), which are hidden from the junction by the hills which act as a buffer. The topography of the area, with steep hills rising sharply from the coastal area, in some part mitigates against both visual impact and sound impact from proposed changes at Junction 16. However consideration should be given to the road surfacing treatment to mitigate against noise impact on the scheduled monuments in the wider area.

Table 10.10: SAMs within 5km of Junction 15

SAM No.	Name	Easting	Northing	Site Type	Period
CN299	Gwern Engan Concentric Enclosed Hut Circle	275331	376794	Hut circle settlement	Prehistoric
CN215	Hut Circle Settlement at Gwern Engan	275515	376452	Hut circle settlement	Prehistoric
CN260	Ring Cairn North-West of Llyn y Wrach	274633	375802	Ring cairn	Prehistoric
CN124	Cefn Llechen Stone Circle	274744	375317	Stone circle	Prehistoric
CN353	Cefn Llechen cairns	274301	375126	Round cairn	Prehistoric
CN116	Hafotty Standing Stone	274787	374960	Standing stone	Prehistoric
CN127	Hut Groups N of Cerrig y Dinas	275348	374143	Enclosed hut circle	Prehistoric
CN128	Round Hut 70m S of St Celynin's Church	275111	373656	Hut circle settlement	Prehistoric
CN125	Caer Bach	274422	372970	Hillfort	Prehistoric
CN317	Ffrith Llwynhwfa Burial Cairn	274327	372310	Cairn	Prehistoric
CN157	Early Fields and Dwellings near Maen-y-Bardd	274134	371962	Enclosure	Prehistoric
CN122	Maen Penddu	273900	373574	Standing Stone	Prehistoric
CN355	Cefn Maen Amor stone circle	273871	373590	Stone circle	Prehistoric
CN354	Cefn Maen Amor cairn	273844	373599	Round cairn	Prehistoric
CN184	Pont y Teiryd Hut Group and Ancient Fields	269526	373554	Enclosed hut circle	Prehistoric
CN049	Dinas Camp	270017	373832	Hillfort	Prehistoric
CN351	Waun Llanfair barrow	270521	374126	Round barrow	Prehistoric
CN283	Hut Circles at Clip yr Orsedd	271091	375018	Hut circle settlement	Prehistoric
CN024	Penmaenmawr Stone Circle	272114	374606	Stone circle	Prehistoric
CN340	Maen Crwn standing stone	273101	374991	Standing stone	Prehistoric
CN339	Bryn Derwydd stone circle	273226	375055	Stone circle	Prehistoric
CN352	Bryniau Bugeilydd cairns	271835	374030	Ring cairn	Prehistoric
CN350	Cerrig Gwynion cairn	272257	373662	Round cairn	Prehistoric
CN349	Foel Lwyd, cairn to N of	271983	373343	Round cairn	Prehistoric
CN348	Foel Lwyd, cairn to NW of	271389	372740	Round cairn	Prehistoric

SAM No.	Name	Easting	Northing	Site Type	Period
CN306	Hut Circles West of Foel Llwyd	271347	372403	Unenclosed hut circle	Prehistoric
CN402	Roman Road N of Llannerch Fedw	270630	372017	Road	Roman
CN341	Yr Orsedd, cairn to NNW of	269096	372119	Round cairn	Prehistoric

### *Listed Buildings*

10.11.4 There are 5 listed buildings in the area surrounding Junction 16, other than those in the initial 1km study area. All are listed at Grade II and evaluated as of Medium importance with negligible impact from the proposed changes to Junction 16. The significance is assessed as Neutral/Slight. None will have a direct impact from the proposals although in all cases the impact of changes in noise generated by the proposals has the potential to impact these listed structures even though it is assessed as negligible. Consideration should be given to the road surfacing treatment to mitigate against noise impact on the listed buildings in the wider area.

**Table 10.11: Listed Buildings within 2km of Junction 16**

EIA ref	No.	Name	Grade	Easting	Northing	Community	Description
1	16521	Incline Drumhouse at Middle Bank	II	270503	375945	Penmaenmawr	Late C19 counterbalance incline drumhouse; snecked rubble construction with mid-C20 concrete slab roof. The oak drum and steel cables remain in situ between two thick gable walls and the brake mechanism survives externally, though lacking its lever. Apparently one of the incline drumhouses shown on the 1888 OS map.
2	16523	Sett Makers Huts at New Bank	II	271683	375467	Penmaenmawr	Listed as an exceptionally scarce survival of an intact counterbalance incline drumhouse with associated sett makers' huts

EIA ref	No.	Name	Grade	Easting	Northing	Community	Description
3	3554	Glan-yr-Afon Farmhouse	II	269961	374452	Llanfairfechan	Two storeys, white-washed rubble with moderately-pitched slate roof. Two rectangular stone chimneys. Central doorway (boarded door) flanked by 12-pane hornless sashes. Two smaller windows on first floor, horned sashes. House extended to R at full height.
4	16519	Primary Barn at Graiglwyd Farmhouse	II	271922	375787	Penmaenmawr	Late C16 or early C17 box-framed timber barn, encased in rubble probably later C17 or C18, and extended by 2 bays to the N in the C19.
5	16518	Graiglwyd Farmhouse	II	271892	375778	Penmaenmawr	A probable late C17 or early C18 house with earlier (late C16 or early C17) core.

### *Conservation Areas*

- 10.11.5 The Pen y Cae, Penmaenmawr Conservation Area stretches eastwards along Conway Old Road, towards Junction 16. The impact of proposals is assessed as Minor with the area being of Slight significance in relation to the Junction proposals. However alterations in noise and noise levels remain a factor which would impact on the Conservation Area. Consideration should be given to the road surfacing treatment to mitigate against noise impact on the Conservation Area.

### *Historic Landscape*

- 10.11.6 The North Arllechwedd Historic landscape stretches northwards almost to the coast in the Penmaenmawr area. It includes the upland areas of Penmaenmawr quarries and Penmaenmawr, parts of Foel Lus but it does not include the upland areas of Allt Wen and Penmaenbach. The impact of the proposals is assessed as Negligible with the Significance assessed as Slight however alterations in noise and noise levels remain a factor which would impact on the Historic Landscape. Consideration should be given to the road surfacing treatment to mitigate against noise impact on the Conservation Area.
- 10.11.7 As described in Section 10.4, specifically with regard to buried archaeological remains, a programme of archaeological evaluation is required. This would include proposals for the archaeological recording of parts of the field system which would be demolished as part of the

Scheme as well as archaeological trenching of features identified through the geophysical survey. Depending on the results of the evaluation, there may be a requirement for further mitigation recording of archaeological deposits found at these locations.

- 10.11.8 The implementation of this programme of archaeological work will not result in the avoidance or reduction of the potential impacts and effects described in section 10.8. It would rather serve to 'offset' the adverse nature of the effects through the provision of information which can be disseminated through appropriate media to the widest possible audience.
- 10.11.9 The scale and nature of archaeological evaluation trenching in areas needs to be fully agreed with the regional curator. Following consideration of the results of the evaluation work, further detailed archaeological mitigation investigation may then be required at some of these locations.
- 10.11.10 Geophysical survey anomalies 94 to 122. As all the features lie within the Scheme boundary and will be impacted by construction activities, the scale of impact is assessed as predominantly major. The significance of effects have been defined as Unknown but Slight/Moderate or Slight for assets which can confidently be identified such as Ridge and Furrow. The Ridge and furrow identified is concentrated to the east of Junction 16 and there is further evidence of Ridge and Furrow in the Dwygyfylchi area on the HER (89, 90). A programme of intrusive evaluation trenching is recommended to provide additional information on this group (94-122) in order to better understand the nature of anomalies identified and their significance. Further detailed mitigation excavation may be required on some or all, of these depending on results.
- 10.11.11 An archaeological watching brief should be undertaken on all construction activity within the Scheme boundary. This may lead to a requirement for further archaeological investigation of any previously unknown buried archaeological remains that are identified during the watching brief. The watching brief will record surviving sections of the Gasworks (124), Ship Inn (125) and Brickfield Cottage (126). Basic recording of hedgerows, part of the field system, will be undertaken as part of the watching brief.
- 10.11.12 The scale and intensity of the watching brief will be determined following the results of the evaluation trenching programme. If this is a thorough characterisation of the nature of subsoil deposits resulting in the majority of archaeological features being identified, then a less intense programme of monitoring may be approved. The scale of this will be agreed in conjunction with the regional curator.
- 10.11.13 The Penmaenmawr gasworks (124) was located almost directly underneath Junction 16, it is shown on the first edition and is visible on aerial photographs right through to the early 1980s. In 2004 part of the gasworks wall which is still extant was recorded by the RCAHMS as an emergency recording activity during works north of the A55 carriageway. It is unclear whether any of this structure survives below ground. The archaeological watching brief should record remains of this should they survive.
- 10.11.14 The Ship Inn (125) is noted on the Tithe Map and the first edition Ordnance Survey maps. It appears to be directly beneath the area of Junction 16a. It is unclear whether any of this structure survives below ground. The archaeological watching brief should record remains of this should they survive.
- 10.11.15 Brickfield Cottage is also noted as a structure as early as the Tithe Maps of the 1840s. It is shown as lying just to the north of the A55 carriageway just west of Junction 16a. It is unclear whether any of this structure survives below ground. The archaeological watching brief should

record remains of this should they survive.

- 10.11.16 As additional construction areas such as site compounds, are identified, archaeological assessment, evaluation or monitoring may be identified as the appropriate action to be undertaken. This will be agreed with the regional curator and implemented by the appointed construction contractor.

#### *Summary of Mitigation*

- 10.11.17 Proposed mitigation includes consideration of noise disturbance and visual impact of the Scheme on designated sites. Consideration should be given to noise reduction from traffic on the new road and to manage construction noise to minimise impacts to designated and non-designated sites. The strategy for mitigation of the Scheme should aim to minimise impact on the Penmaenmawr Town Centre Conservation Area. The design of the proposed footways and cycleways, and associated green space and verges should be sensitive to the architectural importance of the buildings and to the value of the original street setting.
- 10.11.18 Archaeological evaluation trenching should take place before site clearance of a given area so that all anomalies identified through the geophysical survey to identify the nature, age and importance of features identified. All records to be deposited with the HER and Regional archive. Depending on the results of the archaeological evaluation trenching there may be a need for further detailed mitigation excavation.
- 10.11.19 An archaeological watching brief should take place over the full extent of the Scheme and all areas to be used on a temporary basis for construction as compound sites, borrow pits etc. The scale and intensity of the watching brief will be determined following the results of the evaluation trenching programme. If this is a thorough characterisation of the nature of the subsoil deposits resulting in the majority of archaeological features being identified, then a less intense programme of monitoring may be approved. The scale of this will be agreed in conjunction with the regional curator. All records to be deposited with the HER and Regional archive.
- 10.11.20 The results of the geotechnical work combined with the archaeological evaluation should help in the understanding of the nature of the landfill sites and what lies beneath them. There is a potential for there to be archaeological sites remaining sealed under the landfill. This should be carefully examined by, if necessary, further intrusive archaeological evaluation possibly followed by more detailed archaeological excavation.
- 10.11.21 Additional construction areas have been included within the land taken on a temporary basis for construction, archaeological assessment, evaluation or monitoring may be identified as the appropriate action to be undertaken. This will be agreed with the regional curator and implemented by the appointed construction contractor. All records to be deposited with the HER, the National Monument Record Wales (NMRW) curated by the RCAHMS and the relevant local museum service.

#### *Monitoring requirements*

- 10.11.22 The proposed mitigation will not result in the avoidance or reduction of the potential impacts and effects described above. It would rather serve to 'offset' the adverse effects through the provision of information which can be disseminated through appropriate media to the widest possible audience. The magnitude of impacts and significance of effects described in Section 10.8 will remain the same. The assessment of land take, construction and operational effects

would therefore remain as reported in these sections.

10.11.23 It is possible as details of archaeological sites are identified during the evaluation trenching programme, that changes can be made to the design of the Scheme to reduce damage, or preserve *in situ*, identified features. If these are identified a programme of monitoring of the effectiveness of this mitigation will be required.

10.11.24 It is essential to monitor all stages of the mitigation work to ensure that standards are met and complied with, particularly all necessary CIfA standards including but not exclusively, those relating to archaeological excavation and archaeological watching briefs. The monitoring will be overseen by the Regional Curator. It is essential to monitor work to ensure:

- a) the effectiveness of any noise reduction measures.
- b) the archaeological evaluation trenching ensures both the quality of the archaeological work and the veracity of the results.
- c) possible further archaeological mitigation excavation is carried out to a high standard.
- d) the potential archaeological features currently buried beneath landfill are identified and recorded potentially by complete excavation or through the watching brief.
- e) the archaeological watching brief which has the potential to identify previously unknown archaeological features is conducted to a high standard and ensures more detailed further excavation takes place as necessary.
- f) the archaeology potentially present within site compound areas, borrow pits etc. is thoroughly recorded.
- g) all records to be deposited with the HER and Regional archive.

#### *Cumulative Effects*

10.11.25 No proposed projects have been identified in the vicinity of the Scheme with a joint direct physical impact on historic assets identified in this study. The proposed alterations to nearby Junction 15 of the A55 are 4.5km to the west and share several designated sites within the 5km boundary study area for scheduled ancient monuments (CN049, CN351, CN283, CN024, CN340, CN339, CN352, CN350, CN349, CN348, CN306, CN402 and CN341). Similarly there is one Listed Building within a 2km boundary common to both Junctions 16 and 15. This is 16521, a Grade II listed Incline drumhouse at Middle Bank, a feature of the Graiglwyd quarries. The Historic Landscape of North Arllechwedd (19) reaches northwards nearly to both Junction 16 and Junction 15.

10.11.26 The impact individually on these assets has been assessed as predominantly an impact on their setting coming from a change in noise levels generated by proposed changes at the junctions. All of these assets are already impacted by noise from the existing road and Junctions. There is the potential for a cumulative adverse impact brought about by changes or alterations in noise levels to these assets. Great care should be taken to limit alterations and changes to noise levels. If possible a lessening of noise should be brought about by careful consideration of the use of noise reducing surfacing on the proposed new carriageways at both Junctions. In this way any potential cumulative impact can be lessened and the settings of these designated sites enhanced.

10.11.27 The geophysical survey undertaken during the preliminary work at Junction 16 on the A55 has identified several areas of relatively recent landfill. Some were already known from OS mapping (1913) but a further previously unknown area of landfill has been identified (96). Landfill was corroborated by the geotechnical trial pitting which was undertaken as part of the data



gathering processes for this EIA, and when visited in late May 2019 it was possible to identify late Victorian and early 20<sup>th</sup> century glass bottles and stoneware amongst landfill in the area behind (to the south) of the Puffin café.

- 10.11.28 The geophysical survey has identified that there is likely to be landfill present, and this has been corroborated by the trial pitting. However at this stage it is impossible to know whether the landfill was dumped straight onto the ground surface or whether areas were excavated to take the landfill.
- 10.11.29 If the landfill was dumped straight onto the old ground surface there is the potential for there to be archaeological remains below the landfill. Remains which potentially would be damaged or destroyed by the proposed developments.
- 10.11.30 Evidence of remains should come to light during the watching brief process, whereby all groundwork clearance is examined and archaeological features excavated and recorded as necessary, however due to the difficulty in assessing possible features and their unknown nature there is the potential necessity of further archaeological work which is impossible to quantify at this stage.
- 10.11.31 It should be noted that despite exhaustive desk and non destructive field based research there remains the potential for previously unknown archaeological features to be encountered during works. The archaeological watching brief is designed to pick up these features but may result in potentially important, previously unknown, assets being encountered which necessitate further more extensive archaeological excavation.

## **10.12 Conclusions**

- 10.12.1 There are no direct impacts on designated sites although the Penmaenmawr Town Centre Conservation Area is within 100 metres of the proposals.
- 10.12.2 Assets identified through the Geophysical Survey have the potential to be impacted by the Scheme proposals as do features identified through the National Monument Record and OS mapping.
- 10.12.3 By following the mitigation proposed any impacts will be minimised through adherence to a Scheme of mitigation which includes evaluation excavation, possible further excavation and archaeological watching brief, thus ensuring preservation by record.
- 10.12.4 As noted there is always the potential for previously unidentified assets to be discovered. A Watching Brief is designed to record such assets however this may result in previously unknown assets being encountered which necessitate further more extensive archaeological excavation.
- 10.12.5 Noise reduction measures should be incorporated into any Scheme developed with the aim of minimising damaging impacts from noise to the settings of monuments, whether designated or not. If possible the impact of noise on these sites should be minimised and if possible lessened. It may be necessary to monitor the noise generated by any proposed Scheme, post construction, in order to demonstrate that any impact is no worse and ideally better than prior to the Scheme construction.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 11 COMMUNITY ASSETS**

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## 11. COMMUNITY AND PRIVATE ASSETS (INCLUDING AGRICULTURE AND LAND USE)

### 11.1 Chapter Introduction

- 11.1.1 This chapter of the Environmental Statement (ES) describes the assessment of effects on community and private assets, development land and agricultural land, resulting from the Scheme.
- 11.1.2 This ES assessment focuses on those facilities and assets which would be subject to direct land-take (this includes buildings), or where impacts to access during construction and / or operation are likely to be incurred and, impacts on land for development.
- 11.1.3 The impact also considers and takes into account the availability of alternative facilities nearby.
- 11.1.4 The assessment of effects includes the following *community land and facilities*<sup>1</sup>:
- Common land. This includes a town or village green;
  - Fuel and field garden allotment;
  - Doctor surgeries;
  - Hospitals;
  - Aged people homes;
  - Schools;
  - Shops;
  - Post offices;
  - Places of worship;
  - Parks, play areas and other public open space and sports centres;
  - Tourist, visitor attractions; and
  - Community and village halls.
- 11.1.5 In relation to the assessment of effects on *private assets*, the following are included:
- Private property and associated land take;
  - Land used by the community, including common land, village greens, garden allotments, war memorials and public open space;
  - Development land; and
  - Agricultural land and farm businesses.

### 11.2 Study Area

- 11.2.1 Design Manual for Roads and Bridges (DMRB) <sup>2</sup> does not specify a 'study area' for the assessment of effects of land-take but refers to the need to establish local travel patterns and the identification of land used by the community and their catchment areas.
- 11.2.2 The ES must therefore take account of existing community facilities in a setting and identify the location, status and importance of buildings or land that may be lost to the Scheme.
- 11.2.3 Figure 11.1 and Figure 11.2 include the extent of the Study area for use for this ES Chapter.

<sup>1</sup> Volume 11, Section 3, Part 8, Chapter 2, Part 3, Chapter 3 DMRB

<sup>2</sup> DMRB Volume 11, Section 3, Part 8

- 11.2.4 The extent of the Scheme includes the removal of the existing Junction 16 roundabout at Penmaenmawr and replacement with west bound slip roads only, a grade separated junction at Junction 16A connected to Junction 16 by a link road. Improvements to existing cycle routes and Rights of Way are also proposed.
- 11.2.5 This Chapter also considers the relevant effects of a proposed temporary construction site compound, to the south east of Junction 16A.
- 11.2.6 The settlement of Penmaenmawr adjoins the A55, with the town of Conwy to the north east and Llanfairfechan to the west. Penmaenmawr was recognised, at one time, as an important quarrying town and, more recently as a resort town. As with the neighbouring Llanfairfechan, the town was bypassed in the 1980's. Junction 16 lies approximately 1.5 km to the north east of the centre of Penmaenmawr.
- 11.2.7 ES Chapter 2 sets out the location of the Scheme and a detailed description. This ES Chapter considers the relationship and potential impact on the main settlement associated with Junction 16, Penmaenmawr and, the smaller settlement of Dwygyfylchi, which lies to the north east of Penmaenmawr, at the existing A55 Junction 16A.
- 11.2.8 The Scheme (Junction 16 and 16A) is located within the northerly boundaries of the communities of Penmaenmawr and Dwygyfylchi. ES Chapter 5 identifies Penmaenmawr as part of an 'Urban Development Strategy Area' for employment and housing growth within the adopted Conwy County Borough Council Local Development Plan (LDP).
- 11.2.9 The assessment of effects on private assets requires the numbers of properties that would be demolished or, from which land would be taken, including residential, commercial, industrial and other properties<sup>3</sup> to be set out. The private assets assessment for the Scheme therefore includes all properties and land which could be affected by demolition of property, or by loss of land, or by changes to the amenity of properties or land as a result of the Scheme.
- 11.2.10 The effects on agricultural land follows the four 'main areas' highlighted in the DMRB guidance<sup>4</sup>. These comprise the following:
- i. Land take;
  - ii. Type of husbandry;
  - iii. Severance; and
  - iv. Major accommodation works for access, water supply and drainage.

### **11.3 Baseline Conditions**

- 11.3.1 Within this ES Chapter, separate methods and baseline details have been used to assess effects on:
- Community and Private Assets and development land; and
  - Agriculture and Land Use.

<sup>3</sup> DMRB Volume 11, Section 3, Part 6

<sup>4</sup> DMRB Volume 11, Section 3, Part 6, paragraph 6.3

## Methods

- 11.3.2 A short description on the two separate methods used in this ES Chapter is set out in the following sections (Paragraph 11.3.3 to Paragraph 11.4.6.)

## Community and Private Assets and Development Land

- 11.3.3 The assessment process includes the potential for any directly or indirectly-related impact and effects, together with any related potential changes in associated journey length and travel patterns, the demolition of any properties, on any existing community facilities and private assets and development land identified.
- 11.3.4 The following aspects of the Scheme are considered:
- Demolition of properties;
  - Permanent land take required for the Scheme;
  - Construction of the Scheme, including temporary land take areas e.g. construction compounds, soil storage areas; as set out in ES Chapter 2; and
  - Operation of the new Scheme.
- 11.3.5 The assessment requires considerations of the following:
- The potential for demolition of private property and associated land take, and the effects on residential, business, commercial properties;
  - Loss of land and buildings used by the community. This is defined as common land, town and village greens, fuel and field garden allotments and public open space;<sup>5</sup>
  - Loss of, or effects on, new and future, proposed land use development. This is defined by the DMRB<sup>6</sup> as, land of any sites covered by local planning authorities' land use planning designations and identified within the relevant local planning documents (e.g. the local plan or local development framework) and, effects on land within the planning process; and
  - Loss of agricultural land, and assessment of the quality of that land, and the effects of land loss or severance on affected farm businesses.
- 11.3.6 A combination of desk-based studies, questionnaire surveys and meetings with relevant parties was undertaken to confirm the existing land use and ownership for the land and buildings directly affected or adjacent to the Scheme. This included the following:
- Searches of Land Registry for information and detail;
  - Issuing the questionnaires to affected parties; and
  - Meetings held with affected parties.
- 11.3.7 A detailed knowledge of the existing provision of community resources; land use pattern and private assets within the study area also included reference material from other Sections of this ES and the following data sources:
- Walking, Cycling, Horse Riding Assessment Report (ES Chapter 14 Appendix 14.1);
  - Ordnance Survey (OS) mapping;
  - OS MasterMap Address Layer data;

<sup>5</sup> DMRB Volume 11 Section 3 Part 6, Chapter 3

<sup>6</sup> DMRB Volume 11 Section 3 Part 6, Chapter 5

- OS Points of Interest data;
- A study of the Predictive Agricultural Land Classification Map (2017) and the Predictive ALC Map Guidance Note (November 2017);
- A study of the Scheme engineering layout plans and land referencing information;
- A study of aerial photographs and over-the-hedge site survey in July 2019;
- Conwy County Borough Council (CCBC); and
- Wales NHS.

- 11.3.8 DMRB<sup>7</sup> sets out the relevant assessment requirements for development land considerations. This includes identifying the land use planning designations along the Scheme route and land for future development and how route options might affect these and, for the Local Planning Authority to give views on possible developments.

### Existing Community and Private Assets and Development Land

- 11.3.9 Table 11.1 describes the existing community facilities identified within the study area. Each site reference identity is drawn in Figure 11.1 and Figure 11.2. Several community assets are located within the central area of Penmaenmawr but several also exist at Dwygyfylchi, near Junction 16A.
- 11.3.10 Although not identified within the defined list of community assets, the Scheme takes into consideration an annual/biannual circus event, which takes place near the existing A55 Junction 16A.

**Table 11.1: Existing Community Facilities**

Existing Community Facility	Numbers Identified
a Doctor surgeries/pharmacies	None
b Hospital	None
c Aged people homes	None
c Schools	None
e Shops	None. Puffin Café and Shell Station adjoins the study area.
f Post offices	None
g Places of worship	Small portion of land to the front of the Oasis Retreat Centre (as known). <sup>8</sup>
h Parks, play areas and other public open space and sports centres	Three separate open space areas near Puffin Garage.
i Tourist, visitor attractions	Puffin Farm shop; Camp site to the south of Junction 16A; Holiday caravan park, Oasis Retreat Centre.
j Libraries	None
k Community and village halls	None

<sup>7</sup> Volume 11, Section 3, Part 6, Chapter 5

<sup>8</sup> At the time of the baseline data the property was identified as a religious retreat centre.

Existing Community Facility	Numbers Identified
Land used by the community, including common land, village greens, garden allotments, war memorials and public open space	As h)

11.3.11 The Scheme would result in the limited permanent and direct loss of land used by the Community (as defined). This includes the temporary loss during construction and the permanent reconfiguration of the existing football pitch at Maes y Llan. These effects would include temporary changes to the journey time and amenity for users of this community sports field. This temporary change will be considered further.

11.3.12 This assessment also considers the potential of beneficial effects on existing community assets to be derived from the Scheme, including relief from existing community severance.

### Private Assets

11.3.13 No commercial property, as such, lies directly within the Study area. A limited number of commercial properties adjoin the study area boundary. The Study area includes agricultural land which includes seasonal camping and caravan use, to the west of Pendyffryn farm.

11.3.14 Table 11.2 describes the existing private assets within the study area and shown in Figure 11.2.

**Table 11.2: Existing Private Assets**

Existing Private Assets	Description
Residential	None
Offices	None
Others	Seasonal camp site (to the west of Pendyffryn farm)
Commercial property	Part of the Oasis Retreat centre land, to the north

### Development Land

11.3.15 The Scheme includes five sites identified as 'development land'.

11.3.16 The Scheme includes a new link road which would run parallel to the A55 from Junction 16 to 16A.

11.3.17 The proposed route includes land currently allocated within the CCBC LDP (locations shown in Figure 11.2), as:

- a) An allocated housing site (CCBC reference 53) on the north easterly edge of the settlement of Dwygyfylchi. The CCBC Joint Housing Land Availability (JHLA) 2017 indicates a potential for 15 houses on the site. The land is currently in agricultural use as described in Paragraph 11.3.27.
- b) A separate land use allocation for employment contingency uses (identified as CCBC reference MS9) exists at the Puffin Café / Orme view filling station. The land is currently in agricultural use (as described in Paragraph 11.3.30).



- c) Part of a housing contingency site at Conway Road. Improvements to provide a new cycle way along Conway Road is proposed within the southerly boundaries of land identified as a housing contingency site (as defined within the current CCBC LDP) and a limited part of the adjoining site to the west, which includes planning permission for 33 apartments.

## Summary

- 11.3.18 Table 11.3 identifies the extent of Scheme land take on the community and private assets and development lands within the Study area.
- 11.3.19 Figures 11.1 and 11.2 identifies the existing community facilities, private assets and the current adopted CCBC LDP defined land uses.

**Table 11.3: Summary Table of Existing Assets (Community and Private), Development Land and, Agricultural Land Within the Study Area**

Asset	Description
Community	<p>The Scheme would include the use of the following four, separate open space areas:</p> <ul style="list-style-type: none"> <li>Two open space areas at the Maes Y Llan residential estate – temporary</li> <li>The footbridge and route to/from the beach, crossing the A55 - temporary</li> <li>Most of the sports and playing field at Maes Y Llan – temporary and part permanent</li> </ul>
Private Assets and land	<p>The Scheme would use agricultural fields which have an established seasonal camping use.</p> <p>Most of the Scheme land is agricultural land along the route and smaller, individual portions of land near e.g the Oasis Retreat Centre and, separately, the access point from Conway Road to/from the Conway Road football pitch.</p>
Development land	<p>The Scheme would include some/all of three, separate development land areas:</p> <ul style="list-style-type: none"> <li>Most of the housing allocation at Maes y Llan.</li> <li>The whole of the employment contingency site which adjoins the easterly boundary of the existing Puffin Café</li> <li>A strip of land along the length of the Conway Road Housing Contingency site.</li> </ul>

- 11.3.20 The Scheme would not include the direct loss of existing residential properties and therefore, this is not considered further within this ES assessment.
- 11.3.21 DMRB guidelines for assessing associated land-take highlights that the economic impact on business premises should be included in an ES and sets out the relevant stages. The proposed new Junction 16A link road would not have a direct impact on existing businesses at Puffin Café and the Shell petrol station and would not include the direct loss of existing commercial properties. The effect on existing commercial businesses and properties, as such, are therefore not considered further within this ES assessment.
- 11.3.22 The Scheme includes agricultural land. Some of this is currently used as part of an established seasonal camp site adjacent to Glan Yr Afon Road (south west of Junction 16A). The camp site represents part of a local agricultural business and is considered further in this ES chapter assessment.
- 11.3.23 The Scheme would include both limited and direct use of separate development lands. At the time of preparing this ES, no planning permission is secured for these sites.

- 11.3.24 Chapter 14, together with research by others<sup>9</sup>, confirms the status and routes of any existing Public Rights of Way (PROW) within and near the Scheme land-take. PROW Penmaemawr 08 currently provides a route to Penmaenmawr beach from the parish hall located at the junction of Ysguborwen Road and Gwynan. The route uses an existing footbridge over the existing A55 trunk road. This chapter considers the potential for improvements to PROW as part of the Scheme and the details set out in Chapter 14 All Travellers.
- 11.3.25 The community is likely to experience a temporary increase in traffic during construction of the Scheme as described in Chapter 14 All Travellers. The Scheme would retain all routes to and from community facilities. Traffic management would be required in some locations on public roads.

### Agricultural Land

- 11.3.26 'Agricultural land' is land which is capable of being used for agricultural purposes. The Agricultural Land Classification (ALC) sets out a method for assessing the quality of farmland in England and Wales. The ALC system classifies land into five grades, with 1 being the best and 5 being the worst and Grade 3 subdivided into Subgrades 3a and 3b.<sup>10</sup>
- 11.3.27 The agricultural land affected by the Scheme is currently down to grassland cut for silage/hay and grazed by cattle and sheep and is shown on the Predictive ALC Map (Welsh Government, 2017) as comprising a mixture of Subgrades 3a and 3b quality land. Consultation with the relevant Welsh Government Department<sup>11</sup> confirms that this land is borderline Subgrade 3a/3b on the desk-based assessment. Parts of the Scheme, especially near Junction 16, are downgraded to Subgrade 3b on slope. Consequently, the Welsh Government Department has advised that the Scheme is unlikely to affect land of best and most versatile quality (Grades 1, 2 and 3a) and consequently no detailed ALC survey required.
- 11.3.28 Some of the agricultural land is also used for camping/caravanning on a seasonal basis.

### Summary

- 11.3.1 Table 11.4 identifies the Scheme landtake of existing assets and land use:

**Table 11.4: A Summary Description of the Extent of the Proposed Scheme Landtake in Terms of Existing Assets and Land Use**

Asset	Description	Site Area (ha)
Community	The temporary use of four areas located within the Study area	
Private Assets and land, including agricultural land	All other land use, not defined as community or development land	
Development land	All three sites allocated and as contingency site allocations	

<sup>9</sup> Conwy County Borough Council maps available on:

map.conwy.gov.uk/gis/cmfindit/default.aspx?menuconfig=STE&filters=PRA~1%3C2&zoomtoselection=true&itemconfigid=PRA ID

<sup>10</sup> The current ALC grading methodology is described in [The Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for Grading the Quality of Agricultural Land \(MAFF 1988\)](#) The most up to date predictive ALC map for Wales can be viewed on : [lle.gov.wales/map/alc?\\_ga=2.258395978.1920932241.1567162720-234694212.1543587638#m=-3.4,52.5,8&b=europa&l=908h:893h:1326;](https://lle.gov.wales/map/alc?_ga=2.258395978.1920932241.1567162720-234694212.1543587638#m=-3.4,52.5,8&b=europa&l=908h:893h:1326;)

<sup>11</sup> Email 01/07/2019 from James Cooke, Welsh Government Agricultural Land Use Policy Manager to Tony Kernon, Kernon Countryside Consultants

## 11.4 Value (Sensitivity) of Resource

- 11.4.1 As set out in ES Chapter 4, the approach includes a qualitative assessment to indicate the 'significance' of effects. This relies on the significance of an effect, a function of the value or sensitivity of the resource/receptor and the magnitude (or scale) of the impact (in the context of the timescale involved, as temporary or permanent). Levels of 'significance' considers both adverse and beneficial effects during the construction period and arising from the operation of the Scheme <sup>12</sup>.
- 11.4.2 For this ES Chapter, the recommended approach and guidance to evaluate the significance of an effect, includes the following:
- Community and private assets *objectives* for the Scheme – as set out in Chapter 2 of this ES;
  - *Outcomes* of consultations with relevant stakeholders;
  - Professional judgement<sup>13</sup> and,
  - Supplementary advice<sup>14</sup>
- 11.4.3 The DMRB<sup>15</sup> provides separate advice on assessing impacts from the severance and/or loss of community buildings. This relies on an interpretation of the extent or degree of a new severance or a change in the location of centres of activity or, in some cases the permanent loss to a community. DMRB categorises permanent community severance as 'severe'.
- 11.4.4 In the event that a road scheme entails the use of publicly used land, the DMRB sets out the categories of land where exchange land may need to be provided. It also recognises that '*community land may have conservation, landscape or other heritage value*'. Where this is the case, '*the assessment of these aspects should be included in the schemes' wider ecological, landscape or heritage assessment.*' It highlights that '*if public open space is to be taken, identify whether there is land in the vicinity which could be offered as exchange land. If so, this should be assessed to ensure that is no smaller and is equally advantageous to users as that which would be required for the preferred route*'<sup>16</sup>.
- 11.4.5 In line with the DMRB guidance<sup>17</sup>, this ES Chapter focuses on identifying two main agricultural receptors; agricultural land resources and farming/land-based business(es):
- i. Agricultural land resources. Technical Advice Note (TAN) 6 (2010)<sup>18</sup> sets out a threshold of a loss of 20ha or more of grades 1,2 or 3a agricultural land (either as a current or previous use), of which is less than 20 hectares but is likely to lead to further losses amounting cumulatively to 20 hectares<sup>19</sup> or more for consultation with the Welsh Government. The thresholds used in this assessment were agreed in consultation with the Welsh Government (as set out in the Environmental Scoping Report, March 2019); and
  - ii. Farming/land-based business(es). The owners and users of land, whether as direct or indirect, temporary or permanent involvement, represent key receptors. The assessment considered the temporary physical effects, including land loss, severance, the potential

<sup>12</sup> as defined in Table 2.3 of HA205/08 (Highways Agency et al, 2008)

<sup>13</sup> DMRB Volume 11, Section 2, Part 5 (HA205/08) (Highways Agency et al, 2008)

<sup>14</sup> TAN 06 (2010)

<sup>15</sup> DMRB Volume 11, Section 3, Part 8.

<sup>16</sup> Volume 11 Section 3 Part 6 Land use Chapter 4, Paragraph 4.8

<sup>17</sup> HA 205/08

<sup>18</sup> TAN 6, Planning for Sustainable Rural Communities (2010)

<sup>19</sup> The ES Cumulative Assessment Effects considers the potential cumulative loss of agricultural land

effects on the movement of livestock, field accesses, drainage and the use of farm buildings and the potential to affect any long- term agricultural use.

- 11.4.6 This ES Chapter uses the approach set out in the following tables (Table 11.5, Table 11.6 and Table 11.7) to determine the significance of effects on community, private property, development land and agricultural land and/or farming businesses.

**Table 11.5: Magnitude of Impact Assessment Criteria Assessment Descriptions**

Magnitude of Impact	Assessment Criteria
Large adverse	<p>Where residential properties would be demolished, become uninhabitable and inaccessible or lose more than 50% of their garden land.</p> <p>The viability of a commercial or community facility is threatened due to the land -take.</p> <p>The viability of a site allocated for development within an adopted development plan/or with an existing planning permission is threatened due to the land- take</p> <p>A large proportion of land used by the community would be threatened due to land-take.</p> <p>The loss of 20 ha or more of best and most versatile agricultural land.</p> <p>The cessation of a full-time agricultural business.</p>
Moderate adverse	<p>Where a residential property would suffer a permanent, negative impact from losing between 10%-50% of their related amenity/garden land.</p> <p>The viability of a commercial or community facility is not threatened, but significant changes may be experienced in the day to day running and or the relative size and scale.</p> <p>The viability of a site allocated within an adopted development plan /or with an existing planning permission remains viable, but the developable area is reduced by 25%-50%.</p> <p>A moderate proportion of land used by the community would be threatened due to land-take.</p> <p>The loss of between 5 ha and 20 ha of best and most versatile agricultural land.</p> <p>A significant effect on a full-time farm business, or the loss of a part-time farm business.</p>
Slight adverse	<p>Where a residential property would lose less than 10% of their amenity/garden land.</p> <p>The viability of a commercial or community facility using the land is not threatened and land -take may involve only the redundant or infrequently used land/buildings not essential to the continuation of the commercial or community facility.</p> <p>A site allocated within an adopted development plan or with planning permission remains viable, but the developable area is reduced by 25% or less.</p> <p>A minor proportion of land used by the community would be threatened due to the land-take.</p> <p>The loss of less than 5 ha of best and most versatile agricultural land, or the loss of any quantum of poorer quality agricultural land.</p> <p>A moderate or limited effect on a full-time farm business, or a significant or lesser effect on a part-time farm business.</p>
Neutral	The Scheme would have no significant impacts on existing land use.
Beneficial	Additional areas of land which members of the community can access are made available by the Scheme.

**Table 11.6: Receptor Sensitivity Descriptions**

<b>Sensitivity</b>	<b>Examples of Receptors</b>
High	<ul style="list-style-type: none"> <li>Existing private residential/commercial properties with associated gardens/land which are occupied, or a community facility in use.</li> <li>Land allocated for development with the benefit of planning permission.</li> <li>Land with the benefit of public access and frequently used by the community.</li> <li>Land in Grades 1, 2 and 3a of the Agricultural Land Classification, being the best and most versatile agricultural land.</li> </ul>
Moderate	<ul style="list-style-type: none"> <li>Existing private residential/commercial properties/community facilities with associated gardens/land which are not permanently occupied or, is not essential to the residence/running of a business or community facility.</li> <li>An LDP allocated site but without the benefit of planning permission.</li> <li>Land with the benefit of public access which is sometimes used by the community.</li> <li>Land in Grades 3b, 4 and 5 of the Agricultural Land Classification.</li> <li>Full-time farm businesses.</li> </ul>
Low	<ul style="list-style-type: none"> <li>Existing private residential/commercial properties/community facilities with associated gardens/land which are derelict or not in current use.</li> <li>Land which represents a 'candidate site' as part of the local development plan.</li> <li>Land infrequently used by the community/or identified as being used as an unofficial open space.</li> <li>Part-time farm businesses.</li> </ul>

**Table 11.7: Significance of Effect Descriptions**

<b>Magnitude</b>	<b>Sensitivity</b>		
	<b>High</b>	<b>Moderate</b>	<b>Low</b>
Large adverse	Major adverse	Major – Moderate Adverse	Moderate – Minor Adverse
Moderate adverse	Major-Moderate Adverse	Moderate – Minor Adverse	Minor Adverse
Slight adverse	Moderate – Minor Adverse	Minor Adverse	Minor - Negligible
Neutral	Negligible	Negligible	Negligible

## 11.5 Regulatory/Policy Framework

### Legislation and Policy Framework

11.5.1 ES Chapter 5 provides the relevant environmental legislative and policy context for the Scheme. The following legislation, policies and documents are of direct relevance to this ES Chapter:

- The Highways Act 1980. This sets out the compulsory purchase powers for the acquisition of land for highway schemes.
- The Acquisition of Land Act 1981, Section 19. This sets out the compulsory purchase of any land forming part of a common, open space or fuel or field garden allotment; and
- The Countryside and Rights of Way Act 2000 Part 1 Sets out the public right of access to countryside.

11.5.2 Published guidance documents include the following:

- Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5, HA 205/08 (Highways Agency et al., 2008) relating to overarching assessment principles;
- DMRB Section 11.3.6 Environmental Assessment Techniques. 'Land Use' (Highways Agency et al., 2001) for the assessment of effects on Community and Private Assets;
- DMRB Section 11.3.8 Environmental Assessment Techniques. 'Pedestrians, Cyclists, Equestrians and Community Effects' (Highways Agency, 1993) for the assessment of effects on the Community; and
- DMRB Interim Advice Note 125/09(W) Supplementary guidance for users of DMRB Volume 11 'Environmental Assessment' (Wales Only) (Welsh Assembly Government, 2010b).

### **National Planning Policy**

11.5.3 Of relevance to this ES Chapter:

- *Planning Policy Wales (PPW) (Edition 10) (Welsh Government, 2018)* and accompanying Technical Advice Notes (TAN).

PPW sets out the context for development plans and planning applications and infrastructure projects, with detailed technical guidance in TAN. ES Chapter 5 includes a detailed review of PPW 10.

PPW chapters PPW Chapters 2, 3, 4 and 6 highlights that community-based assets should be optimised and integrated; the importance of recreational space and, to conserve the best and most versatile agricultural land. Several objectives and aims are highlighted for communities and the importance of conserving the best and most versatile agricultural land, with development directed towards land of the lowest grade.

The relevant TAN's include: TAN 6: Planning for Sustainable Rural Communities (Welsh Assembly Government, 2010). This provides advice to Local Planning Authorities when preparing development plans and assessing planning applications to consider the quality of agricultural land; TAN 16: Sport, Recreation and Open Space (Welsh Assembly Government, 2009). This sets out detailed requirements for site allocation and community needs.

### **Local Development Plan**

11.5.4 The assessment has had regard to the current, adopted Local Development Plan(s) in force (as detailed in ES Chapter 5).<sup>20</sup>

### **Other Relevant Guidance**

11.5.5 The Welsh Government 2016 Guidance for 'Traditional Allotments and Community Led Gardening Projects'. This guidance covers all aspects of allotments and community growing

<sup>20</sup> DMRB Volume 11 Section 3 Par 6 Land use, Paragraph 5.1

projects, with guidance on managing allotment sites to developing new allotment or community growing sites.

- 11.5.6 Sport for Wales/ Fields in Trust Guidance 'Protecting Playing Fields in Wales' provides guidance on the long-term protection of recreational land.

## **11.6 Design, Mitigation and Enhancement Measures**

### **Design**

- 11.6.1 ES Chapter 3 sets out the Scheme alternatives and includes a description of the difficulties encountered during the design development options. This included construction and operational requirements.
- 11.6.2 The presence of residential private assets is identified as one of the main design constraints for the Scheme options. ES Chapter 3 describes how the Scheme options were assessed as part of the Weltag process. The process considered the technical objectives and environmental, social and cultural impacts.
- 11.6.3 The Scheme is considered beneficial by reducing the severance of members the community from the coast and by enhancing Active Travel provision for walkers and cyclists. Additionally, the Scheme takes reasonable steps to build healthier communities and better environments.

### **Assets**

- 11.6.4 This ES chapter considers the main impact of replacing the existing roundabout at Junction 16 with a four-way movement grade separated junction at Junction16A. The existing roundabout at Junction 16 is replaced with westbound on and off slip roads that meet Conwy Road and Ysguborwen Road at a new roundabout. The proposed new Junction 16A consists of an overbridge, with slip roads constructed on raised embankments with a new highway link road constructed parallel with the A55, to the east and behind the Puffin Cafe and Shell station. This would link into the Ysguborwen Road, near the Gladstone Hotel. Active Travel routes are also proposed for Glan Yr Afon Road.
- 11.6.5 Table 11.3 confirms that the Scheme land-take does not include any existing business premises, but it does include the seasonal use of agricultural land used for camping use. A separate assessment considered farm businesses.
- 11.6.6 Land Registry details confirm that the properties and land areas which are affected by the Scheme include several, separate private ownerships; two separate properties are within the ownership of Cartrefi Conwy Housing Association.
- 11.6.7 A separate legal process, not covered in this ES, considers potential compensation valuation and blight.

### **Development Land**

- 11.6.8 Guidelines for assessing the effects on development land confirm that '*where a proposed scheme should run close to an area reserved for housing development it should be recognised that more residences would be affected by noise, visual intrusion etc than the current assessment suggests. The impacts of planned land use changes for the Scheme should therefore be considered, in broad terms, as part of the overall assessment*'.

11.6.9 The Scheme design stages considered the potential to affect the development lands. These areas are all currently in agricultural use, shown in Figure 11.2, and include:

- An allocation as a contingency employment use;
- An allocation as a contingency housing site; and
- A housing allocation.

11.6.10 The Scheme includes land allocated for employment/ business development, but no planning permission exists (as at August 2019). The current land allocations adjoin the existing Puffin Petrol Station and Café site, Dwygyfylchi and the land allocations identified as Orme View Filling Station –Employment Allocation and Contingency. The current LDP review will include up to date evidence to retain or withdraw existing land allocations.

### **Site Compound**

11.6.11 The location of the proposed temporary construction compound for the Scheme was considered during route selection and design.

11.6.12 The propose compound site, at Junction 16A, represents a convenient location, limiting the use of additional land take and the use of the agricultural land, close to the existing and proposed A55 Scheme.

### **Community Assets**

11.6.13 The use of the community assets includes both permanent and temporary changes (11.3.10). DRMB categorises permanent community severance as 'severe'. The Scheme would not include a permanent severance: the existing facility for the sport pitch would be reinstated with additional benefits, for example, landscape areas included and, an additional area of open space designed.

11.6.14 Consultation with Conwy County Borough Council (CCBC)<sup>21</sup> confirms that, except for the open space embankment between the existing footpath and the A55, the open space area is used as school land areas and in constant use.

### **Mitigation and Scheme Stages**

11.6.15 The potential extent of the impact on assets identified (in Table 11.4) at pre-construction, construction and operational stages includes several measures.

#### **At Pre-construction Stage**

11.6.16 The process of the site clearance for the Scheme would include advanced and temporary mitigation of construction effects. These are set out in ES Chapter 2 and the ES Construction Environmental Management Plan (CEMP). ES Chapter 2 sets out the need to maintain good environmental protection measures for noise, dust and air pollution at pre- construction stage. A CEMP would be produced prior to the commencement of the Scheme and updated to inform members of the public of the site clearance and construction programme.

<sup>21</sup> Emails 26 September and 2 October 2019 from Simon Billington, Open Spaces Manager. Information provided also mentioned a new footpath surfacing project connecting Ysguborwen Road to the A55 Iron bridge as a requirement of a legal section 106 agreement and Beech Homes development



- 11.6.17 Land included within the Scheme, which includes agricultural land, other land, would be secured with a temporary or permanent fence in advance of site clearance and/or accessibility maintained.
- 11.6.18 Agricultural land taken on a temporarily basis during construction would be restored for productive use on completion.
- 11.6.19 The works on the football pitch adjacent to Maes y Llan means that this community facility would be temporarily affected by the Scheme. The works would be timed to avoid the season of peak use and where feasible the works would be completed, and the field restored for community use at the earliest opportunity within the construction programme.
- 11.6.20 Where feasible, the Scheme has been designed to avoid or minimise direct adverse effects on the viability of the housing allocated development land. This includes the consideration of the timing of construction of a future development, should a planning application (or separate applications) be submitted to the Local Planning Authority during the Scheme timetable. The need for appropriate mitigation measures for development affected by the Scheme is also a consideration for other ES chapters.
- 11.6.21 A full assessment of the potential impact of the Scheme and the development land is considered in ES Chapter 19 'Cumulative Assessment'. ES Chapter 19 provides a review of predicated inter-related receptors and in combination impacts and wherever possible relevant mitigation measures incorporated as part of the Scheme CEMP.
- 11.6.22 Depending upon the timing of construction phases, appropriate measures could be required to temporarily relocate the annual/biannual circus event on fields adjacent to the eastern end of the Scheme. This would be a consideration for an appointed contractor who would need to consider how the event could be served by the road network and measures to be put in place in an agreement with the landowner and the event facilitators.

### **Construction Stage**

- 11.6.23 Construction activity would take place within the proposed land taken for the Scheme and would require use of public roads for access. To minimise disruption to traffic, the community, and the use of community facilities, temporary traffic management would be required. ES Chapter 14 details the considerations for Scheme on the accessibility on existing community facilities.

### **Enhancement**

- 11.6.24 The potential impact on existing community assets was considered during route selection and design and the potential for enhancements were examined.
- 11.6.25 The existing football pitch at Junction 16, will be reconfigured within the existing field. Potential community environmental benefits include Active Travel measures and additional open spaces and, amenity improvements. These are considered to achieve environmental benefits for the community.

## **11.7 Monitoring Requirements**

- 11.7.1 The ES CEMP sets out the proposed mitigation measures which would be implemented.
- 11.7.2 The use of temporary agricultural land and community assets would be monitored as part of the

CEMP measures and land restored to their current uses.

- 11.7.3 Potential revisions of the Scheme which would introduce additional effects on all assets identified within this ES would be reassessed.

## 11.8 Magnitude of Impacts (change)

- 11.8.1 Table 11.8 identifies how the Scheme would impact on existing residential properties, land areas, development land and agricultural land:

**Table 11.8: Description of the Magnitude of Impact on the Assets Identified**

Asset	Description of Impact
Community	<p>The impact on the use of a community facility is considered as a temporary moderate adverse at the construction stage, reaching beneficial at the permanent, operational stage.</p>
Private Assets and land	<p>The impact on existing business premises is considered as neutral.</p> <p><i>Agricultural land</i></p> <p>The Scheme permanently affects approximately 8.8 ha of agricultural land. All this land borders the existing A55 or the service station,</p> <p>This land is considered, as confirmed by consultation with the Welsh Government, unlikely to contain any best and most versatile agricultural land. As a consequence, the loss of this land represents a slight adverse-impact.</p> <p>The Scheme will affect land in active farming use, currently used as grassland for fodder conservation and/or grazed. Part of the agricultural land is also used for leisure uses (camping) on a seasonal basis in- conjunction with usual, established farming activities, for example grazing and mowing.</p> <p>The agricultural land affected by the Scheme includes the following:</p> <ul style="list-style-type: none"> <li>• The land east of the existing A55 junction 16, between the A55 and Ysguborwen Road, is mostly grazed for sheep. Gateways onto this land are from the Ysguborwen Road, and access to the remaining land will be maintained. The remaining field area will be reduced in size, which will have some management implications and will reduce the quantum of stock that can be grazed at any one time.</li> <li>• The land to the south and immediate east of the Puffin service station is currently grazed by sheep, but at a low stocking density. This single parcel of land will be taken in its entirety for the Scheme.</li> <li>• Further east, either side of the Glan-yr-Afon Road adjacent to the A55, the land is mown for silage/hay and grazed. There is a gateway off the Glan-yr-Afon Road to the eastern land, which will be unaffected. Access to the central block is from the Glan-yr-Afon Road and is unaffected. Therefore, the Scheme will reduce the amount of land farmable, but it will not cause severance or other adverse effects. This land is relatively level and used for conserving grass for winter fodder. There will be a consequent impact on stocking rates across the affected farms.</li> </ul> <p>The two principal farming enterprises affected by the Scheme are:</p> <ol style="list-style-type: none"> <li>i. At the eastern end the Scheme affects 6.1 ha of land forming part of Pendyffryn Farm. This is a 24-ha holding farmed as part of a large 800+ ha farming enterprise. The land is used for silage, with parts used for camping following silage and for overwintering sheep. Some cattle are housed in farm buildings; and</li> <li>ii. At the western end of the Scheme some 2.3 ha of land is affected grazed by</li> </ol>

Asset	Description of Impact
	<p>animals from Ty Newydd Henryd. Some of this land is accessed from Tyddyn du Farm. The main holding is located some distance to the south east and the affected land forms winter grazing and summer grassland.</p> <p>The minor agricultural impact is:</p> <ul style="list-style-type: none"> <li>• Land to the rear of the service station, which is a small (0.8 ha) area of rough grazing;</li> <li>• A temporary site compound affects a further 0.9 ha of land forming part of Pendyffryn Farm, used for winter grazing, summer silage and then seasonal camping uses;</li> <li>• The quantum of land involved is considerable, especially in the case of Pendyffryn Farm. However, these are both substantial farm units, of which the affected parcels of landform only a small part;</li> <li>• Against the magnitude criteria in Table 11.5, both holdings will experience a “moderate or limited effect on a full-time farm business”, which equates to a ‘slight adverse effect’;</li> </ul>
Development land	<ul style="list-style-type: none"> <li>• The Scheme would impact on the viability of the allocated housing land at Maes y Llan and that of the employment contingency site near Puffin Garage;</li> <li>• Both would be threatened due to the extent of the land take and impact would be ‘large adverse’; and</li> <li>• The Scheme would also include a limited frontage of the residential site allocation at Conway Road.<sup>22</sup></li> </ul>
Others	<p>The Scheme includes design considerations for Active travel routes for Conway Road, Ysguborwen and Glan yr Afon Roads and these provide additional accessibility to members of the existing, identified community assets, together with additional open spaces. This represents a beneficial impact.</p>

## 11.9 Significant Effects

11.9.1 Based on the methodology for the significance of effects (as set out in Table 11.7) the Scheme is considered to impact on:

- The impact on community benefits is recognised as a ‘temporary major - moderate adverse’ reaching to ‘beneficial’, as the facility is currently in use and will remain for the future. Additional open space would also be provided.
- The use of land identified as part development land means that the impact of the Scheme is considered as ‘Major -Moderate Adverse’. Planning permission exists for one of the development lands (for 33 apartments at Conway Road) but although the impact of the Scheme is limited it would be considered as ‘high’.
- The impact on agricultural land and farming activities, and the seasonal camping use, would be ‘moderate’ impacts on full time farm businesses, which is a Minor Adverse effect.

11.9.2 For community assets, the provision of additional cycleways and enhanced connectivity represents a beneficial impact, which has the potential for further indirect beneficial impact on the community assets.

<sup>22</sup> A further consideration should be taken to liaise with CCBC planning Services as part of the final stage of the CBCCLDP review process

### **11.10 Cumulative Effects**

11.10.1 Several ES Chapter assessments indicate a relationship with private and community assets as defined. The following potential inter-relationship effect would take place:

- The potential for existing soil conditions and contamination related to previous structures and importation of materials connected with the construction of the existing A55 route.
- Most assets and routes within the Study area (except for the existing A55 route) include the potential for flood event considerations.
- Nature Conservation (Biodiversity) mitigation potential, the sensitivity of open allocated land and land further to the west on Ysguborwen Road.
- Landscape and Visual Change beneficial changes in impact on/from the residential properties, Maes y Llan.
- Archaeological recording prior to demolition of properties and the potential for previous findings and additional investigations for the Scheme
- Air Quality impacts on existing and proposed assets and proposed land use developments.
- Potential benefits to non-motorised travellers gained.

11.10.2 The cumulative impact on either the temporary or permanent removal of assets connected with other plans and projects<sup>23</sup>, is unlikely to cause a significant impact.

### **11.11 Indication of any Difficulties Encountered**

11.11.1 Baseline details for open space locations were provided directly by CCBC. Accordingly, the baseline is based on secondary information which should be up to date. If the baseline is out of date and/ or incorrect then this ES Chapter assessment should be re-considered.<sup>24</sup>

11.11.2 The LDP, which provides land use designations, is currently in the early stages of a review process and is likely to contain additional and revised land use designations.

### **11.12 Conclusions**

11.12.1 This chapter of the ES describes the assessment of effects on community and private assets, development land, including agriculture land, resulting from the Scheme, and considers the existing use of routes.

11.12.2 The Scheme does not include the direct loss of residential or commercial properties and is therefore not considered further within this ES assessment.

11.12.3 A community asset would be temporarily affected by the Scheme, but the potential exists for a beneficial impact in the longer term.

11.12.4 There will be the use of development land allocated for housing and contingency housing and employment, as set out in the current LDP. The Scheme attempts to minimise any viability implications for these lands and to enhance the opportunities for public rights of way and open space provisions. At the time of preparing this ES, local development plan review consultations were ongoing with the local planning authority.

<sup>23</sup> As defined in ES Chapter 19

<sup>24</sup> At the time of preparation for this ES Chapter a CCBC review is ongoing. Email 07/02/2020 from RML to James Harland, CCBC

11.12.5 Based on the significance of effects, the Scheme would include the following:

- The impact on community benefits is recognised as a 'temporary major - moderate adverse' reaching to 'beneficial', as the facility is currently used.
- The use of land identified as housing development land means that the impact of the Scheme is considered as 'large adverse', and 'low', as no planning permission secured.

11.12.6 The Scheme will result in the permanent loss of 9.2 ha of moderate quality agricultural land and this will result in a minor adverse impact. A further 0.9 ha will be taken temporarily for construction compounds and will affect seasonal camping on that area as well as agricultural activity. Farm businesses will be affected, but in all cases the affected land forms the edge of the holding and other land will remain accessible. The effects are considered as a minor adverse impact.

11.12.7 Where relevant, appropriate mitigation and enhancement measures are mentioned in this Chapter ES. Mitigation measures will also comprise a separate process, outside the scope of this ES, with claims for any relevant and suitable compensation to be assessed and agreed with an independent valuer appointed by the Welsh Government.

11.12.8 Community benefits with the Scheme include additional Active Travel plan provisions, with enhanced pedestrian access to the coast and facilities, in line with the Active Travel (Wales) Act 2013 and Well-being and Future Generations (Wales) Act 2015 to deliver a Healthier Wales.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 12 AIR QUALITY**

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## 12. AIR QUALITY

### 12.1 Chapter introduction

- 12.1.1 This chapter considers the likely significant effects of air quality associated with the construction and operation of the J16 Scheme. The scheme upgrades the existing junction where the A55 dual carriageway meets between Penmaenmawr and Dwygyfylchi into a grade separated junction. A detailed description of the Scheme is provided in Chapter 2.
- 12.1.2 This chapter describes the existing air quality within the study area and assesses the potential impacts of construction and operation of the J16 Scheme on air quality in the surrounding area. The main air pollutants of concern related to construction are dust and particulate matter with an aerodynamic diameter of less than 10µm (PM<sub>10</sub>), and for road traffic are nitrogen dioxide (NO<sub>2</sub>) and PM<sub>10</sub>. Professional experience indicates that any impacts associated with other air pollutants would be negligible.
- 12.1.3 The assessment of operational effects follows the guidance set out in Welsh Transport Appraisal Guidance (WelTAG) Guidance<sup>1</sup>. WelTAG is not prescriptive about the methods that should be used to assess impacts as this is a continually developing field, but the methods used should be appropriate for understanding the extent and severity of each impact. The methods used to assess impacts follow the advice set out by the Department of Transport in the Design Manual for Roads and Bridges (DMRB)<sup>2</sup> Volume 11, Section 3, Part 1 (HA 207/07) combined with up to date guidance published by the Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM)<sup>3</sup> and the Department for Environment, Food and Rural Affairs (Defra)<sup>4</sup>.
- 12.1.4 Subsequent to this assessment, Highways England published a new document on the requirements for assessing and reporting the effects of highway projects on air quality, LA105 Air Quality<sup>5</sup>, which replaces HA 207/07. LA105 scoping methodology would results in a simple qualitative statement being required at detailed design stage as both potential for the project to impact on traffic and the sensitivity of the receiving environment are considered to be low risk. LA105 would have required a lower level of assessment than has been undertaken for the J15 Scheme and therefore would not change the conclusions of the assessment.
- 12.1.5 DMRB is complemented by supplementary guidance Interim Advice Notes (IAN) issued by Highways England, which are then considered for adoption on the Welsh motorway and trunk road network and issued as an IAN (W). Any IAN issued by the Highways England, but not issued as an IAN (W) is not for use on the Welsh motorway and trunk road network<sup>6</sup>, and therefore as there are no IAN (W) issued, no IANs have been used in this assessment. The changes in air quality and significance of potential effects has been classified based upon the sensitivity of identified receptors and the magnitude of predicted impacts following the EPUK and IAQM guidance. Where significant air quality effects are determined, mitigation options are proposed and discussed.

<sup>1</sup> <https://gov.wales/welsh-transport-appraisal-guidance-weltag>

<sup>2</sup> <http://www.standardsforhighways.co.uk/ha/standards/dmr/>

<sup>3</sup> <https://iaqm.co.uk/guidance/>

<sup>4</sup> <https://iaqm.defra.gov.uk/technical-guidance/>

<sup>5</sup> Highways England. LA105 Air Quality. November 2019.

<sup>6</sup> <http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section3.htm>

<sup>6</sup> <https://gov.wales/highway-standards>



- 12.1.6 During the construction period, the increase in heavy duty vehicles (HDVs) movements on the road network will be below the threshold of 100 movements per day outside an Air Quality Management Area (AQMA) for an assessment to be necessary according to the IAQM guidance<sup>7</sup>. The construction HGVs traffic flows assumes the trips would spread uniformly throughout the construction period with approximately 11 HDV serving the site daily. Construction traffic will primarily arrive via A55 from the east. Vehicle movements associated with construction are typically significantly lower than the number of vehicle movements associated with operation of the scheme, which have been taken into account in this assessment, and be closely controlled in accordance with the Construction Traffic Management Plan. The construction traffic impacts in the area are considered to be insignificant and have therefore been scoped out of this assessment.
- 12.1.7 The assessment of the potential temporary nuisance impacts from construction dust, and recommendation of mitigation options, was undertaken in accordance with the IAQM guidance on the assessment of dust from demolition and construction<sup>8</sup>.
- 12.1.8 The DMRB scoping exercise for local and regional air quality is to indicate whether there are likely to be significant impacts associated with a particular scheme. The criteria for regional impacts are presented in section 12.6.8 and if no roads meet the criteria it is not necessary to undertake any calculations. For J16 Scheme, Old Mill Road link is predicted to have a change of more than 10% (Chapter 14 All Travellers), with 158 daily flows without the Scheme increasing to 117 daily flows with the Scheme in place. Given the low traffic flows the change in regional emissions is considered insignificant. Ysguborwen Road, Treforris Road, Conway Old Road are predicted to have a reduction in traffic flows of more than 10%, and, similarly to Old Mill Road, the maximum traffic flows on these links are predicted to be 1175 daily vehicles on Ysguborwen Road. The total traffic flows are considered to be very low and the change in regional emissions insignificant.
- 12.1.9 During the operational phase, although traffic flows could change because of external factors, the scheme itself is considered likely to result in no overall additional traffic or resulting emissions. Similarly, although the replacement of the roundabout with slip roads could result in minor fluctuations in local emissions, these are considered likely to have a negligible regional effect. In this instance, it is therefore considered that operational regional emissions will be negligible, and therefore have been scoped out of this assessment, similar to the Greenhouse Gas operational emissions.
- 12.1.10 Particulate matter with an aerodynamic diameter of less than 2.5  $\mu\text{m}$  ( $\text{PM}_{2.5}$ ) monitoring is not undertaken in close proximity to the Scheme but is carried out at two of the six local authorities that encompass the North Wales Combined Authority<sup>9</sup>. The annual mean  $\text{PM}_{2.5}$  concentrations recorded at all stations were well below the annual mean objective of 25  $\mu\text{g}/\text{m}^3$ , with the highest measured concentration recorded being 8.6  $\mu\text{g}/\text{m}^3$  in 2017.  $\text{PM}_{2.5}$  therefore is not included in the assessment as there is not considered to be a risk of the annual mean air quality criteria being exceeded either with or without the Scheme and the modelling of  $\text{PM}_{10}$  can be used to demonstrate that the Scheme does not impact on  $\text{PM}_{2.5}$  air quality objective<sup>10</sup>.

<sup>7</sup> IAQM. Guidance on the Assessment of dust from demolition and construction. 2014. v1.1.

<sup>8</sup> IAQM. Guidance on the Assessment of dust from demolition and construction. 2014. v1.1.

<sup>9</sup> North Wales Combined Authority. 2018 Air Quality Progress Report. September 2018.

<sup>10</sup> Highways England. LA105 Air Quality. November 2019.

<http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section3.htm>

## **12.2 Regulatory/policy framework**

- 12.2.1 Local air quality is monitored and managed under a range of national and international legislation which sets out procedures, guidelines and standard limits for specific commonly occurring air pollutants.

## **12.3 International Legislation and Agreements**

### *The European Air Quality Framework Directive and Daughter Directives*

- 12.3.1 The European Air Quality Directive 2008/50/EC<sup>11</sup> on ambient air quality and cleaner air for Europe establishes a strategic framework for setting European-wide limit and/or target values for seven pollutants (nitrogen oxides, particulate matter, sulphur dioxide, ozone, carbon monoxide, lead and benzene). Limit values for heavy metals and polycyclic aromatic hydrocarbons are established by the Fourth-Daughter Directive 2004/107/EC<sup>12</sup> and are based on recommendations made by the World Health Organisation (WHO).
- 12.3.2 European Council Directive 92/43/EEC<sup>13</sup> on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) requires member states to introduce a range of measures for the protection of habitats and species.

## **12.4 National Planning Policy and Legislation**

### *Environmental Protection Act 1990*

- 12.4.1 The local authority has powers and duties to address issues arising from dust through the statutory nuisance provisions of the Environmental Protection Act 1990<sup>14</sup>. Regulation through the use of statutory nuisance provides a crucial level of protection in respect of problems that were not anticipated at the planning or permitting stage. Section 79(1)(d) sets out this statutory nuisance as: "Any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance".

### *Environment Act 1995*

- 12.4.2 Part IV of the Environment Act 1995<sup>15</sup>, requires the local authorities to review, assess and manage air quality within their areas. This is known as Local Air Quality Management (LAQM).
- 12.4.3 Where a local authority's review and assessment of its air quality identifies that air quality is likely to exceed the UK's Air Quality Objectives (AQOs), it must designate these areas as Air Quality Management Areas (AQMA) and draw up an Air Quality Action Plan setting out measures to reduce pollutant concentrations with the aim of meeting the UK AQOs.

<sup>11</sup> European Commission. European Air Quality Directive 2008/50/EC. 2008.

<sup>12</sup> European Commission. Directive 2004/107/EC. 2004.

<sup>13</sup> European Commission. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

<sup>14</sup> UK Government. Environmental Protection Act 1990 (Section 79(1)(d)). UK Government, 1990.

<sup>15</sup> UK Government. Part IV of the Environment Act 1995. 1995.

*Air Quality (Wales) Regulations 2000 and the Air Quality Standards (Wales) Regulations 2010*

- 12.4.4 The AQOs were made statutory in Wales with the Air Quality (Wales) Regulations 2000<sup>16</sup>, as amended by the Air Quality (Wales) (Amendment) Regulations 2002<sup>17</sup>, and the Air Quality (Wales) Regulations 2010<sup>18</sup>, as amended by the Air Quality Standards (Wales) (Amendment) (EU Exit) regulations 2019<sup>19</sup>, for the purpose of LAQM. Table 12.1 presents the AQOs objectives for NO<sub>2</sub> and PM<sub>10</sub>, which are relevant to this assessment.

**Table 12.1: Human Health Air Quality Objectives**

Pollutant	Time Period	Objective
<b>Nitrogen Dioxide (NO<sub>2</sub>)</b>	Annual Mean	40 µg/m <sup>3</sup>
	1-hour mean	200 µg/m <sup>3</sup> not to be exceeded more than 18 times a year
<b>Fine Particulate Matter (PM<sub>10</sub>)</b>	Annual mean	40 µg/m <sup>3</sup>
	24-hour mean	50 µg/m <sup>3</sup> not to be exceeded more than 35 times a year

- 12.4.5 The objectives apply at locations where members of the public would be exposed over the relevant exposure period. For example, the annual mean objective applies at the building façades of residential properties and public buildings. The annual mean objectives do not apply in gardens of residential properties, at the building façades of offices (or other places of work), or at kerbside locations where public exposure would be short term. The one hour mean objective would apply at any outdoor location where members of the public might reasonably be expected to spend an hour or longer.

*Air Quality Strategy for England, Scotland, Wales and Northern Ireland*

- 12.4.6 The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) most recently updated in July 2007<sup>20</sup>. The AQS sets out a framework for reducing hazards to health from air pollution and to ensure that the European Union and International agreements are met in the UK.
- 12.4.7 The AQS sets standards and objectives for the ten listed pollutants. Standards are the concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects on human health (including sensitive sub groups) or ecosystems. In general, these are concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects. Objectives are policy targets often expressed as maximum concentrations not to be exceeded either without exception or with a limited number of exceedances within a specified timescale.

<sup>16</sup> The Air Quality (Wales) Regulations 2000 - Statutory Instrument 2000 No. 1940 (W 138).

<sup>17</sup> The Air Quality (Wales) Regulations 2002 - Statutory Instrument 2002 No. 3182 (W.298).

<sup>18</sup> The Air Quality Standards (Wales) Regulations 2010 - Statutory Instrument 2010 No 1433 (W.126).

<sup>19</sup> The Air Quality Standards (Wales) (Amendment) (EU Exit) Regulations 2019- Statutory Instrument 2019 No. 390 (W. 95).

<sup>20</sup> DEFRA. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volume 1). 2007.

- 12.4.8 For some pollutants, there is both a long-term (e.g. annual mean) standard and a short-term (e.g. one-hour mean) standard. These periods reflect the varying impacts on health of differing exposures to pollutants. Long-term standards are generally lower than short-term standards owing to the chronic health effects associated with exposure to low concentrations of pollutants for longer periods of time.

### *Habitats*

- 12.4.9 The Conservation of Habitats and Species Regulations 2017<sup>21</sup>, transposes the European Council Directive 92/43/EEC into law in England and Wales. Sites as Special Areas of Conservation (SACs) are designated under these regulations, as are Special Protection Areas (SPAs); with these classified under the Council Directive 2009/147/EC on the Conservation of Wild Birds. These Sites form a network termed "Natura 2000".
- 12.4.10 The Regulations primarily provide measures for the protection of European Sites and European Protected Species, but also require local planning authorities to encourage the management of other features that are of major importance for wild flora and fauna.
- 12.4.11 The Habitats Directive (as implemented by the Regulations) requires the competent authority to firstly evaluate whether the scheme is likely to give rise to a significant effect on the European site. Where this is the case, it has to carry out an 'appropriate assessment' in order to determine whether the scheme will adversely affect the integrity of the site.
- 12.4.12 Sites of national importance may be designated as Sites of Special Scientific Interest (SSSIs). Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs have been re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs (in England and Wales) were introduced by the Countryside and Rights of Way (CROW) Act 2000. If a development is "likely to damage" a SSSI, the CROW act requires that a relevant conservation body (i.e. Natural Resources Wales) is consulted. The CROW act also provides protection to local nature conservation sites, which can be particularly important in providing 'stepping stones' or 'buffers' to SSSIs and European sites. In addition, the Environment Act (1995) and the Natural Environment and Rural Communities Act (2006) both require the conservation of biodiversity.
- 12.4.13 The United Nations Economic Commission for Europe (UNECE) and the WHO have set a critical level for NO<sub>x</sub> (30 µg/m<sup>3</sup>) for the protection of vegetation. Therefore, the statutory nature conservation agency's (Natural Resources Wales) policy is to apply the 30 µg/m<sup>3</sup> criterion as a benchmark, on a precautionary basis, in internationally designated conservation sites and in nationally designated Sites of Special Scientific Interest (SSSIs) designated for the protection of vegetation. The objectives only strictly apply (a) more than 20 km from an agglomeration (about 250,000 people), and (b) more than 5 km from Part A industrial sources, motorways and built up areas of more than 5,000 people. For the assessment of road schemes, the Highways England follows this approach and requires an assessment of the impacts of roads traffic emissions on nature conservation Sites (Designated Sites) within 200 m of a road. When pollutant concentrations exceed a critical level it is considered that there is a risk of harmful effects.

<sup>21</sup> The Conservation of Habitats and Species Regulations 2017 - Statutory Instrument 2017 No. 1012.

**Table 12.2: Designated Sites (Ecosystems) Air Quality Objectives or Critical Level**

Pollutant	Time Period	Objective
<b>Nitrogen Oxides (expressed as NO<sub>2</sub>)</b>	Annual Mean	30 µg/m <sup>3</sup>

- 12.4.14 In addition, critical loads for nitrogen deposition onto sensitive ecosystems have been specified by UNECE. They are defined as the amount of pollutant deposited to a given area over a year, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge. Exceedance of a critical load is used as an indication of the potential for harmful effects to occur. Critical Loads are determined based on habitat and therefore vary between designated sites.

#### *Welsh Government National Strategy*

- 12.4.15 In September 2016, Welsh Government launched its five-year Programme for Government, Taking Wales Forward<sup>22</sup>. The document set out how the Government intended to build a united, connected and sustainable Wales. In September 2017, Welsh Government launched Prosperity for All: The National Strategy<sup>23</sup>, which sets out how the government will deliver those commitments within the long-term context of working within the wider Welsh public service to lay foundations towards achieving prosperity for all. The well-being objective on building healthier communities and better environments states:

*'We will tackle inequalities between communities and deliver more services closer to home, acknowledging the importance of communities and the wider environment for good health and well-being... We will:*

*... through planning, infrastructure, regulation, and health communication measures, we will reduce emissions and deliver vital improvements in air quality.'*

#### *Planning Policy Wales 2018*

- 12.4.16 Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government<sup>24</sup>. The PPW states regarding air quality *'Development should prevent problems from occurring or getting worse such as the generation of carbon emissions, poor air quality and waste and the depletion of our natural resources which will need to be managed for many years to come'*.
- 12.4.17 Section 6.7 on Air Quality and Soundscape provides the framework for addressing air quality and soundscape with objectives and key planning policy principles to consider the effects of proposed developments may have on air quality.

<sup>22</sup> Welsh Government. Taking Wales Forward 2016-2021 | September 2016. <https://gov.wales/taking-wales-forward>

<sup>23</sup> Welsh Government. Prosperity for All: the national strategy | September 2017. <https://gov.wales/prosperity-all-national-strategy>

<sup>24</sup> Welsh Government. Planning Policy Wales. Edition 10 | December 2018. <https://gov.wales/planning-policy-wales>.

### *Conwy Local Development Plan 2007 – 2022*

- 12.4.18 The Local Development Plan (LDP)<sup>25</sup> was adopted in October 2013. Strategic Policy NTE/1 on the Natural environment states:

*'In seeking to support the wider economic and social needs of the Plan Area, the Council will seek to regulate development so as to conserve and, where possible, enhance the Plan Area's natural environment, countryside and coastline. This will be achieved by:  
... Preventing, reducing or remedying all forms of pollution including air, light, noise, soil and water, in line with Policy DP/6' ...*

- 12.4.19 Strategic Policy DP/1 on sustainable development principles states:

*'... 2. Development proposals should also where appropriate:*

*Protect the quality of natural resources including water, air and soil in line with Strategic Policy NTE1; ...'*

- 12.4.20 Policy STR/3 on mitigation travel impact states:

*'1. New developments will be required to mitigate the undesirable effects of travel such as; noise, pollution, impact on amenity and health and other environmental impacts.'*

### *Replacement Local Development Plan 2018-2033*

- 12.4.21 Conwy are preparing a Replacement Local Development Plan (RLDP) to cover the period 2018 – 2033. The Preferred Strategy document outlines the Plans vision, issues and objectives, preferred level of growth and preferred spatial strategy<sup>26</sup>. Strategic Policy 25 (SP/25) on water, air, soundscape and light states:

*'The RLDP will reduce exposure to air and noise pollution, balance the provision of development and lighting to enhance safety and security, and protect and enhance the water environment and water resources, including surface and groundwater quantity and quality.'*

## **12.5 Relevant Guidance**

### *Guidance on the Assessment of Dust from Demolition and Construction*

- 12.5.1 The Institute of Air Quality Management (IAQM) Guidance<sup>27</sup> sets out a methodology to determine the risk factors which affect the potential for dust to be created and released from the application site during construction activities and to migrate to, and be deposited on surfaces, potentially causing nuisance, health and ecological effects. The guidance also sets out mitigation to ensure the appropriate control of dust risks.

<sup>25</sup> [http://spp.conwy.gov.uk/upload/public/attachments/629/Conwy\\_Adopted\\_LDP\\_2007\\_2022\\_English\\_.pdf](http://spp.conwy.gov.uk/upload/public/attachments/629/Conwy_Adopted_LDP_2007_2022_English_.pdf)

<sup>26</sup> Conwy County Borough Council. Replacement Local development Plan 2018-2033. Preferred Strategy. July 2019. <https://www.conwy.gov.uk/en/Resident/Planning-Building-Control-and-Conservation/Replacement-LDP/Stage-5-Preferred-Strategy/assets/documents/Preferred-Strategy-web.pdf>

<sup>27</sup> IAQM. Guidance on the Assessment of dust from demolition and construction. 2014. v1.1.

### *LAQM Technical Guidance*

- 12.5.2 LAQM Technical Guidance (LAQM.TG16)<sup>28</sup> provides local authorities with guidance, advice and methodologies to undertake their statutory duties under Part IV of the Environment Act 1995. As well as outlining the LAQM duties councils should follow, it also provides a methodology for undertaking the verification process when using dispersion models and the process of annualisation for short term monitoring studies, which has been followed for this assessment.

### *IAQM EPUK Land-Use Planning and Development Control: Planning for Air Quality*

- 12.5.3 The Land-Use Planning and Development Control: Planning for Air Quality guidance<sup>29</sup> provides general guidance as well as criteria for the magnitude of change and significance of impacts for detailed air quality assessments. This document has been used to determine whether any air quality impacts arising from the proposals are significant or not.

### *Welsh Transport Planning Appraisal Guidance WelTAG*

- 12.5.4 The WelTAG<sup>30</sup> provides guidance on how to conduct an appraisal of a transport proposal. It states that the key local pollutants that affect local air quality are PM<sub>10</sub> and NO<sub>2</sub>. For the local pollutants the assessment of air quality impacts (i.e. considering the effects of dispersion) can be undertaken using dispersion models (which are complex and require information such as wind speed, wind direction and temperature) or, for road traffic, the empirical and more straightforward method described in the DMRB<sup>31</sup>.

### *Design Manual for Roads and Bridges (DMRB)*

- 12.5.5 The DMRB<sup>32</sup> is a suite of documents which contains requirements and advice relating to works on motorway and all-purpose trunk roads for which one of the Overseeing Organisations is highway or road authority. Volume 11 Environmental Assessment, Section 3, Part 1 HA 207/07 Air Quality<sup>33</sup> gives guidance on the assessment of the impact that road projects may have on local regional air quality. Where appropriate, this advice may be applied to existing roads.
- 12.5.6 In November 2019, subsequent to this assessment, Highways England published a new document on the requirements for assessing and reporting the effects of highway projects on air quality, LA105 Air Quality<sup>34</sup>, which replaces HA 207/07.

## **12.6 Assessment Method**

### *Consultation*

- 12.6.1 An Environmental Impact Assessment Scoping Report was issued to the Welsh Government and

<sup>28</sup> DEFRA. Local Air Quality Management Technical Guidance (TG16) DEFRA, 2018.

<sup>29</sup> IAQM EPUK. Land Use Planning & Development Control: Planning For Air Quality v1.2. IAQM EPUK, 2017.

<sup>30</sup> <https://gov.wales/welsh-transport-appraisal-guidance-weltag>

<sup>31</sup> The Welsh Assembly Government. Welsh Transport Planning And Appraisal Guidance. WelTAG. June 2008. <https://gov.wales/sites/default/files/publications/2017-09/welsh-transport-appraisal-guidance-weltag.pdf>.

<sup>32</sup> <http://www.standardsforhighways.co.uk/ha/standards/dmrbs/>

<sup>33</sup> The Highways Agency. Volume 11 Environmental Assessment Section 3 Environmental Assessment Techniques Part 1 Ha 207/07 Air Quality.

<http://www.standardsforhighways.co.uk/ha/standards/dmrbs/vol11/section3/ha20707.pdf>

<sup>34</sup> Highways England. LA105 Air Quality. November 2019.

<http://www.standardsforhighways.co.uk/ha/standards/dmrbs/vol11/section3/LA%20105%20Air%20quality-web.pdf>



the Environmental Liaison Group in February 2019. Chapter 4 of this document provide further details about the consultation process. Air Quality was recognised as an important aspect of the scheme; however, no significant issues were raised to the scoping assessment method and approach.

12.6.2 Public consultation was carried out where noise issues were discussed. No changes to the assessment methodology were deemed required.

12.6.3 Consultation has also been carried out with the Environmental Health Officer at CCBC to agree the approach and locations of Ramboll's monitoring study.

#### *Baseline*

12.6.4 No monitoring by Conwy County Borough Council (CCBC) currently takes place in this area. Information on existing air quality has been obtained by a monitoring programme undertaken by Ramboll.

12.6.5 Background concentrations for the site have been defined using the national pollution maps published by Defra. These cover the whole country on a 1x1 km grid.<sup>35</sup>

12.6.6 Existing nitrogen and acid deposition rates for habitats within the study area were determined from the Air Pollution Information System website.<sup>36</sup>

#### *Study Area*

12.6.7 For construction dust, impacts can potentially affect sensitive receptors within 350 m of associated works.

12.6.8 For local air quality impacts, DMRB (HA207/07) provides the following guideline criteria for defining the Affected Road Network (ARN) by a scheme:

- i. A change in road alignment of  $\geq 5$  m; or
- ii. Change in daily traffic flows of  $\geq 1000$  Annual Average Daily Traffic (AADT); or
- iii. Change in Heavy Duty Vehicle (HDV) flows of  $\geq 200$  AADT; or
- iv. Change in daily average speed of  $\geq 10$  km/hr; or
- v. Change in peak hour speed of  $\geq 20$  km/hr.

12.6.9 A regional assessment is required if affected roads are expected to have:

- i. A change of more than 10% in AADT; or
- ii. A change of more than 10% to the number of HDVs; or
- iii. A change in daily average speed of more than 20 km/h.

12.6.10 The above change criteria are based on the difference in traffic data or highway design between the do-minimum (without Scheme) and do-something (with Scheme) scenarios.

12.6.11 The study area for local air quality impacts is proposed to encompass a 200 m corridor either side of the ARN. Only sensitive human health receptors and Designated Sites within 200 m of the ARN have been considered. The regional air quality assessment considers the change in pollutant emissions on a regional basis rather than locally therefore no receptors are assessed.

<sup>35</sup> Department of the Environment, Food and Rural Affairs (Defra) (2019). '2017 Based Background Maps for NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>'

<sup>36</sup> <http://www.apis.ac.uk>



- 12.6.12 For local air quality impacts, the main criteria defining the ARN is a change in road alignment as some sections of the carriageway will be widened by 5 m or more. Although some roads will cease to carry traffic and new links are being proposed, there are no predicted changes in daily traffic flows or HDV flows that meet the above criteria. Further roads have been included in the assessment to account for their emissions at nearby receptors.

## 12.7 Construction Dust Risk Assessment

- 12.7.1 During pre-construction demolition and construction the main potential effects are dust annoyance and locally elevated concentrations of PM<sub>10</sub>. The suspension of particles in the air is dependent on surface characteristics, weather conditions and on-site activities. Impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source. Separation distance is also an important factor as significant dust annoyance is usually limited to within a few hundred metres of its source. This is due to the rapid decrease in concentrations with distance from the source due to dispersion.
- 12.7.2 The assessment of potential construction dust impacts follows the guidance published by the IAQM<sup>37</sup> on the assessment of the impacts of construction on air quality. The guidance recommends that the risk of dust emission magnitude is combined with the sensitivity of the area surrounding the site to determine the risk of dust impacts from construction and demolition activities. Depending on the level of risk (high, medium, low or negligible) for each activity, appropriate mitigation is selected.
- 12.7.3 The IAQM assessment methodology considers three separate dust effects and defines their significance according to the sensitivity of the surrounding area, as follows:
- i. Annoyance due to dust soiling;
  - ii. Harm to ecological receptors; and
  - iii. The risk of health effects due to a significant increase in exposure to PM<sub>10</sub>.
- 12.7.4 The assessment was therefore carried out in a number of steps:
- i. The need for a construction assessment was screened, based on the proximity of receptors;
  - ii. The risk of dust impacts was assessed taking into account the level of activity and the proximity and sensitivity of nearby sensitive receptors;
  - iii. Site specific mitigation integral to the scheme proposals was reviewed and supplemented where necessary; and
  - iv. The significance of the dust effects, after applying the site specific mitigation, was assessed.
- 12.7.5 Full details of the dust risk assessment methodology which includes the assessment criteria is provided in Appendix 12.1.
- 12.7.6 The guidance recommends that no assessment of the significance of effects is made without mitigation in place, as mitigation is assumed to be secured by planning conditions, legal requirements or required by regulations. With mitigation in place, effects are considered to be not significant.

<sup>37</sup> IAQM. Guidance on the Assessment of dust from demolition and construction. 2014. v1.1.

## 12.8 Operational Vehicle Emission Impacts

### *Impact Predictions*

- 12.8.1 The changes to air quality due to local traffic emissions have been predicted using the ADMS Roads (version 4.1.1) dispersion model. This model has been extensively validated against both field and laboratory data sets and against monitoring data in cities throughout the UK.
- 12.8.2 The model requires the user to provide various input data, including the Annual Average Daily Traffic (AADT) flow, the proportion of HDV, road characteristics (including road width and heights, where applicable), and the vehicle speed. The road network for input to the model has been developed using GIS software ArcMap. The terrain within 250 m of ARN is relatively flat with slopes less than 10%, and therefore terrain effects have not been included within the modelling.
- 12.8.3 The model has been run using 2018 meteorological data from Rhyl NO<sub>2</sub>, which is considered to be the most representative meteorological monitoring station to the site (see Appendix 12.2 for further details on the model inputs).
- 12.8.4 AADT flows and the proportions of HDVs, for roads within 250 m of the site, existing receptors and monitoring sites have been provided in accordance with Chapter 14 All Travellers. Traffic data used in this assessment are summarised in Appendix 12.3.
- 12.8.5 Traffic emissions were calculated using the Emission Factor Toolkit (EFT) v9, which utilises nitrogen oxides (NO<sub>x</sub>) and PM<sub>10</sub> emission factors from the European Environment Agency COPERT 5 emission tool<sup>38</sup>. The traffic data were entered into the EFT, along with speed data to provide combined emission rates for each of the road links entered into the model. The emission rates have been selected for each link by classifying the road type as urban not London.
- 12.8.6 The predicted concentrations of roadside NO<sub>x</sub> were converted to roadside NO<sub>2</sub> using the LAQM conversion calculator available from the Defra air quality website<sup>39</sup>.
- 12.8.7 Concentrations were predicted at several monitoring locations using 2018 monitoring data and 2018 traffic data in order to verify the modelled results (see Appendix 12.4 for further details on the verification method).
- 12.8.8 The model, as set up for the assessment, does not provide reliable prediction of one-hour mean NO<sub>2</sub> concentrations. However, research has concluded that exceedances of the one-hour mean objective are unlikely to occur where annual mean concentrations do not exceed 60 µg/m<sup>3</sup><sup>40</sup>. This relationship has been used to assess whether exceedances of the hourly mean objective are likely. Similar to NO<sub>2</sub>, a PM<sub>10</sub> annual mean below 32 µg/m<sup>3</sup> is used to screen whether the 24-hour PM<sub>10</sub> mean objective is likely to be achieved.
- 12.8.9 Daily mean PM<sub>10</sub> concentrations were calculated from annual mean PM<sub>10</sub> concentrations using

<sup>38</sup> Department for Environment Food & Rural Affairs (DEFRA). *Emissions Factors Toolkit*. <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>.

<sup>39</sup> DEFRA. LAQM Support. <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc>.

<sup>40</sup> A, Cook. Analysis of the relationship between annual mean nitrogen dioxide concentration and exceedances of the one-hour mean. May 2008.

the method described in Paragraph 7.92 of LAQM.TG(16)<sup>41</sup>.

- 12.8.10 Due to an extension by 6 months in the proposed construction programme the opening year has changed from late 2022 to early/mid 2023. It should be noted that the traffic modelling has not been updated to reflect this change in opening year due to the anticipated 1% growth in traffic between 2022 and 2023. It is considered that this change in traffic flow would have a negligible impact on the operational performance of the highway network, as the network is not operating near capacity. The assessment is therefore based upon traffic data from 2022, whilst assuming an opening year of 2023.
- 12.8.11 In carrying out the assessment of operational traffic impacts the following scenarios have been considered:
- a) 2018 Baseline for model verification;
  - b) 2022 (opening year) Future air quality in a 'Do Minimum' scenario without J16 Scheme;
  - c) 2022 (opening year) Future air quality in 'Do Scheme' scenario with J16 Scheme.
- 12.8.12 The opening year is considered to be the worst case scenario as vehicle emissions factors and background pollutant concentrations are anticipated to decrease over time due to improvements combustion technologies.

### *Human Health Receptors*

- 12.8.13 Receptor locations have been selected based on changes in road alignment and in traffic as a result of the Scheme. Sensitive receptors were chosen to reflect places where members of the public would receive relevant exposure to annual mean and hourly pollutant concentrations from vehicle emissions. When identifying these receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested, and where there is a combined effect of several road links. The sensitive receptors assessed for road traffic impacts are presented in Table 12.3 below and displayed on Figure 12.1 (Appendix 12.6). Receptor locations were modelled at a height of 1.5 m representing exposure at ground floor level.
- 12.8.14 In addition, annual mean NO<sub>2</sub> and PM<sub>10</sub> concentrations were also predicted for a grid of receptors (contour) across the study area in order to present the results geographically on a map (shown in Figure 12.2 and Figure 12.3). The grid resolution of 15 x 15 metres has been modelled.

**Table 12.3: Sensitive Receptors Identified**

ID	Location	X	Y	Height (m)
J16 1	The Oasis, Ysguborwen Road	272818	377107	1.5
J16 2	Ysguborwen Road Residential	272904	377174	1.5
J16 3	Ysguborwen Road	272945	377191	1.5
J16 4	The Gladstone Rooms, Ysguborwen Road	272972	377200	1.5
J16 5	Ysguborwen Road	273115	377299	1.5
J16 6	Maes Y Llan Residential	273159	377419	1.5

<sup>41</sup> DEFRA. Local Air Quality Management Technical Guidance (TG16). Local Air Quality Management Technical Guidance (TG16).

ID	Location	X	Y	Height (m)
J16 7	Maes Y Llan Residential	273220	377440	1.5
J16 8	Maes Y Llan Residential	273280	377509	1.5
J16 9	Beech Developments, Gwel Y Mor Play Area and Residential	273403	377474	1.5
J16 10	Cae Gwynan	273523	377456	1.5
J16 11	Gardd Eryri	273802	377619	1.5
J16 12	Glan-Y-Afon Road Residential	273865	377647	1.5
J16 13	Static caravan, Glan-Y-Afon Road	273883	377705	1.5
J16 14	Static caravan, Glan-Y-Afon Road	273917	377770	1.5

### Human Health Significance

12.8.15 The relevant objectives for human health are set out in Table 12.1. There is no official guidance in the UK on how to assess the significance of air quality impacts of a new scheme. The approach developed by the IAQM and EPUK guidance, which considers the change in air quality as a result of a proposed scheme on existing receptors, has therefore been used.

12.8.16 The guidance sets out three stages: determining the magnitude of change at each receptor, describing the impact, and assessing the overall significance. Impact magnitude relates to the change in pollutant concentration; the impact description relates this change to the air quality objective. The absolute concentration of the receptor is also taken into consideration i.e. if the receptor is close to or above the UK air quality objective level, marginal changes in magnitude may be determined to be moderate, however if the receptor is less than 75% of the UK air quality objective level marginal changes in magnitude may be determined to be negligible.

12.8.17 The impact descriptors from the guidance are shown in Table 12.4.

**Table 12.4: EPUK IAQM Significance Criteria**

Long Term Average Concentration at Receptor with Scheme	Percentage Change in Concentration Relative to Annual Mean Air Quality Objective (AQO)			
	<1*	2 - 5	6 - 10	>10
75% or less of AQO (a)	Negligible	Negligible	Slight	Moderate
76 - 94% of AQO (b)	Negligible	Slight	Moderate	Moderate
95 - 102% of AQO (c)	Slight	Moderate	Moderate	Substantial
103 - 109% of AQO (d)	Moderate	Moderate	Substantial	Substantial
110% or more of AQO (e)	Moderate	Substantial	Substantial	Substantial

**Notes:**

Where concentrations increase the impact is described as adverse, and where it decreases as beneficial.

\*% change rounded to nearest whole number. Where the % change is less than 0.5% the impact will be Negligible.

(a) NO<sub>2</sub> or PM<sub>10</sub>: ≤30 µg/m<sup>3</sup> annual mean; PM<sub>2.5</sub> ≤18.75 µg/m<sup>3</sup> annual mean; PM<sub>10</sub> ≤24µg/m<sup>3</sup> annual mean (days).

(b) NO<sub>2</sub> or PM<sub>10</sub>: >30 - ≤38µg/m<sup>3</sup> annual mean; PM<sub>2.5</sub> >18.75 - ≤23.75µg/m<sup>3</sup> annual mean; or <24 - ≤

- (c) NO<sub>2</sub> or PM<sub>10</sub>: > 38 – ≤40.8µg/m<sup>3</sup> annual mean; PM<sub>2.5</sub> >23.75 – ≤25.5µg/m<sup>3</sup> of annual mean; PM<sub>10</sub> >30.4 – ≤32.64µg/m<sup>3</sup> annual mean (days).30.4µg/m<sup>3</sup> annual mean (days).
- (d) NO<sub>2</sub> or PM<sub>10</sub>: > 40.8 – ≤ 44µg/m<sup>3</sup> annual mean; PM<sub>2.5</sub> > 25.5 – ≤27.5µg/m<sup>3</sup> annual mean; PM<sub>10</sub> >32.64 – ≤35.2 µg/m<sup>3</sup> annual mean (days).
- (e) NO<sub>2</sub> or PM<sub>10</sub>: > 44µg/m<sup>3</sup> annual mean; PM<sub>2.5</sub> >27.5µg/m<sup>3</sup> annual mean; PM<sub>10</sub> >35.2µg/m<sup>3</sup> annual mean (days).

- 12.8.18 The guidance states that the assessment of significance should be based on professional judgement, taking into account factors including:
- The number of properties affected by slight, moderate or substantial air quality impacts and a judgement on the overall balance;
  - Whether or not an exceedance of an objective or limit value is predicted to arise in the operational study area (where there are significant changes in traffic) where none existed before or an exceedance area is substantially increased;
  - The uncertainty, comprising the extent to which worst-case assumptions have been made; and
  - The extent to which an objective or limit value is exceeded.

### *Ecological Receptors*

- 12.8.19 DMRB requires ecological receptors, designated for nature conservation importance internationally, as Ramsar sites, SAC and SPA, and nationally, as SSSI, to be included where they are located within 200 metres of the ARN. The designated site Sychnant Pass SSSI is located within 200 m of the A55 centreline.
- 12.8.20 Effects at ecological receptors relating to NO<sub>x</sub> concentrations and nitrogen deposition have been assessed. Road traffic is not a significant source of other pollutants that vegetation may be sensitive to, such as ammonia (NH<sub>3</sub>) and sulphur dioxide (SO<sub>2</sub>), and as such an assessment of these pollutants has been scoped out of this assessment.
- 12.8.21 Concentrations of nitrogen oxides were predicted, and deposition calculated, at a range of receptors at increasing distances from the ARN in order to indicate whether or not the critical level and critical loads are being exceeded in the habitat. These transects represent the ecological receptor described in Table 12.5 and shown in Figure 12.1. All ecological receptor locations were modelled at a height of 0 metres representative of vegetation growing at ground level.
- 12.8.22 The lowest critical loads for the most sensitive habitat within each designation are presented in Table 12.5. Data have been taken from the Air Pollution Information System (APIS) website<sup>42</sup>.

**Table 12.5: Deposition and Site Relevant Critical Loads**

Site	Habitat	Critical Load (2015-2017)	
		Nitrogen Deposition (kgN/ha/yr)	Acid Deposition (keqN/ha/yr)
Sychnant Pass SSSI	Lowland Heathland - (Dry Heath)/Dwarf shrub heath	10- 20	0.46 – 1.50

- 12.8.23 Ecological receptors labelled as 'SP' cover the Sychnant Pass SSSI from 144 m up to 200 m from the J16 Scheme (displayed on Figure 12.1 (appendix 12.6)).

<sup>42</sup> <http://www.apis.ac.uk>

- 12.8.24 Nitrogen deposition has been calculated from the predicted NO<sub>2</sub> concentrations using a deposition velocity of 1.5 mm/s for grassland habitats.
- 12.8.25 Where critical loads are already exceeded, an increase of more than 1% of the critical load is an indication of potentially significant effects which would trigger the need for further, more detailed assessment. It should be noted that an increase in deposition of more than 1% is not, per se, an indication that a significant effect exists, only the possibility of one. Depending on a more detailed assessment which would take account of the actual ecological conditions at the location under consideration, an increase of more than 1% may be acceptable. The same approach applies for the NO<sub>x</sub> critical level of 30 µg/m<sup>3</sup> shown in Table 12.2.

## 12.9 Assumptions and Limitations

- 12.9.1 There are many components that contribute to the uncertainty in predicted concentrations. The model used in this assessment is dependent upon the traffic data that have been input which will have inherent uncertainties associated with them. There is then additional uncertainty as the model is required to simplify real-world conditions into a series of algorithms.
- 12.9.2 Calculations used to provide vehicle emission factors and to convert NO<sub>x</sub> to NO<sub>2</sub> use accepted methods and are published on behalf of the Department of Transport and Defra. Diffusion tube coefficient of variation representing their precision has been determined as Good using Defra AEA's DiFT Precision Accuracy Bias Spreadsheet<sup>43</sup>. The uncertainty of the model has been estimated using root mean square error and is presented in Appendix 12.4 Model verification.
- 12.9.3 Future background NO<sub>2</sub> and PM<sub>10</sub> concentrations from Defra are based on projections from a base year of 2018 and based on ambient monitoring and meteorological data for 2018.
- 12.9.4 The J16 Scheme modelling has been based on 2022 emission factors, background concentrations and traffic flows. The model has been verified against 2018 monitoring data. The uncertainties regarding future vehicle emission factors have been taken account of by using the verification factor and the EFT emission factors.
- 12.9.5 Data for the Designated Sites have been taken from the APIS website. As APIS does not provide predictions of future year deposition, therefore 2015-2017 deposition rates are used as future background deposition rates. This is considered to be a conservative assumption as reductions in pollutant concentrations are anticipated in the future.

## 12.10 Baseline conditions

- 12.10.1 CCBC has not declared an AQMA and J15 scheme is therefore not located within or in close proximity to an AQMA.

## 12.11 Defra Predicted Background Maps

- 12.11.1 Defra provides modelled predictions of background concentrations of air pollutants over the whole of the UK with a grid resolution of 1 km<sup>2</sup>. Background concentrations are those levels that would be observed away from specific sources such as roads and industry.
- 12.11.2 Table 12.6 details the NO<sub>x</sub>, NO<sub>2</sub> and PM<sub>10</sub> background levels at the site for 2018 and 2022. The

<sup>43</sup> <https://laqm.defra.gov.uk/diffusion-tubes/precision.html>

background concentrations are all well below the relevant objectives.

**Table 12.6: DEFRA Background Mapping ( $\mu\text{g}/\text{m}^3$ )**

Year	Grid Reference (x, y)	NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>
2018	273500, 377500	8.8	6.8	7.8
2022		7.2	5.6	7.5
Objective		30 (ecological receptors)	40	40

## 12.12 Local Authority Monitoring

### *NO<sub>2</sub> and Particulates (PM<sub>10</sub>)*

- 12.12.1 There is no NO<sub>2</sub> or PM<sub>10</sub> monitoring undertaken in close proximity to the J16 Scheme. However, PM<sub>10</sub> monitoring is carried out at one of the six local authorities that encompass the North Wales Combined Authority<sup>44</sup>. The annual mean PM<sub>10</sub> concentrations recorded at all stations were well below the annual mean objective of 40  $\mu\text{g}/\text{m}^3$ , with the highest measured concentration recorded being 13.3  $\mu\text{g}/\text{m}^3$  in 2017.

## 12.13 Ramboll Monitoring Study

- 12.13.1 A six month monitoring study was organised in order to provide information on existing air quality within the area. The monitoring study was primarily designed to provide data with which to verify the air quality model. As such monitoring locations were chosen adjacent to the main roads in the vicinity of the J16 Scheme. The monitoring sites were all located on street furniture close to the road network and do not therefore represent locations of relevant public exposure (residential properties); or locations where the AQOs apply.
- 12.13.2 Table 12.7 presents measured annual mean NO<sub>2</sub> concentrations. The results have been adjusted to an annual mean and bias adjusted (see Appendix 12.5 for further details on the monitoring study and annualisation).

**Table 12.7: Measured Annual Mean NO<sub>2</sub> Concentrations**

Diffusion Tube	Location	2018 Annual Mean ( $\mu\text{g}/\text{m}^3$ )
1	Ysguborwen Road	14.6
2	Ysguborwen Road	13.7
3	Ysguborwen Road	15.9
<b>Objective</b>		<b>40</b>

- 12.13.3 Measured concentrations are all well below the objectives. Concentrations are also well below 60  $\mu\text{g}/\text{m}^3$ , indicating that the hourly mean objective is unlikely to be exceeded.

<sup>44</sup> North Wales Combined Authority. 2018 Air Quality Progress Report. September 2018.

## 12.14 Air Quality within the Study Area

- 12.14.1 Measured concentrations at the monitoring point were well below the objective in 2018. Existing air quality at the J16 Scheme site would be expected to meet all relevant air quality objectives throughout the scheme site. Some variation in concentrations would be expected across the study area with NO<sub>2</sub> and PM<sub>10</sub> concentrations likely to be highest close to the A55, due to the emissions from traffic.

## 12.15 Baseline Deposition Ecological Receptors

- 12.15.1 The three-year average (2015 – 2017) nitrogen and acid deposition rates for each of the Designated Sites sensitive to either nitrogen or acid deposition are presented in Table 12. 6; data have been taken from the APIS website. The APIS data does not include future year predictions and therefore on a conservative basis, the APIS baseline is assumed constant for the future year assessments.

**Table 12.8: Baseline Deposition Rates**

Habitat(s)	Total Nitrogen Deposition (kgN/ha/yr)	Acid Deposition	
		Nitrogen (keqN/ha/yr)	Sulphur (keqS/ha/yr)
Sychnant Pass SSSI - Lowland Heathland - (Dry Heath)/Dwarf shrub heath			
Background 2015-2017	12.7	1.24	0.66
Critical Load/Level	10 – 20	1.50	0.46

Exceedances highlighted in bold.

- 12.15.2 The nitrogen deposition and acid deposition (sulphur) background deposition rates exceed the relevant critical loads.

## 12.16 Assessment of Likely Effects

### *Construction Phase*

- 12.16.1 The main activities with potential to cause emissions of dust construction will include:
- Earthworks and site preparation;
  - Demolition of existing structures;
  - Construction of building structures, including foundations, which may include piling;
  - Materials Handling such as storage of materials in stockpiles and spillage;
  - Construction of on and off-site highway improvements; and
  - Hard and soft landscaping and open space.
- 12.16.2 Dust impacts would be greatest in dry weather following long periods without rain and with the wind blowing towards sensitive receptors. Depending on wind speed and turbulence it is likely that the majority of dust will be deposited within 100 m of the source. Meteorological data for Rhyl NO<sub>2</sub> Station, shown in Appendix 12.2, suggests that prevailing winds are typically south-westerly.
- 12.16.3 The risk of potential air quality impacts from demolition, earthworks, construction and trackout



(the transport of dust and dirt from the application site onto the public road network) was assessed according to guidance developed by the IAQM in order to identify the appropriate level of mitigation.

- 12.16.4 The closest sensitive receptors to construction activity within 350 m of the J16 Scheme boundary will be residential properties along A55, Conway Road, Ysuborwen Road and Glan-Yr-Afon Road and ecological receptors within the designated sites Y Fenai a Bae Conwy / Menai Strait and Conwy Bay SAC and Sychnant Pass SSSI. The residential properties are considered to be a high sensitivity receptor and the Sychnant Pass SSSI is considered to be medium sensitivity receptor as designated features may be affected by dust soiling.

#### *Step 2A - Define the Potential Dust Emission Magnitude*

- 12.16.5 Using the evaluation criteria within IAQM Guidance the potential dust emission magnitude has been identified for each activity during the construction phase shown in Table 12.9.

**Table 12.9: Dust Emission Magnitude for Each Construction Phases**

Activity	Dust Emission Magnitude	Justification
Demolition	No demolition	
Earthworks	Large	Total site area is more than 10,000 m <sup>2</sup>
Construction	Large	The scheme would have a total estimated construction volume of more than 100,000 m <sup>3</sup>
Trackout	Small	Up to 10 HDV (>3.5t) outward movements in any one day

#### *Step 2B - Define the Sensitivity of the Area*

- 12.16.6 The next stage of the process is to define the sensitivity of the assessment area to dust soiling, human health impacts and ecological receptors. This process combines the sensitivity of the receptor with the distance from the source to determine the overall sensitivity of the area.
- 12.16.7 The sensitivity of receptors and the area in relation to dust impacts is provided in Table 12.10.

**Table 12.10: Sensitivity of Area to Dust Impacts (Taking in to Account Distance to Construction Activity)**

Dust Impact	Receptor	Sensitivity
Dust soiling	10-100 High sensitivity receptors located within 50 m	Medium
Human health	10-100 High sensitivity receptors located within 50 m; Existing PM <sub>10</sub> concentrations estimated to be below 24 µg/m <sup>3</sup> .	Low
Ecological receptors	SSSI with potential dust sensitive features located >100 m.	Low

#### *Step 2C - Define the Risk of Impacts*

- 12.16.8 The dust emission magnitude determined in Table 12.9 has been combined with the sensitivity assessment in Table 12.10 to define the risk of impacts for each phase of the scheme in the absence of mitigation as shown in Table 12.11.

**Table 12.11: Risk of Dust Impacts in the Absence of Mitigation for each Construction Phase**

Effect	Sensitivity of the Surrounding Area	Risk of Dust Impacts (Without Mitigation)		
		Earthworks	Construction	Trackout
Dust soiling	Medium	Medium Risk	Medium Risk	Negligible
Human health	Low	Low risk	Low risk	Negligible
Ecological receptors	Low	Low risk	Low risk	Negligible

12.16.9 Overall, without mitigation, the risk of dust soiling impacts is likely to be highest for earthworks and construction activities. The risk of human health effects from PM<sub>10</sub> and ecological impacts is likely to be low to negligible for all activities. In accordance with the IAQM guidance, mitigation measures associated with the highest level of risk should be applied, i.e. a high-risk site (Table 12.17).

## 12.17 Operational Phase

### *Human Health*

12.17.1 The air quality impacts from operational vehicle emissions in the opening year of 2022 on the local road network have been assessed. The assessment has compared the 'Do minimum' scenario (DM) against the 'Do something' scenario (DS), summarised in Table 12.12 and Table 12.13.

**Table 12.12: Predicted Annual Mean NO<sub>2</sub> at Existing Receptors**

Receptor	2022 DM (µg/m <sup>3</sup> )	2022 DS (µg/m <sup>3</sup> )	Scheme Traffic Contribution	% Change in concentration relative to Assessment Level (AQAL)	Impact Descriptor
J16 1	11.9	11.7	-0.20	-0.51%	Negligible
J16 2	11.6	11.6	0.01	0.03%	Negligible
J16 3	11.0	10.9	-0.03	-0.08%	Negligible
J16 4	10.6	10.6	-0.05	-0.13%	Negligible
J16 5	10.6	10.5	-0.12	-0.29%	Negligible
J16 6	15.8	16.3	0.53	1.33%	Negligible
J16 7	12.9	13.1	0.15	0.37%	Negligible
J16 8	15.7	16.3	0.52	1.30%	Negligible
J16 9	9.1	9.2	0.03	0.08%	Negligible
J16 10	8.0	8.1	0.02	0.05%	Negligible
J16 11	7.8	7.8	0.01	0.03%	Negligible

Receptor	2022 DM ( $\mu\text{g}/\text{m}^3$ )	2022 DS ( $\mu\text{g}/\text{m}^3$ )	Scheme Traffic Contribution	% Change in concentration relative to Assessment Level (AQAL)	Impact Descriptor
J16 12	8.5	8.5	0.05	0.13%	Negligible
J16 13	8.9	8.6	-0.22	-0.56%	Negligible
J16 14	9.1	8.9	-0.14	-0.35%	Negligible
<b>Average Contribution/Change</b>			<b>0.04</b>	<b>0.10%</b>	

Table 12.13: Predicted Annual Mean PM<sub>10</sub> at Existing Receptors

Receptor	2022 DM ( $\mu\text{g}/\text{m}^3$ )	2022 DS ( $\mu\text{g}/\text{m}^3$ )	Scheme Traffic Contribution	% Change in concentration relative to Assessment Level (AQAL)	Impact Descriptor
J16 1	8.4	8.6	0.27	0.67%	Negligible
J16 2	8.6	8.6	0.02	0.04%	Negligible
J16 3	8.4	8.4	0.01	0.02%	Negligible
J16 4	8.4	8.4	0.01	0.01%	Negligible
J16 5	8.4	8.4	-0.01	-0.03%	Negligible
J16 6	9.3	9.5	0.16	0.40%	Negligible
J16 7	8.8	8.8	0.06	0.15%	Negligible
J16 8	9.3	9.5	0.16	0.39%	Negligible
J16 9	8.1	8.1	0.02	0.04%	Negligible
J16 10	7.9	7.9	0.01	0.02%	Negligible
J16 11	7.8	7.9	0.01	0.02%	Negligible
J16 12	8.0	8.0	0.01	0.03%	Negligible
J16 13	8.1	8.0	-0.05	-0.12%	Negligible
J16 14	8.1	8.1	-0.02	-0.06%	Negligible
<b>Average Contribution/Change</b>			<b>0.05</b>	<b>0.11%</b>	

12.17.2 The predicted NO<sub>2</sub> and PM<sub>10</sub> concentrations in 2022 without and with the J16 Scheme in place are below the relevant objectives at all existing receptor locations. The changes in annual mean NO<sub>2</sub> range from a reduction of approximately 0.6% at receptor J16 13 to an increase of approximately 1% at receptor J16 6. The changes in annual mean PM<sub>10</sub> range from a reduction of approximately 0.1% at receptor J16 13 to an increase of approximately 0.6% at receptor J16 1.

12.17.3 The predicted annual mean NO<sub>2</sub> concentrations for all receptors are predicted to be well below 60 µg/m<sup>3</sup>. This indicates that the hourly mean objective is unlikely to be exceeded at outdoor locations of these receptors where the hourly mean would apply. None of the predicted annual mean PM<sub>10</sub> concentrations exceed 32 µg/m<sup>3</sup> and therefore the 24-hour mean PM<sub>10</sub> objective is not predicted to be exceeded.

12.17.4 The impact on annual mean NO<sub>2</sub> and PM<sub>10</sub> concentrations are described as negligible at all receptors, as outlined in Table 12.12 and Table 12.13, with an overall slight increase in pollutant concentrations in the study area. The overall slight increase in pollutant concentrations is due to the proposed new link road (adjacent to the A55 joining Ysgurborwen Road close to Junction 16) and the remodelling works on Conwy and Ysgurborwen Roads which bring the road emissions sources slightly closer to the receptors.

### *Net Emission Changes*

12.17.5 The net changes in the emissions of the local pollutants (i.e. the changes between the 'Do Minimum' and 'Do Something' scenarios) for NO<sub>x</sub>, PM<sub>10</sub> and CO<sub>2</sub> emissions are presented in Table 12.14. The increase in emissions is due to the proposed new link road.

**Table 12.14: Change in Emissions as a Result of the J16 Scheme**

Pollutant	DM (tonnes/year)	DS (tonnes/year)	Change (tonnes/year)
CO <sub>2</sub>	8730	8775	45
NO <sub>x</sub>	17	16	-0.2
PM <sub>10</sub>	2	2	0.01

### *Ecological receptors*

12.17.6 Predicted concentrations, deposition rates and scheme contribution at ecological receptors are presented in Table 12.15 and Table 12.16.

**Table 12.15: Predicted Concentrations and Deposition at Ecological Receptors**

Receptor and Distance in Habitat	2022 'Do Minimum'			2022 'Do something'		
	Total NO <sub>x</sub> (µg/m <sup>3</sup> )	Total Nitrogen Deposition (kgN/ha/yr)	Total Acid Deposition (keqN/ha/yr)	Total NO <sub>x</sub> (µg/m <sup>3</sup> )	Total Nitrogen Deposition (kgN/ha/yr)	Total Acid Deposition (keqN/ha/yr)
Sychnant Pass SSSI - Lowland Heathland - (Dry Heath)/Dwarf shrub heath						
SP 144 m	11.6	<b>13.2</b>	<b>1.93</b>	11.8	<b>13.2</b>	<b>1.93</b>
SP 150 m	11.5	<b>13.2</b>	<b>1.93</b>	11.7	<b>13.2</b>	<b>1.93</b>
SP 175 m	11.0	<b>13.1</b>	<b>1.93</b>	11.1	<b>13.1</b>	<b>1.93</b>
SP 200 m	10.6	<b>13.1</b>	<b>1.92</b>	10.6	<b>13.1</b>	<b>1.92</b>
<b>Critical Level / Load</b>	<b>30</b>	<b>10 - 20</b>	<b>0.5 - 1.50</b>	<b>30</b>	<b>10 - 20</b>	<b>0.5 - 1.50</b>

**Table 12.16: Predicted Scheme Contribution**

Receptor and Distance in Habitat	NO <sub>x</sub> (µg/m <sup>3</sup> )	NO <sub>x</sub> % of Critical Level	Nitrogen Deposition (kgN/ha/yr)	% N Deposition of Critical Load	Acid Deposition (keqN/ha/yr)	% Critical Load
Sychnant Pass SSSI - Lowland Heathland - (Dry Heath)/Dwarf shrub heath						
SP 144 m	0.2	0.6	0.01	0.1	0.001	0.1
SP 150 m	0.2	0.5	0.01	0.1	0.001	0.1
SP 175 m	0.1	0.4	0.01	0.1	0.001	0.1
SP 200 m	0.1	0.3	0.01	0.1	0.001	0.0

- 12.17.7 The NO<sub>x</sub> critical level is not exceeded within 200 m from the J16 Scheme. The nitrogen and acid deposition critical loads are predicted to be exceeded within 200 m from the Scheme for both 'Do Minimum' and 'Do Something' scenarios due to the exceeding background deposition rates. However, the increase in nitrogen and acid deposition is below 1% and therefore not significant.

## 12.18 Design Mitigation and Enhancement Measures

### *Construction Phase*

- 12.18.1 The control of dust emissions from construction sites relies upon good site management and mitigation techniques to reduce emissions of dust and limit dispersion. A summary of the mitigation measures recommended in the IAQM guidance to reduce impacts from high risk sites is provided in Table 12.17. It is recommended that these measures are set out within a Dust Management Plan which would form part of the Construction Environmental Management Plan (CEMP) that would accompany the application for the J16 Scheme or be secured through an appropriately worded planning condition. The proposed mitigation provided below are tried and tested and standard measures included in CEMPs on a regular basis.

**Table 12.17: Recommended Dust Mitigation Measures for High Risk Sites**

Phase	Mitigation Measure
Communications	<ul style="list-style-type: none"> <li>a) Develop and implement a stakeholder communications plan.</li> <li>b) Display the name and contact details of persons accountable on the site boundary.</li> <li>c) Display the head or regional office information on the site boundary</li> </ul>
Management	<ul style="list-style-type: none"> <li>a) Develop and implement a dust management plan.</li> <li>b) Record all dust and air quality complaints, identify causes and take measures to reduce emissions.</li> <li>c) Record exceptional incidents and action taken to resolve the situation.</li> <li>d) Carry out regular site inspections to monitor compliance with the dust management plan and record results.</li> <li>e) Increase site inspection frequency during prolonged dry or windy conditions and when activities with high dust potential are being undertaken.</li> <li>f) Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible.</li> </ul>

Phase	Mitigation Measure
	<ul style="list-style-type: none"> <li>g) Erect solid screens or barriers around dusty activities or the site boundary at least as high as any stockpile on site.</li> <li>h) Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.</li> <li>i) Avoid site run off of water or mud.</li> <li>j) Keep site fencing, barriers and scaffolding clean using wet methods.</li> <li>k) Remove potentially dusty materials from site as soon as possible.</li> <li>l) Cover, seed or fence stockpiles to prevent wind whipping.</li> <li>m) Ensure all vehicles switch off engines when stationary.</li> <li>n) Avoid the use of diesel or petrol powered generators where possible.</li> <li>o) Produce a Construction Logistics Plan to manage the delivery of goods and materials.</li> <li>p) Only use cutting, grinding and sawing equipment with dust suppression equipment.</li> <li>q) Ensure an adequate supply of water on site for dust suppressant.</li> <li>r) Use enclosed chutes and conveyors and covered skips.</li> <li>s) Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use water sprays on such equipment where appropriate.</li> <li>t) Ensure equipment is readily available on site to clean up spillages of dry materials.</li> <li>u) No on-site bonfires and burning of waste materials on site</li> </ul>
Earthworks	<ul style="list-style-type: none"> <li>a) Re-vegetate earthworks and exposed areas /soil stockpiles to stabilise surfaces as soon as practicable.</li> <li>b) Only remove the cover in small areas during work and not all at once</li> </ul>
Construction	<ul style="list-style-type: none"> <li>a) Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless required for a particular process.</li> <li>b) Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored silos with suitable emissions control systems</li> </ul>
Trackout	<ul style="list-style-type: none"> <li>a) Use water assisted dust sweepers on the site access and local roads.</li> <li>b) Avoid dry sweeping of large areas.</li> <li>c) Ensure vehicles entering and leaving the site are covered to prevent escape of materials.</li> <li>d) Record inspection of on-site haul routes and any subsequent action, repairing as soon as reasonably practicable.</li> <li>e) Install hard surfaced haul routes which are regularly damped down.</li> <li>f) Install a wheel wash with a hard-surfaced road to the site exit where site layout permits.</li> <li>g) The site access gate to be located at least 10m from receptors where possible</li> </ul>

## 12.19 Operational Phase

12.19.1 The effects of the scheme traffic on local air quality are judged to be not significant. No additional traffic mitigation is therefore required to reduce the direct effects of the scheme on local air quality.

- 12.19.2 However, to further reduce the impacts of traffic associated with J16 Scheme, following construction phase, improvements to walking and cycling routes and bus stops are being proposed (see Chapter 14 All Travellers). The walking and cycling infrastructure improvements are expected to reduce the number of vehicle movements associated with the J16 Scheme and subsequent emissions by encouraging sustainable transport.

## **12.20 Residual effects**

### *Construction Phase*

- 12.20.1 With appropriate mitigation in place the residual effect of construction is assessed as not significant.

### *Operational Phase*

- 12.20.2 The operational residual air quality effects of the proposed scheme are judged to be not significant.

## **12.21 Cumulative Effects**

### *Construction Phase*

- 12.21.1 Cumulative effects may include intra-project effects, when construction activities overlap in time for Junction 16 and Junction 15, or when changes in operational traffic at Junction 15 affect traffic at Junction 16.
- 12.21.2 Construction works at Junction 16 concurrent with construction works at Junction 15 do not have the potential to affect the identified receptors within the study area because of significant distances separating the two junctions. Significant cumulative effects are unlikely to occur as each development is anticipated to employ similar dust mitigation techniques such that the individual construction phase effect was not significant, alone or in combination.

### *Operational Phase*

- 12.21.3 The J16 Scheme traffic model has taken into account committed developments as well as future predicted traffic growth when both Junctions 15 and 16 are completed in the assessment opening year. The assessment has therefore predicted the cumulative concentrations arising from committed developments in the area in 2022.

## **12.22 Summary**

- 12.22.1 The assessments presented in this chapter identified the potential air quality effects due to construction and operation of the J16 Scheme upon the immediate environment.
- 12.22.2 The assessment of potential impacts to air quality during construction phase has identified that the activities, together with the location of nearby sensitive receptors, would result in a high risk of impacts in the absence of suitable mitigation. Mitigation would be provided through a series of measures set out in a detailed dust management plan secured as part of the wider Construction Environmental Management Plan. With mitigation in place, the effect is not significant.

- 12.22.3 Concentrations of NO<sub>2</sub> and PM<sub>10</sub> have been predicted for a number of worst case locations representing existing properties adjacent to the road network. Predicted concentrations are well below the relevant objectives at all of the existing receptor locations in 2022 with the J16 Scheme in place.
- 12.22.4 The increase in NO<sub>x</sub> concentrations and nitrogen deposition on ecological receptors is unlikely to have a significant effect on the integrity of the receptors given the magnitude of the predicted changes and the limited areas of the habitats affected. The operational air quality effects of the J15 Scheme are judged to be not significant for both human health and ecological receptors.
- 12.22.5 Overall, it is concluded that there are no air quality constraints to the proposed scheme.



Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 13 NOISE AND VIBRATION**

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## 13. NOISE AND VIBRATION

### 13.1 Introduction

- 13.1.1 This chapter considers the likely significant effects of noise and vibration associated with construction and operation of the J16 Scheme. The Scheme removes the existing roundabout at Junction 16 where the A55 dual carriageway meets Conway Rd in Penmaenmawr and replaces it with west bound on and off slip roads only. Scheme provides grade-separated junction for both A55 carriageways at Junction 16A. A detailed description of the Scheme is provided in Chapter 2.
- 13.1.2 The significance of potential effects has been classified based upon the sensitivity of identified receptors and the magnitude of predicted impacts. Where significant noise and vibration effects are determined, mitigation options are proposed and discussed.

### 13.2 Scope of the Assessments

- 13.2.1 The assessment presented in this chapter considers the potential significant effects upon human Noise Sensitive Receptors (NSRs). The assessment considers potential significant effects associated with:
- Construction noise due to use of road construction plant and machinery such as excavators, breakers and delivery lorries;
  - Construction vibration due to use of compaction rollers and piling rigs; and
  - Changes of road traffic noise following the Scheme opening due to changes in road horizontal and vertical alignment, and changes in traffic speed and volume.
- 13.2.2 Assessment of significant vibration effects due to operational road traffic has been scoped out because the Scheme does not introduce a new source of vibration closer than existing roads in relation to the NSRs.
- 13.2.3 Noise due to construction traffic has been scoped out from this assessment because it is assumed all the traffic will access the construction site using the A55. Addition of construction traffic to the A55 traffic is considered negligible.

### 13.3 Regulatory/Policy Framework

#### Environmental Noise Regulations

- 13.3.1 Strategic noise mapping is carried out by each member state of the European Union every four years. The mapping is carried out under Environmental Noise Directive (END) 2002/49/EC. The third round of mapping was completed for Wales in 2017. The aim of the END is to define a common approach intended to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise. END is given legal force in Wales through the Environmental Noise (Wales) Regulations 2006 as amended by the Environmental Noise (Wales) (Amendment) Regulations 2009 (collectively referred to as the Environmental Noise Regulations).
- 13.3.2 The result of mapping under END is identification of Priority Areas, locations of noise sensitive receptors where the current road traffic noise level is above a limit of 73 dB  $L_{DEN}$ , a Day-Evening-Night weighted level. Subsequent to the identification of Priority Areas, Action

Plans are drawn with an aim to reduce the noise levels associated with transportation noise sources.

- 13.3.3 Under the END, the Welsh Ministers have an obligation to draw up action plans for places near major roads. It is expected that the noise maps will inform a range of activities carried out by public bodies in Wales including prioritised noise mitigation works, such as noise barriers and resurfacing.

### **Design Manual for Roads and Bridges (DMRB)**

- 13.3.4 DMRB<sup>2</sup> provides advice on the assessment of noise and vibration impacts due to road traffic. The guidance provides a classification of magnitude of impacts related to changes in road traffic noise levels. As people are less sensitive to noise level changes over time, the classification of impacts is provided in the short term and in the long term.
- 13.3.5 The classification of impacts is used to define the significance criteria for assessing the changes in road traffic noise.
- 13.3.6 DMRB recommends calculation methodologies for the estimation of noise levels resulting from a road project during its construction and during its operation. The operational noise impacts are changes in road traffic noise, due to changes in traffic flow, speed, road alignment and road surface.
- 13.3.7 The new DMRB noise and vibration guidance was published in 2020 which was after the scoping report was published. Ramboll have reviewed the requirements of the new DMRB document (LA 111 Noise and Vibration). The new document requires construction noise thresholds to be determined using the ABC Method to E.3.2 of BS 5228-1:2009+A1:2014. The assessment contained in this chapter determines the construction noise impact using the 5 dB change method to E.3.3 of BS 5228-1:2009+A1:2014. However, the resultant significance of effects remains the same. The assessment of operational noise is not deemed to be affected by the latest guidance document and therefore the assessment is deemed to be valid.

## **13.4 Baseline Conditions**

- 13.4.1 The baseline survey consisted of attended noise level measurements during daytime on 12 Jul 2019. The measurements were carried out at eight locations representative of the nearest NSRs, as shown in Figure 13.2.
- 13.4.2 All measurements were 15 minutes in duration, and multiple measurements were made at each location. Measurement samples were averaged from individual monitoring locations, to obtain a single figure representative of the daytime noise level. A summary of baseline noise levels is shown in Table 13.5 and details of the monitoring are provided in Technical Appendix 13.1.  $L_{Aeq}$  describes the ambient noise level, and its value is equivalent in time to a steady sound level.  $L_{A10}$  is an indicator used in the CRTN prediction method to represent the road traffic noise level.

<sup>2</sup> Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7, HD 213/11 – Revision 1, Noise and Vibration, November 2011

**Table 13.1: Summary of Baseline Noise Levels**

Monitoring Location	dB L <sub>Aeq</sub>	dB L <sub>A10</sub>
B1	61	62
B2	60	61
B3	71	74
B4	57	55
B5	71	74
B6	69	72

### 13.5 Assessment of Likely Effects

#### Construction Noise Effects

- 13.5.1 All demolition and construction effects are considered to be direct and temporary.
- 13.5.2 The results for the predicted construction noise for each NSR are reported in Table 13.7.

**Table 13.2: Predicted Construction Noise Levels**

Receptor ID	Construction Activity					
	Phase 1 Traffic Management	Phase 2 Site Clearance	Phase 2 Excavation	Phase 2 Substructure	Phase 3 Road Works	Phase 4 Finishing
P1	41 dBA	43 dBA	44 dBA	42 dBA	44 dBA	41 dBA
P2	54 dBA	55 dBA	57 dBA	54 dBA	57 dBA	53 dBA
P3	47 dBA	50 dBA	53 dBA	47 dBA	53 dBA	43 dBA
P4	48 dBA	56 dBA	60 dBA	49 dBA	58 dBA	40 dBA
P5	41 dBA	44 dBA	48 dBA	46 dBA	48 dBA	38 dBA
T1	46 dBA	47 dBA	50 dBA	50 dBA	51 dBA	45 dBA
T2	46 dBA	48 dBA	50 dBA	51 dBA	52 dBA	45 dBA
C1	60 dBA	61 dBA	61 dBA	60 dBA	61 dBA	60 dBA

- 13.5.3 **No significant effects** are predicted during the construction phase.

## Construction Vibration Effects

### *Vibratory Compaction*

- 13.5.4 It is predicted that significant vibration levels may occur during the finishing works activity of phase 2 at assessment locations C1, P2, and P4. Assessment receptor P4 is representative of properties located along Maes Y Llan. Therefore, vibratory compaction is assessed to result in significant impacts at these assessment locations.

### *Sheet Piling*

- 13.5.5 No significant vibration levels are predicted with sheet steel piling.

## Operational Effects

- 13.5.6 The results of the assessment are summarised in Table 13.7, which show the number of dwellings which are predicted to experience a change in road traffic noise levels. The change in road traffic noise is also presented graphically in the noise level difference maps in Figure 13.3.

**Table 13.3: Changes in Road Traffic Noise in the Short-term Without Mitigation**

Change in Noise Level	Number of Dwellings	
Increase in noise level, dBL <sub>A10,18h</sub>	5 +	0
	3 - 4.9	0
	1.0 - 2.9	8
	0.1 - 0.9	75
No change		75
Decrease in noise level, dBL <sub>A10,18h</sub>	0.1 - 0.9	381
	1 - 2.9	103
	3 - 4.9	0
	5 +	0

- 13.5.7 The Scheme is predicted to result in a noise level decrease at the majority of the receptors. This is attributed to a diversion of traffic from Glan-Yr-Afon Rd in Dwygyfylch into a new bypass road. Where a noise level increase is predicted, this is attributed to an increase in traffic speed around the existing junction and realignment of the roads with introduction of additional carriageways closer to the receptors. No receptors are predicted to experience a significant decrease effect.
- 13.5.8 However, no receptors are predicted to experience an increase in noise level of at least 3dB, therefore the Scheme is assessed to result in **no significant operational noise effects** in the short term.
- 13.5.9 Properties at Maes y Llan in Dwygyfylchi were identified as a Priority Area under END mapping, as identified in Figure 13.1. Predicted noise contours without any additional mitigation are shown in Figure 13.4.

## 13.6 Mitigation and Enhancement Measures

### Construction Noise Effects

- 13.6.1 The assessment of construction noise identified no significant effects; therefore, no additional mitigation is required.
- 13.6.2 A CEMP would be prepared in advance of construction which would define all mitigation measures to be adopted to minimise noise and vibration emissions at surrounding sensitive receptors. This would incorporate specific measures within all phases of the works where noise and vibration may give rise to disturbance. It is expected that the CEMP would be secured by means of an appropriately worded planning condition.
- 13.6.3 Best Practicable Means (BPM), as defined by the Control of Pollution Act 1974, would be implemented as part of the working methodology. This would serve to minimise the noise and vibration effects at receptors in the vicinity of the construction works. The reduction in noise levels provided through the implementation of BPM would vary depending on the nature of the works.
- 13.6.4 Typical BPM measures would be considered, where reasonably practical, such as:
- Plan working hours to take account of the effects of noise and vibration upon persons in areas surrounding site operations and upon persons working on site;
  - Where reasonably practicable, adopt quiet working methods, using plant with lower noise emissions;
  - Where reasonably practicable, adopt working methods that minimise vibration generation;
  - Locate plant away from noise and vibration sensitive receptors, where feasible;
  - Use silenced and well-maintained plant conforming with the relevant EU directives relating to noise and vibration;
  - Avoid unnecessary revving of engines and switch off equipment when not required;
  - Keep internal haul routes well maintained;
  - Use rubber linings for chutes and dumpers to reduce impact noise;
  - Minimise drop height of materials;
  - Start-up plant and vehicles sequentially rather than all together;
  - Carry out regular inspections of noise mitigation measures to ensure integrity is maintained at all times;
  - Provide briefings for all site-based personnel so that noise and vibration issues are understood, and mitigation measures are adhered to; and
  - Manage plant movement to take account of surrounding NSRs, as far as is reasonably practicable.
- 13.6.5 It is assumed a 2.4 m site hoarding will be installed at the construction site boundary.
- 13.6.6 Community liaison and communication regarding construction works would be undertaken throughout the demolition and construction stage to provide information to people residing in properties located in the vicinity of the construction works and reduce the likelihood of adverse effects on the local community which could result in potential noise complaints. The level of engagement required would vary during the construction period, depending upon the expected effects experienced by individual receptors due to the construction works.

13.6.7 Details relating to liaison with the local community would be managed by the contractor. It is envisaged that community liaison would provide local residents with the following information in relation to the construction works:

- The nature of the works being undertaken;
- The expected duration of the works;
- The contractor's working hours;
- Mitigation measures that have been adopted to minimise noise and vibration, as detailed in the CEMP; and
- Contact details in the event of a noise disturbance.

13.6.8 If work is required to extend into periods beyond the agreed hours, separate authorisation would be secured with the local authority via the CEMP process.

### **Operational Noise Effects**

13.6.9 The assessment of operational noise identified no significant effects; therefore, no additional mitigation is required. Scheme enhancement measurements could be considered for properties at Maes y Llan.

13.6.10 A 3.5 m noise barrier could be considered for the properties at Maes y Llan that were identified as a Priority Area under END. Such a barrier, together with an introduction of a low-noise rolling surface on both A55 carriageways, would be an opportunity to reduce the noise level below 65 dB  $L_{A10,18h}$  below which no further action may be required. The level of 65 dB  $L_{A10,18h}$  is based on the threshold of 68 dB  $L_{A10,18h}$  to the Noise Insulation Regulations 1975<sup>3</sup>, and allowance for a 3 dB façade correction to the calculation methodology of CRTN. The noise barrier would be specified on top of the retaining wall and along the crest of the earth bund as shown graphically in Figure 13.5.

## **13.7 Assessment of Residual Effects**

### **Construction Noise Effects**

13.7.1 The assessment of construction noise identified no significant effects; therefore, no additional mitigation is required. The residual effects are assessment to be **not significant**.

## **13.8 Operational Noise Effects**

13.8.1 The assessment of operational noise identified no significant effects; therefore, no additional mitigation is required. The residual effects are assessment to be **not significant**.

13.8.2 With the incorporation of a 3.5 m noise barrier above the retaining wall along Maes y Llan, the properties identified inside the Priority Area would experience a reduction in noise to a level not exceeding 65 dB  $L_{A10,18h}$ , which is considered a threshold below which no further mitigation may be required. Predicted noise contours with the proposed noise barriers and low-noise surface are shown in Figure 13.5.

<sup>3</sup> HMSO. 1975. The Noise Insulation Regulations



### **13.9 Assessment of Cumulative Effects**

- 13.9.1 Cumulative effects may include intra-project effects, when construction activities overlap in time for Junction 15 and Junction 16, or when changes in operational traffic at Junction 16 affect traffic at Junction 15.
- 13.9.2 Construction works at Junction 16 concurrent with construction works at Junction 15 do not have the potential to affect the identified receptors within the study area because of significant distances separating the two junctions. Therefore, construction works are not predicted to result in significant cumulative effects.
- 13.9.3 Traffic data used for the assessment of operational noise effects is representative of the situations when both Junctions are completed in the assessment opening year. Therefore, the assessment of operational noise is cumulative with Junction 16.
- 13.9.4 Inter-development effects may occur when other committed developments such as new residential or commercial developments are forecast to be operational at the assessment opening year. The traffic data used for the assessment includes the traffic associated with committed developments, therefore the assessment of operational noise is cumulative with other developments.

### **13.10 Summary**

- 13.10.1 The assessments presented in this chapter identified the potential significant effects due to construction and operation of the Scheme upon the immediate environment.
- 13.10.2 Methodology for the noise and vibration assessment was presented to Welsh Government and to the ELG. No objections were raised to the assessment methodology.
- 13.10.3 Predicted noise effects during operation have been found to result in no significant noise effects. Mitigation measures in form of a noise barrier and low-noise surface were proposed for consideration for properties along Maes y Llan which were identified as Priority Areas under strategic noise mapping.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 14 ALL TRAVELLERS**

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## 14. ALL TRAVELLERS

### 14.1 Chapter Introduction

- 14.1.1 This Chapter of the Environmental Statement (ES) addresses impacts in relation to effects on all travellers associated with the Scheme. It includes an assessment of impacts on pedestrians, cyclists, equestrians and vehicular travellers.
- 14.1.2 The chapter describes the methods used to assess the impacts, the baseline conditions currently existing at the site and surroundings, the potential direct and indirect impacts of the development on all travellers, the mitigation measures required to prevent, reduce or offset the impacts and the residual impacts.
- 14.1.3 Secondary effects on noise and vibration (Chapter 13), air quality (Chapter 12), landscape and visual (Chapter 9), cultural heritage (Chapter 10) and nature conservation, including ecology (Chapter 8) are considered within other Chapters of this ES.
- 14.1.4 Due to an extension by six months in the proposed construction programme the opening year has changed from late 2022 to early/mid 2023. It should be noted that the traffic modelling has not been updated to reflect this change in opening year due to the anticipated 1% growth in traffic between 2022 and 2023. It is considered that this change in traffic flow would have a negligible impact on the operational performance of the highway network, as the network is not operating near capacity. The following assessment is therefore based upon traffic data from 2022, whilst assuming an opening year of 2023.

### 14.2 Relevant Guidance

#### Legislation and Policy

##### *National and Regional Policies and Plans*

- 14.2.1 **Prosperity for All: The National Strategy (2017):** This strategy supports the Programme for Government up to 2021 and sets out the Welsh Government's commitment to deliver enhancements to the A55.
- 14.2.2 **Well-Being of Future Generations (Wales) Act (2015):** The Well-Being of Future (Wales) Act is about to improve the social, economic, environmental and cultural well-being of Wales. It sets out the long-term goals, while it looks how to prevent problems and take a more joined-up approach. The seven well-being goals as stated in the document are:
  - A. A prosperous Wales;
  - B. A resilient Wales;
  - C. A healthier Wales;
  - D. A more equal Wales;
  - E. A Wales of cohesive communities;
  - F. A Wales of vibrant culture and thriving Welsh language; and
  - G. A globally responsible Wales.
- 14.2.3 **The Active Travel (Wales) Act, (2013)** legislation requires '...Welsh Ministers and local authorities to take reasonable steps to enhance the provision made for, and to have regard to the needs of, walkers and cyclists; for requiring functions under the Act to be exercised so as to

promote active travel journeys and secure new and improved active travel routes and related facilities; and for connected purposes’.

- 14.2.4 **The Wales Transport Strategy (One Wales: Connecting the Nation (2008)):** This Strategy places high emphasis on the promotion of sustainable transport networks that safeguards the environment while strengthening the Country’s economic and social life. Promotion of walking and cycling is key to reducing greenhouse gas emissions and other environmental impacts, which is one of the priorities of the Strategy. Improving access between key settlements and sites, integrating local transport, enhancing international connectivity and increasing safety and security are also priorities of the Strategy, which relate to all travellers.
- 14.2.5 **Transport Technical Advice Note 18 (2007)** The TAN includes advice on walking and cycling, public transport, planning for transport infrastructure, assessing impacts and managing implementation. TAN 18 should be read in conjunction with **Planning Policy Wales (2018)** sets out the land use planning policies of the Welsh Government. Planning Policy Wales section 4.1 sets out the objectives for ‘Transport’ to ‘enable more sustainable travel choices’, ‘network management’ and ‘demand management’. The policy refers to The Wales Transport Strategy, the National Transport Finance Plan and the Local Transport Plans. It also refers to the Active Travel (Wales) Act 2013 and the Well-being of Future Generations (Wales) Act 2015. The Policy considers a number of areas including, but not limited to, integrated planning and transport strategies, sustainable transport, active travel, traffic management and transport assessments.

### Local Policy

- 14.2.6 **The Conwy Local Development Plan 2007-2022 (2013)** sets out a ‘Vision – Conwy in 2022’ which states that “by 2022, the communities of Conwy would be more sustainable, offer a higher quality of life and be supported by a more balanced age structure”.
- 14.2.7 **Strategic Policy STR/1 Sustainable Transport, Development and Accessibility:** states transport Schemes which lead to improvements in accessibility would be supported in principle.
- 14.2.8 **Strategic Policy STR/4 Non-Motorised Travel** supports increased levels of non-motorised travel, encouraging sustainable short distance trips between home, work, schools and other suitable destination and for leisure.
- 14.2.9 **Strategic Policy STR/5 Integrated Sustainable Transport System,** states the following scheme will be safeguarded and promoted “The Wales Coastal Path Improvement Programme and the Conwy Rights of Way Improvement Plan – To improve accessibility to the coast and countryside for local communities and visitors.”

### 14.3 Guidance

- 14.3.1 The following guidance documents are considered relevant for the All Travellers assessment:
- 14.3.2 Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5, HA 205/08 (Highways Agency *et al*, 2008):
- A. DMRB Volume 11, Section 3, Part 8 ‘Pedestrians, Cyclists, Equestrians and Community Effects’ (Highways Agency, 1993a) in respect of the potential effects on pedestrians, cyclists and equestrians;
  - B. DMRB Volume 11, Section 3, Part 9 ‘Vehicle Travellers’ (Highways Agency, 1993b) in respect of the potential effects on driver stress;

- C. DMRB Interim Advice Note 125/09(W) Supplementary guidance for users of DMRB Volume 11 'Environmental Assessment' (Wales Only) (Welsh Assembly Government, 2009); and
- D. Institute of Environmental Management and Assessment's (IEMA) 'Guidelines for the Environmental Assessment of Road Traffic'.

14.3.3 In October 2019 the DMRB Guidance Volume 11 parts 8 and 9 were withdrawn and have now been superseded by LA 112 Population and Human Health. However, previous guidance has been applied as this was applicable at both the time of scoping and during the authoring of this report.

#### **14.4 Study Area**

14.4.1 DMRB Volume 11, Section 2, Part 5 states the study area should be defined on a case-by-case basis. In accordance with the IEMA 'Guidelines for the Environmental Assessment of Road Traffic' (IEMA Guidelines'), the study area would be defined by identifying any link or location where it is considered that significant environmental effects may occur as a result of the proposed Scheme.

14.4.2 The IEMA Guidelines state two rules to be considered when assessing the impact of development traffic on a highway link:

- A. Include highway links where traffic flows would increase by more than 30% (or the number of heavy goods vehicles (HGVs) would increase by more than 30%); and
- B. Include any other specifically sensitive areas where traffic flows would increase by 10% or more.

14.4.3 Less than a 30% increase is considered to result in imperceptible changes in the environmental effects of traffic. The IEMA Guidelines considered that projected changes in traffic flows of less than 10% create no discernible environmental effect. Only routes that are affected by the Scheme would be assessed.

14.4.4 The study area would be defined by the SATURN Traffic model.

#### **14.5 Baseline Conditions**

##### **Non-Motorised Users**

##### *Public Rights of Way and Cycleways*

14.5.1 The following well-established Public-Rights of Way in the study area have been identified (Figures 14.1-14.2):

- A. National Cycle Network (NCN) Route 5 which extends along the North Wales coast from Chester to Holyhead along the coastline passing Penmaenmawr'
- B. Wales Coast Path from Chester extends along the coast through Penmaenmawr and Llanfairfechan with an optional inland route at Penmaenmawr'
- C. Public Footpath 29/08 crosses the A55 using footbridge close to Puffin Café Services;
- D. Public Footpath 29/06 provides access between Conway Road and Conway Old Road.

14.5.2 In addition, there are a number of informal NMU routes within the area including the footpath between A55 and Glan-y-Afon Road (historically known as Bangor Fields Road).

14.5.3 No equestrian routes have been identified within the Scheme area.

### NMU Flows

- 14.5.4 The following data sources have been used to establish the baseline conditions of the existing walking, cycling and horse-riding facilities and existing travel patterns and use of these resources.
- 14.5.5 Surveys of the numbers of pedestrians, cyclists and equestrians within the study area were undertaken on bank holiday Monday, 28 May 2018 to inform the Walking, Cycling and Horse-Riding Assessment (WCHAR). The survey was undertaken by TRL 360 between 08:00 and 20:00. Survey data and locations are identified in Figure 14.3.
- 14.5.6 The count surveys have been undertaken at the following locations in proximity to J16:
- A. Survey 6 – High Street;
  - B. Survey 7 – Beach Café;
  - C. Survey 8 – Fernbrook Road/ Bangor Road/ Brymor Terrace/ Pant-y-Afon;
  - D. Survey 9 – Conway Road/ Ysguborwen Road; and,
  - E. Survey 10 – A55 Overbridge (near Shell garage).
- 14.5.7 In addition, a site visit was undertaken on Thursday 6 September 2018, between 11:00 and 16:00 during daylight hours. The site visit took the form of walking along a variety of pedestrian and cycling facilities, both within the extents of the Scheme and beyond the Scheme footprint. The level of use and condition/ suitability of each route during the site visit were recorded and potential improvements, repairs were noted. This data forms the basis of the pedestrian, cyclist and equestrian baseline conditions in the area, and is detailed in the WCHAR (Appendix 14.1).
- 14.5.8 Public Rights of Ways (PROW), cycleways and permissive paths affected by the Scheme are identified in Figures 14.1-14.2. Alternative provision would be provided where the Scheme does impact on existing Rights of Way.

### Traffic Flows

- 14.5.9 Traffic data from the SATURN Traffic Model has been used to inform the assessment and to provide baseline traffic flows. Table 14.1 presents the baseline traffic figures 2022 AADT Do Minimum and 2022 AADT Do Something.

**Table 14.1: 2022 AADT Do Minimum and Do Something Traffic Flows**

Road Name	2022		
	DM AADT	DS AADT	% Change
A55 between J16-J16A	39782	37259	-6.3%
A55 between J16A-J17	40702	40900	0.5%
Glan-Yr-Afon Road, Dwygyfylchi	920	955	3.8%
Ysguborwen Road, Dwygyfylchi	1369	1175	-14.1%
New Link Road, Dwygyfylchi	0	2751	N/A
Treforris Road, Dwygyfylchi	589	392	-33.5%
Old Mill Road, Dwygyfylchi	158	177	12.5%
Conway Old Road (Dwygyfylchi to Capelulo)	348	169	-51.4%
Conway Old Road (Dwygyfylchi to Penmaenmawr)	497	266	-46.4%
Conway Road, Penmaenmawr	4321	4669	8.1%

Road Name	2022		
	DM AADT	DS AADT	% Change
Bangor Road, Penmaenmawr	4085	4202	2.9%
Pant-Yr-Afon, Penmaenmawr	1101	1104	0.3%
High Street, Penmaenmawr	1629	1624	-0.3%

- 14.5.10 Figures presented in green represent a reduction in traffic flows, figures presented in red indicate an increase in traffic flows when comparing the 2022 Do Minimum and the 2022 Do Something scenarios.

#### *Trip Generators*

- 14.5.11 Key trip generators and local amenities in the vicinity of the proposed Scheme that could be attractive to pedestrians, cyclists and equestrians are identified in the WCHAR (Appendix 14.1) and Figure 14.4. Local places of employment, education, retail, recreation or community facilities that the public may travel to on foot or by bicycle as identified below:

- A. Hotels and Restaurants in Llanfairfechan, Penmaenmawr and Dwygyfylchi;
- B. Penmaenmawr Golf Club;
- C. Conwy (Caernarvonshire) Golf Club;
- D. Snowdonia National Park;
- E. Retail Units in Penmaenmawr and Llanfairfechan;
- F. Ysgol Pant y Rhedyn and Ysgol Babanod primary schools in Llanfairfechan;
- G. Ysgol Pencae primary school in Penmaenmawr;
- H. Ysgol Capelulo primary school in Dwygyfylchi;
- I. Council offices;
- J. Health care facilities;
- K. Library;
- L. Train station; and
- M. Bus stops.

- 14.5.12 There is a controlled crossing on Pant-Yr-Afon, close to the junction with Brynmor Terrace/ Fernbrook Road/ Bangor Road. In addition, there is a zebra crossing on Bangor Road, between Celyn Street and Station Road West in Penmaenmawr, within the J16 Scheme study area.

#### *Active Travel (Wales) Act 2013 Active Travel Routes*

- 14.5.13 Active Travel refers to walking or cycling as an alternative to motorised transport ie car, bus etc for the purpose of making every-day journeys. This includes all non-motorised users ie wheelchairs, electric wheelchair, mobility scooters and other mobility aids. [source: <https://www.conwy.gov.uk/en/Resident/Parking-Roads-and-Travel/Active-Travel/Active-Travel-Wales-Act-2013.aspx> 15.07.19]. An active travel is 'a journey made to or from a workplace or educational establishment or to access other services or facilities'. This covers short distance commuting, travel to school, shops or leisure facilities etc. The route has to connect to facilities and services and be suitable for utilitarian everyday journeys. It does not cover routes or sections of routes that are just used for leisure or recreational purposes.
- 14.5.14 The Act requires local authorities to prepare maps identifying current and potential future routes for their use as well as ensuring new road Schemes consider the needs of walkers and cyclists at design stage.



- 14.5.15 The Integrated Network Maps form part of the Active Travel (Wales) Act 2013. These represent Conwy County Borough Council (CCBC) draft 15 year Active Travel improvement vision to improve walking and cycling routes across Conwy.
- 14.5.16 The approved CCBC Active Travel Map for Penmaenmawr is provided in Figure 14.5. No data is available for Dwygyfylchi.

## **14.6 Consultation**

- 14.6.1 The Team has worked closely with CCBC, Sustrans and Cycling UK in relation to impacts of the Scheme on Non-Motorised Users (NMUs).
- 14.6.2 Consultation with the local Planning Authority and North and Mid Wales Trunk Road Agency (NMWTRA) in respect to the Scheme is ongoing and would continue. Consultation with non-statutory consultees including groups representing pedestrians and cyclists is ongoing, and would continue.
- 14.6.3 Through this consultation the proposed active travel routes have been developed for inclusion within the proposed Scheme.

## **14.7 Future Baseline Conditions**

- 14.7.1 The following baseline scenarios have been taken into consideration during the assessment of the Scheme, where appropriate:
  - A. Construction Phase – 2021 - 2023 (24 months)
  - B. Operational Phase – Year of Opening 2023

## **14.8 Assessment of Effects**

### **Methodology**

- 14.8.1 The All Travellers topic includes an assessment of the effects on the PROW (footpaths, bridleways and restricted byways); cycle routes; permissive non-motorised user (NMU) routes; public highways; public transport; overbridge and underpass crossings.
- 14.8.2 The assessment of effects on all travellers considers the construction and operation of the proposed new road and changes in amenity and effects on community severance and driver stress. 'Views from the Road' are also considered in Chapter 9.
- 14.8.3 The assessment methodology is presented below.

### **Changes in Amenity**

- 14.8.4 Amenity is defined in DMRB Volume 11, Section 3, Part 8 (Highways Agency, 1993a) as the '*relative pleasantness of a journey*' and changes to the amenity of journeys undertaken by pedestrians, equestrians and cyclists may include exposure to and distance from traffic, noise, dirt, air quality and/ or visual impact. The assessment involves a qualitative description and also considers the quality of NMU routes including street furniture, planting and signage.

### *Community Severance*

- 14.8.5 Community severance is defined in DMRB Volume 11, Section 3, Part 8 (Highways Agency, 1993a) as 'the separation of residents from facilities and services they use within their community caused by new or improved roads or by changes in traffic flows' (paragraph 5.2). The assessment of community severance should be undertaken for the opening year of the Scheme and would take into account the direct effects of the Scheme and any increases in traffic levels on other roads. The following factors would be considered:
- A. An estimation of the number of people whose journey would be affected, their location and the community facilities from which they would be severed;
  - B. The presence of particularly vulnerable groups such as children, the aged and the disabled;
  - C. The type of road involved; and
  - D. The provision of mitigation.
- 14.8.6 The guidelines apply specifically pedestrians, as DMRB states that 'cyclists and equestrians are less susceptible to severance because they can travel more quickly than people on foot, although they may still be deterred from making journeys which require them to negotiate additional roads and especially junctions'.

### *Driver Stress Assessment*

- 14.8.7 Driver stress is defined in DMRB Volume 11, Section 3, Part 9 (Highways Agency, 1993b) as 'the adverse mental and physiological effects experienced by a driver traversing a road network'. Factors including road layout and geometry, surface riding characteristics, journey frequency, and speed and flow per lane can influence the level of stress. These can induce 'feelings of discomfort, annoyance, frustration or fear culminating in physical and emotional tension that detracts from the value and safety of a journey' in drivers. DMRB states that driver stress has the following three main components:
- 14.8.8 'Frustration is caused by a driver's inability to drive at a speed consistent with his or her own wishes in relation to the general standard of the road. It increases as speed falls in relation to expectations and may be due to high flow levels, intersections, roadworks or difficulties in overtaking slower traffic. Congestion can lead to frustration by creating a situation in which the driver does not feel in control.'
- 14.8.9 Fear of potential accidents results from the 'presence of other vehicles, inadequate sight distances and the likelihood of pedestrians stepping out into the road'. Additional factors such as 'inadequate lighting, roadworks, narrow roads and poorly maintained surfaces' are also contributing factors. According to the DMRB fear is highest where traffic speeds, flows and the percentage of HGVs are all high and these factors are of more importance during adverse weather conditions. A new Scheme may increase driver stress because of increased traffic speeds and flows, although the superior driving standards of a new Scheme often offset this.
- 14.8.10 Uncertainty is caused by 'signing that is inadequate for the individual's purposes'.

### *View from the Road Assessment*

- 14.8.11 The assessment of 'View from the Road' which the DMRB defines as 'the extent to which travellers, including drivers, are exposed to different types of scenery through which a route passes' is set out in Chapter 9 of this ES.

### Significance Criteria

- 14.8.12 The proposed approach to assessing the significance of impacts on All Travellers is identified below:

### Receptors

- 14.8.13 Categories of receptor sensitivity have been defined from the principles set out in the IEMA Guidelines, and set out in Table 14.2, based on the following:
- A. The need to identify particular groups or locations which may be sensitive to changes in traffic conditions; and
  - B. The identification of links or locations where it is felt that specific environmental problems may occur.

**Table 14.2: Receptor Sensitivity Criteria**

Receptor Sensitivity	Criteria
High	<p>Individuals, businesses or groups that have a restricted or very limited capacity to experience the impact without incurring substantial economic loss (or gain), loss (or gain) of access to an economic resource, loss (or gain) of amenity or loss (or gain) of access to a recreational resource.</p> <p>PRoW frequently used by pedestrians, cyclists and other Non-Motorised Users (NMU) for utility journeys, such as commuting, or by vulnerable travellers (eg elderly, school children and people with disability). Also includes National Trails likely to be used for recreational/ leisure purposes.</p>
Medium	<p>Individuals, businesses or groups that have a limited or average capacity to experience the impact without incurring substantial economic loss (or gain), loss (or gain) of access to an economic resource, loss (or gain) of amenity or loss (or gain) of access to a recreational resource.</p> <p>PRoW moderately used by pedestrians, cyclists and other NMU for recreational/ leisure purposes (eg regional trails).</p>
Low	<p>Individuals, businesses or groups that have an adequate capacity to experience the impact without incurring a substantial economic loss (or gain), loss (or gain) of access to an economic resource, loss (or gain) of amenity or loss (or gain) of access to a recreational resource.</p> <p>PROW sometimes used by pedestrians, cyclists and other NMU for recreational/ leisure purposes (eg local routes)</p>

### Magnitude of Effects

- 14.8.14 The determination of the importance and sensitivity of the receptors and the magnitude of change specifically relating to road traffic would be informed by the IEMA Guidelines.
- 14.8.15 Where the existing baseline HGV or total traffic flows are very minor, a small increase in vehicles would produce a large change in magnitude whereas in real terms the increase in traffic may still be considered to be negligible or slight. Such an assessment requires appropriate professional and experienced judgements to be made.
- 14.8.16 The temporal scope of effects is described as short, medium, long-term or permanent as shown below. for the operational assessment the effects are long-term, whereas the construction and decommissioning effects are likely to be short-term:
- A. Short term: <12 months;

- B. Medium term: 1 - 10 years;
- C. Long Term: +10 years; and
- D. Permanent: effects that are considered to be 'irreversible' or extremely long-lasting.

14.8.17 The criteria for assessing the impact magnitude is identified in Table 14.3 to Table 14.6.

**Table 14.3: Criteria for Assessing Impact magnitude – New Severance**

Impact Magnitude	Criteria
Severe	<p>Loss of resource and/ or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).</p> <p>People are likely to be deterred from making trips to an extent sufficient to induce a re-organisation of their habits, leading to a change in the location of centres of activity or in some cases to a permanent loss to a particular community. Alternatively, considerable hindrance would be caused to people trying to make their existing journeys (Adverse).</p> <p>Permanent loss/ severance of an existing route used by pedestrians, cyclists or other NMU/ considerable change in amenity value (Adverse).</p> <p>Substantial gain of resource and/ or substantial increase in quality; substantial improvement to key characteristics, features or elements (Beneficial)</p>
Moderate	<p>Loss of resource, but not adversely affecting the integrity; partial loss of/ damage to key characteristics, features or elements (Adverse).</p> <p>Some residents, particularly children and elderly people, are likely to be dissuaded from making trips. Other trips would be made longer or less attractive (Adverse).</p> <p>Disruption of a route used by pedestrians, cyclists or other NMU with significant increase in journey length/ time, or moderate change in amenity value (Adverse).</p> <p>Moderate gain of resource and/ or moderate increase in quality; partial gain or/ improvement to key characteristics, features or elements (Beneficial).</p>
Slight	<p>Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).</p> <p>In general, the current journey pattern is likely to be maintained, but there would probably be some hindrance to movement (Adverse).</p> <p>Alteration of a route used by pedestrians, cyclists or other NMU but with no significant increase in journey length/ time, or minor change in amenity value (Adverse).</p> <p>Small but measurable gain of resource and/or minor improvement in key characteristics, features or elements (Beneficial).</p>
Neutral	<p>No loss or alteration of characteristics, features or elements; no observable impact in either direction (No Effect).</p> <p>No change to route used by pedestrians, cyclists or other NMU or change in amenity value (No Effect).</p> <p>No gain or improvement in quality to one or more characteristics, features or elements (No Effect).</p>

Relief from existing severance can be identified by considering the reduction in traffic on the existing highway network in the opening year as presented in Table 14.4. This should be considered in the context of the size of the community affected, the presence of vulnerable groups and the existing road standards. Note a minimum traffic flow and a minimum reduction in traffic must be expected before any relief can be claimed, guidelines do not apply to roads with an existing AADT flow of less than 8,000 vehicles.

**Table 14.4: Criteria for Assessing Impact Magnitude – Existing Severance**

Impact Magnitude	Criteria
Substantial	Where traffic AADT levels are predicated to change by 60%+ (Built up Area) or 90%+ (Rural Area) from existing levels.

Impact Magnitude	Criteria
Moderate	Where traffic AADT levels are predicated to change by 30%-60% (Built up Area) or 75%-90% (Rural Area) from existing levels.
Slight	Where traffic AADT levels are predicated to change by 30% (Built up Area) or 60%-75% (Rural Area) from existing levels.

- 14.8.18 The following tables give guidance on the appropriate category of stress; Low, Moderate or High, providing speeds and flows exist during peak hour flows for at least 1 km. the assessment is based on the worst year in the first 15 years after opening.

**Table 14.5: Criteria for assessing Driver Stress Dual Carriageway**

Average Peak Hourly Flow per Lane, in Flow Units/1 Hour	Average Journey Speed km/hr		
	Under 60	60-80	Over 80
Under 1200	High	Moderate	Low
1200-1600	High	Moderate	Moderate
Over 1600	High	High	High

**Table 14.6: Criteria for assessing Drivers Stress Single Carriageway**

Average Peak Hourly Flow per Lane, in flow Units/1 Hour	Average Journey Speed km/hr		
	Under 50	50-70	Over 70
Under 600	High	Moderate	Low
600-800	High	Moderate	Moderate
Over 800	High	High	High

#### *Significance of Impact*

- 14.8.19 The significance of the environmental effects is determined by the magnitude of impact and the value/ importance of the affected asset or resource. The degree of significance would be determined in accordance with DMRB guidelines HA 205/08 'Assessment and Magnitude of Environmental Effects'. This provides typical descriptors and criteria for magnitude of impact (degree of change and receptor sensitivity) but does not provide specific descriptors for the assessment of road traffic.
- 14.8.20 The typical significance of effect categories as detailed in Table 14.7 have been taken from the DMRB guidelines and used in this assessment.
- 14.8.21 In all cases a degree of professional judgement would be applied to assess whether the impact is considered significant or not significant.

**Table 14.7: Significance of Impact**

Impact Magnitude	Sensitivity		
	High	Medium	Low
Major	Major Adverse/ Beneficial	Major-Moderate Adverse/ Beneficial	Moderate-Minor Adverse/ Beneficial

Impact Magnitude	Sensitivity		
	High	Medium	Low
Moderate	Major-Moderate Adverse/ Beneficial	Moderate-Minor Adverse/ Beneficial	Minor Adverse/ Beneficial
Minor	Moderate-Minor Adverse/ Beneficial	Minor Adverse/ Beneficial	Minor/ Negligible
Neutral	Negligible	Negligible	Negligible

## 14.9 Identification of Potential Effects

### Construction Effects

- 14.9.1 As far as practicable, the majority of work would be undertaken offline. Two lanes of traffic in each direction would be retained along the A55 during the construction phase which is anticipated to last 24 months.
- 14.9.2 Some minor disruption to traffic and NMUs is anticipated where the new Scheme ties in to the existing infrastructure. All impacts during the 24-month construction phase would be temporary and medium term.
- 14.9.3 Further details of the proposed scheme are provided in Chapter 2. The stepped footpath between Maes Y Llan, Dwygyfylchi and the A55 will be permanently closed. However, the removal of direct pedestrian access to the A55 is considered beneficial on safety grounds. A new footway access to the New Link Road will be formed, and the existing access to Puffin footbridge will be retained. The Bangor Fields Road access will also be permanently closed during construction works, an alternative route will be provided via Glan Y Afon and the New Link Road in the operational phase. There will be a temporary closure of the Network Rail access track during part of the construction works.

### *Changes in Amenity*

- 14.9.4 Changes in amenity during the construction phase are likely to be as a result in changes in traffic flows, noise, dust and visual impact.
- 14.9.5 NMU journeys adjacent to construction works are likely to be subject to a temporary increase in noise levels due to construction machinery and works. The assessment of visual and noise impacts of the Scheme is detailed in Chapters 9 and 13 respectively in this ES.

### *Community Severance*

- 14.9.6 During construction of the Scheme the NMU/PROW routes listed in Table 14.8 would be temporarily affected. Some NMU journeys may be hindered, with potential increases in journey lengths during the construction phase. The magnitude and significance of impacts shown in Table 14.8 assume no mitigation is provided.

*New Severance***Table 14.8: Construction impacts on NMU routes prior to mitigation – New Severance**

Receptor	Description of Impact	Sensitivity	Magnitude	Significance	Significant/ Not Significant	Notes
NCN5	Potential temporary impact during improvement works to NCN5 along north side of A55.	High	Major	Major Adverse	Significant	The loss of access to NCN5 will be a significant impact. 40 cyclists and 514 pedestrians recorded during 28 May 2018 survey.
Conway Road	Potential temporary impact during construction of cycleway along Conway Road.	High	Moderate	Major-Moderate Adverse	Significant	The loss of access to the cycleway will be a significant impact. 34 cyclists and 93 pedestrians recorded during 28 May 2018 survey.
Glan y Afon Road	Potential temporary impact during construction of cycle/ footway, although no existing route along this section.	Low	Moderate	Minor Adverse	Significant	The loss of pedestrian/ cycle access will be a significant impact. No survey data available for this section.
Bangor Fields Road	Temporary closure of informal footpath between Glan Y Afon and A55.	Medium	Major	Major-Moderate Adverse	Not Significant	Direct access to the A55 is not desirable, and therefore this is considered not significant. No survey data available for this section.
Maes Y Llan	Closure of footpath between A55 and Maes Y Llan. (access to Puffin footbridge would be retained, with a new access tying into the new link road footway).	Medium	Major	Major-Moderate Adverse	Not Significant	Direct access to the A55 is not desirable, and therefore this is considered not significant. No survey data available for this section.

### *Relief from Existing Severance*

- 14.9.7 Relief from existing severance does not apply to roads with an existing ADDT flow of less than 8,000 vehicles. Within the study area only flows on the A55 are in excess of 8,000 therefore no further assessment has been considered as users would be required to use dedicated facilities such as an over bridge or underpass to cross the A55, which would not be impacted by changes in traffic flows.

### *Driver Stress*

- 14.9.8 During construction of the Scheme there would be at times two narrow lanes with a reduced speed limit along the A55. This is likely to result in an increase in *drivers stress* during this period when compared to the baseline scenario. This could result in *frustration* due to the driver's inability to drive at a speed consistent with their own wishes. Again, *fear of potential accidents* could increase due to the presence of roadworks and narrow lanes. *Uncertainty* may result from temporary road closures and changes to access/ egress arrangements to/ from the A55 to local roads.
- 14.9.9 Assuming no mitigation, the works would cause considerable disruption to drivers and non-motorised users. Overall the impact of the construction phase on driver stress is considered to adverse.

### **Operational Effects**

- 14.9.10 The assessment of effects provided in this section does not take into account mitigation measures such as diversions or crossing points on NMU routes.

### *Changes in Amenity*

- 14.9.11 Changes in the overall amenity of journeys made by pedestrians, equestrians and cyclists during the operational phase is in part related to changes in visual and noise elements, which are assessed in detail in Chapters 9 and 13 of the ES.
- 14.9.12 Overall the Scheme seeks to improve the quality of NMU routes through a number of mini Schemes as identified in Chapter 2. These Schemes would be designed to current standards and would seek to improve connectivity to the local area for pedestrians and cyclists through the provision of dedicated facilities.
- 14.9.13 The Scheme will include the closure of the informal footway between A55 and Glan Y Afon, known as Bangor Fields Road and the stepped footway between the A55 and Maes Y Llan, Dwygyfylchi. Access between Maes Y Llan and the Puffin Footbridge would be retained.

### *Community Severance*

- 14.9.14 The assessment of community severance considers the opening year of the Scheme and takes into account the direct effects of the Scheme and any increase in traffic levels on other roads.
- 14.9.15 A review of the 2022 Do Minimum and 2022 Do Something AADT as presented in Table 4.1 suggests there would be minimal changes in traffic flow as a result of the Scheme at Junction 16 with no change with an increase greater than 12.5% predicted. A less than 30% increase is considered to result in imperceptible changes in the environmental effects of traffic. There are predicated reductions in traffic of up to 51.4% on Conway Old Road (Dwygyfylchi to Capelulo), 46.4% Conway Old Road (Dwygyfylchi to Penmaenmawr) and 33.5% Treforris Road, Dwygyfylchi where benefits may be noticeable.



**Table 14.9: Operational impacts on NMU routes prior to mitigation**

Receptor	Description of Impact	Sensitivity	Magnitude	Significance	Significant/ Not Significant	Notes
Conway Road	Improved accessibility between Dwygyfylchi and Penmaenmawr and NCN5 due to cycleway along Conway Road.	High	Major	Major Beneficial	Significant	Improved connectivity will be a significant benefit. 34 cyclists and 93 pedestrians recorded during 28 May 2018 survey.
Glan y Afon Road	Improved accessibility between Dwygyfylchi, NCN5 and Penmaenmawr due to 160 m cycle/ footway along Glan y Afon.	High	Major	Major Beneficial	Significant	Improved connectivity will be a significant benefit. No survey data available for this section.
Bangor Fields Road	Access between Glan Y Afon and new Link Road will be retained.	Medium	Major	Major-Moderate Benefit	Significant	Improved connectivity will be a significant benefit. No survey data is available for this section.
	Closure of section of informal footpath between new Link Road and A55.	Medium	Major	Major-Moderate Adverse	Not Significant	Direct access to the A55 is not desirable, and therefore this will be considered not significant. No survey data available for this section.
Maes Y Llan	Closure of footpath between A55 and Maes Y Llan. (access between Maes Y Llan and Puffin Footbridge would be retained).	Medium	Major	Major-Moderate Adverse	Not Significant	Direct access to the A55 is not desirable, and therefore this will be considered not significant. No survey data available for this section.

- 14.9.16 Due to the minimal change in traffic flows (maximum 12.5% increase) current journey patterns are likely to be maintained without hinderance to movement, therefore no new severance is anticipated.

#### *Relief from Existing Severance*

- 14.9.17 Relief from existing severance does not apply to roads with an existing ADDT flow of less than 8,000 vehicles. Within the study area only flows on the A55 are in excess of 8,000 therefore no further assessment has been considered as users would be required to use dedicated facilities such as an over bridge or underpass to cross the A55, which would not be impacted by changes in traffic flows.

#### *Driver Stress*

- 14.9.18 Removal of the A55 J16 roundabout seeks to address existing issues with resilience, delays and safety, thereby reducing *driver stress* when compared to the baseline scenario. The improved J16 would include westbound on/ off slips leading to a 4 arm roundabout, providing connectivity to Conway Road and a new link road. In addition a new link road would provide connectivity directly to Ysguborwen Road and locally between Penmaenmawr and Dwygyfylchi. The improved at grade junction at Junction 16a would enable 4 way movements by utilising an overbridge with a junction to the north of the A55 and a junction to the south. The slip roads are raised locally to allow the bridge to pass over the A55.
- 14.9.19 Through the removal of the A55 roundabout the speed and flow per lane on the A55 should become more consistent, therefore reducing *frustration*. In addition, the new junction would be designed in accordance with design standards. Street lighting and clear signage would also be present.
- 14.9.20 *Fear of potential accidents* could reduce due to the removal of the online roundabout, and its associated traffic movements, traffic speeds on the on/ off slips will be reduced to 30 mph. *Uncertainty* should be minimised due to the presence of clear signage throughout the Scheme.
- 14.9.21 Predicted level of traffic for the design year 2032 are identified in table 14.10 for links over 1km in accordance with DMRB Vol 11.3.9<sup>1</sup>.

**Table 14.10: Driver Stress Assessment**

Road Name (Junction 16)	Direction	2037		
		Peak Hourly Flow per Lane (PCUs)	Average Speed (kph)	Stress Level
A55 between J16-J16A	Westbound	1881	93	High
	Eastbound	1683	94	High
A55 between J16A-J17	Westbound	1955	94	High
	Eastbound	1949	94	High
Old Mill Road	Northbound	7	50	Moderate
	Southbound	8	57	Moderate

<sup>1</sup> DMRB Volume 11, Section 3, Part 9 (Highways Agency 1993b)

Road Name (Junction 16)	Direction	2037		
		Peak Hourly Flow per Lane (PCUs)	Average Speed (kph)	Stress Level
New Link Road	Westbound	17	70	Low
	Eastbound	205	88	Low
Conway Old Road (Dwygyfylchi to Capelulo)	Northbound	8	55	Low
	Southbound	11	57	Low
Conway Old Road (Dwygyfylchi to Penmaenmawr)	Westbound	10	84	Low
	Eastbound	19	88	Low
Conway Road	Westbound	214	57	Moderate
	Eastbound	240	55	Moderate

14.9.22 Overall, it is considered that the Scheme would provide a beneficial effect on driver stress levels.

## 14.10 Mitigation Measures

### Construction Mitigation

- 14.10.1 During construction of the Scheme there would be at times two narrow lanes with a reduced speed limit along the A55. temporary road closures and changes to access/ egress arrangements to/ from the A55 to local road would be managed through the provision of clear and adequate signage during the construction phase. The majority of work would be undertaken offline as far as practical.
- 14.10.2 A Construction Traffic Management Plan would be produced prior to start of works. The public would be informed of proposed roadworks and would be updated throughout the construction phase programme.
- 14.10.3 Some temporary diversions to local NMU routes would be required during the construction phase. Two footways, Bangor Fields Road between Glan Y Afon and A55 and the stepped footway between A55 and Maes Y Llan would be permanently closed. Access between Maes Y Llan and Puffin Footbridge would be retained. The Network Rail access track would also be temporarily closed during stages of the construction work. However, all other existing movements would still be permitted throughout the construction phase, with no loss of access to local facilities.

### Operational Mitigation

- 14.10.4 Following completion of the construction phase, there would be a number of improved NMU routes as identified in Section 4.6. All existing NMU movements would be permitted, with improvements to surfacing, signage and accessibility in particular for cyclists.
- 14.10.5 A new pedestrian/ cycleway will be provided along the length of the New Link Road improving connectivity between Penmaenmawr and Dwygyfylchi. The link will also provide connectivity to the NCN5 and coastline via the Puffin footbridge.
- 14.10.6 The Scheme would include a pedestrian crossing where the existing PROW (29/08) crosses the new link road. The Scheme would also include new DDA compliant access ramp at Puffin services

Footbridge. Both measures would provide a safe crossing point for users wishing to access NCN5 and the coast. The PROW would be diverted locally to include these improvements.

- 14.10.7 The Scheme would include signalled controlled junction at 16A, which incorporates at grade signalised crossing connecting to the shared cycle/ footway on Glan Y Afon and the new link road. This would improve safety for non-motorised users and improve connectivity to NCN5 and the coast. This would also mitigate the closure of a short section of the footpath between the A55 and Glan Y Afon Road (historically known as Bangor Fields Road).
- 14.10.8 Traffic calming measures will be introduced in Dwygyfylchi which will also seek to improve pedestrian connectivity where feasible.
- 14.10.9 The Scheme will also include the relocation of bus stops at Glan Y Afon Road and Ysguborwen Road.

## **14.11 Significance of Residual Effects**

### **Construction Effects**

- 14.11.1 All construction effects would be temporary.

### **Changes in Amenity**

- 14.11.2 Mitigation measures would be in place to minimise changes in amenity where feasible. However, despite these measures some temporary change in amenity is inevitable during the construction phase.
- 14.11.3 The closure of the two footways, Bangor Fields Road between Glan Y Afon and A55 and the stepped footway between A55 and Maes Y Llan would have limited impact as the A55 is not considered a typical pedestrian destination and would be considered beneficial on safety grounds. Access between Maes Y Llan and the Puffin Footbridge would be retained, with a new access to the New Link Road footway/ cycleway.
- 14.11.4 The assessment of visual and noise impacts of the Scheme is detailed in Chapters 9 and 13 respectively in this ES.

### **Community Severance**

- 14.11.5 The residual magnitude and significance of impacts are shown in Table 14.11 assuming mitigation is provided.

#### *Relief from Existing Severance*

- 14.11.6 Relief from existing severance does not apply to roads with an existing ADDT flow of less than 8,000 vehicles. Within the study area only flows on the A55 are in excess of 8,000 therefore no further assessment has been considered as users would be required to use dedicated facilities such as an over bridge or underpass to cross the A55, which would not be impacted by changes in traffic flows.

### *New Severance*

- 14.11.7 New severance is described in Table 14.11.

### **Driver Stress**

- 14.11.8 The mitigation measures proposed would improve driver stress during the construction phase, however not all effects would be mitigated and therefore the overall effect would still be considered adverse.

### **Operational Effects**

- 14.11.9 The assessment of effects provided in this section takes into account mitigation measures such as diversions or crossing points on NMU routes as presented in Section 5.
- 14.11.10 All impacts identified are considered to be permanent, in that the effects are considered to be extremely long lasting over 10 years.

### **Changes in Amenity**

- 14.11.11 Changes in the overall amenity of journeys made by pedestrians, equestrians and cyclists during the operational phase is in part related to changes in visual and noise elements, which are assessed in detail in Chapters 9 and 13 of the ES.
- 14.11.12 Overall the Scheme seeks to improve the quality of NMU routes through a number of mini Schemes as identified in Chapter 2. These Schemes would be designed to current standards and would seek to improve connectivity to the local area for pedestrians and cyclists through the provision of dedicated facilities.
- 14.11.13 The loss of pedestrian access via Bangor Fields Road would be replaced via a new pedestrian/cycleway along Glan Y Afon connecting to the new link road, proving improved connectivity to NCN5 and the coastline.

### **Community Severance**

- 14.11.14 The construction impacts following mitigation are shown in Table 14.12

**Table 14.11: Construction impacts on NMU routes following mitigation – New Severance**

Receptor	Description of Impact	Sensitivity	Magnitude	Significance	Significant/ Not Significant	Notes
NCN5	Access will be retained during improvement works to NCN5 along north side of A55.	High	Minor	Moderate-Minor Adverse	Not Significant	Access will be retained during the construction works, therefore impact considered not significant. 126 cyclists and 21 pedestrians recorded heading westbound along NCN5 at overbridge (east of pinchpoint) during 28 May 2018 survey.
Conway Road	Potential temporary impact during construction of cycleway along Conway Road.	High	Minor	Moderate-Minor Adverse	Not Significant	Users should still be able to maintain access along this route during the construction works, therefore impact considered not significant. 34 cyclists and 93 pedestrians recorded during 28 May 2018 survey.
Glan y Afon Road	There would be no loss of existing facilities during construction of cycle/ footway.	Low	Minor	Minor/Negligible	Not Significant	Access will be retained during construction works therefore impact considered to be not significant. No survey data available for this section.
Bangor Fields Road	Closure of informal footpath between Glan Y Afon and A55.	Medium	Major	Major-Moderate Adverse	Not Significant	Direct access to the A55 is not desirable, and therefore this is considered not significant. No survey data available for this section.
Maes Y Llan	Closure of footpath between A55 and Maes Y Llan, Dwygyfylchi (access between Maes Y Llan and the Puffin Footbridge would be retained).	Medium	Major	Major-Moderate Adverse	Not Significant	Direct access to the A55 is not desirable, and therefore this is considered not significant. No survey data available for this section.

**Table 14.12: Operational impacts on NMU routes following mitigation**

Receptor	Description of Impact	Sensitivity	Magnitude	Significance	Significant/ Not Significant	Notes
Conway Road	Improved accessibility between Dwygyfylchi and Penmaenmawr and NCN5 due to cycleway along Conway Road.	High	Major	Major Benefit	Significant	34 cyclists and 93 pedestrians recorded during 28 May 2018 survey. Improved connectivity will be a significant benefit.
Glan y Afon Road	Improved accessibility between Dwygyfylchi, NCN5 and Penmaenmawr due to 160 m cycle/ footway along Glan y Afon.	High	Major	Major Beneficial	Significant	No survey data available for this section. Improved connectivity will be a significant benefit.
Bangor Fields Road	Access between Glan Y Afon and new Link Road will be retained.	Medium	Major	Major-Moderate Benefit	Significant	Improved connectivity will be a significant benefit. No survey data is available for this section.
	Closure of section of informal footpath between new Link Road and A55.	Medium	Major	Major-Moderate Adverse	Not Significant	Direct access to the A55 is not desirable, and therefore this will be considered not significant. No survey data available for this section.
New Link Road	Closure of section of informal footpath between new Link Road and A55.	Medium	Major	Major-Moderate Adverse	Not Significant	Direct access to the A55 is not desirable, and therefore this will be considered not significant. No survey data available for this section.
Maes Y Llan	Closure of footpath between A55 and Maes Y Llan. It should be noted that the removal of direct pedestrian access to the A55 is considered beneficial in terms of safety (access between Maes Y Llan and the Puffin Footbridge would be retained, new access would also be provided to the New Link Road).	Medium	Major	Major-Moderate Benefit	Significant	Direct access to the A55 is not desirable, and therefore this is considered a significant benefit. No survey data available for this section.

14.11.15 There are no further changes to new severance resulting from the proposed mitigation.

#### **Relief from Existing Severance**

14.11.16 No change is anticipated from the proposed mitigation.

#### **Driver Stress**

14.11.17 The proposed mitigation would lead to improvements in safety, reducing fear of potential accidents. No further changes to the effect on driver stress are anticipated as a result of the proposed mitigation.

### **14.12 Cumulative Effects**

14.12.1 This Chapter considers the cumulative effects of Junction 15 and Junction 16. This Chapter summarises the cumulative effects that arise from both the Junction 15 and Junction 16 Schemes, which have been considered in the above assessment for the J16 Scheme only.

14.12.2 The traffic model has taken into account committed development as well as future predicted traffic growth, as detailed in the Forecasting Report. In order to provide a robust assessment of future developments within the study area, estimates of their likely trip generation were calculated for five residential sites. It was considered that traffic generated by the remaining committed development would not enter, exit or pass through the model and the remainder were included in TEMPro growth assumptions.

14.12.3 Consultation was undertaken with CCBC, and its three neighbouring councils; Denbighshire, Gwynedd and Anglesey.

#### **Construction Phase and Operational Phase**

14.12.4 Traffic flows which consider both Junction 15 Scheme and Junction 16 Scheme are unchanged from the traffic flows which considered the Schemes in isolation. Therefore, no further assessment of the cumulative effects of the construction or operational phase has been considered.

### **14.13 Conclusions**

14.13.1 The Scheme would affect a number of Public Rights of Way surrounding Penmaenmawr and Dwygyfylchi. Consultation, site visits and survey data indicate that the routes are frequently used by both pedestrians and cyclists.

14.13.2 Measures have been developed through consultation to provide improved NMU access as identified in section 4.6. Short term temporary diversions and crossing places would be provided during the construction phase, ensuring that access to local facilities is maintained.

14.13.3 Overall, operational traffic flows on the A55 would remain unchanged. There will be an increase in traffic on Old Mill Road, Dwygyfylchi of 12.5% below the 30% which is considered to result in imperceptible changes in the environmental effects of traffic. There would be a beneficial change in severance as a result of the Scheme, as NMU access would be improved. There is no existing severance caused by road traffic between residential areas, community facilities and places of employment. Opportunities to increase travel by active modes within the area may be increased



as a result of improved NMU routes.

- 14.13.4 During the construction phase, there may be an increase in driver stress due to the narrow lanes on the A55. However, there would be clear signage and two lanes would be operational throughout the construction phase, with a reduced speed limit. A construction traffic management plan would be in place to manage construction traffic efficiently.
- 14.13.5 Driver stress would be improved as a result of the Scheme, due to the removal of the roundabout, associated improved consistency in speeds and reduced frustration and fear of accidents.
- 14.13.6 The Scheme would contribute to both the Well-being of Future Generations (Wales) Act 2015 and the Active Travel (Wales) Act 2013 through the provision of a number of walking and cycling routes. This would include improvements to the NCN 5, improved facilities to cross the A55 and an off road shared cycleway/ footway would be provided along the new link road, Glan-Y-Afon and Conway Road providing safer crossing facilities. These routes would improve sustainable access between the facilities in Dwygyfylchi and Penmaenmawr, and to NCN5 and the coast. The provision of signalised crossing points at J16A would assist with traffic flows, and pedestrian and cyclist safety.
- 14.13.7 The measures identified in Table 14.13 go beyond what is considered essential to mitigate any impact.

**Table 14.13: Summary of proposed measures beyond mitigation**

Proposed Measure	Comment
Glan Y Afon shared cycle/ footway	This would provide improved connectivity for NMUs between Dwygyfylchi and NCN5 and the coast. No existing NMU facilities are currently provided therefore this would be considered beyond the required mitigation for the Scheme.
Conwy Road shared cycle/ footway	The Scheme will include an off road shared cycleway/ footway along Conway Road. This will be a new facility, and is considered to be beyond the required mitigation for the Scheme.

## Summary

- 14.13.8 The mini schemes identified in Chapter 2 have been developed in consultation with key stakeholders including CCBC, Cycling UK and Sustrans and in accordance with the requirements of Active Travel (Wales) Act and the Well-being of Future Generations (Wales) Act.
- 14.13.9 These mini schemes have been developed to mitigate direct impacts from the Scheme layout itself, ie where the Scheme directly conflicts with NMU routes. In addition to this, opportunities to improve NMU routes and sustainable access between local facilities, and the coastline have also been identified which are considered to go beyond the requirement for mitigation.
- 14.13.10 Overall, the Scheme would contribute to the Well-being of Future Generations Act (FGA) through seeking to deliver measures that will have a positive impact on people living in the future as well as those living today. The five ways of working have been considered through the development of the scheme which has taken "into account the impact that the scheme could have on people living their lives in Wales in the future as well as in the present".

- 14.13.11 The Scheme also proposes additional measures which seeks to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs and to meet the seven well-being goals as identified in section 14.2. The Scheme seeks to provide healthy and active travel options alongside the development of A55 the highways infrastructure through the provision of improved, sustainable accessibility between local areas and the coastline.
- 14.13.12 The inclusion of additional walking and cycling routes seeks to improve accessibility, health and wellbeing for both existing and future generations. These seek to improve access to local facilities for all, including those without access to a vehicle. These measures contribute towards achieving a more equal, prosperous, resilient and healthier Wales. Through improving connectivity between local areas the Scheme also seeks to deliver cohesive communities and a vibrant culture in accordance with the FGA seven well-being goals.
- 14.13.13 Similarly, the Scheme has considered the requirements of the Active Travel (Wales) Act 2013 to improve facilities and routes for NMUs, supporting the Welsh Governments vision of walking and cycling being the preferred choice of mode for shorter distance trips. The provision of the mini schemes identified above seeks to improve accessibility to the NCN 5, coastline and neighbouring local areas by NMUs.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 15 MATERIAL ASSETS AND WASTE**

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## 15. MATERIALS ASSETS AND WASTE

### 15.1 Chapter Introduction

- 15.1.1 This chapter considers the likely significant effects on and from Material Assets and Waste associated with the construction and operation of the proposed Scheme. The specific objectives of the chapter are to:
- Identify the consumption of materials and products and the production and disposal of waste associated with the Scheme;
  - Describe the baseline with regard to material and waste management capacity in the study area;
  - Describe the assessment methodology and significance criteria used in completing the impact assessment;
  - Describe the potential effects, including direct, indirect and cumulative effects;
  - Describe the mitigation measures proposed to address likely significant effects; and
  - Assess the residual effects remaining following the implementation of mitigation.
- 15.1.2 Figure 15.1 is included in the text, other figures referenced in the text are included in Volume 2 of the ES.
- 15.1.3 For details of the Scheme description, reference should be made to Chapter 2.
- 15.1.4 This assessment assumes the use of standard construction techniques and practices commensurate for works of this nature, and full compliance with UK legislation and guidance including Pollution Prevention Guidelines. The final installation techniques and their sequencing will be determined by the construction works contractor in consultation with the relevant authorities. In addition, incorporated mitigation measures are described which have been included in the proposed Scheme design to reduce identified impacts.
- 15.1.5 This section does not cover impacts which arise off site and may possibly occur outside the UK, including the depletion of non-renewable resources and the production of waste at the point of extraction and during manufacture. These impacts are outside the scope of this assessment as they are considered to be subject to separate environmental assessment processes.
- 15.1.6 Since the preparation of the scoping report the Interim Advice Note (IAN) 153/11 has been withdrawn and replaced with LA 110 Materials Assets and Waste. Because the information on which this chapter is based only became available at the end of the design development it has been possible to follow the approach outlined in LA110.
- 15.1.7 LA110 notes that the environmental assessment should report on the construction phase and the first year of operational activities. Use of material assets and production of waste during operation after the first year are not covered in this assessment. Given the scale of the Scheme and the fact that there is a substantial element incorporating existing highways the change in activities such as repairing potholes, clearing out drains and road surface maintenance will be relatively minor in scale and are not likely to cause significant effects.

## 15.2 Legislation, Policy Context

15.2.1 This section outlines the legislation, policy and guidance relevant to the assessment of potential effects on and from materials assets and waste associated with the proposed Scheme based on the following:

- International and National Legislation and Policy;
- Local Planning Policy; and
- Guidance and Industry Standards.

### International Legislation

European Union Waste Framework Directive 2008 (Directive 2008/98/EC)

15.2.2 The EU revised Waste Framework Directive<sup>1</sup> provides the overarching legislative framework for the collection, transport, recovery and disposal of waste, and includes a common definition of waste.

15.2.3 The Directive requires all member states, which includes the UK, to take all the necessary measures to ensure waste is recovered or disposed of without endangering human health or causing harm to the environment. The Directive also includes permitting, registration and inspection requirements.

15.2.4 Article 4 of the revised *Waste Framework Directive* sets out the principles of the waste hierarchy to how waste should be managed. The waste hierarchy as shown in Figure 15.1 ensures that waste is dealt with in the following order of priority:

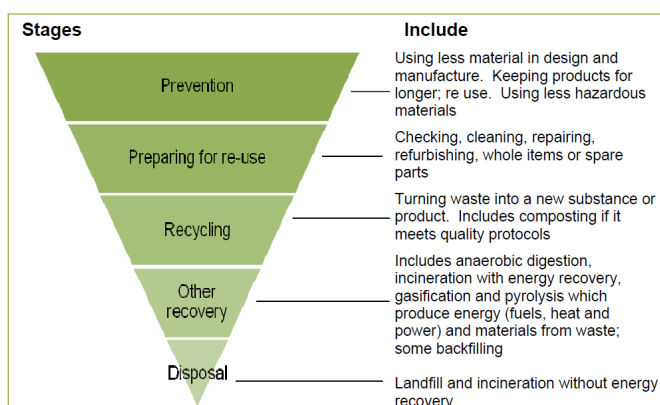


Figure 15.1: Waste Hierarchy

15.2.5 These principles are transposed into UK law by the Waste (England and Wales) Regulations 2011 (as amended)<sup>2</sup>.

### National Legislation and Policy

15.2.6 There are a number of primary legislative instruments on waste in the UK which enact a wide range of secondary legislation that governs the identification, storage, collection, treatment and disposal of waste. The key legislation and policies relevant to the Scheme include the following:

<sup>1</sup> European Union Waste Framework Directive 2008 (Directive 2008/98/EC)

<sup>2</sup> Waste (England and Wales) Regulations 2011 (as amended)

- The Control of Pollution (Amendment) Act 1989;
- Environmental Protection Act (EPA)1990;
- Waste Minimisation Act 1998;
- The Environment (Wales) Act 2016;
- The Waste and Emissions Trading Act 2003;
- The Clean Neighbourhoods and Environment Act 2005;
- The Waste (England and Wales) Regulations 2012 (as amended);
- Hazardous Waste (England and Wales) Regulations 2005;
- National Policy Statement for National Networks;
- National Planning Policy for Waste;
- National Planning Policy for Hazardous Waste;
- Planning Policy Wales (2018);
- Towards Zero Waste – The Overarching Waste Strategy for Wales (2010);
- Technical Advice Note 21 Waste (2014); and
- Construction and Demolition Sector Plan (2012).

15.2.7 The Control of Pollution (Amendment) Act 1989 provides for the registration of carriers of wastes and powers in relation to vehicles that have been used for illegal waste disposal.

15.2.8 The Environmental Protection Act 1990 sets out the structure and authority for the management waste and control of emissions to the environment. It covers the disposal of wastes onto land including:

- The definition of waste;
- Measures to be taken in the case of unauthorised or harmful disposal of waste;
- Duty of Care in relation to waste;
- Waste management licencing, now largely superseded by environmental permitting;
- National and local government responsibilities, including development of waste strategies; and
- Enforcement powers.

15.2.9 The Waste Minimisation Act 1998 relates to the EPA and includes powers for local authorities to take steps to minimise the generation of wastes in their area, including household, commercial and industrial wastes.

15.2.10 The Environment (Wales) Act 2016 cover a range of environmental issues, Part 4 refers to the collection and disposal of wastes and notes the need for separation of wastes prior to collection, prohibits the disposal of food waste to sewer and provides powers to regulate or prohibit the disposal of wastes by incineration.

15.2.11 The Waste and Emissions Trading Act 2003 discusses wastes to be sent to landfill. It introduces the concept of targets and allowances for biodegradable wastes to comply with the European Landfill Directive together with a trading system for the allowances. It also included a requirement for a strategy to reduce the amount of biodegradable waste disposed of to landfill.

15.2.12 The Clean Neighbourhoods and Environment Act 2005 provides powers to tackle environmental quality and anti-social behaviour. With regard to waste it covers transport of waste, control of fly tipping, retention and provision of documentation, seizure and search of vehicles connected with fly tipping and the powers to require landowners to remove fly tipped waste.

- 15.2.13 The Waste (England and Wales) Regulations 2012 Act cover waste management and transpose the European Waste Directive into UK law. Key aspects include duties in relation to waste collection, confirm that the waste hierarchy has been considered and to collect waste streams separately and keep them separate. It also includes requirements on hazardous waste, in particular that it cannot be mixed or diluted without an appropriate permit. Two tiers of registration as a waste carrier were introduced for waste carrier, broker and dealer together with additional provisions relating to hazardous wastes.
- 15.2.14 The Hazardous Waste Regulations 2005 make provision for the management of hazardous wastes from the point of production to disposal, or recovery. The regulations implement the Hazardous Waste Directive (91/698/EEC). The regulations provide a definition of hazardous waste and link to the European List of Wastes which defines whether or not wastes are hazardous. Hazardous wastes must be recorded and identified and must not be mixed with other hazardous, or non-hazardous wastes. If they are already mixed, then separation should be undertaken where technically and economically feasible. The regulations require notification of premises at which hazardous waste is produced and a quarterly return from those who receive the waste or dispose of it on the site of production.
- 15.2.15 The National Policy Statement for National Networks refers to waste management. It notes the need for sustainable waste management through the adoption of the waste hierarchy and that large infrastructure Schemes may generate wastes through their construction and operation. The statement noted that certain operational waste management requirements may require an Environmental Permit. Arrangements for managing wastes should be set out and steps should be taken to minimise the volume of waste generated, and the amounts sent for disposal. In terms of decision making the statement notes the need for the Secretary of State to be satisfied that an effective process for the management of wastes, including that it will be properly managed on and off site, the waste can be dealt with appropriately by the waste infrastructure that is likely to be available and that steps have been taken to minimise waste volumes and disposal. Where necessary planning obligations should be used to ensure that appropriate measures are applied for waste management.
- 15.2.16 The National Planning Policy for Waste notes the ambition to work towards a more sustainable and efficient approach to resource use and management. It focusses on local authorities and the requirements placed on them together with provision of waste management infrastructure. Key points relevant to the proposed Scheme include driving waste management up the waste hierarchy, securing the re-use, recovery or disposal of waste without endangering human health or the environment and ensuring that infrastructure including transport links complements sustainable waste management. With regard to determining planning applications the policy notes that local planning authorities should consider the likely impact of proposed developments on waste infrastructure and that handling of waste maximises re-use/recovery opportunities and minimises off site disposal. The National Policy Statement for hazardous waste focusses on provision of new hazardous waste management infrastructure but does note that hazardous waste may pose a risk to human health and the environment and that it needs to be managed in a sustainable way that recovers or recycles this waste, rather than disposing of it.

### **Planning Policy Wales (December 2018)**

- 15.2.17 The Planning Policy Wales (PPW) <sup>3</sup> sets out the land use planning policies of the Welsh Government with a view to ensuring that the planning system delivers sustainable development and improves the social, economic, environmental and cultural well-being of Wales.

<sup>3</sup> Planning Policy Wales Edition 10



- 15.2.18 The Plan notes the need for planning decisions to consider whether the depletion of non-renewable resources will be minimised, whether waste will be prevented, and that the most appropriate and efficient use of materials will be made, including re-use and recycling.
- 15.2.19 Chapter 5 of the policy refers to making the best use of material resources and promoting the Circular Economy. The document provides guidance to local authorities including the following key points relating to materials and waste relevant to this Scheme:
- Designing out waste by using materials which are, or can be re-used or recycled and through appropriate site selection and treatment;
  - Designing in reused materials and elements;
  - Seeking a cut and fill balance to avoid the creation of waste;
  - Use of locally sourced, alternative or recycled materials should be encouraged in line with the Proximity Principle; and
  - Adequate space and facilities for managing waste materials should be incorporated into the design.
- 15.2.20 The PPW also makes reference to the Waste Hierarchy and notes that the Welsh Government's policy for waste management is contained in Towards Zero Waste and associated sector plans (see below).
- 15.2.21 The policy notes the need for planning authorities to encourage the recycling and re-use of construction and demolition wastes as well as mineral and industrial wastes. It also discusses the efficient use of mineral and aggregate resources, noting the need to ensure that they are not wasted and that they are used efficiently. With regard to aggregates the policy notes the need to consider the use of alternative products to primary materials but also the need to use high specification aggregates in road construction and maintenance, of which significant resources exist in Wales.

#### **Towards Zero Waste - The Overarching Waste Strategy Document for Wales (June 2010)**

- 15.2.22 'Towards Zero Waste' is the overarching waste strategy document for Wales.
- 15.2.23 The Strategy <sup>4</sup> is intended to meet the requirements of EU Directives, including the Waste Framework Directive, and the National waste Strategy for Wales, as required under UK legislation. The strategy notes that detailed delivery actions will be defined in sector plans. These include sector plans for:
- a) Construction and Demolition (C&D) (consulted on in 2011 with responses published in September 2012);
  - b) Environment and Climate Change;
  - c) Transport;
  - d) Collections, Infrastructure and Markets;
  - e) Municipal; and
  - f) Industrial and Commercial.
- 15.2.24 The Sector Plan for Environment and Climate Change states there is currently consultation being held on increasing recycling by businesses, which is open until December 2019. The Transport sector plan makes reference to several guidance notes including the Welsh transport appraisal guidance (WelTAG).

<sup>4</sup> Towards Zero Waste – The Overarching Waste Strategy Document for Wales (2010)

15.2.25 The strategy notes that the documents that form the waste plan/strategy for Wales are:

- a) Towards Zero Waste;
- b) Waste Strategy Progress Report 2002-2008;
- c) Wise About Waste (2002);
- d) Technical Advice Note 21 (Waste);
- e) Regional Waste Plans for North, South West and South East Wales; and
- f) Local Development Plans.

15.2.26 The PPW notes that Wise About Waste (2002) was the previous waste management strategy for Wales but that a number of actions and targets in this older document are still in existence.

15.2.27 The strategy sets targets including that by 2025 waste will have been significantly reduced and that it will be managed to make the most of resources with recycling maximised, residual waste minimised and landfill disposal as close to zero as possible. By 2050 the aim is to phase out residual waste, achieving Zero Waste through enhanced waste prevention and sustainable consumption and production to ensure that all waste is re-used or recycled.

15.2.28 For construction and demolition wastes the strategy notes that the previous target of re-using or recycling at least 85% of construction and demolition wastes by 2010 was met. It refers to the need to maximise the use of alternative materials, secondary and recycled aggregates where possible in the construction industry. The strategy notes that a Sector Plan will be developed for construction and demolition wastes to cover waste produced by all types of development.

#### **Technical Advice Note 21 (February 2014)**

15.2.29 Technical Advice Note (TAN) 21<sup>5</sup> discusses the waste hierarchy and notes the relevant EU Directives and National legislation relating to waste. It discusses strategic planning for waste management and the need for monitoring and data collection.

#### **Construction and Demolition Sector Plan (November 2012)**

15.2.30 The C&D Sector Plan<sup>6</sup> (6) plan was based on the Wales Construction and Demolition Waste Arising survey 2005-2006. The amount of C&D waste was estimated to be 12.2 million tonnes, dominated by aggregates and soils, which accounted for a combined 10.8 million tonnes and forming 89% of the arisings. The recycling rate was approximately 85% with 1.27 million tonnes disposed of to landfill.

15.2.31 The sector plan focusses on 'priority' materials that have the highest ecological footprint, the plan notes that over 75% of the ecological footprint is associated with wood (26.6%), plastic (17.5%), insulation and gypsum materials (12.5%), hazardous wastes (10%) and metals (9.5%).

15.2.32 The key actions addressed in the plan centre on:

- Waste prevention – reducing arisings by around 1.4% each year across the sector to achieve the 2050 goal. Minimising hazardous wastes was a key action;
- Preparing for re-use – items that are discarded should be prepared for re-use so that they can be used as a resource, and re-used by others;

<sup>5</sup> Technical Advice Note 21 Feb 2014

<sup>6</sup> Construction and Demolition Sector Plan Nov 2012

- Recycling – to ensure that wastes are segregated at source as far as practicable so they can be recycled to a high quality; and
- Other recovery/disposal – to ensure that wastes not suitable for re-use or recycling are segregated at source or collected in such a way that they are capable of being recovered in local applications, and to ensure that the retention of economic value in Wales from recovery operations is maximised.

15.2.33 The relevant overarching actions in the plan likely to be relevant at the Scheme level include:

- Encouraging producers of C&D waste to take note of the Welsh Government's 'Guidance on Applying the Waste Hierarchy';
- Encouraging clients, designers and contractors to prevent, minimise and recycle waste on C&D projects through the introduction of mandatory Site Waste Management Plans;
- Ensure the public sector uses its influence as the largest construction client in Wales through 'greening' of public procurement; and
- Consider Design for Deconstruction (D4D) in project design.

15.2.34 Waste prevention measures likely to be relevant at the project level identified in the plan include:

- Minimising wastage from over-ordering, consider take back options from suppliers;
- Encouraging the use of value engineering for large construction projects;
- Increasing awareness of designing out waste, particularly at the start of projects;
- Encouraging greater re-use of surplus materials; and
- Moving the use of demolition wastes up the waste hierarchy.

15.2.35 Actions to prepare wastes for re-use discussed in the plan and likely to be relevant at the project level include:

- Encouraging a reclamation led demolition approach; and
- Encouraging the implementation of the Institution of Civil Engineers Demolition Protocol, by raising awareness of the protocol within the C&D sector, as well as with potential clients.

15.2.36 Actions taken within the plan to implement the recycling objectives that are likely to be relevant at the project level include:

- Separate collection for paper, metal, plastic and glass;
- Encouraging use of alternative substitutes for aggregates, to make better use of waste as a resource; and
- Increasing the recycled content of products and materials used in Government funded projects.

15.2.37 Key benefits and outcomes from the plan relevant to the proposed Scheme include:

- Financial savings;
- Reduction in greenhouse gas emissions;
- Increased skills, employment and social justice;
- Replacing the need for primary aggregates;
- Reduced disposal to landfill; and
- Conservation of resources through recycling.

## **Local Planning Policy**

### *North Wales Regional Waste Plan (2008)*

- 15.2.38 The North Wales Regional Waste Plan <sup>7</sup> is reported to have been prepared by Flintshire County Council as lead authority. However, it has not been possible to obtain a copy of the plan although the Council have been consulted on this aspect.
- 15.2.39 An interim progress report on waste planning monitoring was produced by Flintshire County Council (lead authority for regional waste planning monitoring) in 2016 <sup>8</sup>. This noted that only sporadic surveys had been undertaken on construction and demolition wastes but that in 2024/25 there may be a requirement for between 200,000 and 250,000 tonnes of capacity for residual construction and demolition waste across Wales.

### **Conwy Local Development Plan 2007-2022 Adopted October 2013**

#### *Minerals and Waste Management Strategy*

- 15.2.40 The Conway Local Development Plan (LDP)<sup>9</sup> includes a Minerals and Waste Strategy.
- 15.2.41 Spatial Objective 14 notes the need to promote the prudent use of resources through the minimisation of waste and assist in providing an integrated network of waste management facilities consistent with the needs of the area and the waste hierarchy.
- 15.2.42 Spatial Objective 15 notes the need to contribute to regional and local mineral needs in a sustainable manner.
- 15.2.43 Strategic Policy DP/1 Sustainable Development principles notes the need to reduce waste production and manage waste recycling in line with Strategic Policy MWS/1 Minerals and Waste.
- 15.2.44 With regard to aggregates the strategy notes the need to take a long-term strategic approach to the supply of aggregates. It notes that there is no need or justification to allocate land for hard rock extraction however, the LDP does safeguard additional hard rock, sand and gravel resources. The strategy notes that the existing quarries at Penmaenmawr, Raynes (Lysfaen) and St George will provide the regional supply of hard rock. There are also permitted reserves at Llandulas Quarry and safeguarded sand and gravel resources (as identified on the Proposals Map). Policy MWS/3 safeguards these resources and notes that permission will not be granted for development within the safeguarded zones which could harm the long-term viability of working the resources. The Strategy notes that sand and gravel was not currently produced within the plan area. Policy MWS/4 Quarry Buffer Zones notes that there will be a presumption against inappropriate development in these zones.
- 15.2.45 The plan identifies the Llandulas Quarry landfill as one of the largest and most strategically located waste management facilities in North Wales, with good access to the A55. It notes that the main quarry has planning permission for landfilling and composting and that a number of possible future waste management facilities could be located at this site. Gofer is identified as the location of a previous landfill site that hosts a bulking station, transfer station and civic amenity site. Policy MWS/6 identifies these sites as locations for waste management facilities.

<sup>7</sup> North Wales Regional Waste Plan (2008)

<sup>8</sup> Interim Progress Report on Waste Planning Monitoring (2016)

<sup>9</sup> Conwy Local Development Plan 2007-2022 Adopted 2013

*Background Paper 20 Waste Management (March 2011)*

- 15.2.46 Background Paper 20 Waste Management <sup>10</sup> is referenced in the LDP. This refers to TAN 21, the use of the proximity principle and the waste hierarchy, Towards Zero Waste – Overarching Waste Strategy Document for Wales 2010 and the North Wales Regional Waste Plan 1<sup>st</sup> Review. The background paper identifies a number of waste management facilities within Conwy Borough and discusses forecast arisings for waste in the future, with a forecast of 223,390 tonnes of construction and demolition waste in 2013. Land requirements and locations for future waste management facilities are discussed in the paper to be included in the LDP to ensure that sufficient land is available up until 2022.

*Background Paper 29 Safeguarding Aggregate Resources (March 2011)*

- 15.2.47 Background Paper 29 Safeguarding Aggregate Resources<sup>11</sup> links to the LDP. This Paper defines primary aggregates as mineral resources worked directly to provide aggregates, which can include sand, gravel and crushed rock. It notes the risk that construction projects can sterilise aggregate resources and that national planning policies protect land that contains potentially valuable aggregate resources, a process known as safeguarding.
- 15.2.48 The Paper notes that mineral workings in the area have historically been concentrated along the coast and that this area still contributes significantly to regional aggregate production. It also notes that this is where the three remaining active hard rock quarries in the council area are located and that Conwy does not have permitted reserves of sand or gravel, supplies of which have been sourced from Gwynedd and North East Wales. The Paper considers aggregate production over the period 1999 to 2008 and notes that the quarries in Conwy make a significant contribution to regional and some of the national need for aggregates and that this would continue for the foreseeable future.

**Key Relevant Guidance**

*Design Manual for Roads and Bridges (DMRB)*

- 15.2.49 LA110 Materials Assets and Waste <sup>12</sup> is the key guidance provided in the DMRB. This replaces Interim Advice Note 153/11. The standard aligns with the Waste Directive.
- 15.2.50 The standard notes that the construction, improvement and maintenance of motorways and all-purpose trunk roads can result in environmental effects associated with the consumption and use of material assets, and the disposal or recovery of waste. It notes the need to identify, describe and assess the likely significant effects on the environment arising from material assets and the expected residues and emissions and the production of waste. The assessment is to include:
- The consumption of materials and products from primary, recycled or secondary and renewable sources, the use of materials offering sustainability benefits, and the use of excavated and other arisings that fall within the scope of waste exemption criteria; and
  - The production and disposal of waste.
- 15.2.51 The standard specifically states that consideration of the effects associated with transportation of materials do not form part of the assessment. It also notes the need to consider linkages

<sup>10</sup> Conwy LDP Background Paper 20

<sup>11</sup> Conwy LDP Background Paper 29

<sup>12</sup> Design Manual for Roads and Bridges Standard LA110 Material Assets and Waste (2019)

with other environmental factors, in particular geology and soils for potential sources of hazardous wastes and climate for quantifying emissions associated the use of materials.

15.2.52 The standard notes that the environmental assessment should include:

- A description of the proposed Scheme including the quantities and types of waste produced during the construction and operation cycles;
- A description of the likely significant effects of the proposed Scheme on the environment including the disposal and recovery of waste;
- The direct and indirect significant effects; and
- The interaction with other factors.

15.2.53 The assessment is required to follow the waste hierarchy to encourage options that deliver compliance with the Waste Directive and offer the best environmental outcome. Specifically, the guidance notes the need to consider:

- The principles of precaution and sustainability;
- Technical feasibility and economic viability;
- Protection of resources; and
- The proximity principle, that waste is to be disposed of in one of the nearest appropriate installations.

15.2.54 Where trans-boundary impacts are predicted then the need to consult with relevant planning authorities is noted.

15.2.55 The significance criteria in LA110 include the need to consider the recycled content of aggregates against regional targets. These are defined in the Annexes to LA110 but no specific values are quoted for Wales, therefore the average value for England of 25% has been adopted.

### **15.3 Study Area**

15.3.1 Two study areas have been considered comprising:

- i. The construction footprint including land needed for compounds and temporary land take; and
- ii. That defined by the available waste infrastructure that is suitable, in terms of licensed capacity (volume and type) to accept the anticipated arisings and waste from the proposed Scheme.

15.3.2 The first study area comprises the construction footprint/boundary including land need for compounds and temporary land take. This area also includes land needed for stockpiling and managing materials and waste. For the purposes of this assessment this has been referred to as 'land within the Scheme Boundary'.

15.3.3 The second study area is based on the available waste infrastructure. This has been based on a distance of 30 km reflecting the available facilities in the context of the anticipated arisings and wastes. For the purposes of this assessment this has been referred to as the 'Study Area'.

## 15.4 Methodology

- 15.4.1 The methodology outlined below is considered to be applicable for the assessment of Material Assets and Waste. As noted in Section 15.4.4, Section 15.6.1, Section 15.7.7 and Section 15.7.9 the assessment considers only the construction stage.

### Scope of the Assessment

- 15.4.2 Initial considerations with regard to the scope of the assessment were made based on the points shown in Table 15.1 which are noted in LA110.

**Table 15.1: Initial Review of Scope of Assessment**

Question	Response
Is the Scheme likely to recover/reuse little on-site material thereby requiring materials to be imported to site?	Yes - the Scheme is likely to re-use all of material cut. However, there is still a large net balance of imported material required for the Scheme
Is the Scheme likely to use little or no recycled or secondary materials thereby requiring the majority of the materials used on the project to comprise primary materials?	There are opportunities to re-use road planings and aggregates arising from removal of existing pavements and to re-use excavated materials  However, there is not a materials balance for the Scheme and there is a need to import materials to meet the requirement for fill. In the worst case this could require primary materials, even if all the excavated materials are reused the majority of materials (i.e. > than 50% of the material requirement) would still need to be imported
Is the Scheme likely to sterilise mineral sites or peat resources?	No
Would the Scheme generate large quantities of waste relative to regional waste capacity?	No – at this stage it is expected that requirements for landfill would be limited. The assessments undertaken indicate it should be possible to reuse virtually all of the planings at the site and the excavated materials
Will the Scheme have an effect on the ability of waste infrastructure within the region to continue to accommodate waste from other sources?	Unlikely – as there is a large net fill requirement, it is unlikely that there will be significant volumes of material that will need to be exported to local waste management facilities

- 15.4.3 On the basis of the above assessment the need for more detailed assessment was identified.

- 15.4.4 The scope of the assessment comprised the following:

- Assessment of the likely material requirements and waste arisings for the proposed Scheme;
- A review of the extent to which materials could be re-used within the proposed Scheme, particularly in the context of the earthworks cut/fill balance and opportunities to use recovered, recycled or secondary materials;
- A desk-based review of the key materials available in the Study Area;
- A desk-based review of available waste management facilities and potential sources of materials in the Study Area including disposal, re-use and recovery facilities and, where possible, the available capacity, either at individual sites or reported across the Study Area/Region;
- A review of historical land uses and potentially contaminative land uses (from the Geology and Soils chapter);

- A review of the proposed works for the construction phase against the baseline information and an assessment of the potential impacts and mitigation measures that might be required.

### Desk-based Assessment

15.4.5 Information was obtained from the following sources:

- Natural Resources Wales website<sup>13</sup>;
- North Wales Regional Technical Statement Appendix A (2019)<sup>14</sup>;
- Geology and Soils Chapter for information on ground conditions; and
- Outline engineering design for materials quantities.

### Site Walkover and Surveys

15.4.6 No site walkovers or surveys have been undertaken.

#### *Method of Baseline Data Collection*

15.4.7 Baseline data has been collected from the desk-based sources outlined in Paragraph 15.4.5 above.

#### *Assessment Methodology*

15.4.8 This section sets out the methodology by which the impacts have been assessed.

#### *Significance Criteria*

15.4.9 Significance criteria are defined in the DMRB standard and are shown in Table 15.2.

**Table 15.2: Significance Criteria**

Significance Criteria	Description of Effect/s
Very large	<p><b>Material Assets</b></p> <p>No criteria – use criteria for large categories</p> <p><b>Waste</b></p> <ul style="list-style-type: none"> <li>• &gt;1% reduction or alteration in national capacity of landfill, as a result of accommodating waste from the Scheme; or</li> <li>• Construction of new permanent waste infrastructure is required to accommodate waste from the Scheme</li> </ul>
Large	<p><b>Material Assets</b></p> <ul style="list-style-type: none"> <li>• Scheme achieves less than 70% overall material recovery/recycling (by weight) of non-hazardous Construction and Demolition Waste (CDW) to substitute primary materials;</li> <li>• Aggregates required to be imported to site constitute &lt;1% reused/recycled content; and</li> <li>• Scheme sterilises one or more mineral safeguarding site and/or peat resource</li> </ul>

<sup>13</sup><https://maps.cyfoethnaturiolcymru.gov.uk/Html5Viewer26/Index.html?configBase=https://maps.cyfoethnaturiolcymru.gov.uk/Geocortex/Essentials/REST/sites/Permitting/viewers/Permitting/virtualdirectory/Resources/Config/Default&locale=en-GB&version=26> accessed 16.10.2019

<sup>14</sup> Regional Technical Statement (2<sup>nd</sup> review) Appendix A (North Wales) September 2019<sup>15</sup> Regional Technical Statement (2<sup>nd</sup> review) Appendix A (North Wales) September 2019



Significance Criteria	Description of Effect/s
	<b>Waste</b> <ul style="list-style-type: none"> <li>&gt;1% reduction in the regional waste capacity of landfill as a result of accommodating the waste from the Scheme; and</li> <li>&gt;50% of the waste from the Scheme disposed of outside the region</li> </ul>
Moderate	<b>Material Assets</b> <ul style="list-style-type: none"> <li>Scheme achieves less than 70% overall material recovery/recycling (by weight) of non-hazardous Construction and Demolition Waste (CDW) to substitute primary materials; and</li> <li>Aggregates required to be imported to site comprise reused/recycled content below the relevant regional target</li> </ul> <b>Waste</b> <ul style="list-style-type: none"> <li>&gt;1% reduction in the regional waste capacity of landfill as a result of accommodating the waste from the Scheme; and</li> <li>1 to 50% of the waste from the Scheme disposed of outside the region</li> </ul>
Slight	<b>Material Assets</b> <ul style="list-style-type: none"> <li>Scheme achieves 70% to 99% overall material recovery/recycling (by weight) of non-hazardous Construction and Demolition Waste (CDW) to substitute primary materials; and</li> <li>Aggregates required to be imported to site comprise reused/recycled content in line with the relevant regional target</li> </ul> <b>Waste</b> <ul style="list-style-type: none"> <li>=&lt;1% reduction in the regional waste capacity of landfill as a result of accommodating the waste from the Project; and</li> <li>Waste infrastructure has sufficient capacity to accommodate waste from the Scheme, without compromising integrity of the receiving infrastructure (design life or capacity) within the region</li> </ul>
Neutral	<b>Material Assets</b> <ul style="list-style-type: none"> <li>Scheme achieves greater than 99% overall material recovery/recycling (by weight) of non-hazardous Construction and Demolition Waste (CDW) to substitute primary materials; and</li> <li>Aggregates required to be imported to site comprise &lt;99% reused/recycled content</li> </ul> <b>Waste</b> <ul style="list-style-type: none"> <li>No reduction in the regional waste capacity of landfill as a result of accommodating the waste from the Scheme</li> </ul>

15.4.10 The following information has been considered as part of considering the significance of the effects:

- Status of the impact (beneficial or adverse);
- Duration of the impact (short or long term);
- Permanent or Temporary;
- Direct or Indirect; and
- Significance (significant or not significant).

### *Status of the Impact*

15.4.11 The status of the impact has been assessed by considering whether the proposed Scheme would have a beneficial or adverse effect on the receptor, and whether the proposed Scheme would lead to a change in exposure.

### *Timescales*

- 15.4.12 In assessing the effect, the likely length of the effect has been considered. These have been summarised under the following timescales:
- Short term: <12 months;
  - Medium term: one-10 years;
  - Long term: +10 years; and
  - Permanent: effects that are considered to be 'irreversible' or extremely long-lasting.
- 15.4.13 Short term effects would arise principally within the construction phase, which is anticipated to be 24 months.
- 15.4.14 Medium term effects could arise associated with environmental maintenance and after care (anticipated to be up to five years).
- 15.4.15 Long term and/or permanent effects could arise during the operational phase of the proposed Scheme associated with maintenance of the highway and associated infrastructure. Long term effects could also arise in terms of loss of assets or capacity that cannot be readily replaced, for example, use of primary aggregates or loss of landfill capacity which have the potential to result in a long term change within the study area that extends beyond the construction period.

### *Permanent or Temporary*

- 15.4.16 In assessing whether an impact is permanent, the effect will be regarded as one which is not reversible and will last for the lifespan of the proposed Scheme and beyond.
- 15.4.17 A temporary effect was considered to be one that is reversible or where it ceases to be an issue at some point during the proposed Scheme.

### *Direct or Indirect*

- 15.4.18 Direct effects are considered to arise from activities associated with the proposed Scheme.
- 15.4.19 An indirect impact is one which is not considered to arise directly from the proposed Scheme or one which is already present and may continue after it has been constructed.

### *Significance of Effect*

- 15.4.20 Significance has been assessed based on the DMRB standard as shown in Table 15.3.

**Table 15.3: Definition of Significance**

Significance	Description
Significant (one or more criteria met)	<b>Material Assets</b> Category met for moderate or large effect
	<b>Waste</b> Category met for moderate, large or very large effect
Not significant	<b>Material Assets</b> Category description met for slight or neutral effect
	<b>Waste</b> Category description met for slight or neutral effect

### *Limitations to Assessment*

- 15.4.21 The assessment has been based on the design as developed at this stage. High level materials and waste quantities have been established for the design at this stage and used to develop the materials model, but the exact quantities and measures for handling materials and waste will depend on the developed design at the time of construction. At this stage the quantities are considered to represent a reasonable worst case, waste minimisation and optimisation of materials use would be considered further in the detailed design phase with a view to reducing waste and the need to import materials.
- 15.4.22 The assessment into Material Assets and Waste commenced prior to the issuing of the LA110 standard on the basis of a 30 km buffer around the proposed Scheme. The LA110 standard requires consideration of regional data which has been adopted where practicable, however, the use of a 30 km buffer has been retained for the purposes of defining waste management facilities. This is not considered to significantly affect the outcome of the assessment given that facilities are generally concentrated in the coastal strip along the A55 or on Anglesey.
- 15.4.23 As noted above in Section 15.2.38 it has not been possible to obtain a copy of the North Wales Regional Waste Plan which dates from 2008. This is not considered to be a material limitation given that it would be reasonable to assume that any key requirements of the plan would have been implemented by this time. On this basis, the proposed Scheme is unlikely to either adversely affect the implementation of the plan or not comply with requirements of the plan.

## **15.5 Consultations**

- 15.5.1 Table 15.4 summarises the consultation responses received and provides information on where and/or how they have been addressed in this assessment.

**Table 15.4: Consultation Responses**

<b>Consultee and Date</b>	<b>Type of Consultation</b>	<b>Issue/s Raised</b>	<b>Response/Action Taken</b>
Flintshire County Council – 11/10/2019	Email and telephone call	Telephone conversation and followed up via email the location of the North Wales Regional Waste Plan (2008)	No response
Denbighshire County Council 15/10/2019	Email	North Wales Regional Waste Plan	No response
Flintshire County Council 05/11/2019	Email	North Wales Regional Waste Plan	No response
Flintshire County Council 20/12/2019	Email	North Wales Regional Waste Plan	No response
North and Mid Wales Trunk Road Agency (NMWTRA) 17/12/2019 to 10/01/2020	Email	Liaison with NMWTRA regarding operational activities	Information provided, note NMWTRA do not hold detailed records of the material assets used or waste generated
North Wales Minerals and Waste Planning Service 29/01/2020	Email	North Wales Regional Waste Plan	No response at the time of issue

## 15.6 Potential Effects Scoped Out of Assessment

- 15.6.1 It is anticipated that operational phase effects will be similar to those for the existing highway and therefore these have been scoped out.
- 15.6.2 The decommissioning phases for the proposed Scheme has also been scope out of the assessment. This is because the proposed Scheme will have a design life of 60 to 120 years and it is not possible to predict the effects at the time of decommissioning.

## 15.7 Baseline Environment

### Material Assets and Waste Statistics UK and Wales

- 15.7.1 Information used to inform the materials assets has been sourced from the Regional Technical Statement (2<sup>nd</sup> review) Appendix A (North Wales) September 2019<sup>15</sup>.
- 15.7.2 With regard to waste DEFRA and the Government Statistical Department, jointly published the most recent figures on waste in March 2019<sup>16</sup>.
- 15.7.3 This shows that the UK generated 66.2 million tonnes of non-hazardous construction and demolition waste in 2016, of which 91.0% was recovered. The rates of recovery have been similar between 2010 and 2016.
- 15.7.4 In comparison in 2010, the UK generated 49.5 million tonnes of non-hazardous construction and demolition waste; 87.6% of which was recovered.
- 15.7.5 A survey of construction and demolition waste in Wales was undertaken in 2012. This showed that the Welsh construction and demolition sector produced 3.4 million tonnes of waste with a re-use, recycling and other recovery rate of 87%. Of these wastes 639,000 tonnes (19%) was sent to landfill. An estimated 38,000 tonnes of hazardous wastes were generated in the sector, representing around 1% of the total sector waste.

### Types and Quantity of Material Use Associated with the Operation of the Existing Road

- 15.7.6 Consultation has been held with North and Mid Wales Trunk Road Agency (NMWRTA) on the operational activities and frequencies, the key activities were as shown in Table 15.5.

**Table 15.5: Key Operational and Maintenance - Material Assets**

Maintenance	Activity/Frequency
Winter maintenance gritting	The highway is gritted during winter in accordance with the winter maintenance decision matrix of the TRMM. The rate of spread can vary from 10 gsm upwards.
Future end of life resurfacing planning waste including road markings and studs	This depends upon the material used for surfacing – e.g. thin surfacing is currently replaced approximately every eight-10 years with road markings (road markings are also refreshed (sprayed over) approximately every five years). HRA would be 20-30 years
Replacement of end of life lighting columns, LED lanterns and VMS components	Replaced at the end of the design life (LED lanterns 18 years, steel street lighting columns 30 years, aluminium street lighting columns 45 years and MS4 signs 15 years)

<sup>15</sup> Regional Technical Statement (2<sup>nd</sup> review) Appendix A (North Wales) September 2019

<sup>16</sup> UK Waste Statistics 2019

Maintenance	Activity/Frequency
Replacement of end of life boundary fencing, VRS, signs	Based on DMRB design life.

- 15.7.7 It is anticipated that after the first year operational phase effects will be similar to those for the existing highway and therefore these have been scoped out.

### Types and Quantities of Waste Associated with the Operation of the Existing Road

- 15.7.8 Consultation has been held with North and Mid Wales Trunk Road Agency (NMWRTA) on the operational activities and frequencies, the key activities were as shown in Table 15.6.

**Table 15.6: Key Operational and Maintenance Waste Arisings**

Maintenance	Activity/Frequency
Gully emptying waste	The Trunk Road Maintenance Manual (TRMM) stipulates that catch pit chambers/gullies are cleansed once a year with an additional intelligence leaf cleansing during the winter periods (in leaf fall areas). On the dual carriageway records show that chambers are generally one-third to two-thirds full when they are cleansed annually.
Ditch clearing	TRMM stipulates that ditches are cleansed if identified for cleansing following inspection (every five years). Generally, ditches are cleansed every five to seven years (concrete channels are generally cleansed annually) with the material left in situ or taken off site for disposal.
Litter	The Local Authority is responsible for litter collection on this section of the A55 (litter is collected a minimum of once a year before/after cutting the grass)
Cut and collect grass cutting	Currently grass is collected and taken off site or left in piles in situ once a year if the area is identified as a wildflower plot
Tree and other vegetation maintenance	Trees are checked/maintained annually for encroachment/felling/thinning
Future end of life resurfacing planning waste including road markings and studs	This depends upon the material used for surfacing – e.g. thin surfacing is currently replaced approximately every eight-10 years with road markings (road markings are also refreshed (sprayed over) approximately every five years). HRA would be 20-30 years
Replacement of end of life lighting columns, LED lanterns and VMS components	Replaced at the end of the design life (LED lanterns 18 years, steel street lighting columns 30 years, aluminium street lighting columns 45 years and MS4 signs 15 years)
Replacement of end of life boundary fencing, VRS, signs	Based on DMRB design life.

- 15.7.9 It is anticipated that operational phase effects after the first year will be similar to those for the existing highway and therefore these have been scoped out.

### Availability of Key Construction Materials required for the Scheme

- 15.7.10 Aggregates will be required for the construction of the proposed Scheme, including potentially to provide general fill given the current shortfall in the materials balance. The exact sources of aggregates cannot be defined at this stage and therefore consideration has been given to available materials across the Study Area. Consideration has been given to both primary aggregates which are discussed below and secondary/recycled aggregates, which are discussed below.

- 15.7.11 The Regional Technical Statement Appendix A<sup>17</sup> states that Carboniferous limestone is currently worked at two quarries in Conwy (Raynes (16.2 km east) and Abergele (25.4 km east) and in three quarries on Anglesey (Aber (23.5 km north west), Nant Newydd and Rhuddian Bach (located close to each other 25 km west north west).
- 15.7.12 Igneous rock reserves are also available including Precambrian Coedana Granite of Anglesey (worked at Gwalchmai (34.4 km west), Gwyndy (33.2 km west) and Gaerwen Quarries (25.1 km west). Granite of unknown age is reported to be currently worked at Trefor Quarry (location not identified) on the north coast of the Llyn Peninsula, with Ordovician diorite worked at Penmaenmawr quarry (1.3 km south west) on the Conwy Coast. Ordovician dolerite is worked at two locations outside the Study Area, Minffordd in Gwynedd (40.8 km south west) with other igneous rocks at Nanhoron Quarry on the Llyn Peninsula (62.6 km south west).
- 15.7.13 Precambrian and Ordovician slates are currently worked as either primary aggregate or from previously discarded slate waste at numerous sites in Gwynedd and two sites within Snowdonia National Park.
- 15.7.14 Glaciofluvial sand and gravel deposits are primarily found in the northern Gwynedd area of the Llyn Peninsula, which are currently worked at Penygroes (35.1 km south west) and Cefn Grainog Farm (28.1 km south west). Sand is currently worked at Chwarel Bryncir (40.8 km south west). The BGS has mapped small resources of sand and gravels across the region but they are not currently worked.
- 15.7.15 Llandulas Quarry is discussed in the Conwy LDP Background Paper 20 (10) which notes that it was only worked briefly between 1997 and the date of the paper in March 2011 to provide engineered rock and void space for the landfill site which is located at the site. On this basis it does not form a source of materials as part of the baseline.
- 15.7.16 Table A6 of the Regional Technical Statement Appendix states the permitted reserves of sand and gravel in the region to be 15.2 Mt at 2016. This is mainly from the Wrexham area and therefore lies outside the Study Area. Table A7 stated that there were 175.2 Mt existing permitted reserves, at 2016, of crushed rock. This is shown to be mainly from Flintshire, Conwy and Snowdonia National Park areas.
- 15.7.17 The Regional Technical Statement notes that the national figure for future primary, land won aggregates provision is calculated to be 20.224 million tonnes per annum (mtpa) and that this is only marginally higher than the recorded sales of 20.11 million tonnes for 2007. This takes account of demand from all sectors, including infrastructure Schemes. The report notes that for the North West Wales sub region (Conwy, Gwynedd and Isle of Anglesey) the existing supply pattern is well balanced with the supplies sourced from primarily outside the National Park and the Area of Outstanding Natural Beauty and well distributed between Conwy and Gwynedd, with more limited supplies from Anglesey to local markets. Table A1 of the report notes that the average sales in North Wales to 2016 were 6.155 mtpa, of which 86.6% was from crushed rock sources.

### *Secondary and Recycled Aggregates*

- 15.7.18 The Regional Technical Statement (13) notes that no reliable monitoring data on recycled and secondary aggregate production is currently available for any part of the UK but estimates are that these materials now comprise 30% of the overall supply and that most material suitable for

<sup>17</sup> Regional Technical Statement Appendix A

aggregates use (construction, demolition and excavation waste) is already being recovered and utilised.

- 15.7.19 The Statement outlines that in Conwy, Flintshire and Denbighshire no substantial sources of secondary or recycled aggregates were identified, with the exception of small-scale slate waste tips which are being reworked. In these areas recycled aggregate production was considered to be small scale, associated with construction, demolition and excavation wastes from the towns along the North Wales coast although in Flintshire it was noted that dredgings from the Dee Estuary are landed at Mostyn Dock and have been used as low specification construction fill. The amounts of materials arising from construction, demolition and excavation waste were likely to be greater in Flintshire and Wrexham because of the higher level of industrial and commercial development. In Gwynedd crushed slate formed a more substantial part of the aggregates in use and this material has been used as bulk fill.
- 15.7.20 In August 2019, Gwynedd Council put the slate areas of North West Wales forward for UNESCO World Heritage status. The proposals could ban quarrying and revoke extant mineral working permissions. If implemented this could affect both the generation of secondary or recycled aggregates and the future demand for other sources of primary crushed rock aggregates as slate waste and quarried slate accounted for an average 9.7% of the total crushed rock sales between 2008 and 2016.
- 15.7.21 It is anticipated that the Carboniferous Limestone, igneous rocks and glacio-fluvial sand and gravel deposits would be suitable for use in road construction. The Precambrian and Ordovician slates have also been used in road construction in North Wales, including slate waste.
- 15.7.22 Other key construction materials comprise concrete (ready mix and precast, for example kerbs), steel (reinforcement, barriers), bricks, pipes (concrete and plastic), timber (fencing, formwork and other potential uses) and tarmac for the highway pavement. Concrete plants are noted at Abergele and Rhyl, and asphalt plants at Abergele, Penmaenmawr and Bangor<sup>18</sup>.

### **Presence and Capacity of Landfill Facilities to be Utilised by the Scheme**

- 15.7.23 The exact landfill facilities to be utilised cannot be defined at this stage and therefore consideration has been given to available facilities across the Study Area.
- 15.7.24 A total of seven landfills have been identified within 30 km of the proposed Scheme, as shown in Table 15.7. Locations of waste management facilities in North Wales and within the 30 km Study Area are shown in Figures 15.2 and 15.3.

**Table 15.7: Landfills within the Study Area**

Site Name	Town/City	Local Authority	Operator	Limit (tpa)	Category	Distance (km)
Penhesgyn Gors Landfill (Area 2)	Menai Bridge	Isle of Anglesey	Cyngor Sir Ynys Mon	0	Hazardous Waste Landfill Site	19.58
Penhesgyn Gors Landfill (Area 3)	Menai Bridge	Isle of Anglesey	Cyngor Sir Ynys Mon	0	Non-hazardous Landfill Site	19.72

<sup>18</sup> <https://www.agg-net.com> accessed 20.10.2019

Site Name	Town/City	Local Authority	Operator	Limit (tpa)	Category	Distance (km)
Nant Y Garth Landfill Site	Portdinorwic	Gwynedd	Treborth Leisure Limited	75,000	Inert Landfill Site	20.33
Ty Mawr Farm Landfill	Abergele	Conwy	Griffiths Griffith Wyn, Edward Lloyd And Gwenfrai Rees	99,000	Inert Landfill Site	21.05
Nant Newydd Quarry Landfill Site	Brynteg	Isle of Anglesey	Clive Hurt (Plant Hire) Ltd	125,000	Inert Landfill Site	24.59
Rhuddlan Bach Quarry Landfill Site	Brynteg	Isle of Anglesey	Clive Hurt (Plant Hire) Ltd	125,000	Household, C&I Transfer Stations; Inert Landfill Site	24.63
Pontrug Landfill - Part Ordnance Survey 3990	Caernarfon	Gwynedd	Watkin Jones & Son Ltd	0	Inert Landfill Site	26.72

15.7.25 Of these three have no quoted capacity, this includes the only hazardous waste landfill at Menai Bridge, 19 km from the proposed Scheme. Of the remaining sites there is a total limit of 424,000 tonnes per annum; however, all of these sites are licenced for inert waste.

15.7.26 The closest non-hazardous landfills are noted to be at Caernarfon, 39.5 km from the proposed Scheme with a limit of 40,000 tonnes per annum and at Harlech, 45.7 km from the proposed Scheme with a limit of 18,000 tonnes per annum. The closest hazardous waste landfill listed on the NRW website is located 192 km from the proposed scheme in South Wales. On this basis it is considered that hazardous waste would most likely be transferred to North West England where several suitable landfill sites are present.

#### **Presence and Capacity of Material Recovery/Recycling Facilities to be Utilised by the Scheme**

15.7.27 The exact material recovery and recycling facilities to be utilised by the proposed Scheme cannot be defined at this Stage and therefore consideration has been given to available facilities across the Study Area.

15.7.28 A total of twenty-nine waste management facilities have been identified within 30 km of the proposed Scheme. The licence types cover a range of waste streams, as shown in Table 15.8. Locations of waste management facilities in North Wales and within the 30 km Study Area are shown in Figure 15.2 and Figure 15.3.



**Table 15.8: Waste Management Facilities within the Study Area**

<b>Site Name</b>	<b>Town/City</b>	<b>Local Authority</b>	<b>Operator</b>	<b>Limit (tpa)</b>	<b>Category</b>	<b>Distance (km)</b>	<b>Available to Scheme?</b>
Worldcare Recycling	Llandudno Junction	Conwy	Worldcare Recycling Limited	75,000	Use/treatment of inert waste for land reclamation or construction	6.89	Yes
Worldcare Wales Ltd	Llandudno Junction	Conwy	World Care (wales) Ltd	0	Household, C&I Transfer Stations (including treatment)	6.92	Yes - but no capacity noted
Caerhun Farm	Conwy	Conwy	Sion Roberts	4,000	Open Windrow Composting	7.89	Yes
Morfa Uchaf	Conwy	Conwy	Alwyn Jones Limited	49,999	Use/treatment of inert waste for land reclamation or construction	10.14	Yes
Bron Y Nant Road Waste Transfer And Materials Reclamation Facility	Colwyn Bay	Conwy	Conwy County Borough Council	22,671	Household, C&I Transfer Stations (including treatment)	10.15	No - Council operated site
Llandygai Transfer Station	Bangor	Gwynedd	Watkin Jones & Son Ltd	0	Household, C&I Transfer Stations (including treatment)	14.9	Yes – but no capacity noted
G Lock Scrap Metal Processors	Bangor	Gwynedd	Philip Lock	149,998	Metal Recycling Site; End of life vehicle facility	14.91	Yes
Penrhyn Quarry	Bangor	Gwynedd	Welsh Slate Ltd	0	Inert Waste Transfer Stations (including treatment)	15.87	Yes - but no capacity noted
Plas Y Dre, Llanwrst	Llanwrst	Conwy	Conwy County Borough Council	0	Household, C&I Transfer Stations	16.81	No - Council operated site
Llanddulas Quarry Waste Treatment Centre	Abergele	Conwy	Hogan Waste Limited	110,000	C&D MRF; further materials processing for recycling; Household, C&I Transfer Stations (including treatment)	16.82	Yes

Site Name	Town/City	Local Authority	Operator	Limit (tpa)	Category	Distance (km)	Available to Scheme?
Llanddulas Composting Facility	Conwy	Conwy	3 C Waste Ltd	20,000	Open Windrow Composting	17.45	Yes
Cae Uchaf Farm	Menai Bridge	Isle of Anglesey	Glyngwyn Foulkes	35,000	Use/treatment of inert waste for land reclamation or construction	19.3	Yes
Sp Power Systems	Bangor	Gwynedd	S P Power Systems Ltd	5,000	Hazardous Waste Transfer Stations (including treatment)	19.53	No – Scottish Power site
Penhesgyn Waste Transfer and Materials Recovery Facility	Llansadwrn	Isle of Anglesey	Isle Of Anglesey County Council	75,000	Household, C&I Transfer Stations (including treatment)	19.67	No - Council operated site
Penhesgyn In Vessel Composting Facility	Menai Bridge	Isle of Anglesey	Isle Of Anglesey County Council	25,000	In-Vessel Composting	19.67	No- Council operated facility
Gofer Bulking Station	Abergele	Conwy	Conwy County Borough Council	24,999	Use/treatment of inert waste for land reclamation or construction	24.19	No- Council operated facility
Coed Bolyn Mawr	Caernarfon	Gwynedd	Robert Davies and Jennifer Ann Davies	250,000	Inert Waste Transfer Stations (including treatment)	22.47	Yes
Rhuddlan Bach Quarry Landfill Site	Brynteg	Isle of Anglesey	Clive Hurt (Plant Hire ) Ltd	125,000	Household, C&I Transfer Stations; Inert Landfill Site	24	Yes
Bwlch Gwyn Quarry	Gaerwen	Isle of Anglesey	Anglesey Aggregates Ltd	75,000	Use/treatment of inert waste for land reclamation or construction	25.13	Yes
Thomas Skip And Plant Hire Ltd	Caernarfon	Gwynedd	Thomas Skip & Plant Hire Limited	74,999	Household, C&I Transfer Stations	25.57	Yes

Site Name	Town/City	Local Authority	Operator	Limit (tpa)	Category	Distance (km)	Available to Scheme?
Anglesey C C Highways Depot	Gaerwen	Isle of Anglesey	Dawnus Construction Holdings Limited	74,999	Inert Waste Transfer Stations (including treatment)	25.71	Yes
Phoenix Metals And Colin Davies Non-ferrous Metals	Ynys Mon	Isle of Anglesey	Alwyn Davies and Colin Davies	24,999	Metal Recycling Site	25.72	Yes
Green Skips Environmental Ltd	Gaerwen	Isle of Anglesey	Green Skips (Environmental ) Ltd	0	Household, C&I Transfer Stations (including treatment)	25.82	Yes – but no capacity noted
Cymru Lan	Gaerwen	Isle of Anglesey	Cymru Lan Cyfyngedig	69,000	Household, C&I Transfer Stations (including treatment)	25.88	Yes
Kinmel Park Depot	Bodelwyddan	Denbighshire	Denbighshire County Council	25,000	Household, Commercial and Industrial Transfer Stations	26.67	No – Council operated site
Caergyfchu Waste Management Facility	Caernarfon	Gwynedd	Gwynedd Council	40,000	I&C MRF; Household, C&I Transfer Stations; Household Waste Recycling Centres	26.91	No – Council operated site
Dirtbusters	Kinmel Bay	Conwy	Philip And Michael Garratt	5,000	Household, C&I Transfer Stations (including treatment)	26.92	Yes
Gwynedd Skip And Plant Hire Ltd	Caernarfon	Gwynedd	Gwynedd Skip And Plant Hire Ltd	75,000	Household, C&I Transfer Stations (including treatment)	27.12	Yes
Pilkington Asbestos Removal Services Ltd	Rhyl	Denbighshire	Pilkington Asbestos Removal Services Ltd	3,650	Hazardous Waste Transfer Stations (including treatment)	29.11	Yes

- 15.7.29 Household waste recycling centres have been excluded on the basis they would not accept large quantities of commercial waste.
- 15.7.30 Of the sites recorded twelve are not considered to be viable for the proposed Scheme. This is because they either have no capacity listed, are owned by power companies (and therefore likely to be a private) or because they are Council operated facilities.
- 15.7.31 There are two metal recycling sites, one 14.9 km from the proposed Scheme and the other 25.7 km distant, with a total limit of 174,997 tonnes per annum.
- 15.7.32 Four sites are recorded for the use/treatment of inert waste for land reclamation or construction, located between 6.89km and 25.13 km from the proposed Scheme. These are potential sources of materials for the Scheme. These sites have a combined limit of 234,999 tonnes per annum. One further site for the use/treatment of inert wastes for land reclamation or construction was noted, however this was a Council operated facility, included as a site not considered viable for the proposed Scheme in Paragraph 15.7.30.
- 15.7.33 Two sites have been identified that carry out composting (described as open windrow composting) that are considered to be suitable for composting of green wastes that could arise from the proposed Scheme. These are 7.89 km and 17.45 km from the proposed Scheme. These sites have a combined limit of 24,000 tonnes per annum.
- 15.7.34 One hazardous waste transfer site has been noted, at Rhyl, with a limit of 3,650 tonnes per annum. This is noted to be associated with asbestos removal and so may not be available for all hazardous wastes.
- 15.7.35 The remaining seven sites are described as transfer stations and have a total limit of 703,998 tonnes per annum.

#### **Location of Mineral Sites and Peat Resources in Relation to the Scheme**

- 15.7.36 No active mineral sites have been identified either within the Scheme Boundary or immediately adjacent to the proposed Scheme.
- 15.7.37 There are a number of locations in the vicinity of the proposed Scheme shown to be safeguarded hard rock reserves and safeguarded sand and gravel. There is also a quarry buffer zone around Penmaenmawr Quarry. These areas are identified on the adopted Local Development Plan maps<sup>19</sup>.
- 15.7.38 The closest active mineral site to the proposed Scheme that has been identified is Penmaenmawr Quarry. The quarry forms part of the identified safeguarded hard rock reserves and, as noted above, has a buffer zone around it. The proposed Scheme does not affect the safeguarded area or the buffer zone associated with the quarry. The closest point on the safeguarded area and buffer area associated with the quarry lies approximately 1 km to the south west of the Scheme Boundary. The safeguarded area and buffer zone are shown in Figure 15.4. and Figure 15.5.

<sup>19</sup><http://conwy.opus3.co.uk/ldf/maps/Adopted%20LDP#x=283292.59887709&y=362595.55235803&scale=175000>

- 15.7.39 The proposed Scheme does lie partly over two further areas of safeguarded hard rock reserves east of Penmaenmawr; however, the existing A55 already crosses these safeguarded areas and the proposed Scheme does not significantly alter the amount of safeguarded land affected. These safeguarded hard rock reserves are shown in Figure 15.4.
- 15.7.40 The proposed Scheme also lies partly over safeguarded sand and gravel areas close to Junction 16A, however, the existing A55 already crosses these safeguarded areas and the proposed Scheme does not significantly alter the amount of safeguarded land affected. These safeguarded sand and gravel areas are shown in Figure 15.6.
- 15.7.41 No peat resources have been identified within the Scheme Boundary or in the immediate vicinity of the Scheme Boundary<sup>20</sup>.

### Construction

#### *Materials Required for Construction and Potential to Contain Secondary/Recycled Content*

- 15.7.42 The types and quantities of materials required to construct the proposed Scheme have been assessed as shown in Table 15.9.

**Table 15.9: Types and Quantities of Materials Required for Construction**

Material Type	Estimated Quantity (tonnes)	Potential to Contain Secondary/Recycled Content?
<b>Aggregates</b>		
Pavement foundation (600 mm)	52,211	Yes
Filter Drain	1,300	
<b>Ready-mix concrete</b>		
Kerb backing	497	No
Manholes	493	
Ducting	493	
Small sign foundations and single posts	29	
ADS foundations	216	
CSB incl. foundation	6000	
Structures: Glan y Afon	326	
Structures: Maes y llan Wall	4,207	
Structures: J16a Overbridge	3,264	
Structures: Dwygyfichi Foot bridge	1,157	
<b>Pre-cast concrete</b>		
Kerbs	331	Yes
Manholes	411	
Gullies	73	
Headwalls	120	

<sup>20</sup> BGS website <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> accessed 21.10.2019

Material Type	Estimated Quantity (tonnes)	Potential to Contain Secondary/Recycled Content?
Structures: J16a overbridge	672	
Culverts	113	
<b>Steel</b>		
Vehicle restraint Barrier	82.7	Yes
Lighting columns (8 m)	15.8	
Noise barrier (steel only)	6	
Signs (600 mm dia sign on 2.5 m post)	0.75	
Manhole covers (600x600)	13.7	
Gully gratings (425x425)	15.1	
Structures: Glan y Afon bridge	14	
Structures: Maes y llan wall	190	
Structures: J16a overbridge	207	
Structures: Dwygyflchi foot bridge	245	
<b>Asphalt</b>		
Inlay / overlay (100 mm average)	3,686	No
Full depth Trunk (300 mm)	20,359	
Full depth county (200 mm)	6,740	
<b>Plastic (e.g. pipework)</b>		
Pipework	37.2	Yes
Ducting	21.1	
<b>Timber</b>		
Post and four rail fence	55.4	No
Fencing to properties (1.8 m)	0	
Noise barrier (2 m)	16.5	
<b>Brick</b>		
Walls	43.1	No
Manhole cover risers	51.7	

- 15.7.43 The use of secondary or recycled aggregates in ready mix concrete and in asphalt is possible dependent on the exact specification. However, at this stage it has been assumed that these materials would not contain secondary or recycled aggregates although this could be detailed in the specification, subject to confirmation from the overseeing organisation.
- 15.7.44 Timber is subject to legal and sustainability credentials, for example, Forest Stewardship Council (FSC) accreditation and is a renewable material. On this basis it is not subject to the incorporation of recycled/secondary content though it may be possible to use recycled timber for some construction uses.

### Known Sustainability Credentials of Materials to be Consumed

- 15.7.45 At this stage it is not possible to define the sustainability credentials of the materials to be consumed. This is because the exact materials to be used have not yet been specified, this will form part of the detailed design and the specification.

### Type and Quantities of Materials that will be Recovered from Off Site Sources for Use on the Scheme

- 15.7.46 At this stage it is anticipated that the following materials could be recovered from off-site sources for use on the Scheme:

- General fill, in particular to address the shortfall in the cut fill balance; and
- Pavement foundation aggregates.

- 15.7.47 It is probable that a proportion of these materials could be sourced from sites for the use/treatment of inert waste for land reclamation or construction identified in the search of waste management facilities. However, the volumes required are large and for this reason it has been assumed, on a worst-case basis, that it is not possible to meet the whole of the requirement from these sources.

### Cut Fill Balance

- 15.7.48 The cut fill balance associated with the earthworks for the proposed Scheme has been assessed and indicates a shortfall of 113,120 m<sup>3</sup>, as shown in Table 15.10. The cut fill balance is relevant to the overall assessment as it defines the amount of material that can be 'won' from the proposed Scheme and whether there is an excess which might require materials to be taken off site, or a deficit requiring materials to be imported. In this case there is a deficit, the amount of material cut is less than the fill required.

**Table 15.10: Cut and Fill Volumes/Tonnages**

Cut Volume (m <sup>3</sup> )	Fill Volume (m <sup>3</sup> )	Cut tonnes) <sup>21</sup>	Fill (tonnes)
32,820	145,940	59,076	262,692

### Details of On-site Storage and Stockpiling Arrangements

- 15.7.49 Details of on-site storage and stockpiling arrangements are not available at this stage; however, it is not anticipated that there will not be a significant requirement as materials will be either excavated and placed directly or removed from the site. It is currently anticipated that overall, there will be some importation of bulk fill because a balance cannot be achieved. It is anticipated that fill will be imported when required rather than stockpiled for extended periods. Notwithstanding this, consideration has been given to the potential requirements and temporary areas have been identified within the red line boundary and incorporated within the draft Compulsory Purchase Order to accommodate storage of topsoil and excavated materials.

<sup>21</sup> Based on density 1.8 t/m<sup>3</sup>, no allowance for bulking

## Waste Arising

### *Waste Recovered or Diverted from Landfill*

- 15.7.50 It is anticipated that the following materials Table 15.11 could be recovered or diverted from landfill.

**Table 15.11: Materials Recovery and Diversion**

Material	Estimated Quantity
Any non-paved areas, subject to no contamination being present, would be used as fill material on site	Assuming 58,076 tonnes of the arisings from the cut fill assessment are reused and are diverted from landfill. One location recorded contaminated soils although at depth and in an area which would not be disturbed by the works. An allowance of 1,000 tonnes (approximately 1.5%) has been made for the risk that other pockets of contaminated soils could arise.
Road planings	Assuming 100% of the road planings are reused would equate to 13,855 tonnes diverted. The review of the contaminated land assessment indicates that it should be possible to reuse all of the materials.
Aggregates recovered from the existing road construction	Assuming all of this material can be reused equates to 5,484 tonnes diverted.
Green waste	Diverted for composting, assumes 500 tonnes diverted.
Off cuts, surplus materials and waste from site operations/offices	Segregated to maximise the opportunities for reuse and recycling – allowance of 350 tonnes over the construction period (based on 5 tonnes of waste (one skip) per week over 100 weeks with 70% reused/recycled)
Waste contaminated soils arising from the earthworks	1,000 tonnes residue allowed against the possibility of encountering contaminated soils that cannot be reused in the works, it has been assumed that this would be sent to a soil recycling centre rather than to landfill

### **Types and Quantities of Waste Arising from Construction Requiring Disposal to Landfill**

- 15.7.51 It is anticipated that the wastes arising from construction requiring disposal to landfill is as shown in Table 15.12.

**Table 15.12: Waste Requiring Disposal to Landfill**

Type	Estimated Quantity/Allowance
Invasive species	250 tonnes (allowance)
Waste from off cuts, surplus materials and site operations/offices assuming 70% recycling	150 tonnes (allowance)

- 15.7.52 It has been assumed that it will be possible to reuse all but 1,000 tonnes of the excavated materials arising from the proposed Scheme and all of the tarmac planings from the existing highway. The assumption on re-use of the excavated materials is based one location which recorded contaminated soils which would be unsuitable for re-use. Although this location is at depth and in an area which would not be disturbed by the works an allowance of 1,000 tonnes has been made to cater for the possibility that other pockets of contaminated soils could arise.

### **Details of On-site Storage and Segregation Arrangements for Waste**

- 15.7.53 Details of on-site storage and segregation arrangements for waste are not available at this stage. It is currently anticipated that wastes will be segregated on site in accordance with a



defined Site Waste Management Plan. Typically, this would involve separate skips clearly marked with the wastes to be deposited in each one together with measures to monitor the quantities of waste generated and recycled. Notwithstanding this, consideration has been given to the potential requirements and temporary areas have been identified within the red line boundary and incorporated within the draft Compulsory Purchase Order to accommodate storage of topsoil and excavated materials.

## **15.8 Assessment of Effects**

- 15.8.1 A full description of the proposed works has been provided in Chapter 2.
- 15.8.2 An assessment of the effects has been undertaken using the significance criteria defined in Table 15.2. The assessment methodology outlined in the standard does not make use of a matrix approach but uses defined criteria for materials assets and for wastes as described in Table 15.2. The assessment has taken account of the incorporated mitigation measures that are outlined in Section 15.9 and is reported in Table 15.13 for material assets and Table 15.14 for wastes.

## **15.9 Incorporated Mitigation**

- 15.9.1 Mitigation measures to manage materials and waste on site will be detailed in the Construction Environmental Management Plan (CEMP) to be prepared prior to the construction works commencing and developed to ensure full compliance with relevant and current policy, guidelines and best practice. Sustainability commitments and targets will be incorporated into the CEMP.
- 15.9.2 The following list presents the assumptions that have been made for the purposes of this ES in terms of incorporated mitigation, with the proviso that the list is not exhaustive:
- a) A CEMP will be prepared which will be compliant with all relevant construction best practice and codes of practice. This will include compound establishment and activities such as materials storage and waste management. A pre-construction CEMP is included in Chapter 21;
  - b) Although there is no longer a mandatory requirement for a Site Waste Management Plan (SWMP) a plan will be developed, a pre-construction SWMP is included in Chapter 21;
  - c) Measures would be adopted during the construction works to mitigate environmental effects of ground works including the stockpiling of soils;
  - d) Relevant pollution control measures will be observed during construction in line with current legislation and best practice, this is also discussed in the pre-construction management plans in Chapter 21; and
  - e) Construction will be compliant with the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, in order to protect soil quality during excavation right through to reinstatement.
- 15.9.3 The following tables provide the effects assessments assuming that these mitigation measures have been adopted.
- ## **15.10 Effect Assessment – Construction Stage**
- 15.9.4 The assessment in Table 15.13 and 15.14 has been undertaken to determine potentially significant effects for the construction stage.

**Table 15.13: Categorisation of Effects – Construction Stage – Material Assets**

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Significant Effect?	Commentary
Overall material recovery/recycling by weight of non-hazardous construction and demolition waste	Beneficial	Short/medium term	Temporary	Direct	No	<p>It is estimated that more than 70% of non-hazardous CDW waste will be recovered or recycled.</p> <p>A significant effect would be when the proposed Scheme achieves less than 70% recovery or recycling.</p> <p>The CEMP and SWMP will contribute to managing wastes and ensuring that materials are recovered or recycled where this is appropriate.</p>
Reused or recycled aggregate content	Adverse	Long term/permanent	Permanent	Direct	Yes	<p>There is an earth works import requirement of 113,120 m<sup>3</sup> on top of which there are the aggregates required for the proposed Scheme construction. Opportunities would be sought to use recycled materials, especially for earthworks fill and for aggregates where this can be accommodated in the specification but on a worst-case basis it could be necessary to fulfil the whole of these requirements with primary aggregates. This would be a significant effect though given the available capacity in the regional aggregates market would only amount to 3.3% of sales in the North Wales region.</p> <p>A significant effect would be when the content of reused or recycled aggregates is below the regional target.</p>
Sterilisation of mineral sites or peat resources	Adverse	Long term/permanent	Permanent	Direct	No	<p>It is not anticipated that any mineral sites or peat resources will be sterilised by the proposed Scheme.</p> <p>A significant effect would be when one or more mineral site or area of peat resource was sterilised.</p>

**Table 15.14: Categorisation of Effects – Construction Stage – Material Assets**

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Significant Effect?	Commentary
Reduction or alteration in national capacity of landfill	Adverse	Long term/permanent	Permanent	Direct	No	<p>The proposed Scheme is unlikely to result in a &gt;1% reduction in national landfill capacity.</p> <p>A significant effect would be when a &gt;1% reduction in national landfill capacity arises.</p> <p>The CEMP and SWMP will contribute to managing wastes and ensuring that materials are recovered or recycled where this is appropriate. This will contribute to reducing waste to landfill and loss of capacity.</p>
Construction of new permanent waste infrastructure is required to accommodate wastes from Project	Adverse	Long term/permanent	Permanent	Direct	No	<p>New long-term waste infrastructure is not required in associated with the proposed Scheme.</p> <p>A significant effect would be when new long-term waste infrastructure is required.</p>
Waste disposal outside of region	Adverse	Long term/permanent	Permanent	Direct	No	<p>It is anticipated that &lt;1% of waste could require to be disposed of outside the region (North Wales). This would principally relate to hazardous wastes which could have to be taken to north west England; however, the assessments indicate that very little of the excavated material or road planings will be hazardous wastes.</p> <p>A significant effect would be when greater than 1% of the waste has to be disposed of outside the region.</p> <p>The CEMP and SWMP will ensure that wastes are managed locally as far as possible, reducing as far as possible the need to dispose of wastes outside the region.</p>

Potential Impact	Effect Status	Effect Duration	Permanent/ Temporary	Direct/ Indirect	Significant Effect?	Commentary
Alteration of regional capacity of landfill	Adverse	Long term/permanent	Permanent	Direct	No	<p>It is anticipated that waste from the proposed Scheme would result in a &lt;1% reduction in regional waste disposal capacity</p> <p>A significant effect is when a reduction of &gt;1% of regional landfill capacity arises.</p> <p>The CEMP and SWMP will contribute to managing wastes and ensuring that materials are recovered or recycled where this is appropriate. This will contribute to reducing waste to landfill and loss of capacity.</p>

### 15.11 Summary of Significant Effects

- 15.11.1 Tables 15.13 and 15.14 above contain the assessment of the potential effects of the Scheme on Material Assets and Waste respectively. With regard to material assets one potentially significant effect has been noted for the use of aggregates. No other potentially significant effects have been noted on other material assets or with regard to wastes.
- 15.11.2 On the basis of assessment against the criteria defined in LA110 the proposed Scheme will have a **Large** effect and would be **significant** in terms of re-used/recycled content. This is because the Scheme has a shortfall of materials for construction of some 204,000 tonnes which will need to be imported. At this stage it is not possible to confirm where the imported materials would originate from since it will depend on what projects are underway in the area from which fill materials can be sourced. The review of waste management facilities indicates that there are sites within 30 km for the use and treatment of inert waste for land reclamation or construction, with a limit of 234,999 tonnes per annum, that could be a source of fill, subject to it meeting specification. However, given the amount required it is unlikely that this could be a source for all of these materials and it is likely some primary aggregates will be required, a worst-case assessment would be on the basis that all of this material has to be primary aggregates, and therefore it may not be possible to meet targets for reused/recycled content. Notwithstanding this it is also apparent that in the overall context of primary aggregates production in North Wales, where average sales were 6,155 million tonnes per annum in 2016, that even in this situation this would only represent 3.3% of current annual sales.

### 15.12 Effects with Mitigation

- 15.12.1 The significant effects that have been identified will require mitigation in order to reduce the potential effects. Following implementation of the mitigation by the Contractor these would no longer be considered potentially significant effects.

#### **Materials Selection and Reuse, Recycling and Recovery and SWMP**

- 15.12.2 It is anticipated that most of the materials arising from the construction works would be suitable either for re-use in the works, in the case of soils, or for recycling and recovery in the case of other construction materials. Re-use, recycling and recovery would be the preferred treatment routes with disposal to landfill adopted as a last resort.
- 15.12.3 Opportunities would be sought wherever practicable to make use of local projects to source fill materials for construction, for example, any surplus soils from nearby projects could be reused (subject to complying with legislation and meeting specifications). In addition, this would be the most cost-effective solution compared to using primary aggregates as fill.
- 15.12.4 A number of sites have been identified for the use/treatment of inert waste for land reclamation or construction, located between 6.8 km and 26.9 km from the proposed Scheme. These are potential sources of materials for the Scheme with a combined limit of 234,999 tonnes per annum. In addition, there may be opportunities to make use of slate as fill although this would depend on whether the World Heritage Site is designated before the proposed Scheme proceeds.
- 15.12.5 Based on the LA110 to mitigate the significant effect it would be necessary to incorporate recycled or re-used materials to meet the regional target. No specific targets are included in the standard and therefore an average of the English regional targets has been used. This would require a minimum of 25% recycled/re-used content. This requirement would be incorporated

in the Contract requirements for the proposed Scheme subject to completion of the detailed design and a sustainability review and would be incorporated in the Materials Management Plan (see below).

### **Further Best Practice Mitigation Measures**

- 15.12.6 Further mitigation measures in addition to standard best practice measures are outlined below that would be employed at the site in order to avoid potentially significant effects arising from the construction of the proposed Scheme.
- 15.12.7 It has been assumed that up to 1,000 tonnes of the excavated earthworks could be unsuitable for re-use due to the presence of contamination. Opportunities would be sought for this material to be treated for re-use rather than disposing of it to landfill, this approach should be suitable for materials that can be classified as hazardous wastes and would divert these materials from landfill.
- 15.12.8 Life cycle principles would be applied, including reducing waste and increasing materials recovery for reuse and recycling. Embodied carbon would be reduced during the construction stage by using materials with lower carbon footprints wherever practicable. Wherever feasible materials would be selected that have low environmental impact and are sourced responsibly. In addition, opportunities would be sought to source materials locally, and use local waste management facilities, with the potential for reducing carbon emissions associated with transport.
- 15.12.9 Wastes arising on site would be minimised by applying best practice measures including:
- Designing out waste, during the design phase;
  - Just in Time deliveries to avoid the need to store materials with the risk of damage or loss;
  - Use of off site construction techniques;
  - Planning work sequences to minimise waste and avoid the need for re-work; and
  - Use of 'take back' Schemes for surplus materials and offcuts.
- 15.12.10 Waste streams would be segregated into different containers for each waste stream (timber, metals, plastics etc) to enable appropriate waste management and recycling. Containers would be clearly labelled to show which wastes should be placed where. They would be promptly removed from site when full for waste processing by suitably licenced waste carrier and transported to suitably licensed waste management facilities. During transport waste containers would be covered or sheeted appropriately to prevent material becoming airborne.
- 15.12.11 The site compounds would have adequate space for on-site storage and processing of materials to maximise opportunities for re-use and recycling.
- 15.12.12 Records would be kept showing the amounts of waste generated and the proportions recycled, re-used or disposed of.
- 15.12.13 All waste would be stored safely and securely in accordance with arrangements identified in the SWMP to prevent damage to human health or adverse effects on the environment. Consideration would be given to preventing theft, acts of vandalism or scavenging by vermin.
- 15.12.14 Hazardous waste would be stored separately in suitable containers. Where contaminated soils are present that are hazardous waste these would stockpiled and sheeted to prevent water

ingress and to prevent the materials becoming airborne. Where necessary the materials would be placed in impermeable areas to prevent pollution of the underlying soils and groundwater.

- 15.12.15 The waste management facilities to be used would be identified in the SWMP together with evidence that they are suitable licensed.

### **Targets for Materials Use and Waste Disposal**

- 15.12.16 In preparing the SWMP the Contractor would be required to achieve specific targets with regard to waste management, as follows:

- >70% overall recycling/recovery of non-hazardous CDW; and
- No greater than a 1% reduction in landfill capacity in the region/study area.

- 15.12.17 There would be a requirement for the Contractor to monitor performance against these targets and report on their performance through the SWMP.

### **Materials Management Plan and Recycled Materials under WRAP Protocols**

- 15.12.18 As noted in Chapter 6 Geology and Soils a Materials Management Plan (MMP) in accordance with the CL:AIRE Definition of Waste: Development Industry Code of Practice will be implemented as part of the CEMP to address materials reuse on site and maximise the amount of soils that can be recovered. The plan would need to include all necessary risk assessments/design statements/remediation strategies to address the re-use of both uncontaminated and contaminated soils and materials.
- 15.12.19 Materials excavated from the proposed Scheme would be re-used onsite where possible, where this was not possible, they would be removed off site for recycling, disposal would only be used as a last resort if no beneficial use can be found. If any localised contamination were encountered during excavations, this material would need to be treated for re-use or removed off-site for disposal.
- 15.12.20 A specification will be prepared for existing site won materials or imported new fill material for use as part of the construction works to provide acceptability criteria for geotechnics and contamination. This will form part of the MMP. Within the MMP specific targets would be set with regard to imported materials, including as noted above that aggregates imported to the site would meet or exceed the regional target in terms of reused/recycled content (25% target recycled content based on the average value for England).
- 15.12.21 A key means of achieving the 25% recycled content is likely to be through the use of recycled aggregates. Where these are prepared under WRAP protocol they would not technically be wastes and would therefore lie outside the scope of the MMP. Nevertheless, they would need to be considered in the wider context of materials re-use and the earthworks balance for the site and their contribution to meeting the target for recycled content.
- 15.12.22 In considering materials use in the wider sense would need to be given to demonstrating that incorporating recycled or re-used materials is the most sustainable option at the time of construction, for example, if there are only limited materials available locally it would not be sustainable to transport recycled or re-used material over very long distances to meet a notional target when primary aggregates are available locally.

- 15.12.23 Compliance with the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites would be a requirement of the MMP. On completion of the proposed Scheme a verification report would be required under the MMP to demonstrate that the materials have been used in accordance with the Code of Practice.

### **15.13 Residual Significant Effects**

- 15.13.1 Following implementation of the mitigation measures outlined above, there are considered to be no residual significant effects.

### **15.14 Cumulative Effects**

#### **Intra-Project Effects**

- 15.14.1 Intra-project effects are considered as those that “occur between different environmental topics within the same proposal, as a result of that development’s direct effects”<sup>22</sup>.
- 15.14.2 The following potential direct and indirect intra-project cumulative effects have been considered along with mitigation:
- Chapter 6: Geology and Soils – The proposal is to re-use excavated materials and no potentially significant soil contamination has been encountered. Unexpected contamination could be encountered during construction and this would be managed via a protocol incorporated into the CEMP. If unexpected contamination were encountered, and depending on the risks identified, this could result in additional material being removed offsite. However, based on the findings from the ground investigation and previous land uses identified within the Scheme, along with the construction proposals, this is unlikely to be significant.
  - Chapter 7: Water Environment - Materials and waste represent a potential risk to the water environment, for example, sediment run off from stockpiles. Mitigation measures will be required to manage these potential effects, which will be implemented through the CEMP.
  - Chapter 12: Air Quality – There is likely to be a requirement to stockpile materials. The air quality chapter notes the need for mitigation to prevent off-site migration of dust during excavations and soil stockpiling along with the movement of soils during construction.
  - Chapter 13: Noise and Vibrations – Importation and movement of the fill materials necessary for the Scheme will contribute to construction noise. Significant noise effects have been identified associated with construction and demolition, mitigation in the form of portable noise barriers has been proposed. Where the predicted noise impacts exceed the adopted noise level criteria, and where the effects cannot be controlled using Best Practicable Measures, it is proposed to communicate about the proposed construction and demolition works to the residents affected by the works regarding levels and duration.
  - Chapter 14: Travellers – There will be additional construction traffic on the local roads and A55 associated with the need to import materials for the Scheme. However, traffic models have shown that this is not be a significant effect.

<sup>22</sup> Institute of Environmental Management and Assessment (IEMA), 2011. Special Report – The State of Environmental Impact Assessment Practice in the UK



- Chapter 16: Climate Change – The re-use of excavated materials on the Scheme, which would also divert waste away from landfill will reduce the embedded carbon for the project. Import of Secondary (recycled) aggregates for the project, if available and viable would reduce the need for virgin quarried aggregates and could contribute to reducing the carbon footprint. Consideration of embedded carbon in materials and selection of sustainable products would contribute towards reducing impacts on climate change.

- 15.14.3 Following the implementation of mitigation, no potentially significant intra-project cumulative effects have been identified.

### **Inter-Project Effects**

- 15.14.4 Inter-project effects have been considered as those where “cumulative effect occurs as a result of the likely impacts of the proposed development interacting with the impacts of other developments in the vicinity” (IEMA **Error! Bookmark not defined.**).
- 15.14.5 Chapter 19 sets out the known Schemes that could be considered to have a cumulative effect in combination with the Scheme.
- 15.14.6 If both Junction 15 and Junction 16 are constructed at the same time, there would be a cumulative effect in terms of material imports. The two Schemes in combination have a shortfall of materials for construction of some 290,000 tonnes which will need to be imported. If these materials were all primary aggregates, then on the basis of the criteria defined in LA110 this would be a Large effect and would be significant in terms of not meeting targets for re-used/recycled content. This is because at this stage it is not possible to confirm where the imported materials would originate from since it will depend on where fill materials are sourced from. Sources for re-used or recycled materials could include surplus fill from other construction projects which are underway at the same time (that would otherwise go for disposal), waste management facilities for the use and treatment of inert waste for land reclamation or construction or materials recovered from slate waste heaps. A review of waste management facilities indicates that there are sites within 30 km for the use and treatment of inert waste for land reclamation or construction, with a limit of 234,999 tonnes per annum. If these materials are not available a worst-case assessment would be that all of the material for the two Schemes has to be primary aggregates, and therefore that it may not be possible to meet targets for reused/recycled content. Notwithstanding this it is also apparent that in the overall context of primary aggregates production in North Wales, where average sales were 6,155 million tonnes per annum in 2016, that even in this situation this would only represent 4.6% of current annual sales.

## **15.15 Conclusions**

- 15.15.1 A number of potential effects have been identified and assessed. However, with the implementation of the incorporated mitigation measures and additional mitigation measures as outlined above it is considered that there will be no residual significant environmental effects as a result of the proposed Scheme.
- 15.15.2 The approach adopted to the management of material assets and waste offers the potential for enhancements in accordance with the Well-Being of Future Generations Act (Wales). The Conway and Denbighshire Local Well Being Plan outlines ways to develop environmental resilience, it is considered that the approach to material assets and waste can support the plan in the following ways:

- Recycling and reuse of waste will contribute environmental resilience by diverting materials from landfill and reducing waste – contributing to goals of addressing recycling, producing less waste and reducing carbon emissions; and
- Seeking to reuse materials and/or obtain recycled materials to provide imported fill, rather than primary aggregates, will contribute to environmental resilience by reducing reliance on sources of primary aggregates – contributing to goals of sustainable use of resources and reducing carbon emissions.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 16 CLIMATE CHANGE**

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## 16. CLIMATE CHANGE

### 16.1 Introduction

16.1.1 This chapter reports on the likely significant effects with respect to climate change associated with the construction and operation of the Junction 16 Scheme. The specific objectives of the chapter are to:

- A. Describe the climate and greenhouse gas emissions baselines;
- B. Assess the resilience of the Scheme to climate parameters;
- C. Describe the assessment methodology and significance criteria used in completing the impact assessment;
- D. Describe the potential effects, including direct, indirect and cumulative effects;
- E. Assess the additive effect of climate change on residual effects of other disciplines;
- F. Describe the mitigation measures proposed to address likely significant effects; and
- G. Assess the residual effects remaining following the implementation of mitigation.

16.1.2 There are three aspects that will be considered as part of the climate assessment:

- A. **In-combination Climate Change Impact (ICCI) Assessment** – evaluates the combined effect of the Scheme and potential climate change impacts on the receiving environment during construction and operation;
- B. **Climate Change Resilience (CCR) Assessment** – evaluates the effectiveness and feasibility of adaptation measures integrated into the Scheme to avoid or reduce hazards and/or increase resilience of the Scheme to climate change impacts during construction and operation; and
- C. **Greenhouse Gas (GHG) Emissions Assessment** – quantifies the potential GHG emissions associated with the construction of the Scheme and identifies mitigation measures to reduce these emissions.

16.1.3 This chapter is supported by the following figures and appendices:

- A. Volume 3, Appendix 7.1 Greenhouse Gas Assessment

### 16.2 Relevant Legislation, Policy and Guidance

16.2.1 The assessment has been informed by the legislation, policy and published guidance detailed below.

#### International Legislation

##### *Kyoto Protocol to the UNFCCC*

16.2.2 The Kyoto Protocol<sup>1</sup> is an international agreement linked to the 1992 United Nations Framework Convention on Climate Change (UNFCCC) that commits state parties to reduce greenhouse gas emissions.

<sup>1</sup> Kyoto Protocol to the United Nations Framework Convention on Climate Change. United Nations, 1998. Available at: <https://unfccc.int/sites/default/files/kpeng.pdf> [Accessed 04.06.2019]

## European Legislation

### *EU Intended Nationally Determined Contribution*

- 16.2.3 The EU's Intended Nationally Determined Contributions<sup>2</sup> (INDCs) under the UNFCCC sets out the EU's GHG emissions reduction targets.

### *The EIA Directive 2014/52/EU*

- 16.2.4 European Environmental Impact Assessment (EIA) directives require an EIA to be undertaken in support of an application for development consent for certain types of Scheme. The legislative framework for EIA is set by *European Directive 2011/92/EU*, as amended by *Directive 2014/52/EU* (collectively referred to as the EIA Directive). From May 2017 the new EIA Directive EC2014/52/EU, is transposed into the *Harbours, Docks, Piers and Ferries Environmental Protection - The Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017 (EIA Regulations 2017)* 5 December 2017. The equivalent under town and country planning act is the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2016.
- 16.2.5 The regulations introduced the need to consider climate as part of EIA.

## National Legislation

### *Climate Change Act 2008 (2050 Target Amendment) Order 2019*

- 16.2.6 The Climate Change Act 2008 is the basis for the UK's approach to tackling and responding to climate change. It established a requirement to undertake a climate change risk assessment every five years and develop a programme for adaptation action in response to the risks identified. The 2050 Target amendment order imposes a duty on the Secretary of State to reduce UK wide greenhouse gas emissions in 2050 to net zero (following any adjustment for trading in carbon units).
- 16.2.7 Parts 4 and 5 of the Act impose limited duties and confer limited powers on Welsh Ministers in terms of contributing towards meeting the UK wide carbon targets. The Environment (Wales) Act 2016, imposes specific carbon budgeting duties on Welsh Ministers like those to which the Secretary of State is subject.
- 16.2.8 By removing the existing roundabouts, which typically involves hard acceleration and deceleration, a benefit of the A55 Junction 15 Improvements is to minimise stop-start conditions. This will contribute to improved vehicle emissions.

### *Planning (Wales) Act 2015*

- 16.2.9 The Planning (Wales) Act 2015 became law in Wales on 6 July 2015. The overall aim of the Act is to provide a modern legislative framework for the operation of the planning system in Wales thereby creating a more consistent planning system that enables development and enhances built and natural environments.

<sup>2</sup> Submission by Latvia and the European Commission on Behalf of the European Union and its Member States. Intended Nationally Determined Contribution of the EU and its Member States. March 2015. Available at: <http://www4.unfccc.int/submissions/INDC/Published%20Documents/Latvia/1/LV-03-06-EU%20INDC.pdf> [Accessed 25.09.2018]

*Environment (Wales) Act 2016*

- 16.2.10 The Environment (Wales) Act 2016 delivers against Welsh Government's Programme for Government commitment to introduce new legislation for the environment. It sets out the approach for the sustainable management of natural resources in Wales, which will help to mitigate for and adapt to the impacts of climate change.

*Well-being of Future Generations (Wales) Act 2015*

- 16.2.11 The 2015 Act places a duty on public bodies in Wales and those listed in the Act to work to improve the economic, social, environmental and cultural well-being of Wales. To help do this they must set and publish well-being objectives and give greater consideration to the long term, work better with people and communities and each other, look to prevent problems and take a more joined-up approach. The Act establishes seven well-being goals, which specifically reference acting on climate change.

*Climate Change Strategy for Wales (October 2010)*

- 16.2.12 The Climate Change Strategy for Wales (Welsh Assembly Government, 2010c) sets out the Welsh Government's plan to tackle the causes and the consequences of climate change. The Welsh Government's key target is to reduce greenhouse gas emissions by 3% per year from 2011.
- 16.2.13 Section 8 of the Strategy in particular refers to the transport sector, which is most relevant to the Scheme. In order to reduce transport emissions the Welsh Government sets out the following actions:
- A. Develop sustainable travel centres and supporting 'Smarter Choices';
  - B. Promote eco-driving, walking and cycling;
  - C. Invest in bus and rail services and improve traffic management; and
  - D. Promote infrastructure of electric and hydrogen vehicles.

*Active Travel (Wales) Act 2013*

- 16.2.14 The Active Travel (Wales) Bill places a requirement on local authorities to continuously improve facilities and routes for walkers and cyclists and to prepare maps identifying current and potential future routes for their use. The Bill will also require new road Schemes to consider the needs of pedestrians and cyclists at design stage.

*Prosperity for All: A low carbon Wales*

- 16.2.15 A collection of policies and proposals<sup>3</sup> that will aid Wales in meeting 2016 to 2020 carbon budget and 2020 emission reduction targets.

<sup>3</sup>Prosperity for all: a low carbon Wales (2019). Available at: <https://gov.wales/prosperity-all-low-carbon-wales> [Accessed 23.10.2019].

*The National Adaptation Programme: Making the Country resilient to a Changing Climate (July 2018)*

- 16.2.16 This is the second National Adaptation Programme (NAP)<sup>4</sup> setting out government's response to the second Climate Change Risk Assessment (CCRA), showing the actions government is, and will be, taking to address the risks and opportunities posed by a changing climate.

*UK Climate Change Risk Assessment: Government Report (2017)*

- 16.2.17 The UK Government is required under the 2008 Climate Change Act to publish a UK-wide Climate Change Risk Assessment<sup>5</sup> (CCRA) every five years. The Act stipulates that the Government must assess 'the risks for the United Kingdom from the current and predicted impacts of climate change'. A National summary for Wales<sup>6</sup> is available. This national summary presents the Wales-specific evidence included in the UK CCRA2 Evidence Report.

*The Climate Change (Carbon Budgets) (Wales) Regulations 2018*

- 16.2.18 The Climate Change (Carbon Budgets) (Wales) Regulations 2018 were passed in December 2018 and set the first two carbon budgets for Wales. Following the Climate Change Commission's (CCC) May 2019 advice on net zero, the Welsh Minister for Environment, Energy and Rural Affairs announced that the Welsh Government will bring regulations before the Assembly in 2020 on a net zero by 2050 target for Wales.

*Planning Policy Wales 2018: Edition 10*

- 16.2.19 Planning Policy Wales (PPW) was originally published in 2002 and is the principal and authoritative source of national planning policy, under which local planning authorities prepare their Local Development Plans. It is supplemented by a series of Technical Advice Notes (TANs) including TAN 15: Development and Flood Risk which considers provision for future changes in flood risk as a result of climate change. Together with Welsh Government Circulars and policy clarification letters the with PPW provide the national planning policy framework for Wales.

## **Guidance and Best Practice**

*IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation*

- 16.2.20 This guidance aims to assist EIA practitioners with addressing climate assessment and mitigation. It outlines the process for incorporating climate change resilience into a project and outlines an approach to considering in combination with the impacts of the project and how it relates to the EIA stages.

*IEMA Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance*

<sup>4</sup> DEFRA The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting (2018). Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/727252/national-adaptation-programme-2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/727252/national-adaptation-programme-2018.pdf). [Accessed 28.10.2019]

<sup>5</sup> UK Climate Change Risk Assessment (2017). Available at <https://www.theccc.org.uk/tackling-climate-change/preparing-for-climate-change/uk-climate-change-risk-assessment-2017/introduction-to-the-ccra/> [Accessed 28.10.2019]

<sup>6</sup> Committee of Climate Change (CCC) UK climate change risk assessment 2017 evidence report – summary for Wales. Available at: <https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Wales-National-Summary.pdf>. Accessed 14.10.2019)



- 16.2.21 This guidance aims to assist EIA practitioners with addressing greenhouse gas emissions assessment and mitigation. It outlines the process for undertaking the carbon assessment as it relates to the EIA stages.

*PAS 2080:2016 Carbon Management in Infrastructure*

- 16.2.22 PAS 2080<sup>7</sup> provides a framework on how to manage whole life carbon when delivering infrastructure assets and programmes of work. This assessment broadly follows the principles set out in PAS 2080 for the quantification of GHG emissions.

### 16.3 Consultation

- 16.3.1 As discussed in Chapter 1: Introduction, consideration has been given in this assessment to the EIA Scoping Opinion comments provided by the Welsh Government. These are summarised below in Table 16.1.

**Table 16.1: Consultation Responses**

Comments Received	Response to Comments
17.10 – Not sure if it is appropriate to scope out greenhouse gas emissions likely to arise during construction. Road construction projects are carbon intensive and should be properly assessed. Information from the materials chapter could be used to work out the amount of carbon required for the project.	Accepted - A carbon assessment of the Scheme construction will be undertaken and has been scoped in.

### 16.4 Study Area

#### Spatial Scope

- 16.4.1 Three separate assessments have been undertaken as part of the climate assessment. Due to the nature of each assessment, it is necessary to define a separate study area for each. The study areas are defined as follows:
- A. In-combination Climate Change Impact (ICCI) Assessment: for each discipline, the study area for the ICCI will match that of the relevant discipline. This is to take account of the fact that the ICCI assessment looks at the additive effect of climate change on each discipline;
  - B. Climate Change Resilience Assessment (CCR): the study area for this assessment will not go beyond the boundary of the Scheme footprint. This is to capture only the risks to the Scheme itself from climate change; Adverse effects associated with climate change are likely to be in the medium to long term and so the focus will be on the operational stage, although extreme weather events during construction will also be considered. Proposed design measures and/ or mitigation measures will be identified to address these risks.
  - C. Greenhouse Gas Assessment (GHG): the study area for the GHG assessment will include the Scheme footprint as well as the transport network utilised for transport of materials, the embodied carbon associated with the relevant construction materials and the emissions arising during construction of the Scheme. Greenhouse Gas Assessment - Operational Stage has been scoped out of this assessment. IEMA guidance requires assessments to be proportional to the size of the development and avoid placing un-due responsibility on the developer or assessors. In this instance, during the operational stage, although traffic flows

<sup>7</sup>Carbon Management in infrastructure (2019). Available at: <https://www.lr.org/en-gb/pas-2080/>[Accessed 23.10.2019].

could change because of external factors, the Scheme itself is considered likely to result in no overall additional traffic or resulting emissions. Similarly, although the replacement of the roundabout with slip roads could result in minor fluctuations in emissions, these are considered likely to have a negligible effect on human and ecological receptors. In this instance, it is therefore considered that operational GHG emissions will be negligible, and therefore also scoped out.

### Technical Scope

- 16.4.2 The technical scope of the assessment has been informed by information available on the Scheme, including design elements as described in Chapter 2.
- 16.4.3 This chapter has been undertaken in line with the methodology presented in the Scoping Report (submitted February 2019)<sup>8</sup>. Highways England published their first guidance on the climate topic (LA114) at the end of October 2019. The new guidance has not been followed in this climate assessment as this had been prepared prior to the publication of LA114 using available best practice guidance such as the IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation and Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance.
- 16.4.4 A 'sensitivity test' against LA114 has been undertaken and can confirm that the outcomes of the CCR and ICCI assessment are not materially altered. A precautionary approach has been undertaken when assessing the significance of GHG emissions, drawing upon the conclusions of the IEMA guidance which includes three over-arching principles relating to significance. An assessment of GHGs associated with the construction phase has been undertaken and contextualised against national carbon budgets.

### 16.5 Baseline Conditions

- 16.5.1 Information sources used in the assessment/to characterise existing and/ or future baseline conditions:
  - A. United Kingdom Climate Projection (UKCP)<sup>18</sup>;
  - B. UK Climate Change Risk Assessment (2017) – Wales National Summary;
  - C. Met Office Historic Climate data;
  - D. Welsh Government: A Low Carbon Wales carbon dioxide emissions national statistics; and
  - E. UK local authority and regional carbon dioxide emissions national statistics.

#### *Climate Change Resilience and In-combination Climate Change*

- 16.5.2 A local climate baseline is provided by Met Office Historic Climate Data which presents a set of 30-year averages, covering the period 1981 to 2010 for a range of parameters and locations. The nearest meteorological Met Office data station is Rhyl, North Wales which is located approximately 25 km to the east of the Scheme. The climate data available for Rhyl displays the influence of the maritime setting, with observed maximum and minimum temperatures both being higher than the UK average and fewer days of air frost experienced (an average of 30.9 annual air frost days in comparison to the UK annual average of 54.6 days). In addition, the annual precipitation in Rhyl is 35% less than the UK average.

<sup>8</sup> Ramboll, February 2019, A55 Junction 15 EIA Scoping Report

16.5.3 The Climate Change Risk Assessment for Wales (2017) details historic climate trends across Wales, which can inform and provide context for future projections. The following trends have been observed:

- A. Average annual rainfall over Wales has not changed significantly since 1910; Throughout Wales, the winter months are significantly wetter than the summer ones;
- B. Annual average temperatures in Wales are similar to the UK average. Average temperatures over land have increased, from 2005 to 2014 it was 0.9°C warmer than the 1961 to 1990 average; and
- C. No significant recorded changes in the number of days of air frost in Wales since 1960.

16.5.4 At the UK level, daily maximum and minimum temperature extremes have increased by just over 1°C since the 1950s; and there is some evidence that heavy seasonal and annual rainfall events have also become more frequent with an increasing proportion of rainfall attributed to heavy precipitation events in winter<sup>9</sup>.

#### *Greenhouse Gases*

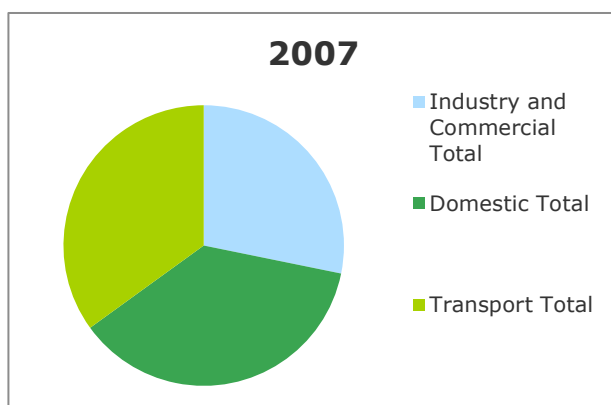
16.5.5 Local and Regional CO<sub>2</sub> emissions data tables published by the Government contain historic emissions data covering 2007 to 2017 for all the UK's Local Authorities and Councils. The total emissions and emissions per capita in Conwy for the reported period are shown Table 16.2 below:

**Table 16.2: Conwy historic GHG emissions (2007 - 2017).**

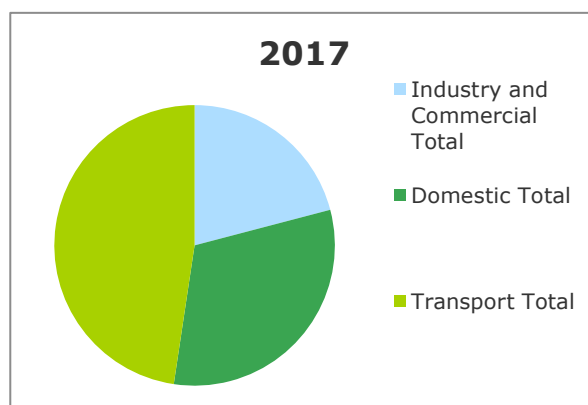
Year	Kt CO <sub>2</sub>	Population ('000s)	Per Capita Emissions
2007	794.9	113.8	7.0
2008	758.2	114.4	6.6
2009	712.1	114.6	6.2
2010	739.5	114.7	6.4
2011	670.1	115.3	5.8
2012	694.6	115.6	6.0
2013	672.7	115.9	5.8
2014	620.1	116.4	5.3
2015	603.5	116.5	5.2
2016	592.8	116.8	5.1
2017	577.4	116.9	4.9

16.5.6 Figures 16.1 and 16.2 below shows the change in the share of emissions between industry and commercial, domestic and transport sources from 2007 to 2017. CO<sub>2</sub> emissions per capita in Wales is higher compared to other regions in the UK due to having the highest Industrial and Commercial sector emissions (4.4 tCO<sub>2</sub> per person), resulting from a greater proportion of industrial activities. The proportion of emissions from industry and commercial accounts for less of the overall total in 2017 compared to 2007, with transport taking up a larger portion.

<sup>9</sup> UK Climate Change Risk Assessment 2017 Evidence Report. Summary for Wales. Available at: <https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Wales-National-Summary.pdf> [Assessed on 04.10.2019]



**Figure 16.1: Proportion of Emissions from Industry and Commercial, Domestic and Transport Sources in 2007 in Conway.**



**Figure 16.2: Proportion of Emissions from Industry and Commercial, Domestic and Transport Sources in 2017 in Conway.**

## Carbon Budgets

16.5.7 The Environment (Wales) Act 2016 and the Climate Change (Carbon Budgets) (Wales) Regulations 2018 requires the Welsh Government to reduce emissions of GHGs in Wales by at least 80% by 2050<sup>10</sup>. This commitment includes interim targets and carbon budgets (set against the 1990 baseline) as follows:

- A. Carbon Budget 1 (2016-2020): Average of 27% reduction; and
- B. Carbon Budget 2 (2021-2025): Average of 33% reduction.

16.5.8 In line with the Paris Agreement on Climate Change, the UK Government has set a target for reducing domestic emissions to net zero by 2050. Following the Committee on Climate Change May 2019 advice on net zero, the Welsh Minister for Environment, Energy and Rural Affairs announced that the Welsh Government will bring regulations before the Assembly in 2020 on net zero emissions by 2050 target for Wales.

16.5.9 The current Welsh Carbon Budget 1 is provided on a sector by sector basis and is shown in Table 16.3 for context however, this sector breakdown is not available for the Carbon Budget 2 which would cover the construction period and opening year of the Scheme (2023).

**Table 16.3: Wales Carbon Budget 1 (2016 to 2020).**

Sector	Carbon Budget (MtCO <sub>2</sub> e)	% of Carbon Budget
Buildings	22.6	10.2%
Power sector	64.9	29.3%
Transport	31.9	14.4%
Industry	72.6	32.8%
Agriculture	27.4	12.4%

<sup>10</sup> Prosperity for All: A Low Carbon Wales. Welsh Government 2019. Available at: [https://gov.wales/sites/default/files/publications/2019-06/low-carbon-delivery-plan\\_1.pdf](https://gov.wales/sites/default/files/publications/2019-06/low-carbon-delivery-plan_1.pdf) Accessed on [04.10.2019]

Sector	Carbon Budget (MtCO <sub>2e</sub> )	% of Carbon Budget
Waste	3.7	1.7%
Fluorinated Gas	2.5	1.1%
Land Use, Land Use Change and Forestry (SINK)	-2.53	-1.9%
<b>TOTAL</b>	<b>225.6</b>	<b>100%</b>

- 16.5.10 The UK Government has set five-yearly carbon budgets which currently run until 2032. The UK is currently in the third carbon budget period with the national budget set at 2,544 megatonnes (Mt) CO<sub>2e</sub> covering the five-year period of 2018 to 2023 which spans majority of the construction and opening year of the Scheme. The fourth carbon budget covers the five year period from 2023 to 2027 and is currently set at 1,950 Mt CO<sub>2e</sub> however given the recent commitment target for reducing domestic emissions to net zero by 2050 it is likely that budgets post 2020 will have to incorporate accelerated carbon reduction.

## 16.6 Future Baseline

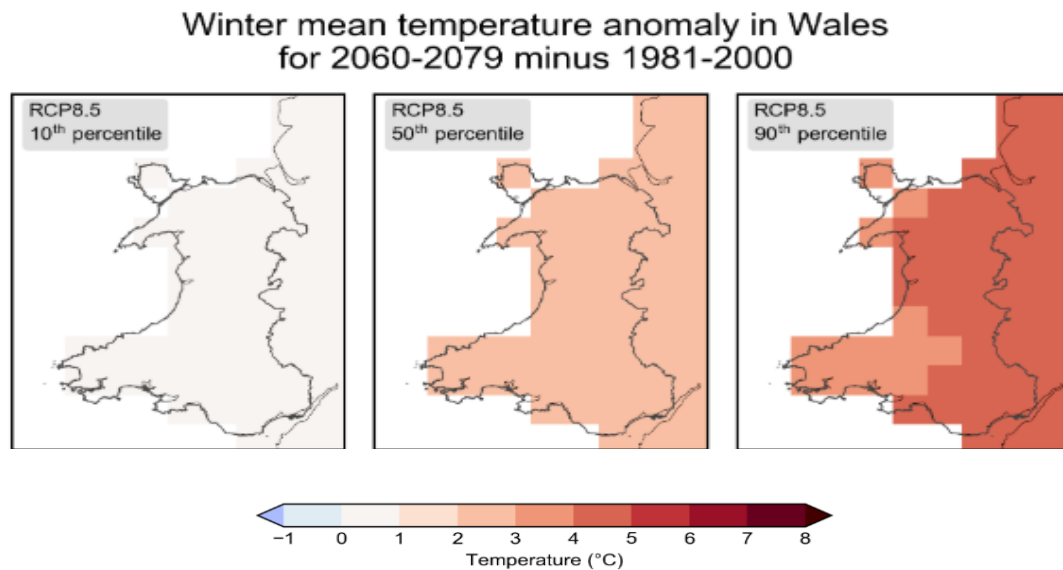
### Climate Change Resilience

- 16.6.1 Climate projections can be used to determine the likely future climate conditions in the locality of the Scheme through its lifetime. Climate projections take into account uncertainty due to natural variability and our incomplete understanding of the climate system and its imperfect representation in models. The projections do this by giving the probabilities of a range of possible outcomes, as estimated by scientific methodology. Good practice in the UK uses projections based on United Kingdom Climate Projections (UKCP18) and published literature such as UK Climate Change Risk Assessment. UKCP18 includes projections of a range of climate variables for different time slices until the end of the century.
- 16.6.2 The probabilistic projections in the UKCP18 provide local low, central and high changes across the UK, corresponding to 10%, 50% and 90% probability levels. There are also a number of Representative Concentrations Pathways (RCPs) available for UKCP18 with each pathway resulting in a different range of global mean temperature increases over the 21<sup>st</sup> century.
- 16.6.3 The central estimate (50<sup>th</sup> percentile) projections for the 2060 to 2079 high emissions scenario (RCP8.5), following the precautionary principle, are presented below for the climate variables considered relevant to this assessment. The 2060 to 2079 scenario has been chosen as the Scheme reference lifespan has been assumed to be 50 years in line with Design Manual for Roads and Bridges (DMRB) Volume 1 Section 3: General Design.<sup>11</sup> (with permanent structures assumed to have a design life of 120 years). RCP8.5 represents a pathway in which global greenhouse gas emissions continue to rise. In addition, the results for the 10<sup>th</sup> and 90<sup>th</sup> percentile have been presented in supporting figures, indicating the uncertainty range. In general, the trends become more pronounced over time with more extreme trends arising by 2080.

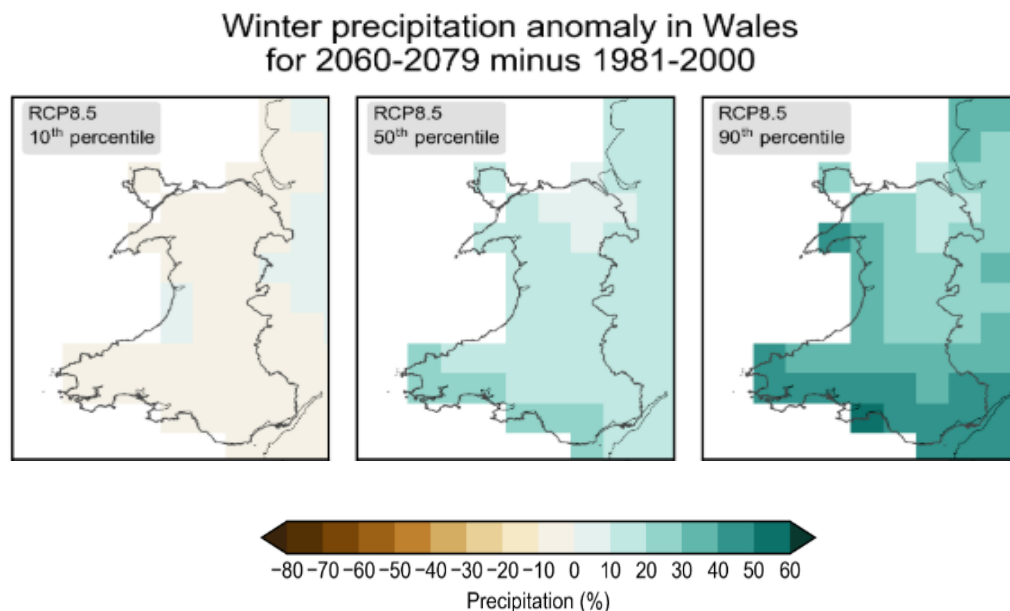
<sup>11</sup> Design Manual for Roads and Bridges (2016). Available at: <http://www.standardsforhighways.co.uk/ha/standards/dmr/b/vol1/section3/bd10016.pdf> [Accessed 28.10.2019]

*Milder, wetter winters (Increase in mean winter rainfall; Increase in mean temperatures; Decreased frequency of cold weather events)*

- 16.6.4 Over land, UKCP18 projections indicate increased likelihood of milder wetter winters. Figures 16.3 and 16.4 summarise the projected changes in mean winter temperature and precipitation for the latter part of the operational period in comparison to the baseline<sup>12</sup>. This indicates an increase in mean temperature by up to 2°C and mean winter precipitation by up to 20% (RCP8.5 - 50<sup>th</sup> percentile). However, due to natural variability, some cold and dry winters will still occur.



**Figure 16.3: Winter mean temperature projected for Wales between 2060-2079. RCP 8.5 and 50<sup>th</sup> percentile has been selected.**



**Figure 16.4: Winter precipitation projected for Wales between 2060-2079. RCP 8.5 and 50<sup>th</sup> percentile has been selected.**

<sup>12</sup> Met Office (2018) Land Projection Maps. Available at: <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/land-projection-maps> [Accessed 8.10.2019].

*Hotter, drier summers (Increased frequency of dry spells; Increase in mean temperatures; Decrease in mean summer rainfall)*

16.6.5 Over land, UKCP18 projections indicate increased likelihood of warmer, drier summers. Figure 16.5 and 16.6 summarise the projected changes in mean summer temperature and precipitation for the latter part of the operational period in comparison to the baseline. This indicates an increase in mean temperature by up to 3°C and a decrease in mean summer precipitation by up to 30% (RCP8.5 - 50<sup>th</sup> percentile). In addition to an increase in average temperatures, UKCP18 projects an increase in the frequency of dry spells and extreme temperature events.

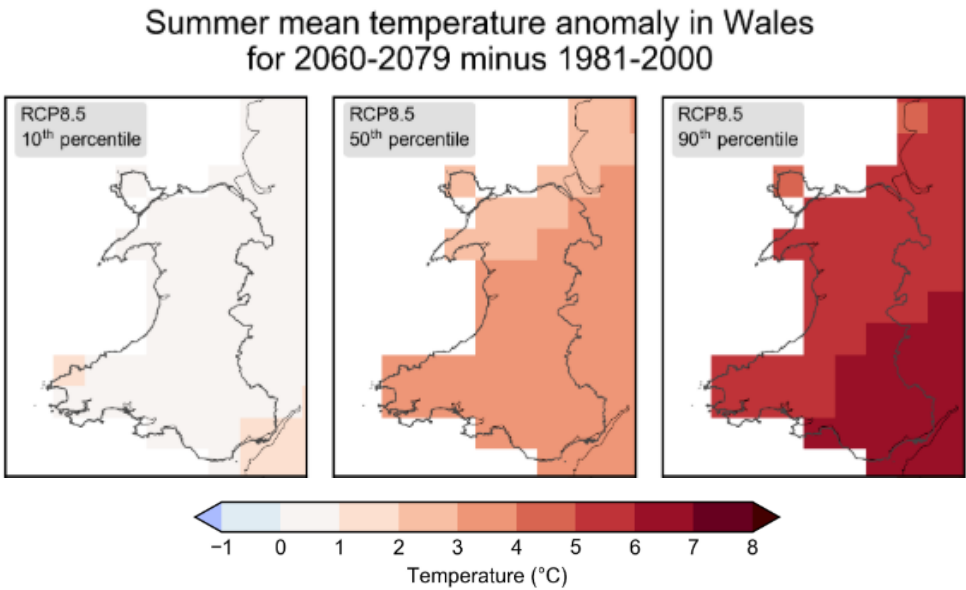


Figure 16.5: Summer mean temperature projected for Wales between 2060-2079. RCP 8.5 and 50<sup>th</sup> percentile has been selected.

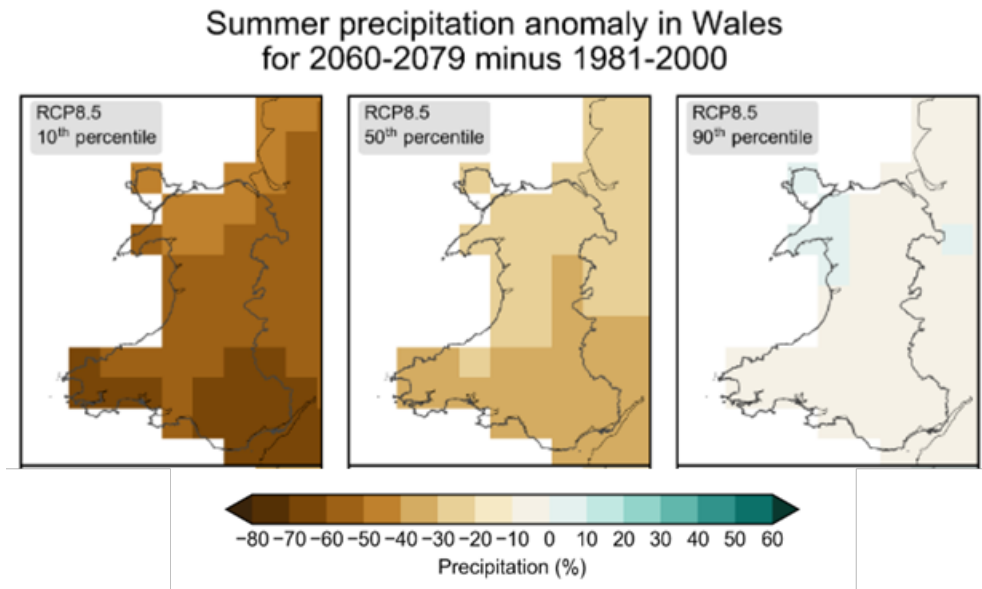


Figure 16.Fg6: Summer precipitation projected for Wales between 2060-2079. RCP 8.5 and 50<sup>th</sup> percentile has been selected.

*Increase in frequency of extreme weather (Increase in heatwaves; Increased frequency of heavy rainfall events)*

- 16.6.6 There is uncertainty in climate modelling around extreme events<sup>13</sup> however UKCP18 projects that there is likely to be an increase in the frequency and magnitude of extreme events such as heatwaves and heavy rainfall.

*Wind*

- 16.6.7 A small increase in the frequency of windstorms across the UK, especially in the winter months, is projected during the second half of the 21<sup>st</sup> century however wind speed change is more dominated by natural and complex variability with other climatic systems such as the North Atlantic oscillation<sup>14</sup>.

*Sea Level Rise*

- 16.6.8 All emission scenarios indicate that UK coastal flood risk is expected to increase over the 21<sup>st</sup> century and beyond. The increase in future coastal flood risk will be dominated by the effects of time-mean sea level rise, rather than changes in atmospheric storminess associated with extreme coastal sea level events. There may also be changes in tidal characteristics<sup>15</sup>.

*Greenhouse Gas Assessment*

- 16.6.9 Local and national GHG emissions have been reducing over recent years, primarily due to increasing generation of electricity from sources that produce less GHG emissions. This trend is expected to continue especially given the recent UK commitment to reduce domestic emissions to net zero by 2050. It is expected that emissions/carbon intensity will continue to decline in the region due to a combination of factors:

- A. National Government carbon budget;
- B. Local carbon reduction targets; and
- C. Decarbonisation of industry, energy supply and transportation.

## **16.7 Assessment of Effects**

### **Method of Assessment**

*In-Combination Climate Change Impact Assessment*

- 16.7.1 Climate change may have an additive effect on impacts already identified within other assessments, where residual impacts identified may now become significant because of the effects of climate change. Therefore, impacts that were originally identified by the assessment but considered non-significant may have to be reconsidered and could require additional design and/or mitigation measures should there be an additive effect.

<sup>13</sup> Stott, P. A., Allen, M., Christidis, N., Dole, R., Hoerling, M., Huntingford, C., Pall, P., Perlwitz, J. and Stone, D. (2013). Attribution of Weather and Climate-Related Extreme Events. Climate Science for Serving Society: Research, Modeling and Prediction Priorities, 307- 337.

<sup>14</sup> Rockel and Woth (2007), Extremes of near-surface wind speed over Europe and their future changes as estimated from an ensemble of RCM simulations, Climatic Change, 81 (1), pAvailable at <http://prudence.dmi.dk/public/publications/PSICC/Rockel&Woth.pdf> [Accessed 30.09.2019]

<sup>15</sup> UKCP18 factsheet (2018) Sea Level rise and storm surge. Available at: <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-sea-level-rise-and-storm-surge.pdf> [Accessed 16.10.2019]



16.7.2 The assessment will be qualitative using information presented in other environmental assessments carried out by applying objective professional judgement. All other topics considered as part of this Environmental Statement (ES) have been considered and a review has been carried out of the topics likely to have the potential for interactions between the impacts identified and the changing climate. The in-combination assessment will consider:

- A. The nature of the effect;
- B. Design and mitigation measures that have been identified;
- C. The implications of climate change;
- D. Additional mitigation that may be required to address the effects of climate change; and
- E. The residual effect taking account of climate change.

16.7.3 The conclusion of the in-combination climate change impact assessment will be to establish whether climate change is likely to alter the significance of any of the effects identified in the impact assessment.

#### *Climate Change Resilience Assessment*

16.7.4 The climate change resilience assessment for the Scheme has been informed by regional scale information based on historic and projected changes in climate variables. The UK Climate Projections 2018 (UKCP18) provide the most current data on projected change in climate variables.

16.7.5 Construction works for the Scheme are anticipated to begin in Q2 of 2022 and to be completed by Q2 of 2024. For the climate change resilience assessment, any adverse effects associated with climate change are anticipated to be more significant in the 2030s and beyond. Climate change over the construction period is anticipated to be limited. Therefore, the assessment during the construction period focuses on the potential impacts of extreme weather events on the construction programme and people on the construction site.

16.7.6 The climate change resilience assessment has been completed as a high-level overview providing:

- A. An assessment of current and future climate trends in the study area using data from UKCP18 on projected changes in climate variables;
- B. A review of potential future climate impacts that could affect the Scheme during operation;
- C. A summary of design and mitigation measures for the Scheme that improve its resilience to future climate trends; and
- D. Identification of any residual climate resilience risks.

#### *Construction Stage Greenhouse Gas Assessment*

16.7.7 The GHG assessment considers the GHG emissions associated with the construction of the Scheme.

16.7.8 GHG emissions are measured in carbon dioxide equivalent emissions (CO<sub>2</sub>e). CO<sub>2</sub>e is a measure used to compare the emissions from various greenhouse gases based upon their global warming potential. The sources of greenhouse gas emissions associated with the construction of the Scheme included within the scope of the assessment are summarised in Table 16.4. For each of the items, input data such as material bill of quantities has been provided by the design team, or reasonable assumptions made using professional judgement, and this has been used in

calculations with standardised GHG emissions factors for determining the associated GHG emissions.

- 16.7.9 The construction GHG emissions are reported in annual tonnes of CO<sub>2</sub>e. CO<sub>2</sub>e is the standard expression of GHGs and includes all GHGs converted into the equivalent total emissions of CO<sub>2</sub>.

**Table 16.4: Construction GHG Assessment Boundaries**

Item	Description	Input Data	Emissions Factors
Embodied GHG emissions	Embodied GHG emissions which are emitted during the manufacture, transport and construction of building materials used in the construction works	Volumes of construction materials	The Bath Inventory of Carbon and Energy. <sup>16</sup>
On-site GHG emissions	GHG emissions from the on-site construction works	Estimated usage of construction plant using Spon's Civil Engineering and Highway Works Price Book (2019). <sup>17</sup>	Government GHG Conversion Factors <sup>18</sup>
Construction transport GHG emissions	GHG emissions associated with vehicles transporting to and from the construction site	Distances travelled by demolition and construction vehicles (from traffic model)	DEFRA Emissions Factors Toolkit. <sup>19</sup>
Waste disposal GHG emissions	GHG emissions associated with the disposal of waste from the demolition works, excavation works and construction process	Volumes of waste arisings	Government GHG Conversion Factors

## 16.8 Significance Criteria

### In-combination Climate Change Impact Assessment

- 16.8.1 The basis of this assessment is to review the identified residual effects for each discipline contained within the environmental statement. If it is considered that climate change could produce an additive effect which changes the significance of a residual effect, the residual effect taking account of climate change will be reported using the same terminology as the relevant discipline.

### Climate Change Resilience Assessment

- 16.8.2 Potential impacts which might affect the Scheme will be identified and assessed against climate projections. A qualitative judgement will be made, relating to the consequences of any impact of climate change on the Scheme. Any design and/ or mitigation measures required to address any significant adverse effects will be identified where necessary. A professional judgement will be

<sup>16</sup> University of Bath Inventory of Carbon and Energy (ICE) Version 2.0. Available at: <http://www.circularecology.com/embodied-energy-and-carbon-footprint-database.html#.XPaGoFWWyUk> [Accessed on 04.10.2019]

<sup>17</sup> Spon Press (2020) Spon's Civil Engineering and Highway Works Price Book. Edition 145th Published 16.09.2019. ISBN: 9780367267032

<sup>18</sup> UK Government emissions conversion factors for greenhouse gas company reporting 2019. Available at: <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting> [Accessed on 04/10/2019]

<sup>19</sup> DEFRA 2019 Emissions Factors Toolkit. Available at: <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html> [Accessed on 04.10.2019]

made as to whether the consequence of any impact of climate change on the Scheme is significant or not in this context.

### **Greenhouse Gas Assessment**

- 16.8.3 IEMA guidance indicates that all GHG emissions should be considered as significant, but that it is appropriate to contextualise emissions against local, national, etc. emissions. As described in Section 16.4, a breakdown of the Wales Carbon Budget is not available therefore, the total GHG emissions associated with the Scheme will be compared to the UK national carbon budget (which are provided in the Baseline section) to provide context. Additional mitigation is then identified to reduce GHG emissions where considered necessary.

## **16.9 Identified Sensitive Receptors**

- 16.9.1 A summary of the receptors identified as being sensitive to the Scheme and which have been 'scoped-in' to the assessment are as follows:

### **Climate Change Resilience and In-Combination Climate Impacts Assessment**

- A. Construction workers for the Scheme
- B. Construction activities, i.e. materials, programme, cost;
- C. People in the immediate surroundings of the Scheme footprint; and
- D. The Scheme (e.g. road surfaces and pavement and integrity of landscape features) during the operational stage.

### **Greenhouse Gases**

- 16.9.2 Construction greenhouse gases emissions associated within the Scheme will be released to the global atmosphere therefore this is considered to be the receptor. In line with standard practice, the sensitivity of human and natural receptors is not considered within this assessment.

## **16.10 Assumptions and Limitations**

### **Climate Change Resilience and In-Combination Climate Change Impact Assessment:**

- 16.10.1 Climate projections can be used to determine the likely future climate conditions in the locality of the Scheme through its lifetime. The climate trends included in this assessment are based on a range of greenhouse gas emissions scenarios which are subject to a degree of uncertainty. How the climate will react to different levels of emissions is also uncertain.
- 16.10.2 There are three sources of uncertainty within climate projections:
- A. Natural Climate Variability: either from natural external influences on climate (e.g. change in atmospheric particulates due to volcanic activity), or changes in the energy received from the sun;
  - B. Incomplete understanding of Earth system processes and their imperfect representation in climate models (modelling uncertainty); and
  - C. Uncertainty in future man-made emissions (of GHG and other pollutants).

## **Greenhouse Gas Assessment**

16.10.3 The following limitations are relevant to this assessment:

- A. Complete data on materials for embodied carbon calculations are not available at the planning stage and therefore this assessment should be considered indicative. The full specification of construction materials is not anticipated to be known until detailed design has been completed;
- B. Emissions factors for Scheme elements are only available in CO<sub>2</sub> units and not CO<sub>2</sub>e. Most emissions factors were available in CO<sub>2</sub>e and this is not considered likely to significantly alter the assessment. For individual assumptions made in the GHG assessment please refer to Appendix 16.1;
- C. The typical emissions associated with the construction are based on the high-level materials quantities provided by the design team presented in Chapter 2 of this ES. The construction materials and process will further develop through the detailed design stage and may vary from that assessed. It is considered that the assessment presents a reasonable estimation of GHG emissions;
- D. Potential for double counting transport emissions from redistribution of local and regional traffic, ie not all vehicle journeys would be new because some would be replacements of current journeys; and
- E. As set out in Section 16.4 it is expected that emissions/ carbon intensity will continue to decline in the region due to a combination of factors however the baseline does not take account of any anticipated GHG emissions reductions by year of operation.

16.11 Identification of Potential Effects

In-combination Climate Impacts Assessment

Table 16.5: In-Combination Climate Change Assessment for Junction 16 Scheme.

Effect of Scheme on Receptors	Stage: Construction or Operation	Existing Design and Mitigation Measures	Climate Change Trend	Potential In-combination Climate Impact on Scheme Effect or Embedded/ Existing Mitigation?	Is there a Significant In- combination Climate Impact?	Additional Mitigation Required
Geology and Soils						
Impacts on soil or groundwater from spills associated with construction activities such as use of fuels/ oils.	Construction	During the construction of compounds, establishment of designated areas for fuels and materials storage and construction of pollution control measures will be undertaken following best practice guidance and outlined in the Pre-Construction Environmental Management Plan (Pre-CEMP). Following compound construction, management procedures will be identified to ensure that the risk of pollution event would be low.	Increased winter rainfall and frequency of extreme rainfall events.	Increased winter rainfall and extreme rainfall events may lead to to increased overland flows which could exacerbate this effect by causing the fuels or oils to contaminate the soil or groundwater.	Not significant due to the design and mitigation measures specified which should prevent spills.  Any requirements for monitoring will be determined as part of the site investigation, which will be undertaken as part of the detailed design process.	No additional measures required.
Exposure of staff or local residents to contaminants during excavations and construction activities (uptake through direct contact, indigestion and inhalation of soil/ dust/ fibres/ vapours)	Construction	The level of soil contamination identified is low however, localised exceedances have been identified at a former gas works. It is unlikely that the contaminated soils will be disturbed. Risk would be minimised by best practice in compliance with the Code of Construction Practice (CoCP) and the Pre-CEMP.  Health and safety measures including personal protective equipment for workers will be provided. A watching brief and protocols for dealing with unexpected contamination during excavations will be put in place.  Any hazardous waste would be stored separately in suitable containers. Where contaminated soils are present that are hazardous waste these would be stockpiled and sheeted to prevent water ingress	Increased winter rainfall and frequency of extreme rainfall events.	Rainfall events are expected to become more intense, which could exacerbate this effect by causing contaminants to migrate into the soil or groundwater more readily.	Not significant due to the design and mitigation measures specified e.g. CoCP and best practice Health and Safety measures.  Any requirements for monitoring will be determined as part of the site investigation, which will be undertaken as part of the detailed design process.	No additional measures required.
Impacts on ground conditions and groundwater during operational activities	Operation	Standard best practice measures would be employed for activities during the operation stage. Potential for foundations introducing preferential pathways for contaminant migration is low.	Increased winter rainfall and frequency of extreme rainfall events.	Rainfall events are expected to become more intense, which could exacerbate this effect by causing contaminants to more readily migrate into the soil or groundwater.	Not significant due to the design and mitigation measures specified e.g. CoCP and best practice Health and Safety measures.	No additional measures required
Road Drainage and Water Environment						
The Scheme will result in larger area of impermeable road surface than at present.	Operation	The potential for surface water flooding on the link road that crosses the Afon Gyrach river will be mitigated by raising the road above ground level on a low embankment to reduce the risk of surface water flooding. Attenuation ponds and a drainage ditch are additional mitigation measures that are proposed in the drainage design. These would serve to further reduce the risk of surface water flooding.  The Scheme’s surface water drainage system will be designed to control runoff rates up to 1 in 100 return period incorporating a 20% allowance to account for climate change in line with HD33 (see Drainage Strategy for more details Ref: A55J15J16-RAM-05-16-RP-D-0001).	Increased winter rainfall and frequency of extreme rainfall events.	Increased winter rainfall and extreme rainfall events may lead to overwhelming of drainage systems, resulting in surface water flooding on the Scheme. The drainage system may not be designed to withstand additional rainfall, thereby exacerbating the impact of the Scheme on flooding.	Not significant due to the consideration of climate change allowances in the Drainage Strategy. (Report Ref: A55J15J16-RAM-05-16-RP-D-0001). This details that the attenuation systems will be designed to temporarily store runoff and discharge at a rate no greater than the existing rate.	No additional measures required.
Nature Conservation (Biodiversity)						
Contaminants entering nearby waterbodies, fisheries and marine environment.	Operation	The proposed surface water drainage strategy specifies that interception of drainage from road and catchment run-off would be undertaken utilising SuDs to prevent silt entering nearby waterbodies including drainage ditches and filter drains and pipes / culverts to control runoff rates up to the 1 in 100 year return period, incorporating a 20% allowance to account for climate change in line with HD33 (see Drainage Strategy for more details Ref: A55J15J16-RAM-05-16-RP-D-0001).	Increased winter rainfall and frequency of extreme rainfall events.	Increased frequency and intensity of rainfall events could exacerbate this effect by causing overwhelming of drainage systems.	Not significant due to the consideration of climate change allowances and SuDs specified in the Drainage Strategy.	No additional measures required.

Effect of Scheme on Receptors	Stage: Construction or Operation	Existing Design and Mitigation Measures	Climate Change Trend	Potential In-combination Climate Impact on Scheme Effect or Embedded/ Existing Mitigation?	Is there a Significant In- combination Climate Impact?	Additional Mitigation Required
Removal of existing planting.	Operation	An Outline Ecological Management Plan will be produced during the detailed design stage as specified in Chapter 8: Nature Conservation. This will include a planting design which allows movement of species in line with the Green Corridors Initiative to achieve a biodiversity net gain, i.e. linear habitats including shrub and tree planting.	Increase in mean temperatures and the frequency and severity of extreme heat events (i.e. heat waves).	Higher temperatures could lead to a change in species composition and or the introduction of invasive species which could compromise the ecological design.	Not significant due to the consideration of planting design in the Outline Ecological Management Plan and the Environmental Landscape and Ecology Aftercare and Management Plan.	Wide genetic base of vegetation types recommended mixed provenances to build in adaptability to future climate <sup>20</sup> .
Landscapes and Visual Effects						
Loss of landscape features and fabric due to removal of hedgerows to facilitate access to the site.	Construction	Where feasible, existing vegetation will remain. Vegetation that is removed would be reinstated following construction. Mitigation planting would replace the existing roadside plantations lost as a result of the Scheme and, subject to successful establishment, screen and integrate the overbridge and widening of the existing road corridor into the localised landscape.	Increase in the frequency and severity of extreme heat events (i.e. heat waves).	Increased frequency of heat waves and drought conditions could cause mitigation plants to deteriorate or die, reducing their screening effect. However, it should be noted that extended growing season due to warmer temperatures and greater rainfall may be beneficial for some plants, increasing their growth and screening effect.	Not significant due to the consideration of planting design in the Outline Ecological Management Plan and the Environmental Landscape and Ecology Aftercare and Management Plan.	Additional measures recommended: A wide genetic base of vegetation types and a mix of provenances is recommended to build in adaptability to an unpredictable future climate <sup>21</sup> .
Loss of landscape features and fabric due to removal of roadside vegetation.	Operation	Vegetation that is removed would be reinstated following construction. Mitigation planting would replace the existing roadside vegetation lost as a result of the Scheme and, subject to successful establishment, screen and integrate the overbridge and westbound slip roads into the localised landscape.	Increase in the frequency and severity of extreme heat events (i.e. heat waves).	Increased frequency of heat waves and drought conditions could cause mitigation plants to deteriorate or die, reducing their screening effect. However, it should be noted that extended growing season due to warmer temperatures and greater rainfall may be beneficial for some plants, increasing their growth and screening effect.	Not significant due to the consideration of planting design in the Outline Ecological Management Plan the Environmental Landscape and Ecology Aftercare and Management Plan.	Additional measures recommended: A wide genetic base of vegetation types and a mix of provenances is recommended to build in adaptability to an unpredictable future climate <sup>21</sup> .
Cultural Heritage						
Potential interaction of climate change with the identified effect are considered negligible						
Community and Private Assets						
Potential interactions of climate change with the identified effects are considered negligible						
Air Quality						
Exposure of sensitive receptors (staff/local residents/ecological receptors) to dust during excavations and construction activities (uptake through direct contact, indigestion and inhalation of soil/ dust/ fibres/ vapours).	Construction	During the construction phase, best practice in compliance with the CoCP will be undertaken. This will include measures such as developing a dust management plan which will form part of the Pre-CEMP. Health and safety measures including personal protective equipment for workers will be provided.	Extended periods of drought could arise as a result of warmer summer months with limited precipitation.	Extended periods of drought could arise as a result of warmer summer months with limited precipitation may increase dust production and circulation which has the potential to affect human health.	Not significant due to the design and mitigation measures specified e.g. CoCP and Pre-CEMP.  Any requirements for monitoring will be determined as part of the site investigation, which will be undertaken as part of the detailed design process.	No additional measures required.
Exposure of sensitive receptors (staff/local residents/ecological receptors) to dust as a result of material storage, processing, and stockpiling.	Construction	During the construction phase, best practice in compliance with the CoCP and Pre-CEMP will be undertaken. This will include measures such as including the use of bunds; not storing of stockpiled materials within 10m of water courses and; damping down / sheeting during dry windy periods.	Extended periods of drought could arise as a result of warmer summer months with limited precipitation.	Drought conditions may impact the availability of water for dust suppression mitigation measures, which would reduce the effectiveness of embedded mitigation measures resulting in impacts upon the receptor.	Not significant.	Additional measures recommended: Temporary storage of water should be considered during the construction stage to be used in drought conditions.
Exposure of sensitive receptors (staff/local residents/ecological receptors) to dust during operational stage (uptake through direct contact, indigestion and inhalation of soil/dust/fibres/vapours)	Operation	During the operational stage of the Scheme it is recommended that earthworks should be revegetated and to stabilise surfaces as soon as practicable.	Extended periods of drought could arise as a result of warmer summer months with limited precipitation.	Extended periods of drought could arise as a result of warmer summer months with limited precipitation may result in failure vegetation on earthworks.	Not significant.	Additional measures recommended: Watering of vegetation should be considered during the construction and planting establishment stage to be used in drought conditions.

<sup>20</sup>Provenance choice of native trees under climate change in England - Policy Advice Note. UK Government, Forestry Commission, 2019. Available at: <https://www.gov.uk/government/publications/provenance-choice-of-native-trees-under-climate-change-in-england-policy-advice-note> [Accessed on 16/10/2019].



Effect of Scheme on Receptors	Stage: Construction or Operation	Existing Design and Mitigation Measures	Climate Change Trend	Potential In-combination Climate Impact on Scheme Effect or Embedded/ Existing Mitigation?	Is there a Significant In- combination Climate Impact?	Additional Mitigation Required
Noise and Vibration						
Potential interactions of climate change with the identified effects are considered to be negligible.						
All Travellers						
Potential interactions of climate change with the identified effects are considered to be negligible.						
Materials						
Potential interactions of climate change with the identified effects are considered to be negligible.						
Population and Human Health						
Potential interactions of climate change with the identified effects are considered to be negligible.						
Major Accidents						
Exposure of sensitive receptors (staff) storms and gales.	Construction	During the construction phase, potential pollution-causing construction materials and plant, or materials that could be dangerous if blown around in strong winds, would be temporarily removed. Please refer to Chapter 17, Major Accident and Disaster for more information.	Increased frequency of windstorm events in the second half of the 21st Century.	Increased frequency of windstorm events could result in higher wind loading and subsequent damage to construction materials, plant and vegetation.	Not significant.	No additional measures required.

Climate Change Resilience Assessment

Table 16.6: Climate Change Resilience Assessment for Junction 16 Scheme

Climate hazard	Construction/ Operational Stage	Climate Effect	Proposed Design and/or Mitigation Measures	Climate Change Implications	Significance of Effect	Additional Mitigation
Intense Rainfall events	Construction	Overland flows could lead to the erosion of stockpiles and silting of drainage assets which could lead to localised surface water flooding.	During the construction stage, management of stockpiles would be undertaken following best practice in line Pollution Prevention Guidelines and according the Pre-Construction Environmental Management Plan (Pre-CEMP) for the Scheme. This would include measures such as such as storing materials in a way to minimise silt laden runoff, water spraying and timely removal of stockpiled soil to prevent surface water run-off. Additionally, the Scheme’s surface water drainage strategy specifies that interception of drainage from road and catchment run-off would be undertaken utilising Sustainable urban Drainage Systems (SuDs) including drainage ditches and filter drains designed to perform good water quality treatment and physical filtration to remove solids.	Increased winter rainfall and frequency of extreme rainfall events could lead to more frequent or more severe flooding.	Not significant	None required – the CoCP should prevent silt build up and the detailed drainage design takes account of existing flood risk + climate change.  Current mitigation is considered appropriate to account for climate change.
	Construction and Operation	Overwhelming of drainage assets design capacity which could lead to localised surface water flooding.	The Proposed surface water drainage strategy specifies that interception of drainage from road and catchment run-off wouldl be undertaken utilising SuDS including drainage ditches and filter drains and pipes / culverts to control runoff rates up to the 1 in 100 year return period, incorporating a 20% allowance to account for climate change in line with HD33 (see Drainage Strategy Ref: A55J15J16-RAM-05-16-RP-D-0001).  Additionally, like-for-like flood compensation including a consideration of climate change, is being provided as part of the Scheme to ensure that the Scheme has no impacts upon flood risk to receptors elsewhere (see Drainage Strategy Ref: A55J15J16-RAM-05-16-RP-D-0001).		Not significant	None required – the detailed drainage design takes account of existing flood risk + climate change. This should prevent localised surface water pooling and flooding of the carriageway.  Current mitigation is considered appropriate to account for climate change.
	Operational	Damage to road surfaces and pavements due to scour from surface water flood events.	During the detailed design, best practice construction techniques and durable materials would be selected in accordance with DMRB HD26/06. This outlines the key requirements in terms of pavement design and layer thickness considering durability and suitability of materials taking into account likely climatic conditions and the vehicles anticipated to utilise the road.  The Proposed surface water drainage strategy specifies that interception of drainage from road and catchment run-off would be undertaken utilising SuDS including drainage ditches and filter drains and pipes / culverts to control runoff rates up to the 1 in 100 year return period, incorporating a 20% allowance to account for climate change in line with HD33 (see Drainage Strategy for more details Ref: A55J15J16-RAM-05-16-RP-D-0001)		Not significant	None required – the detailed drainage design takes account of existing flood risk + climate change and durability has been considered as part of the pavement specification and design. This should prevent localised surface water pooling and flooding of the carriageway and prevent deterioration of the pavement quality.  Current mitigation is considered appropriate to account for climate change.

Climate hazard	Construction/ Operational Stage	Climate Effect	Proposed Design and/or Mitigation Measures	Climate Change Implications	Significance of Effect	Additional Mitigation
	Operation	Localised surface water flooding which could lead to hydroplaning and unsafe diving conditions.	<p>The proposed surface water drainage strategy specifies that interception of drainage from road and catchment run-off would be undertaken utilising SuDS including drainage ditches and filter drains and pipes/ culverts to control runoff rates up to the 1 in 100 year return period, incorporating a 20% allowance to account for climate change change in line with HD33 (see Drainage Strategy for more details Ref: A55J15J16-RAM-05-16-RP-D-0001).</p> <p>In addition, kerb and gullies system would be installed for the Scheme in accordance with DMRB Volume 4 Section 2: Part 3 - Drainage. This specifies the requirements for gully spacings and design, taking account of width of flow for design storms which would be incorporated into the detailed drainage design for the Scheme.</p>		Not significant	<p>None required - the detailed drainage design takes account of existing flood risk + climate change. This should prevent localised surface water pooling and flooding of the carriageway which can lead to a risk of unsafe conditions and hydroplaning.</p> <p>Current mitigation is considered appropriate to account for climate change.</p>
Sea Level Rise	Construction		During the construction stage it is identified that works in Shore Road East and the Promenade will be more vulnerable to flooding (Flood Zone 3). The Pre-CEMP will provide detailed mitigation measures such as ensuring the Contractors sign up to Natural Resources Wales Flood Warning System, and in the event of stormy conditions, warnings will be recieved and construction activties will be paused. Early warnings will also allow for equiptment will be moved out of the area at risk.		Not significant	Current mitigation is considered appropriate to account for climate change.
	Operation	Tidal flooding which could lead to localised flooding of the Scheme.	Coastal flood defences (Llanfairfechan Sea Wall) are located to the north of the Scheme, along the coastline of Llanfairfechan. It is understood from Natural Resources Wales data that the protection provided by these assets is to the 1-in-200 year annual probability event. For more information see the Flood Consequences Assessment (Report Ref: A55J15J16-RAM-30-16-RP-X0027_APPENDIX_7.2).	Increase in future flood risk and coastal sea level rise. There may also be changes in tidal characteristics which could lead to more frequent or more severe flooding.	Not significant	<p>None required – a flood consequences assessment (FCA) has been produced as part of the Scheme which considers the risk of tidal flooding. Existing coastal flood defences are deemed acceptable taking account of climate change.</p> <p>Current mitigation is considered appropriate to account for climate change.</p>
		Tidal locking of proposed drainage network	During the detailed design, the specification of 'Flap Valves' on elements of the drainage systems vulnerable to tidal lock-in following best practice in HA107, will be considered.		Not significant	None required – the detailed draineq strategy will consider the use of Flap Vlaves within the design to mitgate against the potential impacts of tidal locking.
High temperatures and heatwaves	Construction	Staff welfare impacts for example, heat stress and unsafe working conditions.	The risk of heat stress to staff working outdoors would be managed through health and safety procedures. This would include the necessary Personal protective Equipment and toolbox talks to highlight risks of heatstroke.	Increase in the frequency and severity of extreme heat events (i.e. heat waves) could result in unsafe working conditions.	Not significant	None required - Current mitigation is considered appropriate to account for climate change.
	Operation	Distortion of bearings and movement joints as a result of thermal loading which may compromise the structural stability of the bridge.	During the detailed design, thermal loading would be managed through the selection of durable materials and would be informed by best practices such as DMRB Volume 2 – Section 3: Highways Structure and Eurocode design which utilise isotherms to take account of climatic conditions. Regular inspection and maintenance of the bridge structure will take place over its design life and action will be taken as required.	Increase in the frequency and severity of extreme heat events (i.e. heat waves) could result in increased thermal loading on bridges structures.	Not significant	None required - Current mitigation is considered appropriate to account for climate change.
	Operation	Change in composition of vegetation specified as part of the landscaping design for example, introduction of invasive species and disease which could lead to vegetation failure.	<p>An Outline Ecological Management Plan will be produced during the detailed design stage as specified in Chapter 8: Nature Conservation. This will include a planting design which allows movement of species, i.e. linear habitats including shrub and tree planting. A wide genetic base of vegetation types from different provenances following best practice is recommended as part of the ecological mitigation, for example species rich grassland.</p> <p>Regular inspection and checks for health of the vegetation would be required to ensure that invasive and undesired species are managed appropriately.</p>	Increase in the frequency and severity of extreme heat events (i.e. heat waves) could result in the introduction of undesired / invasive species, compromising the landscape design.	Not significant	None required - Current mitigation is considered appropriate to account for climate change.
Cold weather events	Operation	Presence of ice and frost conditions requiring the use of de-icers e.g. grit salt which could result in corrosive action on bridge components.	<p>During the detailed design, the selection of materials will ensure that corrosion rates are considered through best practice for example, British Standards. This includes the consideration of chloride induced corrosion of embedded steel in concrete e.g. weathering steel shall not be used in structures subject to de-icing salts.</p> <p>Regular inspection and maintenance of the bridge structure would occur and remedial action would be taken as required.</p>	Cold weather and extreme cold events will still occur (just less frequently) and the use of de-icers will still be required.	Not significant	None required - Current mitigation is considered appropriate to account for climate change.
Seasonal variation in temperature	Operation	Freeze-thaw during cold snaps and extreme high	During the detailed design, best practice construction techniques and durable materials would be selected in accordance with DMRB.	Increase in the frequency and severity of extreme heat events	Not significant	None required - Current mitigation is considered appropriate to account for climate change.



Climate hazard	Construction/ Operational Stage	Climate Effect	Proposed Design and/or Mitigation Measures	Climate Change Implications	Significance of Effect	Additional Mitigation
<b>(high temperatures and cold events)</b>		temperatures can cause damage to road surfaces including road and pavement cracking and deformation resulting in a reduction of road service life.	DMRB Vol 2 Section 2 Part 3 – HD26/06 – Pavement Design Specification. HD26/06 outlines the key requirements in terms of pavement design, layer thickness and the most suitable materials to be used, taking into account likely climatic conditions and the vehicles anticipated to utilise the road.  Regular inspection and maintenance of the road would take place over its design life and action would be taken as required.	(i.e. heat waves) could result in more frequent pavement rutting / cracking events.		
<b>Drought</b>	Construction and Operation	Dry and desiccated soils leading to soil erosion. This could cause sedimentation of drainage reducing their capacity and increasing the risk of flooding.	The Scheme surface water drainage strategy specifies that interception of drainage from road and catchment run-off would be undertaken utilising Sustainable urban Drainage Systems (SuDS) including drainage ditches and filter drains designed to perform good water quality treatment and physical filtration to remove solids.	Extended periods of drought could arise as a result of warmer summer months with limited precipitation. This could result in increased desiccation and soil erosion.	Not significant	None required - Current mitigation is considered appropriate to account for climate change.
	Operation	Shrink swell processes resulting in desiccation cracking and embankment and earthwork instability.	During the detailed design stage, robust slope design would allow for any future changes in soil moisture content and groundwater pressures as well as specifying appropriate earthworks materials. Earthworks would be designed to incorporate drainage elements which would convey surface water away from the earthworks preventing any scouring impacts.  Regular inspection and maintenance of embankments and earthworks would take place over their design life and action would be taken as required.	Increased winter rainfall followed by an increase in the frequency and severity of extreme heat events or more frequent dry spells would result in greater fluctuations in soil moisture content. This could result in shrink swell impacting upon embankment and earthwork instability.	Not significant	None required - Current mitigation is considered appropriate to account for climate change.
	Operation	Bridge foundation design.	During the detailed design, ground investigations, stability analyses and design calculations would be undertaken to input into the bridge foundation design. The design of the bridge structure would be undertaken in accordance with DMRB and Eurocode design, incorporating best practice.  Regular inspection and maintenance of the embankment structure would take place over its design life and action would be taken as required.	Increased winter rainfall followed by an increase in the frequency and severity of extreme heat events or more frequent dry spells would result in greater fluctuations in soil moisture content. This could result in shrink swell impacting upon structural elements of the asset e.g. foundations.	Not significant	None required - Current mitigation is considered appropriate to account for climate change.
<b>Windstorm events</b>	Construction and Operation	Damage to signs/signals and minor structures (e.g. gantries) and vegetation as a result of wind loading or wind blown debris.	During the detailed design, wind loading would be considered in accordance with DMRB Volume 2: Highway Structures: Design (Substructures and Special Structures) Materials which sets out the wind loading factors considering the structure design life.  Consideration of wind gusting on road side vegetation would be undertaken and best practice such as appropriate staking of trees to reduce vulnerability to wind damage would be undertaken.	Increased frequency of windstorm events in the second half of the 21st Century could result in higher wind loading and and subsequent damage to minor structures and vegetation specified as part of the design.	Not significant	None required - Current mitigation is considered appropriate to account for climate change.
	Operation	Wind erosion for earthworks and embankments	During the detailed design, embankments and earthworks would be grass seeded which would reduce the susceptibility to wind erosion.  Regular inspection and maintenance of embankments and earthworks would take place over their design life and action would be taken as required.		Not significant	None required - Current mitigation is considered appropriate to account for climate change.

## Greenhouse Gas Assessment

- 16.11.1 The demolition and construction GHG emissions are reported in tonnes of CO<sub>2</sub>e for the duration of the construction period. The GHG emission assessment has assumed the construction working hours detailed in Chapter 2.
- 16.11.2 The results of the GHG assessment are presented in Appendix 16.1 and summarised in Table 16.7.

**Table 16.7: GHG Emissions (tonnes of CO<sub>2</sub>e)**

<b>Item</b>	<b>Estimated GHG Emissions (tCO<sub>2</sub>e) over 24 Month Demolition and Construction Pperiod</b>
Embodied GHG emissions	5745.9
Construction onsite GHG emissions	5472.05
Construction transport GHG emissions	481.50
Waste disposal GHG emissions	0.19
<b>Total</b>	<b>11,699</b>

- 16.11.3 The construction and demolition associated with the Junction 16 Scheme is expected to contribute 0.00046% of the UK's 3<sup>rd</sup> carbon budget (2018 to 2022). IEMA best practice guidance states that all GHG emissions contribute towards climate change and are significant. Therefore, although emissions from the Scheme are considered low in comparison the UK Carbon budget, they are significant. It should be noted that by removing the existing roundabouts, which typically involves hard acceleration and deceleration, a benefit of the A55 Junction 16 Improvements is to minimise stop-start conditions. This will contribute to improved vehicle emissions.
- 16.11.4 The construction of Junction 15 and Junction 16 will be delivered concurrently. As a result, GHG emissions would be reduced as the transportation of construction and waste materials and the on-site emissions from machinery would be optimised. Please see Chapter 2: The Scheme for further information on the construction period and working hours associated with the Scheme.
- 16.11.5 It is assumed that 70% of waste materials arising from construction operations will be reused or recycled. The benefits resulting from reusing and recycling materials have been considered in the GHG emissions assessment.

## 16.12 Mitigation Measures

### Construction Stage

#### *Climate Change Resilience Assessment*

- 16.12.1 No additional mitigation measures relating to climate resilience have been identified as being required for the construction stage.

### *In-combination Impact Assessment*

- 16.12.2 No additional mitigation measures relating to ICCI have been identified as being required for the construction stage.

### *Greenhouse Gas Assessment*

- 16.12.1 A Pre-CEMP would be prepared in advance of construction which would define all mitigation measures to be adopted ensure as the design progresses, consideration of construction emissions and design enhancement measures (particularly related to embodied carbon within materials) should be used as a decision-making criterion, with the aim of minimising emissions where practicable.
- 16.12.2 No additional mitigation measures relating to GHG emissions have been identified as being required for the Scheme construction stage. It is recommended that the following opportunities to minimise GHG emissions should be considered at the detailed design and construction stage of the Scheme to reflect the carbon reduction hierarchy as follows<sup>21</sup>:

#### **Build nothing:**

- A. Evaluate the basic need for an asset and/ or programme of works and shall explore alternative approaches to achieve outcomes set by the Welsh Government.

#### **Build less:**

- A. Evaluate the potential for re-using and/or refurbishing existing assets to reduce the extent of new construction required
- B. Reuse or recycle the existing road surface planning's and demolition materials.

#### **Build clever:**

- A. Consider the use of low carbon solutions (including technologies materials and products) to minimise resource consumption during the construction, operation and user's use stages of the asset or programme of work.
- B. Substitute construction assets for lower-carbon alternatives (e.g. using low temperature asphalt).
- C. As far as possible, incorporating material resource efficiency and waste minimisation best practice into design, in particular improving the cut/ fill balance of the Scheme.
- D. Selection and engagement of suppliers of materials and construction contractors taking into account their proximity to the Scheme in order to reduce transport miles, as well as their inhouse policies and commitments to the ongoing reduction of GHG emissions, including embodied emission in materials.
- E. For example, any surplus soils from nearby projects could be reused and local waste management facilities could be used, with the potential for reducing carbon emissions associated with transport.

<sup>21</sup>Carbon Management in infrastructure (2019). Available at: <https://www.lr.org/en-gb/pas-2080/> [Accessed 23.10.2019].

**Build efficiently:**

- A. Use techniques (e.g. construction, operational) that reduce resource consumption during the construction and operation phases of an asset or programme of work.
- B. Consider the use of efficient plant, including hybrid and electric machinery and equipment as appropriate.

**Compensate:**

- A. Consider offsetting of carbon emissions.

**Operational Stage**

*Climate Change Resilience Assessment*

- 16.12.3 No additional mitigation measures relating to climate resilience have been identified as being required for the completed Scheme. However, it is recommended that the design process includes a more detailed assessment of climate risks and that this be reported on at each stage of the detailed design process

*In-combination Impact Assessment*

- 16.12.4 No additional mitigation measures relating to ICCI have been identified as being required for the operational stage.

**16.13 Significance of Effects**

- 16.13.1 The assessment included in Section 16.11 of this chapter concludes that the Scheme will not result in any significant effects with regards to climate change resilience or in-combination climate impacts. Following IEMA guidance, although emissions from the Scheme are considered low in comparison the UK Carbon budget, they are significant.

**16.14 Cumulative Effects**

**Construction Stage**

*Climate Change Resilience Assessment*

- 16.14.1 The climate resilience risks identified are limited in their spatial extent to the Scheme footprint and therefore no cumulative effect with other developments is considered.

*Greenhouse Gas Assessment*

- 16.14.2 This assessment has considered GHG emissions in the context of local and national GHG emissions and no further consideration of the Scheme's GHG emissions with other sources of GHGs is considered necessary.

## **Operational Stage**

### *Climate Change Resilience Assessment*

- 16.14.3 The climate resilience risks identified are limited in their spatial extent to the Scheme footprint and therefore no cumulative effect with other developments is considered.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 17 RISK OF MAJOR ACCIDENT AND DISASTER**

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## 17. RISK OF MAJOR ACCIDENT OR DISASTER

### 17.1 Chapter Introduction

- 17.1.1 This chapter reports on an assessment of risks of major accidents and disasters. The assessment is carried out in compliance with the Environmental Impact Assessment (EIA) Directive 2014/52/EU, published in the EU Journal on the 16th May 2017, which states the need to assess *'the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project during construction and operation to risks of major accidents and/or disasters which are relevant to the project concerned.'* This definition implies a focus on low-likelihood risks (those that occur so infrequently that they cannot be foreseen, or are so unlikely that the cost or adverse effects of avoidance cannot be justified) which are:
- Not properly addressed through the design of the Scheme;
  - Not considered elsewhere in other assessments within the Environmental Statement (ES).
- 17.1.2 The UK published The Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways, and Transport) Regulations on 5 December 2017. This Statutory Instrument requires an assessment of the risks of major accident and disasters to be completed.
- 17.1.3 The underlying objective of this assessment is to identify appropriate precautionary actions (mitigation) to be considered because of the project's vulnerability to major accidents and/or natural disasters set against the baseline situation, which in this case is an existing highway. This chapter seeks to identify:
- Relevant major accidents and natural disasters to which the proposed development could be vulnerable;
  - The potential for these to have significant adverse environmental effects;
  - Measures that should be in place to prevent or mitigate the likely significant adverse effects of such events on the environment; and
  - To be proportionate and to avoid crossing over into the scope of other environmental assessments aspects.

### 17.2 Regulatory and Policy Framework Published Guidance

#### International Regulation and Policy

- 17.2.1 Paragraph 18 of Directive 2014/52/EU<sup>1</sup> states: *'In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment. In order to avoid duplications, it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation, such as Directive 2012/18/EU of the European Parliament and the Council<sup>3</sup> and Council Directive 2009/71/Euratom<sup>4</sup>, or through relevant assessments carried out pursuant to national legislation provided that the requirements of this Directive are met.'*

<sup>1</sup> EU Directive 2014/52EU amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment



## National Regulation and Policy

- 17.2.2 The Directive has been transposed into UK law in Schedule 4 (8) of the 2017 EIA Regulations<sup>2</sup> which require: '*A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned*'.
- 17.2.3 UK law has removed the word 'natural'. An article written by a registrant of the EIA Quality Mark Registrant Scheme of the Institute of Environmental Management and Assessment (IEMA) suggests that given the intention underlying this aspect of the 2017 Directive, both man-made [major accidents] and natural disasters [disasters] should be considered<sup>3</sup>.

## Published Guidance

- 17.2.4 There are no published guidelines setting out clearly how the assessment of major accidents and disasters should be undertaken. As this is a new topic within the realms of EIA, its approach will evolve over time in the absence of any published guidelines. Examples of other assessments and papers published by experienced EIA practitioners have been examined and lessons learned from these.
- 17.2.5 Neither the Regulations nor the EU Directive define the scope or method to be used in the assessment. However, IEMA provides useful outline guidance in an EIA Quality Mark Article<sup>4</sup>. The article provides useful definitions of:

**Major Accident:** *uncontrolled occurrence in the course of the construction or operation of a development, leading to serious danger to the environment, which may be either immediate or delayed.*

Examples: large-scale fire, structural collapse, explosion, or major transport accident.

**Disaster:** *This is an external event (i.e. not directly caused by the development) leading to serious danger to the environment, which may be either immediate or delayed.*

Examples: *natural sources* such as coastal flooding, adverse weather, ground movement; *man-made sources* such as escalation of a fire from an adjacent facility, dam collapse etc.

- 17.2.6 Emerging EIA practice is to consult the following documents to identify potential major accidents and disasters:
- *The International Federation of Red Cross & Red Crescent Societies Early Warning, Early Action* (2008). This guidance looks to other countries including those in warmer climates, thereby identifying risks that the UK may encounter in the future considering climate change and global warming.
  - *The International Disaster Database*. This online source contains data covering over 22,000 mass disasters in the world from 1900 to the present day and aims to '*rationalise decision making for disaster preparedness, as well as provide an objective base for vulnerability assessment and priority setting.*'

<sup>2</sup> The Town and Country Planning (Environmental Impact Assessment) Regulations 2017

<sup>3</sup> IEMA (2016) EIA Quality Mark Article: Assessing Risks of Major Accidents / Disasters In EIA. Available at: [https://www.iema.net/assets/uploads/EIA%20Articles/wsp\\_assessing\\_risks\\_of\\_major\\_accidents\\_disasters\\_in\\_eia\\_revised.pdf](https://www.iema.net/assets/uploads/EIA%20Articles/wsp_assessing_risks_of_major_accidents_disasters_in_eia_revised.pdf)

<sup>4</sup> <https://www.iema.net/assets/uploads/EIA%20Articles/AMEC%20What%20is%20this%20MADness.pdf> | Amec Foster Wheeler. 2018

- *The National Risk Register of Civil Emergencies (2017)*<sup>5</sup>. This document is the unclassified version of the National Risk Register and it identifies the main types of civil emergencies that could affect the UK in the next five years. It is recognised, however, that this document does not provide an all-encompassing list of all potential major accidents and disasters and its timescales are short-term.
- *The North Wales Community Risk Register* produced by the North Wales Resilience Forum, which is made up of representatives from all the main agencies involved in responding to emergencies: fire, police, ambulance, local authorities, the health service, environmental organisations and utilities. The purpose of the forum is to ensure representatives work together to achieve an appropriate level of preparedness to respond to emergencies that may have a significant impact on the communities of North Wales.

17.2.7 There is a lack of clarity over exactly what situations should be included in this assessment. The considered view of Andrew Mahon<sup>6</sup> an EIA practitioner, is that the assessment should include a *'systematic identification and assessment where the vulnerability of a development to an existing low-likelihood environmental hazard introduces or increases the risk of sensitive receptors being adversely affected following realisation of that hazard. This could result from the development introducing or enhancing a pathway between an environmental hazard and one or more sensitive receptors, increasing the likelihood of a pre-existing risk, or from the development being vulnerable to a pre-existing low-likelihood hazard, such that it releases secondary, triggered effects that impact one or more sensitive receptors'*. The assessment of low-likelihood hazards with significant consequences for sensitive receptors is the core of this assessment.

### 17.3 Methodology

17.3.1 The assessment is required to identify the significant adverse effects on receptors, which could arise from the vulnerability of the proposed Scheme to relevant major accidents or disasters. The occurrence of a major accident or disaster is described as an 'event' in this chapter. The significance of the effect is assessed against a baseline of the existing situation.

17.3.2 For such event to pose a risk to the environment, there must be a:

**Source:** a major accident or disaster; and

**Pathway:** the mechanism by which a receptor could be affected by the event; and

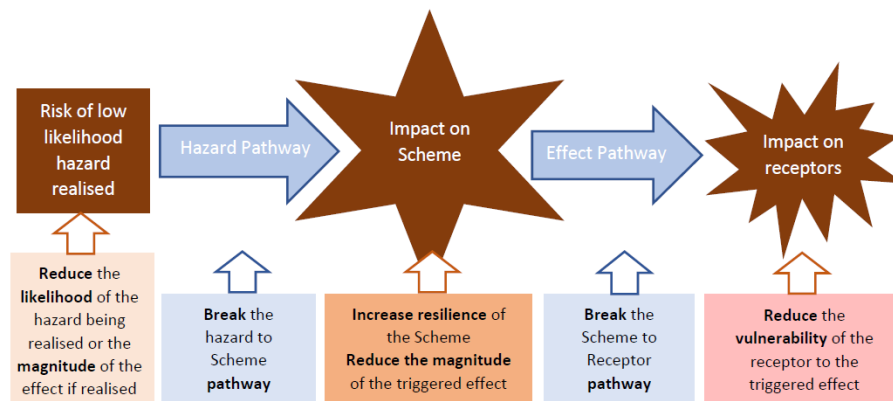
**Receptor:** population, human health, biodiversity (with particular attention to species and habitats protected under [Directive 92/43/EEC\(1\)](#) and [Directive 2009/147/EC\(2\)](#)), land, soil, water, air and climate; material assets, cultural heritage and the landscape; the interaction between the factors.

17.3.3 During Key Stage 1 of this project (considering a long list of options) and Key Stage 2 (examining a short list to identify a preferred option) the high-risk hazards have been identified and then eliminated or avoided. In Key Stage 3 the Low Likelihood Hazards are considered. This chapter is concerned with Key Stage 3, which involves the development of a preferred option and a Scheme of mitigation. The assessment of the preferred option has identified avoidance and mitigation measures for the low likelihood hazards. Figure 17.1 shows how there are various means to achieve avoidance or mitigation.

<sup>5</sup> National Risk Register Of Civil Emergencies 2017 edition, Cabinet Office

<sup>6</sup> Disasters in EIA, by Andrew Mahon, TRANSFORM, For Environmental Professionals 2 March 2018

Figure 17:1: Approach to Avoidance and Mitigation



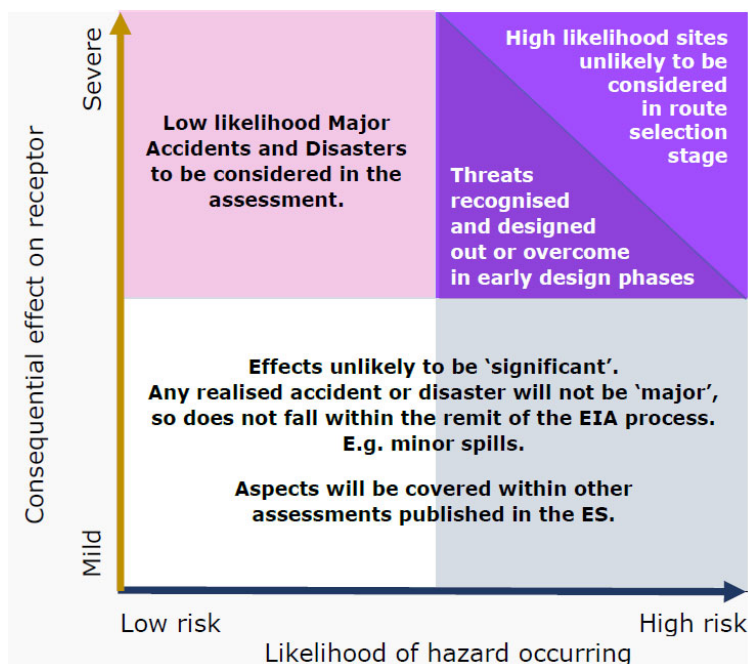
## Identifying Threats

17.3.4 A two-stage screening is used:

- i. Firstly, to rule out matters that are more properly addressed by compliance with detailed legislation, for example, health and safety matters; and
- ii. Secondly, to rule out any potential major accidents and disasters (threats) that are highly unlikely to occur in the context of this project. For example, in the North Wales region volcanic activity is highly unlikely to occur, but there is a recognised likelihood of tidal surges.

17.3.5 Major accidents and disasters on the list are subject to further consideration in the following sequence:

- i. **Adopting the suitable long list of threats** such as those in the sources identified in Paragraph 17.2.6. The most appropriate sources for this project include the *National Risk Register of Civil Emergencies (2017)* and *The North Wales Community Risk Register*;
- ii. **Screening of relevant threats:** based on the risk registers listed in Item i above. This is expected to give rise to a short list of low likelihood/severe consequence threats as set out in Figure 17.2;
- iii. **Consideration of vulnerability:** how site location and adjacent landuse makes the project vulnerable to the risk of the threats remaining on the list following screening;
- iv. **Scoping of threats to the Scheme:** using source-pathway-receptor risk matrix approach where the project becomes a pathway that increases risk as a result of the changes brought about by the Scheme;
- v. **Consideration of threats:** based on risk factors, avoidance, prevention and mitigation;
- vi. **Cross referencing** of identified risks relevant to other ES topics, as appropriate; and
- vii. **Examination of remaining threats.**



**Figure 17.2: Consideration of Risk for Major Accidents and Disasters**

- 17.3.6 The assessment will evaluate the exposure and vulnerability of the development to each of the threats on the short list and identify the major accidents or disasters associated with each that could potentially give rise to adverse effects on the environment. Then the risk of likely significant environmental effects that would be caused is evaluated. Figure 17.2 shows how these potential impacts are considered, and how they are likely to be those of low likelihood and moderate to severe consequences. An explanation of the matrix is provided below:

**Low Likelihood - Mild Consequence** (*bottom left, no colour*): these threats are considered unlikely to have moderate or severe consequences and are therefore outside the scope of this assessment. Although some of these threats might affect other parts of the A55, there are likely to be well-established procedures in place to address the consequences with no significant effects on the environment.

**High Likelihood - Mild Consequence** (*bottom right, grey square*): these threats are considered unlikely to have moderate or severe consequences and are therefore outside the scope of this assessment. Although some of these threats might affect other parts of the A55, there are likely to be well-practised procedures in place to address the consequences of these more frequent events with no significant effects on the environment.

**High Likelihood - Severe Consequence** (*top right, purple square*): This square is divided into two triangles by the diagonal line to differentiate between:

(*Upper triangle*): Threats of such magnitude and severe consequence that they would influence the choice of route.

(*Lower triangle*): Threats of sufficient magnitude and severity of consequence that they will be considered in design of the preferred option and any necessary mitigation incorporated.

**Low Likelihood - Severe Consequence** (*top left*): This is the square containing the threats that pose consequences severe enough to be considered in option selection and Scheme design, but where the risk of occurrence is so low that the risks to the Scheme and the environment, due to the vulnerability of the Scheme, are considered acceptable.

## 17.4 Study Area

- 17.4.1 The study area is definable only after any potential major accidents or disasters that could arise have been identified as relevant to the project and which could result in serious danger to the environment. In each case the project is either the source of, or is subjected to, the major accident or disaster resulting in potentially-significant adverse effects on the environment.
- 17.4.2 Figures in Volume 3 of this ES will provide an understanding of the Scheme and the setting. Figure 1.1 is the Scheme location; Figure 2.2 shows the Scheme setting and Figure 2.3 is photographs of the existing situation. The general arrangement of the Scheme is shown in Appendix 2.5.

## 17.5 Baseline Conditions

- 17.5.1 A desk-based study has been undertaken to establish the baseline environment on which the assessment of risk is to be carried out, as this will influence both the likelihood and the impact of a major accident and/or natural disaster.
- 17.5.2 North Wales' geographical location means that it has low vulnerability to natural disasters such as major earthquake, volcanic activity and tsunamis which pose risk to projects in other parts of the globe. In recent decades there has been an increase in the number of severe weather events which have affected North Wales, particularly those that lead to flooding.
- 17.5.3 The A55 dual carriageway was designed in the 1980s, following the North Wales coast to provide improved access to the port of Holyhead and to the communities that live along the coast. The route responds to some extreme topography from rocky coastline and cliffs to low-lying river flood plains and coastal foreshore. This is reflected in the landform that the dual carriageway crosses on either side of Junction 16. The steep rocky headlands of Penmaenmawr and Penmaenbach extend into the sea, while between them is a gently-sloping landscape occupied by settlements. To pass through this landform the road uses tunnels, follows cliff-side terraces, and embankments on the shoreline. The main Chester to Holyhead Railway shares the narrow transport corridor. For much of the route from Chester to Holyhead the A55 is located on former intertidal and foreshore land behind sea defences provided by the railway and this is the case at Dwygyfylchi. However, at Penmaenmawr the A55 occupies the coastal land with the railway to the south.
- 17.5.4 Some of these communities along the coast, such as Penmaenmawr and Dwygyfylchi, are dependent on the A55 trunk road for connectivity to the rest of Wales and so the resilience of this route is fundamental to their viability and quality of life.
- 17.5.5 Several natural and manmade sources of risk of major accident and disaster have been identified.
  - i. **Sea and tide:** tidal ranges vary from neap to spring tides, and tidal extremes can occur when exacerbated by weather conditions, leading to flooding above the normal high tide line. The effects of climate change are predicted to include an increase in sea level which would exacerbate high tidal extremes. Along the coast at Penmaenmawr and Dwygyfylchi there are no areas of settlement that are at risk of flooding from the sea<sup>7</sup>. There are areas at risk of flooding alongside the Afon Gyrach to the north and south of Glan yr Afon Bridge that are Zone 2 (1% to 0.1% probability) and Zone 3 (0.5% to 0.1% probability).

<sup>7</sup> <https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/>

There are no sea defences along this length of the coast, although the railway would limit the extent to which flooding from the sea could extend. The West Wales Shoreline Management Plan provides information on potential sea flooding and sets out the features that could be affected<sup>8</sup>;

- ii. **Rivers and surface water:** the local catchments are small but mountainous with short, steep routes down to the coastal plain and sea. The Afon Gyrach is the largest watercourses and is considered to be 'flashy', which means that periods of precipitation can result in a rapid increase in the volume and velocity of water descending the steeper upland channel of the Gyrach. In these spate conditions fast flowing water is then slowed as the river channel gradient eases on the coastal plain through the settlement of Dwygyfylchi. As a consequence, the slower-moving water backs up in the river channel and can flood adjacent low-lying areas of the coastal plain and settlement. The potential for this to occur is acknowledged in the Natural Resources Wales (NRW) Flood Risk maps<sup>9</sup>. The potential for localised flooding can be exacerbated by the condition of the tide to cause flooding near the coast, where the Gyrach passes under the A55 and railway. Climate change is predicted to lead to an increase in sea level which would exacerbate high tidal extremes;
- iii. **Steep mountain slopes:** rock faces and extensive areas of scree slope are present on Penmaenmawr headland and to the east of Llanfairfechan. This headland has been extensively quarried and the slopes have historically been affected by quarry inclines, buildings and access tracks. Considerable work has been done to stabilise some steeper slopes above the A55. Whilst not within a zone known for serious earthquakes, some minor tremors have been felt in North Wales. Severe weather could also influence the behaviour of the material forming the slopes;
- iv. **Industrial premises and manufacturing:** quarrying in the Penmaenmawr headland is the largest industry in the proximity of the Scheme with the potential to influence Llanfairfechan and the A55 and railway corridor, but the existing presence of industrial hazards associated with the quarries or other industries in the proximity would not change as a consequence of the Scheme;
- v. **Road tunnels:** through the headlands could be closed by major traffic accidents or other events with the consequence that travellers and goods would be unable to travel east or west on this international route. However, the risk of tunnel closures following the Scheme would be no greater than for the existing A55;
- vi. **Rail and road traffic:** major traffic and rail accidents could occur within or adjacent to the Scheme with fatalities, serious injuries and potential for spillage of loads. These risks already exist for the existing A55 Junction, but the changes brought about could change driving conditions and the consequent risks of major accidents occurring;
- vii. **Climate change effects:** as explained above could increase the above risks or influence the consequences of the risk being realised. However, the risk is no greater for the Scheme than for the existing A55;

<sup>8</sup> West Wales Shoreline Management Plan <http://www.westofwalesmp.org/content.asp>. Relevant area: PDZ20 Conwy - Gerazim to Great Orme.

<sup>9</sup> <https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/>

- viii. **From all of the above** there is potential for the consequences of a low risk hazard being realised and as a consequence affecting environmental receptors.

## **17.6 Potential Effects**

- 17.6.1 Table 17.1 and Table 17.2 provide a checklist of the low likelihood / high (severe) consequence hazards based broadly on the list provided in the Risk Registers.<sup>10</sup> Those that are likely to be relevant to the Junction Improvements Scheme are identified and scoped-in for further assessment.

<sup>10</sup> National Risk Register of Civil Emergencies 2017 edition, Cabinet Office and The North Wales Community Risk Register



Table 17.1: Potential Effects: Initial Threat List: Natural Hazards

Disaster Group: Natural Hazards		Type of Risk Will it occur?			Pathway	Potential Receptor								Result		Reasons
Disaster subgroup	Major accident or disaster type	Particular location risk	Construction risk	Operational risk	Process by which receptor could be affected	Population and human health	Biodiversity (including designations)	Land and soil	Water	Air and climate	Material assets	Cultural heritage	Landscape and townscape	Effect on environment as due to vulnerability of Scheme	Scoped in or out?	Why there is, or is not, a significant effect on the environment as a result of event
Geophysical	Earthquake	NO	NO	NO	Geological conditions allowing the transmission of shockwaves	✓		✓			✓	✓	✓	NO	OUT	Earthquakes of a magnitude to be a threat rarely occur in the UK. Minor earthquakes have not endangered lives or caused extensive damage. National Risk Register of Civil Emergencies 2017 (NRRCE) states: <i>'Earthquakes in the UK are moderately frequent but rarely result in large amounts of damage. An earthquake of sufficient intensity (determined based on the earthquake's local effect on people and the environment) to inflict severe damage is unlikely'</i> . There is a negligible risk of an earthquake of enough magnitude to adversely affect the A55 carriageway, structures and drainage network. Earthquakes or earth tremors of lower magnitude are taken into consideration in design, with the result that there is a negligible risk of significant adverse effects on the Scheme, or on the environment as a result of the Scheme.
	Volcanic activity	NO	NO	NO	Geological conditions are not present	✓	✓	✓	✓	✓	✓	✓	✓	NO	OUT	Volcanic activity in the UK does not occur. The wider effects of ash clouds from Iceland, the closest location of volcanoes, spread to North Wales as experienced in 2010, but did not affect the operation of the road network. There is a negligible risk that a remote volcanic eruption would affect the existing A55 or the Scheme or affect the environment as a consequence.
	Landslides	YES	NO	NO	Loose rock and soil on steep slopes are present and could affect the A55	✓	✓	✓	✓		✓	✓	✓	YES	OUT	Landslides could occur, associated with the steep slopes of the headlands where there are highly-visible scree-covered slopes associated with quarrying and natural weathering. The areas at risk are outside the footprint of the proposed junction improvements. Risks of scree material falling onto the A55 outside the footprint are a recognised threat to the road and to traffic, but measures have been installed at Penmaenmawr headland to reduce the hazards associated with material falling from the slopes. While the A55 corridor might be vulnerable to landslides, the consequences of a landslide on the Scheme is unlikely to have an adverse effect on the environment.
	Tsunami	NO	NO	NO	The sea lies very close to the site	✓	✓	✓	✓		✓	✓	✓	NO	OUT	There is a negligible risk of Tsunami. European Spatial Planning Observation Network (ESPON) have no records of these threats occurring along the North Wales coast and there are no tectonically-active zones in the vicinity to affect the existing A55 or the Scheme, nor to affect the environment as a consequence.
Hydrological	Coastal flooding from the sea	YES	YES	NO	The sea lies very close to the site	✓		✓	✓		✓	✓		YES	IN	The Scheme lies on the coast with much of the existing A55 elevated several metres above the high tide line and within the coastal flood defences at Penmaenmawr and provided by the railway. NRW Flood Maps show that Coastal flooding from the sea can occur along the shoreline and in the flood plain of the Afon Gyrach which crosses under the A55 north east of Dwygyfylchi. Coastal flooding from the sea would not impact the A55 carriageway and the Scheme is unlikely to result in significant adverse effects on the environment as a result of the Scheme. See fluvial flooding below, which could be exacerbated by coastal flooding by the sea. Refer to Chapter 7 Road Drainage and the Water Environment.
	Fluvial flooding	YES	YES	NO	Water flows in watercourses towards the sea	✓			✓		✓	✓		YES	IN	ESPON mapping shows that the Scheme lies within an area of Low Flood Occurrence. However, the NRW Flood Maps show that fluvial flooding (Flood Zone 2 and 3) can occur in the Afon Gyrach floodplain upstream (south) of the A55 for a considerable distance. Flooding could be exacerbated if the river flow is impeded at high tides. There is a 1% chance of fluvial flooding affecting the A55 at the crossing of the Afon Gyrach in a given year. Fluvial flooding impacting the A55 is unlikely to result in significant adverse effects on the environment as a result of the Scheme because a proposed bridge would match the span of the existing bridges. However, fluvial flooding could exacerbate surface water flooding.



Disaster Group: Natural Hazards		Type of Risk Will it occur?			Pathway	Potential Receptor								Result		Reasons
Disaster subgroup	Major accident or disaster type	Particular location risk	Construction risk	Operational risk	Process by which receptor could be affected	Population and human health	Biodiversity (including designations)	Land and soil	Water	Air and climate	Material assets	Cultural heritage	Landscape and townscape	Effect on environment as due to vulnerability of Scheme	Scoped in or out?	Why there is, or is not, a significant effect on the environment as a result of event
	Surface water flooding	YES	YES	YES	Water not infiltrating due to paved surfaces. flows downslope.	✓		✓	✓		✓	✓		YES	IN	<p>ESPON mapping shows that the Scheme lies within an area of Low Flood Occurrence. However, NRW Flood Maps indicate that surface water flooding can occur over several areas associated with the Scheme on low-lying land and in urban areas in Penmaenmawr, on the south side of the A55. The pattern of flooding suggests seasonal watercourses or floodpath flow down from the high land to the south-east and pooling in streets and against man-made obstructions. Obstructions include the railway sidings, Station Road West and East; land including the A55 between the Puffin Services and the Afon Gyrach, and further east where a seasonal watercourse flows under the A55.</p> <p>Surface water flooding impacting the A55 is unlikely to result in significant adverse effects on the environment as a result of the Scheme.</p>
	Avalanches	NO	NO	NO	Heavy snowfall on steep slopes	✓		✓			✓	✓	✓	NO	OUT	<p>No avalanches have occurred in the area in the recent past and are considered to be a negligible risk due to the shallow depths of snow accumulation and the short duration before thawing. This circumstance is not considered likely to change because of climate change. The risks of avalanche are not increased by the Scheme.</p>
Climatological/meteorological	Hurricanes storms and gales	YES	YES	YES	Atmosphere	✓	✓	✓	✓	✓	✓	✓	✓	YES	IN	<p>Areas that are more exposed towards the northern Atlantic experience the highest threat of winter storms. Most of the British Isles lie within the ESPON mapping 'Very High Probability' category, but there is a low frequency of severe hurricanes, storms and gales occurring. A severe event could cause flooding of the carriageway, severe gusting winds affecting vehicles, poor visibility due to rain or blown debris, falling trees or structures blocking roads. These results are likely to cause traffic congestion, speed reductions, vehicle collisions, injuries and fatalities and road or tunnel closures. Coastal locations suffer more of these events due to exposure to the sea and the effects can be more severe than inland areas. Royal Meteorological Society research has found that these events tend to affect critical 'single points of failure' that can sever important social and economic links<sup>11</sup>. Design of the Scheme to take account of severe weather would reduce the likelihood of these effects. Extreme events could still cause temporary road closure. These effects are already a risk associated with the baseline situation and so there would be no significant adverse effects on the environment as a result of the Scheme.</p> <p>Refer to Chapter 16 Climate Change.</p>
	Wave/ storm surges	YES	YES	YES	The sea	✓	✓	✓	✓		✓	✓	✓	YES	IN	<p>ESPON mapping shows that the Scheme lies on a coastline that is prone to storm surges. Storm surges are often closely linked to winter storms. Although North Wales is within the 'Very High Probability' category, the coastline morphology of cliffs and maintained coastal protection reduces the threat of storm surges. Between the Afon Gyrach and the Puffin Services the A55 is at its lowest point relative to the sea. The presence of the railway embankments which act as sea defences, could deflect a wave surge and so the adverse effects of this on the environment is unlikely to be worsened as a result of the Scheme.</p> <p>Refer to Chapter 16 Climate Change and Chapter 7 Road Drainage and the Water Environment.</p>
	Extreme high temperatures	NO	YES	YES	Atmosphere	✓	✓	✓	✓	✓	✓	✓	✓	NO	IN	<p>High temperatures in this maritime context are a low risk hazard for the Scheme, but these events have become more frequent in recent decades with temperatures reaching record highs in the Summer of 2019. In the UK there is a wide annual temperature range from as low as -16°C to over 30°C. Thermal expansion and contraction of materials can affect the performance of surfaces and structures, while the softening of road surfacing can occur in high temperatures. Bridge design for the new junction assumes a normal range of thermal expansion, but extreme conditions could result in damage to bridge abutments and joint bearings. In extreme circumstances the effects could result in temporary bridge closure. Bridge design would take account of predicted temperature ranges. Effects of extremely high temperatures could result in traffic being diverted to other routes for a short duration which would not be a significant impact.</p>

<sup>11</sup> The impacts of the 28 June 2012 storms on UK road and rail transport, [David Jaroszowski](#), et al, published 2014; Royal Meteorological Society

Disaster Group: Natural Hazards		Type of Risk Will it occur?			Pathway	Potential Receptor								Result		Reasons
Disaster subgroup	Major accident or disaster type	Particular location risk	Construction risk	Operational risk	Process by which receptor could be affected	Population and human health	Biodiversity (including designations)	Land and soil	Water	Air and climate	Material assets	Cultural heritage	Landscape and townscape	Effect on environment as due to vulnerability of Scheme	Scoped in or out?	Why there is, or is not, a significant effect on the environment as a result of event
	Extreme low temperatures and heavy snow	NO	YES	YES	Atmosphere	✓	✓		✓		✓	✓	✓	NO	OUT	Extreme low temperatures in this maritime context are a low risk hazard for the Scheme. Some of the highest winter temperatures in the UK have been recorded on the North Wales coast. Low temperatures and deep snow can also occur but with an average of less than five days in a year when snow will lie, combined with the mild maritime setting, the risk of blockage of the A55 at Junction 16 for more than a few hours is extremely low. Extreme low temperatures could result in freezing conditions with iced surfaces, while freezing fog could result in very poor visibility, major accidents, fatalities and injuries. Traffic Wales and the maintaining agent apply long established measures to deal with severe cold, including gritting and snow clearance on the A55. The Scheme will not result in changes to the current situation and snow, frost and severe low temperatures would not have an adverse effect on the environment as a result of the Scheme.
	Droughts	NO	NO	NO	Atmosphere	✓	✓	✓	✓				✓	NO	OUT	Drought is not considered to constitute a risk to the A55, so the Scheme would not cause significant adverse effects on the environment.
	Severe space weather	NO	NO	YES	Atmosphere					✓	✓			NO	OUT	The NRRCE suggests that an extreme space weather event is likely to occur in a five-year period and this would have a moderate severity of impact, but with little effect on the functioning of the road network. Consequently, there would be no adverse effect on the A55. Interference with the function of electronic equipment such as signs and cameras in the nearby tunnels alone would not be a disaster but could result in blockages and congestion on the A55 for a period. The failure of electronic systems would be addressed by the deployment of Traffic Officers when conditions require their intervention. The Scheme would not result in any change to the existing circumstances on the A55 and would not have a significant impact on the environment as a consequence.
	Poor air quality	NO	YES	YES	Construction activity and heavy traffic congestion	✓	✓			✓				NO	OUT	Poor air quality can occur in circumstances when airborne pollutants cannot disperse because of still air, temperature inversion or severe traffic congestion. Air pollution from petrol and diesel engine exhausts can also react, in still, hot and sunlit conditions, to produce smog. The A55 is located close to the coast with a background of high air quality dominated by maritime air carrying low concentrations of pollution. The maritime setting means that on-shore and off-shore winds and the absence of obstructions to air movement disperse air pollution rapidly. The likelihood of congestion and slow-moving queues of traffic producing high concentrations of air pollution on the A55 is mitigated by removing the roundabout and encouraging free-flowing traffic. Air quality is addressed in Chapter 12
	Fog	YES	YES	YES	Local atmospheric conditions	✓								NO	IN	Fog and the resulting poor visibility can increase the risk of fast-moving vehicles on the A55 being involved in collisions. The likelihood of fog occurring would be similar for both the existing A55 and the Scheme. Improving the junction will not result in increased risk of fog occurring. Rapid slowing of high-speed traffic approaching the roundabout in conditions of poor visibility could result in collisions. Providing a free-flowing grade separated junction will reduce the risk of these major accidents, but the higher speeds of vehicles on the Scheme could worsen the consequences of collisions if they do occur. Traffic Wales monitor traffic flows on the A55 and can mitigate or avoid the effects of fog by using electronic information signs to inform drivers of road conditions ahead, or by deploying Traffic Officers to manage traffic and reduce the risk and severity of collisions. Refer to Table 17.4 Threats and Mitigation Measures to protect the water environment are set out in Chapter 7

Disaster Group: Natural Hazards		Type of Risk Will it occur?			Pathway	Potential Receptor								Result		Reasons
Disaster subgroup	Major accident or disaster type	Particular location risk	Construction risk	Operational risk	Process by which receptor could be affected	Population and human health	Biodiversity (including designations)	Land and soil	Water	Air and climate	Material assets	Cultural heritage	Landscape and townscape	Effect on environment as due to vulnerability of Scheme	Scoped in or out?	Why there is, or is not, a significant effect on the environment as a result of event
Biological	Wildfire	NO	NO	NO	Local atmospheric conditions flammable vegetation	✓	✓	✓		✓	✓	✓	✓	NO	OUT	The Scheme does not lie within an area prone to wildfire and there is little or no dry flammable vegetation of the kind that supports wildfire. If fires did affect the A55 the consequences are unlikely to cause significant adverse effects on the environment.
	Diseases and epidemics	NO	NO	NO	Geographical spread on transport or in atmosphere	✓								NO	OUT	NRRCE explains that a pandemic among human beings would arise unexpectedly and spread quickly. The risk matrix indicates that there is a high (4) likelihood and a very high (5) impact severity of this occurring in the five-year period. If a disease or pandemic were to occur, it is unlikely to result in significant adverse effects on the environment because of the Scheme.

Table 17.2: Potential Effects: Initial Threat List: Man-made Hazards

Disaster Group: Man-made Hazards		Type of Risk Will it occur?			Pathway	Potential Receptor								Result		Reasons
Major accident or disaster type		Particular location risk	Construction risk	Operational risk	Process by which receptor could be affected	Population and human health	Biodiversity (including designations)	Land and soil	Water	Air and climate	Material assets	Cultural heritage	Landscape and townscape	Effect on environment as due to vulnerability of scheme	Scoped in or out?	Why there is, or is not, a significant effect on the environment as a result of event
Extensive violence resulting in loss of life		NO	NO	NO	Social discord among resident or visiting population	✓					✓			NO	OUT	NRRCE determines the risk of public disorder in the UK as being a high likelihood but moderate impact severity. Public disorder can escalate into violence in some circumstances. Terrorism can also result in violence and loss of life. Events of this kind occur when large numbers of people are a target of terrorism or gathering to protest and these circumstances are highly unlikely to occur in a small town with a small population and few targets for protests. If extensive violence and loss of life were to occur, the impact on the A55 would not result in adverse effects on the environment because of the Scheme
Act of terrorism (on infrastructure)		NO	NO	NO	Social discord in a high-profile location									NO	OUT	NRRCE rates malicious attacks on infrastructure as a medium to low plausibility (risk) in a five-year period but indicates that there is a medium impact severity. The register lists only railways, air and maritime targets and does not mention attacks on roads. For this assessment, the effectiveness of an attack on the A55, possibly by damaging bridge structures, is considered of low risk and implausible, although a hoax could result in temporary road closure at time of heightened threat. The consequences are unlikely to have a significant adverse effect on the road or the environment as a consequence.

Disaster Group: Man-made Hazards	Type of Risk Will it occur?			Pathway	Potential Receptor								Result		Reasons
	Particular location risk	Construction risk	Operational risk		Population and human health	Biodiversity (including designations)	Land and soil	Water	Air and climate	Material assets	Cultural heritage	Landscape and townscape	Effect on environment as due to vulnerability of scheme	Scoped in or out?	
Major accident or disaster type				Process by which receptor could be affected											Why there is, or is not, a significant effect on the environment as a result of event
Widespread damage to the economy	NO	NO	NO	Political change, financial collapse, loss of workforce	✓					✓			NO	OUT	If widespread damage to the economy were to occur, the impact on the A55 or the Scheme would not result in adverse effects on the road or the environment because of the Scheme.
Famine	NO	NO	NO	Loss of food supply	✓								NO	OUT	If widespread famine were to occur, the impact on the A55 or the Scheme would not result in adverse effects on the road or the environment because of the Scheme.
Major transport accidents (road)	YES	YES	YES	Traffic on the A55 or on the local road network.	✓	✓	✓	✓	✓	✓			YES	IN	<p>NRRCE states that road traffic accidents occur daily on Britain's roads. Major or severe accidents involving numerous fatalities or serious injuries are less frequent. Design of the Scheme to modern standards reduces the risk and severity of some accidents by comparison with the existing road. This assessment is concerned with major accidents that could occur despite these avoidance and mitigation measures.</p> <p>Major accidents resulting in large numbers of casualties could occur in extreme circumstances. Such an event could block the A55 and cause damage to road surfaces and structures. Closure of the road for an extended period could adversely affect the communities by closing the only major road in and out.</p> <p>Traffic Wales monitor traffic on the A55 and use electronic information signs and deploy traffic officers to manage the speed and behaviour of traffic. The emergency services are trained and equipped to deal with the consequences of traffic accidents.</p> <p>While major accidents could result in major spillages of pollutants such as fuels or bulk loads and the use of fire-fighting chemicals, there would be containment measures incorporated into the road drainage system to contain the spread of pollution and reduce the risk of harm to residents, road users, designated marine wildlife sites and other receptors.</p> <p>During construction the contractor will be responsible for managing traffic through the works. They will also be responsible for liaison with the emergency services to ensure free access into and through the works.</p> <p>While these events can result in temporary road closures, they are considered unlikely to cause significant adverse effects on the environment as a result of the Scheme.</p>
Major transport accident (railway)	YES	NO	NO	Derailing or damage to trains on the Chester – Holyhead line	✓	✓	✓	✓	✓	✓			NO	OUT	<p>NRRCE indicates that major rail accidents are infrequent in the UK and the risk of major accident in the vicinity of the Scheme is negligible. Continuing improvements to mainline rail safety have meant that there is a reducing risk of major accident and fatalities. Major railway accidents that include major spillages of highly-polluting materials such as fuels or chemicals to air, water or land, are rare and with few such trains on the Chester – Holyhead line the risk is negligible.</p> <p>While the railway runs parallel to the A55 through the area, the Scheme will not increase the risk of major rail accidents or the risk of adverse effects on the environment.</p>
Industrial accidents	NO	NO	NO	Failure of control systems and human supervision, collapse of structures	✓	✓	✓	✓	✓	✓	✓	✓	NO	OUT	<p>NRRCE explains that major industrial accidents take many forms with variable scale and form of impacts. They can cause loss of life, destruction of property or economic damage in the surrounding communities and wildlife sites. Some have limited local impacts, while others have cascading effects with wider impact. This broad category of risk in the local context includes:</p> <ul style="list-style-type: none"> <li>fires and explosions (e.g. residential buildings, fuel storage, damage to utilities); Infrequent, but minor local impact with low to moderate potential to cause loss of life and damage to property; and</li> <li>chemical and biological contamination (e.g. oil spills or food contamination); Very infrequent, minor low impact and low to moderate potential to cause loss of life.</li> </ul> <p>There is no major industry close to the junction and so major industrial accidents are unlikely to cause significant adverse effects on the environment because of the Scheme, however, chemical and food contamination from road accidents is covered previously.</p>

## 17.7 Potential Construction and Operational Effects

- 17.7.1 The discussion in Table 17.1 and 17.2 provides the basis for determining those potential events that can be scoped out because they pose a negligible risk. Those that need further consideration are identified in Table 17.3 in bold text.

**Table 17.3: Risk and Consequence Assessments for the Identified Threats**

Threats Not Scoped Out	Effect on Junction Improvement Scheme <span style="border: 1px solid green; border-radius: 50%; padding: 2px;">A</span>		Does this Change from the Existing A55?	Potential Effect on Receptors Because of the Scheme <span style="border: 1px solid red; border-radius: 50%; padding: 2px;">B</span>	
	Likelihood	Consequence		Likelihood	Consequence
1. Coastal flooding from the sea	Low	Mild (Construction)	No change	Low	Mild
2. Fluvial flooding	Low	Mild	No change	Low	Mild
3. Surface water flooding	Low	Mild	No change	Low	Mild
4. Hurricanes, storms and gales	Low	<b>Moderate</b>	No change	Low	<b>Moderate</b>
5. Wave / storm surges	Low	Mild	No change	Low	Mild
6. Extreme high temperatures	Low	Mild	Change	Low	Mild
7. Fog	Low	Mild	No change	Low	<b>Moderate</b>
8. Major Road transport accidents	Low	<b>Severe</b>	Positive	Low	<b>Moderate</b>

- 17.7.2 Those threats identified in Table 17.3 are shown on the Risks and Consequences Matrix in Figure 17.3. An explanation of what the matrix shows is set out following Paragraph 17.3.5. The red and green circles at the head of the table columns are also used in Figure 17.3 to differentiate between effects on the Scheme and effects on the environment.

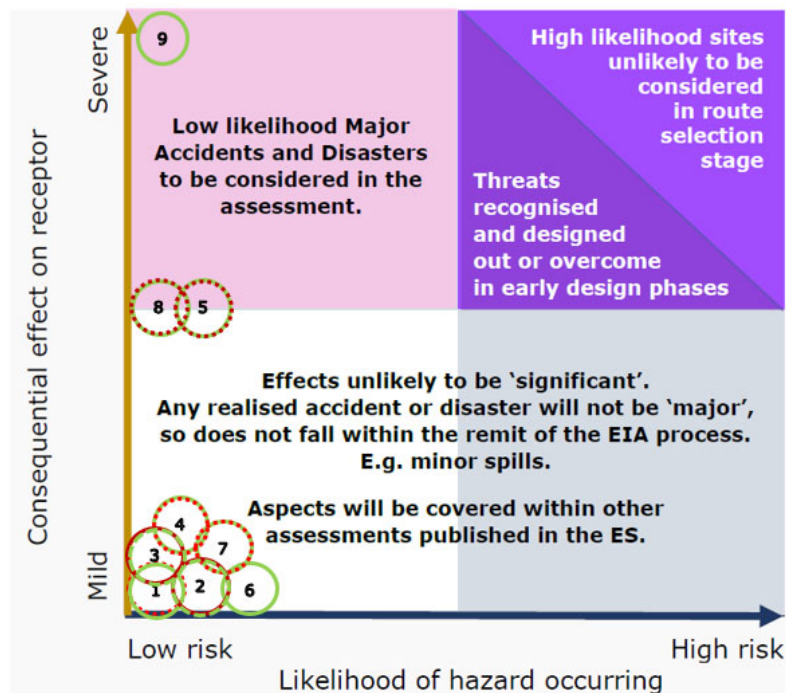


Figure 17.3: Risk and Consequences Matrix

## 17.8 Potential Mitigation

17.8.1 The need for mitigation applies to the 'Low Likelihood / Moderate or Severe Consequence' threats, which are considered significant. The risk matrix in Figure 17.3 shows the events that require further mitigation to break the pathways outlined in Figure 17.1. Five types of mitigation were outlined in Figure 17.1:

- Type (1) Reduce the likelihood of the hazard being realised or the magnitude of the effect if realised;
- Type (2) Break the hazard to Scheme pathway;
- Type (3) Increase resilience of the Scheme or Reduce the magnitude of the triggered effect;
- Type (4) Break the Scheme to Receptor pathway; and
- Type (5) Reduce the vulnerability of the receptor to the triggered effect.

17.8.2 Table 17.4 sets out the proposed avoidance measures and mitigation. All the reasonable and proportionate physical measures that can be applied are included within the Scheme either as avoidance or as mitigation that takes the form of physical changes to the design or are achieved by management of the trunk road. Further measures to address the threats are based on the established systems of trunk road network management. The Trunk Road Agents are the organisations responsible for managing strategic routes in Wales, including the A55 from Holyhead to the English border. In North Wales trunk road management is based in the North Wales Traffic Management Centre in Conwy. Traffic Wales is the Welsh Government's traffic information service for motorways and trunk roads in Wales (here delivered by the North and Mid Wales Trunk Road Agent (NMWTRA)), and they operate a system of CCTV cameras to observe traffic and electronic message signs along the A55. In the area of Junction 16 Traffic Wales operate 14 CCTV cameras between the eastern portal of Pen-Clip Tunnel and the western portal of Penmaenbach Tunnel. These, or replacements, would be maintained during construction and operation of the proposed Scheme.



Table 17.4: Threats and Mitigation

Potential Threat	Threat to		Potential Mitigation (mitigation type)
	Scheme	Environment because of Scheme	
Hurricanes, storms and gales	Yes	No	<p><b>Design:</b> the application of highway and structural design standards would avoid the physical damage to A55 infrastructure (Type 3)</p> <p><b>Operation:</b> advanced notice of severe weather from forecasters with advice from NRW regarding flood risk. Traffic management actions taken on advice from Traffic Wales and NMWTRA to advise drivers, impose temporary vehicle speeds or close the road or the junctions (Type 2)</p> <p><b>Construction:</b> as for operation, but with construction works removed from vulnerable locations, potential pollution-causing construction materials and plant, or materials that could be dangerous if blown around in strong winds, are removed from the vulnerable works. Open excavations backfilled and sealed or adequately covered over (Type 2 and Type 4)</p>
Major road transport accidents	Yes	Yes	<p><b>Design:</b> the application of current highway design standards would reduce risks of major accidents occurring (Type 3).</p> <p><b>Operation:</b> advanced planning of emergency response developed in liaison with emergency services and civil emergency planners to ensure good access and egress from site for police, fire brigade and ambulance to recover vehicles, casualties and reopen road efficiently (Type 5). Proposed link road from Junction 16 A to Junction 16 would provide an alternative route in the event that the dual-carriageway is closed by a major accident (Type 3).</p> <p><b>Construction:</b> appropriate speed limits through all traffic management works and liaison with Traffic Wales/Traffic Officers to ensure advance warnings given to motorists of works area. Construction personnel briefed to avoid trafficked areas to minimise risk of collision (Type 3 and 4).</p> <p>Advanced plans developed in liaison with emergency services and civil emergency planners to ensure good access and egress from construction site for police, fire brigade and ambulance (Type 5).</p>

- 17.8.3 NMWTRA has a team of Traffic Officers who patrol the route and attend incidents. Traffic Wales maintain a website providing up to date traffic information and road traffic 'alerts' on social media, news updates and on roadside information signs to inform the public of congestion, maintenance works, emergencies and road closures.
- 17.8.4 On the A55 NMWTRA is responsible for coordinating any works that could affect the trunk road network. During construction of the Scheme the contractor responsible for the works would liaise with NMWTRA to agree the management of traffic through the works area to ensure the safest driving conditions and to avoid congestion, where possible. In special circumstances, such as the passage of an abnormal load through the works, the contractor would responsible

for providing a route through the works at a suitable time that would be agreed with NMWTRA and Traffic Wales.

## 17.9 Cumulative Effects

- 17.9.1 It is possible that some of the threats identified could realistically occur together, and one threat could occur as the result of another. The threats included are those set out in Table 17.4. Those in highlighted in Table 17.5 are those that could occur simultaneously or as a consequence of another event occurring.

**Table 17.5 Potential Cumulative Effects**

<p><i>Cumulative effects, where two or more threat could combine are indicated by the letter 'C'.</i></p> <p><b>Coastal flooding from the sea</b></p> <p><b>Fluvial flooding</b></p> <p><b>Surface water flooding</b></p> <p><b>Hurricanes, storms and gales</b></p> <p><b>Wave surges</b></p> <p><b>Major Traffic accidents</b></p> <p><b>Fog</b></p> <p><b>Extremely high temperatures</b></p>	<b>Landslides</b>	<b>Coastal flooding from the sea</b>	<b>Fluvial flooding</b>	<b>Surface water flooding</b>	<b>Hurricanes, storms and gales</b>	<b>Wave surges</b>	<b>Major Traffic Accident</b>	
		C						
		C	C					
	C	C	C	C				
		C	C	C	C			
	C	C	C	C	C	C		Fog
							C	
							C	

## 17.10 Conclusions

- 17.10.1 The assessment has demonstrated that there are potential risks to the Scheme and to the environment as a result of the Scheme. Most of these events arise from natural sources and would occur whether or not the junction improvements are carried out. The consequences of these events are associated with major road traffic accidents. Wherever possible this risk is being addressed by a range of measures that include traffic management and design to current design to minimise the risk to people, property and the environment.
- 17.10.2 Some events will cause damage to elements of the Scheme which would require repair. Temporary, full or partial, closures of the road would be implemented, with consequential impacts on road users and adjacent communities.



Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 18 POPULATION AND HEALTH**

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## 18. POPULATION AND HEALTH

### 18.1 Introduction

18.1.1 This chapter considers the likely significant effects on Population and Health from the construction and operation of the Scheme. The chapter considers health through a Health Impact Assessment but it should be noted that the scope of the chapter is wider than solely health aspects and therefore consideration has been given to wider well-being, in particular of future generations under Welsh legislation. On this basis the assessment is broad enough to cover potential determinants of good health and well-being, as well as environmental effects.

18.1.2 The specific objectives of the chapter are to:

- A. Describe the baseline with regard to the health and well-being status of the local community in the study area;
- B. Describe the assessment methodology and significance criteria used in completing the impact assessment;
- C. Describe the potential effects, including direct, indirect and cumulative effects;
- D. Describe the mitigation measures proposed to address likely significant effects; and
- E. Assess the residual effects remaining following the implementation of mitigation.

18.1.3 This chapter is supported by:

- A. Technical Appendix 18.1 Health Impact Assessment.

18.1.4 For details of the Scheme description, reference should be made to Chapter 2.

18.1.5 This assessment assumes the use of standard construction techniques and practices commensurate for works of this nature, and full compliance with UK legislation and guidance. The final installation techniques and their sequencing will be determined by the construction works contractor in consultation with the relevant authorities. In addition, incorporated mitigation measures are described which have been included in the Scheme design to reduce identified impacts.

### 18.2 Legislation, Policy Context

18.2.1 This section outlines the legislation, policy and guidance relevant to the assessment of potential effects on and from materials assets and waste associated with the proposed development based on the following:

- A. International and National Legislation and Policy;
- B. Local Planning Policy; and
- C. Guidance and Industry Standards.

#### **International Legislation**

##### *2014 Environmental Impact Assessment Directive*

18.2.2 The need to consider population and health in Environmental Impact Assessment is identified in EU Directive 2014/52/EU which was transposed into UK law through the Environmental Impact Assessment Regulations 2017.

- 18.2.3 The Directive harmonises the principles for EIA and introduces minimum requirements to ensure a high level of protection of the environment and, by extension, human health. The Directive replaces Article 3 with a new version which notes the need to identify, describe and assess in an appropriate manner the direct and indirect significant effects on a range of factors, the first of which is 'population and health'. It notes that any project should be considered with regard to the risks to human health, for example, from water contamination or air pollution.

### **National Legislation and Policy**

#### *Environmental Impact Assessment (Miscellaneous) Amendments Relating to Harbours, Highways and Transport Regulations 2017*

- 18.2.4 Schedule 2 of the Regulations reflects the 2014 Directive and identifies a wider range of topics to be considered which includes the addition of 'Population and Health'. It notes that each topic needs to be considered in the light of the nature of the proposed development, the site and any interactions with other systems, processes or sites.

#### *Public Health (Wales) Act 2017*

- 18.2.5 The Public Health (Wales) Act 2017 includes a prospective provision within Part 6 for Regulations to be made, requiring health impact assessments to be carried out by public bodies. Although the Act was enacted in July 2017, Part 6 had yet to be implemented at the time of writing.

#### *Well-Being of Future Generations (Wales) Act 2015*

- 18.2.6 The Well-Being of Future Generations (Wales) Act 2015 (FGA) puts in place the legislation needed to make the public bodies listed in the Act consider the long-term impact of their decisions, work better with people and communities and with each other with the goal of preventing problems such as poverty, health inequalities and climate change. The objective of the act is to ensure 'sustainable development' thereby improving the social, economic, environmental and cultural well-being of Wales. A series of seven well-being goals are set out in the legislation, namely:

- A. A prosperous Wales;
- B. A resilient Wales;
- C. A healthier Wales;
- D. A more equal Wales;
- E. A Wales of cohesive communities;
- F. A Wales of vibrant culture and thriving Welsh language; and
- G. A globally responsible Wales.

- 18.2.7 The act refers to public bodies acting in accordance with sustainable development principles, meaning that the body must act in a manner which seeks to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs. The act notes that a public body must take account of:

- A. The importance of balancing short-term needs with the need to safeguard the ability to meet long term needs;
- B. The need to take an integrated approach;
- C. The importance of involving other persons with an interest in achieving the well-being goals and of ensuring those persons reflect the diversity of the population;

- D. How collaboration could assist the body to meet its well-being objectives, or assist another body to meet its objectives; and
- E. How deploying resources to prevent problems occurring or getting worse may contribute to meeting the body's well-being objectives, or another body's objectives.

18.2.8 The act establishes the role of the Future Generation Commissioner for Wales to promote sustainable development and monitor and assess the extent to which well-being objectives set by public bodies are met.

18.2.9 The most recent report on progress to meet the goals set out in the act dates from 2019 and is shown in Table 18.1, this is the third annual report. Key points from the report are:

**Table 18.1: Key Points from the 2019 Report on Future Well-being Objectives**

<p><b>2019 Report on Future Well-being Objectives</b></p>	<p>Life expectancy had changed little, most lives were spent in good health, but that time is less for those living in more deprived areas;</p> <p>Little change in healthy lifestyle behaviours - diets continue to be low in fruit and vegetable consumption and too high in salt, sugar and red meat (despite improvements over the decade);</p> <p>Percentage of babies born with a low birth weight had increased a little over the past few years, after a gradual decline over the previous 7 years;</p> <p>Housing conditions improved over the last 10 years, reducing the potential risk to the health of occupants, with improvements across all tenures;</p> <p>The Welsh labour market continued to perform strongly, with the gap between Wales and the UK narrow in historical terms. However, the percentage of people in low paid work seemed to be increasing;</p> <p>Young people's participation in education and the labour market had grown since the recession, although this fell slightly in the most recent year for 16-18 year olds;</p> <p>Latest data showed the gender pay gap had increased although at 7.3 per cent, it was still one of the lowest on record. New data on the ethnicity pay gap showed, on average, employees from ethnic minority groups earned around 7.5 per cent less per hour than white British employees;</p> <p>There still remained a significant gap in employment outcomes for disabled people, although the gap had reduced in the last year;</p> <p>Qualification levels amongst the population continued to increase, although there remained large differences in attainment at school for different population groups;</p> <p>There had been little change in relative income poverty levels for a number of years, though changes had been seen for some groups. Relative income poverty remained highest amongst children. Fewer households were living in fuel poverty compared with 10 years ago as homes became more energy efficient;</p> <p>In the latest year there had been a slight increase in community cohesion but a slight decrease in feeling safe. However, it was considered too early to tell if this was the beginning of a trend;</p> <p>Recorded race hate crime incidents had been increasing;</p> <p>Levels of regular sports participation for adults and children remained unchanged in the latest year;</p> <p>Latest survey data suggested that there were increases in the percentage of people who say they speak Welsh, but not fluently. Use of the language remained steady;</p> <p>There had been a large fall in greenhouse gas emissions in the latest year, and over the longer term, emissions had fallen by over a quarter since the 1990s;</p> <p>Air pollution continued to be a significant health issue, although there had been improvements in the levels of three of the main air pollutants in the last year;</p>
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The capacity of renewable energy generation installations had risen in the last decade and almost half of electricity consumed came from renewable sources. Although a few years old, assessment of ecological footprint suggested that key natural resources were being depleted faster than they could be replenished; and

There had been improvements in the populations of some species, but the latest comprehensive assessment of Welsh natural resources showed that overall, biological diversity was declining.

### *Equality Act 2010*

- 18.2.10 The public sector equality duty created by the Equality Act 2010 came into force in April 2011. It requires the public sector to have due regard to the need to eliminate discrimination, advance equality of opportunity, and foster good relations, when making decisions and setting policies. To do this, it is necessary for them to understand the potential effects of its activities on different people. Where these are not immediately apparent, it may be necessary to carry out some form of assessment or analysis, in order to understand them.

### *Equality Act 2010 (Statutory Duties) (Wales) Regulations 2011*

- 18.2.11 The Welsh government have brought in specific equality duties in order for public bodies to better perform their public sector equality duties, in the form of the Equality Act 2010 (Statutory Duties) (Wales) Regulations 2011. These Regulations place duties on the devolved public sector, including Welsh Government, including those that cover equality impact assessments. The Equality Act 2010 and the associated regulations place a duty on the public sector to consider potential effects on different people.

### *The Children's Act 1989*

- 18.2.12 The Children Act 1989 allocates duties to ensure children are safeguarded and their welfare is promoted.
- 18.2.13 In terms of the Scheme it is considered that this most directly relates to aspects around broad welfare issues with the potential for:
- A. Effects on health, for example, due to reductions in air quality;
  - B. Increase in road accidents; and
  - C. Community severance, for example, where children cannot readily access their local school.

- 18.2.14 This has been considered in the chapter as part of the Health Impact Assessment and through the Community Assets and Effects on All Travellers chapters.

### *Planning Policy Wales (December 2018)*

- 18.2.15 The Planning Policy Wales (PPW) notes that the primary objective of the PPW is to ensure that the planning system contributes to the delivery of sustainable development. It notes that this should improve the social, economic, environmental and cultural well-being of Wales and links this back to the Planning (Wales) Act 2015 and the FGA. The PPW notes that the intention to promote actions at all levels to encourage a wide, sustainable and problem-solving outlook focussed on integrating and addressing multiple issues.
- 18.2.16 The PPW, together with the National Development Framework, sets out how the planning system delivers these requirements through Strategic Development Plans (SDP) and Local Development

Plans (LDP). It also notes the requirement for planning authorities to produce Well-being Plans, a duty of the local Public Services Boards.

18.2.17 The PPW discusses 'Sustainable Development' in similar terms to the FGA, including the need to deliver on all four aspects of well-being: social, economic, environmental and cultural and references the seven well-being goals of the Act. It notes the need for public bodies to recognise the five ways of working discussed in the Act; namely: involvement, collaboration, integration, prevention and long-term factors.

18.2.18 The PPW identifies key factors to be taken into account in assessing whether a development proposal meets sustainable development proposals, and the FGA. Key factors are identified in Table 18.2.

**Table 18.2 Assessing the Sustainable Benefits of Development**

Aspect	Key Factors
<b>Social</b>	Who are the interested and affected people and communities;
	How does the proposal change a persons way of life, which can include: How people live, for example how they get around and access services; How people work, for example access to adequate employment; How people socialise, for example access to recreation activities; and How people interact with one another on a daily basis
	Who will benefit and suffer any impacts from the proposal
	What are the short and long-term consequences of the proposal on a community, including its composition, cohesion, character, how it functions and its sense of place
	How does the proposal support development of more equal and more cohesive communities
<b>Economic</b>	The numbers and types of long term jobs expected to be created or retained
	Whether, and how far, the development will help redress economic disadvantage or support regeneration priorities, for example by enhancing local employment opportunities or upgrading the environment
	The contribution the development would make to achieving wider strategies, e.g. the growth or regeneration of certain areas
	The contribution this economic activity will have to wider policy goals
	How the proposal would support the achievement of a more prosperous, low carbon, innovative and resource efficient Wales
<b>Cultural</b>	How far the proposal supports the conditions that allow for the use of the Welsh language
	Whether or not the development protects areas and assets of cultural and historic significance
	Have cultural considerations and their relationships with the tourism industry been appropriately maximised

Aspect	Key Factors
	If the proposal protects areas known for their cultural value in terms of music, literature, sport and the arts and vibrant cultural experiences
<b>Environmental</b>	Will important features of the natural and built environment be protected and enhanced
	Are the environmental impacts of development on health and amenity limited to acceptable levels and the resilience of ecosystems improved
	Is environmental protection for people and natural resources, property and infrastructure maximised and environmental risks prevented or appropriately managed
	Will high standards of restoration, remediation, decommissioning and beneficial after uses be achieved
	Will the depletion of non-renewable resources be minimised, waste prevented and the efficient and most appropriate use of materials made and re-use and recycling promoted
	Will the causes and impacts of climate change be fully taken into account through location, design, build, operation, decommissioning and restoration
	Does it support decarbonisation and the transition to a low carbon economy
<b>Transport</b>	Does it enable more sustainable travel choices
	Does the network management make use of available capacity
	Does the application reduce travel demand, specifically that of single-occupancy private vehicles

- 18.2.19 The PPW also states: "The provision of sustainable transport infrastructure is essential in order to build prosperity, tackle climate change, reduce airborne pollution and to improve the social, economic, environmental and cultural well-being of Wales. The planning system should facilitate the delivery, decarbonisation and improvement of transport infrastructure in a way which reduces the need to travel, particularly by private vehicles, and facilitates and increases the use of active and sustainable transport".

*National Clean Air Strategy 2019*

- 18.2.20 The Clean Air Strategy was produced by the UK Government in 2019. It discusses how all sources of air pollution will be addressed and sets out the actions required to meet the goals of the strategy. The strategy notes that public exposure to particulate matter pollution will be progressively cut with new targets to reduce exposure to PM<sub>2.5</sub>, including identifying what action is needed to meet the WHO annual mean guideline of 10 µg/m<sup>3</sup> and ensuring that the number of people living in locations above the guideline is reduced by 50% by 2025. The strategy also emphasises the need to improve air quality messaging and access to air quality forecasts and to help individuals and organisations understand how they can reduce their contributions to air pollution
- 18.2.21 The strategy specifically refers to reducing the emissions from transport, key points relevant to road transport are as follows:



- A. A commitment to cutting air pollution from all forms of transport;
- B. Publication of '[Road to Zero](#)' which sets out the Governments plans to end the sale of new conventional petrol and diesel cars and vans by 2040;
- C. New legislation to enable the Transport Secretary to compel manufacturers to recall vehicles for failures in their emissions control systems;
- D. New legislation to take effective action against tampering with vehicle emissions control systems;
- E. Research and develop new standards for tyres and brakes to address toxic non-exhaust particulate emissions;
- F. Encouraging the use of the cleanest modes of transport for freight and passengers, including active travel; and
- G. Review current uses of red diesel and ensure its lower cost is not discouraging the transition to cleaner alternatives.

18.2.22 Given the proximity of the Scheme to the North Wales coastal railway line it is notable that the strategy also discusses rail transport, in particular that the rail industry will produce recommendations on how to phase out diesel-only trains by 2040.

### **Local Policy and Plans**

18.2.23 At a local level, the Scheme has links to a number of policies contained in the Conwy Local Development Plan 2007-2022, which was adopted in 2013. Key policies include:

- A. Spatial Objective S013: To protect and improve accessibility to essential services and facilities, including open space, allotments, health, education and leisure;
- B. Policy CFS/11: Development and open space, which recognises 'the benefits to health and well-being that parks and open spaces bring to communities', as described in the Conwy Health Strategy<sup>1</sup>;
- C. Strategic Policy STR/1: Sustainable transport, development and accessibility to support healthy lifestyles; and
- D. Strategic Policy STR/4: Non-motorised Travel, which highlights that 'Leisure and recreation routes are also an important resource, particularly to improve access to the surrounding countryside as part of a healthy lifestyle.'

### *Local Well-Being Plan (2018)*

18.2.24 The Conwy and Denbighshire Local Well-being Plan was approved in April 2018. It sets out the local objectives of the Conwy and Denbighshire Public Services Board (PSB) to improve the economic, social, cultural and environmental well-being of the area<sup>2</sup>.

18.2.25 The priorities of the board are noted to be good mental well-being for all ages, supporting community empowerment and supporting environmental resilience. Four additional principles are identified to support these priorities comprising addressing inequalities and treating everyone equally, supporting and promoting the Welsh language, supporting access to appropriate accommodation and avoiding duplication.

<sup>1</sup> Conwy Health, Social Care and Well-Being Strategy, Draft Version 3, Healthy Conwy Strategy 2008-2011 [http://spp.conwy.gov.uk/upload/public/attachments/310/Healthy\\_Conwy\\_Strategy\\_200811\\_draft.pdf](http://spp.conwy.gov.uk/upload/public/attachments/310/Healthy_Conwy_Strategy_200811_draft.pdf) [accessed 04.02.2019]

<sup>2</sup> <https://conwyanddenbighshirelsb.org.uk/wp-content/uploads/2018/04/Conwy-Denbighshire-PSB-Well-being-Plan.pdf> accessed 03.11.19

18.2.26 The plan includes a summary of well-being facts for Conwy and Denbighshire and then discusses the baseline conditions for each of the priorities together with 'Next Steps' in each case. The latter comprise the actions that the PSB will 'explore' to progress the plan although no formal targets are discussed.

### **Key Relevant Guidance**

18.2.27 The amended EIA Directive<sup>3</sup> requires that population and health factors should be considered as part of the EIA process but the Directive itself (as well as the transposed UK legislation) does not define how it should be carried out.

18.2.28 The following guidance as outlined in the Scoping Report has been considered when completing the assessment of potential impacts to population and human health:

- A. DMRB Volume 11, including Section 2 Part 5 HA 205/08: Determining significance of Environmental Effects (superseded by DMRB Volume 11 Section 2 LA 104 Sustainability and Environment. Appraisal. Environmental assessment and monitoring (formerly HA 205/08, HD 48/08, IAN 125/15, and IAN 133/10);
- B. Material provided by the Wales Health Impact Assessment Support Unit (WHIASU)<sup>4</sup>. WHIASU is an all-Wales service responsible to Public Health Wales and funded by Welsh Government as a part of a wider strategy to improve health, reduce inequalities, and assist organisations in planning a health future;
- C. IEMA Health in Environmental Impact Assessment, A Primer for a Proportionate Approach, 2017<sup>5</sup>;
- D. Guidance provided by the World Health Organization (WHO)<sup>6</sup>;
- E. Guidance provided by the World Bank International Finance Corporation (IFC) Introduction to Health Impact Assessment<sup>7</sup>; and
- F. Guidance provided by the Society of Practitioners of Health Impact Assessment (SOPHIA)<sup>8</sup>.

18.2.29 HIA is not currently a statutory requirement in Wales (or anywhere in the UK) but the Welsh Government increasingly regards it as best practice to consider health and well-being specifically in non-health domains. As such, HIAs are referred to in guidance from the Welsh government, including:

- A. Draft Ministerial Interim Planning Policy Statement (DMIPPS) 02/063, which supports a consideration of health and well-being at a local level and is supplementary guidance to Planning Policy Wales for large planning applications and Local Development Plans (LDPs); and
- B. The Welsh Transport Appraisal Guidance (WelTAG) which has been developed by the Welsh Government to ensure that public funds are invested in a way that ensures they maximise contribution to the well-being of Wales.

<sup>3</sup> Environmental Impact Assessment (EIA) Directive 2011/02/EU as amended by 2014/52/EU

<sup>4</sup> <https://whiasu.publichealthnetwork.cymru/en/> accessed February 19

<sup>5</sup> <https://www.iema.net/assets/newbuild/documents/IEMA%20Primer%20on%20Health%20in%20UK%20EIA%20Doc%20V11.pdf> accessed February 19

<sup>6</sup> <https://www.who.int/hia/en/> accessed February 19

<sup>7</sup> <http://documents.worldbank.org/curated/en/437491468331191255/pdf/522150WP0Healt10Box345555B01PUBLIC1.pdf> accessed February 19

<sup>8</sup> <https://hiasociety.org/> accessed February 19

18.2.30 With regard to highway projects environmental assessments will describe impacts on population and human health in line with the wider requirements and standards provided in the following DMRB standards:

- A. LA 101 Introduction to environmental assessment<sup>9</sup>;
- B. LA 102 Screening projects for Environmental Impact Assessment (EIA)<sup>10</sup>;
- C. LA 103 Scoping projects for environmental assessment<sup>11</sup>; and
- D. LA 104 Environmental assessment and monitoring.<sup>12</sup>

#### *DMRB LA112 Population and Health*

18.2.31 The DMRB standard for assessing Population and Health, DMRB LA112 was issued in October 2019. This was not available at the time that the scoping report was prepared but has been taken into account in preparing this Chapter.

18.2.32 LA112 notes that the elements outlined in Table 18.3 should be included, however, because this ES is based on previous approaches to this topic these elements are already covered in other chapters, notably Chapter 11 Community Assets and Chapter 14 Effects on All Travellers. Therefore, whilst LA112 has been reviewed and any additional elements to those already covered across the wider ES have been addressed it has not been followed for this chapter and instead reference has been made to other relevant information in the ES.

18.2.33 LA112 notes an indicative list of consultees although not all of these parties have been approached.

18.2.34 The standard sets out a Study Area generally extending 500m from the Scheme, the assessment area used for the Chapters that inform this section of the ES are consistent with this criterion.

18.2.35 The standard provides indicative types of data to be collected as shown in Table 18.3.

18.2.36 An indication has been provided of where this information has been collected as part of the environmental impact assessment.

**Table 18.3. Elements of DMRB LA112, information to be collected and status within the ES**

Element	Indicative Information to be Collected	Status
Private property and housing	Location and number of properties at risk of demolition, or from which land will be required/ access affected by a project	Considered in Chapter 11 Community Assets
	Location of residential development land and number of units that will be affected by a project	
	Location of community land (e.g. common land, village greens, open green space, allotments, sports	

<sup>9</sup> DMRB Volume 11 Section 1 LA 101 Sustainability and environment. Appraisal. Introduction to environmental assessment. <https://www.thenbs.com/PublicationIndex/documents/details?DocID=327074>

<sup>10</sup> DMRB Volume 11 Section 2 LA 102 Sustainability and environment. Appraisal. Screening projects for environmental impact assessment. <https://www.thenbs.com/PublicationIndex/documents/details?DocID=327077>

<sup>11</sup> DMRB Volume 11 Section 2 LA 103 Sustainability and environment. Appraisal. Scoping projects for environmental assessment. <https://www.thenbs.com/PublicationIndex/documents/details?DocID=327085>

<sup>12</sup> DMRB Volume 11 Section 2 LA 104 Sustainability and Environment. Appraisal. Environmental assessment and monitoring. <https://www.thenbs.com/PublicationIndex/documents/details?DocID=327091>

Element	Indicative Information to be Collected	Status
Community land and assets	pitches etc) and amount of land which will be required/ access affected by a project	Considered in Chapter 11 Community Assets
	Location of community assets (e.g. village halls, healthcare facilities, education facilities, religious facilities etc) and number of assets from which land will be required/ access affected by a project	
	Level of existing accessibility restrictions/ severance to community land and assets within the study area	
	Frequency of use of community land and assets within the study area	
Development land and businesses	Location and number of businesses (and associated jobs) at risk or from which land will be required/access affected by a project	Considered in Chapter 11 Community Assets
	Location of land allocated for development by local authorities and the number of future jobs that will be affected by a project	
	Land not allocated by local authorities which is subject to planning application(s) supporting future jobs	
	Level of existing accessibility restrictions/severance to development land and businesses within the study area	
Agricultural land holdings	Type, location and number of agricultural holdings at risk of demolition or from which land will be required/ access affected by a project	Considered in Chapter 11 Community Assets
	Level of existing severance/ accessibility restrictions to agricultural land holdings within the study area	
	Frequency of use of the agricultural holdings/ assets within the study area	
Walkers, Cyclists and Horse riders	Type, location and extent of WCH provision (e.g. public rights of way) within the study area	Considered in Chapter 14 All Travellers
	Frequency of use of the WCH provision within the study area	
Human health	Health profiles of affected communities	Health Impact Assessment considered in Chapter 19
	Health determinants (e.g noise or air pollution)	
	Likely health outcomes	

18.2.37 LA112 does not specifically discuss key elements such as the FGA that are specific to Wales, however, consideration has also been given to the extent to which the Scheme meets the requirements of wider well-being goals. Again, no specific guidance exists on this issue and

therefore consideration will be given to the extent to which the Scheme meets the requirements of the FGA based on professional judgement.

### Other Sources

18.2.38 The population and health chapter draws information from the ES chapters shown in Table 18.4.

**Table 18.4 Links to Other ES Chapters**

Chapter	Key Aspects Relevant to Population and Health
Chapter 6 Geology and Soils	Contaminated soils and water
Chapter 7 Road Drainage and Environment	Flooding
Chapter 9 Landscape, Townscape and Visual Effects	Landscape design, loss of views
Chapter 11 Community Assets	Severance
Chapter 12 Air Quality	Reduced, or improved air quality
Chapter 13 Noise and Vibration	Reduced, or increased noise levels
Chapter 14 All Travellers	Severance, relief from existing severance, driver stress
Chapter 16 Climate Change	Exposure to contaminants and dust, high temperatures, heatwaves
Chapter 17 Major Accident and Disaster	Major accidents and hazards and road traffic accidents
Chapter 20 Management of Environmental Effects	Summary of mitigation measures

## 18.3 Study Area

18.3.1 DMRB LA112 defines the Study Area as extending for 500 m from the Scheme and as noted above this is consistent the approach adopted for this Chapter. The broader study area for the Scheme includes the A55 corridor between Junction 14 and Junction 16A, which runs parallel to the railway in close proximity to the centres of Llanfairfechan, Penmaenmawr and Dwygyfylchi. Where likely effects are identified outside the 500 m area surrounding the Scheme boundary, the study area is extended accordingly. Where effects are unlikely to occur within the 500 m area surrounding the Scheme boundary, the study area is reduced accordingly.

18.3.2 The geographical scope of the assessment varies between different population and health factors being assessed, for example, hospitals with accident and emergency facilities comprise Ysbwty Gwynedd in Bangor and Ysbwty Glan Clywd at Bodelwyddan which lie some distance from the Scheme and outside the immediate Study Area. Notwithstanding this the data will generally be assessed at a ward level and on this basis the following wards have been considered:

- A. Bryn, Lafan and Pandy; and
- B. Penmaenan, Pant-yr-Afon and Capelulo.

- 18.3.3 With regard to the consideration of wider population and health factors beyond the scope of the HIA it is considered that the above wards also represent a suitable Study Area. Depending on the health factors being considered, the buffer(s) will be defined in accordance with the relevant topic's study area and will be applied proportionately.

## **18.4 Scope of the Assessment**

- 18.4.1 The scope of the assessment has comprised of the following:
- A. Baseline data gathering;
  - B. Review of Health Impact Assessment that draws on information from a number of chapters in the ES;
  - C. Review of other Chapters with the potential to affect population and health, based on the recently issued LA112 standard; and
  - D. Consideration of wider well-being goals in the context of the Well Being of Future Generations, on the basis of the Conwy and Denbighshire Public Services Board Well Being Plan 2018-2023.
- 18.4.2 Where elements of the LA112 standard have not been covered in either the HIA or in the other chapters in the ES they have been included within this Chapter.
- 18.4.3 With regard to the Equalities Act, overall, it is considered that the Scheme is unlikely to result in significantly different effects on different groups of people and therefore no Equality Impact assessment has been carried out.

## **18.5 Baseline Data Collection**

### **Method**

- 18.5.1 Baseline conditions were established through a preliminary scoping review, considering publicly available baseline data (such as the statistical population profiles for wards published by Conwy CBC and the Welsh Index of Multiple Deprivation [WIMD] 2014 data) and findings from the Welsh Transport Appraisal Guidance (WeTAG) and the associated distributional impact assessment. Other relevant activities, including the air quality and noise review and consideration of effects on all travellers were also considered. Baseline conditions from the other ES chapters is discussed in Section 18.7.
- 18.5.2 Feedback from the initial WeTAG Stage Two Public Consultation process has also been reviewed.
- Desk-based Assessment
- 18.5.3 Information was obtained from the following sources:
- A. The 2011 Census;
  - B. Population Profiles for wards published by Conwy CBC;
  - C. Welsh Index of Multiple Deprivation (WIMD); and
  - D. Welsh Transport Appraisal Guidance (WeTAG).

### *Site Walkover and Surveys*

- 18.5.4 No site walkovers or surveys have been undertaken for this Chapter specifically, however other topics, such as All Travellers, have undertaken their own site visits.

## Assessment Methodology

- 18.5.5 This section sets out the methodology by which the impacts have been assessed.
- 18.5.6 As per the scope of the assessment, the Health Impact Assessment, and other ES Chapters have been reviewed for aspects with the potential to affect population and health, based on the recently issued LA112 standard.
- 18.5.7 DMRB guidance LA 112 provides guidance on environmental sensitivity, scale of effect and magnitude of impact, however, as noted in Table 18.4 most elements have already been assessed in other chapters. On this basis it was not considered appropriate to re-assess these elements. These elements have been assessed for potential effects and significance as based on the submitted Scoping Report, which is outlined below.
- 18.5.8 Other elements, including drawing in on wider well-being goals, have been assessed using professional judgement.

### *Assessment of Potential Effects*

- 18.5.9 There are two relevant time periods to consider impacts on human health: during the construction period and after completion during the operational period (including use and any maintenance activities).
- 18.5.10 During the construction period, impacts can potentially affect both construction workers and the nearby community. During this phase the focus will be on the immediate construction zone, as well as nearby receptors.
- 18.5.11 After construction and during operation, the impacts can potentially affect nearby communities, either through direct or indirect effects of the new highway configuration. The impact of the operational period will be assessed up to 15 years after opening.
- 18.5.12 When considering the population and health impacts, both during construction and the operational period, the buffer applied will depend on the impact being considered. For example, as described in Chapter 12 the health impacts associated with construction dust will be considered within 350 m of the associated works, whereas the air quality during the operational phase will be considered in the immediate vicinity of the scheme and adjoining road (up to 200 m). Reference will be made to the relevant chapters for the appropriate buffers that will be applied.

### *Assessment of Significance*

- 18.5.13 The following information outlines the basis to which the effects have been assessed within other relevant ES chapters:
- A. **Nature** - The status of the effects has been assessed by considering whether the proposed development would have a positive or negative effect on the receptor;
  - B. **Likelihood** - Assessing if the likelihood of the impact of the proposal is definite, probable or speculative;
  - C. **Scale and Significance** - it will consider what proportion of the population is likely to be affected, and how severe or beneficial the impact would be;
  - D. **Timing and duration** - it will seek to assess whether short-term risks to health may be worth the long-term benefits; and

**E. Distribution** - Assessing whether the proposal would affect different groups of people in different ways. A proposal that is likely to benefit one section of the population may not benefit others. In some cases, the assessment will identify ways in which members of the least healthy or most disadvantaged populations could be helped. This can be an important contribution to reducing the health inequalities that exist between some communities.

### *Assumptions and Limitations*

18.5.14 Based on the guidance that has been followed, the Environmental Impact Assessment only examined NO<sub>x</sub> and PM<sub>10</sub>, with data on the latter quite limited. No PM<sub>2.5</sub> data was presented in the assessment, even though from a health perspective this is the more relevant size of particulate matter. Furthermore, no data related to hazardous air pollutants (such as benzene) were compiled. Since several hazardous air pollutants are anticipated from mobile sources, analysing these air pollutants would have been useful from a public health perspective.

## **18.6 Consultations**

18.6.1 Consultation was carried out during the Public Information Exhibition held in December 2017 and the 12-week WeITAG Stage Two Public Consultation held during the summer of 2018, including Environmental Liaison Group meetings with statutory consultees such as representatives from Conwy CBC Environmental Health team. The primary purpose of this consultation was to collate information regarding stakeholders' views on the possible options and general environmental information. This consultation did not specifically include health concerns.

18.6.2 Written consultation was carried with key bodies whilst preparing the population and human health assessment. It was anticipated that this would be focussed on Public Health Wales, including the Conwy CBC 'Social Care and Wellbeing' team, the Local Public Health Director, together with the Conwy CBC Environmental Health team. A detailed consultation exercise beyond these organisations was not proposed but other parties were identified and contacted to provide comment, including:

- A. University Health Board;
- B. Conwy and Denbighshire Public Services Board (Councillors);
- C. Dewis Cymru (general email address for Care Inspectorate Wales);
- D. People's Partnership (general email address); and
- E. Community and Voluntary Support Conwy (North Wales Citizens' Panel).

18.6.3 No responses were received from this outreach.

### *Scope of Potential Effects*

18.6.4 Based on the Scoping Report submitted in January 2019, the following effects were scoped out of the HIA:

- A. Individual and lifestyle effects such as smoking, diet, use of alcohol, cigarettes, non-prescription drugs, and sexual activity should not differ between do-minimum and the preferred option. They have therefore not been examined;
- B. Social factors such as neighbourliness, sense of belonging, local pride, community identity, cultural and spiritual ethos, and racism should not differ between do-minimum and preferred option. They have therefore not been examined;
- C. Workplace conditions should not differ between do-minimum and preferred options. They have therefore not been examined;



- D. Macro-economic, environmental and sustainability factors including Government policies, biological diversity, gross domestic product, and climate should not differ between do-minimum and preferred options. They have therefore not been examined;
- E. Although living conditions such as smell, odour and waste management are unlikely to differ between do-minimum and preferred options from the perspective of health, these issues will be considered in other Chapters (such as Chapter 15 Materials); and
- F. The decommissioning phases for the Scheme.

18.6.5 Based on the Scoping Report, the following effects were scoped in. To avoid duplication, reference will be made to the relevant chapters throughout this chapter as appropriate:

- A. Impacts on individuals, including lifestyle factors such as physical activity, risk-taking activities, and impact on access to health care services;
- B. Impacts on access to skills and knowledge, including access to training and education;
- C. Impacts on social effects and health. For example, the preferred option may impact on the availability of housing, access to cost-effective public transportation or the potential to encourage families to use cycle tracks;
- D. Impacts on accessibility and active travel, including the encouragement of walking/cycling, and traffic management and calming measures;
- E. Impacts on the community, including social support mechanisms, social networks and neighbourliness;
- F. Impacts on Community divisions and degree of isolation. This criterion can apply to either groups or individuals. The Scheme has the most potential to impact community severance and degree of isolation for those options where properties are located within slip road 'islands' or along-side roads that form part of the Scheme;
- G. Impacts on the historical identity of a community, as well as cultural and spiritual ethos. This could include the impact on designated Conservation Areas, townscape and landscape and isolation from areas important to the community such as the coast or the mountains. Where severance is reduced, this would potentially provide a positive effect;
- H. Impacts on the local community, related to issues associated with the built environment, housing, noise and air quality, physical view and outlook (e.g. those associated with changes to the landscape/ townscape). The Scheme has the potential to impact during both its construction and operational phases;
- I. Impacts on employment, occupation, and income; and
- J. Impacts on socio-economic, cultural and environmental and sustainability factors, including biological diversity, efficient use of resources, pollution, diversity/ local distinctiveness and climate. This criterion overlaps with a number of ES chapters, to which reference will be made as appropriate. It should be noted that it is not envisaged it would be considered proportionate to carry out a socio-economic study as part of this work.

## 18.7 Baseline Conditions

18.7.1 Full details of baseline conditions are considered in Chapter 11 – Community Assets, Chapter 14 – All Travellers and Appendix 18.1: Health Impact Assessment. To avoid duplication, information in this Section has been grouped according to relevant items within the DMRB LA112 guidance (shown previously in Table 18.3).

### Private Property and Housing

18.7.2 The following private assets are located within the study area:

A. Residential:

The Scheme does not include the direct loss of residential properties and this aspect is therefore not considered further within this ES assessment.

B. Offices:

None.

C. Others:

Seasonal camp site.

D. Commercial Property:

Part of the former Oasis Retreat centre land, to the north.

### **Community Land and Assets**

18.7.3 There are a number of community assets within the study area:

A. Small land parcel of the former Oasis Retreat Centre (Place of Worship);

B. Open spaces to the west of the petrol station; and

C. Puffin Farm shop; Camp site to the south of Junction 16A; Holiday caravan park, former Oasis Retreat Centre (Tourist, visitor attractions).

### **Development Land and Business**

18.7.4 The Scheme includes five sites identified as development land. The Scheme includes a new link road which would run parallel to the A55 from Junction 16 to 16A. The proposed route includes land currently allocated within the Conwy County Borough Council (CCBC) LDP (locations shown in Figure 11.2), as:

A. A housing site, CCBC reference 53. This allocated site lies on the north easterly edge of the settlement of Dwygyfylchi. The CCBC Joint Housing Land Availability (JHLA) 2017 indicates a potential for 15 houses on the site. The land is currently in agricultural use as described in Chapter 11, Section 11.3.30.

B. A separate land use allocation for employment contingency uses (identified as CCBC reference MS9) exists at the Puffin Café/ Orme view filling station. The land is currently in agricultural use as described in Chapter 11, Section 11.3.30.

18.7.5 Improvements to provide a new cycle way along Conway Road is proposed within the southerly boundaries of land identified as a housing contingency site (as defined within the current CCBC LDP) and a limited part of the adjoining site to the west, which includes planning permission for 33 apartments.

### **Agricultural Land Holdings**

18.7.6 The agricultural land affected by the Scheme is currently down to grassland cut for silage/hay and grazed by cattle and sheep and is shown on the Predictive ALC Map (Welsh Government, 2017) as comprising a mixture of Subgrades 3a and 3b quality land. Consultation with the relevant Welsh Government Departments confirms that this land is borderline Subgrade 3a/3b on the desk-based assessment. Parts of the Scheme, especially near Junction 16, are downgraded to Subgrade 3b on slope. Consequently, the Welsh Government has advised that the Scheme is unlikely to affect

land of best and most versatile quality (Grades 1, 2 and 3a) and consequently no detailed ALC survey required.

- 18.7.7 Some of the agricultural land is also used for camping/ caravanning on a seasonal basis.

### **Walkers, Cyclists and Horse Riders**

- 18.7.8 Chapter 14 sets out the impacts on all travellers: pedestrians, cyclists, equestrians and vehicular travellers. The area contains several Public Rights-of-Ways and cycling areas.

- 18.7.9 The following well-established Public-Rights of Way in the study area have been identified:

- A. National Cycle Network (NCN) Route 5 which extends along the North Wales coast from Chester to Holyhead along the coastline passing Penmaenmawr;
- B. Wales Coast Path from Chester extends along the coast through Penmaenmawr and Llanfairfechan with an optional inland route at Penmaenmawr;
- C. Public Footpath 29/08 crosses the A55 using footbridge close to Puffin Café Services; and
- D. Public Footpath 29/06 provides access between Conway Road and Conway Old Road.

- 18.7.10 In addition, there are a number of informal NMU routes within the area including the footpath between A55 and Glan-y-Afon Road (historically known as Bangor Fields Road).

- 18.7.11 No equestrian routes have been identified within the Scheme area.

### **Human Health**

- 18.7.12 The Scheme is located in a rural area with low population density. The nearest homes are along Ysguborwen Road and Maes-y-LLan. The nearest population centres are the Town of Penmaenmawr and the village of Dwygyfychi, both in Conwy County Borough. Both are located along the seaside.

- 18.7.13 Penmaenmawr has a resident population (30 June 2017) estimated to be 2,422 people and a population density of approximately 2,833 persons per square kilometre. Dwygyfychi has a resident population (30 June 2017) of 1,211 people and a population density of approximately 2,329 persons per square kilometre.<sup>13</sup>

### **Health Profiles**

- 18.7.14 The age profile of Penmaenmawr and Dwygyfychi are contrasted to the age profile for the Wales. Approximately 23% (Penmaenmawr) and 30% (Dwygyfychi) of the population is age 65 years or older, slightly higher than Wales where this percentage is 21%. The older age profile in the study area is an important consideration for the health and equalities assessments, as the elderly population can be considered a susceptible population. Furthermore, the elderly are likely to have an increased requirement for healthcare services and changes to well-being and mobility.
- 18.7.15 The gender split in Wales is fairly even with 51% of the population female and 49% male. The gender distribution in Penmaenmawr and Dwygyfychi is similar: 51% female and 49% male in Penmaenmawr and 52% female and 48% male in Dwygyfychi.

<sup>13</sup> <https://citypopulation.de/en/uk/wales/>

- 18.7.16 Data from the 2011 census shows that Penmaenmawr and Dwygyfychi are comprised of fairly homogeneous ethnic populations with over 96% (Penmaenmawr) and over 98% (Dwygyfychi) of the population being classified as White British as compared to 93% in this category across Wales. Although the 'other white' category is comparable in Penmaenmawr (2.09% versus 2.38%), other white is lower in Dwygyfychi (0.94%) and both the mixed ethnic groups and other ethnic groups are much lower in both locations as compared to Wales as a whole.

### Health Determinants

- 18.7.17 According to the National Clean Air Strategy 2019, NO<sub>x</sub> exacerbates symptoms of those already suffering from lung or heart conditions shortening lives and reducing quality of life and short-term exposure to high concentrations of NO<sub>2</sub> can cause inflammation of the airways.
- 18.7.18 Oxides of nitrogen (NO<sub>x</sub>) concentrations are modelled at concentrations of 8.8 µg/m<sup>3</sup> in 2018, and 7.2 µg/m<sup>3</sup> in 2022.
- 18.7.19 There is no NO<sub>2</sub> monitoring undertaken by the CCBC monitoring network in close proximity to the J16 Scheme. The annualization concentration of NO<sub>2</sub> from a Ramboll monitoring programme conducted between April 7, 2019 and June 2, 2019, was 14.6 µg/m<sup>3</sup>, 13.7 µg/m<sup>3</sup>, and 15.9 µg/m<sup>3</sup> along Ysguborwen Road.
- 18.7.20 There is no PM<sub>10</sub> monitoring available from the CCBC monitoring network in close proximity to J16.
- 18.7.21 Noise was reported as ambient noise level (LAeq) with its value equivalent in time to a steady sound level. Values at the seven monitoring locations ranged from 54 dB to 72 dB. Road traffic noise was estimated using the LA10 indicator used in the Calculation of Road Traffic Noise (CRTN) prediction method. Values at the seven monitoring locations ranged from 55 dB to 74 dB. The highest noise levels for both LAeq and LA10 were located at a set of two monitoring stations, at 71 dB (LAeq) and 74 dB (LA10).

### Public Services Board Well-being Plan 2018 - 2023

- 18.7.22 The Public Services Board (PSB) Well-being Plan 2018 – 2023 defines baseline conditions for a wide range of factors, and areas where under the PSB ways to improve will be explored as 'Next Steps'.
- 18.7.23 A review of the 'Next Steps' has been undertaken to identify which elements the Scheme could affect; the outcomes are identified in Table 18.5 below.

**Table 18.5 Review of PSB Well-being Plan 2018**

PSB Well-being Plan 'Next Steps'	Relevant to Scheme?	Potential Effects
<b>1. People – Supporting Good Mental Well-being for All Ages</b>		
Work together to support parents so children have the best start in life	✓	Temporary increase in noise
Work together to support unpaid carers	✗	Temporary severance from amenity and leisure facilities
Help young people learn life skills and behaviours that support health and well-being	✓	Loss of views Improved connectivity

PSB Well-being Plan 'Next Steps'	Relevant to Scheme?	Potential Effects
Encourage partner organisations to give mental well-being training to their workforce	✖	Scheme contribution to active travel  Provision of high quality landscaping and green space  Potential opportunities for community project
Have more activities that bring generations together	✓	
Make the most of volunteer services	✖	
Use the environment to encourage mental well-being	✓	
Make the most of social prescribing, supporting people in their communities to improve well-being	✓	
Develop new ways of working to promote health and well-being	✖	
Help people be less reliant on health and social care services	✓	
2. Community – Supporting Community Empowerment		
Have communities that can meet the needs of all ages	✓	Improved connectivity  Apprenticeship schemes  Site visits by schools and colleges during construction  Give vulnerable people to access services
Help older people to do what matters to them	✓	
Help services and communities work together better	✓	
Find affordable ways to support people to stay in their own home	✖	
Help people adapt their homes to meet their needs	✖	
Encourage people to plan and shape their communities	✖	
Help people travel to work, education and services	✓	
Make superfast broadband and mobile networks available to everyone	✖	
Get support to the people who need training to use digital services	✖	
Give young people better career advice and mentoring	✓	
Offer young people the opportunity to develop skills through volunteering and work experience	✓	
Deliver extra homes across Conwy and Denbighshire	✖	
Connect people to accommodation they can afford	✓	
Support people to prepare for their later years	✖	
3. Place – Supporting Environmental Resilience		
Improve how we manage against flood risk and other weather extremes	✓	Flood risk assessment and mitigation measures

PSB Well-being Plan 'Next Steps'	Relevant to Scheme?	Potential Effects
Help communities understand the value of the natural environment and how they can positively add to it	✓	Biodiversity surveys and assessment Ecological mitigation
Be leaders in sustainability and supporting communities to develop renewable energy schemes	✗	Provision of high quality landscaping and green space Locally sourced materials
Have a natural environment that is thriving and resilient, and where wildlife flourishes	✓	Use of recycled materials where practicable
Work with communities on their place plans and help them consider green infrastructure	✓	Recycling and re-use of materials to divert waste from landfill
Buy in resources that are sustainable and locally produced	✓	Site visits by schools and colleges during construction
Explain how important it is that we address environmental issues like recycling, energy efficiency and carbon emissions	✓	
Improve energy efficiency of our buildings	✗	
Produce less waste	✓	

## 18.8 Assessment of Effects

- 18.8.1 A full description of the proposed works has been provided in Chapter 2: Proposed Development. Those features and assumptions relevant to this chapter are summarised as follows, including best practice methods.

### Health Impact Assessment

- 18.8.2 The HIA considered the same Study Area used for this chapter and noted that the closest sensitive receptors were residential properties along the A55, Conway Road, Ysuborwen Road and Glan-Yr-Afon Road.
- 18.8.3 Consultation was undertaken with the organisations noted in Section 18.6 but as noted no response was received.
- 18.8.4 The HIA considered the population, ethnicity and socio-economic baseline and summarised the information available in the following ES chapters:
- A. Chapter 6 Geology and Soils;
  - B. Chapter 9 Landscape;
  - C. Chapter 11 Community Assets;
  - D. Chapter 12 Air Quality;
  - E. Chapter 13 Noise and Vibration;
  - F. Chapter 14 All Travellers; and
  - G. Chapter 17 Risks of Accidents and Disasters.
- 18.8.5 The assessment comprised a review of the available data including information from the feedback in the WeITAG Stage Two Public Consultation and a critical review of possible health impacts to assess where significant effects could arise. The assessment considered the construction and operational periods with receptors comprising both construction workers and the local community.

- 18.8.6 The assessment identified the following potential effects (greater detail provided in Appendix 18.1: Health Impact Assessment):

### **Geology and Soils**

- 18.8.7 The only potentially significant effect identified for the Scheme with regards to Geology and Soils relates to workers in confined spaces (if introduced). This would require mitigation in order to reduce the potential effects. Following implementation of the mitigation by the Contractor these would no longer be considered potentially significant effects.
- 18.8.8 There would be no long-term significant effect on the groundwater beneath the site from the Scheme and risks associated with the ground conditions can be adequately managed during Construction and Operation Phases.
- 18.8.9 A number of standard best practice measures will therefore be adopted during construction and operation of the site in order to ensure that the contamination identified at the site does not result in any significant environmental effects.

### **Landscape**

- 18.8.10 The most significant potential effects on landscape would be local to the existing road corridor. The widening of the road corridor to form new junctions at 16 and 16A would have little effect on the surrounding landscape character, as it is already heavily influenced by the existing A55 road corridor. There would be localised changes to the character of the existing road corridor and immediate surroundings during the construction phase, which may be disruptive with significant construction activities over an 18 to 24-month period that would be difficult to mitigate against. However, the landscape and visual impact of the Scheme on the wider area would not be significant. The highly scenic qualities of the surrounding upland areas to the south including the Snowdonia National Park would remain intact. There would be no significant change to the wider landscape character or perceptual qualities such as the tranquillity of the surrounding area.

### **Community Assets**

- 18.8.11 The Scheme would result in the limited loss of land used by the Community including a football pitch at the Maes Y Llan residential estate. The impact on use of community facilities has been assessed as a major - moderate adverse impact at the construction stage, achieving beneficial on completion of the Scheme. Overall, this impact is considered as neutral-to-beneficial.
- 18.8.12 The impact on existing businesses is considered to be neutral. The impact on agricultural land and farming activities, including the use of the land for seasonal camping/caravanning, would be moderate. Two farms are affected and both holdings will experience this moderate impact, which equates to a minor adverse effect.
- 18.8.13 The Scheme would impact on the viability of the allocated housing land at Maes y Llan and the employment contingency site near Puffin Café. The impact has been assessed as major-moderate adverse.
- 18.8.14 The Scheme is considered beneficial by reducing the severance of members the community from the coast and by enhancing active travel provisions for walkers and cyclists.

## **Air Quality**

- 18.8.15 During the construction phase, dust impacts may be caused by earthworks and site preparation, demolition of existing structures, construction of structures such as foundations, material handling, construction of on- and off-site highway improvements, and various landscaping activities. Dust impacts would be anticipated to be greatest in dry weather, especially following periods without rain.
- 18.8.16 The closest sensitive receptors to construction activity would be residential properties along A55, Conway Road, Ysuborwen Road and Glan-Yr-Afon Road.
- 18.8.17 Much of the dust generated during the construction phase is likely to be coarse particle sizes, with only a fraction likely to be in the PM<sub>10</sub> size range. As described in Chapter 12, the risk of dust soiling impacts is likely to be highest for earthworks and construction activities. However, this is anticipated to be low without mitigation and negligible with mitigation, and the risk of human health effects from this activity is likewise anticipated to be negligible.
- 18.8.18 To assess the impacts during the operational phase, Chapter 12 presents the changes in NO<sub>2</sub> and PM<sub>10</sub> concentrations by comparing the 'do minimum' scenario with the 'do something' scenario.
- 18.8.19 NO<sub>2</sub> impacts from the Scheme are projected to be negligible, with concentrations at all receptors modelled decreasing slightly, remaining the same, or increasing by no more than 1%.
- 18.8.20 PM<sub>10</sub> impacts are also projected to be negligible, with concentrations at all receptors modelled decreasing slightly, remaining the same, or increasing no more than 0.6%.
- 18.8.21 Based on these two pollutants, the health implications of air quality changes from the Scheme are judged to be minimal, and no health effects are anticipated from these minimal air quality changes resulting from the Scheme.

## **Noise and Vibration**

- 18.8.22 All demolition and construction effects are expected to be direct and temporary, with a Construction Environmental Management Plan (CEMP) defining all mitigation measures and a defined Best Practices Measure (BPM) to minimise the noise and vibration effects at receptors in the vicinity of the construction.
- 18.8.23 Construction-related activities were predicted for 11 noise-sensitive receptors. No significant noise effects are predicted during the construction phase.
- 18.8.24 No significant vibration levels are predicted with sheet steel piling, however there is the potential for significant effects associated with vibratory compaction around Maes y Llan.
- 18.8.25 The Scheme is predicted to result in a noise level decrease at majority of the receptors. This is attributed to a diversion of traffic from Glan-Yr-Afon Rd in Dwygyfylchi into a new bypass road. Where a noise level increase is predicted, this is attributed to an increase in traffic speed around the existing junction and realignment of the roads with introduction of additional carriageways closer to the receptors. No receptors are predicted to experience a significant decrease effect.



18.8.26 However, no receptors are predicted to experience an increase in noise level of at least 3 dB; therefore, the Scheme is assessed to result in no significant operational noise effects in the short-term.

18.8.27 Predicted noise effects during operation have been found to result in no significant noise effects. Mitigation measures in form of noise barriers and low-noise surface were proposed for consideration for properties along Maes y Llan which were identified as Priority Areas under strategic noise mapping.

### **All Travellers**

18.8.28 Proposed mitigation during the Construction Phase should reduce the impact of the Scheme during this phase.

18.8.29 While there are several major-to-minor adverse impacts anticipated during construction, the benefits during the operational phase are expected to outweigh these anticipated impacts, with a net result of a beneficial impact.

18.8.30 In addition, a new link road would provide connectivity between Penmaenmawr and Dwygyfylchi. The improved at grade junction at Junction 16a would enable 4-way movements by utilising an overbridge with a junction to the north of the A55 and a junction to the south. The slip roads are raised locally to allow the bridge to pass over the A55.

### **Risk of Accidents and Disasters**

18.8.31 During construction of the Scheme the contractor would be responsible for managing traffic through the works. They would also be responsible for liaison with the emergency services to ensure that they have free access into and through the works.

18.8.32 There are potential risks to the Scheme and to the environment as a result of the development. Most of these events arise from natural sources and would occur whether or not the junction improvements are carried out. The consequences of these events are associated with road traffic accidents. Wherever possible this risk is being addressed by a range of measures that include traffic management and design to current design to minimise the risk to people, property and the environment.

18.8.33 Some events would cause damage to elements of the Scheme which would require repair. Temporary, full or partial, closures of the road would be implemented, with consequential impacts on road users and adjacent communities.

18.8.34 As described in the Economic Assessment Report, the predicted number of motor vehicle accidents in the 60-year period for the study area under the Scheme is a net prevention of 32.2 total accidents. Of these, 0.5 fatal accidents would be prevented, 3.3 serious accidents would be prevented, and 39.3 slight accidents would be prevented.

### **Well-Being of Future Generations Act (FGA)**

18.8.35 The transport and technical project objectives for the Scheme have been developed during previous development work and engagement, aiming to address identified problems. During the early stages of Key Stage 3 the problems and objectives were refreshed during a focused

workshop event with key stakeholders, considering the WelTAG 2017 guidance and Wellbeing of Future Generations (Wales) Act wellbeing goals.

- 18.8.36 A vision has emerged from the Scheme objectives, as outlined in Chapter 2, which takes into consideration the problems and challenges that have been noted. The vision would be implemented initially through the construction and aftercare of the A55 Junction 16 Improvements project, but also through longer term projects, implemented by others to achieve 'sustainable development', which is the *'process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle, aimed at achieving the well-being goals'*.
- 18.8.37 Fundamental to the identification of problems and opportunities has the involvement of the local communities through key stakeholder and public engagement events. A programme of these has been held since December 2017.
- 18.8.38 Enhancements from the Scheme that would support the purposes of the Well-Being of Future Generations Act are:
- A. Support community life and economic viability through enhanced cohesion and connectivity, support for education, learning and community involvement;
  - B. Enhanced quality and quantity of public spaces associated with the road corridor;
  - C. Improve access and enjoyment of the coastal setting, the townscape and the seafront, while enhancing opportunities for walking, cycling (active travel) and healthy lifestyles; and
  - D. Enhance biodiversity through habitat creation, habitat connectivity and improvements within the road corridor in a manner that reflects and supports the coastal setting.
- 18.8.39 The inclusion of additional walking and cycling routes seeks to improve accessibility, health and wellbeing for both existing and future generations. These seek to improve access to local facilities for all, including those without access to a vehicle. These measures contribute towards achieving a more equal, prosperous, resilient and healthier Wales. Through improving connectivity between local areas, the Scheme also seeks to deliver cohesive communities and a vibrant culture in accordance with the FGA seven well-being goals.
- 18.8.40 As shown in Table 18.5, the Scheme would contribute to achieving the 'Next Steps' within the PSB Well-being Plan. This includes supporting good mental well-being for all ages, supporting community empowerment and supporting environmental resilience. Although not all steps are relevant to the Scheme, the scheme does not prevent other 'Next Steps' from being undertaken. On this basis, the Scheme provides beneficial outcomes as assessed by the FGA.
- 18.8.41 The enhancements listed above also contribute to compliance with the policies related to wellbeing in the Conwy Local Development Plan 2007-2022, and the Local Well Being Plan 2018.

## **18.9 Incorporated Mitigation**

- 18.9.1 The design for the Scheme has been developed iteratively by the design team to ensure that the most appropriate solutions have been identified and developed. Numerous minor adjustments were made to improve the design or to avoid or minimise impacts. The Scheme is complex because it must satisfy wide ranging project objectives as well as complying with legislation and the requirements of safety and of highways design standards.

18.9.2 The following list presents the assumptions that have been made for the purposes of this ES in terms of incorporated mitigation, with the proviso that the list is not exhaustive:

- A. A Construction Environmental Management Plan would be prepared which would be compliant with all relevant construction best practice and codes of practice. This would include impacts associated with compound establishment and activities such as materials storage and waste management. A pre-construction CEMP is included in Chapter 21;
- B. Measures would be adopted during the construction works to mitigate environmental effects of ground works including the stockpiling of soils;
- C. Relevant pollution control measures would be observed during construction in line with current legislation and best practice, this is also discussed in the pre-construction management plans in Chapter 21; and
- D. Construction would be compliant with the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, in order to protect soil quality during excavation right through to reinstatement;
- E. Proposed mitigation for the likely changes to traffic noise and visual impact would include acoustic barriers and the planting of trees and shrubs to screen views of traffic and mitigate for traffic noise. The new junction, in combination with open land for visibility splays, sustainable drainage measures, landscape planting and Active Travel routes will create a corridor of urban public space along Penmaenmawr Road.

18.9.3 Further mitigation measures in addition to standard best practice measures are outlined below that would be employed at the site in order to avoid potentially significant effects arising from the construction of the Scheme.

#### **CEMP**

18.9.4 An overarching mitigation measure which would contribute towards addressing the construction phase impacts is the development of a project specific CEMP. This would need to incorporate specific measures to address the significant impacts identified for the construction phase.

18.9.5 It would be necessary to ensure that mitigation measures are implemented to prevent off-site migration of contaminants as dust/ vapours or run-off during excavations and soil stockpiling. Sheeting of lorries would be undertaken for material importing and exporting materials offsite to mitigate risks from dust. No specific mitigation is considered to be required for asbestos, although the implementation of mitigation measures for dust would also ensure the risks from asbestos remain low.

18.9.6 A protocol would be prepared to address unexpected contamination, should this be encountered, during excavations for the construction works and this would need to be incorporated into the CEMP.

18.9.7 As noted above a Materials Management Plan (MMP) would be put in place and this would include details of how excavated soils would be managed on site including, where appropriate their re-use on site.

18.9.8 Table 18.6 provides signposts to where the effects assessments have taken place and also an overall summary of residual significant effect.

Table 18.6: Assessment of Effects

Element from LA112	Impact related to Population and Human Health	Residual Significant Effect during Construction	Residual Significant Effect during Operation	Status
<b>Land Use and Accessibility</b>				
Private property and housing	None	None	None	Considered in Chapter 11 Community Assets
Community land and assets	Severance	Adverse	Beneficial	Considered in Chapter 11 Community Assets
	Relief from severance	N/A	N/A	Considered in Chapter 14 All Travellers
	Loss of open space	Adverse	Adverse	Considered in Chapter 11 Community Assets
Development land and businesses	Demolition	Adverse	Adverse	Considered in Chapter 11 Community Assets
Agricultural land holdings	Demolition	Adverse	Adverse	Considered in Chapter 11 Community Assets
Walkers, Cyclists and Horse riders	Severance/enhanced connectivity and amenity	Adverse	Beneficial	Considered in Chapter 14 All Travellers
<b>Human Health</b>				
Human health	Contaminated soils and water	None	None	Considered in Chapter 6 Geology and Soils
	Air Quality	None	None	Considered in Chapter 12 Air Quality
	Noise levels	None	None	Considered in Chapter 13 Noise and Vibration
	Driver Stress	Adverse	Beneficial	Considered in Chapter 14 All Travellers
	Climate Change	None	None	Considered in Chapter 15 Climate Change

Element from LA112	Impact related to Population and Human Health	Residual Significant Effect during Construction	Residual Significant Effect during Operation	Status
	Major Accidents and Disasters	Potential	Potential	Considered in Chapter 17 Risk of Accident and Disaster
Landscape	Landscape design, loss of views	Adverse	None	Considered in Chapter 9 Landscape
<b>Policy/Guidance</b>				
Well-Being of Future Generations Act		None	Beneficial	Considered in this Chapter
Active Travel (Wales) Act 2013		None	Beneficial	Considered in Chapter 14 All Travellers

## **18.10 Effects with Mitigation**

- 18.10.1 In some cases, the effects that have been identified within Table 18.6 have required mitigation in order to reduce the potential effect. This process is outlined in the relevant Chapters signposted.
- 18.10.2 As described above, a number of standard best practice measures would be adopted during construction and operation of the site in order to ensure that the Scheme does not result in any significant environmental effects.

## **18.11 Summary of Residual Significant Effects**

- 18.11.1 Table 18.6 above contains an assessment of the potential significant effects of the Scheme on population and health. As outlined already, the assessment of significance of effect for the majority of impacts have been undertaken in other relevant Chapters.
- 18.11.2 Residual adverse effects for the Scheme are in relation to Land use and Accessibility, notably the loss of open space, use of development land and loss of agricultural land.
- 18.11.3 There are considered to be no residual significant adverse effects related to Human Health, however there are a range of beneficial effects. The Scheme is considered beneficial by reducing the severance of members the community from the coast, enhancing active travel provisions for walkers and cyclists and reducing driver stress.
- 18.11.4 There are potential impacts as a result from accidents and disasters. Most of these events arise from natural sources and would occur whether or not the junction improvements are carried out. There is also the potential for road traffic accidents. Wherever possible this risk is being addressed by a range of measures that include traffic management and design to current design to minimise the risk to people, property and the environment. Overall, according to the Economic Assessment Report, the predicted number of motor vehicle accidents in the 60-year period for the study area under the Scheme is a net prevention of 32.2 total accidents. Of these, 0.5 fatal accidents would be prevented, 3.3 serious accidents would be prevented, and 39.3 slight accidents would be prevented.

## **18.12 Cumulative Effects**

### **Intra-Project Effects**

- 18.12.1 Intra-project effects are considered as those that “occur between different environmental topics within the same proposal, as a result of that development’s direct effects”<sup>14</sup>.
- 18.12.2 Intra-cumulative effects have been referenced within other Chapters; Table 18.7 outlines the potential direct and indirect intra-project cumulative effects that have been considered.

<sup>14</sup> Institute of Environmental Management & Assessment (IEMA), 2011. Special Report – The State of Environmental Impact Assessment Practice in the UK

**Table 18.7: Intra-Cumulative Effects**

<b>Topic Area</b>	<b>Cumulative Effects</b>
Geology and Soils	Following the implementation of mitigation no potentially significant intra-project cumulative effects have been identified.
Road Drainage and Environment	Following the implementation of mitigation no potentially significant intra-project cumulative effects have been identified.
Landscape	Noise is considered a potential cumulative effect that could change the perceptual qualities of the landscape, in particular areas with tranquil qualities such as the inter-tidal areas of Penmaenmawr Beach and upland areas such as Allt Wen Moorland. Noise mitigation is required adjacent to the carriageway, involving the construction of 2 m - 3 m high noise barrier fencing. This would appear as another roadside element associated with the road corridor and in the context of the Scheme not likely to represent a significant cumulative effect
Community Assets	Several ES chapters indicate intra-project effects in relation to community and private assets comprising existing soil conditions and contamination related to previous developments and material importation, flood event considerations, nature conservation (biodiversity) in terms of the sensitivity of open allocated land and land further to the west on Ysguborwen Road, beneficial landscape and visual changes on and from residential properties at Maes y Llan, archaeological recording prior to demolition of properties, air quality impacts on existing and proposed assets and potential benefits to non motorised travellers.
Air Quality	Cumulative effects may include intra-project effects, when construction activities overlap in time for Junction 16 and Junction 15, or when changes in operational traffic at Junction 15 affect traffic at Junction 16.
Noise and Vibration	Intra-project effects may arise when construction activities overlap for Junction 15 and 16, or when changes in operational traffic at Junction 16 affect traffic at Junction 15.
All Travellers	No significant intra-project cumulative effects have been identified.
Climate Change	There are no significant effects, therefore no significant intra-project cumulative effects have been identified.
Major Accidents and Disasters	There is potential that threats identified could occur, which would therefore create cumulative effects between topics.
Health Impact Assessment	The Scheme has minimal potential to result in significant effects on human health.

18.12.3 Overall, following the implementation of mitigation no potentially significant intra-project cumulative effects have been identified.

### Inter-project Effects

18.12.4 Inter-project effects have been considered as those where “cumulative effect occurs as a result of the likely impacts of the proposed development interacting with the impacts of other developments in the vicinity” (IEMA)<sup>15</sup>.

18.12.5 Intra-cumulative effects have been referenced within other Chapters; therefore Table 18.8 outlines the potential inter-project cumulative effects that have been considered.

**Table 18.8: Inter-Cumulative Effects**

Topic Area	Cumulative Effects
Geology and Soils	The potential for significant cumulative effects in combination with the Scheme, including the proposals for Junction 15, is considered low.
Road Drainage and Environment	The potential for significant cumulative effects in combination with the Scheme, including the proposals for Junction 15, is considered low.
Landscape	The Scheme for Junction 16 have also been considered in combination with Junction 15. The two Schemes, although geographically not distant from each other, are considered to have no cumulative landscape or visual effects. Effects are very localised and visually not connected due to the intervening landform of Penmaenmawr Mountain.
Community Assets	The potential for significant cumulative effects in combination with the Scheme, including the proposals for Junction 15, is considered unlikely.
Air Quality	<p>Construction works at Junction 16 concurrent with construction works at Junction 15 do not have the potential to affect the identified receptors within the study area because of significant distances separating the two junctions. Significant cumulative effects are unlikely to occur as each development is anticipated to employ similar dust mitigation techniques such that the individual construction phase effect was not significant, alone or in combination.</p> <p>The J16 Scheme traffic model has taken into account committed developments as well as future predicted traffic growth when both Junctions 15 and 16 are completed in the assessment opening year. The assessment has therefore predicted the cumulative concentrations arising from committed developments in the area in 2022.</p>
Noise and Vibration	Construction works at Junction 16 concurrent with construction works at Junction 15 do not have the potential to affect the

<sup>15</sup> Institute of Environmental Management & Assessment (IEMA), 2011. Special Report – The State of Environmental Impact Assessment Practice in the UK



Topic Area	Cumulative Effects
	identified receptors within the study area because of significant distances separating the two junctions. Therefore, construction works are not predicted to result in significant cumulative effects.  Traffic data used for the assessment of operational noise effects is representative of the situations when both Junctions are completed in the assessment opening year. Therefore, the assessment of operational noise is cumulative with Junction 16.
All Travellers	Traffic flows which consider both Junction 15 Scheme and Junction 16 Scheme are unchanged from the traffic flows which considered the Schemes in isolation. Therefore, no further assessment of the cumulative effects of the construction or operational phase has been considered.
Climate Change	There are no significant effects, therefore no significant intra-project cumulative effects have been identified.
Major Accidents and Disasters	There is potential that threats identified could occur, which would therefore create cumulative effects between schemes.
Population and Health	The Scheme has minimal potential to result in significant effects on human health. There are no significant consented developments in the nearby vicinity, and nearby existing developments which could have the potential to cause significant effects have been included within the baseline.

### 18.13 Conclusions

- 18.13.1 On the basis of the significance of effects, the Scheme would result in no impact on existing private property and housing.
- 18.13.2 The Scheme would result in adverse impacts on development land and businesses and agricultural land and farm businesses during the construction stage and permanently.
- 18.13.3 The Scheme includes Land use and Accessibility and Human Health benefits.
- 18.13.4 Overall, the Scheme would contribute to the FGA through seeking to deliver measures that would have a positive impact on people living in the future as well as those living today. The five ways of working have been considered through the development of the scheme which has taken "into account the impact that the scheme could have on people living their lives in Wales in the future as well as in the present".
- 18.13.5 The Scheme also enables some of the 'Next Steps' within the PSB Well-being Plan 2018 to 2023, without preventing or hindering other 'Next Steps' to be undertaken, as all 'Next Steps' are not related to the Scheme. The Scheme enables 'Next Steps' related to people – supporting good mental well-being for all ages, community – supporting community empowerment and place – supporting environmental resilience by:
- A. People – Supporting Good Mental Well-being for All Ages: Improved connectivity, contribution to active travel and provision of high quality landscaping and green space;

- B. Community – Supporting Community Empowerment: Improved connectivity, Apprenticeship schemes and Site visits by schools and colleges during construction; and
- C. Place – Supporting Environmental Resilience: Flood risk assessment and mitigation measures, biodiversity surveys and assessment, ecological mitigation, provision of high quality landscaping and green space, locally sourced materials, use of recycled materials where practicable and recycling and re-use of materials to divert waste from landfill.

- 18.13.6 The Scheme also proposes additional measures which seek to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs and to meet the seven well-being goals.
- 18.13.7 The Scheme seeks to provide healthy and active travel options alongside the development of A55 (the highways infrastructure) through the provision of improved, sustainable accessibility between local areas and the coastline.
- 18.13.8 The inclusion of additional walking and cycling routes seeks to improve accessibility, health and wellbeing for both existing and future generations. These seek to improve access to local facilities for all, including those without access to a vehicle. These measures contribute towards achieving a more equal, prosperous, resilient and healthier Wales. Through improving connectivity between local areas, the Scheme also seeks to deliver cohesive communities and a vibrant culture in accordance with the FGA seven well-being goals.
- 18.13.9 Similarly, the Scheme has considered the requirements of the Active Travel (Wales) Act 2013 to improve facilities and routes for NMUs, supporting the Welsh Governments vision of walking and cycling being the preferred choice of mode for shorter distance trips. The inclusion of additional walking and cycling routes seeks to improve accessibility, health and wellbeing for both existing and future generations.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 19 CUMULATIVE IMPACT ASSESSMENT**

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## 19. CUMULATIVE IMPACT ASSESSMENT

### 19.1 Chapter Introduction

- 19.1.1 This chapter of the ES explains the potential impact of cumulative effects within this Scheme.
- 19.1.2 'Cumulative effects' result from multiple actions on receptors or resources occurring in combination over a period.
- 19.1.3 The ES Scoping Report identifies the need for a cumulative effects assessment (CEA), due to the potential for separate effects of more than one project to incur a significant effect on receptors. This was primarily based on the potential effects associated with the construction and operation of this Scheme could correspond with construction and operation of the Junction 16 Improvements. These two separate Schemes could both be constructed over a similar period time, or with a staggered commencement and completion.
- 19.1.4 In addition, cumulative effects associated with 'other developments', for example, proposed housing developments, could also represent another potential effect on receptors. These are also considered within this ES CEA Chapter.
- 19.1.5 The CEA approach recognises that it should '*not be any longer than is necessary to identify and assess any likely significant cumulative effects that are material to the decision-making process, rather than cataloguing every conceivable effect that might occur.*'<sup>1</sup> This Scheme CEA reflects a '*proportionate and pragmatic process*'

#### Inter-relationships and In-combination Effects

- 19.1.6 Two principal types of cumulative effects are considered: *inter-relationships* between effects generated by the Scheme, and the addition or *interaction* of effects generated by one or more other schemes *in-combination* with the project being assessed. For example, a small area of habitat loss coupled with increased noise disturbance in remaining habitat could together reduce the foraging available to a species sufficiently to reduce the local population (interrelationship). A short period of construction noise added to periods of construction noise from a series of other projects could combine to produce a significant impact on one group of residents (cumulative).
- 19.1.7 At the time of the drafting of this ES Chapter IAN 125/09(W) (Welsh Assembly Government, 2010) acknowledges that '*yet there is no industry standardised approach*' to the assessment of cumulative effects. As several different methods and techniques can be used for the assessment of cumulative effects, the emphasis is for an integrated and holistic approach to demonstrate the potential environmental complexity and relationships involved.
- 19.1.8 As such, for this ES chapter, reliance is made on the following principles:
- Developing existing good practices, methods and techniques
  - Professional judgement and expert opinion;
  - Knowledge of the Scheme; and
  - To present the outcome of the methods and conclusions in a sequential and logical format.
- 19.1.9 A cumulative assessment relies on the interpretation of several terms<sup>2</sup>. These include the interpretation of '*direct*'; '*indirect*', '*secondary*' effects and '*short/medium/long*' term and '*permanent*' and/or '*temporary*' effects. These are described with ES Chapter 22 Glossary.

<sup>1</sup> <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf>

<sup>2</sup> As detailed in '*The Environmental Impact assessment handbook A practical guide for planners, developers and communities*' 2009, page 115. ES Chapter 22 Glossary includes a full description

19.1.10 This Chapter therefore presents two separate CEA elements:

- i. The 'interrelationship' assessments reported as part of each ES topic chapter.
- ii. Systematic review of 'other developments' and their potential '*interaction*' impacts.

## 19.2 Study Area and Methods

19.2.1 Available guidance does not define a specific study area but recommends a proportionate and systematic CEA process.

### Inter-relationships

19.2.2 For the review of '*inter-relationships*', the Scheme CEA process initially identifies the 'study areas' set for each topic. This is based on the information provided in each of the ES Chapters.

19.2.3 As the Scheme design developed a more defined '*zone of influence*' (ZOI) for each environmental topic was identified, within the limits of the initial ES topic study areas.

19.2.4 The ES topic study areas and ZOI's for each Chapter topic are identified and these are drawn in Figure.19.1

19.2.5 Each of the ES topic chapters establishes and considers the inter-relationship between impacts on receptors or receptor groups as part of their Chapter assessment. For instance, effects on ecological receptors arising from any combination of land take, noise/visual disturbance, air quality impacts, water quality impacts and potential traffic collision are considered within the ecology chapter.

19.2.6 The ES Chapter assessments are then reviewed and the relevant interrelationships 'scoped' for the Scheme. The inter-relationships assessed for each topic chapter were then collated together and reviewed against the Scheme. The process is summarised in Table 19.1.

**Table 19.1: Method of Assessment for the Consideration of CEA Inter-relationships**

Stage	Description
1 <b>Which</b> receptor/resources are affected by the Scheme	Scoping exercise of receptor/resource types not affected or where these receptor/resource types are assessed wholly in a single EIA topic.
2 <b>How</b> will the receptor/resource be affected?	Review receptor(s)/resource affected by more than one effect through analysis of the assessment of effects sections undertaken for individual EIA topics
3 <b>What</b> is the <b>probability</b> of these effects occurring?	Identification of potential inter-relationship effects on these receptor groups through review of the topic specific assessments in the EIA chapters and present findings
4 <b>What ability</b> does the receptor/resource have to absorb further effects before changes become irreversible?	Assessment undertaken on how individual effects may combine to create interrelated effects on each receptor for: 'Project lifetime effects', i.e. during construction, operational and decommissioning phases; and 'Receptor-led effects', i.e. multiple simultaneous effects on a single receptor/resource

Source: DMRB Volume II Section 2 Part 5 HA 205/08 Part IV Paragraph 2.14

## In-combination

- 19.2.7 The assessment of in-combination effects with 'other development' was identified through a systematic approach. This consisted of searching and identifying 'reasonably foreseeable' projects and proposals which could have 'in-combination' effects.
- 19.2.8 'Other developments' are described within the ZOI's identified for the Scheme. Development sites at the margins of the ZOI's could be included and then excluded at a later stage, as the likely effects of the proposed Scheme and projects were more clearly defined.

## Collation of Details for In-combination Effects

- 19.2.9 As described in Paragraph 19.2.7, the CEA considers and uses the most relevant available guidance and advice<sup>3</sup> (as set out in Section 19.5) and similar CEA comparable Schemes and projects. This is to ensure consistency of a robust CEA approach and importantly, in defining 'other developments'<sup>4</sup>.
- 19.2.10 'Other developments' were identified through a systematic approach consisting of searching out 'reasonably foreseeable' projects and proposals and then 'screening' to select those which could have in-combination effects. A four-stage approach was used to identify and screen other proposed developments within a 'zone of influence' of the Scheme.
- 19.2.11 Briefly, the activities within each of the four stages are:
- Stage 1:** Using the established Zone of Influence (ZOI) of the Scheme, identify Long List of 'Other Developments';
  - Stage 2:** Identify Shortlist of 'Other Development' for Cumulative Effects Assessment, by applying inclusion/exclusion criteria to the Long List of 'other development';
  - Stage 3:** Gathering information on projects listed in Stage 2; and
  - Stage 4:** Detailed assessment of each 'other development' and assess overlap in effects between the Scheme and other developments. Assess whether contributions to effect come equally, or predominantly from one development.
- 19.2.12 Matrices are used to present the process and findings in a clear format.
- 19.2.13 A review of the following sources was undertaken to identify proposed developments:

- The Local Planning Authority websites for Conwy County Borough Council and Gwynedd County Council, with particular emphasis on proposed developments (including transport or minerals-related developments) in closest proximity to the site;
- Annual reports and updates relating to adopted and emerging Local Plan (LP) previews for these two counties;
- Planning Inspectorate website, in order to identify any Nationally Significant Infrastructure Projects, planning appeals or 'call in' proposals in the vicinity of the Scheme; and
- Details of all Environmental Impact Assessment (EIA) category developments within the Scheme study areas.

<sup>3</sup> <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf>

<sup>4</sup> As examples: M4 Road Transport Infrastructure Scheme; Wylfa Newydd Development Infrastructure; A40 Llanddewi Velfrey Road Scheme

- 19.2.14 The identification of relevant town planning permissions and Local Development Plan (LDP) allocations included a review of the existing LDP maps and indexes, planning update reports and planning permissions, LPA annual monitoring records and other related information available at the end of February 2019.

### **Long List**

- 19.2.15 Using the relevant sources, a 'long list' of other developments<sup>5</sup>, both within and bordering the CEA boundary, was identified. The 'long list' a total of 22 separate 'other developments', which are subsequently categorised<sup>6</sup> into the following:

- Development under construction;
- Application(s) permitted but which are not yet implemented;
- Submitted applications not yet determined, and which, if permitted, would affect the proposed development in the scoping request;
- Development identified in the adopted and emerging development plan (with appropriate weight being given as they move closer to adoption), recognising that information on any relevant proposals will be limited.

- 19.2.16 Long list projects were further categorised as either 'major' developments; EIA developments and/or those with sensitive receptors or unique matters relevant to the Scheme.

- 19.2.17 Detailed information and development descriptions were taken from publicly available planning application documents, and from developer websites or similar sources for projects not yet at planning application stage.

- 19.2.18 Figure 19.2 shows the location of the 22 sites and Appendix 19.1 provides a detailed a review of the long list of all 22 'other developments'.

- 19.2.19 The review included a systematic description of the type of development and the relationship with the Scheme, leading to the identification of a 'short list' of development sites/projects which could have an interaction with the Scheme.

### **Short List' of 'Other Development' Sites**

- 19.2.20 In consultation with the Local Planning Authorities<sup>7</sup>, a 'short-list' of these sites was subsequently agreed. The 'short listed' sites includes the following:

- a) Land on north-westerly edge of Dwygyfylchi
- b) Orme view filling station, adjoins easterly lane of A55
- c) Phase 1 Y Bluen Goch
- d) Phase 2 Y Bluen Goch
- e) Conwy Road
- f) Land at Cambrian Court/Dyffryn, Penmaenmawr
- g) Extension to burial ground
- h) Pennant Hall Bach

<sup>5</sup> These include planning applications submitted and determined within a five – year period up to the end of February 2019. Further updates may be necessary

<sup>6</sup> See details included in Paragraph. 19.5

<sup>7</sup> Email sent from RML on the 05/06/2019 to Cara Owen, Planning Services, Gwynedd Council; David Watson and James Harland, Conwy County Borough Council, Planning Services; Aled Lloyd, Snowdonia National Park, Planning Services



- i) A55 Junction 15 improvements
- j) A55 Abergwyngregyn to Tair Meibion A55 improvements.<sup>8</sup>

### 19.3 Value (Sensitivity) of Resource

19.3.1 As set out in ES Chapter 4, the CEA includes a qualitative assessment to indicate the 'significance' of effects. This relies on the significance of an effect on the function of the value or sensitivity of the resource/receptor and the magnitude (or scale) of the impact (in the context of the timescale involved, as temporary or permanent). Levels of 'significance' considers both adverse and beneficial effects during the construction period and arising from the operation of the Scheme <sup>9</sup>.

19.3.2 The recommended approach and guidance to evaluate the significance of a CEA effect <sup>10</sup>highlights *'The focus in assigning significance to cumulative effects should be determined by the extent to which the impacts can be accommodated by the receptor/resources. Thresholds (limits beyond which cumulative change becomes a concern) and indicative levels of acceptable performance of a receptor/resources may also aid the assessments process'*.

19.3.3 In determining the 'significance' of cumulative effects, DRMB<sup>11</sup> suggests the following approach:

**Table 19.2: Determining the Significance of Cumulative Effects**

1	<b>Which</b> receptor/resources are affected
2	<b>How</b> will the activity or activities affect the condition of the receptor/resource?
3	<b>What</b> are the probabilities of such effects occurring?
4	<b>What ability</b> does the receptor/resource have to absorb further effects before changes become irreversible?

19.3.4 DMRB also suggests that *'it is useful to standardise significance criteria for cumulative effects'* using the framework in **Error! Reference source not found.**

**Table 19.3: Assigning Significance to Cumulative Effects**

Significance	Effect
Severe	Effects that the decision-maker must take into account as the receptor/resource is irretrievably compromised
Major	Effects that may become key decision-making issue
Moderate	Effects that are unlikely to become issues on whether the project design should be selected, but where the future work may be needed to improve current performance
Minor	Effects that are locally significant
Not significant	Effects that are beyond the current forecasting ability or are within the ability of the resources to absorb such change.

Source: DMRB Volume II Section 2 Part 5 HA 205/08 Part IV Paragraph 2.15

<sup>8</sup> No firm commencement date was established for this scheme project/plan at the time of the preparation of the CEA Chapter. In late March 2020, as this ES was completed, the award of a construction contract to build the A55 (T) Abergwyngregyn to Tair Meibion Improvement was announced, with a completion date before construction of the Junction 15 Scheme would be likely to commence. The level of 'significance' initially attributed for this CEA project is no longer relevant for this CEA and is not considered further. See: <https://gov.wales/contract-awarded-29m-a55-tair-meibion-scheme-north-wales-transport-improvements>.

<sup>9</sup> as defined in Table 2.3 of HA205/08 (Highways Agency et al., 2008)

<sup>10</sup> DMRB Volume II Section 2 Part 5 HA 205/08 Part IV Paragraph 2.13

<sup>11</sup> DMRB Volume II Section 2 Part 5 HA 205/08 Part IV Paragraph 2.14

## 19.4 Regulatory and Policy Framework

### Legislation and Policy Framework

- 19.4.1 ES Chapter 5 provides the relevant environmental legislative and general policy context for the Scheme.

#### Legislation

- 19.4.2 The following legislation is of direct relevance to this ES Chapter:

***The EIA Directive 2011/92/EU***, as amended. This requires the consideration of interrelationships and cumulative effects. The information required includes the assessment of *'the direct effects and any indirect, secondary, cumulative, short, medium and long term permanent or temporary, positive and negative effects of the project'*.

***Planning (Wales) Act 2015***. This strengthens the established plan-led approach to land use planning in Wales and sets out the preparation of a national land use and infrastructure requirements plan, the National Development Framework.

#### Policy

##### *National Planning Policy Wales*

- 19.4.3 The national Planning Policy Wales (PPW) is the principal and authoritative source of national planning policy, under which local planning authorities prepare their Local Development Plans (LDP's). PPW 10 (December 2018) is the latest edition of Planning Policy Wales and takes account of the Well-being of Future Generations (Wales) Act 2015. It outlines policies on all the key land use matters and is supplemented by Technical Advice Notes, Circulars and Policy Clarification Letters.
- 19.4.4 PPW and the Wales Transport Strategy both aim to secure the provision of transport infrastructure and services, which improve accessibility, build a stronger economy, improve road safety and foster more sustainable communities<sup>12</sup>.

*'Integration of land use planning and development of transport infrastructure has a key role to play in addressing the environmental aspects of sustainable development, climate change and the outcomes identified in the Assembly Government's Environment Strategy.'*<sup>13</sup>

##### *Local Plans*

- 19.4.5 Local Plans identify site specific land use, infrastructure and other developments. The relevant Local Plan is the adopted Conwy County Borough Council local development plan (CCBC LDP) 2000 to 2015, supported by accompanying planning guidance notes.

#### Relevant Guidance<sup>14</sup>

- 19.4.6 At the time of drafting this ES CEA IAN 125/09(W) (Welsh Assembly Government, 2010) acknowledges that *'yet there is no industry standardised approach'* to the assessment of

<sup>12</sup> <https://gov.wales/sites/default/files/publications/2018-09/tan18-transport.pdf>, Page 2

<sup>13</sup> <https://gov.wales/sites/default/files/publications/2018-09/tan18-transport.pdf>, Page 2

<sup>14</sup> November 2019 saw the publication of a new series of Design Manual for Roads and Bridges. This included LA04 'Environmental assessment and monitoring'. This provides additional advice for all specialist and 'Cumulative effects' <sup>14</sup>. This

cumulative effects. The cumulative assessment should nevertheless 'differentiate between permanent, temporary, direct, indirect and secondary effects, positive and negative'.

- 19.4.7 *HA205/08. Principles of Environmental Assessment – Assessment and Management of Environmental Effects (Highways Agency et al, 2008)*. The guidance set out in HA 205/08 (Highways Agency et al, 2008) forming Design Manual for Roads and Bridges (DMRB) Volume 11 Section 2 Part 5 states that there are two types of cumulative effects to be considered in environmental assessment: (i) cumulative effects from a single scheme (referred to as 'interrelationships') and (ii) cumulative effects from different schemes. The resulting cumulative effect or effects may be significant even where individually these effects are not. Good coordination and sharing of results between topic areas to ensure a comprehensive identification and understanding of the interaction between effects is therefore important.
- 19.4.8 The DMRB guidance defines '*reasonably foreseeable*' for 'other developments' to mean other proposed developments that are committed, including (but not limited to) trunk road and road schemes which have been confirmed through the statutory process, and development projects with valid planning permissions granted by the local planning authority. Projects for which formal EIA is a requirement or for which a non-statutory environmental impact assessment was undertaken should then be selected

#### **Further Guidance**

- 19.4.9 Further guidance for is taken from:
- *Environmental impact assessment handbook*. A practical guide for planners, developers and communities. Second Edition, 2009;
  - *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions* European Communities 1999. EC DG XI Environment, Nuclear Safety & Civil Protection NE80328/D1/3;
  - *Advice Note 17: Cumulative effects assessment relevant to nationally significant infrastructure projects* (Planning Inspectorate, 2015) which gives a systematic approach to 'other development' assessments for cumulative impacts, identifying tasks and suggesting templates.
  - *Advice Note 9 version 3: Using the Rochdale Envelope* (Planning Inspectorate, 2018) Although not specifically designed for highway schemes, the Planning Inspectorate guidance note provides more recent guidance on good practice for the assessment of cumulative effects for major infrastructure schemes, particularly where there is uncertainty or a need for flexibility within the proposal.
- 19.4.10 The Planning Inspectorate Advice Note (PINS) 9 Version 3 (2018) states that '*The potential cumulative impacts with other developments will also need to be carefully identified such that the likely significant effects can be shown to have been identified and assessed against the baseline position (which would include built and operational development)*. In assessing cumulative impacts, other development should be identified through consultation with the local planning authorities and other relevant authorities. Applicants should have regard to the staged approach to cumulative effects assessment set out in Planning Inspectorate's Advice Note Seventeen: Cumulative Effects Assessment'.

ES Chapter pre-dates the publication of the new guidance but is considered to reflect the approach offered in the new guidance

19.4.11 The PINS Note 17 identifies a wider range of proposed developments to be considered in this part of the CEA, noting that the certainty of implementation and the level of information available is likely to decrease from a) to g):

- a) Developments under construction.
- b) Permitted applications not yet implemented.
- c) Submitted applications not yet determined.
- d) Planning applications where a scoping report was submitted.
- e) Projects on the planning register where a scoping report was submitted.
- f) Sites identified in the relevant LDPs (and emerging LDPs – with appropriate weight being given as they move closer to adoption).
- g) Other plans and programmes (as appropriate) which set the framework for future development consent/approval, where such development is reasonably likely to come forward.

## **19.5 Design, Mitigation and Enhancement measures**

### **Design**

- 19.5.1 The development of the design options for the Scheme included matters that are integral to both construction and operation, and to the consideration of potential inter-relationships and in-combination effects.
- 19.5.2 ES Chapter 3 sets out the context for the Scheme alternatives and includes a description of the difficulties encountered. In particular, the potential effect on residential occupiers and designated sites and habitats have been significant considerations. These were identified as major design constraints in all five potential Scheme options. The assessment and consideration of the inter-relationships and in-combination effects of the options were influential in selection and design of the preferred Scheme.
- 19.5.3 The topic specialists carrying out the ES assessments have implications of inter-relationships, to identify potential impacts and design changes.
- 19.5.4 The Scheme design process has consistently considered, and remains aware, of the potential construction and operational stages.

### **Mitigation and Enhancement**

- 19.5.5 The potential impact of the Scheme, in pre-construction, construction and operation is described in the ES Chapters, and any relevant avoidance and mitigation and enhancement measures assessed as part of the individual ES Chapter specialist cumulative assessment.
- 19.5.6 Continued dialogue and communication is identified as an ongoing measure as is the need to be aware of further, new developments which coincide with the Scheme.

### **Monitoring Requirements**

- 19.5.7 The ES Construction Environmental Management Plan (CEMP) sets out monitoring to be conducted during the construction and management of the final Scheme. This would ensure that if any potential revisions of the Scheme design would arise then additional positive and/or negative effects on all receptors are identified and re-assessed and this would include a CEA.

19.5.8 No additional mitigation or monitoring specifically for cumulative effects would be necessary.

## 19.6 Magnitude of Impacts (Change)

### Inter-relationships Assessment

19.6.1 Table 19.4 sets out the ES topic study areas and ZOI'S for each Chapter topic and these are drawn in Figure.19.1

**Table 19.4: Topic Study Areas and ZOI's**

Topic Receptor/ Resource	Study Area Limits	Zone of Influence
Geology and soils	0.5 km	
Road drainage and water environment	0. 5 km from Junction alignment	Extent of environment
Nature conservation (biodiversity)	2km for protected and notable species, set out in Figure 8.2	Up to 30 km for SAC site features
Landscape and visual	0.5 km	2 km, set out in Figure 9.1
Archaeology and cultural heritage	1 km corridor, set out in Figure 10.2	5 km
Community and private assets	Extent of Scheme land take, set out in Figure 11.1	
Air quality	200 km either side of the affected road network	
Noise and vibration	As set out in Figure 13.1	
All travellers	The study area defined by the SATURN Traffic model <sup>15</sup>	
Materials	ES Chapter methods utilises two separate study areas; Scheme boundary; 30 km for available waste infrastructure.	
Climate change	ES Chapter method utilises three separate study areas <sup>16</sup> : <ol style="list-style-type: none"> <li>1.In-combination Climate Change Impact (ICCI) Assessment: for each discipline, the study area for the ICCI will match that of the relevant discipline.</li> <li>2.Climate Change Resilience Assessment (CCR): the study area for this assessment will not go beyond the boundary of the Scheme. This is to capture only the risks to the Scheme itself from climate change.</li> <li>3.Greenhouse Gas Assessment (GHG): the study area for the GHG assessment will include the Scheme as well as the transport network utilised for transport of materials, the embodied carbon associated with the relevant construction materials and the emissions arising during construction of the Scheme. Greenhouse Gas Assessment - Operational Stage has been scoped out of this assessment.</li> </ol>	
Risks of accidents or disasters	Due to the nature of the topic, there is no 'defined' zone identified within this specialist ES chapter	
Population and human health	Chapter 18 defines the following: DMRB LA112 defines the Study Area as extending for 500 m from the Proposed Scheme and as noted above this is consistent the approach adopted for this Chapter. The broader study area for the Proposed Scheme includes the A55 corridor between Junction 14 and Junction 16A, which runs parallel to the railway in close proximity to the centres of Llanfairfechan,	

<sup>15</sup> Paragraph 14.4.4 of ES Chapter 14

<sup>16</sup> Paragraph 16.4.1 of ES Chapter 16

Topic Receptor/ Resource	Study Area Limits	Zone of Influence
	<p>Penmaenmawr and Dwygyfylchi. Where likely effects are identified outside the 500 m area surrounding the project boundary, the study area is extended accordingly. Where effects are unlikely to occur within the 500 m area surrounding the project boundary, the study area is reduced accordingly.</p> <p>Health factors assessed at a ward level and on this basis the following wards considered:</p> <ul style="list-style-type: none"> <li>• Bryn, Lafan and Pandy; and</li> <li>• Penmaenan, Pant-yr-Afon and Capelulo.</li> </ul> <p>With regard to the consideration of wider population and health factors beyond the scope of the HIA it is considered that the above wards also represent a suitable Study Area. Depending on the health factors being considered, the buffer(s) will be defined in accordance with the relevant topic's study area and will be applied proportionately.</p>	

- 19.6.2 The identification of possible inter-relationship ES topics are listed in **Error! Reference source not found.** Many of the ES specialist chapters have considered the full range of potential effects of the Scheme on a single receptor, or group of receptors, and include the possibility of inter-relationship effects. None are 'scoped out' of this CEA.
- 19.6.3 Some of the ES topic chapters have limited 'inter-relationships', for example, archaeology, with other topics identifying a more complex array, for example, the topics of climate change, nature conservation and material assets and waste.
- 19.6.4 The Scheme includes several potential receptor inter-relationships, with impacts on several ES receptors (for example, climate change, nature conservation or agricultural land) identified with the potential to cause indirect or secondary effects on several receptors.

**Table 19.5: ES Topics which Include Inter-relationship Effects**

Topic Receptor/ Resource	Coverage of Inter-relationship Effects
Geology and soils	<p>All of the potential impacts on geological soil receptors were assessed and reported within Chapter 6:Geology and Soils.</p> <p>The assessment includes the consideration of the inter-relationship effects with the following receptors/topics:</p> <p>Road drainage and Water; Nature Conservation; Air Quality; Materials.</p>
Road drainage and water environment	<p>All of the potential impacts on road drainage and water were assessed and reported within Chapter 7:Road Drainage and Water Environment.</p> <p>The assessment sets out the consideration of the effects with geology and soils, nature conservation.</p> <p>No separate significant effects are identified.</p>
Nature conservation (biodiversity)	<p>The assessment of in-combination effects is central to the assessment of potential impacts on ecological receptors and the integrity of the biodiversity network of sites and species. As such, Chapter 8 Nature Conservation (Biodiversity) has considered and assessed the impact of in-combination effects in detail.</p> <p>ES Chapter 8 relies on the coordination with several other ES topics to understand the potential range and complexity of impacts on ecological receptors.</p> <p>Chapter 8 sets out the consideration on the inter- relationship effects of the following receptors/topics:</p> <p>Geology and Soils; Road drainage and water environment; Landscape &amp; Visual; Air Quality; Noise and vibration; Materials.</p> <p>No additional effects are therefore considered likely to occur beyond the conclusions assessed in Chapter 8.</p>

Topic Receptor/ Resource	Coverage of Inter-relationship Effects
Landscape and visual	<p>All of the potential impacts on landscape receptors were assessed and reported within Chapter 9: Landscape and Visual.</p> <p>The chapter assessment sets out the considerations on the inter-relationship effects of Noise:</p> <p>The impact of noise could affect existing perceptual tranquil qualities within the Scheme study area.</p> <p>The addition of noise mitigation noise barrier fencing would not represent a significant cumulative effect for the Scheme.</p>
Archaeology and cultural heritage	<p>All of the potential impacts on archaeological and cultural heritage receptors were assessed and reported within Chapter 10: Archaeology and Cultural Heritage.</p> <p>The chapter assessment sets out the considerations on the inter-relationship effects with: Noise and Geology and Soils.</p> <p>The conclusions indicate, with the additional potential for further archaeological investigations, an inter-relationship with noise and geological soil (landfill) receptors.</p>
Community and private assets and agricultural land	<p>The potential impacts on community and private assets and agricultural (includes farm businesses) were assessed and reported within Chapter 11: Community and Private assets and agricultural land. Chapter 11 relies on the coordination with several other ES topics to understand the potential range and complexity of impacts on community and private assets and agricultural land.</p> <p>Chapter 11 sets out the consideration of the following inter-relationship receptors/topics:</p> <p>Geology and Soils; Road drainage and water environment; Nature conservation (Biodiversity); Landscape &amp; Visual; Archaeology and Cultural Heritage; Air Quality; Noise and vibration; All Travellers; Materials.</p> <p>No additional effects are therefore considered likely to occur beyond the conclusions assessed in Chapter 11.</p>
Air quality	<p>All of the potential impacts on Air Quality were assessed and reported within Chapter 12: Air Quality.</p> <p>Air Quality and both human health and ecological receptors considered.</p> <p>No separate inter-relationships were identified within Chapter 12.</p>
Noise and vibration	<p>The potential impacts on Noise and Vibration were assessed and reported within Chapter 13: Noise and Vibration.</p> <p>The assessment included the residential receptors.</p> <p>No separate inter-relationships were identified within Chapter 13.</p>
All travellers	<p>All of the potential impacts on All Travellers were assessed and reported within Chapter 14 All Travellers.</p> <p>The assessment mentions inter-relationship with: visual and noise impacts and community and private assets.</p>
Material assets and waste	<p>All of the potential impacts on material assets and waste were assessed in Chapter 15: Material assets and waste.</p> <p>Chapter 15 sets out the consideration on the inter-relationship effects of the following receptors/topics:</p> <p>Geology and soils; Water environment; Air Quality; Noise and Vibrations; All Travellers; Climate Change.</p> <p>No additional effects are therefore considered likely to occur beyond the conclusions assessed in Chapter 15.</p>
Climate change	<p>All of the potential impacts from Climate Change is provided in detail in Chapter 16.</p> <p>No separate inter-relationships were identified within Chapter 16.</p>

Topic Receptor/ Resource	Coverage of Inter-relationship Effects
Risks of accidents or disasters	<p>All of the potential impacts relating to the risks of accidents or disasters were assessed in Chapter 17: Risks of accidents or disasters.</p> <p>Chapter 17 relies on the appreciation of several potential natural and man made events or 'threats' and as such, relates to other ES topics to understand the potential range and complexity of impacts from the risks of accidents or disasters. Chapter 17 sets out specific considerations of the potential cumulative effects of several combination of 'threats' arising.</p> <p>No additional effects are therefore considered likely to occur beyond the conclusions assessed in Chapter 17.</p>
Population and human health	All the potential impacts on Population and Human Health is provided in Chapter 18 and relies on the information and co-ordination of other topic details.

- 19.6.5 Details for the provision of a construction site compound would need further consideration and assessment.

### **In-combination**

- 19.6.6 Three of the 'short listed' sites include land described as 'allocated sites' within the current adopted LDP. These include sites:

- a) Land on north westerly edge of Dwygyfylchi;
- b) Orme View Filling Station and,
- e) Land at Conwy Road.

- 19.6.7 All three sites include allocated land as defined in the current adopted LDP.

- 19.6.8 Four sites (c), d), f) and h) include planning permission for residential development. These include sites:

- c) Phase 1 Bluen Goch;
- d) Phase 2 Bluen Goch;
- f) Land at Cambrian Court/Dyffryn Penmaenmawr and,
- h) Pennant Hall Bach.

- 19.6.9 The proposed A55 improvements for Junction 16 represents a potential for the most significant impact on the Scheme, either alone or, in-combination.

- 19.6.10 Four, separate projects identified in the Tair Meibion CEA (development 'j') in the initial list in Paragraph 19.2.21) Scheme and their relationship with this Scheme ES have been considered as of limited relevance to this ES Scheme: the A487 Caernarfon and Bontnewydd bypass is currently under construction and is sufficiently distant from the Scheme and no consents in place for the Wylfa Newydd project.

- 19.6.11 All chapter specialists have considered the potential implications for an in-combination effect of any or all of these site developments to take place at the same time as the Scheme.

- 19.6.12 Within the limits of information available, each project was reviewed to assess whether likely effects would:

- Extend to overlap with effects of the Scheme, affecting the same receptors.



- Arise or apply at the same time as effects of the Scheme (temporary effects).
- Add together to generate significant effects.

19.6.13 Details within Appendix 19.3 shows the consideration of cumulative effects of each of the nine 'short listed' sites against each ES topic considered in this ES.

19.6.14 Of the 'short listed' sites, the concurrent J15 Scheme would generate effects which, cumulatively with the effects of the Scheme, are considered as 'significant' within the area influenced by the Scheme.

19.6.15 The remainder of these sites would also have a potential for a cumulative effect with nature conservation.

19.6.16 This is likely to arise because all 'short listed' sites/projects are sufficiently close so that their effects would overlap, they affect the same receptors within the adjoining areas, and they would potentially occur at the same time and sufficiently large in scale to be significant.

19.6.17 As the potential for cumulative effects with developments and plans also forms part of the Scheme's Statement to inform Appropriate Assessment' process (SIAA) (of Implications for European Sites' then a more extensive and broader report is covered in that document. <sup>17</sup> It is also summarised in this ES Chapter 8.

## 19.7 Significant Effects

19.7.1 Based on the methodology set out earlier in this ES Chapter, the Scheme is considered to include the following potential CEA impacts.

### Inter-relationships Review

19.7.2 Table 19.5 identifies several receptor 'inter-relationships' for the Scheme. The inter-relationships for the ES topics for example, for Nature conservation or Community and Private assets and agricultural climate change, represent the potential to cause the most effects on several receptors, either temporarily or permanently. This means that an unplanned potential impact on either of these receptors can give rise to additional CEA effects.

19.7.3 Some ES topic chapters have limited 'inter-relationships', for example, archaeology.

19.7.4 Nature conservation, as one of the key environmental 'receptors', is central to the Habitat Regulations Assessment <sup>18</sup> and is reported separately in a 'Statement to Inform an Appropriate Assessment'.

19.7.5 The Schemes REAC and CEMP sets out several commitments and measures. These would mean that the potential for the 'inter-relationship' effects, at all stages of the Scheme, are 'unlikely to become issues on whether the project design should be selected and current work would improve the inter-relationship performance. As such the level of 'significance' is considered to reflect a 'moderate' effect for this CEA assessment of 'inter-relationships'.

<sup>17</sup> Section 10 of the SIAA includes detailed mitigation measures and the conclusions reached makes reference for PEU mitigation

<sup>18</sup> The Habitat Regulations for the 'Assessment of Implications for European Sites'

### **In-combination**

- 19.7.6 Paragraph 19.8.12 highlights that the concurrent J15 Scheme would generate effects which, cumulatively with the potential effects of the Scheme, would be considered as 'significant' within the 'zone of influence' of the Scheme.
- 19.7.7 The assessment identifies occurrence of an 'in-combination' effect with several receptors, for example, water and drainage; climate change, risks of accidents, use of agricultural land and, separately, materials and waste. Where relevant, mitigation measures are identified as part of this assessment stage.<sup>19</sup>
- 19.7.8 Overall, the cumulative impact is assessed as 'modest' and 'major'. 'Modest' as the effects mentioned 'are unlikely to become issues on whether the project design should be selected, but where the future work may be needed to improve current performance' and 'major'; as 'Effects that may become key decision-making issue.' This includes the consideration of potential mitigation measures.<sup>20</sup>
- 19.7.9 Essentially, further future work is needed to improve current resilience and performance. This could include for example, further communication and details of programming of the 'other developments' identified, significantly the concurrent A55 J15 Scheme of Improvements.

### **Residual Effects**

- 19.7.10 Subject to programme constraints on the separate A55 J15 Improvement Scheme and the outcome of the Conwy Borough Council Local Development Plan Review, the potential residual effects are primarily an increase in construction traffic associated with different projects coinciding. To add to this, all projects could include separate construction contracts, with different and separate site compounds and mitigation measures.
- 19.7.11 All Schemes could share good practice environmental methods and management and measures<sup>21</sup> and work towards alignment with the process and outcome for example, assisting with nearby drainage design for the existing new development near Fernbank and also, the of the CCLDP Review.
- 19.7.12 If the separate A55 Improvement Schemes could be managed to limit or avoid the potential for cumulative effects, then the potential for these effects to occur is reduced. This process should consist of a collaborative approach, significantly for the Scheme and the concurrent but, separate J16 Scheme.
- 19.7.13 The A55(T) Abergwyngregyn to Tai'r Meibion Improvement Scheme (see Paragraph 19.2.20) is expected to be completed by the spring of 2022. If the completion date were to change then the potential for residual effects for this Scheme CEA could include an additional review process.<sup>22</sup>
- 19.7.14 Separately, the Scheme includes a statement to inform the 'Habitat Regulations' which describes how the Scheme, either alone, or in-combination with 'other plans or projects', avoids having a significant effect on nearby designated habitats, as is any mitigation and/or residual effects. The conclusions reached as part of this separate statement will provide a key to control any effects and impact on nearby designated habitats and species.

<sup>19</sup> and no direct reference to the 'levels of significance' described in Table 19.2

<sup>20</sup> As highlighted in Appendix 19.2

<sup>21</sup> As highlighted in Appendix 19.2

<sup>22</sup> Further details of the Scheme and the initial CEA details are included in Appendix 19.2

## 19.8 Indication of Any Difficulties Encountered

- 19.8.1 The characterisation of 'inter-relationships' and 'other developments' is dependent on information available for the Scheme and published documents for 'other developments' at the time of preparing this ES. Additionally, the ES Chapter Climate Change is included as a relatively new ES topic for transport Schemes.
- 19.8.2 For developments at earlier stages, and for applications for which EIA has not been undertaken, professional judgement and knowledge of the wider study area is employed to consider the receptors or resources that could be affected by the Scheme and the 'other development' in question.
- 19.8.3 Although the proposed timescale for the construction of the Scheme is known, the timescale over which the potential impacts from 'other developments' cannot be determined with certainty. The information given in Appendix 19.1 (Matrices 1 and 2) sets out indicative timescales<sup>23</sup> but the potential for overlapping of effects, or changes to developments approved, particularly those arising from construction activity, is therefore unpredictable.
- 19.8.4 Paragraph 19.2.20 confirms that the A55(T) Abergwyngregyn to Tai'r Meibion Improvement Scheme was initially 'short listed' as a potential for cumulative effects. This was primarily based on that Scheme commencing within a defined timescale, at the time. As this timescale subsequently changed from this ES Chapter's initial baseline of a 'short list' of sites, this meant that the Scheme's description as one of the CEA's 'short listed' sites also changed. The A55(T) Abergwyngregyn to Tai'r Meibion is now programmed for completion by the spring of 2022, before the commencement of this Scheme. The final CEA 'short list' within this ES chapter was revised and does not include that Scheme.
- 19.8.5 It is noted that the CCBC LDP is currently in the later stages of a review process and is likely to contain additional and revised land use designations. There is the potential for further development proposals and LDP revisions between that date and the implementation of this Scheme and so the relevant local plan(s) documents and 'other developments' should be reviewed at each stage of the Scheme.
- 19.8.6 Details for the provision of a construction site compound would need further considerations and assessments.
- 19.8.7 This ES Chapter includes the use of the simplified standardised approach proposed in DMRB and other relevant guidance for assigning 'significance'. This is different to the main ES topic assessments and includes five descriptions, (as in Table 19.3), focusing on those which are 'moderate' and above. This means that, for the assessment of a 'significant effect' for this Chapter, this relies on the ES topic specialists' understanding of the assessment process for cumulative effects and also, when the use of secondary information or details (for separate assessments/consents required for the Scheme) is not necessarily applicable to this Chapter.

## 19.9 Conclusions

- 19.9.1 The ES Scheme Scoping Opinion identified the need for a CEA. This was primarily based on the basis that the construction and operation of the Scheme and the corresponding, but separate, Junction 16 Scheme, could both be constructed over a similar period time. In addition, cumulative effects associated with proposed multiple projects taking place represented another

<sup>23</sup> The timescales are, in the main, derived in consultation with the LPA and published documents

potential effect on receptors are also considered.

- 19.9.2 The CEA process for the Scheme is considered to reflect a "*proportionate and pragmatic process*". In line with current guidance, advice and similar Schemes, Chapter 19 attempts to present a systematic review and holistic approach for the CEA. Two types of cumulative effects are considered: *inter-relationships* between effects generated by the Scheme, and the addition or *interaction* of effects generated by one or more other schemes *in-combination* with the Scheme. So that the Chapter maintains focus, all detailed information is presented within three linked matrix data sets and these are referenced in Chapter Appendices 19.1-3. The layout and function of these matrix follows the guidance and good practice referenced with the ES Chapter and is similar to other CEA transport and infrastructure Schemes.<sup>24</sup>
  
- 19.9.3 The impacts of inter-relationships are considered by ES topic Chapters and are reviewed within this ES Chapter CEA. Based on the complexity of the impact of receptor *inter-relationships*, the assessment identifies a 'modest' effect. The assessment considers several 'inter-relationship' receptors for the Scheme.
  
- 19.9.4 In the '*in-combination assessment*' the CEA identifies several projects, but the separate A55 J15 Improvement Scheme has the most potential to generate effects which, cumulatively with the potential effects of the Scheme, could affect several environmental receptors. With additional refinements, dialogue and communication identified as part of the Scheme's overall mitigation measures, any potential cumulative effects can be either minimised and/or avoided.

<sup>24</sup> For example, the M20 Junction 10a Scheme. [https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010006/TR010006-000188-M20\\_J10a\\_6.1\\_ES\\_Chapter\\_15.pdf](https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010006/TR010006-000188-M20_J10a_6.1_ES_Chapter_15.pdf)

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 20 MANAGEMENT OF ENVIRONMENTAL EFFECTS**

## CONTENTS

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## 20. MANAGEMENT OF ENVIRONMENTAL EFFECTS

### 20.1 Chapter introduction

- 20.1.1 The Environmental Impact Assessment (EIA) carried out for this project and reported in the topic chapters of this Environmental Statement (ES), identified the following matters that need to be addressed in detailed design, construction and aftercare:
- a) Potentially significant effects associated with the Scheme;
  - b) Strategies to avoid, reduce or remedy (mitigate) these adverse environmental effects.
- 20.1.2 Ensuring that commitments to comply with the law and to provide mitigation are fulfilled during design, construction and operation of this project, is a binding requirement on Welsh Government. A contractor will be appointed who will be responsible for design and construction of the Scheme. Welsh Government will require the contractor to:
- a) Conform with relevant legislation;
  - b) Satisfy national policy and standards;
  - c) Fulfil project-specific commitments;
  - d) Provide mitigation as it is set out in the ES and associated documents and appendices.

### 20.2 Environmental Management

- 20.2.1 Ensuring compliance with environmental commitments is a process known as Environmental Management which is delivered by the project team working within a framework set out in an Environmental Management System (EMS). The EMS is a procedure run by an organisation to ensure that its activities are compliant with legislation and with its own environmental policies and commitments.
- 20.2.2 The requirements of the EMS are applied to a specific construction project through a Construction Environmental Management Plan (CEMP). Of key importance in a CEMP are specific project objectives that will have been set out at the commencement.
- 20.2.3 The contractor will be expected to ensure that the project is effectively managed and that the environmental impacts realised during construction are minimised. Contractors will have an environmental policy and will be required to maintain an Environmental Management System (EMS) in compliance with ISO 14001 and ISO 14004.

#### *The Construction Environmental Management Plan*

- 20.2.4 The EMS provides the framework within which a project specific plan will be prepared. For a construction project the plan is known as the CEMP. The CEMP develops through the stages of the project and is used to assist the project team in implementation while maintaining high environmental standards. The sequential development of the CEMP is set out in Table 20.1.
- 20.2.5 A Pre-Construction Environmental Management Plan (Pre-CEMP) is provided as an appendix to this ES. Once a construction contract is awarded the contractor will be responsible for environmental management and will adopt and update the Pre-CEMP to set out a plan of work. Table 20.1 sets out the stages of development of the CEMP.

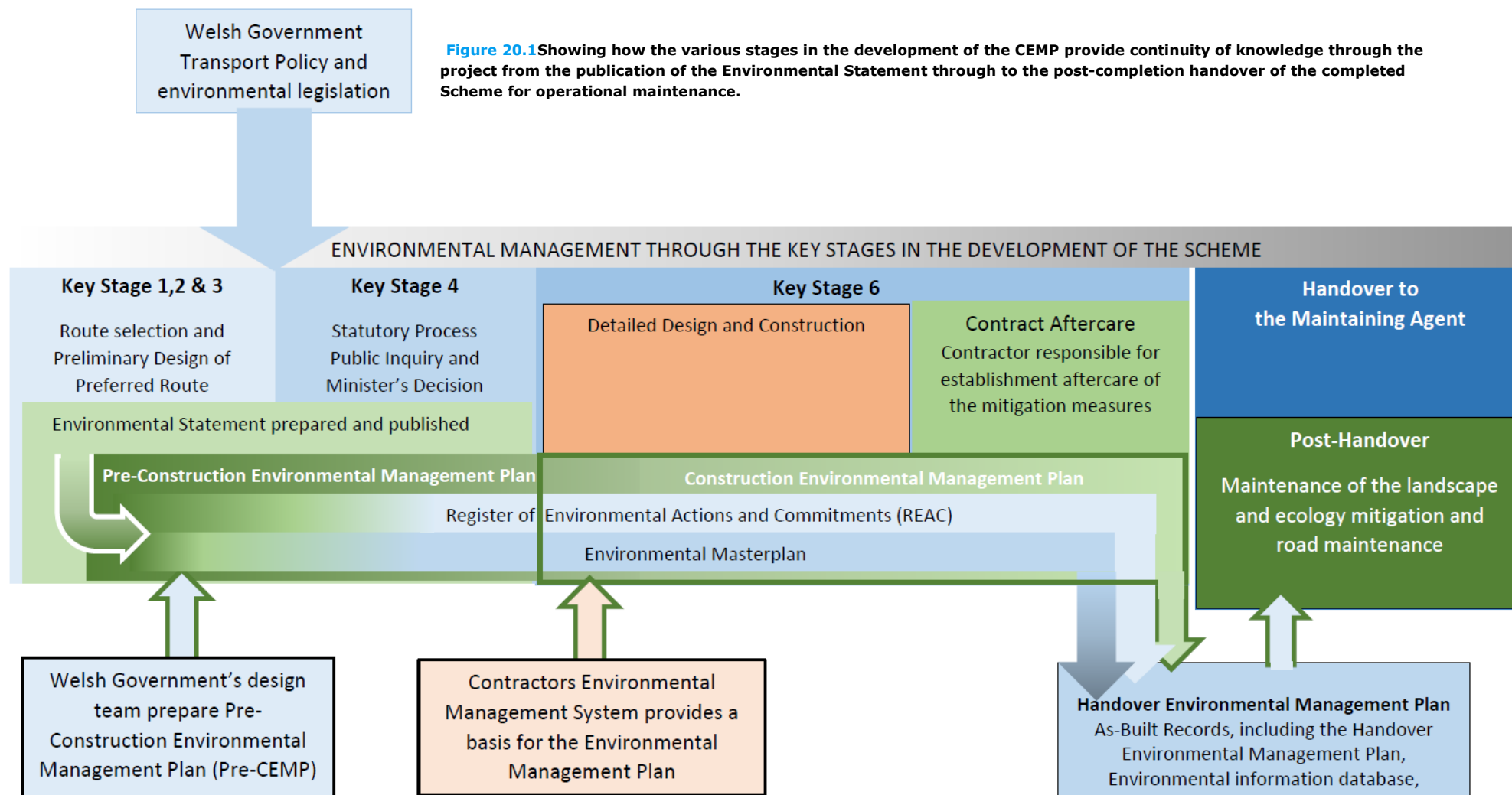
**Table 20.1 Sequential development of the CEMP**

Key Stage of project	Description	Status	Responsibility
Key Stage 0	Shaping of strategy	None	Welsh Government
Key Stage 1	Identification and selection of options		
Key Stage 2			
Key Stage 3	Preliminary design	(Pre-CEMP) Pre-construction environmental management plan (refer to Section 22.3 below)	Designer
Key Stage 4	Statutory procedures and powers		
Key Stage 5	Preparation for construction	Construction Environmental Management Plan (CEMP)	Contractor (to be appointed)
Key Stage 5/6	Construction and aftercare	Environmental Landscape and Ecology Aftercare and Management Plan (ELEMAMP)	
Key Stage 6	Handover	(Handover Environmental Management Plan (HEMP)	
Key Stage 7	Operation and maintenance		Maintaining Agent

- 20.2.6 As knowledge about the Scheme continues to grow through the Key Stages set out in Table 20.1, the CEMP goes through a development sequence which is shown diagrammatically in Figure 20.1.
- 20.2.7 The Key Stage 3 pre-construction draft of the CEMP (Pre-CEMP) has been compiled and a copy is provided in Volume 3 Appendix 2.2. Understanding the approach to construction of the Scheme and the sequence of activities is important when preparing the Pre-CEMP. For this Scheme the approach to construction is set out in Chapter 2. The construction activities and the effects on the environment have also been considered in each of the environmental topic chapters of this ES. Any new matters that emerge in Key Stage 4 are added to the Pre-CEMP before a contractor is engaged.
- 20.2.8 In Key Stage 5 the appointed contractor will adopt, refine and expand the Pre-CEMP into a 'live' CEMP so that it contains all current environmental management plans, method statements, permits, relevant licences, certificates, health & safety plans, the register of environmental commitments, quality assurance procedures, and any other relevant documentation the site environmental team require in order to manage the site effectively. The CEMP would also set out plans for procurement, energy use, and waste management and minimisation activities. The project specific plans to be included in the CEMP would include the following which are described in more detail in Section 20.5:
- Site Waste Management Plan (SWMP);
  - Materials Management Plan (MMP);
  - Pollution Control and Contingency Plan (PCCP);
  - Environmental Landscape and Ecology Aftercare and Management Plan (ELEAMP);
  - Cultural Heritage Management Plan (CHMP);
  - Noise and Vibration Management Plan (NVMP), if appropriate;
  - Maintenance Environmental Management Plan (MEMP).



- 20.2.9 In the CEMP the contractor will set out the key staff in the team and their respective responsibilities in environmental control, communication, training requirements and delivering the project. The contractor's team will use the CEMP as the main reference document for environmental matters so that continuity of knowledge is maintained between each stage of the project, as set out in Figure 20.1 and this knowledge about the site and the completed project is handed on to the future maintenance organisation.
- 20.2.10 The contractor's site personnel, sub-contractors and suppliers, have the CEMP so that they can be fully aware of the following:
- a) Compliance with legislation;
  - b) Good and best practice to prevent environmental damage, prevent pollution, minimise waste and achieving continuous improvement;
  - c) Project and environmental objectives and sustainable construction objectives;
  - d) Statutory consultees advice and their requirements;
  - e) Roles and responsibilities in meeting the requirements of the CEMP including performance benefits of raised environmental awareness of personnel, remedial and emergency procedures and the potential consequences of departure from operating procedures;
  - f) Measures required to avoid and mitigate actual or potential environmental effects during construction activity;
  - g) Project-specific mitigation (commitments), set out in the ES and mapped out in the Environmental masterplan, that the contractor and the maintaining agent are required to implement during construction and operation;
  - h) Environmental hold points at which construction work must cease until the Environmental Coordinator (ECO) agrees that work can proceed;
  - i) The basis for the future operation and maintenance of the completed Scheme.
- 20.2.11 The contractor will use the CEMP to assist in:
- a) Identifying and managing construction environmental risks, including the preparation of risk assessments and method statements;
  - b) Liaison with regulatory authorities and third parties and recording what is agreed and implemented;
  - c) Recording how the requirements of environmental legislation, policy, good practice, and Scheme objectives are met or not;
  - d) Recording how mitigation measures and the environmental design are implemented with evidence of completion in the Register of Environmental Actions and Commitments (REAC) – described in Section 20.3.3;
  - e) Provide a review, monitoring and audit mechanism to determine effectiveness of, and compliance with, environmental control measures and how any necessary corrective action takes place.



## 20.3 The Pre-CEMP for this Scheme

- 20.3.1 A Pre-CEMP has already been prepared as part of this ES to form the framework that the contractor would adopt throughout the construction and aftercare stage. Subsequently the maintenance organisation will make use of the information in operational maintenance of the Scheme. The Pre-CEMP is set out in Volume 3 Appendix 2.2.
- 20.3.2 A list of the documents which are included in Appendix 2.2 and which will be adopted and developed by the appointed contractor, are listed in Table 20.2. It is anticipated that there will be further management plans and method statements required as the design of the Scheme progresses. A list of the further management plans and method statements is set out in Table 20.3. All of these documents will be issued to the relevant statutory environmental bodies for agreement.

**Table 20.2 Annexes within ES Volume 3 Appendix 2.2 Pre-CEMP**

Proposed title	Description
A Regulatory Framework	A list of the legal statutory requirements for construction staff working on this Scheme.
B Preliminary List of Permits/Consents	A list of the statutory consents and permits required before construction can proceed. Some items will be subject to seasonal requirements.
C Invasive Species Management Plan	Identifies which invasive species have been identified on site and the procedure for construction works on how to deal with invasive species.
D Outline Pollution Control and Prevention Plan	Identifies the main risks of pollution during construction and the prevention measures which should be implemented to prevent or reduce the effects.
E Outline Site Waste Management	Plan Site Waste Management Plan (SWMP), used to plan, implement, monitor and review waste minimisation and management on construction sites. The plan can be based on the Waste and Resources Action Programme's (WRAP) SWMP template;
F Outline Ground and Surface Water Management Plan	Developed in consultation with Natural Resources Wales (NRW). It describes the design of each element of surface water management system required to manage surface water runoff during construction and potential risks to surface waters. It would include, consideration of temporary storage and settlement requirements to manage waterborne sediment, water quality criteria to ensure any discharge to receiving watercourses meets regulatory requirements.
G Outline Materials Management Plan (MMP)	The Scheme's Materials Management Plan (MMP) would detail how all construction phase materials (material resources and waste) would be managed, developed and implemented by the appointed contractor and provides a framework which will be used as a basis from which to develop the Scheme's MMP.
H Outline Cultural Heritage Management Plan (CHMP)	Informed by the outcome of the EIA, the CHMP should contain detailed method statements for the Scheme construction (from survey, machine excavation, hand-excavation, environmental sampling etc. to office-based activities such as finds processing, database use, reporting etc.).

Proposed title	Description
I Outline Ecological Management Plan	This outline plan sets out the measures and procedures for reducing impacts on ecological receptors. It outlines the procedures for preconstruction surveys, vegetation clearance, draining of ponds, translocating of hedges or trees, temporary or permanent measures for protected species.

Table 20.3 Further documents to be included in the CEMP.

Title
Register of Environmental Actions and Commitments (more detail provided from paragraphs 20.3.3)
Design Mitigation requirements
Ghost licences and Consent applications
Timing of the Works
Environmental Masterplans (more detail provided below from paragraphs 20.3.7)
Additional survey requirements
Site supervision requirements and implementation of the CEMP (more detail set out in Section 20.4.3 to 20.4.10)
Proposals for environmental protection
Proposals for special measures for translocation or habitat creation
Appropriate Assessment Compensatory Measures, if appropriate
Monitoring and reporting procedures (paragraph 20.5.5 to 20.5.13).
Consultation and liaison measures
Review and update procedures
Arrangements for consultations
Environmental Hold Points at which construction work shall cease until the Environmental coordinator agrees work can proceed.

### *Register of Environmental Actions and Commitments (REAC)*

- 20.3.3 A draft Register of Environmental Actions and Commitments (REAC) has been created and a copy included in ES Volume 3, Appendix 2.3. The REAC is a record of the specific environmental actions and commitments to be implemented and managed through all stages of the Scheme. The draft REAC lists commitments made within the ES (principally taken from the mitigation sections of each chapter).
- 20.3.4 The draft REAC is critical to the success of a CEMP and subsequently the environmental performance of the Scheme. The REAC would be implemented through the CEMP and the Environmental, Landscape and Ecology, Monitoring, Aftercare and Management Plan.

20.3.5 The draft REAC is provided in table format with each column of the table containing an element of the information required as detailed below:

<b>Column A &amp; B:</b>	Identification and referencing of the environmental aspect in question ( <i>a reference letter and number</i> );
<b>Column C &amp; D:</b>	The primary and secondary environmental topic that benefits ( <i>e.g. Landscape and Visual &amp; Nature Conservation</i> );
<b>Column E:</b>	Brief description of the environmental action or commitment ( <i>e.g. to plant a linear belt of trees</i> );
<b>Column F:</b>	The objective or desired outcome of the mitigation/action ( <i>e.g. to screen a view of the road</i> );
<b>Column G to M:</b>	The main and secondary source of the commitment and a document reference ( <i>e.g. Environmental Statement/ Chapter X, Section or Table Y, chainage 0.0034</i> );
<b>Column N &amp; O:</b>	The organisation responsibility for the commitment and the stage of the project when it would be completed ( <i>e.g. contractor, during construction</i> );
<b>Column P:</b>	Is the commitment to avoid, mitigate, enhance or a combination of these;
<b>Column Q:</b>	How is the outcome to be achieved ( <i>the physical work required</i> );
<b>Column R:</b>	Sets out the current state of taking the action or fulfilling the commitment, to indicate the status of the necessary actions. This will be updated as the project progresses;
<b>Column S:</b>	Is the location for notes on completion to be added and updated until fulfilment;
<b>Column T:</b>	Space to provide a cross reference to where evidence is provided of completion of a commitment or action. The evidence could be in meeting minutes, photographs, drawings, site notes or monitoring reports.

20.3.6 The details of monitoring, success criteria, reporting requirements and trigger level for remedial works would be clearly defined. Where it is deemed necessary, the mitigation/action must be monitored to determine success.

#### *Environment Masterplan*

20.3.7 The environmental mitigation measures incorporated within the design of the Scheme are illustrated on the EMP (see drawings in Appendix 2.5 A to F, Volume 3). The masterplan drawings have been prepared in accordance with Design Manual for Roads and Bridges (DMRB) Volume 10. The landscape and environmental design proposals for the proposed new section of highway are described in Chapter 9 Landscape and Visual Effects.

20.3.8 Symbols are used on these plans to represent existing or proposed landscape and environmental features. Each feature is ascribed both an Element and a 'Function' to indicate the physical attributes and the purpose. Sometimes, when appropriate, highway and structural elements are given an environmental function that will guide design and maintenance. In addition to a range of proposed features, the masterplan shows existing features, for example retained vegetation, watercourses, cultural heritage assets and culverts.

20.3.9 Elements and Function are described in Tables 20.4 and 20.5.

**Table 20.4 Masterplan Elements**

Term used	Definition
Landscape Element	Landscape features found within the highway estate, which can encompass both hard landscape features (i.e. retaining walls, hard surfacing) and elements of the soft estate (i.e. grasslands and woodlands);
Environmental Element	Non-landscape features of the highway estate that have environmental functions, i.e. noise attenuation measures, water quality controls, protected species, and legislated elements such as injurious weeds and pests
Planning Policy Feature	Features pertaining to, or situated in close proximity to, the highway estate that have a specific designation or land use, i.e. Special Area of Conservation (SAC), Scheduled Ancient Monuments (SAM), Snowdonia National Park (SNP) or Listed Building.

**Table 20.5 Masterplan Functions**

Definition: The intended environmental purpose of features within the highway estate			
Visual Screening	EFA	Heritage	EFF
Landscape Integration	EFB	Auditory amenity	EFG
Enhancing Built Environment	EFC	Water quality	EFH
Nature conservation & biodiversity	EFD	Highway/land boundary	EFJ
Visual amenity	EFE	Access	EFK

## 20.4 Roles and responsibilities of those implementing the CEMP

### *Contractor's Project Manager and Environmental Manager*

20.4.1 The contractor's Project Manager would be responsible for developing the CEMP for the Scheme. The contractor's Environmental Manager would oversee and audit the internal systems and plans to ensure compliance with the environmental management system.

20.4.2 To ensure that there is adequate liaison between the Project Manager, Environmental Manager and the Environmental Coordinator and Environmental Clerk of Works (ECOW), there would be regular meetings. These would include Monthly Progress Meetings and weekly site inspections.

### *Environmental Coordinator (ECO)*

20.4.3 The ECO would have a prominent role in Scheme delivery, required to be a full time member of

the contractors team, spending at least a full day on site every week, with the authority to direct members of the contractors site staff on environmental matters. He would work alongside the Project Manager to ensure that environmental commitments, and quality standards are set out in that document are fulfilled. The ECoW would support the ECO during pre-construction and construction. The ECO would coordinate the activities of the environmental specialists during detailed design, construction and contract aftercare.

- 20.4.4 The ECO would be an experienced Chartered Member of an appropriate environmental profession. Their role would be to ensure that the key environmental documents are properly considered during the development of the detailed design and during construction. The ECO would oversee the Environmental Compliance Process.
- 20.4.5 The ECO would identify works that are likely to have a significant environmental impact and advise the contractor how to avoid the impacts. If necessary, the ECO would identify activities that should only proceed once he/she has agreed that adequate measures are in place for environmental protection. As works progress the ECO would review the contractor's environmental performance against the commitments, objectives and targets/key performance indicators in the CEMP.
- 20.4.6 The CEMP and all the documents it contains would be developed to contain procedures for checking, auditing and corrective action. These procedures would continue through the construction and aftercare period.
- 20.4.7 The role and responsibilities of the ECO would be set out in the contract documents.

#### *Environmental Clerk of Works (ECoW)*

- 20.4.8 The ECoW would be an experienced professional with a broad-based competency in environmental management, construction and environmental surveys. The ECoW would assist the ECO by overseeing the implementation of environmental mitigation and compliance with environmental management systems and plans. A broad base of skills and experience would best suited to a construction contract with wide ranging environmental challenges. The ECoW would be assisted by ecologists, landscape architects and other specialists as required. The ECoW would liaise with the archaeologist responsible for archaeological recording and investigations to ensure that archaeological sites are protected from damage until the necessary archaeological works are completed.
- 20.4.9 Both the ECO and ECoW would work with the contractor's Environmental Manager to apply the CEMP through the company's Environmental Management System.
- 20.4.10 The ECoW would be expected to carry out training for the contractor's site management team and for other site personnel. The role and responsibilities of the ECO would be set out in the contract documents.

## **20.5 The next steps**

- 20.5.1 Following the publication of this ES, the public can scrutinise the Scheme. If required, an independent Inspector will hold a Public Inquiry to allow a detailed examination. It is possible that during this stage (Key Stage 4 shown in Table 22.1) further requirements, or mitigation will be introduced. These will be added to the REAC in preparation for the construction contract to

commence.

- 20.5.2 Pre-construction surveys will be required early in Key Stage 6, and there could be modifications to the design. These would be updates to the Pre-CEMP.
- 20.5.3 During construction, the CEMP would be modified as necessary to take account of changes arising during construction works. These modifications could include changes to the design to reflect site conditions, but also to reflect any:
- a) New legislation or standards;
  - b) Unforeseen site conditions, for example the discovery of ground contamination, a previously unknown protected species, or archaeological discoveries;
  - c) Failings in the environmental performance of the contractor that require improved procedures, or changes in the design;
- 20.5.4 Towards the end of the construction phase, the CEMP would be refined to provide the essential environmental information needed by the body responsible for contract aftercare and the future maintenance and operation of the road and the associated land. Prepared before the end of the construction period, this document would be issued under the title of Environmental Landscape and Ecology, Monitoring Aftercare and Management Plan (ELEMAMP), this document would set out the requirements for monitoring and maintenance during the aftercare period.

#### *Aftercare, monitoring and management*

- 20.5.5 Proposed mitigation is provided for a purpose and is a commitment made in the ES on behalf of Welsh Government to address an environmental impact. For example, tree planting might be proposed to reduce the visual impact of a view of traffic. When they are planted, trees will not be an effective screen and will need to grow over several years to perform their function properly. Normally, the planting is expected to fully perform as mitigation by the Design Year, 15 years following completion. The contractor will have to maintain the completed Scheme for the full duration of Contract Aftercare during which he will be expected to manage the proposed mitigation to ensure it will meet performance requirements. During aftercare, the ECO, ECoW and other members of the designer's environmental team will be carrying out a programme of monitoring. The ELEMAM would cover the activities described in the following paragraphs.
- 20.5.6 **Aftercare:** will be carried out by the contractor for three years, as set out in the contract. During that time, the contractor will carry out tasks such as grass cutting, weed control, replacement of dead plants, watering, repair of fences, cleaning out ditches, and repair or replacement of bat boxes or other environmental measures. These tasks will be performed to ensure that the seeding and planting survive and successfully establish as new vegetation. At the end of the aftercare period the contractor will hand over the established landscape and environmental mitigation to the Welsh Government's maintenance organisation called North and Mid Wales Trunk Road Agent (NMWTRA).
- 20.5.7 **Management:** once established, the Scheme of mitigation will continue to perform its function and satisfy commitments made in the ES until circumstances change. Changing conditions can be predictable or unexpected and they can occur slowly or catastrophically. For example, a hedge will continue to grow but will need trimming regularly to ensure it remains stock proof. In the case of a plantation, it will grow for 15 to 20 years before it will need to be thinned, coppiced or underplanted to ensure it remains an effective visual screen. A fire could destroy a coniferous plantation within hours, while a plant disease could kill only one species in a plantation over an extended period. Completing both routine maintenance, guiding long term



change, or dealing with occasional unexpected incidents, is the process of management.

20.5.8 **Monitoring:** the developing environmental mitigation will be undertaken regularly throughout the aftercare period. Monitoring of various kinds, ranging from day-to-day observation to sophisticated sampling and analysis, is essential to assist managers in making management decisions. The main tasks will be to:

- a) To check that maintenance work is being properly carried out;
- b) Ensure that mitigation continues to develop properly to meet commitments and functions (e.g. trees should grow as planned);
- c) Review and predict if the mitigation can achieve the commitment and function in the required time period (e.g. will an area of planting and seeding develop fast enough to satisfy the requirements of a Protected Species Licence);
- d) Identify successes, failures and weaknesses in the application of proposed mitigation and monitoring;
- e) Check for adverse or changing conditions that might compromise the effectiveness of mitigation (e.g. has a drain blocked, or has a utility company or neighbouring landowner damaged a fence or trees);
- f) Meet the monitoring requirements of the National Transport Plan;
- g) To provide data needed by the contractor to compile and submit environmental progress and performance reports which would be required under the contract;
- h) Advise on management interventions that might be required as remedial measures, if a failure to meet commitments is identified.

20.5.9 The contractor would monitor the environmental performance of the Scheme:

- a) Against the commitments, objectives and targets identified in the CEMP;
- b) At a frequency set out in the specific monitoring proposed in the specialist chapters of the ES and any licenses and consents.
- c) With a minimum monitoring frequency of 3 times a year for landscape and ecological mitigation in early Spring, Summer and late Autumn.

20.5.10 Typically monitoring, (detailed scope will be set out in the contract), would include:

- a) Botanical measures to record establishment, gain and loss of species in key areas;
- b) Landscape/soft estate establishment and maintenance;
- c) Retained vegetation, especially mature trees close to the route;
- d) Protected species mitigation: species crossings and underpasses, mammal fencing, habitat creation and management;
- e) The condition of noise attenuation, highway boundary fence;
- f) Water quality monitoring; and
- g) Performance of attenuation measures and Sustainable Urban Drainage measures.

20.5.11 Environmental Performance Reports would be prepared annually during aftercare to provide the Project Manager with:

- a) the results of each visit;
- b) the requirements for additional maintenance work or repairs;
- c) indications of how the Scheme of mitigation is performing against agreed indicators; and
- d) Predictions on the likely performance of mitigation over the remaining years of aftercare and at 15 years after completion.

- 20.5.12 Periodic aftercare progress meetings and site walkover will be held with a representative of the Welsh Government Soft Estates Manager and NMWTRA to review monitoring results to determine whether the implemented mitigation measures are likely to meet their mitigation objectives of the design and the commitments set out in the REAC by the end of aftercare. The contractor will carry out remedial work to mitigation measures if necessary.
- 20.5.13 Annual, or twice annually, the ECoW will organise Environmental Liaison Meetings on site with the Statutory Environmental Bodies (SEBs). The meetings will involve a site visit if required. Where monitoring is demonstrating that proposed mitigation is not likely to be effective the SEBs will be consulted about remedial measures.
- 20.5.14 Following completion of contract aftercare, monitoring will be reduced in frequency to an annual check by the Maintaining Agent to ensure that the effective mitigation continues to perform its proposed function (see Table 20.5).
- 20.5.15 **Handover:** at the end of the aftercare period, a Handover Environmental Design Performance Report (HEDPR) will be prepared. The HEDPR will accompany the Handover Environmental Management Plan (HEMP) to assist NMWTRA in taking on the long-term maintenance. The HEMP will include the as-built information.

## 20.6 Summary

- 20.6.1 Environmental Management of the Scheme is a continuous process during design, construction, operation and maintenance which is in line with the requirements of the DMRB and ISO 14001. The contractor will implement a Scheme specific EMS and a CEMP.
- 20.6.2 Management plans identified within this chapter and set out within the Pre-CEMP will be treated as 'live' documents. These live documents will ensure that design and mitigation measures from the EIA will be implemented on-site by the contractor. The CEMP will identify those responsible for implementing the various management plans. These management plans will compliment and inform one another as well as require regular updates and revisions. Outline versions of these management plans have been prepared at Key Stage 3 and are provided as Annexes to the Pre-CEMP in ES Volume 3 Appendix 2.2.
- 20.6.3 The objective of the EMS and the CEMP is to mitigate environmental impacts and have a comprehensive management plan in place to reduce any unforeseen environmental impacts.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTION 16 ENVIRONMENTAL STATEMENT CHAPTER 21 CONCLUSIONS**

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## 21. CONCLUSIONS

### 21.1 Chapter introduction

- 21.1.1 This Environmental Statement (ES) has provided a description of the Scheme, set out details of completed surveys, described the assessments that have been undertaken and describes the main environmental effects of the Scheme. Proposals to avoid, remedy or reduce any adverse effects and to provide enhancements to the existing circumstances have been set out. This chapter draws out the main points.
- 21.1.2 In 2018 and 2019 an exercise was undertaken to establish if the Scheme should be subject to an Environmental Impact Assessment (EIA). This formal process, known as screening, is required under the EIA Directive and is used to determine whether the Scheme falls within thresholds that classified as a Relevant Project as set out in Table 4.1 above. The conclusion was that a Statutory Environmental Impact Assessment is required for the Scheme. The Screening process is described in the Screening Report and the relevant details set out in the Record of Determination (RoD). These documents were completed in June 2019.
- 21.1.3 The primary reasons for determining that an EIA is required are that:
- A. The project lies adjacent to sensitive sites in the form of a Special Protection Area (SPA) and a Special Area of Conservation (SAC). These are known as Natura 2000 sites and is visible from Snowdonia National Park.
  - B. There is the potential for the project to have significant effects on several aspects of the environment including ecology, cultural heritage, landscape and townscape, motorised and non-motorised users and the local population.
- 21.1.4 Subsequently, a Scoping exercise was completed, taking account of changing legislation, to identify the aspects of the environment that should be considered in the EIA and reported in the ES. Statutory Environmental Bodies, including Natural Resources Wales (NRW), Conwy County Borough Council (CCBC), Cadw were consulted and a Scoping Report was completed in July 2019.
- 21.1.5 During the Screening exercise it was identified that because the Schemes were geographically separate with no connecting Line Order, a separate statutory process would be required for each junction improvement. For this reason, to maintain the separation of legal procedures, a separate ES has been prepared for each junction. Consequently, there are two separate Schemes with their own sets of Draft Orders, Environmental Statements and Statements to Inform and Appropriate Assessment.
- 21.1.6 The Screening and Scoping reports are in Appendix 4.2 and 4.3. The Notice of Determination is in Appendix 4.4.

### 21.2 Consultation

- 21.2.1 Stakeholder organisations, including Cadw, GAT, NRW, CCBC, SNPA, Design Commission for Wales (DCfW) and Welsh Government departments, were consulted or have provided information. Their views were considered as the Scheme was developed. The statutory organisations have attended Environmental Liaison Meetings and will be consulted throughout the development of the Scheme.

- 21.2.2 Town Councils, Community Councils, local residents, business owners, and stakeholder groups attended public exhibitions in Dwygyfylchi and Penmaenmawr and met with the project team. Commercial, industrial, business operators, landowners and stakeholder groups were also consulted.

## 21.3 Description of the Scheme

- 21.3.1 The Scheme would encourage free-flowing traffic in both directions on the A55, improve road safety and improve access to the communities of Penmaenmawr and Dwygyfylchi by replacing the roundabout at Junction 16 with westbound on and off slip roads only and upgrading Junction 16A to a grade-separated junction. Slip roads would allow safer access and egress from the A55 with local roads modified to meet current highway design standards. The Scheme involves changes to both Junction 16 and 16A. A new link road would extend from the grade separated Junction 16A to join Ysguborwen Road close to Junction 16.
- 21.3.2 The proposals include mitigation measures to limit the adverse effect of the improvements on the environment. A false cutting topped by a masonry wall would be provided between Junction 16 and the west side of Maes Y Llan and from the east side of Maes Y Llan eastwards to the Puffin Café and filling station, to reduce traffic noise and screen views of the A55, the link road and traffic for many residential properties in Dwygyfylchi, whilst allowing views to the sea. Tree and shrub planting would be provided around the junctions and along the link road to reinforce the screening effects of the false cutting and to extend the effective screen eastwards to meet established pine trees close to the tunnel portals. Further noise barriers would be provided at Maes Y Llan, where the most northerly properties would be much closer to the road than they are at present.
- 21.3.3 The northern portion of an established sports field and public open space to the east of Maes Y Llan would be taken for the Scheme and so a new pitch will be set out on the remaining land and an area of replacement public open space provided to the south of the Puffin Café.
- 21.3.4 A proposed Active Travel route (cycle and pedestrian) would be provided from Junction 16A to J16 along the proposed link road. Links to this for pedestrians and cyclists would be provided from Dwygyfylchi along Glan-Yr-Afon Road and across the A55 to link with the coast and the National Cycle Route 5 using the existing pedestrian bridge over the A55 and the proposed junction overbridge.
- 21.3.5 The scheme involves measures intended to improve the corridor associated with the A55:
- a) The removal of the existing Junction 16 roundabout and construction of a replacement junction with westbound on and off slip roads only.
  - b) A range of Active Travel measures to enhance the provision made for walkers and cyclists that would promote active travel journeys. These measures would improve the local network within Dwygyfylchi and between the Penmaenmawr and Dwygyfylchi and facilities and connect with established long-distance routes.
  - c) A new link road would be constructed running roughly parallel with the A55 to the south of the Puffin Café linking back into the local road network at Ysguborwen Road, near the Gladstone Hotel.
  - d) On the south side of the A55 a corridor of Green Infrastructure would be created separating the strategic transport routes and the new link road to the north from the residential and agricultural areas to the south. The corridor would contain an active travel route with links to Dwygyfylchi and Penmaenmawr and new and existing crossings to the foreshore.
  - e) Within the green corridor a large earthwork, known as a false cutting, would be formed

with tree and shrub planting to provide visual separation of the intrusive transport routes to the north from the existing and possible future residential areas to the south.

- f) The green corridor would incorporate links to existing facilities such as the football field by Maes y Llan, and the Puffin Café and provide a naturalistic landscape barrier of woodland and meadows as a setting for circular cycle and walking routes and safe access to the shore.
- g) Measures to reduce through traffic using Glan-yr-Afon Road and Ysguborwen Road.
- h) A new junction would be constructed further east at Junction 16A Dwygyfylchi with a new overbridge and grade separated junction with slip roads in both directions.

- 21.3.6 Further information with respect to the Scheme description, the design approach and the construction strategy, can be found in ES Chapter 2, The Scheme and shown in the General Arrangement Drawings in Appendix 2.5. The design proposals include mitigation measures to limit the adverse effect of the improvements on the environment. These are shown on the Environmental Masterplans in Appendix 2.6.

## **21.4 Environmental effects of construction**

- 21.4.1 If the Welsh Ministers confirm the Orders for J16, construction could start in early 2021 and the Scheme could open in early 2023. Construction work will be carried out in accordance with best practice to minimise the effects of noise, dust and construction traffic and the inconvenience of road closures. Following the construction phase, there would be three years of landscape maintenance and aftercare.
- 21.4.2 Typically, construction working hours would be 0700 to 1900 hours (Monday to Friday), and 0700 to 1700 hours on Saturdays. In certain circumstances, specific works may have to be undertaken outside these hours with night working required in accordance with Welsh Minister's instructions.
- 21.4.3 During the 18 to 24 months of construction, two lanes will be kept open in each direction on the A55. Temporary traffic management would be necessary to maintain steady flows of traffic through the works. The EIA has concluded that there would be some minor disruption to vehicle traffic as well as to cyclists and pedestrians.
- 21.4.4 Construction works would also affect travellers on local routes close to the A55. The National Cycle Network, Route 5, which follows the coast, would be disrupted and this would have an adverse effect on users, while the effects of construction on established pedestrian and cycle routes to the Promenade and coastal strip would be negligible.
- 21.4.5 There would also be a temporary increase in noise levels due to construction machinery, which could affect local receptors. Modern construction equipment is designed to minimise engine noise, but activities can still be noisy.
- 21.4.6 Construction would typically commence with temporary fencing of the works corridor, setting up of temporary compounds, followed by site clearance, demolition and the diversion or protection of utilities. Following these preparations, cuttings and drainage attenuation basins would be excavated and embankments and false cuttings formed. Construction of structures such as the bridge at J16A, retaining walls, culverts and the bridge over the Afon Gyrach would require a long period and so would commence as soon as possible in the construction period. The EIA shows that during construction vibratory compaction, which would be required for piling for some structures site would affect receptors close to the Scheme, such as houses in Maes y Llan.

With the bridge, retaining walls, cuttings and embankments in place, the new carriageway would be completed, followed by the installation of lighting columns, road signs, safety barriers and further fencing. Finally, the landscape planting and accommodation works would be completed.

- 21.4.7 The approach to construction planning is to aim for the best balance between the amount of soil and rock excavated and the amount used in construction. For Junction 16 there is a substantial shortfall in fill material, which will be brought to site from elsewhere. Part of the shortfall would arise because of the proposed false cutting and a predicted volume of contaminated materials and construction waste which would have to be removed from the site. The management of materials will ensure that waste is minimised and that suitable recycled materials will be available for use. All material for construction and waste would need to be carried by road vehicles.
- 21.4.8 Ground investigations and historical records have shown that there is the potential for construction to affect made ground and buried materials associated with historical land uses, including a gasworks and tar storage tank and refuse disposal. There is a risk that contaminated materials could be excavated and so mitigation would include measures to protect the general public and construction workers from any adverse effects of these materials. With these mitigation measures it is considered that there would be no residual significant environmental effects, nor would there be any long-term significant effect on groundwater, which is near the surface. During construction there would also be measures in place to protect watercourses and the sea from construction silt, spilled chemicals, such as cement, and fuels.
- 21.4.9 The control of dust emissions from construction sites relies upon good site management and the application of readily applicable techniques to reduce emissions of dust and limit dispersion, including damping down sources of dust, cleaning of soiled road surfaces, limiting the speed of construction vehicles that could otherwise raise dust, and covering vehicles laden with dusty materials. With these measures in place, construction dust would be limited and the effects on receptors would not be significant.
- 21.4.10 The Scheme would bring about changes that could affect climate. Aspects that are considered are the release of greenhouse gases into the atmosphere by construction activity, the resilience of the Scheme to the effects of climate change, and the possibility of in-combination effects arising from different aspects of the environment. The greenhouse gas assessment shows that construction of the Scheme would produce a total emission of 9,700 tonnes (tCO<sub>2</sub>e). These emissions are considered significant but are low in terms of the overall UK Carbon Budget.
- 21.4.11 The Scheme is designed to resist the normal adverse effects of natural and man-made events that might be expected to affect the area in which it is sited, for example, flooding, high winds or vehicle collisions. Some extreme and very unlikely natural and man-made events could occur during construction, for which the Scheme cannot be designed. If they did occur the impact of failure might be closure of the road or harm to the environment in which it is set. The assessment considered a wide range of events including those identified in The National Register of Civil Emergencies (2017) and The International Disaster Database. Most of these events were scoped out because the consequences were not significant. Those that were considered further were associated with flooding from the sea, rivers and surface water, hurricanes, storms, fog and major road or rail accidents.
- 21.4.12 The assessment demonstrated that the Scheme would not worsen the consequences for the environment but could result in temporary disruption and closure of the A55 construction site. Mitigation for these events would include advanced warnings from the Met Office and NRW, and



advanced planning to dealing with emergencies and training of site personnel to react when warnings are given or when disruption occurs.

- 21.4.13 Much of the existing roadside vegetation close to junction 16 would be lost and as a result previously screened views of the junction would be revealed to residents that overlook the road from Ysguborwen Road. There is considerably less roadside vegetation to be cleared on the eastern portion of the Scheme and so the effects of vegetation will be considerably less. Measures to limit construction activities to a defined construction corridor would be required to protect retained vegetation, private property, sensitive habitats and the Afon Gyrach. Some construction activities would be seasonally constrained to avoid harm and disturbance to nesting birds and bats for example.
  
- 21.4.14 During construction works will be planned to take account of seasonal constraints to avoid harm and disturbance to nesting birds, bats, otter and reptiles. For the Afon Gyrach measures would be required to protect the banks and gravelly riverbed from disturbance during construction. Temporary lighting would be directed to ensure that there would be no light spill from the road into the Afon Gyrach corridor to minimise disturbance to bats, otters, trout, eels and other species.
  
- 21.4.15 Measures are proposed to protect designated nature conservation sites of national and international importance which are close to the Scheme. These encompass the coastal waters directly north of the junction (Menai Strait and Conwy Bay SAC, the Liverpool Bay SPA. These could be adversely affected by the Scheme during construction because airborne dust, silt and construction noise could adversely affect coastal habitats and species. The future contractor would be expected to implement measures to effectively control airborne dust and waterborne silt and to limit construction noise.
  
- 21.4.16 There are no designated cultural heritage sites that would be directly affected by the Scheme, but up to 26 potential cultural heritage features, identified by the geophysical survey, would be directly affected. Archaeological evaluation of these sites is likely to be required during construction. Mitigation for the direct impact on a site cannot be mitigated, but the consequences can be minimised by an appropriate form of recording. An Archaeological Watching Brief would be implemented on all areas during construction and a programme of recording and investigation would be carried out by the contractor and the results archived.
  
- 21.4.17 All mitigation, and the requirements for monitoring the effectiveness of mitigation, would be detailed in the Construction Environmental Management Plan (CEMP) to be prepared prior to the construction works commencing. The future contractor will be required to develop the CEMP and to ensure that all construction activities are carried out in full compliance with relevant and current policy, guidelines and best practice. To assist in proper environmental management all construction personnel would be given training in avoidance of harm to biodiversity, removal and eradication of invasive non-native species, dust and silt control, protection of vegetation and community liaison.
  
- 21.4.18 There have been regular public information exhibitions before the publication of Draft Orders and this ES. Welsh Government would require the future contractor responsible for building the Scheme, to inform the public before and during construction with Public Information Exhibitions, regular updates using the local press and radio, a Scheme website and newsletters if required. A member of the contractor's management team will be responsible for stakeholder liaison so that the public and public bodies will be kept informed of how construction is progressing. Liaison with the emergency services and police will be maintained to ensure that construction

works do not interfere with the movement of emergency vehicles such as ambulances. Statutory Environmental Bodies (SEB), including NRW, Cadw and CCBC will be able to attend regular Environmental Liaison Group (ELG) meetings to discuss the scheme and to ensure adequate protection for the environment and local population.

## **21.5 Environmental effects of operation**

### **Geology and soils**

- 21.5.1 The underlying geology and soils have a strong influence on the appearance of the local landform and how the use of land has evolved. Historical mapping and results of a detailed ground investigation show that there are areas of made ground and potentially there are buried materials associated with past activities that include refuse disposal, a gasworks, and a tar storage tank as well as areas previously used to tip household waste and fill materials associated with the construction of the A55 in the early 1990s. An existing sewage treatment works lies between the railway line and the coast to the east nearby Junction 16A.
- 21.5.2 The assessment has considered likely effects of the scheme on the underlying geology, ground conditions, groundwater and any areas of contamination. There are no significant effects on the geology or underlying soils as a result of the construction or operational phases of the Scheme. There are no significant risks to the general public of being exposed to contamination.

### **Drainage and water**

- 21.5.3 The Scheme has been designed to protect water quality from the effects of the completed junction. The Afon Gyrach, which discharges into the sea to the east of the Puffin Café and filling station, is no longer classified under the Water Framework Directive (WFD), but did have 'Good' status, while the sea along the coast is classified as 'Moderate to Good'. Protecting the water quality in these waterbodies from the adverse effects of drainage discharges from the road would require effective sustainable drainage measures, including flow attenuation measures, pollution control and containment in case there are spillages on the A55. The mitigation measures, in the form of balancing ponds/basins and penstocks to contain pollution within the ponds would be monitored and maintained to ensure they are working effectively. With these measures in place the assessment concluded that there would be no net deterioration in water quality from routine road runoff, and from the risk of spillage.
- 21.5.4 Much of the Scheme lies within Flood Zone 1 with a less than 0.1% annual probability of flooding (apf). There are also areas of land adjacent to the Afon Gyrach which are in Flood Zone 2 (greater than 0.1% apf) and Flood Zone 3 (greater than 1% apf). A small residential area of Dwygyfylchi lies to the east of the Afon Gyrach and is also within these flood zones. Surface water flowing from higher ground could cause localised surface water flooding at Puffin Café and in an area of the A55 between the café and the Afon Gyrach. Where floodplain volume would be occupied by material to construct the widened embankment for the west-bound on-slip, an equivalent compensation volume would be made available for floodwaters so that there would be no net change in peak flood levels.
- 21.5.5 The Scheme will result in an increase in impermeable area and thus the rate at which surface water run-off would be discharged into receiving waterbodies. The drainage design will include balancing ponds/basins to attenuate the flow such that there would be no increase in runoff rate. The overall discharge of surface water runoff from the Scheme into the Menai Strait would

result in a negligible magnitude of effect with respect to changes to chemical quality, effects on aquatic ecosystems and bathing water quality. The Scheme would comply with the Water Framework Directive.

## **Nature conservation**

- 21.5.6 There are designated sites of national and international importance that have been considered as potentially being adversely affected by the Scheme. These include the Menai Strait and Conwy Bay SAC and the Liverpool Bay SPA. These are located within 350 metres of the Scheme and encompass the coastal waters directly north of the junction. In the immediate vicinity of the Scheme there are habitats that are considered of value to biodiversity, including the Afon Gyrach and two local wildlife sites on the seaward side of the A55 that include shingle and reedbeds. There are also areas of coastal scrub, rocky shoreline and semi-improved grassland. Some hedges have been classified as 'important' based on their nature conservation value.
- 21.5.7 There are no notable or protected plant species within the proposed Scheme footprint, but there are invasive non-native plant species (INNS). These include Japanese Knotweed has been found along the banks of the Afon Gyrach and around J16. A number of other INNS plants species were found within the wider study area.
- 21.5.8 Records and surveys during 2018 and 2019 have shown that noctule, lesser horseshoe, soprano and common pipistrelle bats and Whiskered/Brandts, Daubenton's, and natterers bats have been recorded near the Scheme. Records show that there is a roost 300m from the Scheme and a maternity roost over 1km away. No new roosts were found in recent surveys. Bats have been recorded using the Afon Gyrach corridor as far north as the railway bridge, and mixed plantation woodland to the west of Junction 16 for commuting and foraging.
- 21.5.9 Surveys of the Afon Gyrach have revealed signs that Otter are in the area. An aquatic invertebrate study of the Afon Gyrach found several notable species. Records show that there is a good population of brown trout and Eel.
- 21.5.10 Records show that grass snake and slow worm are present. Surveys of the limited suitable habitat confirmed the presence of slow worm in areas of grassland to the west of Maes y Llan and south of Puffin Café. Hedgehogs are also recorded in the area, but none were encountered during surveys.
- 21.5.11 A wide range of bird species are recorded, including species normally associated with coastal habitats. A survey of overwintering birds identified that large numbers of oystercatchers that forage in the intertidal zone also take refuge during high tide on local grasslands. A number of other over wintering species were noted, including red-throated diver, eider, great crested grebe, red-breasted maganser, curlew, ringed plover and turnstone.
- 21.5.12 A range of mitigation is proposed to reduce any potential adverse effects on habitats and species. These include planting of extensive linear belt of coastal scrub woodland along the south side of the proposed link road to replace and enhance areas that would be cleared during construction and so restore and extend cover, shelter and flightlines for fauna. Seeding of grass areas would include a mix that includes locally indigenous wildflower species to encourage pollinators. Measures to protect marine and aquatic habitats from road pollution and drainage attenuation to reduce the rate of run-off into watercourses would be installed.
- 21.5.13 Bat boxes would be provided to enhance opportunities for the species to roost. Masonry and

drystone walls would be constructed with crevices for bats, reptiles and invertebrates to take refuge. Highway lighting will be designed to minimise light spread, particularly in the area of the Afon Gyrach crossing. During the 3 years of aftercare these proposed measures will be monitored to demonstrate how effectively the objectives of mitigation are achieved.

- 21.5.14 With mitigation many of the impacts will be short term, but once replacement habitat becomes established the impact would be neutral to slightly beneficial. Establishment would occur over a period of 1 to 15 years, with biodiversity gain increasing over the period. Overall there will be a Biodiversity Net Gain (BNG) of 148%, which once established, will provide an overall beneficial effect. There would be no adverse impacts on bat, otters and reptile species during construction, but the proposed habitat creation would be a biodiversity enhancement that would provide suitable coastal habitat, link fragmented habitat and provide refugia for a range of species. Plans to reduce the light spread from highway lighting close beside the Afon Gyrach, would improve the existing situation.

## **Landscape**

- 21.5.15 The existing A55 road corridor is a significant man-made feature that traverses the highly scenic North Wales coastal plain at the foot of the Snowdonia mountain range. The existing road corridor at Penmaenmawr was constructed in the late 1980's and involved extensive planting along its length to screen the road from nearby properties and to integrate the road into the landscape.
- 21.5.16 The A55 Junction 16 Scheme, including the new link road and grade separated junction at 16A, would result in the widening of the existing road corridor into primarily agricultural land to the south of the existing road and to the north of Dwygyfylchi. Much of the existing roadside vegetation between Junction 16 and 16A would be lost leading to open views of the A55 road corridor and associated traffic for some properties. There would be significant short-term disruption to landscape and general amenity of the area and nearby residential properties during the construction period due to the extensive earthmoving and construction works.
- 21.5.17 The Scheme includes mitigation measures to reduce the landscape and visual impact in the form of a false cutting, that would be planted with trees and shrubs to screen views of the link road and dual-carriageway and their traffic. There would also be a substantial cutting to accommodate the new grade separated Junction 16A. Where the false cutting stops, to the east of the Puffin Café, extensive tree planting would continue east along the south side of the A55 to meet the established trees around the tunnel portal. The tree and shrub planting would take some time to establish but over time would integrate the Scheme into the localised landscape. The result of the mitigation measures would mean that the A55 and link road would be screened from the views of nearby residential areas such as those along Ysguborwen Road, Gwel y Mor and Cae Gwynan while keeping open views of the sea beyond. The Scheme would pass closer to the residential properties at Maes y Llan but existing views north over the existing vegetation to the open sea from these properties would be retained.
- 21.5.18 Once mitigation is established there would be beneficial effects for residential receptors of high sensitivity on the outskirts of Dwygyfylchi. Views of passing traffic at night would also be screened all year round by the false cutting topped with a masonry wall. Views south from the A55 road corridor would be contained by the roadside planting and earthworks between Junctions 16 and 16A while retaining distant views of landmarks to the east and west and the mountainous backdrop to the south. This green corridor would create a continuous band of value to the visual amenity experienced by motorists and non-motorised users of the active

travel routes. Planting around the Junction 16 and 16A would integrate the structure and associated earthworks into the localised landscape while creating areas of visual amenity for users of the local road network and attractive entrance at the gateways to the town of Penmaenmawr and village of Dwygyfylchi.

- 21.5.19 The landscape and visual impact of the Scheme in the wider area would not be significant. The highly scenic qualities of the surrounding upland areas to the south, including the Snowdonia National Park, would remain intact. There would be no significant change to the wider landscape character or perceptual qualities such as the tranquillity of the surrounding area.

### **Cultural heritage**

- 21.5.20 Surveys and archival research have shown there are many sites in the vicinity of the Scheme that are listed on the Historic Environment Register (HER) There are no Scheduled Ancient Monuments (SAM) within 1km but 28 within 5 kms. Those sites that could be affected, or their settings affected include 8 Grade 2 Listed Buildings within 1km. There are four Conservation Areas within Penmaenmawr which protects mainly 19th century buildings. There are no sites on the Register of Parks and Gardens. There are 72 further non-designated sites on the HER ranging in date from the Neolithic to the Modern period. The geophysical survey identified 26 anomalies within the study area, some of which could be directly affected by the proposed Scheme.
- 21.5.21 There would be no direct impact on the Conservation Areas, or other designated sites, but some of the geophysical survey anomalies would be directed affected. The direct impact on a site cannot be mitigated, but the consequences can be minimised by an appropriate form of recording. Archaeological evaluation of two sites identified by geophysical surveys is likely to be required and an Archaeological Watching brief would be carried out on all areas. Mitigation of indirect landscape, visual and noise impacts would be reduced by the design of the Scheme and proposed planting and boundary measures.
- 21.5.22 The proposed false cutting and landscape planting around the junction and along the south side of proposed link road would mitigate adverse visual and noise effects on a number of designated and HER sites which currently lie within view or hearing of the A55.

### **Community assets**

- 21.5.23 The assessment examines the effects on community facilities such as surgeries, post offices, shops, parks, play areas, village halls, development land and farmland. The Scheme would require a small area of garden at the former Oasis Retreat Centre and an area of public open space to the east of Maes y Llan, currently used as part of the sports field.
- 21.5.24 There would be a permanent loss of 9.2 hectares of moderate quality agricultural grazing land and a temporary loss of a further 0.9 hectares for construction works. There would be no farm severance or restrictions on access to farmland. The loss of farmland would have a moderate or limited adverse effect on two farm businesses.
- 21.5.25 Two areas of land, allocated under the CCBC Local Development Plan for housing, would be affected and this would threaten the viability of these allocations. The viability of an Employment allocation close to Puffin Café would also be adversely affected.

- 21.5.26 In mitigation, additional public open space land would be designated to replace the area of sports field with nearby land, and new, safer Active Travel Routes provided to enhance connectivity to the coast and access to community facilities and the wider public network of routes.
- 21.5.27 There would be no adverse effects on community facilities such as shops and village halls. The Scheme is considered likely to have an overall temporary adverse effect on existing private and community assets during construction, but this would improve to a beneficial impact once construction is completed.

### **Air quality**

- 21.5.28 Surveys of existing air quality (the baseline) were undertaken in 2018. These results were then compared with calculations of air quality in the opening year of the proposed Scheme (2022). The comparison is based on calculations using predicted vehicle numbers for two scenarios: one that assumes the Scheme is not implemented by 2022 and the second assumes it will be. The comparison shows whether the proposals will improve or worsen air quality for local people and nature. Air quality assessments take account of construction dust and airborne pollutants such as Nitrous oxides (NO<sub>2</sub>), and tiny particulate matter known as PM<sub>10</sub>. The assessment considers the impact of changes that would be brought about by traffic on the road after it is built, on local residential receptors and on important nature conservation sites.
- 21.5.29 Existing airborne pollution is assessed by comparing pollutant concentrations to the UK Air Quality Objectives (AQOs). If concentrations are above the AQOs then the local authority must designate an Air Quality Management Area (AQMA) and set out measures to reduce the pollutant concentrations. Monitoring of airborne pollutants close to J16 shows that concentrations are well below the levels that would require reduction measures. The assessment of the operational effects of the Scheme show that there would be no significant changes as a result of the Scheme.

### **Noise and vibration**

- 21.5.30 This assessment examines how the Scheme will change noise and vibration associated with construction and operation of the proposed Scheme. Surveys of existing noise (the baseline) were undertaken in 2018. These results are then compared with calculations of noise in the opening year of the proposed Scheme (2022).
- 21.5.31 The assessment uses predicted vehicle numbers for two scenarios: one that assumes the Scheme is not implemented by 2022 and the second assumes it will be. The comparison shows whether the proposals will improve or worsen noise and vibration for local people.
- 21.5.32 Surveys of baseline were carried out in July 2019 at 8 representative locations around the area of the proposed improvements. There is a Noise Action Plan Priority Area (NAPPA) identified for Maes y Llan, where traffic noise exceeds 65dBLA10.
- 21.5.33 Mitigation for the effects of increased noise from traffic on the A55 would include a low-noise surfacing system for parts of the carriageway. In addition, noise barriers would be provided in the form of an earth bank along the south side of the link road, masonry walls and solid noise fences. The diversion of traffic from the centre of Dwygyfylchi (Glan-yr-Afon Road) onto the new link road would benefit nearby residential areas.

- 21.5.34 With mitigation there would be a noise level decrease at the majority of the receptors and those receptors that would experience a noise level increase would experience less than a 3dB increase. Residential properties at Maes y Llan, with a noise barrier on or close to the link road, would experience a reduction in traffic noise.

### **All travellers**

- 21.5.35 Travellers in vehicles, walkers, cyclists and horse riders will experience changes as a result of the Scheme. Surveys of roads, footways and public rights of way have established the numbers of people and vehicles using routes within the vicinity of the Scheme to move around the area and access employment, recreation, retail areas and public services.
- 21.5.36 Following consultations with Conwy County Borough Council, Sustrans and Cycling UK Active Travel proposals have been included within the Scheme. These contribute to the purposes of the Active Travel Act and the Well Being of Future Generations Act, by improving safety and access for non-motorised users and improving connectivity.
- 21.5.37 During construction, two narrow lanes of the A55 will be kept open as much as possible in each direction. Temporary road closures and changes to the existing junction would be required. Some local routes for walkers and cyclists would be temporarily diverted during construction. The National Cycle Network, Route 5, which follows the coast, would be maintained during construction and operation.
- 21.5.38 The assessment has concluded that there would be some minor disruption to vehicle traffic and to cyclists and pedestrians during construction. When fully operational the improvements in safety on the A55 should reduce driver stress.
- 21.5.39 Existing pedestrian and cycle routes would be resurfaced and new signage provided. New routes would be added, including a cycleway and footpath within a landscaped corridor along the proposed link road with links into Dwygyfylchi an improved route across the A55 to the coast. During operation there would be a beneficial effect on users.
- 21.5.40 Traffic on the A55 would remain unchanged but there would be an imperceptible increase in traffic on Old Mill Road. The Scheme would also contribute to the purposes of the Active Travel Act and the Well-Being of Future Generations Act by improving safety and access for non-motorised users.

### **Material Assets and Waste**

- 21.5.41 The assessment has considered the effects of the Scheme on the use of materials and waste generated during the construction stage, there would be no significant change in the use of materials or generation of waste when the road is completed and in use. During construction the Scheme would require a large amount of fill material to be imported from elsewhere for construction of the new junction and slip roads. At this stage it is not known where the material will come from.
- 21.5.42 Opportunities would be sought wherever possible to make use of local projects to source suitable fill materials for construction, for example, any surplus soils or fill material from nearby projects could be reused. Waste would be minimised by recycling and suitable recycled materials would be used in construction wherever possible and feasible.

## **Climate Change**

- 21.5.43 During the 24 months of Construction Greenhouse Gases (GHG) emissions would be the equivalent of around 11,603 tonnes of Carbon dioxide (CO<sub>2</sub>). This would contribute 0.00046% of the UK's 3rd carbon budget (2018 to 2022). It should be noted that by removing the existing roundabouts, which typically involves hard deceleration and acceleration, there would be improved vehicle emissions as a result of minimising stop-start conditions.
- 21.5.44 Operational aspects that are considered in this assessment are the resilience of the Scheme to the effects of climate change and the possibility of in-combination effects arising from different aspects of the environment. The climate change resilience assessment demonstrated that the Scheme is not vulnerable to the effects of Climate Change and so no mitigation measures would be required. The climate risks will be monitored during the period of detailed design and construction.

## **Risk of Major Accident and Disaster**

- 21.5.45 The Scheme is designed to resist the normal adverse effects of natural and man-made events that might be expected to affect the area in which it is sited, for example, flooding, high winds or vehicle collisions. Some extreme and very unlikely natural and man-made events, for which the Scheme cannot be designed, could occur. If they did occur the consequences of failure might be closure of the road or harm to the environment in which it is set.
- 21.5.46 The assessment considered a wide range of events including those identified in The National Register of Civil Emergencies (2017) and The International Disaster Database. Most of these events were scoped out because the consequences of occurrence were not significant. Those that were considered further were associated with flooding from the sea, rivers and surface water, hurricanes, storms, fog and major road or rail accidents.
- 21.5.47 The assessment demonstrated that the Scheme would not worsen the consequences for the environment but could result in closure of the A55 for a short period while damage is repaired. Mitigation for these events would include advanced warning signs, digital information systems, and advanced planning for the consequences of collisions and repair of damage.

## **Population and Health**

- 21.5.48 The assessment of population and health has drawn upon the work reported in other chapters of the ES in considered the potential effects of the Scheme. These effects relate to private property and housing, community land assets, development land and businesses, agricultural land holdings and walkers, cyclists and horse riders. The Health Impact Assessment has considered potential effects relating to geology and soils, landscape, community assets, air quality, noise and vibration, all travellers and the risks of accidents and disasters.
- 21.5.49 The most adverse effects would be loss of open space, loss of development land and agricultural land during both construction and when the Scheme is in operation. The football pitch at Maes y Llan residential area would be temporarily affected during construction but would be returned to the community on completion of the works. The effects on agricultural land include loss of land used as a seasonal camp site.



- 21.5.50 There would be beneficial effects from improvements to public open space, provision of additional cycleways and access to areas of amenity once the Scheme is completed. No adverse effects are anticipated in terms of private properties and housing or private businesses.
- 21.5.51 The Health Impact Assessment has concluded that there would be some potential adverse effects on driver stress during construction but beneficial effects as a result of the Scheme. With regard to the Well-Being of Future Generations (Wales) Act 2015 and the Active Travel (Wales) Act 2013, there would be some beneficial effects resulting from improved provision of non-motorised users such as cyclists and pedestrians.

### **Cumulative Effects**

- 21.5.52 Because the construction and operation of this Scheme and the corresponding, but separate Junction 15 Scheme could occur over the same time frame, it has been recognised that cumulative effects could arise. Cumulative effects with consequences for the same receptors could also arise with other proposed projects in the surrounding area. Two types of cumulative effects are considered:
- A. Interrelationships between effects generated by the Scheme;
  - B. The interaction of effects generated by one or more other schemes in combination with this Scheme.
- 21.5.53 The inter-relationships between ES topics for climate change, nature conservation and agricultural land, in particular, could potentially cause temporary or permanent effects on several receptors. This means that an unplanned potential impact on any of these receptors could give rise to additional cumulative effects.
- 21.5.54 The assessment of in-combination effects identifies developments with the potential to generate effects that could affect several environmental receptors cumulatively with the Junction 15 Improvements. The potential for cumulative effects can be either minimised and or avoided either through dialogue between the different developers to manage the construction effects, or by scheduling works to occur at different times. At least three out of five development projects in the area have potential to generate cumulatively effects with the Scheme. The assessment identifies potential 'in-combination' effects for several receptors, particularly water, climate change, risks of accidents, use of agricultural land and, materials and waste.
- 21.5.55 Subject to programme constraints on the two other separate junction improvement schemes identified and the outcome of the Conwy Borough Council Local Development Plan Review, the potential residual effects are primarily an increase in construction traffic associated with different projects coinciding. To add to this, all projects could include separate construction contracts, with different and separate site compounds and mitigation measures. If the separate junction improvement schemes could be managed to limit or avoid the potential for cumulative effects, then the potential for these effects to occur is reduced. All Schemes could share good practice environmental management methods.
- 21.5.56 An entirely separate Statement to Inform an Appropriate Assessment (SIAA) which describes how the Scheme, alone or in-combination with other plans or projects, avoids having a significant effect on nearby designated habitats. The conclusions reached as part of the SIAA is important in addressing effects and impact on nearby designated habitats and species.

## Enhancements and benefits

- 21.5.57 The Scheme is an opportunity to bring about the following enhancements and beneficial works to the environment that could support the purposes of the Environment (Wales) Act 2016, the Well-Being of Future Generations Act 2015 and the Active Travel (Wales) Act 2013.
- 21.5.58 **Active Travel measures:** a proposed shared use cycleway/footways route would be provided along from the Conwy Road from the eastern edge of Penmaenmawr to J16. This would continue east along Ysguborwen Road and then along the south side of the proposed link road as far as J16A. Here it would cross the A55 on the junction overbridge to connect with the National Cycle Route. From there users could also access the beach or travel east to Conwy or west to Penmaenmawr Promenade. This new crossing of the A55 would enhance access to the beach and provide a safe route to the sea from the nearby caravan and camping sites.
- 21.5.59 **New Public Open Space:** a proposed landscape corridor would extend for the full length of the link road associated with the false cutting and land taken for a proposed balancing pond and as replacement public open space. An informal footpath would be provided. This new area of open space/green infrastructure would be provided in a location where there is currently under-provision.
- 21.5.60 **Wellbeing improvement:** the provision of green infrastructure would have benefits in terms of recreational exercise and active travel, but if the land between the A55 and existing residential areas in Dwygyfylchi is developed in the future, its health and recreational value will be enhanced. The false cutting is proposed as mitigation for the link road, but it will additionally provide the same benefits in relation to the existing A55 and its traffic. Furthermore, the green space and the false cutting will provide valuable physical separation as well as visual and noise screening between the transport corridor and residential areas.
- 21.5.61 **Biodiversity enhancements:** the proposed green infrastructure and false cutting would form a biodiversity corridor from the eastern headland and the Afon Gyrach into areas of the green areas of town of Penmaenmawr to the west. Within this area coastal scrub will be planted to provide a wildlife refuge and foraging area. All the grass areas of the Scheme would be seeded as wildflower meadow creating large areas of species rich grassland which would provide habitat for invertebrates, reptiles, small mammals and birds. Within the masonry wall along the false cutting crevices would be formed during construction to provide refugia for reptiles, bats and invertebrates. The balancing pond would provide shallow waterbodies of less than a 300mm depth which will quickly develop value for a wide range of aquatic and emergent native species.

## 21.6 Summary

- 21.6.1 The ES chapters demonstrate the effects of the Scheme on the environment. The most significant effects can be summarised as:
- a) Temporary disturbance to local residents and travellers during construction of which traffic and construction noise for 18 to 24 months would be the most significant effect for residential properties nearby.
  - b) Views to the sea will be retained but views of the A55 and proposed link road would be screened.
  - c) The loss of roadside plantations would open up views of the road from a small number of residential properties on Ysguborwen Road until the proposed planting grows sufficiently.

- d) Traffic noise would be reduced by proposed mitigation so that most residential properties will experience a reduction, including those at Maes Y Llan.
- e) Biodiversity would be beneficially affected by the Scheme.
- f) The improvements to public open space and active travel routes would have a beneficial effect of travellers, including local residents, and would improve the existing community severance.
- g) Vehicle travellers on the A55 and local roads would benefit from the junction improvements.

Intended for  
**Welsh Government**

Document type  
**Environmental Statement**

Date  
**February 2021**

# **A55 JUNCTIONS 15 & 16 ENVIRONMENTAL STATEMENT CHAPTER 22 GLOSSARY & ABBREVIATIONS**

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## 22. GLOSSARY OF TERMS AND ABBREVIATIONS

Term or Abbreviation	Definition
AADT	Annual Average Daily Traffic
AONB	Area of Outstanding Natural Beauty
Active Travel	Active Travel (Wales) Act 2013 Welsh Government wants to increase levels of walking and cycling in Wales to realise the many benefits that travelling actively brings for individuals and for society. The Active Travel Act focuses on walking and cycling as a mode of transport, i.e. for purposeful journeys.
Additional Effects	The cumulative effects of a proposed development assuming past, present and future proposals are already present within the existing baseline.
ADMS	Air Dispersion Modelling System
Adverse impacts	The effect is regarded as damaging for a receptor
AIES	Assessment of impacts on European Sites
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
AQMA	Air Quality Management Area
AQOs	Air Quality Objective
AQS	Air Quality Strategy
ARN	Affected Road Network
Base Year	The year (normally the year when surveys are carried out, or the ES is published) against which other years are compared.
Baseline	The situation before the proposed scheme is implemented
Baseline Studies	Work done to determine and describe the environmental conditions against which any future changes can be measured or predicted and assessed.
BPM	Best Practicable Means
BRP	Bat Roost Potential
BTC	Bat Conservation Trust
Beneficial impacts	The effect is considered to be positive for a receptor
bgl	Below ground level
BGS	British Geological Society

<b>Term or Abbreviation</b>	<b>Definition</b>
BH	Borehole
Biodiversity	The variety of plant and animal life in the world or in a particular habitat, a high level of which is usually considered to be important and desirable.
BNG	Biodiversity Net Gain
BCC	Birds of Conservation Concern
CCBC	Conwy County Borough Council
CCR	Climate Change Risk (Assessment), or Climate Change Resilience
CCRA	Climate Change Risk Assessment
CCS	Current Conservation Status
CCTV	Closed Circuit Television
CEMP	Construction Environmental Management Plan
Chainage	A measure of distance along the scheme from a given point.
Characteristics	Elements (or combinations of elements) which contribute to distinctive landscape character.
CHMP	Cultural Heritage Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
CLVIA	Cumulative Landscape and Visual Impact Assessment
CM	Conceptual Model
CMP	Contract Management Plan
CO <sub>2</sub>	Carbon Dioxide
CO <sub>2</sub> e	Carbon Dioxide emissions
CoCP	Code of Construction Practice
COFNOD	North Wales Environmental Information Service
Combined Effects	Effects of more than one scheme are combined, for example, where an observer is able to see two or more developments from one viewpoint.
Compensation measures	Measures devised to offset or compensate for residual adverse effects which cannot be prevented/avoided or further reduced.
Competent Authority	The authority which determines the application...
Consultation Bodies	Bodies specified in the relevant EIA Regulations which the competent authority must consult in respect of an EIA, and which also has a duty to provide scoping opinion and information.

<b>Term or Abbreviation</b>	<b>Definition</b>
CLR	Contaminated Land Report
CROW Act	Countryside and Rights of Way Act 2000
CPO	Compulsory Purchase Order
CTRN	Calculation of Road Traffic Noise
Cumulative effects	Cumulative / in-combination effects can be defined as changes to the environment caused by the combined impact of the proposed Scheme and other developments in the area.
C4SL	The Development of Category 4 Screening Levels
dB	Decibel: a unit of measure of noise
DCfW	Design Commission for Wales
DEFRA	Department for Environment, Food and Rural Affairs
DEFRA	Department for Environment and Rural Affairs
Design Year	The year for which the scheme has been designed, which is normally 15 years after the Opening Year.
Designated	Identified as being of importance at international, national or local levels, either defined by statute or identified in development plans or other local documents.
Desirable mitigation	Measure considered to be environmentally beneficial but that cannot usually be achieved using statutory powers. For example, third party agreement may be required.
Development	Any proposal that results in a change to the landscape and / or visual environment.
DfT	Department for Transport
Diffusion Tube	A passive sampler used for collecting NO <sub>2</sub> in the air
Direct effect	Effect arise from activities associated with the Scheme.
DMRB	Design Manual for Roads and Bridges
Do Minimum	Without the J15 Scheme proposals in place
Do Something	With the J15 Scheme proposals in place
DQRA	Detailed Quantitative Risk Assessment
DTM	Digital Terrain Model
Duration	How long an effect it will last;
EA	Environment Agency
EC	European Commission
ECI	Early Contractor Involvement



<b>Term or Abbreviation</b>	<b>Definition</b>
ECO	Environmental Coordinator
ECoW	Environmental Clerk of Works / Ecological Clerk of Works
Effect	The results of an environmental impact on a receptor
EFT	Emission Factor Toolkit
EIA	Environmental Impact Assessment
ELEAMP	Environmental Landscape and Ecology Aftercare and Management Plan
ELG	Environmental Liaison Group
EMP	Environmental Masterplan
EMS	Environmental Management Systems
Enhancement	A measure that is over and above what is required to mitigate the adverse effects of a project. This could also be interpreted as desirable mitigation. The recent Environment (Wales) Act encourages enhancements for the benefit of biodiversity.
Environmental Manager (EM)	E.g. contractor's Environmental Manager  A professional person responsible for overseeing the environmental performance of the contractor's organisation. On site the EM would run an Environmental Management Plan setting out how the contractor's personnel should implement the construction project in a sustainable manner, that is in accordance with legislation, best practice and the environmental actions and commitments set out in the REAC , Method Statements, Permits and Licenses as well as this Environmental Statement
EPA	Environmental Protection Act 1990
Episodic	Occurring with a frequency that can be predicted
EPR	Environmental Permitting Regulations 2010
EPUK	Environmental Protection UK
EqIA	Equality Impact Assessment
EQS	Environmental Quality Standards
ES	Environmental Statement
ESPON	European Spatial Planning Observation Network
Essential mitigation	Mitigation which the Overseeing Organisation (Welsh Government) has the statutory power to achieve.
EU	European Union
Extent	The area and/or distance over which in effect might be experienced;

<b>Term or Abbreviation</b>	<b>Definition</b>
FCS	Favourable Conservation Status
FGA	Well-Being of Future Generations (Wales) Act 2015
Frequency	How often will the effect occur;
GA	General Arrangement: a title for a set of drawings that show the engineering layout of the proposals.
GHG	Greenhouse Gas(es)
GLVIA	Guidelines for Landscape and Visual Impact Assessment, Third Edition
GQRA	Generic Quantitative Risk Assessment
GWDTE	Groundwater dependent terrestrial ecosystem
HDV	Heavy Duty Vehicle; a vehicle with a gross vehicle weight greater than 3.5 tonnes. Includes Heavy Goods Vehicles and buses
HRA	Hot Rolled Asphalt
HSE	Health and Safety Executive
HEMP	Handover Environmental Management Plan
HER	Historic Environmental Records
Heritage	The historic environment and especially valued assets and qualities such as historic buildings and cultural traditions.
HEWRAT	Highways England's Water Risk Assessment Tool
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
HRA	Habitats regulations Assessment
I&TP	Inspection & Test Plan
IAN	Interim Advice Note
IAQM	Institute of Air Quality Management
ICCI	In-Combination Climate Change Impact (Assessment)
IEMA	Institute of Environmental Management and Assessment
Impact	Change that is caused by an action
IMS	Integrated Management System
INNS	Invasive Non-Native Species

<b>Term or Abbreviation</b>	<b>Definition</b>
IROPI	Imperative reasons of overriding public interest
Indirect effects	Effects that result indirectly from the proposed project as a consequence of the direct effects, often occurring away from the site, or because of a sequence of interrelationships or a complex pathway. They may be separated by distance or in time from the source of the effects and can occur as a result of a complex pathway.
ITS	Intelligent Transport System
JNCC	Joint Nature Conservation Committee
Land Cover	The surface cover of the land, usually expressed in terms of vegetation cover or lack of it.
Landform	The shape and form of the land surface which has resulted from combinations of geology, geomorphology, slope, elevation and physical process.
Landscape	An area, as perceived by people, the character of which is the result of the action and interaction of natural and / or human factors.
Landscape Character	A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another.
LB	Listed Building
LCA	Landscape Character Area
LI	Landscape Institute
Landuse	What the land is used for, based on broad categories of functional land cover, such as urban and industrial use and the different types of agriculture and forestry.
LCA	Landscape Character Area: a single unique areas which are the discrete geographical areas of particular landscape type.
LAQM	Local Air Quality Management
LDP	Local Development Plan
LED	Light Emitting Diode
LNR	Local Nature Reserve
LPA	Land with Public Access
LRN	Local Road Network
Long term	A period of greater than nine years.

<b>Term or Abbreviation</b>	<b>Definition</b>
LVIA	Landscape and Visual Impact Assessment: used to identify and assess the likely significance of the effects of change resulting from development both on the landscape as an environmental resource in its own right and on people's views and visual amenity.
Magnitude	Size /scale of an impact or effect
Magnitude (of effect)	A term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration.
Materials	Materials required in construction of the Scheme or are generated by demolition and earthworks and thus can be defined as waste.
mb	Millibars
MCA	Marine Character Areas
Medium-term	A period of four to nine years;
MEMP	Maintenance Environmental Management Plan
MMP	Materials Management Plan
Monitoring	Observing and measuring the progress of development of the Scheme and it's mitigation measures over a period of years so that it is kept under systematic review by comparison with objectives and functions.
Mitigation	Measures intended to avoid, reduce and, where possible, remedy significant adverse environmental effects
NCLA	National Landscape Character Areas
Natural Capital	The world's stocks of natural assets which include geology, soil, air, water and all living things. It is from this natural capital that humans derive a wide range of services, often called ecosystem services, which make human life possible.
NCN 5	National Cycle Network (Route 10)
NCR	Non-Conformance Report
NDF	National Development Framework
NERC	Natural Environment and Rural Communities Act 2006
NNR	National Nature Reserve
NMWTRA	North and Mid Wales Trunk Road Agent
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen oxides, generally considered to be nitric oxide and NO <sub>2</sub> . Its main source is from combustion of fossil fuels, including petrol and diesel used in road vehicles

<b>Term or Abbreviation</b>	<b>Definition</b>
NPPF	National Planning Policy Framework
NRRCE	National Risk Register of Civil Emergencies
NRW	Natural Resources Wales
NSR	Noise Sensitive Receptor
NTFP	National Transport Finance Plan
NTS	Non Technical Summary
NVMP	Noise and Vibration Management Plan
Opening Year	The year when a proposed scheme will be open for traffic
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbons
Parameters	A limit or boundary which defines the scope of a particular process or activity
PAS2080	Publicly Available Specification 2080
Pathway	Pathway is the route that a hazard takes to reach a Receptors. Source is the origin of a hazard (for example, heavy rainfall, strong winds, contaminated land, point from which noise is emitted). This is often associated with the source - 'pathway' - 'receptor' model for assessing environmental impacts. Source and Receptor are defined separately are defined separately.
PCCP	Pollution Control Contingency Plan
Permanent effect	An effect of the Scheme that will remain for ever.
PIE	Public Information Exhibition
PINS	Planning Inspectorate
PLO	Public Liaison Officer
PM <sub>10</sub>	Small airborne particles less than 10 µm in diameter
PPG	Planning Policy Guidance
ppm	Parts per million
PPW	Planning Policy Wales (currently Edition 10)
PRA	Preliminary Risk Assessment

<b>Term or Abbreviation</b>	<b>Definition</b>
Primary mitigation	Measures incorporated within the Scheme design sometimes referred to as embedded mitigation. These are often intended to avoid or minimise adverse effects considered in the design process and that may not readily be recognisable as mitigation. fundamental part of the design and incorporated within the scheme shown on the Environmental Masterplans (EMP).
Project Manager	E.g. Contractor's Project Manager: The contractor's project manager is a professional person responsible for day-to-day management of the construction contract to build the Scheme. He manages the, scope, programme, finance, risk, quality, personnel and other resources to achieve completion of construction to time and budget.
PROW	Public Right of Way
RBMP	River Basin Management Plan
RCPs	Representative Concentrations Pathways
REAC	Register of Environmental Actions and Commitments
Receptor	Individual environmental features or locations that have the potential to be affected by a scheme. This term is also often associated with the 'source' - 'pathway' - 'receptor' model for assessing environmental impacts. Source and Pathway are defined separately are defined separately
Reversibility	Whether the effect can be undone or repaired;
Pathway	Pathway - Route that a hazard takes to reach a Receptors. Source is the origin of a hazard (for example, heavy rainfall, strong winds, contaminated land, point from which noise is emitted). .
RML	Richards, Moorehead & Laing Ltd (landscape, planning and environmental consultants
RoD	Record of Determination
SAC	Special Area Conservation
SAM	Scheduled Ancient Monument
Scoping	A step on the EIA process that is used to identify the aspects of the environment that might be affected by development as o should be subject to an impact assessment
Screening	A step in the EIA process that is used to demonstrate the need, or otherwise of a formal IEA and the need to publish an ES.
Scheme	This is the term used to describe the physical arrangements required for the proposed junction improvements
SDR	Strategic Diversion Routes

<b>Term or Abbreviation</b>	<b>Definition</b>
SEB	Statutory Environmental Bodies
Secondary Mitigation	Additional measures identified during the EIA process to further prevent, reduce and, where possible, offset any adverse effects on the environment. These measures are supplementary to those measures in (1) above and are also shown on the EMP and best managed through the environmental management plan and is recorded in the REAC.
Sensitivity	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value related to that receptor.
Short-term	A period of one to three years;
SIA	Social Impact Assessment
Site or Scheme Boundary	This is the area affected by changes brought about by the Scheme. This Scheme is not subject to a planning application and so the term does not refer to the red line boundary, or planning application boundary that would be shown on a planning application plans.
Significance	<p>A term used in EIA to indicate a particular degree of effect / impact that should be considered when making an informed decision about whether or not to proceed with a proposed development.</p> <p>A measure of the importance or gravity of the environmental effect, defined by significance criteria specific to the environmental topic.</p>
SIAA	Statement to Inform Appropriate Assessment
SINC	Site of Importance for Nature Conservation
SNPA	Snowdonia National Park Authority
Source	<p>Source is the origin of a hazard (for example, heavy rainfall, strong winds, contaminated land, point from which noise is emitted). This is often associated with the source - 'pathway' - 'receptor' model for assessing environmental impacts. Pathway and Receptor are defined separately are defined separately</p> <p>Pathway - Route that a hazard takes to reach Receptors. A pathway must exist for a Hazard to be realised. Receptor - Receptor refers to the entity that may be harmed (a person, property, habitat etc</p>
SPA	Special Protection Area
SPG	Supplementary Planning Guidance
SPOSH	Significant Possibility of Significant Harm
SSSI	Site of Special Scientific Interest
SPA	Special Protection Area
SPZ	Source Protection Zone

<b>Term or Abbreviation</b>	<b>Definition</b>
SuDS	Sustainable Urban Drainage Systems
Susceptibility to Change:	The ability of a receptor to accommodate the proposed development without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies.
SVOC	Semi-Volatile Organic Compounds
SWMP	Site Waste Management Plan
TAG	Transport Analysis Guidance
TAN	Technical Advice Note
TDR	Tactical Diversion Routes
Temporary effect	An effect of the Scheme that will last for a shorter duration than a permanent effect. This might arise from a change that will be reversed at the end of construction, for example.
TEMPO	Trip End Model Presentation Programme
TEN-T	Trans-European Transport Network
Tertiary mitigation	Good practice measures to be adopted during construction to avoid and minimise environmental effects, such as pollution control measures identified in a CEMP and monitoring to ensure that is effective (HEMP).
Townscape	The character and composition of the built environment including the buildings and the relationships between them, the different types of urban open space (including green spaces) and the relationship between buildings and open spaces.
TLSE	Test of Likely Significance Effect
TPO	Transport Planning Objectives
TRL	Transport Research Laboratory
TR111	A 1:10,000 scale map and notification issued to indicate the line of a named proposed route that should be protected for planning purposes.
Tranquillity	A state of calm and quietude associated with peace, considered to be a significant asset of landscape.
TTTC	Through the Tide Counts
TW	Traffic Wales
UKCP18	United Kingdom Climate Projections 2018
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change



<b>Term or Abbreviation</b>	<b>Definition</b>
UXO	Unexploded Ordnance
Value	Rarity or sensitivity of a receptor to an action normally defined on a scale from 'Negligible' to 'Very High'
VER	Valuable Ecological Receptors
VES	Visual Effects Schedule
VOC	Volatile Organic Compounds
WCA	Wildlife and Countryside Act 1981
WelTAG	Welsh Transport Appraisal Guidance
WFD	Water Framework Directive
WG	Welsh Government
WHO	World Health Organization
WS	Window Sample
YGC	Ymgynghoriaeth Gwynedd Consultancy
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility: a map, usually digitally produced, showing the areas of land within which, a development is theoretically visible.