8 NATURE CONSERVATION

8.1 Introduction

8.1.1 General

This chapter describes the Ecology and Nature Conservation assessment of the Scheme.

The chapter summarises key nature conservation legislation and policy, describes the survey and assessment methodologies used, describes the baseline conditions and evaluates the nature conservation resources on the route of the Scheme. The chapter identifies and assesses the significance of effects the Scheme would have on nature conservation and outlines mitigation measures to avoid, minimise or remove these effects. Finally, it identifies and assesses any residual effects the Scheme would have after implementation of the mitigation measures described. A summary of the impacts is provided in Table 8.7.1 at the end of this chapter.

Refer to Volume 2, Figure 8.1 for the Ecological Designations and Volume 2, Figure 8.2 for the results of the Phase 1 Habitat Survey. Volume 2 Figure, 8.3 shows the Ecological Constraints Plan, which contains sensitive information relating to protected species and will not be available to the public.

This chapter also makes references to the impacts, mitigation and conclusions detailed in the rest of the ES including Air Quality (Chapter 5), Landscape (Chapter 7), Noise and Vibration (Chapter 11) and Road Drainage and the Water Environment (Chapter 14).

8.1.2 Policy Context

Key legislation

This section summarises the key legislation in relation to nature conservation and ecology, which primarily concerns protected sites and protected species.

Conservation (Natural Habitats &c.) Regulations 2010 as amendmended

Conservation (Natural Habitats &c.) Regulations 2010 as amendmended transposes Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into national law. The Regulations provide for the designation and protection of European protected sites and European protected species as listed in the EC Habitats Directive and EC Birds Directive (Council Directive 2009/147/EC). The Regulations provide guidance on undertaking assessment of impacts on European Protected Sites (Special Areas of Conservation, Special Protection Areas and Ramsar sites) through the Assessment of Implications on European Sites (AIES) process.*Wildlife and Countryside Act (1981) (as amended)*

The Wildlife and Countryside Act (WCA) governs the designation and protection of Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR) and protection of various plant and animal species. Schedule 1 of the Act lists protected bird species, Schedule 5 lists other protected animal species and Schedule 8 lists protected plant species. Schedule 9 of the Act lists invasive alien species which it is an offence to introduce or allow to spread in the wild.

Section 28G of this Act places duties on section 28G authorities (which includes Ministers, Government Departments, local authorities, statutory undertakers and any other public body) to notify Natural Resources Wales before reaching its decision. Section 28G authorities have specific duties and responsibilities in respect of SSSIs and the *'Act sets out specific procedures that must be followed by these authorities when carrying out or authorising operations which are likely to damage the special interest features of SSSIs.*'

The Government expects all section 28G authorities, including planning authorities, to:

a) apply strict tests when carrying out any functions within or affecting SSSIs, to ensure that they avoid or at least minimise adverse effects;

b) adopt the highest standards of management in relation to SSSIs in their ownership, and to take appropriate action to prevent damage by third parties; and

c) as owners or otherwise to take positive steps, wherever possible, to conserve and enhance the special interest features of a SSSI where their activities may be affecting it, or as opportunities arise in the exercise of their functions. [NRW] will advise on a case by case basis as to opportunities for enhancement.

Although the Scheme does not fall within a SSSI boundary, its affect must be considered in relation to bats at the Glynllifon SSSI and Otters (*Lutra lutra*) at Afon Gwyrfai a Llyn Cwellyn SSSI, due to the mobile nature of these qualifying features. Consultation with NRW has taken place in relation to these features.

The Countryside and Rights of Way (CRoW) Act (2000)

The CRoW Act further enhances protection given to some species through the WCA by introducing an offence of recklessly disturbing a Schedule 5 animal. It also provides further protection and guidance regarding the protection of SSSIs. The CRoW Act required the compilation of a list of species and habitats of principal importance for biodiversity in Wales, though this was superseded by the Natural Environment and Rural Communities Act, which has been superseded by the Environment (Wales) Act (see below).

Environment (Wales) Act (EWA) 2016

Part 1 of the Environment Act sets out Wales' approach to planning and managing natural resources at a national and local level with a general purpose linked to statutory 'principles of sustainable management of natural resources' defined within the Act.

Section 6 of the Act places a duty on public authorities to 'seek to maintain and enhance biodiversity' so far as it is consistent with the proper exercise of those functions. In so doing, public authorities must also seek to 'promote the resilience of ecosystems'. The duty replaces the section 40 duty in the Natural Environment and Rural Communities Act 2006 (NERC Act 2006), in relation to Wales, and applies to those authorities that fell within the previous duty.

Public authorities will be required to report on the actions they are taking to improve biodiversity and promote ecosystem resilience.

Section 7 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.

Part 1 of the Act, including Sections 6 and 7, came into force on May 21, 2016.

The Water Environment (Water Framework Directive) England and Wales

Regulations (2003)

These regulations are the transposition into UK legislation of the EU Water Framework Directive (Council Directive 2000/60/EC). The basic principles are the following:

- Enhance the status and prevent further deterioration of aquatic ecosystems and associated wetlands, which depend on the aquatic ecosystems.
- Promote the sustainable use of water.
- Reduce pollution of water, especially by 'priority' and 'priority hazardous' substances.
- Ensure progressive reduction of groundwater pollution.

The Protection of Badgers Act (1992)

This legislation protects Badgers (*Meles meles*) against wilful killing, injury or ill-treatment and disturbance in their setts. It also prohibits interference with or obstruction of Badger setts. Although primarily intended to protect Badgers against deliberate persecution, the legislation is also relevant in the context of development work.

The Hedgerow Regulations (1997)

This legislation governs the assessment and protection of hedgerows, although it should be noted that while the Scheme is exempt from these regulations as it is a highway scheme they shall still be applied.

Wild Mammals Protection Act (1996)

This act operates in parallel with the legislation listed above conferring specific protection on rare or threatened mammal species by protecting all wild mammals from any action intended to cause unnecessary suffering.

Salmon and Freshwater Fisheries Act 1975

Part II of the Act relates to Obstructions to Passage of Fish and places duties on owners or occupiers to maintain fish passes. It states that:

9. Duty to make and maintain fish passes.

(1) Where in any waters frequented by salmon or migratory trout—

(a) a new dam is constructed or an existing dam is raised or otherwise altered so as to create increased obstruction to the passage of Salmon or migratory Trout, or any other obstruction to the passage of Salmon or migratory Trout is created, increased or caused; or
(b) a dam which from any cause has been destroyed or taken down to the extent of one-half of its length is rebuilt or reinstated.

The Scheme would not obstruct or dam any of the water courses over or near which it passes.

Eels (England and Wales) Regulations 2009

This implements Council Regulation (EC No. 1100/2007) of 18 September 2007 establishing measures for the recovery of the stock of European Eel (*Anguilla anguilla*). The Regulation requires Member States to implement a number of short and long-term measures to achieve a target of ensuring that at least 40% of the potential production of adult Eels return to the sea to spawn on an annual basis. The following extract from Part 4 (Passage of eels) is relevant to the Scheme:

Construction, alteration etc. of obstruction

12.—(1) This regulation applies to—

(a) the construction of a new dam;

(b) alterations or maintenance made to an existing dam that are likely to affect the passage of Eels around, over or through the dam;

(c) the construction or maintenance of a structure in or near waters that amounts to, or is likely to amount to, an obstruction.

(2) Any person who constructs, alters or maintains a dam or structure must first notify the Agency.

(3) An application for, or variation of, a licence to abstract water or for impounding works under section 24 or 25 of the Water Resources Act 1991(11) is deemed to be notification for the purposes of this regulation.

(4) Failure to comply with paragraph (2) is an offence.

One Wales: One Planet (May 2009)

The One Wales: One Planet states that sustainable development in Wales means enhancing the economic, social and environmental wellbeing of people and communities, achieving a better quality of life for our own and future generations:

- In ways which promote social justice and equality of opportunity;
- In ways which enhance the natural and cultural environment and respect its limits using only our fair share of the earth's resources and sustaining our cultural legacy.

It also states that sustainable development is a core principle within the National Assembly's founding statute and the Welsh Government has a statutory duty under

the Government of Wales Act 2006 (Section 79) to develop a scheme setting out how they propose, in the exercise of their functions, to promote sustainable development.

Some of the actions set out in the document for achieving this relate to sustaining the environment, including the natural environment.

Environment Strategy for Wales (2006)

The Environment Strategy for Wales was published in 2006 and outlines the Welsh Government's long-term strategy for the environment of Wales for the next 20 years. It provides a framework within which to achieve an environment, which is clean, healthy, biologically diverse and valued by the people of Wales.

Technical Advice Note (TAN) 5, Nature Conservation and Planning (2009)

TAN 5 provides advice to local planning authorities on the application of the law relating to planning and nature conservation and its impact within the land use planning system. The most recent revision of TAN 5 brings it in line with the strategic policy in Planning Policy Wales (PPW, issued in 2002 and revised in 2016) and advises how planning policy with regard to ecology needs to be interpreted to be in compliance with Planning Policy Wales.

TAN 5 provides advice on the following:

- Positive planning for nature conservation;
- Nature conservation and Local Development Plans;
- Nature conservation in development management procedures;
- Development affecting protected internationally and nationally designated sites and habitats;
- Development affecting protected and priority habitats and species.

Planning Policy Wales – Edition 8 (Jan 2016)

Of particular relevance to this assessment is Chapter 5 – Conserving and Improving Natural Heritage and the Coast which outlines the Welsh Government's commitments to Nature Conservation. The Welsh Government's objectives for the conservation and improvement of the natural heritage are to:

- Promote the conservation of landscape and biodiversity, in particular the conservation of native wildlife and habitats;
- Ensure that action in Wales contributes to meeting international responsibilities and obligations for the natural environment;
- Ensure that statutorily designated sites are properly protected and managed;
- Safeguard protected species;
- Promote the functions and benefits of soils and in particular their function as a carbon store.

Wales Transport Strategy (April 2008)

Of particular relevance to this assessment is Outcome 17 – Biodiversity which outlines the duties that public bodies including the Welsh Government have under the NERC Act (since replaced by the EWA 2016) as well as the requirements for protected specues and habitats under UK and European legislation. The outcome aims to improve the impact of transport on biodiversity through the protection and

enhancement of land and marine environments and the use of mitigation and compensatory measures where transport has a significant negative effect.

Wales Action Plan for Pollinators (2013)

The Action Plan for Pollinators in Wales recognises that:

'Pollinators are an essential component of our environment. Honey bees and wild pollinators including bumblebees, solitary bees, parasitic wasps, hoverflies, butterflies and moths and some beetles are important pollinators in Wales, for crops such as fruit and oil seed rape, clovers and other nitrogen fixing plants that are important to improving the productivity of pasture systems for livestock grazing, and wild flowers.'

The Welsh Government has worked with industry and stakeholders to look in more detail at the evidence and issues around pollinators and their conservation in Wales. Following consultation, an 'Action Plan for Pollinators in Wales' was launched setting the strategic vision, outcomes and areas for action to halt and reverse pollinator decline in Wales. This plan aims to reduce and reverse the decline in wild and managed pollinator populations, which includes bees, some wasps, butterflies, moths and hoverflies, some beetles and flies. A pollinator task force comprising of key stakeholders is now active and a draft implementation plan is in place.

Gwynedd Unitary Development Plan (UDP) (2001 – 2016)

The Biodiversity and Geodiversity section of the UDP relates to nature conservation policies with the general aim to 'provide land use planning guidance in respect of development that affects statutorily protected and locally or nationally valued habitats and species'.

Relevant specific nature conservation policies included in the plan include:

- Policy B15: Protection of international nature conservation sites
- Policy B16: Protecting nationally important conservation sites
- Policy B17: Protecting sites of regional or local significance
- Policy B19: Protected trees, woodlands and hedgerows
- Policy B20: Species and their habitats that are internationally and nationally important
- Policy B21: Wildlife corridors, habitat linkages and stepping stones

Policy B15: Internationally Important Sites.

Proposals not directly linked with or necessary in order to manage a site, and which are likely to cause direct or indirect significant harm (either individually or in combination with other plans or projects) to the integrity of Special Protection Areas (potential or classified), Special Areas of Conservation (candidate or designated), RAMSAR sites (proposed or listed) will be refused unless the following criteria can be met:

a There is no alternative solution;

b There are imperative reasons of over-riding public interest for the development or land use change which override the ecological importance of the site;

c In the case of sites where priority habitats or species are affected, the only considerations which could justify granting planning permission are those

associated with public health, public safety or those that bring benefits of primary importance for the environment and that proposals meet all the following requirements:

- The location, design and construction of the development is such that damage to nature conservation features are minimised, and opportunities for nature conservation gain are taken;
- Compensating and equivalent nature conservation features are provided;
- The remaining nature conservation features are protected and enhanced and provision is made for their management;
- Opportunities are provided for the public to enjoy and interpret the site.

Policy B16: Nationally Important Sites

Proposals likely to cause direct or indirect harm to a Site of Special Scientific Interest (SSSI) or National Nature Reserve (NNR) (either individually or in combination with other plans or projects) will be refused unless, either:

1. Damage to nature conservation features can be avoided and the developer takes steps to protect, enhance and manage nature conservation features, or

2. The reasons for the proposals clearly outweigh the particular nature conservation importance of the site and the national policy of protecting such sites.

And all the following criteria can be met:

a The location, design and construction of the development is such that damage to nature conservation features are minimised, and opportunities for nature conservation gain are taken;

b Compensating and equivalent nature conservation features are provided;

c The remaining nature conservation features are protected and enhanced and provision is made for their management;

d Opportunities are provided for the public to enjoy and interpret the site.

When a development is approved planning conditions or agreements will be used in order to conserve and enhance the biodiversity value of any affected site, or any new site that is created, and to put in place appropriate compensatory and management measures.

Policy B17: Sites of Regional/Local Significance

Proposals likely to cause direct or indirect harm to a Local Nature Reserve (LNR), or Non-statutory Nature Reserve (NsNR) or Wildlife Site (WS) will be refused unless, either:

1. Damage to nature conservation features can be avoided and the developer takes steps to protect, enhance and manage nature conservation features, or

2. The proposal is required in order to fulfil social, environmental and/or economic needs that override the site's regional or local importance.

And all the following criteria can be met:

a. The location, design and construction of the development is such that damage to nature conservation features are minimised, and opportunities for nature conservation gain are taken;

b. Compensating and equivalent nature conservation features are provided;

c. The remaining nature conservation features are protected and enhanced and provision is made for their management;

d. Opportunities are provided for the public to enjoy and interpret the site.

When a development is approved planning conditions or agreements will be used in order to conserve and enhance the biodiversity value of any affected site, or any new site that is created, and to put in place appropriate compensatory and management measures.

Policy B19: Protected Trees, Woodlands and Hedgerows

Proposals that lead to the loss or damage to a tree, woodland or hedgerow that is protected or lies within a designated ancient and semi-natural woodland will be permitted only where any harm is clearly outweighed by the economic and/or social benefits of the development. Proposals will be assessed against the following criteria:

In the case of protected trees and woodlands:

1. Whether the social and economic benefits of the development outweighs:

    a. The archaeological, historic and landscape value of the protected tree/woodland;
    b. The contribution of each tree/woodland to public amenity;
    c. The recreational value of the protected tree/woodland, or;
    d. The ecological, biodiversity and wildlife value of the protected tree/woodland

2. Whether other trees will be planted instead of those lost to development.

In the case of hedgerows:

3. Whether the social and economic benefits of the development outweigh the archaeological, landscape, ecological, biodiversity and wildlife value of the hedgerow;

4. Whether new hedgerows can be planted instead of those lost to development.

Policy B20: Internationally and Nationally Important Species

Proposals likely to result in direct or indirect unacceptable disturbance or harm to protected species and their habitats will be refused unless:

In the case of protected trees and woodlands:

1. In the case of a species protected under European legislation:

a. There is no other satisfactory alternative, and
b. The development will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range, and,
c. The development will preserve public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment.

2. There is no other satisfactory alternative, and

    a. The effects will be minimised or mitigated through careful design, work arrangements or other actions or, when this is not practical and the following is likely to prove effective;
    b. The developer will take careful and effective steps to relocate the species or habitat.

When a development is approved, planning conditions and/or agreements will be used in order to protect and sustain the species' vitality.

Policy B21: Wildlife Connectivity

Development which may adversely affect the integrity or continuity of the landscape features which are of major importance for wild flora and fauna will only be permitted if it can be shown that the reasons for the development clearly outweigh the need to retain the features and that mitigating measures can be provided, which are within the control of the developer, which would reinstate the integrity or continuity of the features. Appropriate management of these features will be encouraged generally and particularly by the imposition of conditions on planning permissions, by the use of planning agreements and by entering into management agreements with landowners and developers where appropriate.

Anglesey and Gwynedd Joint Local Development Plan (JLDP) 2015

The Natural and Built Environment section of the JLDP includes nature conservation policies with the general aim to 'conserve and enhance the Plan area's distinctive natural environment, countryside and coastline, and proposals that have an adverse effect on them will be refused'. The Strategic Policy PS16: Conserving and Enhancing the Natural Environment states that Planning Authorities will ensure that they are:

1. Safeguarding the Plan area's habitat and species, geology, history and landscapes;
2. Protecting and enhancing sites of international, national, regional and local importance and their settings in line with National Policy;
3. Having regard to the relative significance of the designations in considering the weight to be attached to acknowledged interests in line with National Policy;
4. Protecting and enhancing biodiversity within the Plan area and enhancing and/or restoring networks of natural habitats in accordance with the Local Biodiversity Action Plan and Policy AMG4;
5. Protecting and enhancing biodiversity through networks of green/ blue infrastructure;
6. Safeguarding internationally, nationally and locally protected species;

7. Protecting, retaining or enhancing the local character and distinctiveness of the individual Landscape Character Areas (in line with Policy AMG2) and Seascape Character Areas (in line with Policy AMG3);
8. Protecting, retaining or enhancing trees, hedgerows or woodland of visual, ecological, historic cultural or amenity value.

Relevant specific nature conservation policies included in the plan include:

- Policy AMG3: Coastal Protection
- Policy AMG4: Local Biodiversity Conservation
- Policy AMG5: Protecting Sites of Regional or Local Significance

Policy AMG3: Coastal Protection

In considering proposals on the coast, including the Heritage Coast, there will be a need to ensure that the proposal conforms to the following criteria:

1. The development due to its nature must be located on the coast or in open estuaries or nearby and that there is an overriding economic and social benefit from the development

2. They do not cause unacceptable harm to:

    a. Water quality
    b. Public access considerations
    c. The built environment or the landscape or seascape character
    d. The area's biodiversity interests (including features of European Protected Areas such as marine Special Areas of Conservation and Special Protected Areas) due to their location, scale, form, appearance, materials, noise or emissions or due to an unacceptable increase in traffic.

3. Priority is given to locations with a close visual connection to current buildings or existing structures.

4. There are no suitable alternative locations on the coast that have been developed.

5. That the development is consistent with other policies within the Plan including Policy ARNA1.

Policy AMG4: Local Biodiversity Conservation

Proposals should protect and enhance biodiversity that has been identified as being important to the local area. Proposals will be refused unless they can conform to all the following criteria:

1. Ensure that there is no other satisfactory alternative site for the development.
2. Ensure that the development is in a suitable location, avoiding locations that are of international, national and local biodiversity importance.
3. Provide measures to mitigate potential detrimental impact. Protect and enhance the nature conservation features.
4. Create, improve and manage wildlife habitats and natural landscape including wildlife corridors and stepping stones.

5. Contribute towards achieving the targets set in the Local Biodiversity Action Plan.

Where necessary, an Ecological Assessment which highlights the relevant biodiversity issues should be included with the planning application.

When a development can't protect or enhance biodiversity and the need for the development outweighs the importance of the site for nature conservation, it should be clearly shown that there is no other appropriate location available and there are appropriate mitigation or compensation measures in place.

Policy AMG5: Protecting Sites of Regional or Local Significance

Proposals that are likely to cause direct or indirect significant harm to Local Nature Reserves (LNR), Wildlife Sites (WS) or regionally important geological / geomorphologic sites (RIGS) will be refused, unless it can be proven that there is an overriding social, environmental and/or economic need for the development, and that there is no other suitable site that would avoid having a detrimental impact on sites of nature conservation value and local geological importance. When development is granted, assurance will be required that there are appropriate mitigation measures in place. It will be possible to use planning conditions and/or obligations in order to safeguard the site's biodiversity and geological importance.

United Kingdom Biodiversity Action Plan (UK BAP)

In 1992 the UK signed the Convention on Biological Diversity at the Rio Convention pledging the UK to develop national strategies for the conservation and sustainable use of biological diversity.

The UK Government subsequently produced Biodiversity: The UK Action Plan in 1994 which described the biological resources of the UK as a whole and in turn led to the production of Biodiversity Action Plans for individual habitats and species. A total of 65 Priority Habitats and 1150 Priority Species have been identified (following updates to the list in 2007) as the most in need of protection, these are summarised in Table 8.1.1 below.

Table 8.1.1 Summary of UK Priority BAP Habitats and Species

Habitats	
Terrestrial	27 broad habitats covering 65 Priority Habitats
Species	
Group	**Number of Species**
Terrestrial mammals	18
Birds	59 (incl. subspecies)
Fish (excl. marine)	15
Reptiles	6
Amphibians	4
Terrestrial invertebrates	413
Vascular plants	212
Lichens	69 & 2 communities
Non-vascular plants	122
Fungi (including lichens)	215

Marine (incl. fish, reptiles, mammals, invertebrates and algae)	87

Local Biodiversity Action Plans (LBAPs)

Biodiversity: The UK Biodiversity Steering Group Report was published in 1995. This recognised that to successfully implement the UK BAP at a local level and translate national policy into action, it would be necessary to produce Local Biodiversity Action Plans (LBAPs) across the UK. In response to this, local authorities throughout the UK produced LBAPs; the Gwynedd LBAP is of relevance to the Scheme and is summarised in Table 8.1.2 below.

Table 8.1.2 Summary of Gwynedd LBAP Habitats and Species

Habitat Action Plans	Species Action Plans
Upland Oakwoods	Otter
Wet Woodland	Pine Marten
Arable Field Margins	Polecat
Cloddiau	Brown Hare
Mudflats	Hazel Dormouse
Maritime Cliff and Slopes	Water Vole
River Corridors	Lesser Horseshoe Bat
Rhos Pasture	Barn Owl
Lowland Heathland	Chough
Upland Heathland	Lapwing
Lowland Meadows and Pasture	Arctic Charr
Lowland Dry Acid Grassland	Lampreys
Lowland Wetlands	Salmonids
Strandlines	Adder
Gardens	Marsh Fritillary
	Hornet Robberfly
	Bluebell
	Floating Water Plantain
	Waxcaps

Trunk Road Estate Biodiversity Action Plan (TREBAP)

The National Assembly for Wales, as Highway Authority for Wales, has direct responsibility for the maintenance, improvement and development of the trunk road and motorway network for Wales. Under the Countryside and Rights of Way (CRoW) Act 2000, the National Assembly for Wales has a duty to have a regard for the conservation of biodiversity in its work. The WG Transport Directorate is already incorporating biodiversity into its work, and the Trunk Road Estate Biodiversity Action Plan (TREBAP) is to contribute to this ongoing process.

- The Objectives of the TREBAP, within the constraints of recourses and road safety, are to: Set practical and realistic actions and targets for the period 2004 – 2014
- Link with other Biodiversity Action Plan targets for habitats and species

- Increase awareness of the Transport Directorate's staff and contributors, its environmental partners and the general public, of the biodiversity interest of the trunk road and motorway network,
- Encourage the use, the dissemination, of best practise for biodiversity in the management and development of the trunk road and motorway network; and
- Reflect the requirements of the National Assembly's Sustainable Development Scheme (Learning to Live Differently) and Action Plan where relevant.

Of the eleven Habitat Action Plans included in the TREBAP, 7 are of relevance to the Scheme, these being:

- Boundary features
- Coastal and estuarine habitats
- Purple moor-grass and rush pastures
- Rivers and streams
- Rock faces and scree
- Water bodies
- Woodlands and planted native trees and shrubs

Of the seventeen Species Action Plans included in the TREBAP, 10 are of relevance to the Scheme, these being:

- Amphibians
- Aquatic species (excluding Otter and Water Vole)*
- Barn Owl (*Tyto alba*)
- Bats
- Dormouse (*Muscardinus avellanarius*)
- Marsh Fritillary butterfly (*Euphydryas aurinia*)
- Otter
- Reptiles
- Water Vole (*Arvicola amphibius*)
- Bluebell (*Hyacinthoides non-scripta*)

Both of the two Generic Action Plans within the TREBAP are also of relevance to the Scheme, these being the Action Plan for Ecological Surveys and Education and Awareness.

Section 42 of the EWA 2016 – List of Species and Habitats of Principal Importance for Conservation of Biological Diversity in Wales

The list which is reproduced in full in Volume 3, Appendix E.1 is summarised in Table 8.1.3 below. Although these lists were primarily based on the UK BAP habitats and species lists, the numbers in each category differ from the UK BAP list as not all priority habitats and species occur in Wales. This is the same as the list under Section 42 of the Natural Environment and Rural Communities Act (2006) but is currently under review by Welsh Government.

Table 8.1.3 Summary of Section 7 Habitats and Species

Habitats

Terrestrial	16 broad habitats covering 36 Priority Habitats
Marine	4 broad habitats covering 20 Priority Habitats
Species	
Group	**Number of Species**
Terrestrial mammals	17
Birds	51
Fish (excl. marine)	10
Reptiles	5
Amphibians	3
Terrestrial invertebrates	186
Vascular plants	77
Lichens	69 & 2 communities
Mosses and liverworts	33
Fungi (including lichens)	26
Stoneworts	5
Marine (incl. fish, reptiles, mammals, invertebrates and algae)	56

Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man, (2015).

A total of 246 species have been assessed against a set of objective criteria to place each on one of three lists – green, amber and red – indicating an increasing level of conservation concern. There are 67 species on the red list, 96 on the amber list and 81 on the green list.

The Population Status of Birds in Wales (2009)

This report is similar to the Birds of Conservation Concern 4 list but is considered from a Welsh perspective rather than a UK perspective. The findings are broadly similar but there are important differences in the classification of conservation concern for a small number of species. A total of 213 species have been assessed with 45 species on the red list, 100 on the amber list and 68 on the green list.

8.2 Methodology

8.2.1 Survey Methodologies

The survey methodologies for work undertaken in 2009 are described in the A487 Caernarfon – Bontnewydd Study DMRB Stage 2 Environmental Impact Assessment Report Volume 1 dated December 2011[8.1]. Survey methodologies for work undertaken in 2015 are described below and, where appropriate, in Volume 3 Appendices. In addition, surveys were undertaken in 2014 as outlined within the Environmental Scoping Report (ref. 3513874-PB-XX-XX-RP-EN-00001)[8.2] and were used to guide the surveys proposed for 2015 as well as provide additional baseline information.

8.2.2 Desk study and biological records search

A desk study of the Scheme and a 1km buffer to either side was undertaken in February 2015 to determine the available data with regard to protected species and habitats from which potential ecological constraints were identified. This involved the study of OS data, aerial photography and the CCW Phase 1 Habitat Survey[8.3], a data search with the North Wales Environmental Information Service (Cofnod) and a review of reliable online resources. Records of all bat species within a 5km buffer of the Scheme, noctule bats within a 10km and Lesser Horseshoe Bats (*Rhinolophus hipposideros*) within a 30km buffer were also obtained. Following consultation additional records were included for Otter (25km) and Marsh Fritillary (10km) in July 2015.

A thorough review of the Key Stage 2 Study surveys and the 2014 surveys has also been undertaken and incorporated into the baseline conditions detailed in Section 8.3 below.

8.2.3 General walkover/habitat survey

A general walkover and update of the phase 1 habitat survey was undertaken within 500m of the Scheme during May 2015 with particular attention paid to those areas previously identified as having ecological and nature conservation value. This recorded any changes to the 2009 survey information. The survey methods followed the Handbook for Phase I Habitat Survey[8.4] guidelines produced by the JNCC and Volume 10, Section 4, Part 1 of the Design Manual for Roads and Bridges (DMRB)[8.5] and were undertaken by experienced ecologists.

Species lists, complete with abundances and target notes were produced for each habitat, where appropriate (refer to Volume 3, Appendix E.3). The species lists are not intended to be exhaustive, but to highlight the value of sites and identify ecologically significant species where possible. During this survey, observations and notes were also made regarding any areas that have potential for the presence of protected species or are of interest from an ecological and nature conservation perspective. None of the habitats were of particular ecological interest or high quality vegetation and as such NVC surveys were not considered necessary.

Non-native invasive species including Japanese Knotweed (*Fallopia japonica*) were also recorded and mapped as part of these surveys.

No veteran trees were highlighted as part of these surveys, therefore specific surveys were not considered necessary.

8.2.4 Hedgerow survey

Detailed hedgerow surveys were undertaken as part of the Dormouse habitat assessment surveys detailed below, during which, hedgerows with the potential to be classified as 'important hedgerows' under the Hedgerow Regulations 1997 were identified and recorded.

8.2.5 Bat surveys

Bat activity surveys

Activity surveys were undertaken across the 13 transects established in 2014 in May, July and September 2015 (as detailed within Appendix E.5). Each transect was surveyed for two hours at dusk with additional two hour dawn surveys included as part of the September surveys. As a higher level of activity was recorded at R7, it

was considered useful to study the nearby area in more detail; therefore, an additional transect (Transect R7a) was surveyed during September 2015, following discussions with the Welsh Government.

These surveys were undertaken using AnaBat frequency division and Bat Scanner Heterodyne bat detectors with Bat Box Duet Heterodyne bat detectors set at 110Khz to ensure that any Lesser Horseshoe Bats were identified and recorded. Notes were also made of bat activity and behaviour to aid with the identification and establishment of the value of habitats and areas in relation to foraging, commuting routes, roosts etc.

Bat calls were recorded and analysed using AnalookW software with reference to Russ 2012[8.6] to aid identification. Recorded bats were identified to species level where possible.

Pre-construction bat monitoring began in May 2016 in accordance with the revised Bat Conservation Trust Bat Survey Guidelines (February 2016) following consultation with NRW (refer to Appendix E.6 for survey locations). These surveys continue monitoring along the 14 transects established in 2009, 2014 and 2015 (Transects R1 to R13 including R7a) with three additional survey locations added following consultation with NRW (NRW1, NRW2 and NRW3). These are surveyed every month up to and including October as above with the addition of two static detectors left in situ for 5 consecutive nights at each survey location.

From June 2016 static detectors are also being left in situ each month for 5 consecutive nights at the locations of proposed Structures 101, 101a, 107, 112b, 112e and 115a&b (Transects R14 to R19).

A An investigative survey approach is being applied to an additional seven locations (A1 to A7) along the Scheme following consultation with NRW. These surveys began in June 2016 using a single static detector at each location for one night each month. However, following further consultation with NRW, this has been increased to three nights at each location for the remainder of 2016 (up to and including October).

Bat roost inspections

All buildings, structures and trees potentially directly affected by the Scheme through damage, destruction or disturbance have been subject to preliminary roost assessments in accordance with Hundt 2012[8.7] in May 2015.

Further inspections and/or activity surveys were identified as a future requirement for all buildings and structures categorised as having low roost potential or above.

Preliminary tree roost assessments were undertaken in accordance with 'the protocol for visual inspection of trees due to be affected by arboricultural work' (Hundt, 2012[8.7]) with trees inspected from the ground with the aid of close-focusing binoculars and a high-powered torch. Each tree was categorised for its value to bats based on the presence of features commonly used by bats to roost and field signs that may indicate use of trees by bats (as described in Hundt 2012[8.7]).

Further climbing inspection surveys were identified as a future requirement for all trees categorised as 1 or 1* with those categorised as 2 identified to be soft felled only. Category 3 trees are not considered to require any specific measures relating to bats or their roosts. Given the period between these surveys and the start of construction and the variable nature in the use of tree roosts it is considered most

appropriate for these inspections and any subsequent emergence/re-entry surveys to be undertaken as part of the pre-construction works to ensure the most accurate and up-to-date information is used to inform felling requirements.

Landscape-scale approach

A landscape scale assessment of habitat connectivity informed the choice of transect routes during the original transect survey scoping in 2009, which was then adopted/adapted in 2014 and 2015. Due to the results of these surveys, this approach was carried through into the Scheme and mitigation design in consultation with NRW.

8.2.6 Badger survey

The status of Badger setts identified during surveys for the Key Stage 2 Study was ascertained by re-surveying them. Additionally, an area 250m either side of the Scheme alignment was surveyed for Badger setts and signs of Badger activity, following the methodology and guidance given within DMRB Volume 10 Section 4 Part 2 [8.8]. This involved searching for the following signs of Badger activity:

- Dung pits/latrines – single or multiple pits (latrines) usually found along pathways or as territorial markers;
- Hairs – distinctive texture and colouration;
- Footprints – distinctive size and shape, often with claw marks in deeper sediment;
- Setts – distinctive size and shape of entrance, can be main, annex or outlier;
- Paths and boundary crossing – well used trails through vegetation including through hedges, over banks, across roads and streams, often with additional signs of Badger activity. This will identify likely Badger crossing points of the proposed Scheme; and
- Feeding signs – often distinctive and include snuffle pits (conical depressions in the soil where the snout has been inserted) and scratched up turf.

These surveys were undertaken by a suitably experienced ecologist and focused on the areas with previous records of Badger activity and those highlighted as having Badger potential. These surveys were carried out in May 2015 in conjunction with the general walkover/habitat survey.

Particular attention was paid to the possible severance of Badger territories by the Scheme. This was carried out where possible by noting the location and orientation of confirmed Badger paths within the Study Area. This information would have been used to determine the number and location of underpasses required, extent of Badger fencing and the need for licences. Due to the low level of confirmed or suspected Badger activity it has been determined that supplementary bait-marking was not necessary and that territory severance is highly unlikely.

8.2.7 Dormouse survey

Habitat assessments were carried out across the survey area with focused hedgerow surveys within 50m of the Scheme during May 2015. These surveys recorded the likely suitability of features, taking into account their connectivity, diversity of food-plants, structure and management. From this the Dormouse potential of the habitats present was determined in accordance with the categories below and the need for nest tube surveys highlighted.

- A – Optimal habitat for Dormice, with a high diversity of food plants, sympathetic management, good structural complexity for creation of nest sites and links to other suitable habitats;
- B – Suitable habitat for Dormice, but with a lower diversity, poorer structure, less sympathetic (but not entirely adverse) management, or more isolated;
- C – Sub-optimal habitat for Dormice, lacking one or more of the optimal characteristics described above;
- D – Suitable only for dispersal by Dormice, due to low diversity or unsympathetic management, these features may be used by Dormice dispersing from adjacent habitats but are unlikely to support resident Dormice;
- E – Unsuitable for Dormice, comprising fences or ditches rather than hedgerow field boundaries.

Following the completion of these surveys it was determined that all of the woodland, scrub and hedgerow habitats across the survey area were at best of sub-optimal value for Dormice. Further consultation was undertaken with NRW and it was agreed that nest tube surveys were not necessary as they would not provide meaningful results given the poor potential of the habitats present and the lack of suitable tube placement areas.

8.2.8 Otter survey

Specific surveys were undertaken of watercourses and adjacent areas during May 2015 for evidence of Otter activity or potential use by Otters, following the widely accepted methodology from the National Rivers Authority (1993a and b)[8.9] and the guidance given within DMRB Volume 10 Section 4 Part 4[8.10]. This involved searching watercourses for 500m up and downstream for the following signs of Otter activity:

- Spraints – characteristic faeces often deposited in prominent positions, can be described as fresh (up to a few days), recent (a few days to a few weeks) or old (at least a couple of weeks)
- Sign Heaps – scrapes of sand, mud or vegetation often with additional spraint
- Footprints – characteristic shape and size
- Feeding Remains – such as fish scales or amphibian remains
- Actual/Potential Holt – including cavities under tree roots and within banks, additional signs of activity will determine whether these are in use
- Actual/Potential Resting Up Sites – temporary shelters within dense vegetation such as scrub and reedbed.

8.2.9 Water Vole survey

As no evidence for the presence of Water Vole was found in the Key Stage 2 surveys, and the latest Cofnod record for this species within the Study Area is from 1999, it was considered unlikely that this species occurs within the Study Area.

Specific surveys were included as a precaution and were undertaken in accordance with best practice methodologies. This involved searching along watercourses for the following signs:

- Latrines – piles of characteristic droppings
- Footprints – characteristic shape and size
- Tunnel entrances – both above and below water level

- Pathways in vegetation – often running between tunnels and vegetated waterside habitat
- Cropped grass around tunnel entrances – a distinctive sign of breeding females
- Feeding remains – large chewed segments of vegetation with distinctive teeth marks

8.2.10 Breeding bird survey

Surveys for breeding birds were conducted in line with the methods used in the British Trust for Ornithology (BTO)'s Breeding Bird Survey[8.11]. Visits were timed so that the first was in the early part of the breeding season (April to mid-May) and the second at least four weeks later (mid-May to the end of June). The Phase 1 habitat survey results were used to inform the selection of focused survey sites within the study area. These surveys also focused on the presence of Schedule 1 species breeding within the area. As Barn Owl is known to occur within the area, particular attention has been paid to this species, but as it is a nocturnal bird, survey methods have been different to other breeding bird surveys (see below). Additionally, particular attention was paid to areas of river corridors suitable for Kingfisher (*Alcedo atthis*). Survey maps are included in Volume 3, Appendix E.4.

8.2.11 Barn Owl survey

As it is known to occur within the study area, further surveys were identified for Barn Owl in order to record possible nest sites and foraging areas. Sites with potential to support this species were identified during the extended Phase 1 habitat survey. No nest sites were identified and as such further species specific surveys were not considered necessary. It is acknowledged that much of the Scheme area is potential foraging habitat. Incidental observations of Barn Owl were recorded during the bat surveys proposed for the Scheme.

8.2.12 Amphibian (including Great Crested Newt) survey

All ponds within 500m of the Scheme (twelve in total) were subject to a Habitats Suitability Index (HSI) assessment in accordance with the system devised by Oldham et al (2000)[8.12]. This system assesses the suitability of each pond for the presence of Great Crested Newt (*Triturus cristatus*) using the following ten criteria:

- Geographical location
- Pond area
- Frequency of drying out
- Water quality
- Shading of pond
- Presence of waterfowl
- Presence of fish
- Number of other ponds in the vicinity
- Quality of surrounding terrestrial habitat
- Percentage cover of water plants

Each criteria are assigned an indicative value ranging from 0.01 to 1.0 with the higher value being more suitable. Each of these ten values is then multiplied together and the tenth root of the resultant number is calculated to provide a HSI score between 0 and 1 for each pond. This can then be interpreted as either poor, below average, average, good or excellent for Great Crested Newt (GCN). Those identified as being

of 'average' or higher potential for presence of GCN were surveyed further for the presence/absence of GCN in May 2015.

Two of the ponds were considered to have a HSI assessment of average or above and as such were subject to further surveys. Three survey methods were used as described in the 'Great Crested Newt Mitigation Guidelines' (English Nature, 2001)[8.13], namely bottle trapping, torch surveys and egg searches. Fours survey visits were made during suitable weather conditions (i.e. overnight temperatures above 5^{o}C and calm pond conditions) with three of the four visits completed during the optimum time between mid-April and mid-May. GCN were not found during any of the surveys and as such no further surveys were required.

Surveys were undertaken and supervised by a suitably licenced and experienced ecologist.

8.2.13 Reptile survey

No specific reptile surveys have been carried out, but the Extended Phase 1 surveys carried out for the Key Stage 2 Study revealed that the Study Area is of limited potential for reptiles. The walkover and habitat survey undertaken in May 2015 confirmed the limited potential of the survey area with few areas of suitable habitat noted including linear features such as hedgerows and stone walls. This assessment will assume reptile presence in these areas.

8.2.14 White-clawed Crayfish survey

As stated within the Environmental Scoping Report (ref. 3513874-PB-XX-XX-RP-EN-00001[8.2]) there were no Cofnod records for White-clawed Crayfish (*Austropotamobius pallipes*) associated with watercourses in the vicinity of the Study Area. No detailed surveys were carried out as part of the Key Stage 2 Study, but surveyors were vigilant when surveying near watercourses and no crayfish were noted. Given the lack of previous records it is considered unlikely that White-clawed Crayfish are present within the study area.

8.2.15 Fisheries and aquatic invertebrate survey

As stated within the Environmental Scoping Report (ref. 3513874-PB-XX-XX-RP-EN-00001[8.2]) there are known populations of several fish species of conservation concern, such as Atlantic Salmon (*Salmo salar*), Brown Trout (*Salmo trutta*), European Eel, Twaite Shad (*Alosa fallax*), Allis Shad (*Alosa alosa*), River Lamprey (*Lampetra fluviatilis*), Sea Lamprey (*Petromyzon marinus*) and Brook Lamprey (*Lampetra planeri*), in other nearby rivers in North Wales and so could potentially populate the study area. Spawning areas for these species are known within and downstream of the Study Area. There is no record status for Bullhead (*Cottus gobio*) in the area however it is considerd likely that they would be present.

As the Water Framework Directive aim is to retain ecological potential and the presence of all the species identified above has been assumed in all suitable watercourses, specific surveys for fish, including electrofishing, have not been proposed or undertaken.

Previous desk studies and consultations have not identified the presence of protected or sensitive aquatic invertebrate species within the Study Area. Neither the results of the 2015 desk study and/or site surveys indicated that the habitat conditions or these conclusions may have changed, therefore more detailed surveys were not

undertaken. However, during the 2016 consultations NRW raised concerns with regard to the potential presence of Freshwater Pearl Mussel (*Margaritifera margaritifera*), particularly within the Afon Rhyd. As such surveys for this species are due to be undertaken in 2016 as part of Key Stage 4 and if present appropriate measures will be put in place accordingly.

8.2.16 Invasive species survey

The extent of Japanese Knotweed and Himalayan Balsam (*Impatiens glandulifera*), together with any other invasive non-native plant species listed on Schedule 9 of the Wildlife and Countryside Act (6th April 2010), was noted during the Extended Phase 1 Habitat Survey.

8.2.17 Other wildlife observations

During the surveys described above, field observations of other species within the Study Area, such as Brown Hare (*Lepus europaeus*), West European Hedgehog (*Erinaceus europaeus*) and Stoat (*Mustela ermine*a) were recorded where observed and have been included as part of the assessment accordingly.

The presence of lower plants (lichens and bryophytes) was also identified as part of the other site surveys. No specific surveys have been identified for these as the Stage 2 assessment did not raise any concerns or potential impacts for either of these species groups. Neither the results of the desk study and/or site surveys indicated that these conclusions may have changed, therefore more detailed surveys were not undertaken.

No specific surveys have been identified for invertebrates as the Stage 2 assessment did not raise any concerns or potential impacts for this species group. Neither the results of the desk study and/or site surveys indicated that these conclusions may have changed, therefore more detailed surveys were not undertaken. However, following consultation the desk study was widened to include a specific 10km search area for Marsh Fritillary.

8.2.18 Assessment Methodologies

A Stage 3 Assessment has been undertaken in accordance with DMRB Volume 11 Section 3 Part 4[8.14], the Chartered Institute for Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the United Kingdom[8.15] and all other relevant guidance as detailed in the specific methodologies above.

An Assessment of the Implications on European Sites (AIES) has been produced with regard to the Natura 2000 sites potentially affected by the Scheme. This assessment was carried out in accordance with DMRB Volume 11, Section 4, Part 1 – (HD 44/09)[8.16] and the Interim Advice Note 130/10 (Ecology and Nature Conservation: Criteria for Impact Assessment)[8.17]. This assessment has been reported in the Statement to Inform an Appropriate Assessment (SIAA) which has been provided in the Volume 3, Appendix E.2. The following sites (which were considered during the Key Stage 2 Study) have been considered in the SIAA:

- Afon Gwyrfai SAC
- Menai Strait and Conwy Bay SAC
- Glynllifon SAC
- Meirionnydd Oakwoods and Bat Sites SAC

- Gwydir Forest Mines SAC

The assessment criteria below relate to the EIA only, those for the AIES have been detailed separately within the AIES documents. The surveys identified within this report are sufficient to inform the AIES.

Value of Environmental Resources and Receptors

The wildlife value has been assessed using the Ratcliffe Criteria, as described in DMRB Volume 11 Section 3 Part 4[8.14]. This assesses an ecological feature in terms of:

- Fragility
- Rarity
- Size (Area or extent)
- Diversity
- Potential Value
- Position within the Ecological/ Geographical Unit
- Typicality
- Recorded History
- Naturalness
- Intrinsic Appeal

In addition to the above, criteria are taken from the Report of UK Steering Group on Biodiversity and Guidelines for Local Biodiversity Action Plans[8.18] which will underpin the results.

- UK priority species and habitats – in particular those most characteristic of the area.
- Significance – is the habitat confined to the area or does the area have a high proportion of the national resource
- Opportunity – available to enhance the resource.
- Decline Rates – declines and measure assessment over the last 25 years.
- Threat – lack of management, recreation, pollution, development.
- Distinctiveness – high profile or popular species particularly associated with the area.
- Fragmentation – degree of habitat fragmentation/fragment viability

Importance of habitat for key species

The degree to which a feature can be substituted has also been taken into consideration. Guidance suggests that the loss of a feature of national value that is irreplaceable may be considered more significant than the loss of a feature that can be replaced or substituted.

The overall ecological value of the area has been considered in the context of the pattern of habitat and interdependencies between habitats, as well as the relative legislative value of any protected species, habitats or sites.

Values are given in terms of the geographical context in accordance with CIEEM (2006) guidance[8.15], as shown below:

- International
- UK

- National (Wales)
- County (Gwynedd)
- Local or Parish
- Zone of Influence

Examples of features of value are given below for each value level with respect to ecological features. Professional judgement has been used where the extent/population size is considered to have a bearing on the assigned value.

Very High Value (International/European Value)

- Special Areas of Conservation (EU Habitats Directive)
- Special Protection Areas (EU Birds Directive)
- Significant populations of European protected species (such as Otters, bats etc.)
- Sites hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals 1979)
- Non-designated International features such as a large population of a bird that is rare on a European scale.

High Value (UK/National Value)

- Sites of Special Scientific Interest (Wildlife & Countryside Act 1981 as amended
- Geological Conservation Review (GCR) sites
- Significant populations of UK protected species (Wildlife & Countryside Act 1981 – as amended)
- Significant populations of species listed within Section 42 of the NERC Act.

Medium Value (National i.e. Wales)

- Regionally (Gwynedd) important designations which can be reasonably substituted including: Local Nature Reserves (LNRs; National Parks and Access to the Countryside Act 1949)
- Important “inventory” sites (e.g. ancient semi-natural woodland and grassland inventories)
- Small populations of European or UK protected species
- Significant populations of UK or Wales ‘Red List’ of Birds of Conservation Concern, Species of Principal Importance for biodiversity under the NERC Act or Wales Red Data Book Species

Lower Value (County or District i.e. Gwynedd)

- Sites of Importance to Nature Conservation (SINCs)/County Wildlife Series (CWSs)/ other local designations
- Sites with Local Biodiversity Action Plan (LBAP) habitats or species,
- Non-breeding individuals of European or UK protected species
- Small populations of UK or Wales ‘Red List’ Birds of Conservation Concern, Species of Principal Importance for Biodiversity under the NERC Act or Wales Red Data Book Species

Negligible Value

Sites with no ecological designations, and at most only non-breeding individuals of LBAP species, and sites with no recognised nature conservation interest.

Assessment Criteria

The CIEEM (2006) guidance[8.15] states that '*the assessment of impacts should be undertaken in relation to the baseline conditions within the* zone *of influence that are expected to occur if the development were not to take place*'.

The baseline conditions are described as '*the conditions that would pertain in the absence of the proposed project at the time that the project would be constructed/operated/commissioned*'. The guidance recommends that these should be informed by changes arising from other causes. It is also stated that the future baseline condition should take account of:

- Environmental trends
- Completed developments
- Developments for which planning consent has been granted

A baseline projection has been presented based on the assumption that the land is left in its present condition or the present management regime continues. The significance of the impacts has been re-assessed on the assumption that the proposed mitigation measures are implemented.

The assessment includes direct, indirect, short-term, medium-term and long-term, secondary and cumulative impacts. Positive and negative impacts on the ecological baseline of the site have also been assessed.

Magnitude of impact has been assessed by the scale of loss or damage predicted to semi-natural vegetation, wildlife habitats and protected species. Significance has been assigned by looking at the magnitude of change to habitats and species of local and regional importance and assigning higher significance to greater loss of regionally important habitats.

The following criteria for determining the magnitude of impact has been used and are based upon, or adapted from, those given in the guidance.

Major negative – The proposal (either on its own or with other proposals) may adversely affect the integrity of the site, in terms of the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the population levels of species of interest.

This includes large-scale damage or loss of a large proportion of a particular semi-natural habitat type or protected species habitats that are of regional/national importance or listed as key habitats in the UK Biodiversity Action Plan Steering Group Report Loss of Protected Species.

Moderate negative – The site's integrity will not be adversely affected but the effect on the site is likely to be significant in terms of its ecological objectives. If, in the light of full information, it cannot be clearly demonstrated that the proposal will not have an adverse effect on integrity, then the impact should be assessed as major negative.

This would apply in the case of damage or loss of a small proportion of a particular semi-natural habitat type or protected species habitat that are of regional / national

importance or listed as key habitats in the UK Biodiversity Action Plan Steering Group Report.

Minor negative – Neither of the above apply, but some minor negative impact is evident. (In the case of Natura 2000 sites a further assessment may be necessary if detailed plans are not yet available).

This would apply in the case of damage or loss of a proportion of a particular semi-natural habitat type or protected species' habitat that are of district/ county importance or listed as key habitats in Local Biodiversity Action Plans.

Negligible negative – Very minor loss of or detrimental impact is evident, but below a level which would be considered a Minor negative impact.

This would apply in the case of damage or loss of semi-natural vegetation or wildlife habitats but not protected species. Habitats are not locally or regionally important.

Neutral – No observable impact in either direction. This would apply in the case of damage or minor losses of common types of habitats or common wildlife. Habitats are not locally or regionally important.

Negligible positive – Impacts which provide a negligible net gain for biodiversity overall.

Minor Positive – Impacts which provide a slight net gain for biodiversity overall. This would apply in the case of an increase in the population of a species or area of habitat which is not locally or nationally important.

Moderate Positive – Impact which provide a net gain for biodiversity overall (but which will not positively affect the integrity of the site). This would include a small increase in the proportion of a semi-natural habitat or habitat of a protected species that are locally important or listed as key habitats within the UK Biodiversity Action Plan Steering Group Report.

Major Positive – Impact which provides a net gain for biodiversity overall in terms of increases in habitat diversity (and which may positively affect the integrity of the site).

This would apply in the case of a large-scale increase in a protected species or habitat of a protected species that are locally important or listed as key habitats within the UK Biodiversity Action Plan Steering Group Report.

The integrity of a site is defined within the Welsh planning guidance (TAN 5, Welsh Office, 1996) as: '*…the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified*'.

8.2.19 Assessment of Overall Impacts

The CIEEM guidelines (2006)[8.15] define an ecologically significant impact as; '*an impact (negative or positive) on the integrity of a defined site or ecosystem and/ or the conservation status of habitats or species within a given geographical area*'.

Significance criteria has been established to take account of:

- Conservation value and/ or sensitivity of ecological feature

- Magnitude of impact
- General disturbance/ disruption to habitat
- Structural and species diversity
- Timing of impact
- Duration
- Reversibility
- Cumulative effects
- Impact inter-relationships

The overall significance of each impact is determined from the ecological value of the feature and the magnitude of the potential impact, as shown in Table 8.2.1 below, which is based on that provided within DMRB Volume 11 Section 2 Part 5 HA 205/08[8.19] and associated IAN 130/10[8.19]. As a result of the Impact Assessment table having more than one significance level for some combinations of nature conservation value and impact magnitude, professional judgement has been used in deciding which significance category is more appropriate, taking a precautionary approach where necessary.

Table 8.2.1. Table of Overall Significance of Impacts Assessment

Magnitude of potential impact	Nature Conservation Value of Sites Damaged or Improved				
	Very high	**High**	**Medium**	**Lower**	**Negligible**
Major negative	Very large adverse	Large or Very large adverse	Moderate or Large adverse	Slight or Moderate adverse	Slight adverse
Moderate negative	Large or Very large adverse	Moderate or Large adverse	Moderate adverse	Slight adverse	Neutral or Slight adverse
Minor negative	Moderate or Large adverse	Slight or Moderate adverse	Slight adverse	Neutral or Slight adverse	Neutral or Slight adverse
Negligible negative	Slight adverse	Slight adverse	Neutral or Slight adverse	Neutral or Slight adverse	Neutral
Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Negligible positive	Slight positive	Slight positive	Neutral or Slight positive	Neutral or Slight positive	Neutral
Minor positive	Moderate or Large positive	Slight or Moderate positive	Slight positive	Neutral or Slight positive	Neutral or Slight positive
Moderate positive	Large or Very Large positive	Moderate or Large positive	Moderate positive	Slight positive	Neutral or Slight positive
Major positive	Very large positive	Large or Very large positive	Moderate or Large positive	Slight or Moderate positive	Slight positive

The CIEEM guidelines published in January 2016 have not been incorporated within this assessment as these were published after the first draft of the Environmental

Statement was published and the guidelines to be used were agreed as part of the Environmental Scoping Report.

8.2.20 Zone of Influence (ZoI)

The Zone of Influence (ZoI) concept is used to describe the area over which impacts may occur as a result of the Scheme. Clearly, the relevant ZoI will depend on the ecological receptor concerned. For example, a SAC designated for mobile species such as bats may be considered within the ZoI at greater distance from the Scheme than a SAC designated for sedentary species or habitats such as ancient woodland, and the same may be true for undesignated receptors. The relevant ZoI have been provided for each feature within the baseline and impact assessment sections, where relevant.

8.2.21 Limitations and Assumptions

A number of limitations apply for the ecological surveys which have been undertaken. Species and habitats are dynamic, affected by natural processes as well as human intervention; consequently, the presence of particular species or habitats may change over time, and this can be impossible to detect during 'snapshot' surveys, over a brief time period, however detailed those surveys are. Where possible, an indication of likely future baseline conditions for the receptors described below is provided.

In addition, many species are only apparent seasonally, so that surveys at some times of year may be better able to detect them (e.g. recording of higher plants during Phase 1 habitat surveys). Some species are also affected by weather conditions, and may not be recorded during adverse weather even if present at that time of year (e.g. bats recorded during bat activity surveys). As far as possible, all surveys described in this Chapter were undertaken at optimal times and conditions for recording the target species, and all surveys were undertaken at suitable times and conditions unless otherwise stated below or in the relevant appendix. Weather conditions for the spring and summer of 2015 were as expected and not considered to be colder or warmer than average.

Given these difficulties in reliable recording and prediction of the presence of ecological receptors, where there is any uncertainty, a precautionary approach has been taken where necessary in the assessment of impacts and subsequent mitigation design.

8.2.22 Consultation

Various formal and informal meetings, discussions and other communications have been had with NRW, Gwynedd Council and other statutory and non-statutory bodies during the Key Stage 3 process. These have been summarised within Chapter 1 and Appendix A.3.

8.3 Baseline Conditions

8.3.1 Designated Sites

Internationally designated sites

All internationally designated sites within 30km of the Scheme are compiled within Table 8.3.1 below:

Table 8.3.1: International Statutory Designated Sites within 30km of the Scheme

Designation Type	Site Name	Distance from Scheme	Qualifying Interests
SAC	Afon Gwyrfai a Llyn Cwellyn	0.00km	Habitats: - Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea Uniflorae and/or of the Isoëto-Nanojuncetea - Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation Species: - Atlantic Salmon - Floating Water Plantain - Otter
SAC	Y Fenai a Bae Conwy / Menai Strait and Conwy Bay	0.38km	Habitats: - Sandbanks that are slightly covered by seawater at all times - Mudflats and sandflats not covered by seawater at low tide - Reefs - Large shallow inlets and bays - Submerged of partially submerged sea caves
SAC	Glynllifon	1.29km	Species: - Lesser Horseshoe Bat
SAC	Y Twyni o Abermenai i Aberffraw / Abermenai to Aberffraw Dunes	2.53km	Habitats: - Embryonic shifting dunes - Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`) - Fixed dunes with herbaceous vegetation (`grey dunes`) - Dunes with Salix repens ssp. argentea (Salicion arenariae) - Humid dune slacks - Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation Species: - Petalwort - Shore Dock
SAC	Glannau Mon: Cors heli / Anglesey Coast: Saltmarsh	3.31km	Habitats: - Salicornia and other annuals colonising mud and sand - Atlantic salt meadows (Glauco-Puccinellietalia maritimae) - Estuaries

Designation Type	Site Name	Distance from Scheme	Qualifying Interests
			- Mudflats and sandflats not covered by seawater at low tide
SAC	Corsydd Eifionydd / Eifionydd Fens	5.95km	Habitats: - Transition mires and quaking bogs Species: - Marsh Fritillary - Slender Green Feather-moss
SAC	Eryri / Snowdonia	6.11km	Habitats: - Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea - Siliceous alpine and boreal grasslands - Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels - Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) - Calcareous rocky slopes with chasmophytic vegetation - Siliceous rocky slopes with chasmophytic vegetation - Northern Atlantic wet heaths with Erica tetralix - European dry heaths - Alpine and Boreal heaths - Alpine and subalpine calcareous grasslands - Species-rich Nardus grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe) - Blanket bogs - Depressions on peat substrates of the Rhynchosporion - Petrifying springs with tufa formation (Cratoneurion) - Alkaline Fens - Alpine pioneer formations of the Caricion bicoloris-atrofuscae - Old sessile oak woods with Ilex and blechnum in the British Isles Species: - Slender Green Feather-moss - Floating Water-plantain
SAC	Glan-traeth	8.41km	Species: - Great crested newt
SAC	Corsydd Mon / Anglesey Fens	10.96km	Habitats:

Designation Type	Site Name	Distance from Scheme	Qualifying Interests
			- Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. - Calcareous fens with Cladium mariscus and species of the Caricion davallianae - Alkaline fens - Northern Atlantic wet heaths with Erica tetralix - Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) Species: - Geyer's Whorl Snail - Southern Damselfly - Marsh Fritillary
SAC	Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites	14.69km	Habitats: - Old Sessile Oak woods with Ilex and blechnum in the British Isles - Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) - Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation - Northern Atlantic wet heaths with Erica tetralix - European dry heaths - Tilio-Acerion forests of slopes, screes and ravines - Bog woodland Species: - Lesser Horseshoe Bat
SAC	Coedydd Aber	15.44km	Habitats: - Old Sessile Oak woods with Ilex and blechnum in the British Isles - Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)
SAC	Clogwyni Pen Llyn / Seacliffs of Lleyn	18.44km	Habitats: - Vegetated sea cliffs of the Atlantic and Baltic coasts
SAC	Pen Llyn a'r Sarnau / Lleyn Peninsula and the Sarnau	19.86km	Habitats: - Sandbanks which are slightly covered by sea water all the time - Estuaries - Coastal lagoons - Large shallow inlets and bays - Reefs

Designation Type	Site Name	Distance from Scheme	Qualifying Interests
			- Mudflats and sandflats not covered by seawater at low tide - Salicornia and other annuals colonising mud and sand - Atlantic salt meadows (Glauco-Puccinellietalia maritimae) - Submerged or partially submerged sea caves Species: - Bottlenose Dolphin - Otter - Grey Seal
SAC	Llyn Dinam	22.30km	Habitats: - Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation
SAC	Morfa Harlech a Morfa Dyffryn	23.69km	Habitats: - Embryonic shifting dunes - Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`) - Dunes with salix repens ssp. argentea (Salicion arenariae) - Humid dune slacks - Species: - Petalwort
SAC	Mwyngloddiau Fforest Gwydir / Gwydyr Forest Mines	24.87km	Habitats: - Calaminarian grasslands of the Violetalia calaminariae - Species: - Lesser Horseshoe Bat
SAC	Corsydd Llyn / Lleyn Fens	25.13km	Habitats: - Alkaline fens - Calcareous fens with Cladium mariscus and species of the Caricion davallianae Species: - Desmoulin's Whorl Snail - Geyer's Whorl Snail
SAC	Migneint-Arenig-Dduallt	28.78km	Habitats: - European dry heaths - Blanket bogs - Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea - Natural dystrophic lakes and ponds - Northern Atlantic wet heaths with Erica tetralix - Old sessile oak woods with Ilex and blechnum in the British Isles
SAC	Rhinog	29.16km	Habitats: - European dry heaths

Designation Type	Site Name	Distance from Scheme	Qualifying Interests
			- Old sessile oak woods with Ilex and blechnum in the British Isles - Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea - Northern Atlantic wet heaths with Erica tetralix - Alpine and Boreal heaths - Blanket bogs - Depressions on peat substrates of the Rhynchosporion Species: - Floating Water-plantain
SPA	Traeth Lafan / Lavan Sands, Conway Bay	11.07km	Significant numbers of: - Oystercatcher - Curlew - Great Crested Grebe
SPA	Liverpool Bay / Bae Lerpwl (Wales)	16.08km	Significant numbers of: - Red Throated Diver - Common Scoter
SPA	Ynys Seiriol / Puffin Island	20.86km	Significant numbers of: - Cormorant
SPA	Ynys Feurig, Cemlyn Bay and The Skerries	20.95km	Significant numbers of: - Roseate Tern - Common Tern - Arctic Tern - Sandwich Tern
SPA	Glannau Ynys Gybi / Holy Island Coast	23.34km	Significant numbers of: - Chough
SPA	Migneint-Arenig-Dduallt	28.78km	Significant numbers of: - Hen Harrier - Merlin - Peregrine Falcon
Ramsar	Corsydd Môn a Llyn / Anglesey and Llyn Fens	10.96km	Ramsar criterion 1: The site supports a suite of base-rich, calcareous fens which is a rare habitat type within the United Kingdom's biogeographical zone. Habitats Directive Annex I features present on the SAC include: - Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. - Northern Atlantic wet heaths with Erica tetralix - Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)

Designation Type	Site Name	Distance from Scheme	Qualifying Interests
			- Calcareous fens with Cladium mariscus and species of the Caricion davallianae - Alkaline fens - Geyers' whorl snail - Southern damselfly - Marsh fritillary Ramsar criterion 3: The site supports a diverse flora and fauna with associated rare species and is of special value for maintaining the genetic and ecological diversity of the region.
Ramsar	Llŷn Idwal	13.84km	Ramsar criterion 1: A small, shallow, oligotrophic corrie lake. The semi-circular rock basin (or cwm) containing the lake is one of the finest examples in Snowdonia. Ramsar criterion 2: Species-rich plant community, including almost all of the species typical of oligotrophic waters in Britain. Notable species include Elatine hexandra and Subularia aquatica (both nationally scarce) and Pilularia globulifera (vulnerable at a European level).

Of the above there are five sites considered to be within the ZoI of the Scheme, as shown in Volume 2, Figure 8.1 and listed below:

- Afon Gwyrfai Special Area of Conservation (SAC), located within the Scheme footprint
- Menai Strait and Conwy Bay SAC, located approximately 0.38km to the north and west of the Scheme
- Glynllifon SAC, located approximately 1.29km to the south of the Scheme
- Meirionnydd Oakwoods and Bat Sites SAC, located approximately 14.69km to the south east of the Scheme
- Gwydir Forest Mines SAC, located approximately 24.87km to the east of the Scheme

The remaining sites are considered sufficiently distant, with immobile designatory features or features that are not considered likely to be impacted by the Scheme and as such have not been considered further within this assessment. The Llŷn Peninsula and the Sarnau SAC located 19.9km to the south is designated for Otters and whilst the SAC, at 20km distant, is within the known possible home range of Otters. The fact that it lies within a different catchment means that the SAC will not be considered further. Potential landscape scale habitat links between this catchment and the Afon Gwyrfai catchment will be considered as requested during consultation with the statutory bodies. Refer to the Statement to Inform the Appropriate Assessment 8.17 for more detail.

The Afon Gwyrfai SAC is designated for its oligotrophic standing waters with vegetation of the *Littorelletea uniflorae*, *Isoetes lacustris* and other macrophytes. It is a watercourse of plain to montane levels, with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. It has also been designated for its populations of Atlantic Salmon, Floating Water-plantain (*Luronium natans*) and Otter.

The Menai Strait and Conwy Bay SAC is designated for its sandbanks which are slightly covered by sea water all the time, mudflats and sandflats not covered by seawater at low tide, reefs, large shallow inlets and bays and submerged or partially submerged sea caves.

The Glynllifon SAC is designated for its significant Lesser Horseshoe Bat populations which constitutes approximately 6% of the total UK population and includes breeding and hibernating colonies.

The Meirionnydd Oakwoods and Bat Sites SAC is designated for its old Sessile Oak (*Quercus petraea*) woods and associated flora of bryophytes and lichens, Alder (*Alnus glutinosa*) alluvial forest, watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, Tilio-Acerion forests of slopes, screes and ravines and bog woodland. It has also been designated for its Lesser Horseshoe Bat populations including breeding and hibernating colonies.

The Gwydir Forest Mines SAC is designated for its Calaminarian grasslands of the Violetalia calaminariae and for its Lesser Horseshoe Bat populations.

The potential impacts resulting from the Scheme are explored in more detail in the SIAA which is included in Volume 3, Appendix E.2.

The Core Management Plan (CMP) for the Afon Gwyrfai SAC[8.20] highlighted that the oligotrophic standing waters are unfavourable (recovering) due to historic moderate acidification, Atlantic Salmon is unfavourable due to a precautionary assessment of survey results and the presence of adverse factors and Otter populations are unfavourable due to the number and distribution of breeding sites. The watercourses of plain to montane levels and floating water-plantain were noted to be in favourable condition. However, the CMP details management requirements and provides an action plan for each management unit, consequently it is predicted that the SAC would remain of international importance over the lifetime of the Scheme.

The Regulation 33 Advice for the Menai Strait and Conwy Bay SAC[8.21] highlighted that the (features) to be in unfavourable condition. However, the Advice details management requirements and provides an action plan for each management unit, consequently it is predicted that the SAC would remain of international importance over the lifetime of the Scheme.

The CMP for the Glynllifon SAC[8.22] highlighted that the Lesser Horseshoe Bat population within the SAC is considered to be in an unfavourable condition based on the summer bat counts in 2007 and past data largely due to the maintenance and management requirements of the roost structures not being met sufficiently. However, the CMP details management requirements and provides an action plan for each management unit, consequently it is predicted that the SAC would remain of international importance over the lifetime of the Scheme.

The CMP for the Meirionnydd Oakwoods and Bat Sites SAC[8.23] highlighted that the oak woods are in unfavourable recovering status due to a lack of dead wood and

mature-veteran trees, low regeneration levels, high levels of non-native species and the poor condition of lower plants and field layer species, bog woodland is unfavourable due to the spread of species that result in drying out, alluvial forests are unfavourable due to a lack of dead wood and veteran trees and dry heath are also unfavourable due to poor heather structure and bracken dominance. Lesser Horseshoe Bat populations are also recorded as unfavourable due to a lack of commuting route and roost connectivity. Mixed woodland is recorded as favourable while the Floating Water Crowfoot vegetation has not been assessed. However, the CMP details management requirements and provides an action plan for each management unit, consequently it is predicted that the SAC would remain of international importance over the lifetime of the Scheme.

The CMP for the Gwydir Forest Mines SAC[8.24] highlighted that the Calaminarian grasslands are in unfavourable condition due to encroachment of higher plants, smothering from conifer needles, and extraction of mine spoil and recreation impacts. Lesser Horseshoe Bat populations are in unfavourable condition due to poor roost entrance integrity and internal and external roost disturbance. However, the CMP details management requirements and provides an action plan for each management unit, consequently it is predicted that the SAC would remain of international importance over the lifetime of the Scheme.

None of the other internationally designated sites within 30km of the Scheme are considered to be within the Zone of Influence (ZoI) for the Scheme, given the features for which they are designated and the distances involved.

Nationally designated sites

All nationally designated sites within 10km of the Scheme are compiled within Table 8.3.2 below:

Table 8.3.2: National Statutory Designated Sites within 10km of the Scheme

Designation Type	Site Name	Distance from Scheme	Brief Citation Summary
SSSI	Afon Gwyrfai a Llŷn Cwellyn	0.00km	The site is of special scientific interest for its geological and biological features. Features of special interest on this site are running and standing water, aquatic plant assemblage, floating water-plantain, Arctic Charr (not in river section which is in close proximity to scheme), Atlantic Salmon and Otter.
SSSI	Afon Seiont	0.63km	Geological
SSSI	Glynllifon	1.29km	This site is of special interest for the population of Lesser Horseshoe Bats (roost as well as foraging habitat). A number of other bat species are also present.
SSSI	Y Foryd	1.39km	This site is of special interest for its ornithological and marine biological features, comprising dwarf eelgrass beds and their associated intertidal species and

Designation Type	Site Name	Distance from Scheme	Brief Citation Summary
			a nationally important over-wintering population of Wigeon.
SSSI	Pant cae Haidd	2.26km	This site is of special interest for its fen meadow vegetation and associated habitats.
SSSI	Morfa Dinlle	2.53km	This site is of special interest for its sand dune and shingle plant communities and geomorphological interest. The site supports the only example within the West Gwynedd Area of Search (AoS) of the uncommon sand sedge, lichen-dominated sand dune community described as the Carex arenaria-Cornicularia aculeata dune community. Morfa Dinlle is the best example of only two sites in Wales for this type of community.
SSSI	Newborough Warren - Ynys Llanddwyn	3.31km	This site is notified for its geological, geomorphological and biological (botanical, invertebrate and ornithological) interest. Newborough Warren is the largest sand dune system in West Gwynedd, showing the full development from strandline and shingle flora, dune ridges, wet and dry slacks to dune grassland and scrub development along with a dune-dammed lake, freshwater fen, saltmarsh and mudflats.
SSSI	Dinas Dinlle	3.64km	Geological
SSSI	Moel Tryfan	4.48km	Geological
SSSI	Llwyn y Coed	4.74km	This site is a Sessile Oak wood. The principle interest of the wood is its Atlantic flora which includes both British species of filmy ferns (Hymenophyllum wilsonii and H tunbrigense and an abundance of oceanic mosses, liverworts and lichens. It is one of the most important woodland sites in North Gwynedd for its woodland Atlantic bryophyte flora.
SSSI	Llyn Padarn	4.82km	This site is notified for its biological and geological interest. It is one of only three remaining natural localities in Wales for the Arctic Charr, a glacial relict fish species.
SSSI	Coedydd Afon Menai	5.53km	Coedydd Afon Menai is a representative example of an ivy-oak/ash Hedera Helix -

Designation Type	Site Name	Distance from Scheme	Brief Citation Summary
			Quercus/Fraxinus type woodland. A number of rare Sorbus species occur in the woodland.
SSSI	Cors Llanllyfni	5.95km	Cors Llanllyfni is selected for its biological interest and particularly a population of the internationally important Slender Green Feather-moss.
SSSI	Eryri	6.11km	
SSSI	Glannau Porthaethwy	6.27km	The shore is of special interest as it is the most extensive sheltered rock shore in the area between Bardsey Island and Great Orme's Head and because it supports the greatest diversity of marine plant and animal communities on this type of shore within this area. The shore is also important for the presence of five marine communities of restricted national distribution, five diverse rockpool and overhang communities, and for exhibiting the most comprehensive community zonation characteristic of sheltered rocky shores.
SSSI	Sgistau Glas Ynys Mon	6.27km	
SSSI	Malltraeth Marsh - Cors Ddyga	6.94km	This site has been selected for its biological interest. It is especially important for its breeding bird community of lowland damp grassland, as a threatened habitat of wet meadows, and for its botanical interest of its ditches and watercourses
SSSI	Eithinog	7.13km	This site is primarily designated for its waxcap grassland fungi.
SSSI	Cwm Dwythwch	7.13km	Geological
SSSI	Coed Dinorwig	7.22km	Coed Dinorwig is a large representative example of a wood sage - oak/birch Teucrium scorodonia - Quercus/Betula type woodland.
SSSI	Glan-traeth	8.41km	This site is selected for its zoological interest and also has important botanical features. The shallow pools at Glan-traeth, created by the extraction of sand, support one of the largest breeding populations of the Great Crested Newt (*Triturus cristatus*) known in Great Britain.

Designation Type	Site Name	Distance from Scheme	Brief Citation Summary
SSSI	Llyn Peris	8.46km	Geological
SSSI	Trum y Ddysgl	8.71km	Geological
SSSI	Cadnant Dingle	8.81km	This site has been selected as a representative example of the Brachypodium sylvaticum - Quercus/Fraxinus (slender false brome - oak/ash) group of broadleaved woodlands. The ground flora includes a range of woodland herbs and corns and is notably rich in bryophytes. It is also one of the few remaining localities in the area which is still frequented by Red Squirrel.
SSSI	Clogwynygarreg	9.18km	Geological
SSSI	Cors Gyfelog	9.30km	This site is selected for its biological interest, including three habitat types: as an example of a northern mesotrophic mire, for other wetland (swamp) habitats and for its mature willow carr (Salix cinerea) habitat, the latter supporting rich lichen and bryophyte communities. The site also qualifies for the Slender Green Feather-moss, for the important assemblage of bryophytes and for the Marsh Fritillary butterfly
SSSI	Caeau Tan y Bwlch	9.45km	The site encompasses an area of Centaurea nigra - Cynosurus cristatus (Common Knapweed - Crested Dog's-tail) neutral pasture. It is one of the few remaining examples of traditionally managed enclosed pastures on the Llŷn which have not been agriculturally "improved" by artificial fertiliser or reseeding in recent times.
AONB	Ynys Mon - Anglesey	1.00km	
AONB	Llŷn	6.90km	
National Nature Reserve	Newborough Warren and Ynys Llanddwyn	3.46km	
National Park	Snowdonia	5.25km	

Of the above there are four Sites of Scientific Interest (SSSI) considered to be within the ZoI of the Scheme, these are shown in Volume 2, Figure 8.1 and as listed below:

- Afon Gwyrfai a Llyn Cwellyn SSSI, located within the footprint of the Scheme
- Afon Seiont SSSI, located approximately 0.63km to the west of the Scheme
- Glynllifon SSSI, located approximately 1.29km to the south of the Scheme

- Llwyn y Coed SSSI, located 4.74km to the east of the Scheme

The SSSIs associated with the Menai Straits and Conwy Bay, Meirionnydd Oakwoods and Bat Sites and the Gwydir Forest Mines SACs are designated for immobile habitats or features that are outside the ZoI of the Scheme and as such have not been included within the above list.

The Afon Gwyrfai a Llyn Cwellyn SSSI is designated for both geological and biological features. The biological features of the site are running and standing water, aquatic plant assemblages, Floating Water-plantain, Arctic Charr (*Salvelinus alpinus*) (not in river section which is in close proximity to scheme), Atlantic Salmon and Otter. The geological features of the site consist of a steeply inclined unique occurrence of fluorite mineralization in the Welsh Caledonides.

The Afon Seiont SSSI is designated for its geological features of exposed Arenig and overlying Llanvirn strata which is of national importance because of the succession demonstrated.

The Glynnllifon SSSI is designated for its population of Lesser Horseshoe Bats (roost as well as foraging habitat). A number of other bat species are also present including Whiskered Bat (*Myotis mystacinus*), Natterer's Bat (*M. nattererii*), Daubenton's Bat (*M daubentonii*), Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano Pipistrelle (*P. pygmaeus*), Noctule Bat (*Nyctalus noctula*) and the Brown Long-eared Bat (*Plecotus auritus*).

The Llwyn y Coed SSSI is designated for its Sessile Oak wood. The principle interest of this wood is its Atlantic flora which includes both British species of filmy ferns (*Hymenophyllum wilsonii* and *H tunbrigense*) and an abundance of oceanic mosses, liverworts and lichens. It is considered to be one of the most important woodland sites in North Gwynedd for its woodland Atlantic bryophyte flora.

As these sites are subject to monitoring by NRW and there are no specific known threats to these, it is predicted that these sites would remain of national importance for the life time of the Scheme.

8.3.2 Locally designated sites

All locally designated sites within 1km of the Scheme are shown in Volume 2, Figure 8.1 and compiled in Table 8.3.3 below:

Table 8.3.3: Local Non-Statutory Designated Sites within 1km of the Scheme

Designation Type	Site Name	Distance from the Scheme
Wildlife Site 1	Afon Seiont (Middle)	0km
Wildlife Site 2	Afon Seiont Mosaic (North)	0km
Wildlife Site 3	Felinwnda	0km
Wildlife Site 4	Waenfawr Road	0km
Wildlife Site 5	Rhyddallt-bach	0.007km
Wildlife Site 6	Llanfair Wood & nearby copses	0.009km
Wildlife Site 7	Lon-glai	0.058km
Wildlife Site 8	Afon Seiont Mosaic (South)	0.110km

Designation Type	Site Name	Distance from the Scheme
Wildlife Site 9	Gallt-y-sil farm	0.138km
Wildlife Site 10	Afon Seiont (Lower)	0.143km
Wildlife Site 11	Afon Seiont Mosaic (East)	0.155km
Wildlife Site 12	Pont Rug (Id:894)	0.199km
Wildlife Site 13	Afon Cadnant	0.292km
Wildlife Site 14	Afon Beuno (Id:995)	0.294km
Wildlife Site 15	Maes-merddin	0.353km
Wildlife Site 16	Tyddyn-llwydyn	0.429km
Wildlife Site 17	Afon Beuno (Id:999)	0.455km
Wildlife Site 18	Glanrafon	0.460km
Wildlife Site 19	Pont Rug (Id:875)	0.487km
Wildlife Site 20	Afon Seiont (Upper)	0.517km
Wildlife Site 21	Tyddyn-bach	0.555km
Wildlife Site 22	Ty' rallt Farm	0.625km
Wildlife Site 23	Ty'n-y-coed	0.637km
Wildlife Site 24	Caeathro	0.650km
Wildlife Site 25	Cae-rhydau	0.665km
Wildlife Site 26	Ty Gwyn	0.674km
Wildlife Site 27	Dolgynfydd-uchaf	0.685km
Wildlife Site 28	Coed Mawr	0.738km
Wildlife Site 29	Pen-yr-Orsedd	0.819km
Wildlife Site 30	Plas Brereton	0.825km
Wildlife Site 31	Buarthau	0.832km
Wildlife Site 32	Tyn'-lon	0.852km
Wildlife Site 33	Coed Parciau	0.880km
Wildlife Site 34	Tyddyn Bychan	0.884km
Wildlife Site 35	Lletty	0.992km

Of the above there are nine Wildlife Sites (candidate) considered to be within the ZoI of the Scheme as listed below:

- Afon Seiont (Middle), located within the footprint of the Scheme and consists of aquatic habitats
- Afon Seiont Mosaic (North), located within the footprint of the Scheme and consists of broadleaved woodland
- Felinwnda, located within the footprint of the Scheme and consists of broadleaved woodland
- Waenfawr Road, located within the footprint of the Scheme and consists of semi-improved neutral grassland
- Rhyddallt Bach, located 0.007km to the west of the Scheme and consists of broadleaved woodland
- Llanfair Wood & nearby copses, located 0.009km to the north of the Scheme and consists of broadleaved and coniferous woodland

- Lon-glai, located 0.058km to the east of the Scheme and consists of marshy grassland
- Gallt-y-sil farm, located 0.138km to the west of the Scheme and consists of broadleaved woodland

As there are no specific known threats to these, it is predicted that these sites would remain of local importance for the life time of the Scheme.

8.3.3 Plants and Habitats

Description of the Scheme

The Scheme would cross primarily improved grassland to the west of Bontnewydd and the east of Caernarfon. The Scheme crosses the Afon Gwyrfai and the Afon Seoint and their associated flood plains which are dominated by improved grassland separated by heavily managed hedgerows. There are small woodland areas along the length of the Scheme with more sizeable woodland areas at Penrhos and adjacent to the Glan Gwna Holiday Park. There are also a number of small marshy grassland areas along the length of the Scheme. The northern half of the Scheme also includes a small number of arable fields.

The following sections describe the habitats present on the Scheme; Phase 1 Habitat survey plans for the Scheme are shown in Volume 2, Figure 8.2.

Broadleaved woodlands and scrub

There are small woodland areas along the Scheme in several locations: to the south and west of Llanwnda, within and to the north and east of Gypsy Wood Park and to the south and west of the Plas Menai Roundabout. These woodlands typically support Sycamore (*Acer pseudoplatanus*), Willow (*Salix sp.*), Hazel (*Coryllus avellana*), Ash (*Fraxinus excelsior*) and Hawthorn (*Crataegus monogyna*) with a range of other species in some areas including Field Maple (*Acer campestre*), Horse Chestnut (*Aesculus hippocastanum*), Silver Birch (*Betula pendula*), Holly (*Ilex aquifolium*), Bramble (*Rubus fruticosus agg*), European Gorse (*Ulex europeaus*), Hornbeam (*Carpinus betulus*) and Beech (*Fagus sylvatica*). Several of the woodlands also supported relatively diverse ground floras such as Wild Garlic (*Allium ursinum*), Cleavers (*Galium aparine*), Herb Robert (*Geranium robertianum*), Ivy (*Hedera helix*), Bracken (*Pteridium aquilinum*) and Lesser Celandine (*Ranunculus ficaria*).

There are some larger woodland areas along the Scheme in the vicinity of Penrhos and the Glan Gwna Holiday Park either side of the Afon Seoint. These woodlands typically support Sycamore, Field Maple, Bird Cherry (*Prunus avium*), Sessile Oak, Hawthorn and Pedunculate Oak (*Quercus robur*). These areas also support a diverse ground flora including Ivy, Bramble, Wood Sage (*Teucrium scorodonia*), Common Dog Violet (*Viola riviniana*), Foxglove (*Digitalis purpurea*), Male Fern (*Dryopteris filix-mas*), Willowherb (*Epilobium sp.)* and Bluebell.

Native broadleaved woodlands are identified as a priority habitat in the TREBAP

The nature conservation value of these areas in the absence of development is unlikely to increase significantly over time. Changes to management are considered unlikely, as the majority of these woodlands are managed as part of wider agricultural practices and the remaining areas are on slopes too steep to readily allow access,

consequently it is considered most likely that these would retain their value over the operational lifetime of the Scheme.

Coniferous woodlands

There is only one area of conifer plantation across the Scheme, located to the northern end adjacent to the Plas Menai Roundabout. This is known as Bryn Covert and supports European Larch (*Larix decidus*) and Spruce (*Picea sp*) as well as some broadleaf species including Sycamore, Hazel and Blackthorn (*Prunus spinosa*).

The conifers are unlikely to be harvested from this area, and it may therefore be expected that as this becomes over-mature and fails, the proportion of broadleaved species may increase through germination from the seed bank. As such, it is considered possible that the ecological value of these may increase over time, either through harvesting or natural processes, though any benefit may be negated by replanting of conifers, and consequently an increase in value cannot be predicted with any certainty.

Mixed woodland

No mixed woodland areas were identified along the Scheme.

Hedgerows

The majority of field boundaries along the Scheme are hedgerows rather than fences or walls. The majority of hedgerows are species-poor and/or subject to regular management by tractor-mounted flail, consequently both the lack of diversity and structure of many hedgerows along the Scheme mean they are of limited ecological value. A number of the hedgerows have associated unmanaged trees, which are not routinely trimmed. Many of these hedgerows also have associated earth banks and/or stone walls.

These hedgerows typically consist of Hawthorn, Blackthorn and European Gorse with many also supporting Bramble and Pedunculate Oak. A minority of hedgerows support other species including Willow, Ash, Rose (*Rosa sp.*), Sycamore, Field Maple, Holly, Hazel and other species.

Of the 47 hedgerows surveyed along the Scheme alignment, eight were found to have the criteria to be classified as ‘important hedgerows’ under the hedgerow regulations, due to their species diversity and/or association with features such as public rights of way, earth banks and standard trees.

There are a number of hedgerow trees on or close to the route of the Scheme, the majority of which are typical hedgerow trees with limited ecological value. The arboricultural assessment did identify a group of high quality Category A trees which are of increased value due to the purpose these serve as a shelter belt to the adjacent nursery stock. This does not increase the value of these trees from an ecological perspective.

Assessment of these and other trees for their potential for roosting bats (see below) found a number of Category 1 and 1* trees as well as numerous Category 2 and 3 trees throughout the length of the Scheme. Volume 3, Appendix D.4 of this ES is a detailed arboricultural survey and shows the locations of individual trees within 50m of the Scheme.

Assessment of hedgerows for their suitability to support Dormice (see below) found many of these hedgerows to be sub-optimal with the remaining suitable for dispersal only.

Linear features including hedgerows are identified as a priority habitat in the TREBAP.

The nature conservation value of the hedgerows is unlikely to either increase or decrease over the operational life time of the Scheme.

Watercourses

The Scheme crosses watercourses in the following locations: two minor streams flowing through woodland and improved and marshy grassland to the north and south of Llanwnda, the Afon Gwyrfai, classified as a main river, to the southern part of the Scheme, a minor stream that flows beneath the existing A487 south of Bontnewydd, the Afon Seoint, classified as a main river, to the central part of the Scheme, a minor stream flowing through improved and marshy grassland north of Erw-pwll-y-glo, the Afon Cadnant, classified as a main river and a minor stream/tributary flowing through improved grassland and scrub to the west of Crug House. A ditch was noted along the north western boundary of Bryn Covert although this was dry at the time of survey. Each of these are described fully within Section 14.3.3 of Chapter 14: Road Drainage and the Water Environment.

The majority of these watercourses are small streams or seasonally wet ditches which do not support distinctive or important communities of aquatic, semi-aquatic or marginal plants. The two larger watercourses, Afon Gwyrfai and Afon Seiont, represent a more ecologically important resource with diverse and important communities of aquatic, semi-aquatic or marginal, particularly the Afon Gwyrfai given its designation as an SAC for such features. Part of the Afon Seiont is also designated as a SSSI for its geological value. Consequently, these two watercourses are considered to be more valuable that the other minor streams and ditches and so are considered as separate receptors in the summary table below.

Rivers and streams are identified as priority habitats under both the Gwynedd LBAP and TREBAP.

Watercourses are a habitat at risk of experiencing changes over time, even in the absence of the Scheme, due to climate change. Although specific changes are hard to predict, there appears to be a trend towards experiencing more frequent periods of very wet weather resulting in flood conditions, and also more periods of prolonged drought. In addition, watercourses can obviously be affected by changes to land management upstream. It is considered likely that the two larger watercourses would retain sufficient flow even during dry periods to maintain their current ecological value, though they would remain at risk of damage through pollution or sedimentation, particularly during low flows. The smaller streams and ditches may become seasonal/even more seasonal in their flow patterns and are therefore unlikely to increase in value, and may well decline in value over the operational life time of the Scheme.

Ponds

Twelve ponds have been identified within the survey area although there are none along the route of the Scheme itself. A majority of these ponds are relatively small within either marshy grassland or woodland areas with limited aquatic/semi-aquatic

vegetation. There are a small number of larger ponds but these also have limited aquatic/semi-aquatic vegetation and are primarily used for amenity purposes. None of the ponds are considered to be at risk from frequent drying out.

All of these ponds were subject to a HSI assessment which found a majority of these ponds to be below average or poor. Two of the ponds were average or better and as such were subject to further amphibian surveys (see below), which showed medium populations of common amphibian species, namely Palmate (*Lissotriton helveticus*) and Smooth Newts (*Lissotriton vulgaris*), but no evidence of Great Crested Newts. No adult common toads were recorded during these surveys however pond 1 was noted to have numerous tadpoles during the first survey visit.

Smaller ponds are a habitat at risk of experiencing changes over time, even in the absence of the Scheme, particularly due to climate change as drought periods are longer and more frequent, although specific changes are hard to predict. In addition, all ponds can be affected by changes to adjacent land management as well as changes in direct management. It is considered that the larger ponds would remain relatively unchanged maintaining their current nature conservation value while the smaller ponds may become prone to drying out potentially resulting in a decline in value over the operational life time of the Scheme.

Marshy grassland

There are relatively small areas of marshy grassland present throughout much of the Scheme, mostly within grazed fields along small streams or ditches. Areas of marshy grassland are present at: the southern end of the Scheme to the west of the existing A487, within farmland around Glan-rhyd to the west of Llanwnda, along the Scheme route north of Glan-rhyd, to the east and north of Cae-rhos, within Gypsy Wood Park, south of the quarry at Penrhos, within farmland at Erw-pwll-y-glo and within farmland to the south of Crug House (in the vicinity of the Bethel Road).

These areas of marshy grassland are mostly relatively small areas associated with small watercourses, springs and ditches. With the exception of the area within Gypsy Wood Park all of these were species-poor, with Soft Rush (*Juncus effusus*) dominant and often the only plant species present which was characteristic of the habitat. Consequently, while these areas have been classified as marshy grasslands to distinguish them from other improved grassland habitats, those on or close to the Scheme are considered to be of little intrinsic nature conservation value.

As with the minor watercourses, it is considered that these areas may be at risk of deterioration during the operational lifetime of the Scheme, if current trends towards prolonged periods of dry weather continue.

The marshy grassland areas south of Crug House was resurveyed in July 2016 as part of the consultation process and while it was noted that there were a small number of indicator species for Rhos Pasture habitat, the level of poaching and intensive grazing reduces the nature conservation value of this habitat. While it is acknowledged that this area is of slightly greater value than the Soft Rush dominated habitats found elsewhere it is not considered to be of sufficient diversity or extent to compare with that found within Gypsy Wood Park, which is considered to be of lower ecological value (refer to Table 8.3.6 below) and as such is still valued as negligible overall.

The marshy grassland area within Gypsy Wood Park is more diverse with soft rush sharing dominance with Bulrush (*Typha latifolia*), Common Sorrel (Rumex acetosa),

Yellow Flag Iris (*Iris pseudacorus*). Field Horsetail (*Equisetum arvense*), Marsh Thistle (*Cirsium palustre*) and Water Mint (*Mentha aquatica*) were also notable in their abundance within the sward. Consequently, this area is considered to be of greater nature conservation value than the other marshy grassland areas within the study area.

Marshy grassland could be considered under the Rhos Pasture priority habitat of the Gwynedd LBAP and TREBAP however the general dominance of Soft Rush does reduce its value.

As with the minor watercourses and other marshy grassland areas, it is considered that this area may be at risk of deterioration during the operational lifetime of the Scheme, if current trends towards prolonged periods of dry weather continue.

Poor semi-improved grassland

There are small areas of poor semi-improved grassland to the centre of the survey area with two further areas to the northern end of the Scheme. Areas of poor semi-improved grassland are located: within Gypsy Wood Park, to the south and east of the quarry at Penrhos, between the Afon Seoint and the A4085, between the Afon Seoint and the Cibyn Industrial Estate and to the north of the existing A487 at the Plas Menai Roundabout.

A majority of these areas are dominated by Meadow Grass (*Poa sp*), Bent Grass (*Agrostis sp*) and Yorkshire Fog (*Holcus lanatus*) with other grass species including Sweet Vernal Grass (*Anthoxanthum odoratum*) and Tufted Hair Grass (*Deschampsia caespitosa*). Soft Rush was also present within the sward of many of these areas along with a variety of other flora species including Common Knapweed (*Centaurea nigra*), Common Bird's-foot Trefoil (*Lotus corniculatus*), Meadow Buttercup (*Ranunculus acris*) and Common Sorrel.

These areas have limited species diversity and as such are considered to be of low nature conservation value. It is predicted that the nature conservation value of these grasslands would generally remain unchanged, although some areas could become subject to further residential or light industrial development.

The area within Gypsy Wood Park and around the Afon Seoint have a mixed sward consisting of Sweet Vernal Grass, Crested Dogstail (*Cynosurus cristatus*), Yorkshire Fog and Annual Meadow Grass (*Poa annua*) with Sedges (*Carex sp*) and Tufted Hair Grass. Silverweed (*Potentilla anserina*), Red Clover (*Trifolium pratense*) and White Clover (*T. repens*) were also present along with Common Bird's-foot Trefoil, Bluebell, Broad-leaved Dock (*Rumex obstusifolius*) and Stinging Nettle (*Urtica dioica*). Soft Rush, Bulrush and Yellow Flag Iris were noted in increased abundance within the wetter areas.

These areas are more species diverse than those elsewhere along the Scheme and as such are considered to be of greater nature conservation value. It is predicted that the nature conservation value of these grasslands would generally remain unchanged. The areas around the Afon Seoint may reduce in value as the Himalayan Balsam recorded in this area increases in extent reducing the species diversity of the habitat.

Improved grassland

As stated above, the majority of the land crossed by the Scheme comprises species-poor improved grassland of limited ecological interest. This is typically grazed with sheep or cattle, though some areas are being used for the production of silage in addition to being grazed. These habitats make up the majority of the area directly affected by the Scheme.

It is predicted that the nature conservation value of these grasslands would generally remain unchanged, although some areas close to the edge of Caernarfon and Bontnewydd could become subject to further residential or light industrial development.

Arable

A small number of arable areas were noted largely to the northern end of the Scheme, north of the Afon Seoint. Arable areas are located: west of Pont-rug, within farmland north of Erw-pwll-y-glo, within farmland north of Pen-y-Gelli and to the east of the existing Plas Menai Roundabout. These are of limited ecological interest.

It is predicted that the nature conservation value of these areas would generally remain unchanged, although their use could change as different agricultural management is applied.

Amenity grassland

Small areas of amenity grassland are present along the Scheme associated with the residential areas Llanwnda, Bontnewydd and Penrhos and with the Glan Gwna Holiday Park. These have a negligible nature conservation value and are considered unlikely to change in character or ecological importance in the absence of the Scheme.

Invasive Plant Species

The Key Stage 2 Study identified Japanese knotweed along the Afon Seoint and the Afon Gwyrfai, within the grounds of the Glan Gwna Holiday Park and along the riverbank downstream of the quarry. Himalayan Balsam was identified along the Afon Seoint.

Japanese Knotweed was identified within the Glan Gwna Holiday Park along the Afon Seoint as well as some scattered plants along the Afon Gwyrfai to the north of Plas Dinas. It was noted that Japanese Knotweed cuttings had been left with other vegetation cuttings within the habitat mosaic to the west of the Glan Gwna Holiday Park in July 2015. It did not appear to be growing in this area at the time of survey however the cuttings were fresh and given the nature of this species it is considered likely that it could become established and will need to be addressed accordingly prior to the start of works.

Extensive areas of dense Himalayan Balsam were identified on the southern side of the Afon Seoint with scattered plants recorded through the adjacent habitats including along the banks of the Seoint and along the Afon Cadnant.

Giant Hogweed (*Heracleum mantegazzianum*) was reported along the Afon Seoint although it was noted that this was being chemically controlled and removed. The

2015 habitat surveys and subsequent inspections of the area did not positively identify Giant Hogweed suggesting that this control is currently successful.

No other invasive non-native species were identified during the surveys.

These have a negligible nature conservation value and it is considered that their extent would either remain unchanged or increase in the absence of the Scheme.

Ash Die-back Disease

Ash die-back disease (*Chalara fraxinea* and its sexual stage *Hymenoscyphus pseudoalbidus*) is a fungal pathogen which causes widespread damage and death in Ash (*Fraxinus excelsior*). It was first identified as present in Britain in 2012 and by 2014 was widely, if uncommonly, reported throughout lowland England and Wales. Information on the presence of Ash die-back is required to manage the effects of the disease and inform the response of controlling and monitoring the spread of the disease.

No evidence of Ash die-back was identified during the other surveys on site, although it should be noted that ash die-back was recorded at Glynllifon in 2014, and given the low presence of Ash across the Scheme area it is anticipated that this would remain the case during the life of the Scheme.

8.3.4 Protected and Other Notable Animal Species

Roosting bats

The Key Stage 2 Study identified a number of roosts through the biological records search involving Brown Long-eared, Whiskered, Common Pipistrelles, Pipistrelle sp. (*Pipistrellus sp*.) and Lesser Horseshoe Bat, of which thirteen are located within 500m of the Scheme including two Lesser Horseshoe Bat (LHB) roosts. No specific roosts surveys were undertaken; however, no suspected roosts were identified during the 2009 or 2014 activity surveys.

The 2015 desk study and subsequent consultations identified 28 bat roosts, mainly Brown Long-eared and Pipistrelle roosts within 1km of the Scheme although none have been identified along the route itself. Fourteen non-designated Lesser Horseshoe Bats roosts were also identified within 2.5km of the Scheme including two within 500m and one within approximately 600m. The 2015 surveys did not identify any buildings along the line or within proximity of the Scheme with bat roosting potential.

The tree roost potential surveys identified 15 Category 1* trees, 79 Category 1 trees and 2 tree clusters of Category 1 & 1* out of the 162 trees surveyed. The remaining trees were generally Category 2 (62 trees) with some Category 3 (4 trees). None of these trees have been confirmed as roosts.

Lesser Horseshoe Bats are included within the Gwynedd LBAP and a general bat action plan has been included within the TREBAP.

In the absence of the Scheme, building roosts would be expected to persist while tree roosts tend to have a shorter lifespan as these are typically provided by decay features on the trees, such as peeling bark and rot cavities. It has been suggested that changing climatic conditions may allow a number of British bat species to expand their current ranges and if this were to occur it is possible that the area around the

Scheme may support a higher diversity of roosting bats than at present, although numbers would be limited by roosting and foraging opportunities.

Commuting and foraging bats

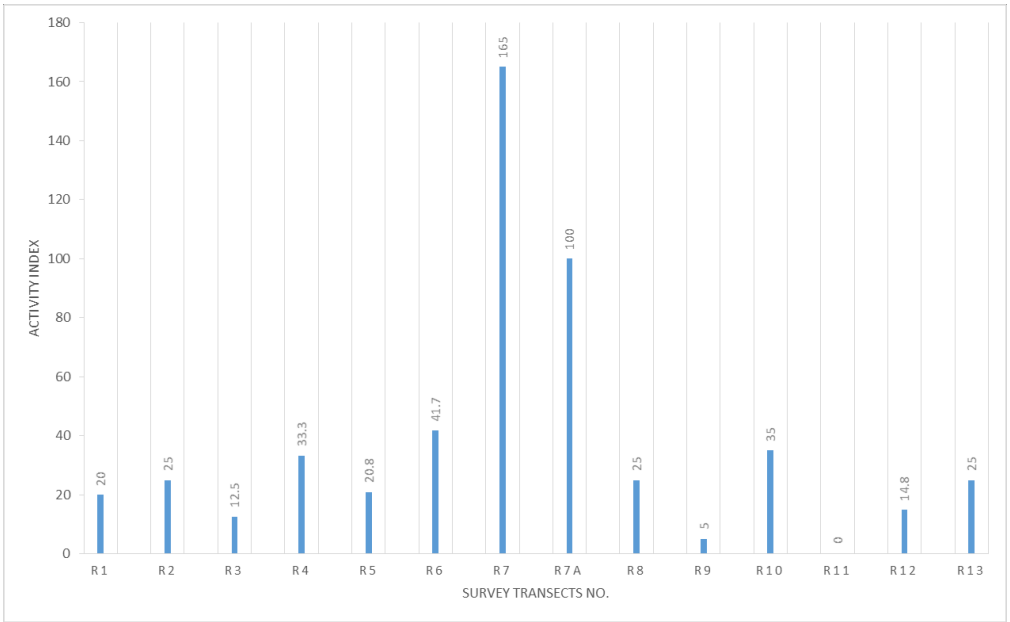
The Key Stage 2 Study confirmed the presence of seven bat species on site, namely Soprano and Common Pipistrelle, Noctule, *Myotis* sp., Daubenton's, Brown Long-eared and Lesser Horseshoe Bat. The surveys did note a southern bias with regard to Lesser Horseshoes however this species was recorded during the surveys of the more northern transects and as such were considered likely to be present throughout much of the survey area.

The 2015 surveys identified good activity across much of the Scheme with Soprano Pipistrelle recorded at all 14 transects (refer to Volume 2, Figure 8.3 for survey areas), Common Pipistrelle at 9 of the transects and Noctule and *Myotis* species at 10 of the transects. Lesser Horseshoe Bats were recorded at eight of the transects, generally to the southern and central transects. No obvious commuting routes were identified during the surveys with activity spread throughout the survey routes however it is suspected that the hedgerows to the south of the quarry are frequently used for foraging and potentially commuting given the level of activity noted in survey area 7 and 7A and the presence of a known LHB roost within the quarry area and at Glan Morfa. A summary of the survey results can be seen in table 8.3.4 with the activity indices for all surveys shown in Graph 8.3.4 below. Detailed survey information is provided within Appendix E.5:

Table 8.3.4: Summary bat survey results

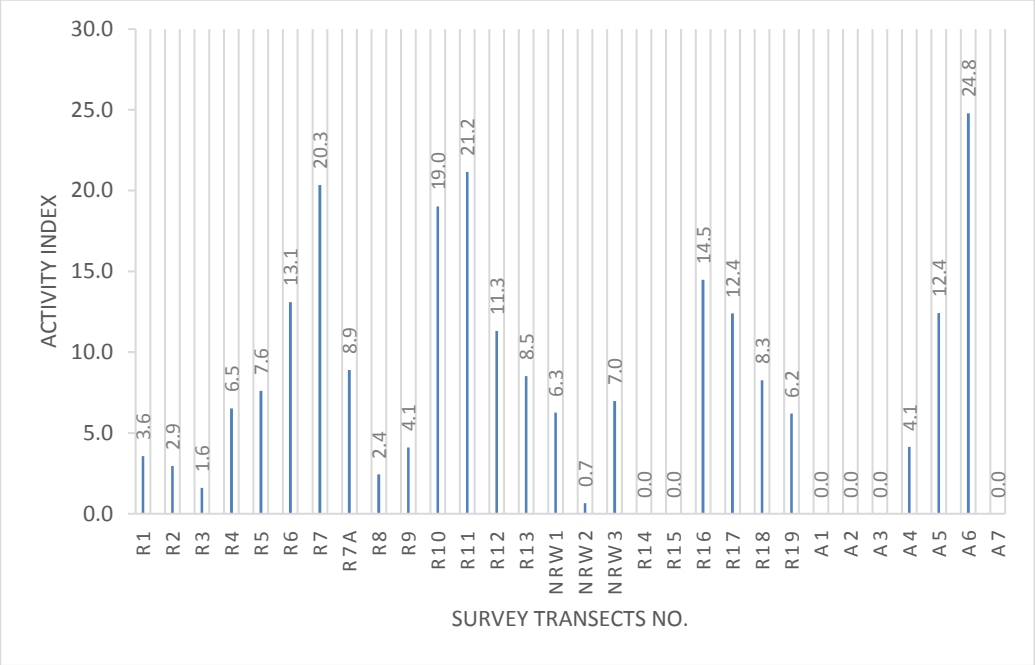
Transect	**1**	**2**	**3**	**4**	**5**	**6**	**7a**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Species														
BLE/*Myotis*														
Brown Long-eared	✔			✔								✔	?	
Common Pipistrelle	✔	✔	✔	✔				✔	✔	✔			✔	✔
Leisler's (*Nyctalus leisleri*)						?								
Lesser Horseshoe	✔	✔		✔	✔	✔	✔	✔					✔	
Myotis	✔	✔	✔		✔		✔	✔		✔	✔	✔		✔
Noctule	✔	✔	✔		✔			✔	✔	✔	✔	✔	✔	
Pipistrelle species								✔						
Serotine (*Eptesicus serotinus*)									?				✔	
Soprano Pipistrelle	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Graph 8.3.4: Lesser Horseshoe Bat activity index walked transects only - all surveys 2009, 2014 and 2015



The surveys undertaken in May and June 2016 showed a similar pattern of activity as previous years with Common and Soprano Pipistrelle and Noctule bats recorded across all survey transects. Myotis species were also recorded at all transects except R18 and Brown Long-eared were confirmed on eight of the transects. Lesser Horseshoe Bats were recorded at 21 of the 23 survey transects and 3 of the 7 scoping transects. Once again no obvious commuting routes were identified during the surveys with activity spread throughout the survey routes, as per the updated LHB activity index shown in Graph 8.3.5 below:

Graph 8.3.5: Lesser Horseshoe Bat Activity Index for all surveys conducted between 2009 and June 2016 – includes both surveyor and static detector data



All of the surveys undertaken to date have indicated that Lesser Horseshoe Bats are present across the majority of the Scheme (recorded along all but one of the survey transects). These surveys have also shown that there are no significant or frequently used commuting routes and that much of the behaviour, where observed, has been that of foraging and feeding. This type of behaviour is more unpredictable and thus more difficult to mitigate than commuting behaviour.

It should be noted that while the 2016 has indicated that there may be activity peaks elsewhere along the Scheme this data is still being collected and has yet to be analysed in detail. This change may be at least partially due to the increase in survey coverage given the use of static detectors for 5 consecutive nights, particularly as the observations made during the walked surveys remains consistent with those of previous years. It should also be noted that transects A1 to A7 have only been surveyed for a single night in June 2016 to date, further monthly surveys are programmed for 2016.

As stated for roosts above, changing climatic conditions may allow a number of British bat species to expand their current ranges and if this were to occur it is possible that the area around the Scheme may support a higher diversity of bats than at present. However, it is considered unlikely that the prevailing agricultural management of the area would change sufficiently that its use by potentially commuting or foraging bats would change significantly. Overall the Scheme area is considered unlikely to significantly increase in value for potentially commuting and foraging bats in the absence of the Scheme.

Badgers

The Key Stage 2 Study recorded very little Badger activity within the study area with only seven confirmed setts and one potential sett recorded, largely to the east and south of Caernarfon. Only one of these setts, that located between the western rail

embankment and fields associated with Plas Dinas to the east, appeared to be in use at the time of survey. Few other signs were found during the surveys with a single print found north west of Tyddyn-Slaters and Badger hairs found within woodland south of Plas-y-Bryn Farm.

Badger surveys undertaken during 2015 also showed very low levels of Badger activity with no active setts or latrines found. The setts recorded during the Key Stage 2 surveys were reassessed and were either disused with no signs of Badger or other mammals or occupied by Rabbits with droppings noted at the entrances and in the surrounding areas. Numerous paths were noted in the vicinity of the previously active setts and in other areas considered suitable for Badgers however no evidence of Badger activity was noted along these so it could not be confirmed whether these areas were being used for foraging purposes. No previously unrecorded actual or potential setts were found during any of the 2015 surveys. It is noted that a small amount of Badger hair was found by NRW and Gwynedd Council to the northern boundary of the quarry during a walkover in May 2016. This is in keeping with the previous survey results that suggest low levels of infrequent foraging activity across the Scheme area.

In the absence of the Scheme it is considered likely that the value of the Scheme corridor for Badgers would be maintained. Changes in land use are unlikely to reduce this unless the remaining woodland areas are lost, however there are no indications that this is likely at present.

Dormice

The Key Stage 2 Study did not confirm the presence of Dormice along the Scheme although some limited potential was noted in places. However, many of these areas were highlighted as being generally fairly isolated, although better connectivity was noted along the riverbanks.

Assessment of hedgerows and woodlands along the Scheme found that the majority were sub optimal for Dormice with the remaining considered suitable for dispersal only or unsuitable. Of the 78 boundaries and 51 woodlands surveyed, 34 hedgerows and 21 woodlands were considered to be sub-optimal for Dormice with a further 19 and 30 considered suitable for dispersal only. The remaining 25 boundaries were considered unsuitable due to either the boundary type, their limited diversity of food plants, their management, connectivity to other habitat, or a combination of these. While it is recognised that such habitat assessment may not reliably indicate presence or absence of Dormice in all cases, this approach is likely to be more reliable than tube surveys in sub-optimal habitats where Dormice may be present at low densities.

Given the intensive management regime that the majority of hedgerows and woodlands along the Scheme are subject to, it is considered unlikely that Dormice are present or only present in low densities in late summer and early autumn when juveniles are more likely to disperse through the wider landscape. This conclusion is supported by the lack of Dormice records within the Cofnod records search or confirmation of this species during the Key Stage 2 Study. As it is difficult to confirm absence or low densities of Dormice and given that they are known to be present in Gwynedd their potential presence will be assumed.

Dormice are a TREBAP and Gwynedd LBAP species.

Given the limited habitat potential and low diversity of food sources and the lack of/low numbers of records in the area it is considered unlikely that Dormice are present within the woodlands and hedgerows on the Scheme however the greatest potential has been noted within the woodlands around the quarry at Penrhos where there is a greater abundance of food plants and connectivity and less intensive management regimes than elsewhere along the Scheme. Even in these areas, if they are present it is considered that they would only be at low densities. This situation is unlikely to change in the absence of the Scheme, as it would require a widespread relaxation of hedgerow and woodland management, which is considered unlikely to occur.

Otters and Water Voles

No confirmed resting up sites or holts were recorded during the Key Stage 2 Study although both the Afon Gwyrfai and the Afon Seoint were noted to have significant areas of woodland and scrub which could be used by Otters for resting up. Only two spraints were found along the Afon Gwyrfai and no prints were seen along either watercourse. Otter activity was noted on the Afon Seoint during the September bat survey with one adult female and three young cubs observed downstream of the A4086 road bridge. No sightings or evidence of Water Vole was found and few areas of suitable habitat were identified.

The desk study and records search, including a review of the records held by the Cardiff Otter Project, found both Otter and Water Vole records within the study area (in 2014 and 1999 respectively). The records also noted that Otter were frequently observed/found in terrestrial areas between watercourses, including crossing major and minor roads. The Cardiff Otter Project has two records for Otters on the B4366 (one in 2006 and one in 2008), one to the west of the Scheme and one to the east of the Scheme. A further record was noted in 2007 on the A487 south of the Goat Roundabout. A casualty was also recorded on the minor road between the A4085 and the A4086 to the east of the Afon Seiont in 2002.

The 2015 surveys (Volume 2 Figures 8.2) did not find any evidence of Otters along the Afon Gwyrfai or the Afon Seoint or any of the smaller watercourses within the survey area. Both the Afon Gwyrfai and the Afon Seoint were noted to have good habitat for foraging and commuting although no potential holt or resting up sites were identified. The smaller watercourses generally provided poor habitat for Otters as they tend to pass through open agricultural and marshy grassland habitats. It was noted that watercourses 3 (Afon Carrog), 4 (Afon Rhyd east of the A487), 9 (Afon Cadnant) and 10 (Afon Cadnant tributary) have more vegetation cover in the form of woodland and scrub areas compared to the remaining watercourses and as such have a greater potential for Otter use. It was subsequently reported that NMWTRA found spraints on watercourse 10 in 2015. An Otter spraint was also found on the Afon Cadnant during the bat surveys undertaken in May 2016 and a spraint was recorded by NRW 5m upstream of the existing bridge over the Cadnant during a walkover meeting.

It has also been noted during the 2015 and 2016 consultation process that Otter populations in the area are known to move between catchments, particularly near the Caernarfon Brickworks and around Crug Farm, although no evidence has been found to date to indicate which routes are taken across these areas.

The 2015 surveys (Volume 2 Figures 8.2) found evidence of Water Voles along watercourses 6 (watercourse east of Cae-rhos), 9 and 10 in the form of vegetative feeding remains and pathways through the vegetation. A burrow was recorded on

watercourse 9 although this was flooded at the time of survey. The Afon Gwyrfai and the Afon Seoint were both noted to have moderate to fast flows at the time of survey reducing the likelihood of Water Vole activity. The remaining watercourses were generally noted to have no to slow flow although their potential is limited by the lack of suitable bankside vegetation. Watercourses 3 and 5 (Afon Rhyd west of the A487) had moderate flows and as such have lower potential for Water Voles. It is understood that evidence of Water Voles was found in the quarry area by NRW and Gwynedd Council in May 2016. However, the exact location within the quarry area,, form and extent of this evidence was not available at the time of writing. Assessments of the habitat in this area in 2015 and 2016 showed that despite mitigation measures being put in place in 2000 this area has been left unmanaged and have become sub-optimal for Water Vole. The channel has very low to no flow, the banks collapsed in places and become overgrown with dense scrub and Meadowsweet vegetation limiting burrowing opportunities and connectivity to other watercourses in the wider area is limited.

Otters are a TREBAP and Gwynedd LBAP species. The presence, and continued presence, of Otters on the watercourses in the vicinity of the Scheme is likely to depend both on the food resource available (which in turn could be affected by changing flow characteristics and pollution events) and on the suitability of the watercourses between the Scheme and the main river. These are unlikely to change significantly, consequently it is considered unlikely that the value of these watercourses for Otters would change significantly during the operational lifetime of the Scheme.

Water Voles are a TREBAP and Gwynedd LBAP species. The presence, and continued presence, of Water Voles on the watercourses in the vicinity of the Scheme is likely to depend both on the food resource available (which in turn could be affected by changing flow characteristics and pollution events) and on the suitability of the watercourses between the Scheme and the main river. These are unlikely to change significantly, consequently it is considered unlikely that the value of these watercourses for Water Voles would change significantly during the operational lifetime of the Scheme. It should be noted however that the Water Vole populations have been affected by the increasing presence of American Mink in the area and as such may reduce if this continues.

Breeding birds

The Key Stage 2 Study identified 70 different species, all of which, with the exception of three species were considered likely to nest within the survey area. Breeding activity was noted to be concentrated away from existing roads within wooded areas, particularly broadleaf woodland along watercourses. Hedgerows were also noted as important breeding habitat although this was limited by the intensive management of many of these. No part of the survey area was noted as being of exceptional importance for breeding birds.

The desk study identified a number of bird species recorded in the area including Section 42, red list and amber list species.

The Schedule 1 species identified within the survey area during the 2015 surveys are Red Kite (*Milvus milvus*) and Kingfisher, the latter is also included on the amber list.

The table below shows the red and amber list species recorded during the 2015 surveys, which should be considered resident or breeding migrants.

Table 8.3.5 Red and amber list breeding bird species recorded

Species Name	Common Name
Alauda arvensis	Skylark
Anas clypeata	Northern Shoveler
Anas platyrhynchos	Mallard
Anser	Greylag Goose
Apus	Swift
Aythya fuligala	Tufted Duck
Cuculus canorus	Cuckoo
Delichon urbica	House Martin
Egretta garzetta	Little Egret
Emberiza schoeniclus	Reed Bunting
Hirundo rustica	Swallow
Larus argentus	Herring Gull
Motacilla cinerea	Grey Wagtail
Musicapa striata	Spotted Flycatcher
Oenanthe	Wheatear
Passer domesticus	House Sparrow
Phylloscopus sibilatrix	Wood Warbler
Phylloscopus trochllus	Willow Warbler
Prunella modularis	Dunnock
Pyrrhula	Bullfinch
Riparia	Sand Martin
Saxicola rubetra	Whinchat
Sturnus vulgaris	Starling
Sylvia communis	Whitethroat
Tachybaptus ruficollis	Little Grebe
Turdus philomelos	Song Thrush

Chough (*Pyrrhocorax pyrrhocorax*) and Lapwing (*Vanellus vanellus*) are included within the Gwynedd LBAP.

In the absence of the Scheme it is considered likely that the value of the Scheme corridor for breeding birds would be maintained. Changes in land use are unlikely to reduce this unless the remaining woodland areas and hedgerows are lost or degraded, however there are no indications that this is likely at present.

Barn Owls

The Key Stage 2 Study recorded Barn Owls on three separate occasions during the bat surveys undertaken, to the south of the existing Plas Menai Roundabout, to the east of the Glan Gwna Holiday Park and to the south of the quarry. It was also assumed that this species was breeding either within or close by the study area.

The desk study and records search found thirteen records of Barn Owl within the Scheme area between 1999 and 2014.

No specific surveys were undertaken as part of the 2015 study although once again any evidence of Barn Owls was recorded during other site surveys, particularly the

bat surveys. These recorded a single Barn Owl hunting within the habitats around the quarry (bat transect 6) during the July survey only.

Barn Owls are included in both the Gwynedd LBAP and the TREBAP.

In the absence of the Scheme it is considered likely that the value of the Scheme corridor for Barn Owls would be maintained.

Amphibians

The Key Stage 2 Study identified 54 ponds within the survey area of which only 7 were considered suitable for further torching surveys with HSI evaluations of average or better. These surveys did not find any evidence of GCN however Smooth Newt and Common Frog (*Rana temporaria*) were recorded.

The 2015 desk study identified eleven ponds within the survey area with a twelfth found during the HSI site surveys. Of these twelve ponds only two were considered to have HSI scores of average or above (ponds 1 and 10). Pond 1 had an average HSI score and pond 10 had a good HSI score. These two ponds were surveyed on four separate occasions during which no evidence of GCN was found. Palmate Newts were confirmed within pond 1 and both Palmate and Smooth Newts were confirmed in pond 10 with tadpoles (which cannot be accurately identified to species level at such an early stage) recorded in both ponds. These results are supported by the lack of GCN records found during the 2015 desk study. Common Toad (*Bufo bufo*) was not found during these surveys however the desk study has shown them to be in the area with a single record in the Caernarfon area and it is considered likely that they are present.

It is therefore considered that GCN are absent from the Scheme and are not considered as an ecological receptor in the assessment below. Common amphibians were present in the two ponds surveyed as stated above and are therefore included within the assessment.

A general amphibian species action plan has been included within the TREBAP.

Amphibians are a species group under threat from various factors including deliberate removal or inappropriate management of ponds and from introduced infectious diseases. Changing climatic patterns may also affect the suitability of ponds for these species. It is therefore considered more likely that the already limited nature conservation value of the Scheme for amphibians would decline in the absence of the Scheme.

Reptiles

The Key Stage 2 Study didn't undertake any specific reptile surveys but a habitat assessment was undertaken which identified limited potential across much of the survey area. The less intensively managed habitats around the Glan Gwna Holiday Park and the quarry were noted as having increased potential as were the areas of rough and marshy grassland, domestic gardens and larger road verges where mowing is less frequent. The hedgerows, earth banks and cloddiau were also noted to have some reptile potential particularly as potential refugia.

A habitat assessment was undertaken as part of this current assessment which has again identified reptile potential within the less intensively managed areas around the Glan Gwna Holiday Park and the quarry and within the Gypsy Wood Park. Many of

the poor semi-improved and marshy grassland areas will also have some potential although this is more limited given the agricultural nature of these areas. Domestic gardens and some of the larger road verges along the existing A487 have also retained their reptile potential as have the hedgerows, earth banks and cloddiau. The 2015 desk study highlighted the presence of more common reptile species within the study area, namely Common Lizard (*Zootoca vivipara*) and Slow-worm (*Anguis fragilis*).

Adders (*Vipera berus*) are included within the Gwynedd LBAP and a general reptile species action plan has been included within the TREBAP.

In the absence of the Scheme it is considered likely that the value of the Scheme corridor for reptiles would be maintained but that the ongoing habitat management activities, particularly across the agricultural areas, would be unlikely to allow any expansion of existing populations.

White-clawed Crayfish

No records, potential or evidence of White-clawed Crayfish were found during the Key Stage 2 Study or the 2015 desk study.

No detailed surveys have been undertaken during 2015 but surveyors were vigilant when surveying near watercourses and no evidence of or potential for this species was identified. Given the lack of previous records it is considered unlikely that White-clawed Crayfish are present within the study area.

It is considered that this situation is not likely to change in the absence of the Scheme.

Fisheries and aquatic invertebrates

The 2015 desk study only identified one fish species record, for Sea Lamprey (*Petromyzon marinus*), within the Afon Seiont and one aquatic invertebrate species, *Acanthocnema glaucescens*, along the Afon Gwyrfai. As stated above potential presence of Atlantic Salmon, Brown Trout, European Eel, River Lamprey, Brook Lamprey, Twaite Shad and Allis Shad has also been assumed and therefore specific surveys were not been undertaken. Mitigation has been designed based on this assumption, particularly with regard to the Afon Rhyd which has the highest potential of the watercourses crossed by the Scheme, with the exception of the Afon Gwyrfai and Afon Seoint, both of which are being crossed on wide-span structures. The Cadnant is not considered as important for migratory species as the lower reaches are culverted through Caernarfon creating unfavourable tidal reaches for inward migration of anadromous species. The reaches upstream of the proposed crossing have a modest catchment with relatively shallow gradients, predominately muddy substrate with emergent vegetation in dense places. The upstream habitat is sub-optimal for salmonids.

In addition to these species, subsequent consultations with NRW have identified the likely presence of Freshwater Pearl Mussel within the watercourses affected by the Scheme, particularly with regard to the Afon Rhyd. Given recent declines across Wales, it is considered that this species is likely to be present in small non-breeding populations only.

Other species

The 2015 desk study identified records of a number of other Section 42 species within the Scheme area including Polecat (*Mustela putorius*), West European Hedgehog and Brown Hare. The site surveys didn't identify any signs of these or other species however there remains the potential for other species to be present given the habitats present, particularly the woodland and scrub habitats and the less intensively managed grassland areas. The hedgerows and tree lines within the survey area provide connectivity between these areas as well as providing additional habitat themselves.

The 2015 desk study did not identify any records of Marsh Fritillary within the search area of the Scheme and the other site surveys found no habitats with potential for this species due to the intense management of the marshy grassland areas and the lack of tussock forming grasses within these.

The 2015 desk study and records search identified the presence of Olive Earthtongue (*Microglossum olivaceum*) to the south of the Scheme. This species is listed on Section 7 of the EWA and is a UK BAP species. A number of LBAP species were also identified, a majority of which were recorded to the south of the Scheme in the Llanwnda area within short mown mossy grasslands. The other 2015 site surveys didn't indicate any potential lower plant species of concern or the potential for the presence within the study area. Olive Earthtongue requires short mown mossy grassland habitats, none of which were present within the Scheme area. It is considered that this would not change in the absence of the Scheme.

Summary of Ecological Receptors

The table below lists the ecological receptors described above with appropriate valuations for their level of nature conservation significance.

Table 8.3.6 Summary of Ecological Receptors

Ecological Receptor	Valuation of Receptor
Afon Gwyrfai SAC	Very High
Menai Strait and Conwy Bay SAC	Very High
Glynllifon SAC	Very High
Meirionnydd Oakwoods and Bat Sites SAC	Very High
Gwydir Forest Mines SAC	Very High
Afon Gwyrfai a Llyn Cwellyn SSSI	High
Afon Seiont SSSI	High
Glynllifon SSSI	High
Llwyn y Coed SSSI	High
Afon Seiont (Middle) Wildlife Site	Lower
Afon Seiont Mosaic (North) Wildlife Site	Lower
Felinwnda Wildlife Site	Lower
Waenfawr Road Wildlife Site	Lower
Rhyddallt-bach Wildlife Site	Lower
Llanfair Wood & nearby copses Wildlife Site	Lower

Ecological Receptor	Valuation of Receptor
Lon-glai Wildlife Site	Lower
Gypsy Wood Park habitats	Lower
Broadleaved woodland	Lower
Scrub	Lower
Coniferous plantation	Negligible
Hedgerows	Lower
Watercourses	Negligible
Ponds	Negligible
Marshy grassland	Negligible
Poor semi-improved grassland	Negligible
Improved grassland	Negligible
Arable	Negligible
Amenity grassland	Negligible
Invasive plant species	Negligible
Lower plant species	Negligible
Roosting bats	Lower
Commuting and foraging bats	Medium
Badgers	Lower
Dormice	Lower
Otters	Lower
Water Voles	Lower
Breeding birds	Medium
Barn Owls	Negligible
Amphibians	Negligible
Reptiles	Lower
White-clawed Crayfish	Negligible
Fisheries and aquatic invertebrates	Lower
Other species	Lower

The habitats within permanent and temporary works areas of the Scheme are set out in **Table 8.3.7** below. The areas considered to be of temporary loss are those areas to be used for site compounds, storage and other constructions works and that will be reinstated at the end of the construction works. These areas include all areas that may be subject to habitat disturbance and prevention of use by protected species as well as direct habitat loss. The areas of permanent loss are those that will not be reinstated at the end of the works.

Table 8.3.7 – Permanent and temporary land loss by habitat type

Habitat	Permanent Loss (ha)	Temporary Loss (ha)
Semi-natural broadleaved woodland	1.35	1.61
Broadleaved plantation woodland	0.20	0.34

Habitat	Permanent Loss (ha)	Temporary Loss (ha)
Plantation Coniferous woodland	0.54	0
Dense scrub	2.06	3.12
Semi-improved neutral grassland	0.48	0.29
Improved grassland	52.84	35.45
Marshy grassland	5.10	2.60
Poor semi-improved grassland	1.36	0.79
Tall ruderal	0.51	0.08
Running water	0.49	0.56
Acid Scree	0.15	0
Arable	0.42	0.74
Amenity grassland	0	0.01
Ephemeral/short perennial	0.19	0
Caravan site	0.01	0.78
Track	5.27	4.19
Bare ground	0	0.54
Other	0.70	0.18
Total Habitat Loss	**71.67**	**51.28**

8.4 Predicted Environmental Effects

The likely effects of the Scheme are described below, both for construction and operation, in relation to each of the ecological receptors described above that have been valued at 'lower' level or above. With reference to published guidelines and Table 8.1.1, impacts on receptors of negligible value are considered to be neutral, consequently this section and the mitigation proposals which follow focus on those receptors where there is potential for an adverse or beneficial impact.

It is important to note that, although potential impacts are identified below in the absence of mitigation measures, the iterative design process by which the Scheme has been developed means that potential impacts have been avoided and minimised where possible in order to design the Scheme as described in this ES (refer to Volume 1, Chapter 2.1). Therefore, potential ecological impacts resulting from culverting of the Afon Gwyrfai and the Afon Seiont have not been considered, as it is proposed that clear-span crossings would be used at both locations. This 'mitigation by design', primarily comprising the preferred route alignment, nature and locations of major structures and locations of road drainage attenuation, are taken into account in the predicted impacts, though other mitigation elements described in Section 8.5 below are not.

8.4.1 Construction Impacts

Predicted impacts during construction vary in their detailed characterisations between individual ecological receptors, however the predicted impacts fall into several discrete types. Potential direct impacts include:

- Loss of habitats through vegetation clearance (e.g. trees/hedgerows for bats, Dormice, breeding birds);
- Loss of habitats through topsoil stripping and subsequent earthworks (e.g. loss of reptile habitat);
- Loss of potential bat roosts through tree removal;
- Loss of aquatic habitat during diversion of watercourses for culvert construction;
- Injury or mortality of key species if present in these habitats at the time of their removal;
- Direct severance of fish migration routes along watercourses through culverting, in particular the Afon Rhyd;
- Severance of retained habitats either side of the Scheme, particularly for less mobile species.

Potential indirect impacts include:

- Damage to retained habitats adjacent to the Scheme through dust deposition during construction;
- Small-scale disruptions in hydrology caused by earthworks during construction of the Scheme;
- Disturbance to individuals of key species which are resident in retained habitats close to the Scheme (e.g. by construction site activities such as noise, construction site lighting);
- Similar disturbance which could affect breeding success or survival of these species locally;
- Indirect severance of fish migration routes along watercourses through increased water velocities, decreased water depths etc., in particular the Afon Rhyd;
- Potential for pollution events to affect watercourses crossed by the Scheme and as a result affect key species and habitats downstream of the pollution incident.

Some of these impacts, as well as varying between receptors, also vary seasonally. However, appropriate timings of works (such as removal of vegetation outside the breeding bird season) have been taken into account in the proposed construction programme in order to minimise these effects. These potential impacts are characterised in more detail in Table 8.4.1 below.

8.4.2 Operational Impacts

Predicted effects on key ecological receptors during operation of the Scheme also vary in their characteristics, but fall into several broad types. Potential direct impacts include:

- The risk of road mortality for a number of species during operation of the Scheme, where these species attempt to cross the Scheme (e.g. bats, Otters, Water Voles)
- The risk of mortality where the verges of the Scheme provide habitat for species which are subsequently at risk from road traffic collisions (e.g. bird and bat species) or from routine management of the verges (e.g. reptiles);
- The potential that some key species may be able to recolonize the verges and even extend their populations due to the lower intensity of management on the verges compared to the baseline conditions.

The majority of potential effects identified during operation of the Scheme are indirect and include:

- The risk of adverse effects from pollution incidents on the Scheme entering watercourses;
- The risk of noise and lighting associated with the Scheme causing disturbance to key species in retained habitats close to the Scheme (e.g. nesting birds or roosting bats);
- The potential of the Scheme to represent a physical or psychological barrier to key species and therefore to result in fragmentation of populations.

8.4.3 Summary

Table 8.4.1 below summarises the predicted construction effects on each of the key receptors identified above and Table 8.4.2 summarises the predicted operational effects, both in the absence of mitigation.

Table 8.4.1 Summary of Predicted Construction Impacts (Before Mitigation)

*Key for Characterisation of impacts
SI (Sign): Positive (beneficial (+ve)) or Negative (adverse (-ve))
PO (Probability of Occurring): Certain, Probable, Unlikely
CO (Complexity): Direct, Indirect, Cumulative
EC (Extent): Area measures and percentage of total (e.g. area of habitat/ territory lost)
SZ (Size): Description of level of severity of influence (e.g. complete loss, number of animals affected)
RE (Reversibility): Reversible or Not Reversible (can the effect be reversed, whether or not this is planned)
DU (Duration): Permanent (P) or Temporary (T) in ecological terms. Where differing timescales are determined in relation to the life-cycle of the receptor, these should be defined.
TF (Timing and frequency): Important seasonal and/or life-cycle constraints and any relationship with frequency considered.

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Afon Gwyrfai SAC	Very High	Loss of designatory habitats	SI: -ve PO: certain CO: direct EC: permanent habitat loss is not anticipated, 0.13ha temporary loss SZ: Impact would affect a small proportion of habitats within the SAC RE: not reversible DU: permanent TF: one off loss	Minor negative	Moderate adverse
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	SI: -ve PO: unlikely CO: indirect EC: likely to be limited to habitat in close proximity to the Scheme SZ: would affect a small proportion of habitat in the local area RE: reversible DU: temporary TF: throughout construction, dust deposition more likely during dry weather	Minor negative	Moderate adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Injury/mortality to designatory species during construction	SI: -ve PO: unlikely CO: direct EC/SZ: limited to animals that access the construction area RE: not reversible DU: permanent TF: could occur at any point during construction	Minor negative	Moderate adverse
		Disturbance to designatory species within retained habitats during construction due to noise, vibration, lighting etc.	SI: -ve PO: unlikely CO: direct EC/SZ: will be limited areas close to the Scheme RE: not reversible DU: temporary TF: could occur at any point during construction	Minor negative	Moderate adverse
Menai Strait and Conwy Bay SAC	Very High	No direct impacts on habitat features are anticipated	N/A	Neutral	Neutral
		Indirect impacts may occur through hydrological connectivity and inappropriate working practices	SI: -ve PO: unlikely CO: indirect EC: likely to be limited to habitat with hydrological connectivity to the Scheme SZ: would affect a small proportion of habitat in the local area RE: reversible DU: temporary TF: throughout construction	Minor negative	Moderate adverse
Glynllifon SAC	Very High	No confirmed LHB roosts have been identified along the line of the Scheme as such no direct impacts to roosting bats is anticipated	N/A	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Disturbance to the three retained LHB roosts within 600m of the Scheme during construction due to noise, vibration, lighting or blasting	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to small numbers of animals present in retained roosts at time of works RE: not reversible DU: temporary TF: most likely to occur during summer months when bats are active and in summer roost sites	Minor negative	Moderate adverse
		Loss/fragmentation of potential LHB commuting routes and foraging areas due to site clearance - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	SI: -ve PO: certain CO: direct EC: permanent and temporary loss of hedgerows and potential foraging habitat SZ: the potential commuting routes lost span much of the Scheme area however they only represent a small proportion of the local resource, the foraging area lost represents a small proportion of the local resource RE: partially reversible, as some bats may forage on verges of the Scheme post-construction DU: permanent/temporary TF: one off loss	Moderate negative	Large adverse
		Disruption of potential LHB commuting routes due to construction lighting - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	SI: -ve PO: certain CO: direct EC/SZ: all of the hedgerows affected have the potential to be used as commuting routes and represents a small proportion of the local resource RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Moderate negative	Large adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Disruption to LHB foraging areas due to construction lighting	SI: -ve PO: certain CO: direct EC/SZ: potential foraging habitats affected are considered to represent a small proportion of the available resource RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Minor negative	Moderate adverse
Meirionnydd Oakwoods and Bat Sites SAC	Very High	No direct or indirect impacts on habitat features anticipated due to distance from the scheme (14.69km)	N/A	Neutral	Neutral
		No confirmed LHB roosts have been identified along the line of the Scheme as such no direct impacts to roosting bats is anticipated	N/A	Neutral	Neutral
		Disturbance to the three retained LHB roosts within 600m of the Scheme during construction due to noise, vibration, lighting or blasting	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to small numbers of animals present in retained roosts at time of works RE: not reversible DU: temporary TF: most likely to occur during summer months when bats are active and in summer roost sites	Minor negative	Moderate adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Loss/fragmentation of potential LHB commuting routes and foraging areas due to site clearance - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	SI: -ve PO: certain CO: direct EC: permanent and temporary loss of hedgerows and potential foraging habitat SZ: the potential commuting routes lost span much of the Scheme area however they only represent a small proportion of the local resource, the foraging area lost represents a small proportion of the local resource RE: partially reversible, as some bats may forage on verges of the Scheme post-construction DU: permanent/temporary TF: one off loss	Moderate negative	Large adverse
		Disruption of potential LHB commuting routes due to construction lighting - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	SI: -ve PO: certain CO: direct EC/SZ: all of the hedgerows affected have the potential to be used as commuting routes and represents a small proportion of the local resource RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Moderate negative	Large adverse
		Disruption to LHB foraging areas due to construction lighting	SI: -ve PO: certain CO: direct EC/SZ: potential foraging habitats affected are considered to represent a small proportion of the available resource RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Minor negative	Moderate adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Gwydir Forest Mines SAC	Very High	No direct or indirect impacts on habitat features anticipated due to distance from the scheme (24.87km)	N/A	Neutral	Neutral
		No confirmed LHB roosts have been identified along the line of the Scheme as such no direct impacts to roosting bats is anticipated	N/A	Neutral	Neutral
		Disturbance to the three retained LHB roosts within 600m of the Scheme during construction due to noise, vibration, lighting or blasting	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to small numbers of animals present in retained roosts at time of works RE: not reversible DU: temporary TF: most likely to occur during summer months when bats are active and in summer roost sites	Minor negative	Moderate adverse
		Loss/fragmentation of potential LHB commuting routes and foraging areas due to site clearance - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	SI: -ve PO: certain CO: direct EC: permanent and temporary loss of hedgerows and potential foraging habitat SZ: the potential commuting routes lost span much of the Scheme area however they only represent a small proportion of the local resource, the foraging area lost represents a small proportion of the local resource RE: partially reversible, as some bats may forage on verges of the Scheme post-construction DU: permanent/temporary TF: one off loss	Moderate negative	Large adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Disruption of potential LHB commuting routes due to construction lighting - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	SI: -ve PO: certain CO: direct EC/SZ: all of the hedgerows affected have the potential to be used as commuting routes and represents a small proportion of the local resource RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Moderate negative	Large adverse
		Disruption to LHB foraging areas due to construction lighting	SI: -ve PO: certain CO: direct EC/SZ: potential foraging habitats affected are considered to represent a small proportion of the available resource RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Minor negative	Moderate adverse
Afon Gwyrfai a Llyn Cwellyn SSSI	High	Loss of designatory habitats	SI: -ve PO: certain CO: direct EC: permanent habitat loss is not anticipated, 0.1348ha temporary loss SZ: Impact would affect a small proportion of habitats within the SSSI RE: not reversible DU: permanent TF: one off loss	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	SI: -ve PO: unlikely CO: indirect EC: likely to be limited to habitat in close proximity to the Scheme SZ: would affect a small proportion of habitat in the local area RE: reversible DU: temporary TF: throughout construction, dust deposition more likely during dry weather	Minor negative	Slight adverse
		Injury/mortality to designatory species during construction	SI: -ve PO: unlikely CO: direct EC/SZ: limited to animals that access the construction area RE: not reversible DU: permanent TF: could occur at any point during construction	Minor negative	Slight adverse
		Disturbance to designatory species within retained habitats during construction due to noise, vibration, lighting etc.	SI: -ve PO: unlikely CO: direct EC/SZ: will be limited areas close to the Scheme RE: not reversible DU: temporary TF: could occur at any point during construction	Minor negative	Slight adverse
Afon Seoint SSSI	High	Refer to Chapter 9: Geology and Soils			

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
			SI: -ve PO: unlikely CO: indirect EC/SZ: likely to be limited to features with hydrological connectivity to the Scheme RE: not reversible DU: temporary TF: throughout construction	Minor negative	Moderate adverse
Glynllifon SSSI	High	No confirmed LHB roosts have been identified along the line of the Scheme as such no direct impacts to roosting bats is anticipated	N/A	Neutral	Neutral
		Disturbance to the three retained LHB roosts within 600m of the Scheme during construction due to noise, vibration, lighting or blasting	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to small numbers of animals present in retained roosts at time of works RE: not reversible DU: temporary TF: most likely to occur during summer months when bats are active and in summer roost sites	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Loss/fragmentation of potential LHB commuting routes and foraging areas due to site clearance - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	SI: -ve PO: certain CO: direct EC: permanent and temporary loss of hedgerows and potential foraging habitat SZ: the potential commuting routes lost span much of the Scheme area however they only represent a small proportion of the local resource, the foraging area lost represents a small proportion of the local resource RE: partially reversible, as some bats may forage on verges of the Scheme post-construction DU: permanent/temporary TF: one off loss	Moderate negative	Moderate adverse
		Disruption of potential LHB commuting routes due to construction lighting - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	SI: -ve PO: certain CO: direct EC/SZ: all of the hedgerows affected have the potential to be used as commuting routes and represents a small proportion of the local resource RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Moderate negative	Moderate adverse
		Disruption to LHB foraging areas due to construction lighting	SI: -ve PO: certain CO: direct EC/SZ: potential foraging habitats affected are considered to represent a small proportion of the available resource RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Llwyn y Coed SSSI	High	No direct or indirect impacts on habitat features anticipated due to distance from the scheme (4.74km)	N/A	Neutral	Neutral
Afon Seiont (Middle) Wildlife Site	Lower	Loss of designatory habitats	SI: -ve PO: certain CO: direct EC: permanent loss is not anticipated, 0.31ha temporary loss SZ: Impact would affect a small proportion of habitats within the WS RE: not reversible DU: permanent TF: one off loss	Minor negative	Neutral
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	SI: -ve PO: unlikely CO: indirect EC: likely to be limited to habitat in close proximity to the Scheme SZ: would affect a small proportion of habitat in the local area RE: reversible DU: temporary TF: throughout construction, dust deposition more likely during dry weather	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Afon Seiont Mosaic (North) Wildlife Site	Lower	Loss of designatory habitats	SI: -ve PO: certain CO: direct EC: 0.93ha permanent loss of mixed habitats including broadleaf woodland and scrub, 1.34ha temporary loss SZ: Impact would affect a small proportion of habitats within the WS RE: not reversible DU: permanent TF: one off loss	Minor negative	Slight adverse
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	SI: -ve PO: unlikely CO: indirect EC: likely to be limited to habitat in close proximity to the Scheme SZ: would affect a small proportion of habitat in the local area RE: reversible DU: temporary TF: throughout construction, dust deposition more likely during dry weather	Minor negative	Slight adverse
Felinwnda Wildlife Site	Lower	Loss of designatory habitats	SI: -ve PO: certain CO: direct EC: 0.19ha permanent loss of mixed habitats including broadleaf woodland, 0.33ha temporary loss SZ: Impact would affect a small proportion of habitats within the WS RE: not reversible DU: permanent TF: one off loss	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	SI: -ve PO: unlikely CO: indirect EC: likely to be limited to habitat in close proximity to the Scheme SZ: would affect a small proportion of habitat in the local area RE: reversible DU: temporary TF: throughout construction, dust deposition more likely during dry weather	Minor negative	Slight adverse
Waenfawr Road Wildlife Site	Lower	Loss of designatory habitats	SI: -ve PO: certain CO: direct EC: 2.43ha permanent loss of mixed habitats including dense scrub, 2.59ha temporary loss SZ: Impact would affect a small proportion of habitats within the WS RE: not reversible DU: permanent TF: one off loss	Minor negative	Slight adverse
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	SI: -ve PO: unlikely CO: indirect EC: likely to be limited to habitat in close proximity to the Scheme SZ: would affect a small proportion of habitat in the local area RE: reversible DU: temporary TF: throughout construction, dust deposition more likely during dry weather	Minor negative	Slight adverse
Rhyddallt-bach Wildlife Site	Lower	No direct habitat losses are anticipated	N/A	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	SI: -ve PO: unlikely CO: indirect EC: likely to be limited to habitat in close proximity to the Scheme SZ: would affect a small proportion of habitat in the local area RE: reversible DU: temporary TF: throughout construction, dust deposition more likely during dry weather	Minor negative	Neutral
Llanfair Wood & nearby copses Wildlife Site	Lower	Loss of designatory habitats	SI: -ve PO: certain CO: direct EC: 0.71ha permanent loss of mixed habitats including dense scrub, 0.10ha temporary loss SZ: Impact would affect a small proportion of habitats within the WS RE: not reversible DU: permanent TF: one off loss	Neutral	Neutral
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	SI: -ve PO: unlikely CO: indirect EC: likely to be limited to habitat in close proximity to the Scheme SZ: would affect a small proportion of habitat in the local area RE: reversible DU: temporary TF: throughout construction, dust deposition more likely during dry weather	Minor negative	Neutral
Lon-glai Wildlife Site	Lower	No direct habitat losses are anticipated	N/A	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	SI: -ve PO: unlikely CO: indirect EC: likely to be limited to habitat in close proximity to the Scheme SZ: would affect a small proportion of habitat in the local area RE: reversible DU: temporary TF: throughout construction, dust deposition more likely during dry weather	Minor negative	Neutral
Gallt-y-sil farm Wildlife Site	Lower	Loss of designatory habitats	SI: -ve PO: certain CO: direct EC: no permanent loss expected, 0.46ha temporary loss SZ: Impact would affect a small proportion of habitats within the WS RE: not reversible DU: permanent TF: one off loss		
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	SI: -ve PO: unlikely CO: indirect EC: likely to be limited to habitat in close proximity to the Scheme SZ: would affect a small proportion of habitat in the local area RE: reversible DU: temporary TF: throughout construction, dust deposition more likely during dry weather		

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Gypsy Wood Park habitats	Lower	No direct or indirect impacts on habitat features anticipated due to the low sensitivity of the habitats present and their distance from the scheme (0.5km)	N/A	Neutral	Neutral
Broadleaved woodland	Lower	Loss of woodland during site clearance	SI: -ve PO: certain CO: direct EC: 1.35ha permanent loss, 1.61ha temporary loss SZ: Impact would affect a small proportion of woodland in local area RE: not reversible DU: permanent TF: one off loss	Minor negative	Neutral
		Damage/disturbance to retained woodland during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	SI: -ve PO: unlikely CO: indirect EC: likely to be limited to habitat in close proximity to the Scheme SZ: would affect a small proportion of habitat in the local area RE: reversible DU: temporary TF: throughout construction, dust deposition more likely during dry weather	Minor negative	Slight adverse
Scrub	Lower	Loss of scrub during site clearance	SI: -ve PO: certain CO: direct EC: 2.06ha permanent loss, 3.12ha temporary loss SZ: Impact would affect a small proportion of scrub in local area RE: not reversible DU: permanent TF: one off loss	Minor negative	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Damage/disturbance to retained scrub during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	SI: -ve PO: unlikely CO: indirect EC: likely to be limited to habitat in close proximity to the Scheme SZ: would affect a small proportion of habitat in the local area RE: reversible DU: temporary TF: throughout construction, dust deposition more likely during dry weather	Minor negative	Slight adverse
Hedgerows	Lower	Loss of hedgerows during site clearance	SI: -ve PO: certain CO: direct EC: 4111.2m permanent and 2911.33m temporary including 2,395m permanent and 454.8m temporary classified as important hedgerows (Hedgerow Regs) SZ: Impact would affect a small proportion of hedgerows in local area RE: not reversible DU: permanent TF: one off loss	Minor negative	Slight adverse
		Damage/disturbance to retained hedgerows during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	SI: -ve PO: unlikely CO: indirect EC: likely to be limited to habitat in close proximity to the Scheme SZ: would affect a small proportion of habitat in the local area RE: reversible DU: temporary TF: throughout construction, dust deposition more likely during dry weather	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Roosting bats	Lower	No confirmed bat roosts have been identified along the line of the Scheme as such no direct impacts to roosting bats is anticipated – no buildings with roost potential will be directly affected by the Scheme, tree surveys are programmed for 2016 after which this conclusion will be reviewed.	N/A	Neutral	Neutral
		Disturbance to retained roosts during construction due to noise, vibration, lighting or blasting	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to small numbers of animals present in retained roosts at time of works RE: not reversible DU: temporary TF: most likely to occur during summer months when bats are active and in summer roost sites	Minor negative	Slight adverse
Potentially commuting and foraging bats	Medium	Loss/fragementation of potential commuting routes and foraging areas due to site clearance - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	SI: -ve PO: certain CO: direct EC: permanent and temporary loss of hedgerows and potential foraging habitat SZ: the potential commuting routes lost span much of the Scheme area however this represents a small proportion of the local resource, the foraging area lost represents a small proportion of the local resource RE: partially reversible, as some bats may forage on verges of the Scheme post-construction DU: permanent/temporary TF: one off loss	Moderate negative	Moderate adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Disruption of potential commuting routes due or construction lighting - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	SI: -ve PO: certain CO: direct EC/SZ: all of the hedgerows affected have the potential to be used as commuting routes however these represent a small proportion of the local resource RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Moderate negative	Moderate adverse
		Disruption to foraging areas due to construction lighting	SI: -ve PO: certain CO: direct EC/SZ: potential foraging habitats affected are considered to represent a small proportion of the available resource RE: reversible DU: permanent TF: during construction period, in the summer months when bats are active	Minor negative	Slight adverse
Badgers	Lower	Injury/mortality to Badgers during construction	SI: -ve PO: unlikely CO: direct EC/SZ: limited to animals that access the construction area RE: not reversible DU: permanent TF: could occur at any point during construction	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Dormice	Lower	Loss of habitat due to site clearance	SI: -ve PO: certain CO: direct EC: permanent and temporary loss of woodland and hedgerow habitats SZ: habitat lost would only represent a small proportion of the local resource, and the majority of hedgerows are sub-optimal for Dormice RE: not reversible DU: permanent TF: one off loss	Minor negative	Slight adverse
		Injury/mortality to Dormice during site clearance	SI: -ve PO: probable CO: direct EC: would be limited to small numbers of animals present within the Scheme footprint at the time of site clearance works SZ: likely to affect only a small proportion of the local dormouse population RE: not reversible DU: permanent TF: one off loss	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Disturbance to Dormice within retained habitats due to construction activities	SI: -ve PO: unlikely, as Dormice are known to nest close to roads CO: indirect EC: would be limited to small numbers of animals present close to the Scheme footprint during construction SZ: likely to affect only a small proportion of the local dormouse population RE: not reversible DU: temporary TF: during construction, and primarily during the summer months when Dormice are active	Minor negative	Slight adverse
Otters	Lower	Injury/mortality to Otters during construction	SI: -ve PO: unlikely CO: direct EC/SZ: limited to animals that access the construction area RE: not reversible DU: permanent TF: could occur at any point during construction	Minor negative	Slight adverse
		Disturbance to Otters within retained habitats due to construction activities	SI: -ve PO: unlikely CO: direct EC/SZ: will be limited to watercourses close to the Scheme RE: not reversible DU: temporary TF: could occur at any point during construction	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Water Voles	Lower	Injury/mortality to Water Voles during construction	SI: -ve PO: unlikely CO: direct EC/SZ: limited to animals that access the construction area RE: not reversible DU: permanent TF: could occur at any point during construction	Minor negative	Slight adverse
		Disturbance to Water Voles within retained habitats due to construction activities	SI: -ve PO: unlikely CO: direct EC/SZ: will be limited to watercourses close to the Scheme RE: not reversible DU: temporary TF: could occur at any point during construction	Minor negative	Slight adverse
Breeding birds	Medium	Loss of breeding bird habitat during site clearance works, including foraging habitat within territories for breeding pairs	SI: -ve PO: certain CO: direct EC: permanent and temporary habitat loss considered to represent only a small proportion of the overall resource available SZ: Limited to footprint of the Scheme RE: partially reversible for some species if suitable mitigation measures are put in place DU: permanent TF: one off loss	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Damage or destruction of active nests/eggs/dependant young during site clearance works	SI: -ve PO: unlikely CO: direct EC: would be limited to any areas not cleared outside the bird breeding season SZ: likely to affect only a very small proportion of the Scheme RE: not reversible DU: permanent TF: only during site clearance activities taking place during the bird breeding season	Minor negative	Slight adverse
		Disturbance to breeding birds (including potentially to birds listed on Schedule 1 of the WCA) in nearby retained habitat during construction works, including blasting	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to immediate vicinity of Scheme, depending on sensitivity of the species concerned RE: not reversible DU: temporary TF: only during construction activities taking place during the bird breeding season	Minor negative	Slight adverse
Reptiles	Lower	Loss of habitat due to site clearance	SI: -ve PO: certain CO: direct EC: permanent and temporary habitat loss considered to represent only a small proportion of the overall resource available SZ: Scheme affects a small proportion of the area occupied by the reptile population RE: partially reversible if mitigation measures put in place DU: permanent/temporary where mitigated TF: one off loss	Minor negative	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Injury/mortality of reptiles due to site clearance works	SI: -ve PO: likely CO: direct EC/SZ: likely to affect only a small proportion of population, though not necessarily in proportion to the area affected RE: not reversible DU: permanent TF: one off loss	Minor negative	Slight adverse
Fisheries and aquatic invertebrates	Lower	Injury/mortality to species during in river works	SI: -ve PO: unlikely CO: direct EC/SZ: limited to individual animals within the affected watercourse sections RE: not reversible DU: permanent TF: could occur at any point during in river works	Minor negative	Slight adverse
		Disturbance to species within retained watercourses due to construction activities including pollution risk and mobilisation of suspended solids	SI: -ve PO: unlikely CO: direct EC/SZ: will be limited to watercourses close to the Scheme RE: not reversible DU: temporary TF: could occur at any point during construction	Minor negative	Slight adverse
		Disturbance to retained fish habitats in particular smothering of clean gravel habitat	SI: -ve PO: unlikely CO: direct EC/SZ: will be limited to watercourses close to the Scheme RE: not reversible DU: temporary TF: could occur at any point during construction	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Other species	Lower	Loss of habitat due to site clearance	SI: -ve PO: certain CO: direct EC: permanent and temporary habitat loss considered to represent only a small proportion of the overall resource available SZ: Scheme affects a small proportion of the area occupied by the species population RE: partially reversible if mitigation measures put in place DU: permanent/temporary where mitigated TF: one off loss	Minor negative	Neutral
		Injury/mortality of other species due to site clearance works	SI: -ve PO: likely CO: direct EC/SZ: likely to affect only a small proportion of populations, though not necessarily in proportion to the area affected RE: not reversible DU: permanent TF: one off loss	Minor negative	Slight adverse

Table 8.4.2 Summary of Predicted Operational Impacts (Before Mitigation)

*Key for Characterisation of impacts
SI (Sign): Positive (beneficial (+ve)) or Negative (adverse (-ve))
PO (Probability of Occurring): Certain, Probable, Unlikely
CO (Complexity): Direct, Indirect, Cumulative
EC (Extent): Area measures and percentage of total (e.g. area of habitat/ territory lost)
SZ (Size): Description of level of severity of influence (e.g. complete loss, number of animals affected)
RE (Reversibility): Reversible or Not Reversible (can the effect be reversed, whether or not this is planned)
DU (Duration): Permanent (P) or Temporary (T) in ecological terms. Where differing timescales are determined in relation to the life-cycle of the receptor, these should be defined.
TF (Timing and frequency): Important seasonal and/or life-cycle constraints and any relationship with frequency considered.

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Afon Gwyrfai SAC	Very High	No direct impact on retained habitats, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable habitat effects	N/A	Neutral	Neutral
		Risk of mortality to designatory species crossing the Scheme carriageway, particularly Otters	SI: -ve PO: probable CO: direct EC: limited to designatory species that utilise areas adjacent to the watercourse SZ: limited to the very small number of individual animals RE: not reversible DU: permanent TF: could occur at any time during operation of the Scheme	Minor negative	Moderate adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Menai Strait and Conwy Bay SAC	Very High	No direct impact on retained habitats, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable habitat effects	N/A	Neutral	Neutral
Glynllifon SAC	Very High	Disturbance to LHBs or disruption of LHB roost use for retained roosts close to the Scheme. Such effects could result from lighting (lighting columns or vehicle headlamps) or noise associated with operation of the Scheme	SI: -ve PO: unlikely CO: indirect EC: limited to any retained roosts close to the Scheme, particularly those close to lit junctions SZ: severity would depend on species affected. Could potentially result in effective loss of one or more roosts RE: not reversible DU: permanent TF: impacts would occur during first summer season that Scheme was operational with potential on-going impacts due to roost loyalty	Moderate negative	Large adverse
		Continued fragmentation of potential commuting routes and associated prevention of access to foraging areas through 'barrier effect' created by operational Scheme	SI: -ve PO: probable CO: indirect EC/SZ: limited to animals using roosts associated with potential commuting routes RE: not reversible DU: permanent TF: ongoing during operation of the Scheme, during the active season	Minor negative	Moderate adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Risk of injury/mortality to LHBs crossing the Scheme carriageway	SI: -ve PO: probable CO: direct EC/SZ: limited to animals crossing the Scheme or utilising habitats close to the Scheme RE: not reversible DU: permanent TF: could occur at any time during operation of the Scheme, during hours of darkness, during the active season	Minor negative	Moderate adverse
Meirionnydd Oakwoods and Bat Sites SAC	Very High	No direct or indirect impacts on habitat features anticipated due to distance from the scheme (14.69km)	N/A	Neutral	Neutral
		Disturbance to LHBs or disruption of LHB roost use for retained roosts close to the Scheme. Such effects could result from lighting (lighting columns or vehicle headlamps) or noise associated with operation of the Scheme	SI: -ve PO: unlikely CO: indirect EC: limited to any retained roosts close to the Scheme, particularly those close to lit junctions SZ: severity would depend on species affected. Could potentially result in effective loss of one or more roosts RE: not reversible DU: permanent TF: impacts would occur during first summer season that Scheme was operational with potential on-going impacts due to roost loyalty	Moderate negative	Large adverse
		Continued fragmentation of potential commuting routes and associated prevention of access to foraging areas through 'barrier effect' created by operational Scheme	SI: -ve PO: probable CO: indirect EC/SZ: limited to animals using roosts associated with potential commuting routes RE: not reversible DU: permanent TF: ongoing during operation of the Scheme, during the active season	Minor negative	Moderate adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Risk of injury/mortality to LHBs crossing the Scheme carriageway	SI: -ve PO: probable CO: direct EC/SZ: limited to animals crossing the Scheme or utilising habitats close to the Scheme RE: not reversible DU: permanent TF: could occur at any time during operation of the Scheme, during hours of darkness, during the active season	Minor negative	Moderate adverse
Gwydir Forest Mines SAC	Very High	No direct or indirect impacts on habitat features anticipated due to distance from the scheme (24.87km)	N/A	Neutral	Neutral
		Disturbance to LHBs or disruption of LHB roost use for retained roosts close to the Scheme. Such effects could result from lighting (lighting columns or vehicle headlamps) or noise associated with operation of the Scheme	SI: -ve PO: unlikely CO: indirect EC: limited to any retained roosts close to the Scheme, particularly those close to lit junctions SZ: severity would depend on species affected. Could potentially result in effective loss of one or more roosts RE: not reversible DU: permanent TF: impacts would occur during first summer season that Scheme was operational with potential on-going impacts due to roost loyalty	Moderate negative	Large adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Continued fragmentation of potential commuting routes and associated prevention of access to foraging areas through 'barrier effect' created by operational Scheme	SI: -ve PO: probable CO: indirect EC/SZ: limited to animals using roosts associated with potential commuting routes RE: not reversible DU: permanent TF: ongoing during operation of the Scheme, during the active season	Minor negative	Moderate adverse
		Risk of injury/mortality to LHBs crossing the Scheme carriageway	SI: -ve PO: probable CO: direct EC/SZ: limited to animals crossing the Scheme or utilising habitats close to the Scheme RE: not reversible DU: permanent TF: could occur at any time during operation of the Scheme, during hours of darkness, during the active season	Minor negative	Moderate adverse
Afon Gwyrfai a Llyn Cwellyn SSSI	High	No direct impact on retained habitats, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable habitat effects	N/A	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Risk of mortality to designatory species crossing the Scheme carriageway, particularly Otters	SI: -ve PO: probable CO: direct EC: limited to designatory species that utilise areas adjacent to the watercourse SZ: limited to the very small number of individual animals RE: not reversible DU: permanent TF: could occur at any time during operation of the Scheme	Minor negative	Slight adverse
Afon Seoint SSSI	High	No direct impact on designatory features, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	N/A	Neutral	Neutral
Glynllifon SSSI	High	Disturbance to LHBs or disruption of LHB roost use for retained roosts close to the Scheme. Such effects could result from lighting (lighting columns or vehicle headlamps) or noise associated with operation of the Scheme	SI: -ve PO: unlikely CO: indirect EC: limited to any retained roosts close to the Scheme, particularly those close to lit junctions SZ: severity would depend on species affected. Could potentially result in effective loss of one or more roosts RE: not reversible DU: permanent TF: impacts would occur during first summer season that Scheme was operational with potential on-going impacts due to roost loyalty	Moderate negative	Moderate adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Continued fragmentation of potential commuting routes and associated prevention of access to foraging areas through 'barrier effect' created by operational Scheme	SI: -ve PO: probable CO: indirect EC/SZ: limited to animals using roosts associated with potential commuting routes RE: not reversible DU: permanent TF: ongoing during operation of the Scheme, during the active season	Minor negative	Slight adverse
		Risk of injury/mortality to LHBs crossing the Scheme carriageway	SI: -ve PO: probable CO: direct EC/SZ: limited to animals crossing the Scheme or utilising habitats close to the Scheme RE: not reversible DU: permanent TF: could occur at any time during operation of the Scheme, during hours of darkness, during the active season	Minor negative	Slight adverse
Llwyn y Coed SSSI	High	No direct or indirect impacts on habitat features anticipated due to distance from the scheme (4.74km)	N/A	Neutral	Neutral
Afon Seiont (Middle) Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	N/A	Neutral	Neutral
Afon Seiont Mosaic (North) Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	N/A	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Felinwnda Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	N/A	Neutral	Neutral
Waenfawr Road Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	N/A	Neutral	Neutral
Rhyddallt-bach Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	N/A	Neutral	Neutral
Llanfair Wood & nearby copses Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	N/A	Neutral	Neutral
Lon-glai Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	N/A	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Gallt-y-sil farm Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	N/A	Neutral	Neutral
Gypsy Wood Park habitats	Lower	No direct or indirect impacts on habitat features anticipated due to the low sensitivity of the habitats present, consideration that air pollution from traffic using the Scheme would not be expected to have any measurable effects and their distance from the scheme (0.5km)	N/A	Neutral	Neutral
Broadleaved woodland	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	N/A	Neutral	Neutral
Scrub	Lower	No direct impact on retained scrub, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	N/A	Neutral	Neutral
Hedgerows	Lower	No direct impact on retained hedgerows, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	N/A	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Roosting bats	Lower	Disturbance to bats or disruption of roost use for retained roosts close to the Scheme. Such effects could result from lighting (lighting columns or vehicle headlamps) or noise associated with operation of the Scheme	SI: -ve PO: unlikely CO: indirect EC: limited to any retained roosts close to the Scheme, particularly those close to lit junctions SZ: severity would depend on species affected. Could potentially result in effective loss of one or more roosts RE: not reversible DU: permanent TF: impacts would occur during first summer season that Scheme was operational with potential on-going impacts due to roost loyalty	Moderate negative	Slight adverse
Potentially commuting and foraging bats	Medium	Continued fragmentation of potential commuting routes and associated prevention of access to foraging areas through 'barrier effect' created by operational Scheme	SI: -ve PO: probable CO: indirect EC/SZ: limited to animals using roosts associated with potential commuting routes RE: not reversible DU: permanent TF: ongoing during operation of the Scheme, during the active season	Minor negative	Slight adverse
		Risk of injury/mortality to bats crossing the Scheme carriageway	SI: -ve PO: probable CO: direct EC/SZ: limited to animals crossing the Scheme or utilising habitats close to the Scheme RE: not reversible DU: permanent TF: could occur at any time during operation of the Scheme, during hours of darkness, during the active season	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Badgers	Lower	Risk of injury/mortality to Badgers crossing the Scheme carriageway	SI: -ve PO: probable CO: direct EC/SZ: limited to animals utilising habitats close to the Scheme RE: not reversible DU: permanent TF: could occur at any time during operation of the Scheme, during hours of darkness, higher risk during summer months when Badgers are more active	Minor negative	Slight adverse
Dormice	Lower	Continued fragmentation of population through 'barrier effect' created by operational Scheme, which may affect viability of population in the long-term	SI: -ve PO: unlikely CO: indirect EC: wherever Dormice are present in vegetation adjacent to the Scheme SZ: as Dormice are present in low density, populations sizes may be small, particularly on the north side of the Scheme, and therefore at risk of local extinction RE: not reversible DU: permanent TF: ongoing during operation of the Scheme, during the summer months	Minor negative	Slight adverse
		Recent research has shown that Dormice can cross road carriageways during seasonal dispersal movements, and therefore could theoretically be at some risk of road traffic mortality. However, it is likely that such dispersal movements are so rare that the risk of Dormouse road mortality is negligible.	N/A	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Similarly, as Dormice have been shown to nest in habitat very close to active carriageways, including those with lighting columns, no disturbance effects on Dormice are predicted.			
		Improved foraging resource for Dormice along the verges of the Scheme, as these would be less intensively managed than existing grazed pastures	SI: +ve PO: unlikely CO: direct EC: as Dormice may be present all along the Scheme, this effect could occur in any locations where planting on the verges provides suitable foraging habitat SZ: the beneficial effect is unlikely to significantly affect local Dormouse populations RE: reversible DU: permanent TF: once wood and shrub vegetation on verges is established, several years following construction, and only during the summer months	Minor positive	Slight positive
Otters	Lower	Loss of connectivity for Otters on watercourses crossed by the Scheme due to the 'barrier' effect (not applicable along the Afon Gwyrfai and Afon Seoint where widespan structures are used)	SI: -ve PO: unlikely CO: indirect EC: limited to watercourses due to be culverted/diverted SZ: this effect would only result in the loss of marginal foraging areas for a very small number of individual Otters RE: not reversible DU: permanent TF: ongoing during operation of the Scheme	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Risk of mortality to Otters crossing the Scheme carriageway	SI: -ve PO: probable CO: direct EC: limited to watercourse crossings where flow characteristics mean that culverts are impassable during wet weather SZ: limited to the very small number of individual Otters resident on watercourses close to the Scheme, and unlikely to affect the Afon Gwyrfai population significantly RE: not reversible DU: permanent TF: could occur at any time during operation of the Scheme, though primarily during periods of high flows in watercourses.	Minor negative	Slight adverse
Water Voles	Lower	Loss of connectivity for Water Voles on watercourses crossed by the Scheme due to the 'barrier' effect (not applicable along the Afon Gwyrfai and Afon Seoint where widespan structures are used)	SI: -ve PO: unlikely CO: indirect EC: limited to watercourses due to be culverted/diverted SZ: this effect would only result in the loss of marginal foraging areas for a very small number of individual Water Voles RE: not reversible DU: permanent TF: ongoing during operation of the Scheme	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Risk of mortality to Water Vole crossing the Scheme carriageway	SI: -ve PO: probable CO: direct EC: limited to watercourse crossings where flow characteristics mean that culverts are impassable during wet weather SZ: limited to the very small number of individual Water Vole resident on watercourses close to the Scheme, and unlikely to affect the population significantly RE: not reversible DU: permanent TF: could occur at any time during operation of the Scheme, though primarily during periods of high flows in watercourses.	Minor negative	Slight adverse
Breeding birds	Medium	Risk of road injury/mortality for birds foraging over the verges of the Scheme or flying low across the Scheme. Of the breeding species present, or likely to be present in future, Barn Owls are considered likely to be most at risk of road mortality.	SI: -ve PO: unlikely CO: direct EC/SZ: road mortality could potentially affect a significant proportion of local populations of these species, particularly for those which may colonise (or re-colonise) the local area in future and therefore only be present in small numbers RE: not reversible DU: permanent TF: could occur at any time during the operation of the Scheme	Minor negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
		Disturbance of breeding birds present in retained habitats close to the Scheme, through noise and/or light pollution, is considered very unlikely to occur as birds would not be expected to choose nesting sites where disturbance was already occurring. Impacts would therefore only be predicted if the Scheme first opened to traffic during the bird breeding season, and even in this situation, an adverse impact of breeding birds is considered very unlikely, given levels of human activity associated with the Scheme during construction	N/A	Neutral	Neutral
Reptiles	Lower	Potential for injury/mortality associated with routine management of verges if reptiles recolonize these areas	SI: -ve PO: unlikely CO: direct EC/SZ: likely to affect only a small proportion of population, though not necessarily in proportion to the area affected RE: not reversible DU: permanent TF: could occur whenever grassland management activities take place during the reptile active season	Moderate negative	Slight adverse

Ecological Receptor	Nature Conservation Value	Description of Impact	Characterisation of Impact	Magnitude of Impact	Significance of Impact
Fisheries and aquatic invertebrates	Lower	Loss of/reduction to connectivity on watercourses crossed by the Scheme due to the 'barrier' effect (not applicable along the Afon Gwyrfai and Afon Seoint where widespan structures are used)	SI: -ve PO: unlikely CO: indirect EC/SZ: limited to watercourses due to be culverted/diverted RE: not reversible DU: permanent TF: ongoing during operation of the Scheme	Moderate negative	Slight adverse
		Loss of/reduction to connectivity to the upper reaches of the Afon Rhyd due to the 'barrier' effect	SI: -ve PO: likely CO: indirect EC/SZ: limited to watercourses due to be culverted/diverted RE: not reversible DU: permanent TF: ongoing during operation of the Scheme	Major negative	Moderate adverse
Other species	Lower	Potential for injury/mortality associated with routine management of roadside vegetation if these species recolonize these areas	SI: -ve PO: unlikely CO: direct EC/SZ: likely to affect only a small proportion of population, though not necessarily in proportion to the area affected RE: not reversible DU: permanent TF: could occur whenever grassland management activities take place during the active season	Moderate negative	Slight adverse

8.5 Proposed Mitigation

This section describes the proposed mitigation measures that are not already included as 'mitigation by design' through the iterative process by which the preferred route and basic characteristics of the Scheme has been derived. Proposed mitigation measures are outlined for each of the predicted effects on key ecological receptors described above, for construction and operation of the Scheme.

8.5.1 Construction Mitigation

Designated Sites

The Afon Gwyrfai SAC and SSSI will not be directly affected during either the construction works or the operational phase however indirect impacts on retained habitats may occur. Those areas affected by indirect impacts on retained habitats will be addressed as detailed within the habitats section below. Direct and indirect impacts on Otters can also be considered to impact this site however these would be addressed through the measures detailed in the Otter and Water Vole section below.

No direct impacts on the habitat features of the remaining designated sites are anticipated during the construction works. Potential indirect habitat impacts would be addressed through the measures detailed within the habitats section below.

Those sites designated for their bat populations, particularly Lesser Horseshoe Bats, or other mobile species such as Otters may be indirectly affected by the construction works through potential impacts on these species when outside the designated site boundaries. These impacts would be addressed through the mitigation measures detailed within the species specific sections below.

Habitats

The Scheme will result in an overall permanent loss of 26.44ha of habitat (as per Table 8.5.1 below):

Table 8.5.1 – Permanent loss and creation by habitat type

Habitat	Permanent Habitat Loss (ha)	Habitat Creation (ha)
Semi-natural broadleaved woodland	1.35	0
Broadleaved plantation woodland	0.20	13.02
Plantation Coniferous woodland	0.54	0
Dense scrub	2.06	0
Semi-improved neutral grassland	0.48	0
Improved grassland	52.84	0
Marshy grassland	5.10	0
Poor semi-improved grassland	1.36	0
Tall ruderal	0.51	0
Running water	0.49	0
Acid Scree	0.15	0
Arable	0.42	0

Habitat	Permanent Habitat Loss (ha)	Habitat Creation (ha)
Amenity grassland	0	0
Ephemeral/short perennial	0.19	0
Caravan site	0.01	0
Track	5.27	26.44
Bare ground	0	0
Other	0.70	0
Species-rich grassland (seeding)	N/A	29.61
Natural regeneration on rock slope	N/A	2.6
Total	**71.67**	**71.67**
Total (exc track/road)	**66.4**	**45.23**

The majority of this habitat is considered to be of negligible nature conservation value however the loss of those habitats considered to be of lower value or above (i.e. broadleaved woodland, scrub and hedgerows) is to be mitigated.

It is therefore proposed that the permanent loss of 1.35ha of broadleaved woodland and 2.06ha of scrub (3.41ha total) would be mitigated by planting 13.02ha of locally native and ideally locally sourced trees and shrubs and 144 individual trees as shown on the landscape mitigation measures (Volume 2, Figures 7.12). Road safety requirements dictate that mature woodland should not be established in close proximity to the Scheme carriageway. However, the establishment of woodland in suitable locations at the base of embankment slopes, to the top of cuttings and at a suitable distance from the Scheme carriageway is considered sufficient to mitigate the identified adverse impact in the long term. The detailed design for this planting is to be agreed during Key Stage 4 in consultation with NRW and other bodies to ensure that all constraints are considered including protected species mitigation and landscape requirements. The hedgerow planting detailed below will provide connectivity between the new and retained woodland areas.

The temporary loss of 1.61ha of broadleaved woodland and 3.12ha of scrub (4.73ha total) has been reduced as far as possible and will be mitigated through replacement planting following completion of works in each particular area. This planting will mimic the species composition of the vegetation removed as far as possible or if considered appropriate a more species diverse mix will be planted. Short term connectivity within these habitats will be maintained through the use of moveable windrows of similar features.

In addition to the areas of new planting, key areas of vegetation have been included within the Scheme to ensure their retention. This includes the dense mature hedgerow adjacent to the Scheme between Structures 104 and 105, the wooded stream that runs along the eastern side of the Scheme from Pen-y-Bryn Lane northwards past the quarry area has also been included and the mature trees and scrub vegetation retained. The woodland areas around Structures 111 and 111a have also been included given the connectivity this provides between the habitats in this area. The woodland block to the western side of the carriageway at the Plas Menai roundabout has also been included within the CPO of the Scheme.

It is also proposed that that hedgerows would be planted within the Scheme boundary as shown on the landscape mitigation measures (Volume 2 Figures 7.12). The strategic positioning of hedgerows is discussed below in relation to the role of the new hedgerows as a bat and Dormouse mitigation tool. The intention is that the planted hedgerows would link together the retained ends of hedgerows severed by the Scheme. This will facilitate the colonisation of new hedgerows by a wide range of plant and animal species present in the local hedgerow network. Approximately 22,954m of hedgerow planting would be provided by the Scheme compared with the approximate loss of 4,111.2m of hedgerow removed during construction of the Scheme.

Hedgerows would be created in two ways: where sections of hedgerow that require removal during construction support well-established coppice stools of hazel or other shrubs, these would be coppiced (again see mitigation relating to Dormice, below) and translocated to the alignment of proposed new hedgerows. Translocated coppice stools establish sooner than newly planted shrubs and therefore start providing structural and foraging habitat for a range of species more quickly following construction. Ideally, coppice stools would be translocated direct from donor to receptor sites nearby, though earthworks or drainage requirements may mean that some stools have to be translocated twice, first into a temporary 'holding' area within which they should still be replanted with all roots covered by soil until it is possible to move them into their final destination.

The remainder of new hedgerow would be planted using a range of locally native tree and shrub species (refer to the habitat survey target notes in Volume 3 Appendix E.3). Care should be taken to use plants of UK and ideally Welsh stock rather than sourced from overseas, which can have slightly different genetic and ecological characteristics with potential implications for other wildlife.

The temporary loss of 2,911.33m of hedgerows has been minimised as far as possible and will be mitigated on a short term basis through the use of moveable windrows or similar features wherever possible to maintain connectivity during the construction phase. Any hedgerows removed to permit the construction works would be translocated and replanted as soon as possible following completion of works in each area if feasible and practical to do so, particularly if these have been classified as Important Hedgerows under the Hedgerow Regulations. If this is not possible new hedgerow planting of a similar species composition would be undertaken.

Impacts of dust deposition on retained hedgerows and broadleaved woodlands would be minimised by following good practice measures during construction such as damping down haul routes where necessary and ensuring that all site traffic obeys the site speed limits. Disruption of hydrology during earthworks resulting in retained habitats being either flooded or parched is very difficult to predict and avoid due to the complexity of the watercourses and the Scheme earthworks. Consequently, the identification of these impacts, if they occur, would form part of the remit of the site Environmental Clerk of Works and remedial action would be taken on site if any problem locations are found.

The verges of the Scheme and other areas acquired for access and maintenance purposes would also provide opportunities for habitat enhancement, compared to the relatively low ecological value of much of the Scheme footprint described in the baseline conditions above. In particular, on areas where hedgerow or woodland planting are not appropriate, grassland seeding would be undertaken, which will provide 29.61ha mitigation for the 6.94ha of grassland habitats and 53.26ha agricultural grassland habitats lost. This seeding would be native and species rich

unless safety requirements dictate the need for amenity mixes to be used to preserve sight lines etc. These grassland areas will be created in a variety of conditions with different drainage regimes and different floral mixes to encourage the establishment of different grassland types, including species rich marshy grassland, particularly to the north and south of the Bethel Roundabout where potential rush pasture is being lost. If possible the topsoil from the existing marshy grassland will be retained and reused to maintain the seedbank already established. Translocation of topsoil from other grassland areas, particularly those affected within the Wildlife Sites, will also be considered during Key Stage 4 in consultation with NRW and other statutory bodies.

Additional habitat diversity is also provided on the rock cut adjacent to the Plas Menai Roundabout where 2.6ha of exposed rock and retained soils will be left and encouraged to regenerate naturally.

Direct impacts on the Afon Gwyrfai and the Afon Seoint are largely avoided through the use of clear span structures in these locations. Realignment works are to be undertaken on the Afon Rhyd (as detailed within Section 8.5.2 Fisheries and aquatic invertebrates below), Afon Bueno, Afon Cadnant and other unnamed watercourses, which would result in temporary loss and disturbance of the watercourses and associated habitats although this would be minimised through the creation of the realigned section and associated habitats before the loss of the existing watercourse wherever possible. Over-sized culverts would be installed over all watercourses affected and consequently pollution incidents affecting these watercourses could occur during the works on or above these watercourses. The risk of this occurring would be minimised by using appropriate site procedures for pollution control based on current best practice guidelines. These are described in more detail in the Road Drainage and the Water Environment chapter 14 and would include:

- Avoiding re-fuelling or parking site vehicles close to watercourses;
- Avoiding machinery working in watercourses as far as possible;
- Minimising release of sediment during necessary watercourse diversion by use of silt traps downstream of the works;
- Positioning site compounds and welfare facilities at sufficient distance from watercourses to avoid the risk of pollution incidents;
- Using bunded fuel tanks and generators;
- Controlling construction site run-off into watercourses;
- Having spill kits available close to watercourses for rapid deployment in the event of a pollution event.

Japanese Knotweed and Himalayan Balsam associated with watercourses and elsewhere would be treated and handled in accordance with the Environment Agency's (EA) best practice guidelines and measures to treat and prevent the spread of these species and other invasive plant species would be included in the CEMP for the Scheme.

Bats

As part of the 2016 and 2017 surveys, all trees would be reassessed to identify any evidence of use by bats and a small number of buildings in the vicinity of the Scheme will be inspected and surveyed. All Category 1* and Category 1 trees affected by the Scheme would be subject to a climbing inspection and/or emergence and re-entry surveys to confirm the presence of likely absence of bats. No confirmed roosts have been identified in trees directly affected by the Scheme but any trees showing evidence of use during these re-inspections would be subject to further survey in order to inform an application for their removal under licence (a ghost licence has

been drafted and included within Volume 3 Appendix E.7) from Natural Resources Wales (NRW). Subsequent felling of other trees would be undertaken following a precautionary approach which would form part of the CEMP for the Scheme.

Roost counts will also be undertaken at three locations previously identified as LHB roosts, namely Caernarfon Brickworks, Glan Morfa and Glangwna Hall, in 2016 and 2017 in accordance with the National Bat Monitoring Programme. This will provide an up-to-date baseline from which future monitoring can continue.

The risk of disturbance of bats in retained roosts close to the Scheme would also be assessed in more detail following re-inspection of trees pre-construction. However, impacts would largely be avoided by limiting construction site lighting to specific locations where it is absolutely necessary for public safety or security and by minimising light spill by directing lighting downwards onto rather than across areas requiring illumination. Care would be taken to avoid positioning site compounds or welfare units, generators for traffic management etc. in close proximity to retained roosts or other features habitats likely to be used by bats. Where this is not possible other measures will be put in place to minimise disturbance from these including the use of directional lighting, time restricted generator use etc. Rock drilling and blasting works are required in relation to the Plas Menai rock cut to the northern end of the Scheme however such works will be limited as far as possible and the blasting will be low intensity and only occur once a week. No Lesser Horseshoe Bat roosts have been identified in the immediate area however a Lesser Horseshoe roost is known to be 1.5km to the south west at Plas Brereton and two Brown Long-eared roosts have been noted approximately 0.4km to the east of the rock cut, although no commuting route has been identified crossing this area. These roosts are considered to be a sufficient distance from the construction works to avoid significant disturbance impacts.

The majority of species recorded during the 2015 and previous surveys are less sensitive that other species to disruption of potential commuting routes. As such, whilst loss of continuous vegetated features across the Scheme is considered as an adverse impact above, it is also considered likely that during construction that these species would continue to cross the Scheme successfully (using either the same potential commuting route or a parallel feature) in locations where a clear span structure is not being provided.

Species more sensitive to creation of gaps in potential commuting features, such as Lesser Horseshoe and Brown Long-eared Bats, were also recorded, however no commuting routes for either of these species were identified as the survey results indicated widespread low numbers of bats indicative of foraging behaviour rather commuting behaviour. Where there is significant vegetation disruption as a result of the construction works, namely around the Afon Seoint where the haul road placement requires the removal of broadleaved woodland and scrub and where vegetation is lost around water crossings, temporary measures would be used to maintain vegetation edges. These measures would take the form of a temporary pipe of approximately 600mm diameter beneath the haul route where there is sufficient material or debris netting/brash windrows that can be removed and replaced on a daily basis and will be included within the CEMP. This approach will also be used to maintain connectivity at each crossing point location along the Scheme to ensure that bats can continue to use these features during construction.

Safe potential commuting routes would either be maintained (e.g. Afon Gwyrfai and Afon Seoint) or reinstated (e.g. through the reinstatement of hedgerow connectivity as soon as possible and the use of temporary measures in the interim period) at the

majority of potential commuting route locations during the construction period. It is noted that potential route in the area of peak activity for the Scheme (south of the quarry area) will be maintained through the retention of the Plas-y-Bryn Lane route through the inclusion of an oversized box culvert beneath the carriageway. Three additional culverts have also been added along the Scheme following consultation with NRW to further increase the number of safe crossing locations along the Scheme. These have also been maximised in size, although the culvert to the south of the Meifod roundabout is considered unlikely to be used by bats due to its limited size (0.9m in comparison to 1.5m plus elsewhere). The sizes and purpose of these structures are detailed in the Table 8.5.1 below:

Table 8.5.1: Summary of Scheme Structures and Associated Wildlife Mitigation

Ref	Structure	Length	Headroom when in spate (1 in 100yr)	Associated mammal mitigation	Function
	Size /Type	(m)	(m)		
S100	0.6m pipe	33		Non-LHB foraging and potential commuting route, mammal ledge	Watercourse crossing
S101	1.8m pipe	57.2	1.11	LHB foraging and potential commuting route, mammal ledge	Watercourse crossing
S101A	7.2 x 5.8m box underbridge	23.7	N/A	LHB foraging and potential commuting route, wildlife crossing	Road crossing
S102	3.2m x 2.4m box culvert	54.9	0.71	LHB foraging and potential commuting route, wildlife crossing, dry pipes also provided	Stream diversion
S103	Overbridge	N/A	50.9	Non-LHB foraging and potential commuting route	Road crossing

NRW1	1.8m pipe	25.5	N/A	LHB foraging and potential commuting route, wildlife crossing	Ecological mitigation only
S104	1.8m pipe	35.2	1.10	LHB foraging and potential commuting route, mammal ledge	Watercourse crossing
S105	4.5 x 4.5 box underbridge	23.6	N/A	LHB foraging and potential commuting route, wildlife crossing	Farm access
S106	Afon Gwyrfai Viaduct	260	N/A	LHB foraging and potential commuting route, wildlife crossing	Watercourse crossing
S107	7.2 x 6.1m box underbridge	24.6	N/A	LHB foraging and potential commuting route, wildlife crossing	Road crossing
S108	19.5 underbridge	17	N/A	LHB foraging and potential commuting route, wildlife crossing	Rail crossing
S109	Overbridge	24.7	N/A	Non-LHB foraging and potential commuting route, wildlife crossing	Road crossing
S109A	1.8m pipe	36.4	0.89	LHB foraging and potential commuting route, mammal ledge	Watercourse crossing
S109B	0.6m pipe	23.6	0.36	Non-LHB foraging and potential	Watercourse crossing

				commuting route, mammal ledge	
NRW2	0.9m pipe	28.0	N/A	Non-LHB foraging and potential commuting route, wildlife crossing	Ecological mitigation only
S110	1.8m pipe	30.2	1.16	LHB foraging and potential commuting route, mammal ledge	Watercourse crossing
S110A	1.8m pipe	23.2	1.09	LHB foraging and potential commuting route, mammal ledge	Watercourse crossing
S111A	1.8m box culvert	29.6	N/A	LHB foraging and potential commuting route, wildlife crossing	Ecological mitigation only
S111B	1.5m pipe	14.2	0.66	LHB foraging and potential commuting route, mammal ledge	Watercourse crossing
NRW3	1.8m pipe	28.5	N/A	LHB foraging and potential commuting route, wildlife crossing	Ecological mitigation only
S112	Afon Seoint Viaduct	148	N/A	LHB foraging and potential commuting route, wildlife crossing	Watercourse crossing
S112A	1.5m pipe	15	0.85	LHB foraging and potential commuting	Watercourse crossing

				route, mammal ledge	
S112B	1.5m pipe	32.2	0.81	LHB foraging and potential commuting route, mammal ledge	Watercourse crossing
S112C	0.6m pipe	32.7	0.34	Non-LHB foraging and potential commuting route, mammal ledge	Watercourse crossing
S112D	0.6m pipe	118		Non-LHB foraging and potential commuting route, mammal ledge	Watercourse crossing
S112E	18.7m box underbridge	9.7	N/A	LHB foraging and potential commuting route, wildlife crossing	Road crossing
S113A	2.3m x 3.0m box culvert	23.0	2.3	LHB foraging and potential commuting route, wildlife crossing	Watercourse crossing
S114	3.4m x 3.4m box culvert	22	1.77	LHB foraging and potential commuting route, wildlife crossing	Watercourse crossing and cattle creep
S114A	1.8m pipe	29.4	0.60	LHB foraging and potential commuting route, mammal ledge	Watercourse crossing
S115	Overbridge	23.5m	N/A	Non-LHB foraging and potential commuting	Road crossing

				route, wildlife crossing	
S115A	2.1m pipe	55.5	0.79	LHB foraging and potential commuting route, mammal ledge	Watercourse crossing
S115B	2.1m pipe	53.5	0.78	LHB foraging and potential commuting route, mammal ledge	Watercourse crossing
S115C	2.1m pipe	21	0.72	LHB foraging and potential commuting route, mammal ledge	Watercourse crossing
S116	0.6m pipe	35	0 (surcharged ~ 2m)	Not suitable for wildlife passage, dry pipes provided (S116A and S118A)	Watercourse crossing
S116A	0.6m pipe	46	0	Dry pipe provided for mammal passage (NB: Otter pipe surcharged by about 1.3m for 100CC event.)	Ecological mitigation only
S118A	0.6m pipe	24	0	Dry pipe provided for mammal passage (NB: Otter pipe surcharged by about 1.3m for 100CC event.)	Ecological mitigation only

Culverts would not be fitted with grilles or screens so they are fully accessible for use by bats, unless required for public safety reasons. These structures would be linked to the wider landscape through the retention of existing woodland, scrub and hedgerows and through the use of new planting to reconnect fragmented hedgerows as shown

within the Environmental Master Plans. This planting will be subject to further review and detailed design in consultation with NRW as part of the Key Stage 4 process.

Hedgerows and woodland blocks would also be planted along the length of the Scheme to ensure that bats are guided to safe crossing locations and are discouraged from crossing the carriageway itself (refer to the Environmental Master Plans). Temporary guidance fencing will be used until this planting is established using the principles established within the SIAA (refer to Appendix E.2). The intention is that the planted hedgerows would link together the retained ends of hedgerows severed by the Scheme. This will facilitate the colonisation of new hedgerows by a wide range of plant and animal species present in the local hedgerow network. The woodland planting along the Scheme embankments would discourage bats from the carriageway as well as providing replacement foraging habitat.

It is acknowledged that there is less connectivity across the carriageway to the northern end of the Scheme due to the long deep cut required to bring the carriageway to the Plas Menai roundabout. The cutting slopes will be seeded as species rich grassland with the area of rock cut adjacent to the roundabout to be soiled to allow natural regeneration. Woodland, scrub and hedgerow planting has been pulled back to the top of the cutting to discourage bats from crossing the carriageway and to reconnect the woodland blocks and other vegetation severed by the Scheme. Crossing structures are provided around the Bethel roundabout to permit bats to cross the carriageway safely and these are connected to the wider area, including the Plas Menai area through the landscape planting.

In conjunction with the above there is the potential for the Scheme to provide south-north habitat connectivity both along the length of the Scheme and between different sections as detailed within the SIAA (Volume 3 Appendix E.2). This connectivity has the potential to benefit LHB populations in the wider area as well as those in the Scheme area. This is not part of the mitigation strategy for the Scheme and as such has not been considered as part of this assessment.

It is not possible to mitigate the effects of loss of foraging habitat in hedgerows, woodland and grassland in the short term during the construction period. However, less than 1.5ha of high potential bat foraging habitat (woodland) and further areas of lower potential bat foraging habitat such as improved grassland (54ha), scrub (2ha) and species rich grassland (6.9ha) will be affected. As there are large areas of foraging habitat in the vicinity of the known roosts, this constitutes a small proportion of the available foraging habitat and as such mitigation is not considered to be required in the short-term. Planting of hedgerows and woodlands and seeding of grassland along the Scheme as described above would mitigate this impact in the medium to long term.

Badgers

No active setts and no evidence of Badger activity were found during the 2015 surveys. As such it is considered that construction related impacts should be limited to individual animals only. Best practice measures would be applied to ensure that animals either cannot enter the construction area and/or the site is made safe overnight. Disturbance will be avoided by limiting construction site lighting to specific locations where it is absolutely necessary for public safety or security, and by avoiding light spill onto watercourses and wooded areas. Care will be taken to avoid positioning site compounds or welfare units, generators for traffic management etc., in close proximity to watercourses or wooded areas which may be used by Badgers. These measures would be incorporated into the CEMP.

A pre-construction survey will be conducted immediately prior to commencement of works to ensure no Badger setts have been established that may be damaged or disturbed. If a sett has become established inside or within a 30m of the boundary of the construction site, a licence from NRW will be required in order to exclude Badgers from the sett prior to commencement of construction (unless reliance on a legal defence is possible). It should be noted that sett exclusions are seasonally constrained, and can only be carried out on active setts between July and November inclusive and may require the creation of a replacement sett prior to exclusion.

Dormice

Direct impacts on Dormice during construction, comprising habitat loss and a risk of mortality during site clearance operations would be mitigated through a combination of careful working methods and timing of works.

Based on the survey results none of the vegetation clearance is considered licensable as the habitats present were considered to be sub-optimal or lower and should Dormice be present it would be in low densities which are difficult to identify through surveys. As such low density populations have been assumed on site and reasonable avoidance measures are to be applied to the clearance of the woodland, scrub and hedgerow habitats. These measures are to be included in the CEMP and would involve clearing vegetation in a sensitive manner either towards retained habitats if undertaken during the active season or in a two stage approach where above ground clearance takes place over winter and stump removal during the summer. Clearance would not be undertaken between June and September as this is the breeding season when adults are most likely to have dependent young.

Loss of Dormouse habitat would be mitigated by planting of hedgerows and woodland as described above. This planting would connect up the ends of severed hedgerow features to maintain or enhance connectivity of Dormouse habitat along the Scheme, on both sides. In doing so, it is anticipated that the populations would remain viable despite the loss of connectivity across the Scheme. Where possible the reconnection of severed hedgerow ends would be expedited by use of translocated material, which would establish more quickly than new planting.

Disturbance to Dormice in retained habitats would largely be avoided by limiting construction site lighting to specific locations where it is absolutely necessary for public safety or security, and by minimising light spill by directing lighting downwards onto, rather than across, areas requiring illumination. Care would be taken to avoid positioning site compounds or welfare units, generators for traffic management etc., in close proximity to retained habitat likely to be of particular value to Dormice.

Otters and Water Voles

During construction, Otters and Water Voles using watercourses crossed by the Scheme may be disturbed by construction site activities, such as construction site noise and lighting. Disturbance would largely be avoided by limiting construction site lighting to specific locations where it is absolutely necessary for public safety or security, avoidance of night-working wherever possible and by avoiding light spill onto watercourses. Care would be taken to avoid positioning site compounds or welfare units, generators for traffic management etc., in close proximity to watercourses which may be used by Otters and/or Water Voles and connectivity along these will be maintained as far as possible during the construction programme. No excavations will be left open overnight or where this is necessary at least one means of escape

provided. A method statement to ensure that impacts on Otter and Water Voles during construction are avoided would form part of the CEMP for the Scheme.

A pre-construction survey will be conducted immediately prior to commencement of works to ensure no holts, resting up sites or burrows have been established that may be damaged or disturbed. If a holt or burrow has become established inside or within a 30m of the boundary of the construction site, a licence from NRW will be required if these are to be disturbed, damaged or destroyed.

Breeding Birds

Avoiding mortality of breeding birds would be achieved through timing of works to avoid vegetation clearance during the breeding bird season. This is generally March to August inclusive (weather dependent), but varies between species with some, such as crossbills, potentially breeding earlier in the year. Timings of vegetation clearance are also constrained by the presence of Dormice (see above), but the principle to be followed during site clearance would be to coppice hedgerows and other vegetation suitable for use by breeding birds during the winter months, to prevent breeding birds occupying vegetation on the footprint of the Scheme. Any vegetation that cannot be cleared prior to the bird breeding season would need to be checked prior to removal by a suitably qualified ecologist, to confirm the absence of active nests.

When birds are setting up breeding territories in the spring following vegetation removal, the Scheme would be an active construction site with construction traffic etc. Consequently, the proposed timings of works have been planned to avoid causing disturbance on breeding birds.

It is not possible to mitigate the effects of loss of nesting habitat in hedgerows and woodland in the short term during the construction period, but planting of hedgerows and woodlands as described above on the verges of the Scheme would mitigate this impact in the medium to long term.

Reptiles

The habitat survey highlighted that the habitats in and around the quarry and around the Afon Seoint have some potential for small populations of reptiles which may be killed during the site clearance works and a small proportion of the habitat used by this population would be lost. Mitigation to minimise the risk of mortality of any potential reptile populations would comprise a watching brief being kept during clearance works within these areas and small scale capture and relocation of reptiles if required. This approach will also be applied to the removal of stone walls and cloddiau.

Given the small proportion of suitable habitat and the likely low populations present it is not considered necessary to identify an off-site receptor area. However, the numbers of any animals caught would be kept under review to ensure the carrying capacities of receptor areas are unlikely to be exceeded. Approximately 11.46ha of low and medium potential reptile habitat would be permanently lost, with a further 9.31ha temporarily lost, during construction however by the time the Scheme is operational, establishment of grassland, woodland and scrub habitats along the Scheme would provide 42.63ha of potential reptile habitat. Although this is unlikely to be of the same quality as the habitat lost immediately, its greater area would be sufficient to mitigate this loss in the short term.

Habitat connectivity across and along the Scheme area will be mitigated for through the creation of 22,954m of native hedgerow planting. These will link together the retained ends of severed hedgerows and woodland habitats and connect through the grassland areas created along the Scheme.

Fisheries and aquatic invertebrates

Fish passage will be maintained along all of the watercourses affected by the Scheme through the avoidance of in-river working wherever possible. Where such work is necessary, sensitive periods such as spawning periods (particularly between the 17th October to 15th May which is the spawning period for Atlantic Salmon and spring and early summer which is the smolt migration period) will be avoided and works undertaken in a sensitive manner, in consultation with NRW. Some form of passage will be provided at all times (i.e. no watercourse will be completely blocked) or an alternative passage will be provided during construction. This is particularly important where watercourses are to be culverted on line.

Construction impacts on fish and aquatic species have also been addressed through the watercourse protection and pollution prevention measures detailed within Chapter 14: Road Drainage and the Water Environment, including the need for an Energency Plan should any pollution incidents occur during construction.

Other Species

The habitat survey highlighted that the habitats in and around the quarry and around the Afon Seoint have some potential for populations of other species, particularly Hedgehogs and Brown Hare, which may be killed during the site clearance works and a small proportion of the habitat used by this population would be lost. The rest of the habitats across the Scheme also have some potential although this is limited by the agricultural nature and management of these areas. Mitigation to minimise the risk of mortality of any potential populations would comprise a watching brief being kept during clearance works within these areas and small scale capture and relocation if required although it is anticipated that these species would leave the working areas of their own accord.

Approximately 11.46ha of potential habitat would be permanently lost, with a further 9.31ha temporarily lost, during construction however by the time the Scheme is operational, establishment of grassland, woodland and scrub habitats along the Scheme would provide 42.63ha of potential habitat. Although this is unlikely to be of the same quality as the habitat lost immediately, its greater area would be sufficient to mitigate this loss in the short term.

8.5.2 Operational Mitigation

Designated Sites

No direct impact on the habitat features of the designated sites are anticipated during Scheme operation and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable habitat effects. The nitrogen deposition models show enhanced levels for nitrogen deposition up to 15 m parallel to the A499 and 65 m parallel to the A487 within the Glynllifon SAC. The most likely consequence is a continuing slow change in the composition of the ground flora in these areas with increases in nitrophilous species such as brambles, nettles and grasses, whilst the canopy trees and shrubs remaining broadly the same. Thus the habitat structure will remain broadly the same as now.

The Afon Gwyrfai SAC and SSSI may be affected during Scheme operation through direct and indirect impacts on Otters however these would be addressed through the measures detailed in the Otter and Water Vole section below.

Those sites designated for their bat populations, particularly Lesser Horseshoe Bats, or other mobile species such as Otters may be indirectly affected during the operation phase through potential impacts on these species when outside the designated site boundaries. These impacts would be addressed through the mitigation measures detailed within the species specific sections below.

Habitats

No direct impacts are anticipated on retained habitats and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable habitat effects. As stated above the nitrogen models show increases in nitrogen deposition along the A499 and A487, which may result in an increase in nitrophilous species such as brambles, nettles and grasses. However, the structure of retained habitats should remain largely unchanged.

Pollution impacts on the watercourses during operation of the Scheme would be avoided through careful design of drainage and pollution control measures for the Scheme, and appropriate maintenance of these features during operation of the Scheme.

Bats

Although operational impacts on bats using retained roosts close to the Scheme are considered unlikely, provision of bat boxes would ensure that alternative roost sites are available in the short-term, in the event that road noise or road lighting caused significant disturbance. Bat boxes, of the Schwegler-type woodcrete boxes selected to suit the bat species present in the area, would be provided in the vicinity of any identified retained roosts, in locations where they are screened from the road carriageway and any associated lighting, by other vegetation. Three bat boxes would be provided for each of the retained roosts that may be impacted by the operation of the Scheme. Wherever possible bat boxes will be provided in advance of construction and operation.

Direct impacts on bats due to enhanced levels of air pollution are hard to predict and there are no guidelines in relation to bats and air quality. As such those for human health have been applied which indicate that predicted levels are well within the ambient air quality guidelines. The daily mean nitrogen oxides concentrations exceed the air quality objective in all cases for up to 105 m from the A499 and 210 m from the A487. However, as the main periods of bat activity during the summer are generally at night when traffics levels are low, bats are likely to experience much lower than average daily exposures, though there may be some overlap with peak evening traffic flow during the spring (April/May) and autumn (September/October).

Indirect impacts on bats due to enhanced levels of air pollution are also hard to predict although as stated above changes to the structure of retained habitats, including those within sites designated for bats, is considered unlikely. Similarly, it is unlikely there would be direct effects on the overall abundance of their invertebrate food resources, such as small flies (mainly midges), moths, caddis flies, lacewings, beetles, wasps and spiders.

Fragmentation impacts on bats during operation of the Scheme would largely be avoided through the use of wide-span bridges across the Afon Gwyrfai and Afon Seoint, the provision of oversized culverts along the length of the Scheme as well as the retention of the Pen-y-Bryn Lane as a specific bat underpass. Three additional culverts have also been added along the Scheme following consultation with NRW to further increase the number of safe crossing locations along the Scheme. Details of these strctures have been given in Section 8.5.1 above. The measures outlined below in relation to avoiding provision of species rich grassland close to the carriageway to avoid impacts on reptiles and breeding birds would also be applicable to foraging bats using the verges of the Scheme. The use of wildflower seeding along the Scheme would be considered during the detailed design stage.

Badgers

As no active setts or evidence of Badger activity was recorded during the 2015 surveys it is considered that long term fragmentation impacts would be minimal and as such no specific measures have been included for this species.

It should be noted however that the wide-span bridges and oversized culverts, including the three additional NRW culverts (provision will be made through the grille on NRW3 if possible given the safety constraints in this location) and the dry pipes provided at S102 and S116a and S118a, would provide safe crossing points along the Scheme. The proposed and retained planting would guide animals to these locations and discourage access onto the carriageway. Mammal fencing has not been identified as a requirement given the limited activity in the area however the Otter-resistent fencing installed at various locations will perform a similar function in guiding any Badgers present to safe crossing points. This would be reviewed should casualties be recorded.

Dormice

Planting during construction would seek to minimise fragmentation impacts by connecting up the severed ends of hedgerows on either side of the Scheme, and in this way it should be possible to maintain viable Dormice populations on both sides of the Scheme with minimal requirement for habitat connections across the Scheme. The wide span crossings over the Afon Gwyrfai and the Afon Seoint permit the retention of existing vegetation and additional hedgerow and woodland planting to be connected either side of the Scheme beneath these structures where considered necessary further reducing the fragmentation risk to Dormouse populations in the area. However, where oversized culverts provide an opportunity to do so, habitat connections beneath these structures would be created using either ‘dead hedges’ (brash from vegetation clearance stacked in a row connecting live hedgerows on each side of the structure), or by using hurdle fencing or a similar feature. These are proposed as it is not anticipated that live hedges would persist through these structures. These strategic links between Dormouse populations on either side of the Scheme (and any dispersal of Dormice across the Scheme carriageway that may occur) would prevent isolation of the populations on either side of the Scheme.

Management of landscape planting on the verges of the Scheme would have regard to the presence of Dormice. In particular, any trimming of hedgerows and scrub would take place during the winter months, to avoid disturbing or mortality of Dormice in summer nests.

Otters and Water Voles

Otters and potentially Water Voles would be at risk of fragmentation of habitats and/or of road mortality unless safe crossing points combined with Otter-resistant fencing are provided. As wide-span bridges and oversized culverts are to be used through much of the Scheme (as detailed in Table 8.5.1 above) only two additional safe crossing is proposed, one at the southern end of the Scheme and one at the northern end. A dry pipe of at least 600mm has also been included either side of the Afon Rhyd (S102) to ensure continued safe passage beneath the carriageway during flood events. Another 600mm dry pipe has been included adjacent to the culvert structures at S116/118 given the risk of these structures flooding during 1 in 100-year flood events. This has been located a short distance to the south of structure 116 to ensure that it remains dry and to straighten the structure increasing the likelihood that it would be used. Mammal ledges have also been proposed for culverts, wherever possible (as noted in Table 8.5.1 above), and will be tied into the adjacent banks using ramps and/or landscaping as appropriate (to be confirmed during the detailed design process in Key Stage 4). The culvert along Pen-y-Bryn Lane and the two of the additional culverts included following consultation with NRW would also provide additional crossing opportunities for Otters and Water.

Otter-resistant fencing has been included for 100m each way at all structure points including around the embankments associated with the wide-span bridges and beyond proposed ponds as shown in Volume 2, Figure 16.1. The specification for Otter fencing proposed is, as shown in DMRB, Badger fencing with the addition of an overhanging crank on the outer face of the fencing where specific Otter mitigation is required (1500mm with a 300mm crank above ground and 500mm section below ground with an additional 300mm underground return). However, this will be reviewed during Key Stage 4 and Key Stage 6 and discussed with the Statutory Bodies to ensure the most suitable design is used as other schemes in the area have not used the crank design (e.g. Porthmadog and Maes yr Helmau). This fencing and associated landscape planting will be tied in to the structures and/or banks to ensure the animals are directed to these crossings.

All of the watercourse crossings along the Scheme have been designed to ensure continued use by Otters and Water Voles, including the installation of mammal ledges within culverts, and additional routes have been provided around structures 116/118, through the bat culvert to the south of the quarry and the three additional culverts included following consultation with NRW (provision for these species passage will be made through the grille within NRW3). The length of culverts and dry pipes have also been minimised as far as possible given the other constraints on the Scheme design. However, it is acknowledged that there are some sections of the Scheme that do not have crossing provisions as there is a lack of opportunities to do so due to the carriageway being in cut rather than on embankment.

The woodland, scrub and hedgerow planting, retained vegetation areas and Otter-resistent fencing along the Scheme will guide animals to safe crossings should either of these species find themselves away from the watercourses. The recreation of marshy grassland habitat around the Bethel Roundabout will also mitigate for the loss of potential Water Vole habitat in this area.

Breeding Birds

Vegetation clearance would be undertaken to avoid and/or minimise direct and indirect impacts on breeding birds. Firstly, clearance would be undertaken outside of the breeding bird season (late February to early September inclusive, weather

dependent) where possible. Where this is not possible due to programme constraints or other conflicts, clearance will only be undertaken once vegetation has been checked by a suitably experienced ecologist. Should active nests be found within or adjacent to the clearance area, a suitable no working buffer zone would be established (generally 10m but potentially more depending on the sensitivity of the species) and clearance works postponed until the young have fledged.

Birds breeding close to the Scheme and Barn Owls foraging along the Scheme would potentially be at risk of road mortality; although the causes of road mortality vary between bird species, factors increasing risks are the provision of high quality foraging habitat very close to road carriageways, and planting discontinuous blocks of shrub planting which screen birds' views of oncoming traffic. Landscaping of the Scheme would therefore avoid provision of species-rich grasslands within 2m of the carriageway, and shrub planting would be designed to maintain visibility along the Scheme for birds flying over the verges, as far as is practical. The proposed species-rich grassland within the Plas Menai cutting could also result in road mortalities as they hunt along these sections. However, this habitat is required for habitat and bat mitigation and the risk of significant increases in mortalities is low due to use of lighting around this junction.

Reptiles

Reptiles that recolonise the verges of the Scheme following construction would be at some risk of mortality during routine grassland cutting. This risk would however be reduced as species-rich grassland would not be created on the verges within 2m of the carriageway or within visual splays, where more regular cutting is required. Habitat likely to be of higher value to reptiles would therefore be limited to cutting and embankment slopes away from the carriageway.

Management of grassland areas supporting reptiles should aim to minimise risk of mortality through timing of works (i.e. during the winter months, when reptiles will be hibernating underground and therefore at lower risk) or, if necessary during the summer months, a cutting height of no less than 50mm would be set to minimise the risk of reptiles being harmed.

Fisheries and aquatic invertebrates

The Afon Gwyrfai and the Afon Seoint are to be crossed using wide-span structures which will maintain the existing riparian habitats, river beds and natural course of the river.

The Afon Rhyd culvert will incorporate a number of measures to ensure continued fish passage including lowering of the culvert invert to 200mm below the up and down stream bed levels with a step down at the entrance and a step up at the exit to encourage natural deposition of sediments. Concrete V notch baffles would be set at intervals across the width of the culvert to reduce velocities under moderate flow and to increase depths under low flow. The height of baffles, depth of the V notches and distances between baffles will be calculated according to the gradient to ensure approximately 200mm of water depth downstream of each baffle beneath the V notch during lowest flow conditions. Gravel fill will be included to recreate the natural bed level leaving typically 200mm of the baffles protruding above the bed material. The stream bed downstream of the culvert will be protected from over erosion in accordance with the Environment Agency Fish Pass Manual[8.25]. The section of diverted channel upstream of the culvert would also be excavated in the form of meanders (as shown on the Typical Cross Sections Drawing Volume 2 Figure 2.9)

and rocks of a similar size to those in the existing Afon Rhyd channel would be placed on the stream bed.

Those watercourses that are to be culverted will have natural bed material and varying bed depths to ensure continued fish passage and habitat provision for invertebrates upon completion of the Scheme. Where open channels are used these will be designed to permit the watercourse to meander through the channel. A permanent engineered fish pass has not been proposed for the culverts on the Cadnant as it is considered that this would be unlikely to benefit or change the present fishery status. The final design for each culvert will be produced as part of the Key Stage 4 process in consultation with NRW.

Operational impacts on fish and aquatic species have also been addressed through the operational watercourse protection and pollution prevention measures detailed within Chapter 14: Road Drainage and the Water Environment.

Other Species

Other species such as Hedgehogs and Brown Hares that recolonise the verges of the Scheme following construction would be at some risk of mortality during routine grassland cutting. This risk would however be reduced as species-rich grassland would not be created on the verges within 2m of the carriageway or within visual splays, where more regular cutting is required. Habitat likely to be of higher value to these and other species would therefore be limited to cutting and embankment slopes away from the carriageway.

Management of grassland areas supporting other species should aim to minimise risk of mortality through timing of works (i.e. during the winter months, when such species are either hibernating underground or are significantly less active and therefore at lower risk) or, if necessary during the summer months, a cutting height of no less than 50mm would be set to minimise the risk of animals being harmed.

Given the presence of low numbers of common amphibian species and the potential for Common Toad, the use of amphibian friendly drainage design options will be considered during Key Stage 4.

Enhancements

It is considered that the proposed creation of hedgerow and species-rich grassland habitats along the verges of the Scheme post-construction have the potential to represent an enhancement on the baseline conditions for the Scheme, provided these are managed sympathetically, and with regard to other ecological receptors such as reptiles, nesting birds and Dormice, that may be using these habitats.

Such biodiversity gains would be dependent on appropriate management. For woodland and scrub habitats management should be undertaken on a 10-15-year rotational basis, except where more regular management is needed for other reasons, such as road safety. A similar approach is to be taken for hedgerow habitats with hedgerows trimmed no more than one year in three. In addition, management of hedgerows should be phased and randomised across the Scheme so that not all woodland, scrub and hedgerows on the Scheme are managed in the same year and adjacent areas are not cut in successive years. This management should have regard to the possible presence of breeding birds and Dormice, and be undertaken in line with guidance from NRW, particularly in respect of licensing requirements for

Dormice. This management should encourage the colonisation of these areas by native species such as Bluebell.

For grassland habitats, management should aim to provide a range of sward heights and conditions, in order to provide habitat for a wide range of species, including reptiles. This could be achieved by less regular cutting of areas furthest from the carriageways. Collection of arisings from cutting of grassland areas would also assist in the development and maintenance of species-rich swards and associated fauna. The Scheme would help the Welsh Government meet TREBAP objectives and would support the Minister's initiative for wildflowers along road verges.

During the 2016 consultations queries were raised as to whether works could be undertaken in relation to the Water Vole mitigation habitat within the Caernarfon Brickworks created in 2000 as part of the quarry extension. This area is included within the land take of the Scheme, including a small section of the channel that is to be realigned, although no evidence of Water Voles was found and the habitat considered to be of low potential. The potential for management and enhancement of this area to improve its quality in relation to Water Voles and other species will be reviewed as part of the Key Stage 4 process in consulation with NRW and other interested parties. Such enhancement will also consider the provision of another wildlife crossing in the area to provide additional connectivity between this and the quarry habitats.

Where possible log/brash piles and other similar features will be created within the woodland and scrub habitats and along the woodland/grassland boundaries associated with the Scheme. These features would benefit a variety of different populations including reptiles, amphibians and invertebrates.

Other enhancements will be identified and implemented wherever possible during the detailed design of the Scheme in consultation with NRW and other relevant bodies.

Monitoring

Ecological monitoring during and post construction would be required in order to confirm the effectiveness of mitigation measures and enhancements described above. For some receptors the necessary ecological monitoring would be combined with monitoring for landscape reasons (e.g. assessing the success of planting and grassland establishment along the Scheme) and for others monitoring would be a requirement of Statement to Inform Appropriate Assessments and/or derogation licences obtained for the construction of the Scheme. As a minimum, ecological monitoring for the Scheme would comprise:

- Monitoring the establishment of tree, shrub and hedgerow planting and grassland areas on the Scheme, in parallel with monitoring for landscape purposes;
- On-going pre-construction bat monitoring, in line with that undertaken in 2016 to date and as detailed within the SIAA (refer to Appendix E.2);
- Monitoring bat mitigation works, in line with the monitoring detailed within the SIAA (refer to Appendix E.2);
- Monitoring of LHB bat roosts in accordance with the National Bat Monitoring Programme as detailed within the SIAA (refer to Appendix E.2);
- Monitoring of any Dormouse connectivity features if installed within any of the culvert structures along the Scheme;

- Monitoring the effectiveness of fencing and safe crossing points on the Scheme for Otters and Water Voles, Badger activity in and around these crossing points would also be monitored;
- Monitoring of pass-ability of in stream structures for fish.

The details of the monitoring requirements will be agreed with NRW as part of the consultation process.

The results of this monitoring will be reported and discussed during the Environmental Liaison Group meetings during which further surveys and/or actions required can be identified.

8.6 Residual Environmental Effects (following mitigation)

Assuming the effective implementation of mitigation measures detailed above, it is considered that the only residual effects following mitigation would be:

The short term loss of key habitats (hedgerows, broadleaved woodland and scrub) between site clearance and when new planting matures sufficiently to represent an effective reinstatement of these habitats. For hedgerows it is anticipated that this residual adverse impact would become a neutral impact within approximately ten years following planting, and for woodlands it is anticipated that this would be achieved within approximately fifteen years, given the characteristics of existing woodlands affected by the Scheme. It should be noted that this residual short term impact affects the Afon Gwyrfai SAC as this site is subject to limited temporary habitat loss associated with the construction works. This has been addressed within the SIAA in Appendix E.2.

The short term loss of potential commuting routes for bats including Lesser Horseshoe Bats along hedgerows affected by the Scheme due to the time required for replacement connecting planting to mature. However, given the extent of planting, the number of wide-span bridges and oversized culverts used throughout the Scheme, the lack of definitive evidence of specific commuting routes and the low numbers of bats recorded using the various hedgerows it is considered likely that bats would adapt their behaviour. As such it is considered unlikely to result in significant residual impact and is anticipated that this would represent a short term adverse impact and that in the medium to long term it would become a neutral impact. It should be noted that this residual impact affects the Glynllifon SAC, the Meirionnydd Oakwoods and Bat Sites SAC and the Gwydir Forest Mines SAC as Lesser Horseshoe Bats are a designatory features of these sites. This has been addressed within the SIAA in Appendix E.2.

8.7 Summary and Conclusions

The Scheme is not anticipated to have any medium to long term effects on designated sites. Some short term impacts have been identified for a small number of sites, namely the Afon Gwyrfai SAC and SSSI due to short term habitat losses and the Glynllifon SAC, the Meirionnydd Oakwoods and Bat Sites SAC and the Gwydir Forest Mines SAC due to short term impacts on Lesser Horseshoe Bats. Due to the very high ecological value of these sites the minor negative impacts anticipated in the short term are deemed moderate adverse in significance although it is considered that these would not have an impact on the conservation status or objectives of the features affected (refer to Appendix E.2).

These same residual impacts would also affect a small number of other ecological receptors including habitats and protected species, although the majority of these are considered to be of medium or lower value and as a result the majority of predicted impacts are slight adverse both during construction and operation of the Scheme.

Mitigation measures outlined above would ensure that residual impacts on most of these receptors are avoided in the short and medium term. The only receptors for which residual effects are predicted are the short term loss of key habitats between site clearance and when new planting matures, and the loss/fragmentation of foraging habitat and potential commuting routes for small numbers of bats, though it is anticipated that bats would adapt to the presence of the Scheme. Consequently, residual adverse impacts on all ecological receptors would be avoided in the long term.

For several receptors, benefits arising from the Scheme are predicted, though these would be dependent on appropriate future management. Overall, it is considered that the Scheme would have a neutral impact on ecological receptors within the Zone of Influence of the Scheme. Further benefits may also arise from the enhancements detailed at the end of Section 8.5.2., particularly for habitats, breeding birds, Dormice, Water Voles, reptiles and amphibians. There is also potential for improvement of south-north habitat connectivity provided by the Scheme and associated habitat mitigation works, particularly for bat populations along the Scheme and in the wider area.

Table 8.7.1 summarises likely effects of construction and operation on key receptors, before and after mitigation. Refer also to Table 8.7.1 for significance of impacts.

8.7.1 Review against Policies

Policies relevant to nature conservation were listed in Section 8.1.2. Through the iterative design process adopted, it has been possible to avoid or minimise effects of the Scheme on ecological receptors and where this is not possible to propose measures that would mitigate these impacts in the long term and achieve enhancements for some ecological receptors. As a result, the Scheme is considered to be consistent with these policies.

Specifically, the Scheme avoids medium to long term impacts on sites designated for their nature conservation interest and aims to minimise fragmentation impacts on wildlife in the vicinity of the Scheme through appropriate design of culverts and structures. Although some impacts on protected species are unavoidable during construction and operation of the Scheme, these impacts have been minimised through the design process and would be mitigated to ensure compliance with relevant policies.

It is acknowledged that there is an overall loss of habitat area however a majority of this relates to agricultural grassland that is subject to intensive management and is of negligible ecological and biodiversity value. The mitigation measures and retention of habitats included within the Scheme proposals will ensure ecosystem resilience by maintaining and increasing the extent of native woodland, scrub and hedgerow habitats and connectivity between these habitats. This contributes to the requirements of Section 6 of EWA 2016 and to the UK BAP, Local BAP and TREBAP plans for boundary features and field margins, woodlands and planted native trees and shrubs and potentially for Bluebells.

The creation of species rich grassland along the length of the Scheme will mitigate for the loss of the non agricultural grassland habitats and increase the proportion of these habitats in the area. These areas will be created in a variety of conditions and with different floral mixes to encourage the establishment of different grassland types, which will provide further ecosystem resilience and biodiversity along the Scheme and within the wider area. This contributes to the requirements of Section 6 of EWA 2016 and to the UK BAP, Local BAP and TREBAP plans for rhos pasture, purple moor grass and rush pastures and rock faces and scree.

This grassland creation works and the area of natural regeneration within the Plas Menai cutting will benefit pollinator populations in the area and thus contribute to the Action Plan for Pollinators. The native woodland, scrub and hedgerow planting will also contribute to the aims of this Action Plan by mitigating for the loss of and providing additional woodland habitats.

The Scheme would also result in some impacts on species listed in the UK BAP, Gwynedd BAP or TREBAP particularly Otter, Water Vole, Lesser Horseshoe Bat, Barn Owl, Adder, amphibians, bats (all species) and reptiles. The mitigation measures proposed above would ensure that the objectives of these BAP's are not compromised by the Scheme.

Table 8.7.1 Summary of Impacts in relation to Nature Conservation

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
Construction					
Afon Gwyrfai SAC	Very High	Loss of designatory habitats	Minor negative	Minor negative decreasing to neutral	Moderate adverse in short term, neutral in medium/long term
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	Minor negative	Neutral	Neutral
		Injury/mortality to designatory species during construction	Minor negative	Neutral	Neutral
		Disturbance to designatory species within retained habitats during construction due to noise, vibration, lighting etc.	Minor negative	Neutral	Neutral
Menai Strait and Conwy Bay SAC	Very High	No direct impacts on habitat features are anticipated	Neutral	Neutral	Neutral
		Indirect impacts may occur through hydrological connectivity and inappropriate working practices	Minor negative	Neutral	Neutral
Glynllifon SAC	Very High	No confirmed LHB roosts have been identified along the line of the Scheme as such no direct impacts to roosting bats is anticipated	Neutral	Neutral	Neutral
		Disturbance to the three retained LHB roosts within 600m of the Scheme during construction due to noise, vibration, lighting or blasting	Minor negative	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
		Loss/fragmentation of potential LHB commuting routes and foraging areas due to site clearance - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	Moderate negative	Minor negative decreasing to neutral within 10 years of replacement planting establishment	Moderate adverse in short term, neutral in medium/long term
		Disruption of potential LHB commuting routes due to construction lighting - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	Moderate negative	Neutral	Neutral
		Disruption to LHB foraging areas due to construction lighting	Minor negative	Neutral	Neutral
Meirionnydd Oakwoods and Bat Sites SAC	Very High	No direct or indirect impacts on habitat features anticipated due to distance from the scheme (14.69km)	Neutral	Neutral	Neutral
		No confirmed LHB roosts have been identified along the line of the Scheme as such no direct impacts to roosting bats is anticipated	Neutral	Neutral	Neutral
		Disturbance to the three retained LHB roosts within 600m of the Scheme during construction due to noise, vibration, lighting or blasting	Minor negative	Neutral	Neutral
		Loss/fragmentation of potential LHB commuting routes and foraging areas due to site clearance - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	Moderate negative	Minor negative decreasing to neutral within 10 years of replacement planting establishment	Moderate adverse in short term, neutral in medium/long term
		Disruption of potential LHB commuting routes due to construction lighting - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	Moderate negative	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
		Disruption to LHB foraging areas due to construction lighting	Minor negative	Neutral	Neutral
Gwydir Forest Mines SAC	Very High	No direct or indirect impacts on habitat features anticipated due to distance from the scheme (24.87km)	Neutral	Neutral	Neutral
		No confirmed LHB roosts have been identified along the line of the Scheme as such no direct impacts to roosting bats is anticipated	Neutral	Neutral	Neutral
		Disturbance to the three retained LHB roosts within 600m of the Scheme during construction due to noise, vibration, lighting or blasting	Minor negative	Neutral	Neutral
		Loss/fragmentation of potential LHB commuting routes and foraging areas due to site clearance - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	Moderate negative	Minor negative decreasing to neutral within 10 years of replacement planting establishment	Moderate adverse in short term, neutral in medium/long term
		Disruption of potential LHB commuting routes due to construction lighting - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	Moderate negative	Neutral	Neutral
		Disruption to LHB foraging areas due to construction lighting	Minor negative	Neutral	Neutral
Afon Gwyrfai a Llyn Cwellyn SSSI	High	Loss of designatory habitats	Minor negative	Minor negative decreasing to neutral	Slight adverse in short term, neutral in medium/long term
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	Minor negative	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
		Injury/mortality to designatory species during construction	Minor negative	Neutral	Neutral
		Disturbance to designatory species within retained habitats during construction due to noise, vibration, lighting etc.	Minor negative	Neutral	Neutral
Afon Seoint SSSI	High	No direct impacts on designatory features are anticipated	Neutral	Neutral	Neutral
		Indirect impacts may occur through hydrological changes affecting geological features	Minor negative	Neutral	Neutral
Glynllifon SSSI	High	No confirmed LHB roosts have been identified along the line of the Scheme as such no direct impacts to roosting bats is anticipated	Neutral	Neutral	Neutral
		Disturbance to the three retained LHB roosts within 600m of the Scheme during construction due to noise, vibration, lighting or blasting	Minor negative	Neutral	Neutral
		Loss/fragmentation of potential LHB commuting routes and foraging areas due to site clearance - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	Moderate negative	Neutral	Neutral
		Disruption of potential LHB commuting routes due to construction lighting - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	Moderate negative	Neutral	Neutral
		Disruption to LHB foraging areas due to construction lighting	Minor negative	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
Llwyn y Coed SSSI	High	No direct or indirect impacts on habitat features anticipated due to distance from the scheme (4.74km)	Neutral	Neutral	Neutral
Afon Seiont (Middle) Wildlife Site	Lower	Loss of designatory habitats	Minor negative	Minor negative decreasing to neutral within 15 years of planting	Slight adverse in short term, neutral in medium/long term
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	Minor negative	Neutral	Neutral
Afon Seiont Mosaic (North) Wildlife Site	Lower	Loss of designatory habitats	Minor negative	Minor negative decreasing to neutral within 15 years of planting	Slight adverse in short term, neutral in medium/long term
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	Minor negative	Neutral	Neutral
Felinwnda Wildlife Site	Lower	Loss of designatory habitats	Minor negative	Minor negative decreasing to neutral within 15 years of planting	Slight adverse in short term, neutral in medium/long term
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	Minor negative	Neutral	Neutral
Waenfawr Road Wildlife Site	Lower	Loss of designatory habitats	Minor negative	Minor negative decreasing to neutral within 15 years of planting	Slight adverse in short term, neutral in medium/long term

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	Minor negative	Neutral	Neutral
Rhyddallt-bach Wildlife Site	Lower	No direct habitat losses are anticipated	Neutral	Neutral	Neutral
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	Minor negative	Neutral	Neutral
Llanfair Wood & nearby copses Wildlife Site	Lower	Loss of designatory habitats	Minor negative	Minor negative decreasing to neutral within 15 years of planting	Slight adverse in short term, neutral in medium/long term
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	Minor negative	Neutral	Neutral
Lon-glai Wildlife Site	Lower	No direct habitat losses are anticipated	Neutral	Neutral	Neutral
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	Minor negative	Neutral	Neutral
Gallt-y-sil farm Wildlife Site	Lower	Loss of designatory habitats	Minor negative	Minor negative decreasing to neutral within 15 years of planting	Slight adverse in short term, neutral in medium/long term
		Damage/disturbance to retained habitats during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	Minor negative	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
Gypsy Wood Park habitats	Lower	No direct or indirect impacts on habitat features anticipated due to the low sensitivity of the habitats present and their distance from the scheme (0.5km)	Neutral	Neutral	Neutral
Broadleaved woodland	Lower	Loss of woodland during site clearance	Minor negative	Minor negative decreasing to neutral within 15 years of planting	Slight adverse in short/medium term, neutral in long term
		Damage/disturbance to retained woodland during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	Minor negative	Neutral	Neutral
Scrub	Lower	Loss of scrub during site clearance	Minor negative	Minor negative decreasing to neutral within 15 years of planting	Slight adverse in short/medium term, neutral in long term
		Damage/disturbance to retained scrub during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	Minor negative	Neutral	Neutral
Hedgerows	Lower	Loss of hedgerows during site clearance	Minor negative	Minor negative decreasing to neutral within 10 years of planting	Slight adverse in short term, neutral in medium/long term
		Damage/disturbance to retained hedgerows during construction through inappropriate working practices, dust deposition, changes to hydrology etc.	Minor negative	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
Roosting bats	Lower	No confirmed bat roosts have been identified along the line of the Scheme as such no direct impacts to roosting bats is anticipated	Neutral	Neutral	Neutral
		Disturbance to retained roosts during construction due to noise, vibration, lighting or blasting	Minor negative	Neutral	Neutral
Potentially commuting and foraging bats	Medium	Loss/fragmentation of potential LHB commuting routes and foraging areas due to site clearance - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	Moderate negative	Minor negative decreasing to neutral within 10 years of replacement planting establishment	Slight adverse in short term, neutral in medium/long term
		Disruption of potential LHB commuting routes due to construction lighting - may render foraging habitat on the far side fo the Scheme from roosts inaccessible	Moderate negative	Neutral	Neutral
		Disruption to foraging areas due to construction lighting	Minor negative	Neutral	Neutral
Badgers	Lower	Injury/mortality to Badgers during construction	Minor negative	Neutral	Neutral
Dormice	Lower	Loss of habitat due to site clearance	Minor negative	Minor negative decreasing to neutral within 10 years of replacement planting establishment	Slight adverse in short term, neutral in medium/long term
		Injury/mortality to Dormice during site clearance	Minor negative	Neutral	Neutral
		Disturbance to Dormice within retained habitats due to construction activities	Minor negative	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
Otters	Lower	Injury/mortality to Otters during construction	Minor negative	Neutral	Neutral
		Disturbance to Otters within retained habitats due to construction activities	Minor negative	Neutral	Neutral
Water Voles	Lower	Injury/mortality to Water Voles during construction	Minor negative	Neutral	Neutral
		Disturbance to Water Voles within retained habitats due to construction activities	Minor negative	Neutral	Neutral
Breeding birds	Medium	Loss of breeding bird habitat during site clearance works, including foraging habitat within territories for breeding pairs	Minor negative	Neutral	Neutral
		Damage or destruction of active nests/eggs/dependant young during site clearance works	Minor negative	Neutral	Neutral
		Disturbance to breeding birds (including potentially to birds listed on Schedule 1 of the WCA) in nearby retained habitat during construction works, including blasting	Minor negative	Neutral	Neutral
Reptiles	Lower	Loss of habitat due to site clearance	Minor negative	Neutral	Neutral
		Injury/mortality of reptiles due to site clearance works	Minor negative	Neutral	Neutral
Fisheries and aquatic invertebrates	Lower	Injury/mortality to species during in river works	Minor negative	Neutral	Neutral
		Disturbance to species within retained watercourses due to construction activities including pollution risk and mobilisation of suspended solids	Minor negative	Neutral	Neutral
		Disturbance to retained fish habitats in particular smothering of clean gravel habitat	Minor negative	Neutral	Neutral
Other species	Lower	Loss of habitat due to site clearance	Minor negative	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
		Injury/mortality of other species due to site clearance works	Minor negative	Neutral	Neutral
Operation					
Afon Gwyrfai SAC	Very High	No direct impact on retained habitats, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable habitat effects	Neutral	Neutral	Neutral
		Use of a wide-span bridge over this watercourse should ensure that there is no loss in connectivity in this area	Neutral	Neutral	Neutral
		Risk of mortality to designatory species crossing the Scheme carriageway, particularly Otters	Minor negative	Neutral	Neutral
Menai Strait and Conwy Bay SAC	Very High	No direct impact on retained habitats, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable habitat effects	Neutral	Neutral	Neutral
Glynllifon SAC	Very High	Disturbance to LHBs or disruption of LHB roost use for retained roosts close to the Scheme. Such effects could result from lighting (lighting columns or vehicle headlamps) or noise associated with operation of the Scheme	Moderate negative	Neutral	Neutral
		Continued fragmentation of potential commuting routes and associated prevention of access to foraging areas through 'barrier effect' created by operational Scheme	Minor negative	Minor negative decreasing to neutral within 10 years of replacement planting establishment	Moderate adverse in short term, neutral in medium/long term

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
		Risk of injury/mortality to LHBs crossing the Scheme carriageway	Minor negative	Neutral	Neutral
Meirionnydd Oakwoods and Bat Sites SAC	Very High	No direct or indirect impacts on habitat features anticipated due to distance from the scheme (14.69km)	Neutral	Neutral	Neutral
		Disturbance to LHBs or disruption of LHB roost use for retained roosts close to the Scheme. Such effects could result from lighting (lighting columns or vehicle headlamps) or noise associated with operation of the Scheme	Moderate negative	Neutral	Neutral
		Continued fragmentation of potential commuting routes and associated prevention of access to foraging areas through 'barrier effect' created by operational Scheme	Minor negative	Minor negative decreasing to neutral within 10 years of replacement planting establishment	Moderate adverse in short term, neutral in medium/long term
		Risk of injury/mortality to LHBs crossing the Scheme carriageway	Minor negative	Neutral	Neutral
Gwydir Forest Mines SAC	Very High	No direct or indirect impacts on habitat features anticipated due to distance from the scheme (24.87km)	Neutral	Neutral	Neutral
		Disturbance to LHBs or disruption of LHB roost use for retained roosts close to the Scheme. Such effects could result from lighting (lighting columns or vehicle headlamps) or noise associated with operation of the Scheme	Moderate negative	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
		Continued fragmentation of potential commuting routes and associated prevention of access to foraging areas through 'barrier effect' created by operational Scheme	Minor negative	Minor negative decreasing to neutral within 10 years of replacement planting establishment	Moderate adverse in short term, neutral in medium/long term
		Risk of injury/mortality to LHBs crossing the Scheme carriageway	Minor negative	Neutral	Neutral
Afon Gwyrfai a Llyn Cwellyn SSSI	High	No direct impact on retained habitats, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable habitat effects	Neutral	Neutral	Neutral
		Use of a wide-span bridge over this watercourse should ensure that there is no loss in connectivity in this area	Neutral	Neutral	Neutral
		Risk of mortality to designatory species crossing the Scheme carriageway, particularly Otters	Minor negative	Neutral	Neutral
Afon Seoint SSSI	High	No direct impact on designatory features, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	Neutral	Neutral	Neutral
Glynllifon SSSI	High	Disturbance to LHBs or disruption of LHB roost use for retained roosts close to the Scheme. Such effects could result from lighting (lighting columns or vehicle headlamps) or noise associated with operation of the Scheme	Moderate negative	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
		Continued fragmentation of potential commuting routes and associated prevention of access to foraging areas through 'barrier effect' created by operational Scheme	Minor negative	Minor negative decreasing to neutral within 10 years of replacement planting establishment	Slight adverse in short term, neutral in medium/long term
		Risk of injury/mortality to LHBs crossing the Scheme carriageway	Minor negative	Neutral	Neutral
Llwyn y Coed SSSI	High	No direct or indirect impacts on habitat features anticipated due to distance from the scheme (4.74km)	Neutral	Neutral	Neutral
Afon Seiont (Middle) Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	Neutral	Neutral	Neutral
Afon Seiont Mosaic (North) Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	Neutral	Neutral	Neutral
Felinwnda Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	Neutral	Neutral	Neutral
Waenfawr Road Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	Neutral	Neutral	Neutral

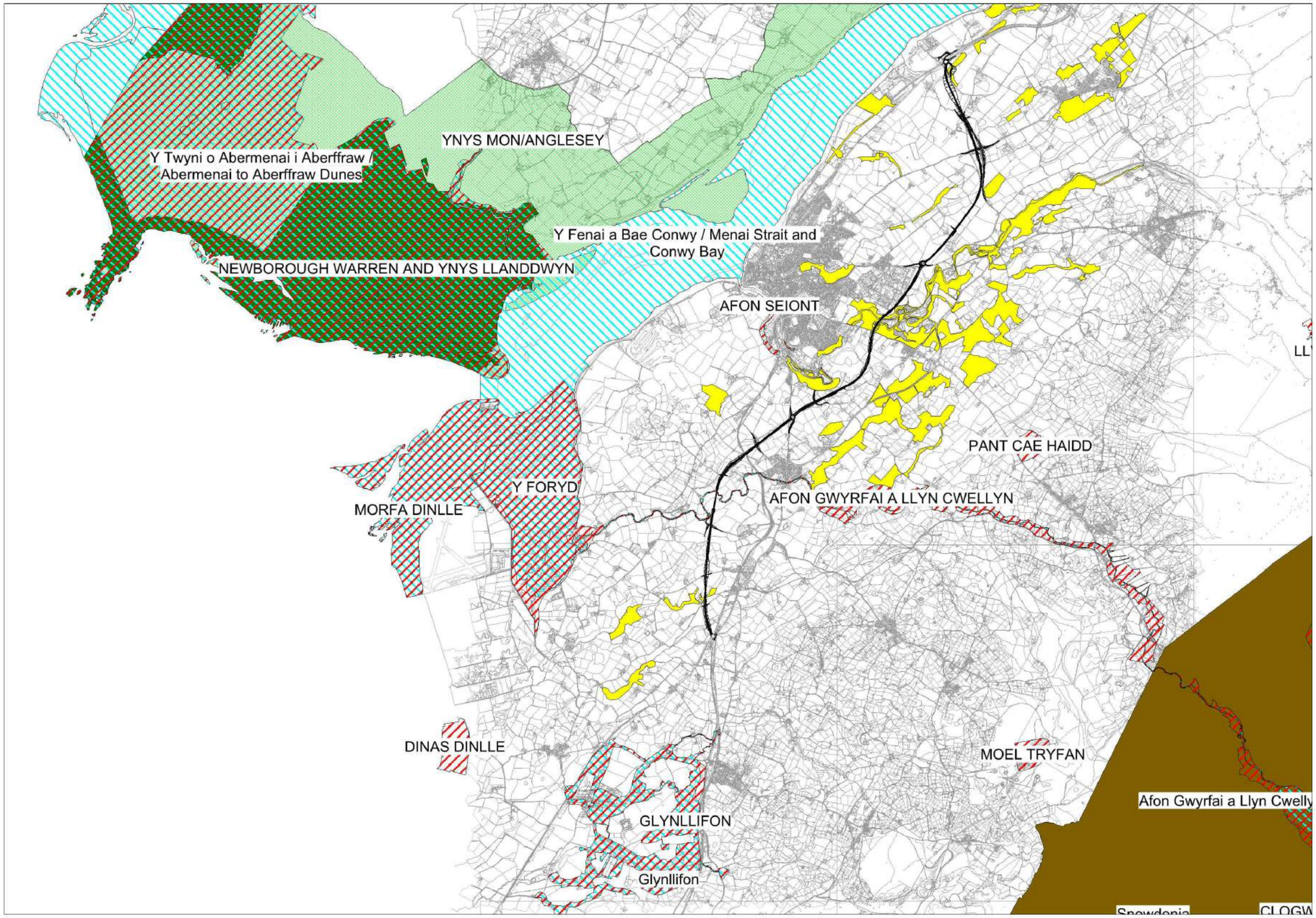
Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
Rhyddallt-bach Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	Neutral	Neutral	Neutral
Llanfair Wood & nearby copses Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	Neutral	Neutral	Neutral
Lon-glai Wildlife Site	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	Neutral	Neutral	Neutral
Gypsy Wood Park habitats	Lower	No direct or indirect impacts on habitat features anticipated due to the low sensitivity of the habitats present, consideration that air pollution from traffic using the Scheme would not be expected to have any measurable effects and their distance from the scheme (0.5km)	Neutral	Neutral	Neutral
Broadleaved woodland	Lower	No direct impact on retained broadleaved woodlands, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	Neutral	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
Scrub	Lower	No direct impact on retained scrub, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	Neutral	Neutral	Neutral
Hedgerows	Lower	No direct impact on retained hedgerows, and indirect impacts such as air pollution from traffic using the Scheme would not be expected to have any measurable effects	Neutral	Neutral	Neutral
Roosting bats	Lower	Disturbance to bats or disruption of roost use for retained roosts close to the Scheme. Such effects could result from lighting (lighting columns or vehicle headlamps) or noise associated with operation of the Scheme	Moderate negative	Neutral	Neutral
Potentially commuting and foraging bats	Medium	Continued fragmentation of potential commuting routes and associated prevention of access to foraging areas through 'barrier effect' created by operational Scheme	Minor negative	Minor negative decreasing to neutral within 10 years of replacement planting establishment	Slight adverse in short term, neutral in medium/long term
		Risk of injury/mortality to bats crossing the Scheme carriageway	Minor negative	Neutral	Neutral
Badgers	Lower	Risk of injury/mortality to Badgers crossing the Scheme carriageway	Minor negative	Neutral	Neutral
Dormice	Lower	Continued fragmentation of population through 'barrier effect' created by operational Scheme, which may affect viability of population in the long-term	Minor negative	Minor negative decreasing to neutral within 10 years of replacement planting establishment	Slight adverse in short term, neutral in medium/long term

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
		Recent research has shown that Dormice can cross road carriageways during seasonal dispersal movements, and therefore could theoretically be at some risk of road traffic mortality. However, it is likely that such dispersal movements are so rare that the risk of dormouse road mortality is negligible. Similarly, as Dormice have been shown to nest in habitat very close to active carriageways, including those with lighting columns, no disturbance effects on Dormice are predicted.	Neutral	Neutral	Neutral
		Improved foraging resource for Dormice along the verges of the Scheme, as these would be less intensively managed than existing grazed pastures	Minor positive	Neutral	Neutral
Otters	Lower	Loss of connectivity for Otters on watercourses crossed by the Scheme due to the 'barrier' effect (not applicable along the Afon Gwyrfai and Afon Seoint where widespan structures are used)	Minor negative	Neutral	Neutral
		Risk of mortality to Otters crossing the Scheme carriageway	Minor negative	Neutral	Neutral
Water Voles	Lower	Loss of connectivity for Water Voles on watercourses crossed by the Scheme due to the 'barrier' effect (not applicable along the Afon Gwyrfai and Afon Seoint where widespan structures are used)	Minor negative	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
		Risk of mortality to Water Vole crossing the Scheme carriageway	Minor negative	Neutral	Neutral
Breeding birds	Medium	Risk of road injury/mortality for birds foraging over the verges of the Scheme or flying low across the Scheme. Of the breeding species present, or likely to be present in future, barn owls are considered likely to be most at risk of road mortality.	Minor negative	Neutral	Neutral
		Disturbance of breeding birds present in retained habitats close to the Scheme, through noise and/or light pollution, is considered very unlikely to occur as birds would not be expected to choose nesting sites where disturbance was already occurring. Impacts would therefore only be predicted if the Scheme first opened to traffic during the bird breeding season, and even in this situation, an adverse impact of breeding birds is considered very unlikely, given levels of human activity associated with the Scheme during construction	Neutral	Neutral	Neutral
Reptiles	Lower	Potential for injury/mortality associated with routine management of verges if reptiles recolonize these areas	Moderate negative	Neutral	Neutral
Fisheries and aquatic invertebrates	Lower	Loss of/reduction to connectivity on watercourses crossed by the Scheme due to the 'barrier' effect (not applicable where widespan structures are used)	Moderate negative	Neutral	Neutral

Ecological Receptor	Nature Conservation Value	Description of Impact	Magnitude of Impact Prior to Mitigation	Magnitude of Impact After to Mitigation	Significance of Impact Following Mitigation
		Loss of/reduction to connectivity to the upper reaches of the Afon Rhyd due to the 'barrier' effect	Major negative	Neutral	Neutral
Other species	Lower	Potential for injury/mortality associated with routine management of roadside vegetation if these species recolonize these areas	Moderate negative	Neutral	Neutral



Legend

- Site of Special Scientific Interest (SSSI)
- Special Area of Conservation (SAC)
- National Nature Reserve
- Area of Outstanding Natural Beauty (AONB)
- National Park
- Local Wildlife Sites
- Proposed Scheme

REV	DATE	DESCRIPTION	BY	CHKD	APPD

• TITLE

A487 CAERNARFON AND BONTNEWYDD BYPASS

Nature Conservation
Ecological Designations (a-e)

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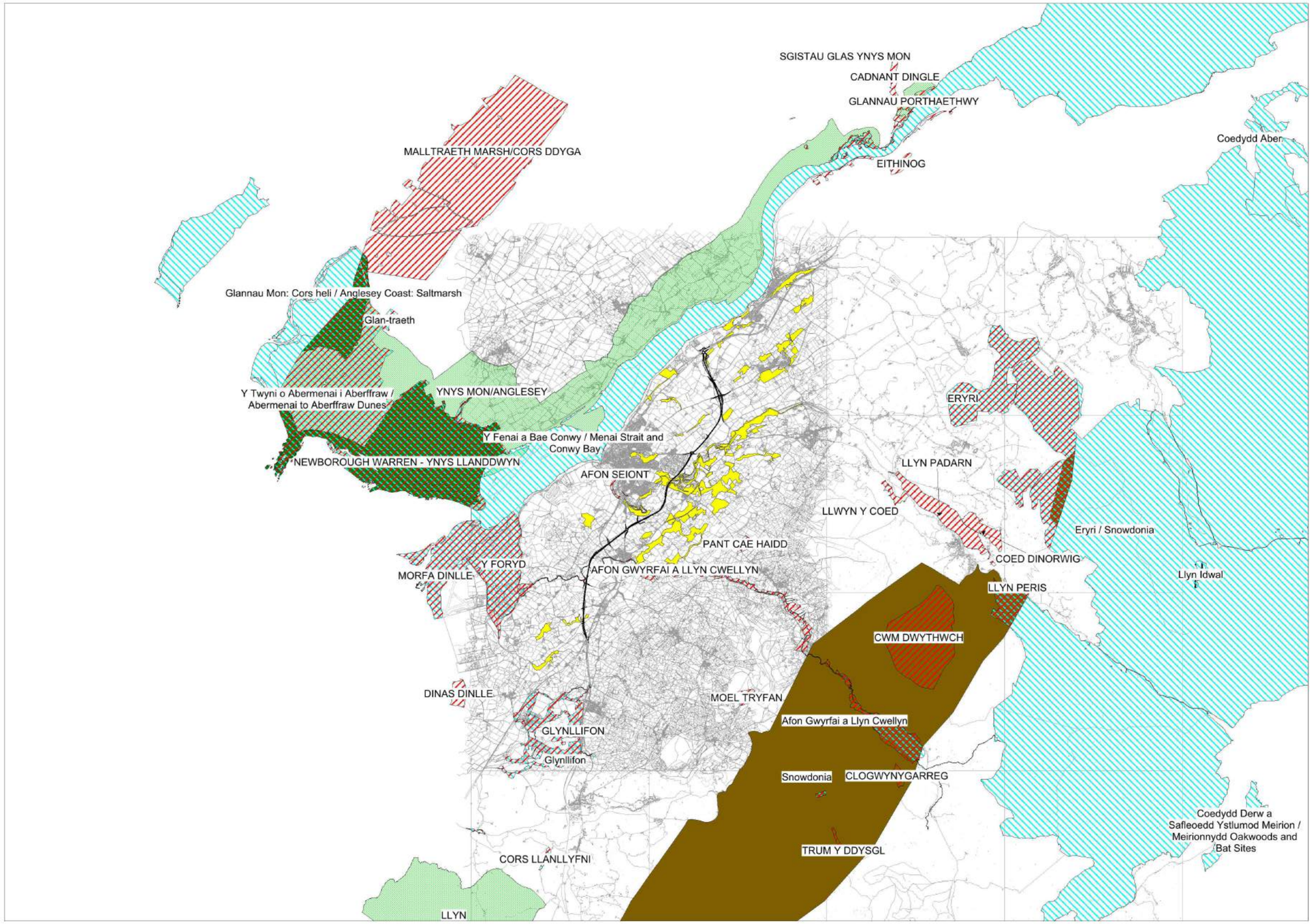

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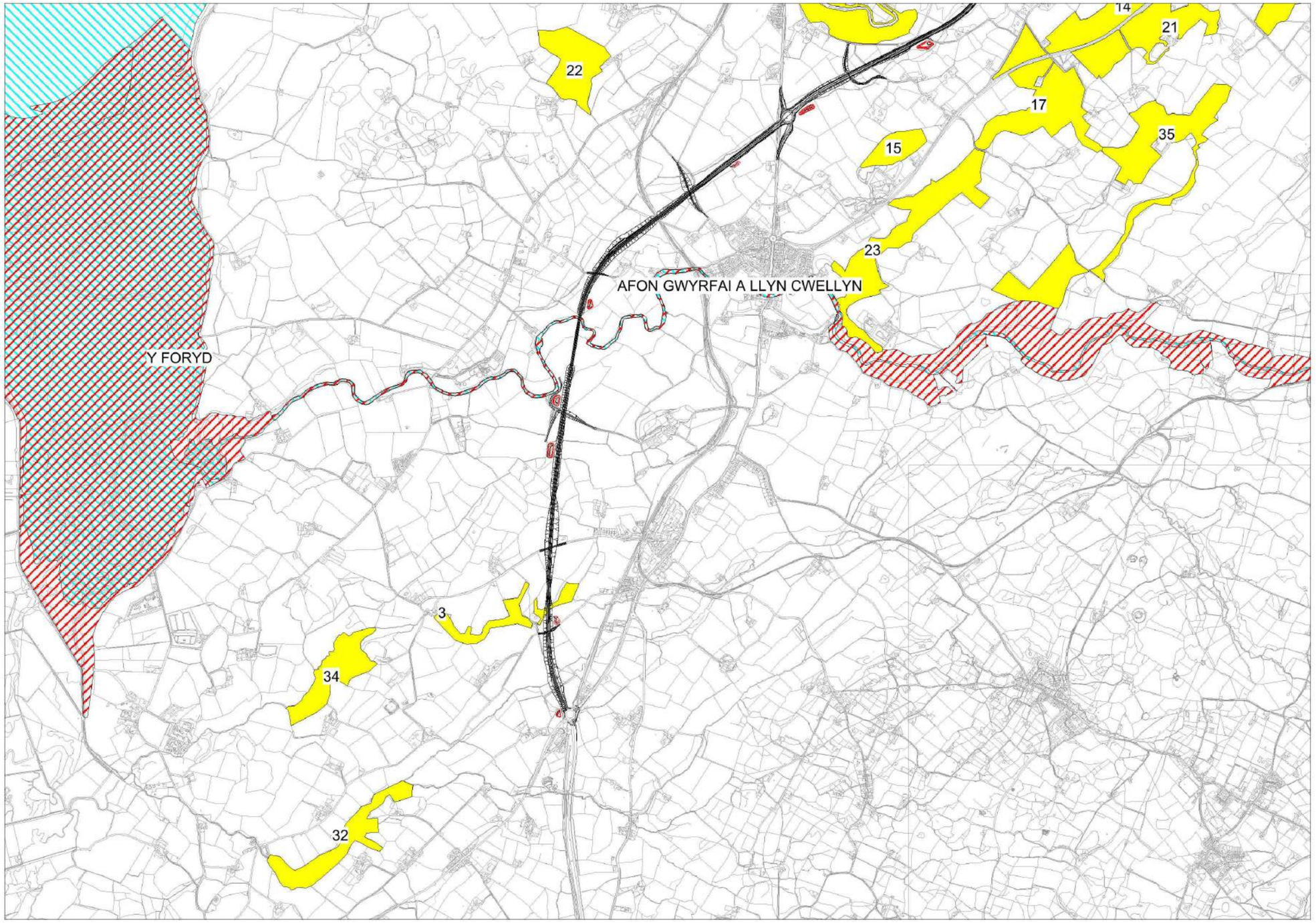

Legend

- Site of Special Scientific Interest (SSSI)
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- Area of Outstanding Natural Beauty
- Local Wildlife Sites
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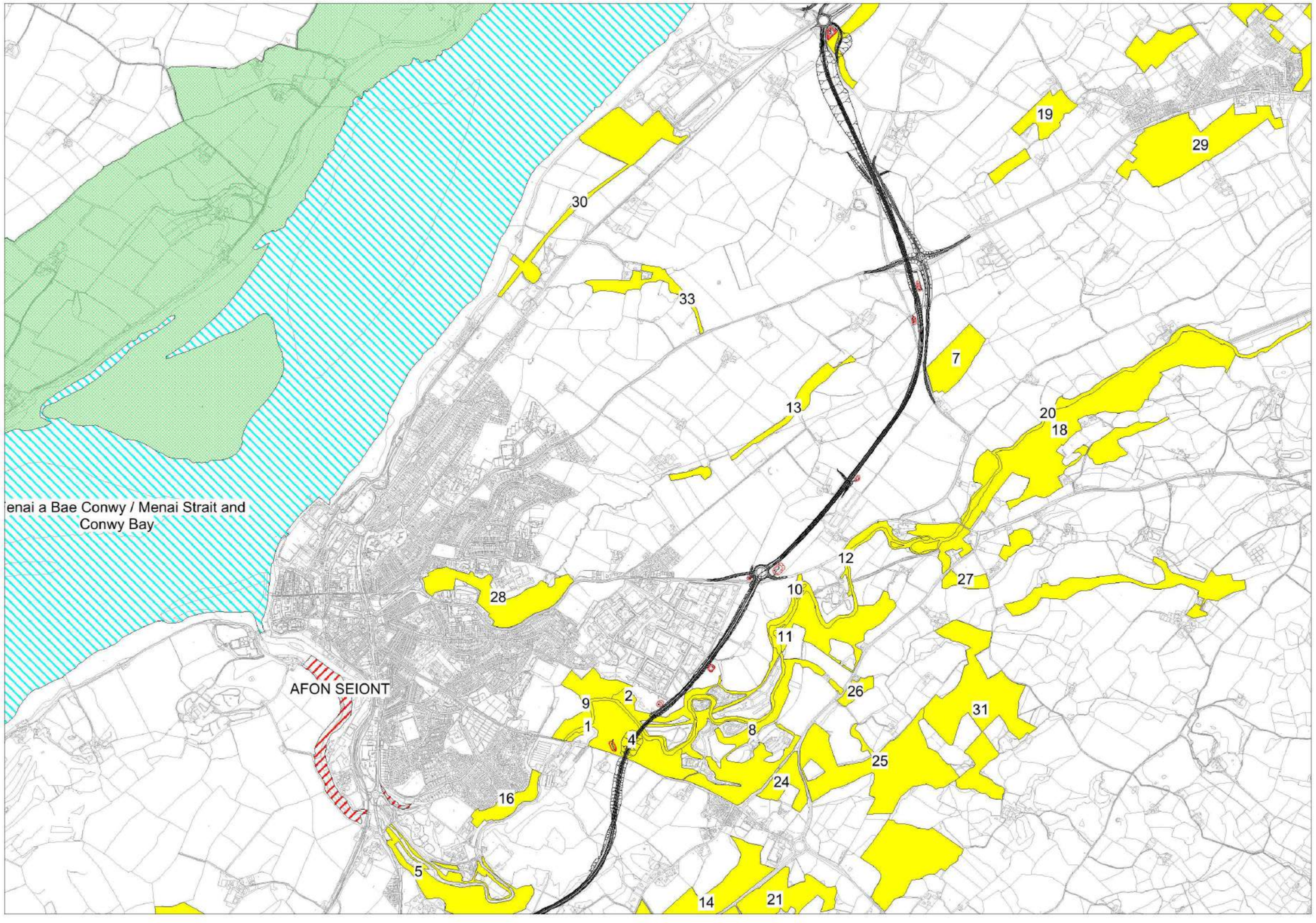

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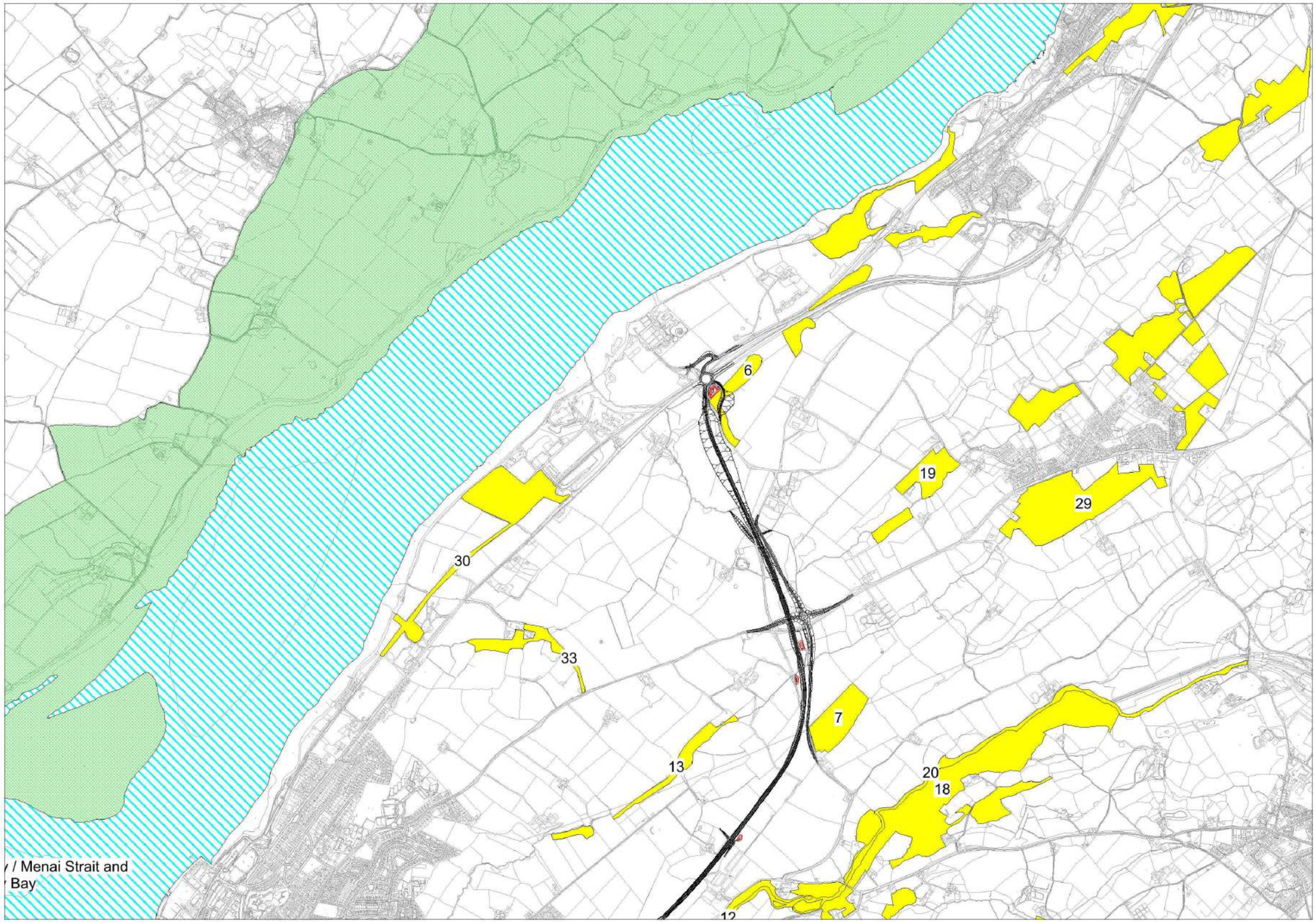

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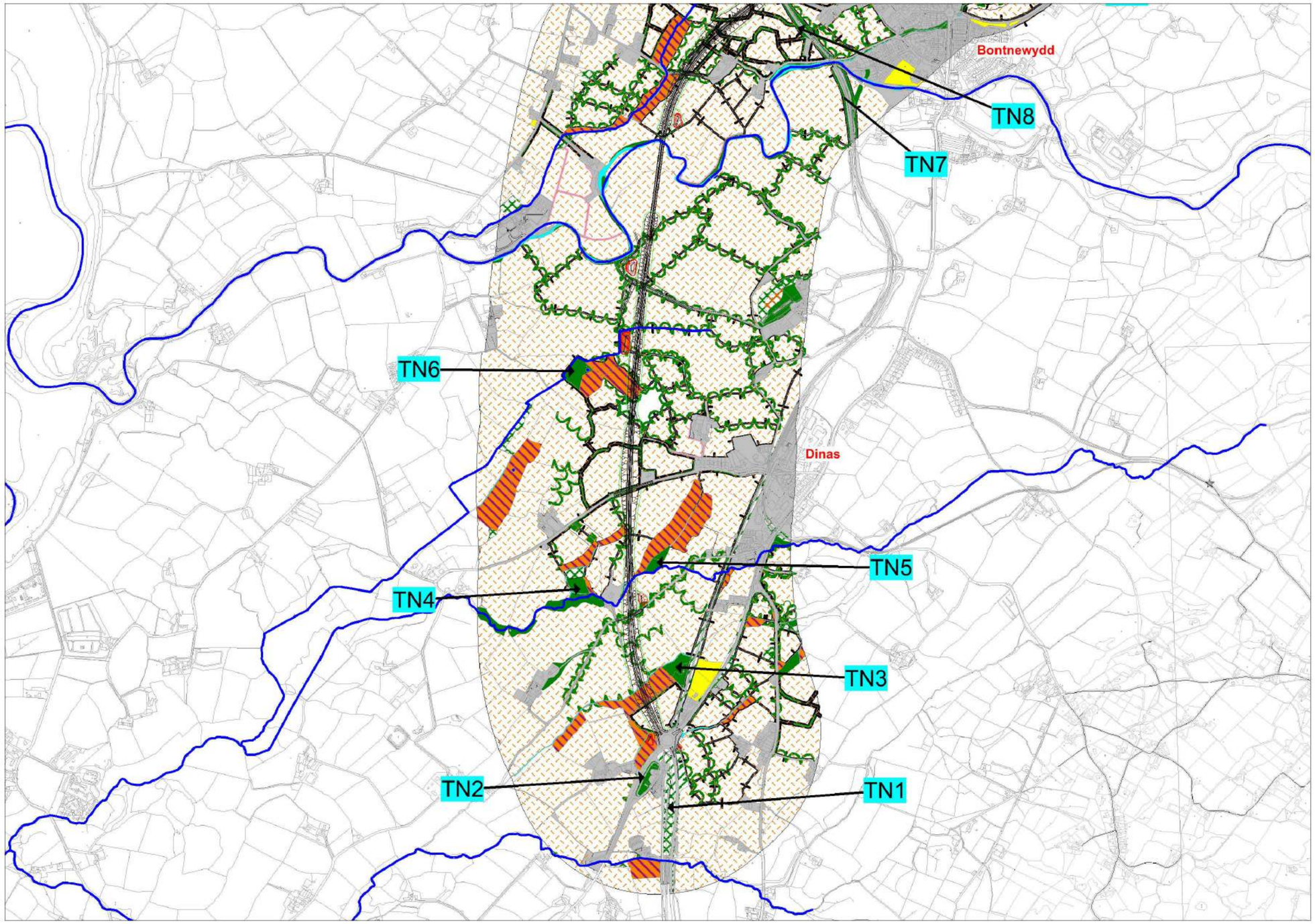

Legend

- Proposed Scheme
- Attenuation Ponds
- Scheme fenceline

Phase 1 Habitat Key

- Semi-natural Broadleaved Woodland
- Plantation Broadleaved Woodland
- Plantation Coniferous Woodland
- Dense/continuous Scrub
- Semi-improved Neutral grassland
- Improved grassland
- Marsh/Marshy grassland
- Poor semi-improved grassland
- Tall ruderal
- Standing Water
- Running Water
- Quarry
- Spoil
- Arable
- Amenity grassland
- Ephemeral/short perrennial
- Introduced shrub
- Caravan site
- Track
- Bare ground
- Other

TN - Target Note

- Scattered trees
- Fence
- Intact hedge
- Cloddiau
- Wall
- Hedge and trees
- Dry ditch
- Hedge and trees
- Earth bank

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Nature Conservation
Phase 1 Habitat Survey (a-d)

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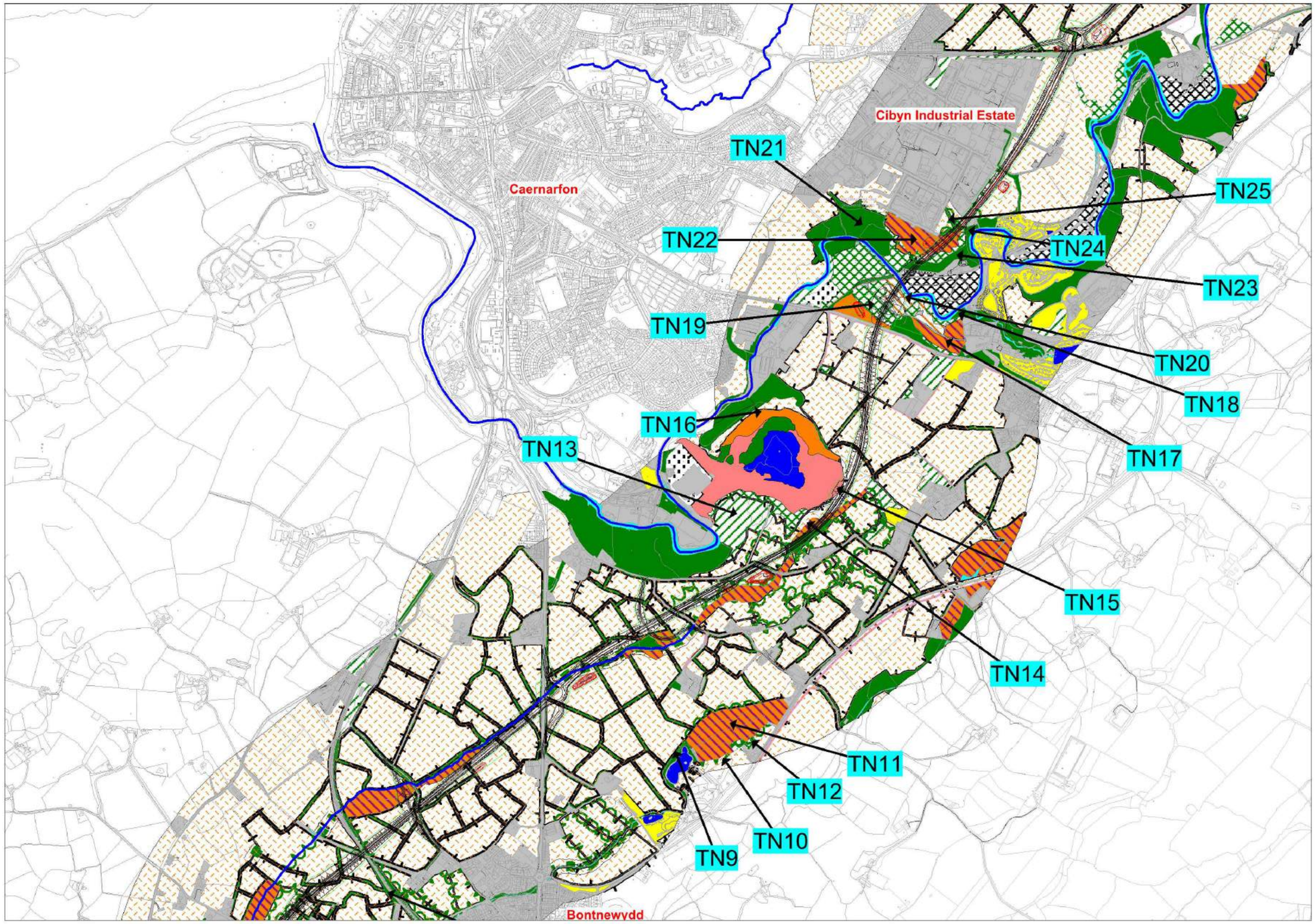

Legend

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Phase 1 Habitat Key

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Nature Conservation
Phase 1 Habitat Survey (a-d)
Sheet 2 of 4

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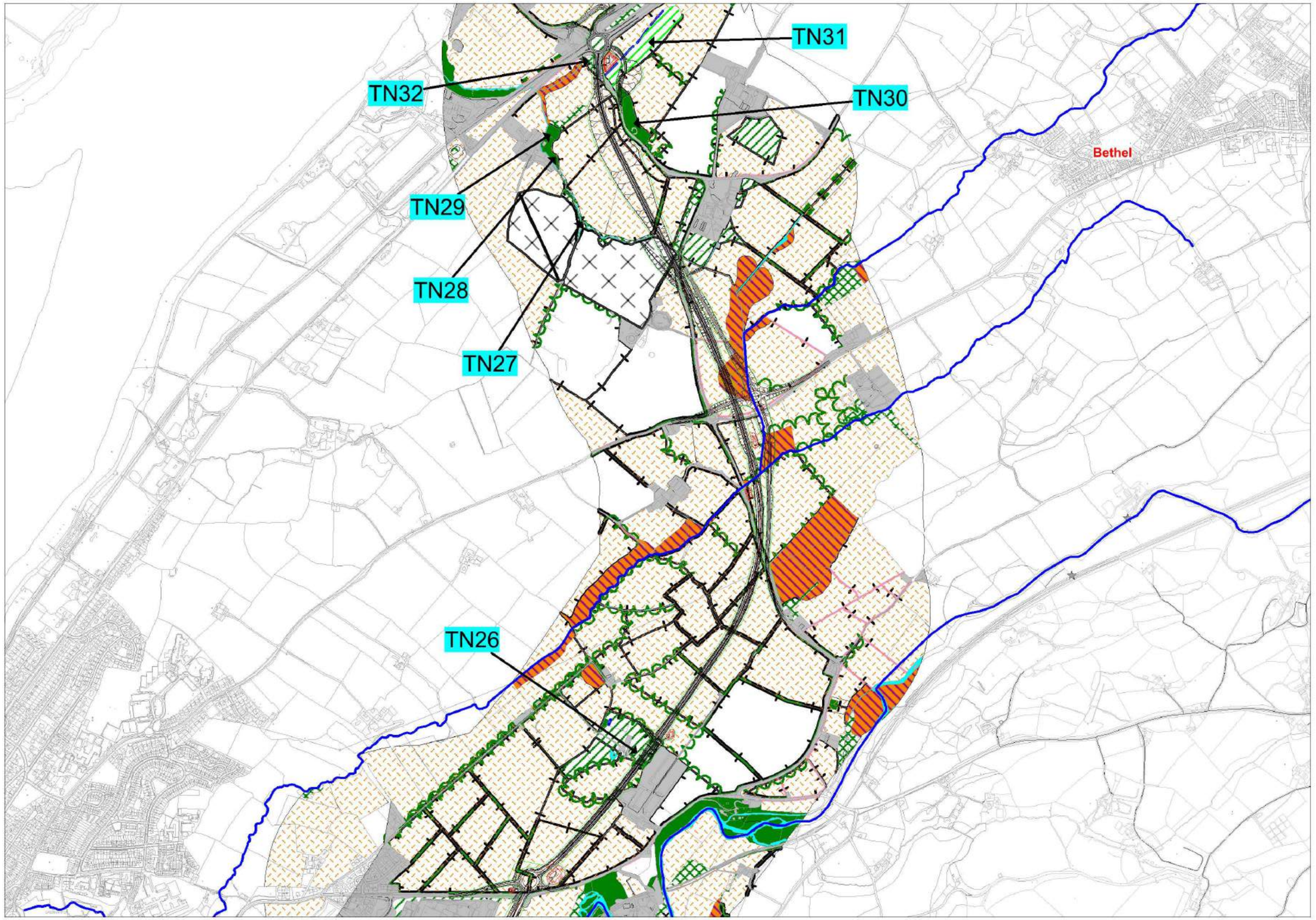

Legend

- Proposed Scheme
- Attenuation Ponds
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Phase 1 Habitat Key

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Nature Conservation
Phase 1 Habitat Survey (a-d)
Sheet 3 of 4

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• FIGURE NUMBER
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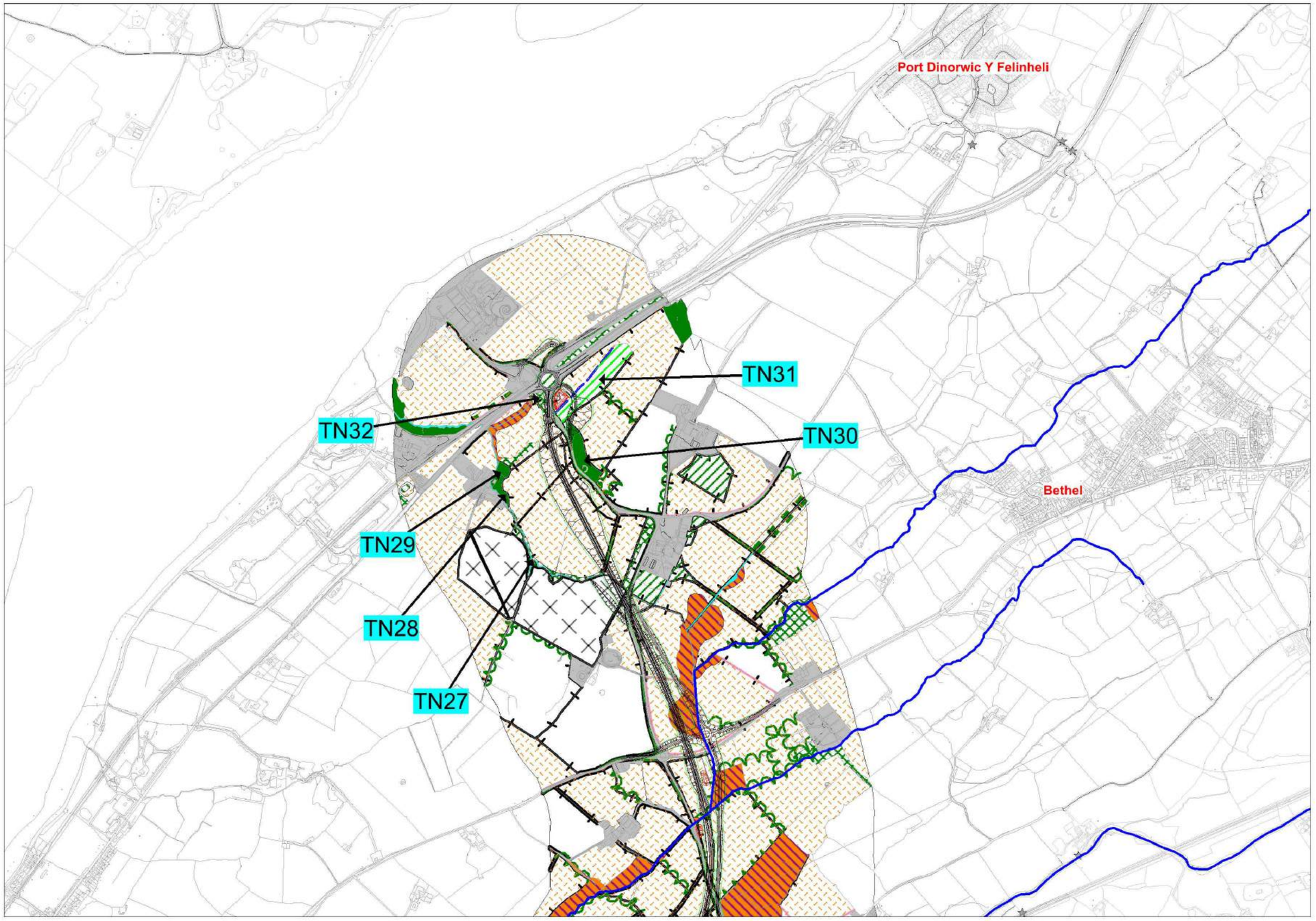

Legend

- Proposed Scheme
- Attenuation Ponds
- Scheme fenceline

Phase 1 Habitat Key

- Semi-natural Broadleaved Woodland
- Plantation Broadleaved Woodland
- Plantation Coniferous Woodland
- Dense/continuous Scrub
- Semi-improved Neutral grassland
- Improved grassland
- Marsh/Marshy grassland
- Poor semi-improved grassland
- Tall ruderal
- Standing Water
- Running Water
- Quarry
- Spoil
- Arable
- Amenity grassland
- Ephemeral/short perrennial
- Introduced shrub
- Caravan site
- Track
- Bare ground
- Other

TN - Target Note

- Scattered trees
- Fence
- Intact hedge
- Cloddiau
- Wall
- Hedge and trees
- Dry ditch
- Hedge and trees
- Earth bank

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Nature Conservation
Phase 1 Habitat Survey (a-d)
Sheet 4 of 4

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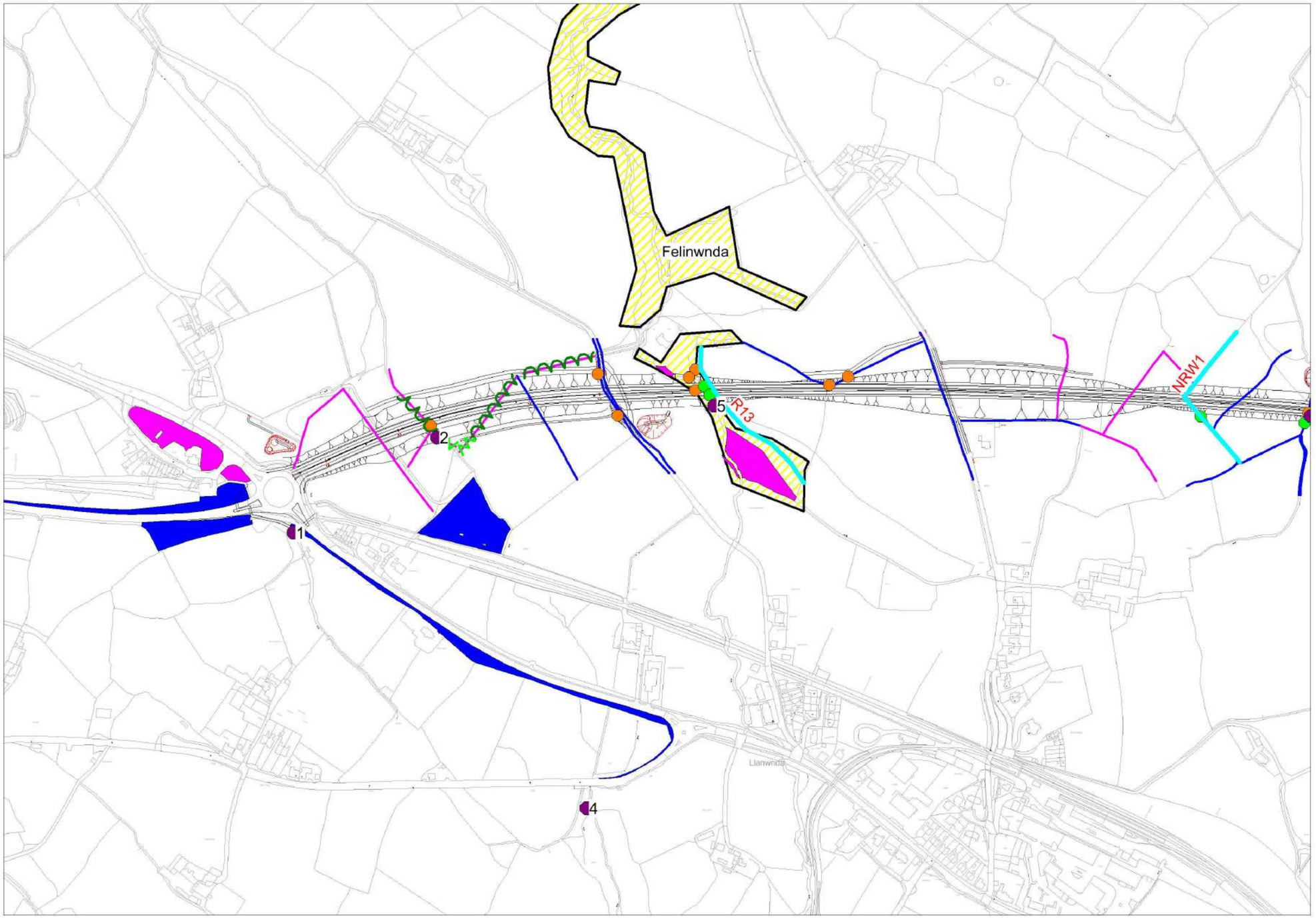

Legend

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Dormouse Habitat Assessment

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- Category D

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Nature Conservation
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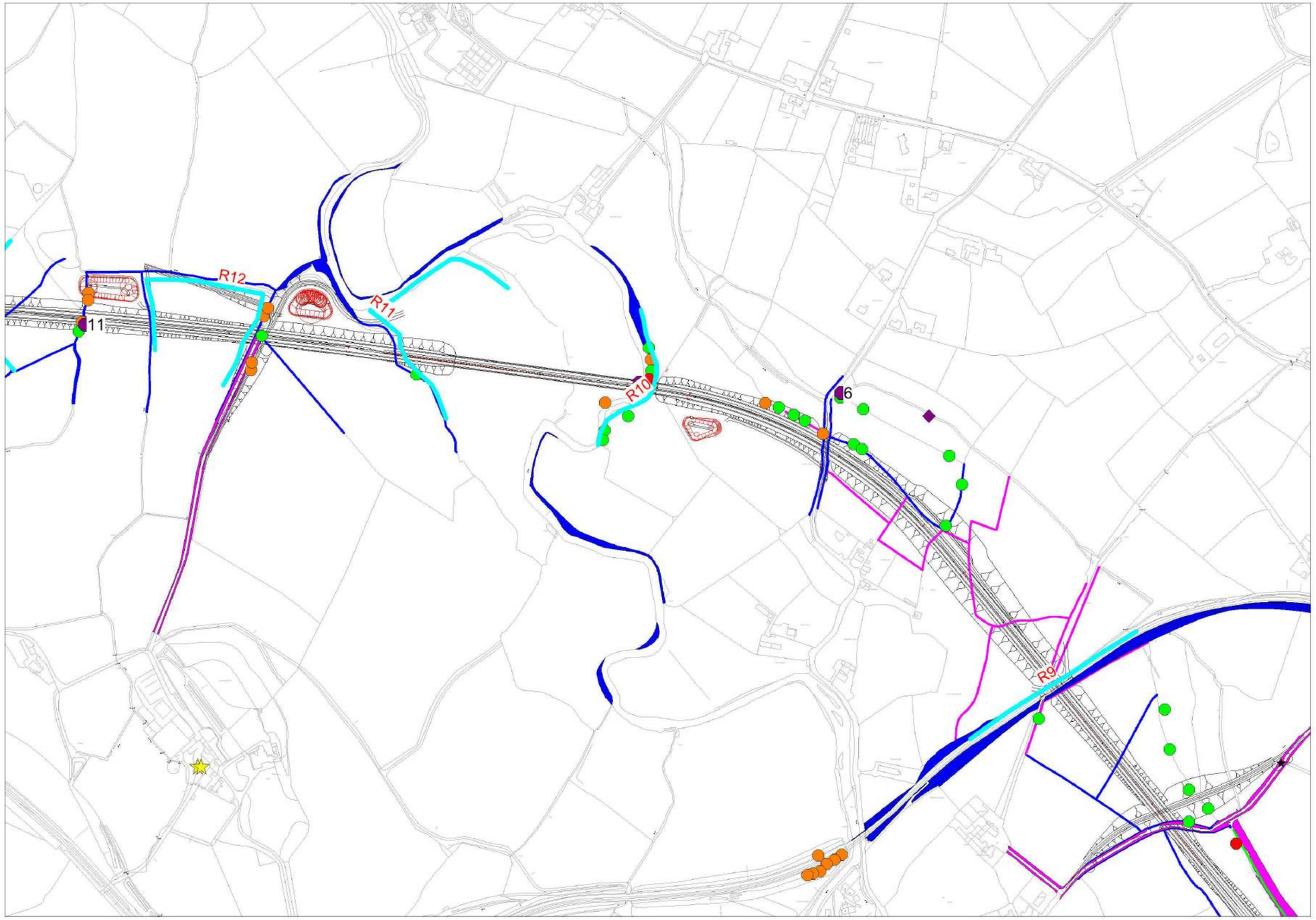

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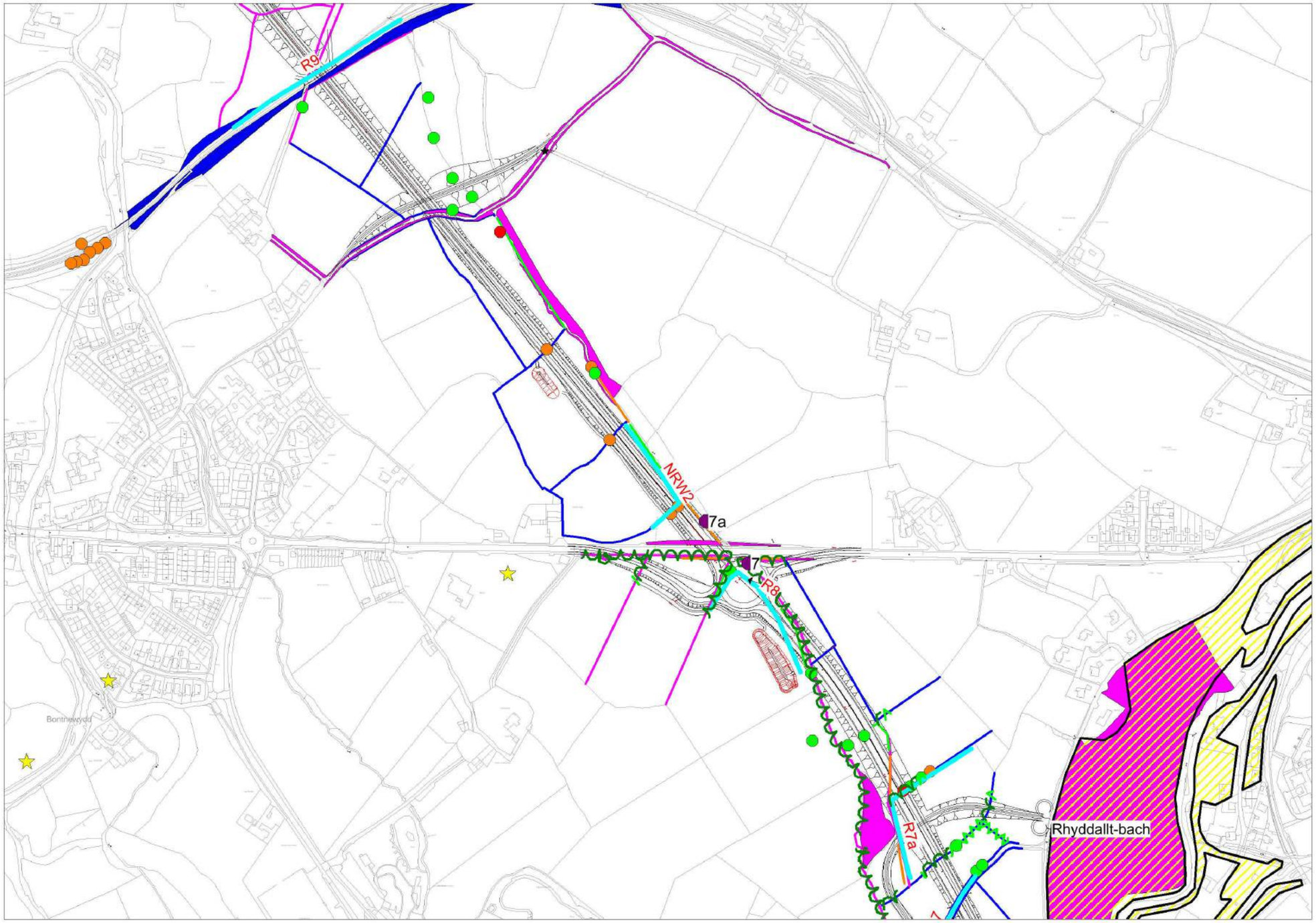

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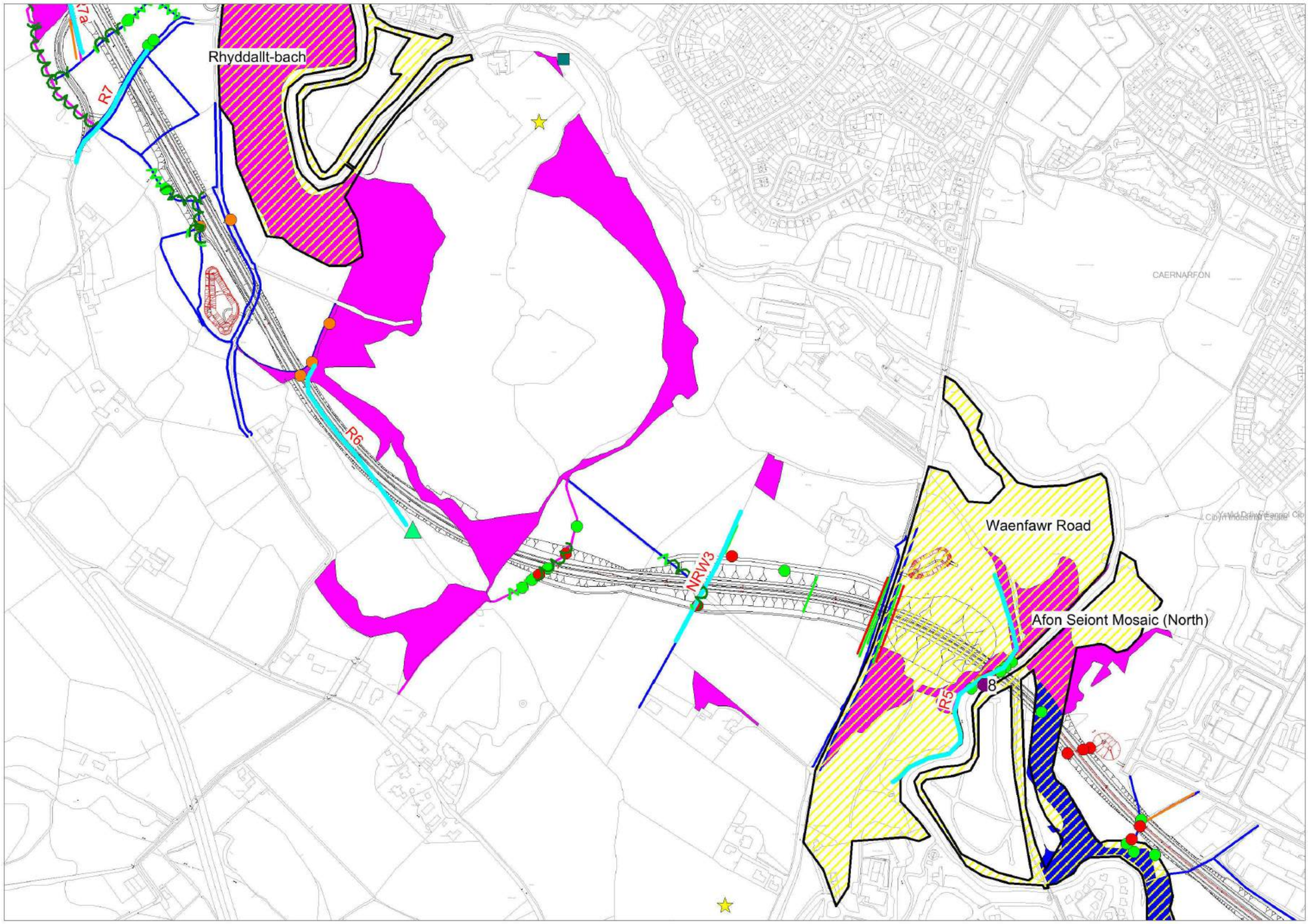

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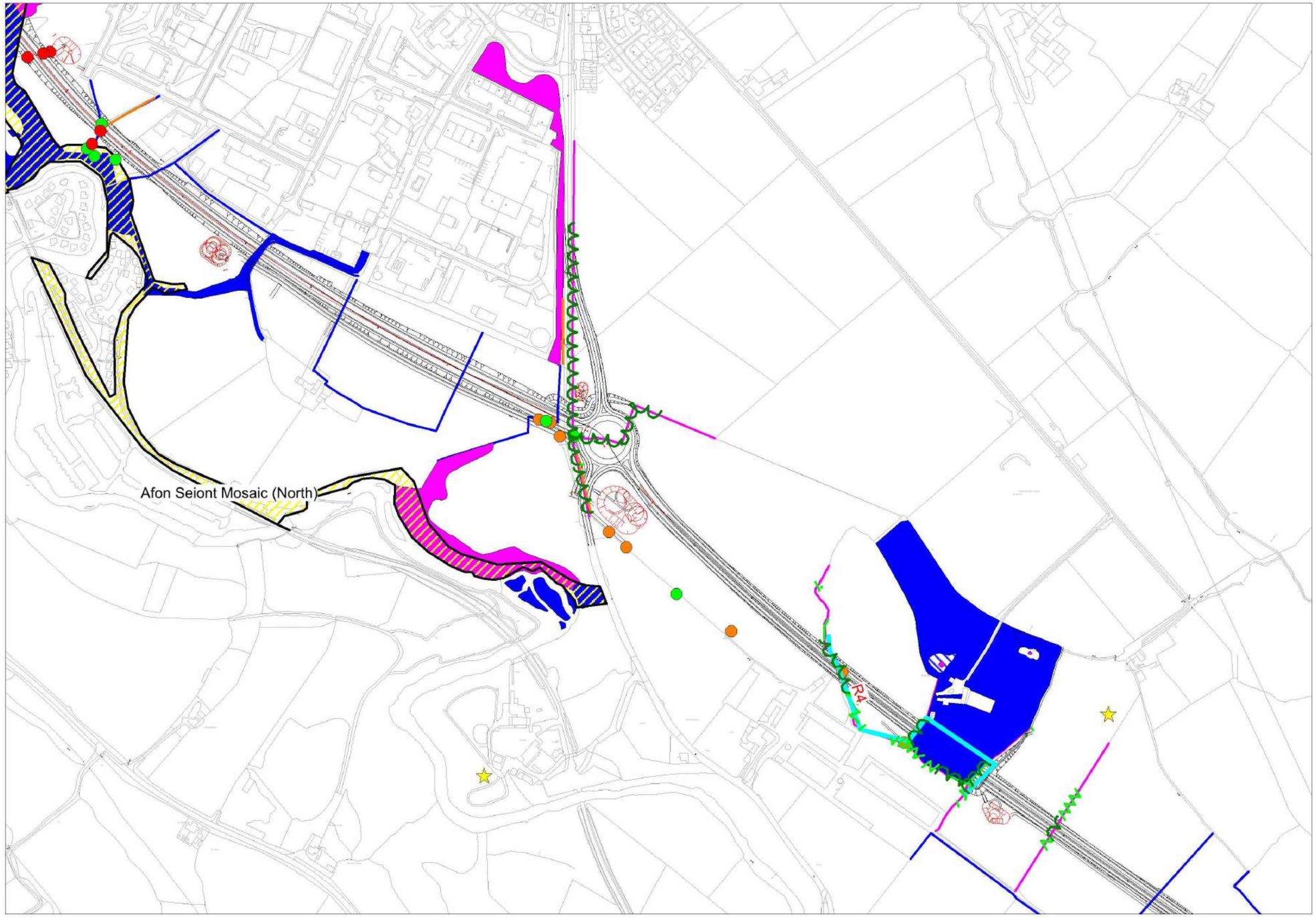

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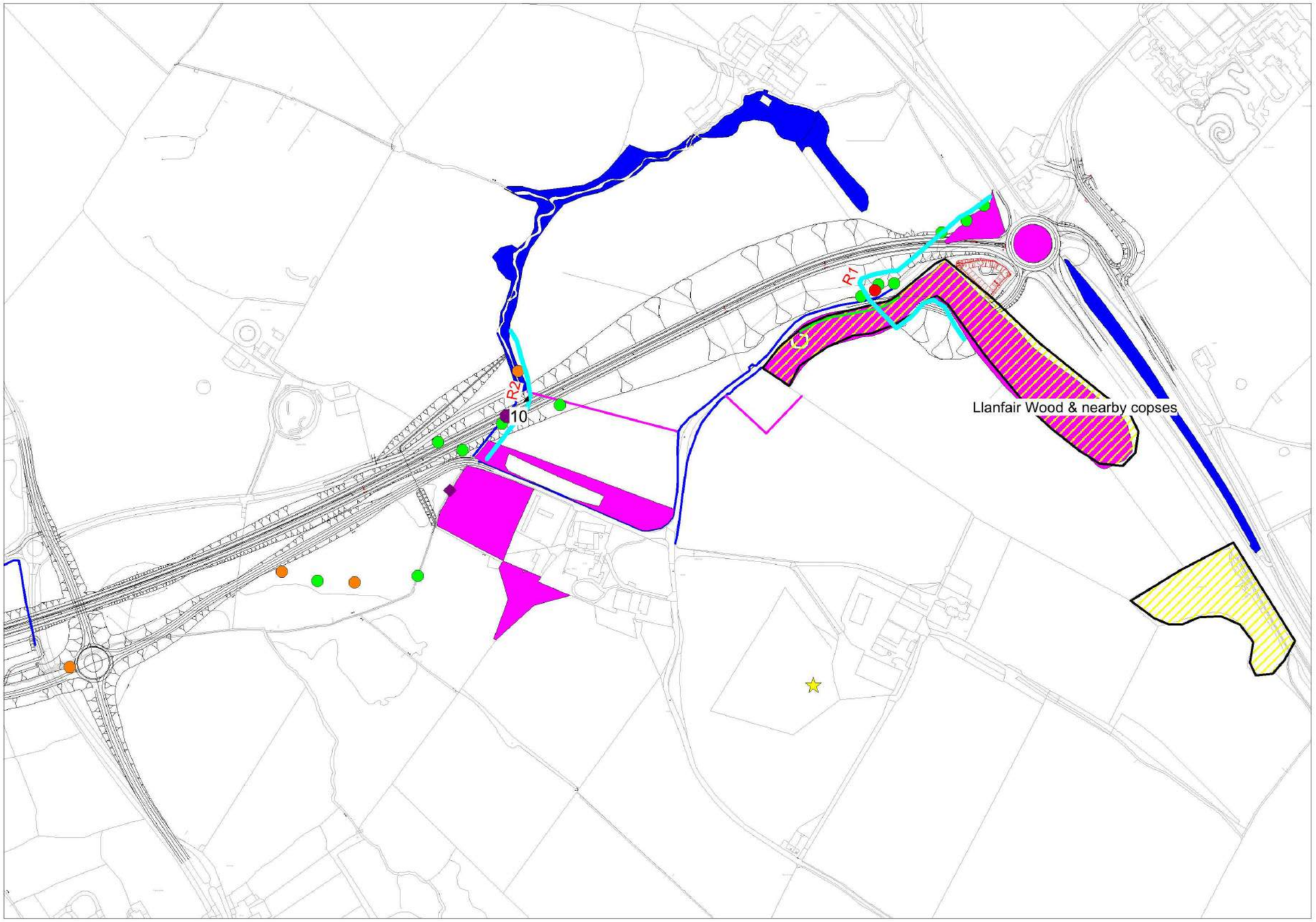

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Nature Conservation
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