Llywodraeth Cymru / Welsh Government

A487 New Dyfi Bridge

Environmental Statement – Volume 1: Chapter 11 Materials

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11 Material Resources

11.1 Introduction

11.1.1 This chapter provides an assessment of the likely significance of environmental effects from the use of material resources and the generation and management of waste resulting from the Scheme.

11.1.2 It should be noted that the effects on geology and soils, and the potential for land contamination, has been addressed in Chapter 10 Geology and Soils of this Environmental Statement.

11.1.3 The use of material resources and generation of waste has been estimated based on the likely requirements of the Key Stage 3 Scheme design as described in Chapter 2 of this Environmental Statement.

11.1.4 For the purposes of this assessment, 'Material resources' are defined as comprising the:

- use of material resources; and
- generation and management of waste.

11.1.5 The assessment focuses mainly on the construction phase of the proposed Scheme as this is primarily where potential significant effects for materials and waste are more likely to arise. Section 11.2 provides a further description on the terminology.

11.1.6 Operational effects, in terms of resource use and waste generation, will be considered, however the effects are dependent on the maintenance regime and the need to replace materials throughout the lifetime of the structure. This has been assessed in Section 11.8.

11.1.7 The assessment has been conducted in accordance with the guidance set out in the DMRB Interim Advice Note (IAN) 153/11 "Guidance of the Environmental Assessment of Material Resources"[1]. There is no Welsh equivalent IAN, however the Highways Agency IAN is considered to provide the most up to date guidance for the assessment of the effects of material resources and waste. It was agreed with Welsh Government at the Scoping stage for the Environmental Impact Assessment that this IAN represents good practice and should be used when undertaking the assessment of the effects in relation to material resources.

[1] Interim Advice Note 153/11 Guidance on the Environmental Assessment of Material Resources, 2011

11.1.8 The cost for the proposed Scheme is estimated to be over £20million, which is greater than the £300,000 threshold included in guidance. Therefore, it is assumed that the potential exists for environmental effects from the use of materials and generation of waste. A Simple level of assessment is therefore required, at a minimum, in accordance with IAN 153/11.

11.1.9 The Scoping Report recommended that a Simple level of assessment would be appropriate, given the identified intent to maximise re-use of site won materials which is not intended to increase the risk from existing contamination and existing pollutant linkages nor create new contamination.

11.1.10 The assessment of environmental effects associated with the use of material resources and the generation and management of waste resulting from the construction and operation of the Scheme has taken into account the following:

- Types and quantities of materials associated with the construction of the Scheme;
- Types and quantities of waste arisings associated with the construction of the Scheme; and
- Movement of materials during construction (both to and from the site).

11.1.11 It is outside the scope of the guidance to assess the environmental effects associated with the extraction of raw materials and the manufacture of products which occur off-site. The guidance recognises that these stages of a material's life cycle are likely to have already been subjected to an environmental assessment. These effects are therefore not addressed in this chapter. The embodied carbon associated with these processes is, however, included in the assessment of effects on the global climate system.

Material Resources

11.1.12 Material resources include both primary raw materials, such as aggregates and minerals, and secondary manufactured products. Many material resources would originate off-site and some, such as excavated soils, would arise on-site.

11.1.13 Road schemes require significant quantities of both primary raw materials and secondary manufactured products. The production, sourcing, transport, handling, storage and use of these materials, as well as the disposal of any surplus, have the potential to affect the environment adversely. The key effects associated with the use and consumption of materials in relation to the Scheme are addressed in Sections 11.7 and 11.8. The

consumption of significant quantities of materials is likely to result in indirect and direct effects on the environment which includes embodied carbon emissions associated with a number of stages in the material's life cycle.

Generation and Management of Waste

11.1.14 In considering material resources use and waste management, it is important to define when, under current legislation and understanding, a material is considered to be a waste. The definition of waste is important because the classification of substances as waste is the basis for the formulation of waste management and the application of controls to protect the environment and human health.

11.1.15 The EU Waste Framework Directive (Directive 2008/98/EC) includes a common definition of 'waste', which is '*any substance or object which the holder discards or intends or is required to discard'*, with the term 'discard' including the disposal, recovery or recycling of a substance.

11.1.16 Some types of waste are harmful to human health, or to the environment, either immediately or over an extended period of time. These are called hazardous wastes.

11.1.17 Once a material has become waste, it remains waste until it has been fully recovered and no longer poses a potential threat to the environment or to human health, at which point it is no longer subject to the controls and other measures required by the Directive.

11.1.18 The generation of large quantities of waste in road schemes has the potential to have an effect on available waste management infrastructure through occupying landfill space, limiting short-term use of available waste storage and effects of the Scheme upon relevant waste policies and plans.

11.1.19 Under the Waste Framework Directive, waste is categorised as follows:

11.1.19.1 Inert waste: waste that does not undergo any significant physical, chemical or biological transformations e.g. rock; naturally occurring soils (excluding topsoil, peat, soil and stones from potentially contaminated sites); concrete; bricks; tiles and ceramics; glass etc.;

11.1.19.2 Non-hazardous waste: waste that is not hazardous but does undergo a physical, chemical or biological transformation, e.g. topsoil, vegetation, timber, metal, plastics, etc.; and

11.1.19.3 Hazardous waste: waste that contains substances or has properties that might make it harmful to human health or the

environment e.g. contaminated soil, asbestos containing materials, batteries, mineral oils, etc.

11.2 Legislation, Policy Context, Guidance and Statutory Targets

Legislation

EU Waste Framework Directive 2008/98/EC

11.2.1 The overarching policy in relation to the handling of material resources along the Scheme is the EU Waste Framework Directive 2008/98/EC. This provides the framework legislation for the collection, transport, recovery and disposal of waste. It includes a common definition of 'waste', which is 'any substance or object which the holder discards or intends or is required to discard', with the term 'discard' including the disposal, recovery or recycling of a substance.

11.2.2 The overall purpose of the Waste Framework Directive is to set out measures to protect the environment and human health by preventing or reducing the adverse effects of waste generation and its management, and by improving the efficiency of resource use. Member States are required by the Directive to take all the necessary measures to ensure that waste is recovered or disposed of without endangering human health or causing harm to the environment.

11.2.3 The Directive sets a number of high-level objectives, which have influenced national waste management policy and legislation. In particular, Article 11 of the Waste Framework Directive (amended in 2008) requires that Member States take the necessary measures to achieve 70% recycling of non-hazardous construction and demolition waste by 2020.

The Waste (England and Wales) Regulations 2011 (as amended)

11.2.4 Directive 2008/98/EC has been transposed in to UK law in Wales by the Waste (England and Wales) Regulations 2011 (S.I. 2011 No. 988) (as amended). In Wales, the Regulations are supplemented by the Waste (Miscellaneous Provisions) (Wales) Regulations 2011 (S.I. 2011 No. 971 (W.141)). The latter Regulations make a number of consequential amendments to several Welsh Statutory Instruments and revoke one Wales–only instrument (i.e. the Environmental Protection (Duty of Care) (Amendment) (Wales) Regulations 2003).

11.2.5 The Directive also sets out 5 steps for dealing with waste, ranked according to environmental effect – the 'waste hierarchy'. Prevention offers the best environmental outcome and is situated

at the top of the hierarchy, followed by preparation for re-use, recycling, and other recovery and disposal. This has been transposed into UK law through the Waste (England and Wales) Regulations 2011 (as amended).

11.2.6 In addition to the above, reference has been made to the following legislation relating to material resources and waste management

- The Controlled Waste (England and Wales) Regulations 2012; and
- The Hazardous Waste (England and Wales) Regulations 2005.

Landfill Directive 1993/31/EC (updated 2010)

11.2.7 The Directive aims to prevent or reduce negative effects on the environment from the landfilling of waste, as far as is practicably possible, and introduces stringent technical requirements for waste and landfills as a disposal option through:

- Setting minimum standards for the location, design, construction and operation of landfills;
- Setting targets for the diversion of Biodegradable Municipal Waste from landfill;
- Controlling the nature of waste accepted for landfill; and
- Defining the different categories of waste (hazardous waste, non-hazardous waste and inert waste) and applies to all landfills, defined as waste disposal sites for the deposit of waste onto or into land.

11.2.8 The requirements of the Directive were transposed into national legislation through the Landfill (England and Wales) Regulations 2002 (as amended) and subsequently re-transposed as part of the Environmental Permitting (England and Wales) Regulations 2007 (as amended).

Wildlife and Countryside Act 1981 (as amended) and Environmental Protection Act 1990

11.2.9 Japanese Knotweed (Fallopia japonica) is listed under Schedule 9 to the Wildlife and Countryside Act 1981 with respect to England, Wales and Scotland. As such it is an offence to plant or otherwise cause Japanese knotweed to grow in the wild. Under the Environmental Protection Act 1990, Japanese Knotweed is classified as controlled waste.

11.2.10 Indian balsam (*Impatiens glandulifera*) and a number of other species are listed under Schedule 9 of the Wildlife and

Countryside Act 1981 with respect to England and Wales. As such, it is an offence to plant or otherwise allow this species to grow in the wild. A full list of invasive species recorded in the vicinity of the Scheme is provided in Chapter 9 (Ecology) of this Environmental Statement.

11.2.11 The Environmental Protection Act (Section 34) imposes a duty of care which applies to anybody involved in the production, importation, handling, storage, transportation, treatment or disposal of waste.

The Well-being of Future Generations (Wales) Act 2015

11.2.12 This Act aims to improve the social, economic, environmental and cultural well-being of Wales. The Act will make the public bodies listed in the Act think more about the long term, work better with people and communities and each other, look to prevent problems and take a more joined-up approach. The Act puts in place seven well-being goals:

- A prosperous Wales;
- A resilient Wales;
- A healthier Wales;
- A more equal Wales;
- A Wales of cohesive communities;
- A Wales of vibrant culture and thriving Welsh language; and
- A globally responsible Wales.

Environment (Wales) Act 2016

11.2.13 The Environment (Wales) Act includes key features that will ensure that managing natural resources sustainably will be a core consideration in decision-making. Part 1: "Sustainable management of natural resources" provides a modern legislation for managing Wales' natural resources that helps to tackle the challenges faced and is focused on the opportunities resources provide.

11.2.14 Part 2 focuses on Climate Change and the targets set for Welsh Ministers to reduce emissions of greenhouse gases, including the requirements to set carbon budgets for Wales.

Environmental Permitting Regulations (England and Wales) 2010 (as amended)

11.2.15 The Environmental Permitting Regulations require operators to obtain permits for some facilities, to register others as exempt and to provide ongoing supervision by regulators.

11.2.16 The Contractor may need to apply for an environmental permit under the Environmental Permitting Regulations if it uses,

recycles, treats, stores or disposes of “Waste”. If the Contractor planhows to carry out a “waste activity”, then it must meet the requirements of the EPR 2010 regulations using one of the following mechanisms:

- a ‘regulatory position statement’ (e.g. the CL:AIRE CoP etc.);
- an ‘exemption’;
- a ‘standard rules permit’; or
- a ‘bespoke permit’.

11.2.17 The Contractor will be required to contact the Regulator in order to determine how the EPR 2010 regulations will be met, and will be responsible for securing any permits or exemptions with Natural Resources Wales prior to undertaking any waste storage, treatment, use or disposal activity regulated under the Environmental Permitting (England and Wales) 2010 (as amended).

The Climate Change Act 2008

11.2.18 The Act sets out a framework for developing an emissions reduction path and commits the UK to reduce emissions by at least 80% by 2050 from 1990 levels.

Policy Context

National and Regional Policy

Planning Policy Wales (Edition 8), 2016

11.2.19 Planning Policy Wales (PPW) presents the Welsh Government's land use policy, which should be taken into account when preparing development plans. The policy sets out the Welsh Government's objectives in terms of waste management. The main focus of the policy is the provision of future waste management facilities by local planning authorities. However, it states that ‘*waste prevention efforts at the design, construction and demolition stage should be made by developers’*.

11.2.20 Further to this, PPW states that the use of renewable resources, including sustainable materials (recycled and renewable materials and those with a lower embodied energy), should be maximised and where it is judged necessary to use non-renewable resources they should be used as efficiently as possible. It adds that *'the use of renewable resources and of sustainably produced materials from local sources should be*

encouraged and recycling and re-use levels arising from demolition and construction maximised and waste minimised".

Minerals Planning Policy Wales (MPPW), 2001

11.2.21 Policy E of Minerals Planning Policy Wales (MPPW) 2001 aims to encourage the efficient use of minerals by promoting the appropriate use of high quality materials, and by minimising the production of waste through maximising the potential for reuse and recycling waste, where environmentally acceptable.

Towards Zero Waste, One Wales: One Planet 2010 (Welsh Assembly Government, 2010)

11.2.22 Towards Zero Waste (TZW) was published in 2010 and is the overarching waste strategy document for Wales. TZW sets out at a high level strategy for how WG will manage waste in Wales to produce benefits not only for the environment, but also for the economy and social wellbeing. The strategy and its associated sector plans outline the actions Wales must take to reach the ambition of becoming a high recycling nation by 2025 and a zero waste nation by 2050. Achieving the aims in TWZ relies on a suite of waste sector plans. These provide details on how the outcomes, targets and policies in Towards Zero Waste are to be implemented.

Welsh Government (2012) Construction and Demolition Sector Plan

11.2.23 This plan details outcomes, policies and actions on waste for organisations, companies and individuals in construction and demolition (C & D) in Wales.

11.2.24 The Plan supports Welsh Government's Towards Zero Waste Strategy which – as set out above – identifies how waste will be managed in Wales until 2050. The Plan is one of a suite of sector plans and provides further detail on the outcomes, policies and actions on waste for organisations, companies and individuals in the construction and demolition sector in Wales.

11.2.25 The Plan provides information following an analysis of the current situation of construction and demolition waste management and sets out objectives and outcomes to be completed by 2025.

11.2.26 One of the overarching actions described in the plan is to encourage "clients, designers and contractors to think and plan to prevent, minimise and recycle waste on C&D projects through the introduction of mandatory Site Waste Management Plans".

Technical Advice Note 21: Waste, 2014

11.2.27 Technical Advice Note 21 Waste provides advice on how the land use planning system should contribute towards sustainable waste management and resource efficiency.

11.2.28 TAN 21 sets out a framework for facilitating the delivery of sustainable waste management infrastructure through the planning process and emphasises the importance of collaboration between local authorities, Natural Resources Wales, the waste management industry and the general public.

Minerals Technical Advice Note (Wales) 1: Aggregates

11.2.29 The Minerals Technical Advice Note sets out detailed advice on the mechanisms for delivering the policy for aggregates extraction by mineral planning authorities and the aggregates industry. Its aim is to ensure mineral resources are used sustainably whilst meeting society's needs. It should be read in conjunction with Minerals Planning Policy Wales' which sets out the general policies for all mineral development.

WRAP Cymru Delivery Plan: 2011-15 For a World Without Waste

11.2.30 This plan focuses on the most important issues: minimising resource use and diverting priority materials from landfill. The Plan is divided into two themes: waste prevention and resource minimisation (including reuse) and recycling and recovery (including preparation for reuse).

Climate Change Strategy for Wales 2010

11.2.31 Chapter 12 of the Climate Change Strategy, "Resource efficiency and waste sector emission reduction", sets out actions to reduce emissions in the waste sector including:

- Reducing Green House Gas emissions from landfill sites; and
- Reducing indirect emissions associated with resource consumption by increasing reuse, recycling and composting.

Invasive Non-native Species Strategy for Great Britain 2015

11.2.32 The Great Britain Invasive Non-native Species Strategy provides a framework on how to minimise the risks posed by invasive non-native species. The strategy sets out key aims and actions for addressing the threats posed by invasive non-native species. It aims to:

- get people working together better including government, stakeholders, land managers and the general public; and
- improve co-ordination and co-operation on issues at a European and international level.

11.2.33 This strategy covers 2015 to 2020. It replaces the first strategy published in 2008.

Code of Practice for Species Control Provisions in Wales (draft 2016)

11.2.34 A draft Code of Practice for Species Control Provisions in Wales was issued on the 12 January 2016 and it underwent consultation until the 5 April 2016. The draft Code of Practice is currently being redrafted following comments made at consultation.

11.2.35 The Infrastructure Act 2015 amended the Wildlife and Countryside Act 1981 to introduce species control provisions to ensure that, in certain circumstances, appropriate action can be taken against invasive non-native species.

11.2.36 Welsh Ministers and Natural Resources Wales have new powers requiring owners to control invasive non-native species, or allow them to do so where an owner has refused to act or allow access. Provisions may also be applied to formerly resident native animals where they have been released unlawfully without the necessary approvals from Natural Resources Wales.

11.2.37 This draft code of practice sets out how these provisions should be applied in practice in Wales.

Local Planning Policy

Powys Waste Strategy 2014/2015 (most up to date waste strategy at the time of writing)

11.2.38 The Powys Waste Strategy sets out the methods used by Powys to increase recycling and composting rates, and to supply a framework that the local authority can work to in the future to ensure that these tough targets are met by Powys County Council.

Powys Unitary Development Plan (UDP), 2001 - 2016

11.2.39 The Powys Unitary Development Plan (UDP) was adopted in March 2010 and includes the strategic policy UDP SP11 - Waste Management which states "*All development proposals should incorporate sustainable principles for waste management processes. Proposals for development will be assessed sequentially as to whether they would:*

i. Reduce the creation of waste;

ii. Re-use waste;

iii. Recycle or recover waste;

iv. Convert waste to energy;

v. Dispose of waste to landfill with minimum environmental impact."

11.2.40 The UDP states that Powys has a current land bank of over 40 years supply of aggregates, relating to output figures from 2010. It notes that:

"*This bold statistic needs to be examined in greater detail as it covers a range of materials, which may be in individual short supply. It may also be materially affected by possible shifts in the distribution of mineral production and supply*."

11.2.41 As part of the process of preparing the Powys Local Development Plan (LDP) (2011-2026), the Council consulted on the revised Deposit Local Development Plan (LDP) on the 8 June to 20 July 2015. A further consultation was held from 10 October to 21 November 2016.

Eryri Local Development Plan 2007 – 2022

11.2.42 The Eryri Local Development Plan 2007 – 2022 (Snowdonia National Park Authority 2011) is the adopted plan in the Snowdonia National Park and contains the following relevant policy:

- DP 6: Sustainable Design and Materials states: '*The development will not have an unacceptable adverse effect, through increased resource use, discharges or emissions, on public health, surface and ground water (quality, quantity or ecology), air quality, soil and the best and most versatile agricultural land.*'

North Wales Regional Waste Plan 1st Review Core Document and Technical Companion

11.2.43 The regional waste plan was produced in line with the requirements of Planning Policy Wales Technical Advice Note 21: Waste (TAN 21) to provide an approach to the management of waste streams in the region.

Survey of Construction and Demolition Waste Generated in Wales 2012

11.2.44 A survey of construction and demolition waste generated in Wales was carried out for the calendar year 2012. This document provides the results of the survey and includes figures on the amount of waste generated, composition of waste and routes for disposal.

Relevant Guidance

11.2.45 In addition to the Waste Framework Directive, reference has been made to the following guidance and legislation relating to material resources and wastes:

- Interim Advice Note (IAN) 125/09(W) Supplementary Guidance for Users of DMRB Volume 11 'Environmental Assessment;
- Interim Advice Note (IAN) 153/11 Guidance on the Environmental Assessment of Material Resources;
- DMRB Volume 11, Section 3 Part 3, Disruption Due to Construction. This covers the effect on people and on the natural environment which can occur, mainly during construction works; and
- Definition of Waste: Development Industry Code of Practice, Version 2 (Contaminated Land: Applications in Real Environments (CL:AIRE) 2011).

Project Targets

11.2.46 The project targets have been agreed with the Client and set out in the ECI Design Build and Contract Information for Works Volume 2A (June 2015).

11.2.47 Welsh Government's Construction and Demolition Waste targets:

- 90% target (by weight) for recycling and re-use of non-hazardous construction and demolition waste by 2019-20; and
- 75% target for diverting waste away from landfill by 2019-20.

11.2.48 Welsh Government's Construction and Demolition Waste priorities:

- Reusing and recycling packaging waste;
- Reducing the landfilling of biodegradable wastes;
- Reducing waste arisings and increasing recycling of the following priority wastes: Wood, Plastic, Metal, Insulation & Gypsum and Hazardous Waste; and
- Reducing the quantity of waste to landfill towards zero.

11.2.49 Additional targets:

- Recover a minimum of 70% of construction materials and packaging;
- Recover a minimum of 80% of demolition and strip-out materials; and
- Ensure that at least 15% of total material value derives from reused and recycled content in new build, select the top opportunities to exceed this figure without increasing the cost of materials, and report actual performance.

11.3 Best Practice

Pollution Prevention Guidelines (PPG6) 'Working at construction and demolition sites'

11.3.1 The Pollution Prevention Guidelines provides practical advice and guidance for the prevention of pollution during construction and demolition projects. The guidance explains what is required by law and describes good practice measures to reduce the risks of a pollution incident.

11.3.2 Although PPG6 was withdrawn on 14 December 2015 and is no longer maintained by the Environment Agency, such guidance continues to provide useful pollution prevention guidance on site in the absence of revised guidelines.

Site Waste Management Plan (SWMP)

11.3.3 A Site Waste Management Plan will be prepared for the Scheme as part of the Construction Environmental Management Plan (CEMP) (refer to Chapter 17 Environmental Management). This would be implemented by the Contractor during construction. The SWMP would set out how the resulting waste would be managed during the construction of the Scheme. As SWMPs are not a legal requirement in Wales this will be undertaken to provide supporting information on the basis of best practice. An Outline Site Waste Management Plan is provided within Volume 3 Appendix 17.1 of this ES.

11.3.4 Related guidance for the SWMP includes the following by Waste & Resources Action Programme (WRAP):

- WRAP SWMP template; and
- WRAP Designing out Waste: a design team guide for Civil Engineering.

11.3.5 A Materials Management Plan (MMP) will be prepared for the Scheme as part of the CEMP. This would also be implemented by the Contractor during construction and would set out how

building materials would be managed during the construction of the Scheme. An outline Materials Management Plan is provided within Volume 3 Appendix 17.2 of this ES.

11.3.6 The scope of this MMP is to cover the Scheme. It will identify the information from the Scheme design and construction documentation to demonstrate the requirements of the CL:AIRE Definition of Waste Code of Practice can be met. The earthworks strategy for the Scheme, and hence this MMP, is at an outline stage and will be developed further as the Scheme design progresses.

11.4 Study Area

11.4.1 The study area for the assessment covers the construction and permanent land take areas associated with the Scheme (see Figure 2.4 Construction Plan in Volume 2).

11.4.2 The study area encompasses the spatial area over which the Scheme would be predicted to have an effect, as agreed at scoping. For material resources, this would typically relate only to the areas that would be disturbed by the Scheme. Consideration of the potential effects outside of the study area has also been included where appropriate, specifically in regards to the effects associated with the supply and movement (import/export) of materials outside of the Scheme boundary.

11.5 Methodology

11.5.1 This section sets out the methods used to undertake the material resources and waste materials assessment, with reference to published standards, guidelines and best practice.

11.5.2 The assessment of the environmental effects associated with the use of material resources and the generation and management of waste resulting from the construction of the Scheme has been undertaken in accordance with the guidance provided within the IAN 153/11.

11.5.3 There is currently no specific defined methodology for assessing the environmental significance of a material resource or for determining the magnitude of the effect on such a resource. It was agreed at the Environmental Impact Assessment Scoping stage with Welsh Government that draft Materials guidance HD 212/11 will not be used for this Scheme. With this in mind, the guidance given in the DMRB, Volume 11, Sections 1 and 2 has been taken into account. In particular, the guidance in Volume 11, Section 2, Part 5 (HA 205/08) together with professional judgement have been used to assess environmental value, magnitude of effect and the significance of environmental effects from the use of material resources.

11.5.4 The methodology for assessing the effects of the waste generated is based on professional judgment and the information available at this stage of design.

Methodology for the Identification of Baseline

11.5.5 The existing baseline conditions have been identified as the receptors which have the potential to be affected by the material resources and the waste arisings associated with the proposed Scheme.

11.5.6 The baseline conditions have been informed by:

- The 2015 Ground Investigations (Volume 3; Appendix 10.2);
- The Phase 1 Habitat Survey Maps (Volume 2 Figures 9.4 and 9.5);
- The Carbon Report (Volume 3 Appendix 11.1);
- National Waste: Wales Waste Information 20132;
- South Wales Regional Aggregate Working Party Annual Report3;
- Powys Waste Strategy from 2014/154;
- Local development policies and topic papers;
- Intergovernmental Panel on Climate Change (IPPC, 2013)5; and
- The A487 New Dyfi Bridge Traffic Surveys Report (Volume 3; Appendix 11.1).

11.5.7 In order to identify the baseline conditions, data has also been collected from the Contractor, Alun Griffiths (Contractors) Ltd, and members of the design team on the materials which are likely to be used during each stage of the Scheme, and the waste that is likely to arise. This has been presented in Section 11.7.

[2] Natural Resources Wales (2013) 'National Waste: Wales Waste Information Report' Accessed 06/12/2016 at http://naturalresources.wales/media/2805/wales-waste-information-eng.pdf
[3] South Wales Regional Aggregate Working Party (SWRAWP) (2008) 'Annual Report' Accessed 06/12/2016 at http://www.swrawp-wales.org.uk/Html/RAWP2008%20Annual%20Report%20A4.pdf
[4] Powys County Council (2014) 'Powys Waste Strategy 2014/2015' Accessed 06/12/2016 at http://pstatic.powys.gov.uk/fileadmin/Docs/Planning/LDP/Powys_Waste_Strategy_2014-15.pdf
[5] Intergovernmental Panel on Climate Change (IPPC) (2013) 'Fifth Assessment Report – Climate Change 2013'

Methodology for the Assessment of Construction Effects

11.5.8 The assessment aims to identify the environmental effects associated with material resource demand and waste generation through a review of the resources required for the construction phase of the Scheme and the waste that is likely to arise.

11.5.9 Given the extent of the Scheme, and the identified intent to re-use site won materials, a simple level of assessment has been undertaken for this Scheme, in line with IAN 153/11 requirements.

11.5.10 It is anticipated that the re-use of site won materials will not increase the risk from existing or new contamination and pollutant linkages. Chapter 10 (Geology and Soils) of this report notes that a strategy would be developed to enable unforeseen ground conditions to be addressed if or when encountered, in line with the Specification for Highways Works. Where pollutant linkages are identified, it is noted that additional assessments would be carried out at detailed design stage.

11.5.11 The assessment of potential effects due to construction has been based on estimated material requirements and includes a review in terms of material volumes, sources and movements. Vehicle movements required for delivery and export of materials have been considered.

11.5.12 The assessment of the environmental effects associated with the use of material resources and the generation and management of waste resulting from the construction of the Scheme has taken into account the following:

- Types and quantities of materials associated with the construction of the Scheme;
- Types and quantities of waste arisings associated with the construction of the Scheme;
- External waste management infrastructure; and
- Movement of materials during construction (both to and from the Scheme).

Methodology for the Assessment of Operational Effects

11.5.13 The environmental effects associated with material resource demand and waste generation during operation are not considered to be significant. Any effect is dependent upon the maintenance regime which will incorporate work every 25 years (assuming the bridge has a life span of 120 years) and will not

involve significant resource demands or waste generation over this period of time, based on the estimated quantities provided.

11.5.14 The assessment aims to identify the potential environmental effects, based on the likely maintenance regime.

Methodology for Determining the Significance of Effects

11.5.15 For the assessment of materials, no specific methodology has been published to assign significance to both the sensitivity of a material resource and the magnitude of an effect. Professional judgement and the procedures for assessing effects given in DMRB Volume 11 Section 1 and 2 have been used.

11.5.16 The first stage of the assessment is an evaluation of the sensitivity of the material resource or feature, based on an assessment of the quality, scale, rarity and the services provided. The value (sensitivity) of the material resources in the study area of the Scheme is determined on the basis of the descriptions described from Table 11.1 of the HA 205/08 as follows.

Table 11.1: Environmental Value (or Sensitivity)

Value	Typical descriptors
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

11.5.17 The second stage is an evaluation of the magnitude of effect that the proposed works are likely to have on the resource or feature. The magnitude of the effect has been determined on the basis of the descriptions derived from HA 205/08 as provided in Table 11.2 below.

Table 11.2: Magnitude of Effect

Magnitude	Description of Effect
Major	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Moderate	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).

Magnitude	Description of Effect
Minor	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial effect on attribute or a reduced risk of negative effect occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable effect in either direction.

11.5.18 The final stage of the assessment combines the value (sensitivity) of the receptor and the magnitude of effects to arrive at a level of significance. The significance has been derived in accordance with Table 11.3.

Table 11.3: Significance of Effect

		Magnitude of Effect (Degree of Change)				
Sensitivity of Receptor		No Change	Negligible	Minor	Moderate	Major
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or Moderate
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or Large
	High	Neutral	Slight	Slight or moderate	Moderate or Large	Large or Very large
	Very High	Neutral	Slight	Moderate or large	Large or Very large	Very large

Limitations and Assumptions

11.5.19 The assessment of material resources and waste arising from construction is still a developing area; detailed assessment guidance is therefore not yet available on some aspects of the assessment process. This limitation has been considered and the IAN 153/11 has formed the basis for the assessment.

11.5.20 The construction and operation of the Scheme would be carried out in accordance with normal good working practice implemented on such projects. The normal good working practice will be set out in the CEMP which will include the environmental measures that would be adopted during the construction phase, such as the Site Waste Management Plan. A pre-CEMP is provided in Appendix 17.1 in Volume 3.

11.5.21 Details of the approach to construction are set out in Chapter 2.

11.5.22 The quantities of materials to be used for construction of the Scheme, the sources from where they would be obtained and their mode of transport is yet to be finalised and are estimated based on the Scheme design as described in Chapter 2 of this ES. The quantities of the waste likely to arise have also been estimated on this basis, and it is considered that the quantities will not be significantly different to lead to a greater magnitude of effect.

11.5.23 Whilst limitations exist, it is considered that the assessment of material resources and waste arising from construction is sufficiently robust according to the guidelines set out in the IAN 153/11 and for the purposes of this ES.

Consultation

11.5.24 Consultation with NRW, SNPA, Powys County Council and Gwynedd Council has been undertaken through the submission of the draft Scoping Report and discussions at the ELG meetings. This did not reveal any concerns regarding material resources and waste management. Section 4.8 of the ES provides further information on the approach taken for consultation.

11.5.25 SEB comments on the draft A487 New Dyfi Bridge Environmental Statement were received in August 2016 and have been considered and addressed where necessary.

11.6 Baseline Environment

11.6.1 The baseline environment is comprised of receptors which have been identified based on the likely effects set out in IAN 153/11. The receptors vary for the construction and operation phase and have been identified in Table 11.4.

Table 11.4: Identification of the receptors that are relevant for each stage of development

Receptor	Construction	Operation
Primary material sources (on-site)	✓	✓
Imported material sources (off-site)	✓	n/a
Waste and material management infrastructure (on-site)	✓	n/a
Waste and material management infrastructure (off-site)	✓	✓
Local road network	✓	✓
Global climate system	✓	✓

Primary Material Sources (on-site)

11.6.2 A Preliminary Sources Study Report (PSSR) has been prepared for the proposed Scheme, which documents the findings of the geotechnical desk study investigation. Section 10.5 of the ES presents detailed findings of the report and describes the existing ground conditions on site.

11.6.3 The ground investigations did not identify any evidence of soils or groundwater contaminants, indicating that any made ground is likely to be suitable for re-use. Based on these assessments, the sensitivity of the ground conditions and therefore the on-site material sources is considered to be **low**.

Imported Material Sources (off-site)

11.6.4 The imported material, such as concrete and steel, will be sourced from established suppliers who regularly provide materials for similar sized projects. The suppliers have not yet been determined, but the Contractor will ensure that they are suppliers with adequate resources to meet the quantitative needs of the Scheme, without having a negative influence on their resources. When identifying suppliers, the Contractor will consider the distance from the Scheme with the intention to ensure that the distance travelled by the materials is as low as can be possible.

11.6.5 The sensitivity of the raw material sources has been determined through the land bank availability in Powys.

11.6.6 Powys County Council provided their land bank figures in the South Wales Regional Aggregate Working Party Annual Reports. The latest was 2013 (pages 21 and 22) which indicates:

- the landbank for crushed rock (based on 10 years average sales) is 64 years; and
- the landbank for sand and gravel (based on 10 years average sales) is 1,333 years.

11.6.7 In addition, the landbanks of Gwynedd and Isle of Anglesey have been considered as a source of materials in the event that Powys is unable to provide the particular aggregates necessary for the Scheme.

11.6.8 Based on the above, the sensitivity of the off-site material sources is considered to be **low**.

Waste and Material Management Infrastructure (on-site)

11.6.9 The Scheme is likely to generate various types of non-hazardous waste which will be handled at a designated on-site waste management facility prior to transfer to external waste management sites. The on-site waste management facility would be located at the main construction compound established for the construction phase, which is yet to be determined.

11.6.10 It is possible that the invasive species, currently on site, will be managed through the creation of onsite bunds. This will be confirmed, and a location identified, in the SWMP at detailed design stage. The bunds will be in accordance with general guidance on the management of invasive species and will be set in an area at least 10m away from the site boundary to prevent spread, refer to Volume 3 pre-CEMP Appendix 17.1 Annex C Outline Invasive Species Management Plan.

11.6.11 The on-site waste management facility will consist of various skips to cater for the different waste streams. It is unlikely that any crushing or screening facilities would be required, as the excavation quantities are likely to be limited. Where possible, materials from haul roads / crane and piling platforms will be re-used within the works or for accommodation works. The facility would also comprise a bunded area where the material could be dried out and eventually transported to a licensed tip.

11.6.12 The location of the on-site construction compound has yet to be determined. Any waste that is generated will be transported to the construction compound in a tanker or dumber to the main compound. The full site has undergone an assessment in this ES, which includes a consideration of nearby water resources, flood risk, ground conditions and ecological habitats. The construction compound will be situated away from water bodies and the flood plain. The sensitivity of the compound as a result of storage of materials is therefore considered to be **low.**

Waste and Material Management Infrastructure (off-site)

Local Waste Management Infrastructure

11.6.13 Waste management off-site will follow the guidelines of the most recent Powys Waste Strategy from 2014/15 which indicates the importance of the commercial sector to maximise recycling in order to meet the statutory recycling targets.

11.6.14 In the event that the invasive plant material cannot be managed on site, it is proposed that the material is sent to an identified

facility. Biffa Waste Services have identified Trecatti Landfill Site in Methyr Tydfil, which is licensed to receive controlled waste. Disposal options will be outlined in the SWMP at detailed design stage and will include a consideration of facilities within closer proximity to the Scheme, also refer to Volume 3 pre-CEMP Appendix 17.1 Annex C Outline Invasive Species Management Plan.

11.6.15 Local waste management sites will be identified and reviewed for availability closer to the time of construction, and the Contractor will ensure that each identified site has adequate capacity to cater for the waste likely to be generated by the Scheme. This will also be documented in the SWMP which will be developed during the detailed design stage, prior to construction. Powys' recent waste management performance and the Local Development Plan and topic papers have been used to provide an assessment of the sensitivity.

11.6.16 Table 11.5 provides a breakdown of the targets set for waste collection by local authorities over the next 10 years. This includes minimum targets for recycling, limits for disposal at landfill and limits for distribution to energy from waste facilities.

Table 11.5: Waste and recycling targets for local authorities

Target on Waste collected by local authorities	**Year**			
	2012/2013	**2015/2016**	**2019/2020**	**2024/2025**
Minimum overall recycling	52%	58%	64%	70%
Maximum level of landfill	-	-	10%	50%
Maximum level of energy from waste	-	42%	36%	30%

11.6.17 According to the Powys Local Development Plan (2014): Topic Paper Waste, the Council was utilising just 63% of its landfill allowance in 2013/14, which is the equivalent to achieving the 2019/2020 allowance, and no major interventions are foreseen within the LDP period. The LDP states however that there are few authorised construction waste sites in Powys County and there is a need for more. It goes on to state that:

"*every effort is made to balance materials used in and arising from highway works / construction projects in Powys. The recycling of 'waste' road construction materials is increasingly carried out but where there is a surplus of material, disposal at exempt sites is also still necessary*".

11.6.18 As the LDP states that further construction waste sites are necessary within Powys, it is considered that the sensitivity of the local waste infrastructure to increased waste generation is **medium**.

Regional Waste Management Infrastructure

11.6.19 In the event that a waste cannot be reused, recycled, recovered or disposed of locally, the waste may have to be managed at a waste management facility outside of the local authority's boundary. In accordance with the Proximity Principle, local facilities would be considered first. The latest data, Wales Waste Information Report 2013, confirms the following regional waste management facilities were available in Wales during 2013:

- Inert landfill: Available in North Wales and South East Wales only;
- Non-hazardous landfill: Available in all regions;
- Non-hazardous (Stable Nonreactive Hazardous Waste): Available in South East Wales only;
- Hazardous Restricted landfill: Available in South West Wales only;
- Restricted user landfill: Available in all regions;
- Hazardous waste incineration: Available in North Wales only;
- Non-hazardous waste incineration: Available in South East Wales only;
- Incineration of Municipal and/or Industrial & Commercial waste: Available in South West Wales only;
- Transfer stations: Available in all regions; and
- Waste treatment (Material recovery, Physical, Physico-chemical, Chemical, Composting, Biological): Available in all regions, with the exception of South West Wales where there appears to have been little or no available chemical treatment and composting facilities during 2013.

11.6.20 In the event that the invasive plant species cannot be managed on site, disposal at landfill will be necessary. Invasive plants are classed as a non-hazardous waste and must therefore be disposed of at a licensed waste management facility. This will be set out in the Invasive Species Management Plan at detailed design stage.

11.6.21 The report indicates that the North Wales waste planning area is likely to have an adequate range of waste management transfer, treatment and disposal facilities to accommodate the majority of wastes arising from the Scheme. Based on this, the sensitivity of

the regional waste management infrastructure is considered to be **low**.

National Waste Management Infrastructure

11.6.22 In the event that a waste cannot be reused, recycled, recovered or disposed of at either a local or regional level, the Scheme would extend its search to other regions in Wales.

11.6.23 The Wales Waste Information 2013 Report confirms the availability of the 31 active landfill and recovery sites in Wales during 2013:

- 11% of capacity was at inert sites;
- 69% of capacity was at non-hazardous sites;
- 20% of capacity was at restricted user sites (non-hazardous and hazardous); and
- approximately 10.7 years of landfill life was left at sites for non-hazardous wastes in Wales, at 2013 input rates.

11.6.24 No additional landfill capacity was created during this reporting year, but more accurate surveying of sites by landfill operators has indicated that more space may be available at some sites.

11.6.25 The Wales Waste Information 2013 Report confirms the availability of a further 436 active sites in Wales during 2013:

- Metal Recycling: 98 sites;
- Incineration with energy recovery: three sites;
- Incineration without energy recovery: one site;
- Transfer: 218 sites;
- Treatment: 109 sites; and
- Use of waste: seven sites.

11.6.26 No information could be sourced, at the time of assessment, with regards to the annual capacities of these sites (i.e. permitted quantities vs annual throughputs).

11.6.27 Based on the available information, the sensitivity of the national waste management infrastructure to additional waste generated by the Scheme is considered to be **low**.

11.6.28 Based on the assessment of sensitivity of the local, regional and national waste management infrastructure, the overall sensitivity of the off-site waste management infrastructure available to the Scheme is considered to be **medium**.

Local Road Network

11.6.29 The A487 New Dyfi Bridge Traffic Surveys Report (Volume 3, Appendix 11.1) states that the major traffic flows in the area of the Scheme are on the A487 and A489. The A487 north of Machynlleth is lightly trafficked, with the inbound and outbound Machynlleth seven day average flows being similar indicating that overall those vehicles that travel in one direction and then travel in the opposite direction at some point. This is a relatively lightly trafficked area and the proportion of Heavy Goods Vehicles (HGV) on the roads is relatively low.

11.6.30 The sensitivity of the local road network is therefore considered to be **low**.

Global Climate System

11.6.31 The global climate system is the ultimate receptor of any carbon emissions associated with the materials and waste resources during the construction and operational phases of the Scheme.

11.6.32 There is currently no accepted methodology for determining the sensitivity of the global climate system to new greenhouse gas emissions. However, the Institute of Environmental Management and Assessment's Principles on Climate Change Mitigation and EIA (2010)[6] states that "*greenhouse gas emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any greenhouse gas emissions or reductions from a project might be considered to be significant".*

11.6.33 The document sets out the over-arching advice on the need for considering greenhouse gas emissions in EIA and recommends that, when evaluating significance, "*all new greenhouse gas emissions contribute to a significant negative environmental effect; however some projects will replace existing developments that have higher greenhouse gas profiles. The significance of a project's emissions should therefore be based on its net greenhouse gas effect, which may be positive or negative."*

11.6.34 The Intergovernmental Panel on Climate Change (IPPC, 2013) states that "*Continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions*".

[6] Institute of Environmental Management and Assessment (2010), IEMA Principles: Climate Change Mitigation & EIA

11.6.35 Based on the IPPC's assessment of continued greenhouse gas emissions, the sensitivity of the global climate system is considered to be **very high**.

11.7 Potential Construction Effects - Before Mitigation

11.7.1 The Scheme has the potential to generate local effects during the construction phase. This is due to:

- The requirement for the import of construction materials (including primary aggregates); and
- The generation of excess materials requiring removal from site to alternative sites or landfill.

11.7.2 This section assesses the potential effects of the materials used and waste generated during the construction phase.

Types and Quantities of Materials

11.7.3 A variety of different materials would be required for the construction phase of the Scheme. The Scheme would be designed to prevent where possible the volumes of both the waste materials generated and the imported construction materials by reusing or recycling the available existing materials along the Scheme.

11.7.4 The types and provisional estimated quantities of materials required for the construction and phase of the Scheme are listed in Table 11.6.

Table 11.6: Summary of the material resources associated with the construction phase of the proposed Scheme

Project Activity	Material resources generated/required for the project	Quantities of material resources generated/required	Additional information on material resources
Earthworks	Excavated material	North of the river: 16,650 m³ South of the river: 300 m³	Total cut material = 16,950 m3
	Placed material	North of the river: 2,250 m³ South of the river (including flood bunds): 18,100 m³	Total fill material = 20,350 m3
	Any excess material required	Approx. 3,400 m³	Sourced from local supplier where possible
	Any material replacing the invasive plant species and associated removed material	Exact quantities unknown	Sourced from local supplier where possible.
Site construction	Concrete	6,465 m³	Sourced from local supplier where possible.
	Steel reinforcement	1,220 tonnes	Sourced from local supplier where possible.
	Metal parapet (1.4m high)	1.5km length	Sourced from local supplier where possible.
	Verge fill	675 m³	Sourced from local supplier where possible.
	Waterproofing spray	To cover an area of 9000 m²	Sourced from local supplier where possible.
	Silane impregnant	To cover an area of 1,800 m²	Sourced from local supplier where possible.
	Carriageway surfacing	To cover an area of 1,800 m³	Sourced from local supplier where possible.

Project Activity	Material resources generated/required for the project	Quantities of material resources generated/required	Additional information on material resources
	(Painted) Structural steel	1,750 tonnes	Sourced from local supplier where possible.
	Paint	TBC	Sourced from local supplier where possible.
	Bearings	50	Sourced from local supplier where possible.
	Expansion joints	35 m length	Sourced from local supplier where possible.
	Drideck (or similar)	To cover a length of 1.5 km	Sourced from local supplier where possible.
	Envirocheck (or similar)	To cover a length of 1.5 km	Sourced from local supplier where possible.
	Gravel / crushed stone	5,000 m^3	For the temporary laydown areas, haul road and piling mats.

11.7.5 Earthworks estimates predict a deficit of 3,400 m³ of general earthworks materials, subject to appropriateness of the fill material. Where possible this material will be sourced locally.

Primary Material Sources (on-site)

11.7.6 The source of the primary material to be used from on-site is considered to be of **low** importance as this is within the physical scope of the Scheme and the ground has been assessed. The magnitude of effect on the source of primary materials is considered to be **moderate adverse**. The significance of effect on the source of raw materials is therefore considered to be **slight adverse**.

Imported Material Sources (off-site)

11.7.7 There is a net import of construction materials required for the Scheme, which could potentially have an effect on material sources. The Contractor would work to ensure that materials are imported from established local or regional suppliers who regularly provide materials to commercial projects and therefore the sensitivity of the source is considered to be **low**. The quantities of the common construction materials required, however, are relatively large in the context of the material suppliers and therefore the magnitude of effect is assessed to be **moderate adverse**. The significance of effect from construction on the material sources is considered to be **slight adverse**.

Types and quantities of waste arisings

11.7.8 During construction, it is proposed that all materials arising from construction would be re-used on site in accordance with the waste hierarchy defined within the Waste Framework Directive.

11.7.9 The types and provisional estimated quantities of waste arisings associated with the construction operational phase of the Scheme are listed in Table 11.7.

Table 11.7: Summary of the waste arisings associated with the construction phase of the Scheme

Project Activity	Waste arisings from the project	Waste category	Quantities of waste arisings	Conversion in tonnes* (where applicable)	Additional information on waste arisings
Earthworks	Invasive non-native species (INNS) including Japanese knotweed and Indian balsam.	Non-hazardous	Exact quantities not known. Locations are indicated in Volume 2 Figures 9.4, 9.5, 9.6 and 9.7	n/a	Indian balsam is along field boundaries and ditches. Japanese knotweed is widespread throughout the Study Area; along the Afon Dyfi banks, within woodland areas to the north of the river and within hedgerows and treelines in the western area, at the boundary of the Dyfi Eco Park and in the north-eastern areas of the Study Area
	Soil	Non-hazardous	Exact quantities not known.	n/a	Surplus topsoil will be generated throughout construction, including the cut and fill, and the strip for the laydown areas, haul road and piling mats.
Demolition	Metals	Non-hazardous	0.5 tonnes	n/a	Iron and steel (lighting columns).
	Mixed construction and demolition wastes	Inert, Non-hazardous, hazardous	53.5 tonnes	n/a	Fencing, road signage, gates, walls
Site construction	Surplus concrete	Inert	40m^3	50.8 tonnes	Surplus of pours. Disposed of off-site.
	Packaging domestic waste (general waste	Non-hazardous	180 tonnes	n/a	Total over construction period (2 skips per month)

Project Activity	Waste arisings from the project	Waste category	Quantities of waste arisings	Conversion in tonnes* (where applicable)	Additional information on waste arisings
	from compound area and welfare set-up)				
	Liquid waste from septic tank	Hazardous	TBC	n/a	Tanker to be emptied.
	Crushed stone (material imported for temporary launch platform)	Inert	3200 to 6400m^3	4000 to 8000 tonnes	

**Conversion factors for each material sourced from Appendix 9 of Wales Construction and Demolition Waste Generation Survey 2012 to allow for calculation of total waste in tonnage.*

11.7.10 Site clearance will include the clearing of existing vegetation, top soil stripping, and removal of kerbs, fences, gates, lighting columns, and traffic signs. The final quantity of these materials and location for disposal would be confirmed during detailed design. The materials would be segregated and appropriately recycled/reused on site prior to disposal at an appropriate waste handling facility. If removal of materials from site is required, the location for the disposal of these materials is likely to include a combination of local / regional recycling facilities and disposal at an inert, hazardous or non-hazardous landfill site.

Effect on Waste and Materials Management Infrastructure (on-site)

11.7.11 The on-site waste management facility will consist of various skips and storage areas to cater for the different waste streams. It is unlikely that any crushing or screening facilities would be required, as the excavation quantities are likely to be limited. Where possible, materials from haul roads / crane and piling platforms will be re-used within the works or for accommodation works.

11.7.12 The sensitivity of the location of the construction compound – yet to be determined - is considered to be **low** based on the whole site having undergone assessment. The waste will be removed from the site on a regular basis, so as to ensure that a build-up of waste and contaminants does not occur. The magnitude of effect on the on-site waste management infrastructure is therefore considered to be **negligible adverse**. The significance of effect is considered to be **neutral or slight adverse**.

Effect on Waste and Materials Management Infrastructure (off-site)

Local Waste Management Infrastructure

11.7.13 A review of availability of local sites will be undertaken closer to the time of construction. The sensitivity of the local waste management infrastructure has therefore been assessed using recent waste management performance in Powys and the LDP. As the LDP states that further sites are necessary to manage waste, the sensitivity of the local waste management infrastructure has been defined as medium. On a local scale, the waste will be separated and disposed of at appropriate management facilities. Whilst the LDP states that additional construction waste sites are necessary, it is considered that following separation of the waste the magnitude of effect of the various waste streams likely to be generated is considered to be

minor adverse. The significance of effects on the local waste management infrastructure is therefore **slight adverse**.

Regional Waste Management Infrastructure

11.7.14 The Wales Waste Information Report 2013 states that the North Wales waste planning area is likely to have an adequate range of facilities in the future, thereby indicating that the region will be able to accommodate the majority of waste that may arise from the Scheme. The sensitivity of the regional waste management infrastructure is therefore considered to be low.

11.7.15 The intention of the project is to maximise re-use and recycling therefore the magnitude of effect on the regional waste management infrastructure is considered to be **minor adverse**.

11.7.16 The significance of effect of waste generation associated with the project on the regional waste management infrastructure is considered to be **slight adverse**.

National Waste Management Infrastructure

11.7.17 The sensitivity of the national waste management infrastructure is considered to be **low**, based on the Wales Waste Information 2013 Report which confirms that there is waste management infrastructure availability within Wales.

11.7.18 The total amount of waste estimated to be generated during the two years of construction is between 4,284.8 and 8,284 tonnes. The estimated quantity of generated waste is approximately between 0.63 and 1.21 % of the national construction and demolition waste target for Wales by 2018. On a national scale, this is not considered to be significant.

11.7.19 The magnitude of effect on the national waste management infrastructure is considered to be **minor adverse**, as the intention for the project is to maximise re-use and recycling, thereby limiting the amount of waste to landfill to that which is unable to be dealt with in any other way.

11.7.20 The significance of effect of waste generation associated with the project on the national waste management infrastructure is considered to be **slight adverse**.

11.7.21 The overall significance of effects on the off-site waste management infrastructure is considered to be **slight adverse**.

Effect on the Local Road Network

11.7.22 The import and export of construction materials will result in additional traffic. The existing A487 is lightly trafficked and is

regularly used by HGVs to transport materials to and from the industrial and commercial developments in the local area and other areas in Mid-Wales. There are just three routes leading to the Scheme area and there is no alternative route option to reaching the area from the north or through the town of Machynlleth.

11.7.23 The effect of vehicle movements associated with construction has been considered in terms of

- the importing/exporting of construction materials; and
- the movement of materials for off-site disposal to a waste management facility.

11.7.24 As set out in Chapter 6 Air Quality, the Scheme will not trigger the DMRB HA207/07 criteria for HGV traffic of more than 200 additional HGV movements per day. In addition, the vehicle movements associated with the Scheme will be spread over the construction period and given the lightly trafficked nature of the local roads and relatively small volumes of material to be imported and exported, it is considered that the increase will be absorbed by the highway network.

11.7.25 Materials would be imported from local suppliers where possible and the Contractor would aim to ensure that transportation distances are modest where possible. The receptors anticipated to be affected by the movement of materials to site would be local road users on the local road network.

11.7.26 Traffic management measures will be implemented during the proposed works. This will include single lane movement of traffic, speed restrictions and potential closures. These measures, in addition to the increase in construction vehicles, will have an effect on the road users and the network.

11.7.27 The sensitivity of the receptors (local road network and local public road users) is considered **low**. Given the potential disruption to traffic that may occur the magnitude of effect is considered to be **minor adverse**. The significance of effect from the transportation of materials is therefore assessed as **slight adverse**.

11.7.28 The movement of materials for off-site disposal to a waste management facility could have potential effects on the local road users on a local and potentially regional scale. The sensitivity of the receptors (local road network and local public road users) is considered **low**. Given the low number of additional HGV movements that are likely to be required to dispose of the unsuitable materials off site, these are not considered to have a significant effect on the local road network and thus the magnitude of effect is considered **minor adverse**. The

significance of effect from disposal of unsuitable materials is therefore assessed to be **neutral / slight adverse**.

Effect on the Global Climate System

11.7.29 A full carbon assessment will be carried out at detailed design stage which will allow for a thorough assessment of the effect of the Scheme on the global climate system. The preliminary assessment of effect on the global climate system has been undertaken using the results of the preliminary carbon assessment, set out in the Carbon Report (Volume 3 Appendix 11.2). The sensitivity of the global climate system is considered to be **very high** based on the IPPC's assessment of the effect of continued global emissions.

11.7.30 The carbon emissions associated with the construction stage of the Scheme is 12,116 tCO2e. This equates to approximately 0.02% of the total annual Welsh carbon emissions for 2 years. The magnitude of effect on the global climate system during construction is therefore considered to be **negligible adverse** and the significance of effect is considered to be **slight adverse.**

11.7.31 Table 11.8 provides a summary of the assessment of the construction effects on each receptor before mitigation.

Table 11.8: A Summary of the Assessment of Construction Effects on each Receptor – Before Mitigation

Receptor	Sensitivity of Feature Receptor	Magnitude of Effect pre-Mitigation	Significance of Effect pre-Mitigation
Primary material sources (on-site)	Low	Moderate adverse	Slight adverse
Imported material sources (off-site)	Low	Moderate adverse	Slight adverse
Waste and materials management infrastructure (on-site)	Low	Negligible adverse	Neutral or slight adverse
Waste and materials management infrastructure (off-site)	Medium	Minor adverse	Slight adverse
Local road network	Low	Minor adverse	Neutral or slight adverse
Global climate system	Very high	Negligible adverse	Slight adverse

11.8 Potential Operational Effects - Before Mitigation

11.8.1 The Scheme has limited potential to generate effects during the operational and maintenance phase as there are minimal requirements to import or export surplus materials and waste.

11.8.2 All permanent highway structures are required to have a life cycle of 120 years. The maintenance regime during this time period is likely to consist of:

- Resurfacing of the bridge every 25 years;
- Replacement of parapets, expansion joints and bearings every 50 years; and
- Waterproofing spray every 50 years;
- Removal of material from petrol interceptors, ditches, gully pots; and
- Thinning of landscape planting.

11.8.3 At this stage the type, source and quantity of materials to be used for the maintenance regime is not known, however it is likely that the materials will be as locally sourced as possible which will minimise any effect. The types and quantities of materials likely to be required during operation are listed in Table 11.9. Due to the limited quantity of materials, the magnitude of effect on material sources is considered to be **negligible** and the significance of effect is considered to be **neutral**.

Table 11.9: Types and quantities of materials

Project Activity	Materials required	Quantities of materials	Additional information on materials
Operation and maintenance of asset	Expansion joints replacement	26.8m length	To be replaced every 50 years
	Parapet replacement	1.5km length	To be replaced every 50 years
	Resurfacing material	To cover an area of 1,075 m^3	To be replaced every 25 years
	Waterproofing spray	To cover an area of 9,550 m^2	To be replaced every 50 years
	Bearing replacement	50	To be replaced every 50 years

11.8.4 Quantities of the waste that are likely to arise during the operation and maintenance regime have been estimated and listed in Table 11.10.

Table 11.10: Types and quantities of waste arisings

Project Activity	Waste arisings from the project	Quantities of waste arisings	Additional information on waste arisings
Operation and maintenance of asset	Replaced bearings	100	Removed every 50 years; metal to be recycled off site if appropriate.
	Replaced expansion joints	26.8 m length	Removed every 50 years; steel to be recycled off site.
	Replaced parapets	1.1 km length	Removed every 50 years; metal to be recycled off site if appropriate.
	Resurfacing material	To cover an area of 767 m^3	Resurfaced every 25 years.
	Waterproofing spray	Unknown quantities.	Spray every 50 years.
	Material from petrol interceptors, ditches, gully pots	Unknown quantities.	Removal undertaken by network operators, North and Mid-Wales Trunk Roads Agency, and would therefore fall under their waste management plan.
	Green waste associated with thinning of landscape planting	Unknown quantities.	Thinning undertaken by network operators, North and Mid-Wales Trunk Roads Agency, and would therefore fall under their waste management plan.

Effect on the Waste and Materials Management Infrastructure (off-site)

Local Waste Management Infrastructure

11.8.5 It is considered that the generation of waste during the operation and maintenance regime would not have a significant effect on the local waste management infrastructure. The sensitivity of the receptor is considered to be **medium**.

11.8.6 The waste arisings listed in Table 11.10 will be recycled or re-used where possible. The magnitude of effect on the regional capacity due to the limited and infrequent amount of materials that will be required during this phase is considered to be **negligible**. The significance of effect is therefore considered to be **neutral** or **slight adverse**.

Regional Waste Management Infrastructure

11.8.7 The sensitivity of the regional waste management infrastructure is considered to be **low**. As the quantities of material to be

produced during the operation phase are relatively small, and recycling and re-use will be maximised where possible, the magnitude of effect on the regional waste management infrastructure is considered to be **negligible**. The significance of effect from operation and maintenance is therefore considered to be **neutral** or **slight adverse**.

National Waste Management Infrastructure

11.8.8 The sensitivity of the national waste management infrastructure is considered to be **low**. As the quantities of material to be produced during the operation phase are small, and recycling and re-use will be maximised where possible, the magnitude of effect on the national waste management infrastructure is considered to be **negligible**. The significance of effect from operation and maintenance is therefore considered to be **neutral** or **slight adverse**.

11.8.9 The overall significance of effects on the off-site waste management infrastructure is considered to be **neutral** or **slight adverse**.

Effect on the Local Road Network

11.8.10 It is anticipated that the transportation of material resources and waste arisings throughout the operation and maintenance regime would not have a significant effect on the local road network and local public road users. The sensitivity of the receptors (local road network and local public road users) is considered **low**. The magnitude of effect of the low and infrequent number of additional HGV movements that would likely to be required is considered to be **negligible adverse**. The significance of effect on the local road network from operation and maintenance is therefore **neutral or slight adverse**.

Effect on the Global Climate System

11.8.11 The sensitivity of the global climate system is considered to be **very high.** The magnitude of effect during the operation of the Scheme is considered to be **slight or negligible adverse** due to the minimal amounts of material which will be required and the limited potential for waste arisings.

11.8.12 The significance of effect on the global climate system throughout operation and maintenance is therefore considered to be **neutral or slight adverse**.

11.8.13 The assessment of effects on the global climate system will be updated following the carbon assessment at a detailed design stage.

Table 11.11 provides a summary of the assessment of operational effects on each receptor prior to mitigation.

Table 11.11: A Summary of the Assessment of Operation Effects on each Receptor – Before Mitigation

Receptor	Sensitivity of Feature Receptor	Magnitude of Effect pre-Mitigation	Significance of Effect pre-Mitigation
Material sources (off-site)	Low	Negligible adverse	Neutral / slight adverse
Waste and materials management infrastructure (off-site)	Medium	Negligible adverse	Neutral / slight adverse
Local road network	Low	Negligible adverse	Neutral / slight adverse
Global climate system	Very high	Negligible adverse	Neutral / slight adverse

11.9 Mitigation and Monitoring

11.9.1 This section details the measures proposed to mitigate the potential effects. Mitigation measures would be implemented in order to mitigate the potential environmental effects associated with the material resources and the waste arisings.

11.9.2 Procedures would be adopted by the Contractor prior to construction to control the use of materials and further reduce the effect. This will be documented in the SWMP for the Scheme which would form part of the CEMP. The SWMP will detail the estimated quantities of waste material and the opportunities for reuse, recycling, recovery or disposal.

11.9.3 A pre-CEMP, including draft SWMP and draft Invasive Species Management Plan, is included in Volume 3 Appendix 17.1.

11.9.4 The assessment of any environmental effects associated with material resource use and waste during any future maintenance, renewal, or improvement works, will be reported by the Managing Agent Contractor (or equivalent) in accordance with the requirements of the Overseeing Organisation (Welsh Government).

11.9.5 Materials would be responsibly sourced (i.e. must have a certified provenance, traceability and sustainability) where possible, in order to reduce the effect on the highways network and material resources. Responsible sourcing is defined in BS8902 – Responsible sourcing sector certification schemes for construction projects – Specification as:

"*the management of sustainable development in the provision or procurement of a product*"

Where sustainable development is further defined as:

"*an enduring, balanced approach to economic activity, environmental responsibility and social progress*".

11.9.6 In order to comply with responsible sourcing principles, the Contractor would, for example:

- Refer to standard BES 6001 - The Responsible Sourcing of Construction Products; and
- Ensure suppliers are certified by the Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC).

Construction Mitigation

11.9.7 Where possible, site won materials will be reused in construction, if assessed as being suitable for re-use without causing other environmental effects. A specification for suitable material to be used in construction is to be developed, in accordance with the Specification for Highway Works, and testing undertaken during construction to confirm that the materials meet the specification requirements which would be developed in line with the CL:AIRE Code of Practice [7]. Any material that does not meet this specification will be disposed of at a suitable landfill site.

11.9.8 It is intended to re-use as much surplus soil as possible. There are large areas of land take required for access/laydown areas and all of these areas will have to be reinstated. The soil will be stored outside of the flood plain for re-use. Chapter 8 Landscape and Visual of this Environmental Statement provides further information on the replacement of topsoil and Chapter 9 Nature Conservation considers the resilience of ecosystems.

11.9.9 Topsoil will arise through the strip for the permanent access/haul road across the floodplain. The topsoil strip for the construction of the flood bunds will be reused on the bund side slopes and the topsoil strip from under the embankments will be re-used on the batters and in the landscape areas where the soil can be thickened to "lose" any surplus. Similarly the topsoil from the cutting north of the river and around the north abutment will be used in the landscape areas and on the batter slopes

11.9.10 Following the above measures, if a surplus of soil still exists, it may be possible to dispose of this on adjacent farm land (by local agreement) and in any other landscape areas.

11.9.11 It is necessary to remove some unsuitable and excess materials from site. To limit the quantities that are sent to landfill, the materials will be sorted/processed and, where necessary, treated and the materials disposed of or reused as appropriate for the

[7] The Definition of Waste: Development Industry Code of Practice, CL:AIRE, March 2011

particular waste stream. The pre-treatment of waste material prior to disposal is a requirement of the Waste Regulations. By minimising the quantity of materials to be disposed of offsite, the associated HGV movements will be minimised.

11.9.12 Due to the relatively simple nature of the construction processes involved, the small number of different types of potential surplus materials and relatively small quantities, preparation and use of a SWMP is likely to be an effective approach to the mitigation of potential effects.

11.9.13 Details on pollution prevention measures are outlined in Volume 3 Appendix 17.1 pre-CEMP and supporting annexes, in particular Annex D Outline Pollution Prevention Plan, Annex F Outline Ground and Surface Water Management Plan and Annex G Outline Material Management Plan.

11.9.14 Site clearance may involve the removal and/or treatment of invasive non-native species (INNS). An Invasive Species Management Plan will be produced as part of the CEMP. A draft Invasive Species Management Plan (Appendix 17.1, Annex C) has been produced which will be expanded and agreed with relevant stakeholders during the detailed design phase prior to construction. As noted in Chapter 9 (Nature Conservation), Japanese knotweed and Indian balsam is widespread along the course of the Afon Dyfi.

11.9.15 The areas of invasive species which have been identified during the surveys will be treated in accordance with all relevant guidance available including guidance published by the Environment Agency such as the Knotweed Code of Practice (Environment Agency, 2006).

11.9.16 Some of the soil contaminated with invasive plant material may need to be removed for construction. The intention is to manage the material on site through the creation of bunds. This will be confirmed, and a location identified, in the SWMP at detailed design stage.

11.9.17 Where the invasive plant material cannot be dealt with on-site, removal from the site can be done via various methods, which include the following, the appropriateness of which will be considered at the detailed design stage:

1. Transport the Japanese knotweed to landfill by excavating a 7m wide/ 2m depth buffer around each stand. The removal needs to be done under an environmental watching brief and the vegetation and spoil needs to be treated as ‘controlled waste’ and as such must be disposed of safely at a licensed landfill site (the nearest available site is in Merthyr Tydfil).
2. If this area of land is not to be developed for a year or longer herbicide treatment can be undertaken. When the majority of

shoots reach 75-100cm tall they are ready to receive herbicide applications. Glyphosate is the only herbicide used to eradicate Japanese knotweed. (It is noted that this may not be appropriate option for the Scheme due to programme constraints).

3. If this land is to be developed sooner and/or the landfill option is not practical, the Japanese knotweed area should be contained and isolated for disturbance after the initial herbicide treatment.

4. To prevent knotweed stands growing back and/or spreading a root barrier membrane could be installed to a depth of 2m. Root barriers are typically made of heavy gauge polythene and cushioned on both sides to prevent puncturing when installing the membrane.

11.9.18 It should be noted, that depending on the treatment method and size of the stand, it can take up to three growing seasons (three years) to eradicate the species. In practice it may take considerably longer for complete eradication.

11.9.19 For any remaining Japanese Knotweed, works should not be, conducted within 7m of the stands in order to avoid the potential spread of the rhizomes (plants root system). If work is required within 7m of the stands, measures will be employed to avoid the spreading of contaminated material.

11.9.20 The Invasive Species Management Plan will set out disposal locations for Japanese knotweed at detailed design stage.

11.9.21 Measures to reduce carbon emissions have been incorporated into Appendix C of the Carbon Report. The Carbon Briefing Note provides advice to the contractor on how carbon can be reduced, for example through making the most of in-situ materials and through selecting reused or higher recycled content materials offering lower carbon intensities. The Contractor is obliged to actively manage and reduce the carbon footprint where possible, as set out in the Works Information Contract.

Operational Mitigation

11.9.22 The effect of the material resources and waste arisings during the operational phase of the Scheme is not known at this stage, but is likely to be minimal. Disposal of waste will be limited and the Managing Agents' SWMP will measure and monitor the quantities and area for disposal.

11.9.23 Table 11.12 describes the mitigation measures likely to be implemented for each stage of the Scheme.

Table 11.12: Summary of mitigation measures.

Project Activity	Potential effects associated with material resource use/ waste management	Description of mitigation measures (where practicable)	How the measures will be implemented, measured and monitored
Design	Carbon Emissions	Using less new materials Efficient design Change the specification of elements Design for less waste on site Design for off-site construction to benefit from lower wastage and efficient fabrication Using alternative materials Select materials with lower carbon intensities Select reused or higher recycled content products and materials offering lower carbon intensities Select materials with lower transport-related carbon emissions Select materials with high levels of durability and low through-life maintenance Designing and implementing energy efficient equipment Select most energy efficient and economically viable equipment available	Carbon Calculation and Carbon Accounting Mechanism, See Appendix 11.2 Volume 3 for further details.
Site preparation / remediation	Waste disposal	Identify opportunities for reuse, recycle, recover.	Materials to be sorted and, where practical, disposed of at recycling facilities. SWMP to implement, measure and monitor. Invasive Species Management Plan to implement, measure and monitor.

Project Activity	Potential effects associated with material resource use/ waste management	Description of mitigation measures (where practicable)	How the measures will be implemented, measured and monitored
Earthworks	Use of primary resources Waste disposal	Reuse of materials in earthworks. Limit disposal and movements.	Design to maximise the earthworks balance. SWMP to implement, measure and monitor.
Demolition	Waste disposal	Identify opportunities for reuse, recycle and recover.	Materials to be sorted and, where practical, disposed of at recycling facilities. SWMP to implement, measure and monitor.
Site construction	Use of resources Waste disposal	Identify opportunities for reuse, recycle and recover.	Materials to be locally and responsibly sourced where practical. Materials to be sorted and, where practical, disposed of at recycling facilities. SWMP to implement, measure and monitor.
Operation and maintenance of asset	Waste disposal	Limit disposal where possible.	Managing agents' SWMP to implement, measure and monitor.

11.10 Construction Effects - With Mitigation

11.10.1 It is considered that, by application of standard good construction practice and implementation of the mitigation measures outlined above, the potential effects identified would be either significantly reduced or neutralised.

11.10.2 As summarised in Table 11.13, the remaining residual effects during the construction phases following mitigation are considered to be **neutral/slight adverse.**

Table 11.13: Significance of the Construction Effects before and after mitigation

Receptor	Significance of Effect pre-Mitigation	Significance of Effect with Mitigation
Primary material sources (on-site)	Slight adverse	Neutral / slight adverse
Imported material sources (off-site)	Slight adverse	Slight adverse
Waste and materials management infrastructure (on-site)	Neutral or slight adverse	Neutral / slight adverse
Waste and materials management infrastructure (off-site)	Slight adverse	Neutral / slight adverse
Local road network	Neutral or slight adverse	Neutral / slight adverse
Global climate system	Slight adverse	Slight adverse

11.11 Operational Effects - With Mitigation

11.11.1 The Scheme has limited potential to generate effects during the operational and maintenance phase. With the proposed mitigation procedures in place, the significance of effects will

Table 11.14: Significance of the Operational Effects before and after mitigation

Receptor	Significance of Effect pre-Mitigation	Significance of Effect with Mitigation
Imported material sources (off-site)	Neutral / slight adverse	Neutral / slight adverse
Waste and materials management infrastructure (off-site)	Neutral / slight adverse	Neutral / slight adverse
Local road network	Neutral / slight adverse	Neutral / slight adverse
Global climate system	Neutral / slight adverse	Neutral / slight adverse

11.12 Assessment of Cumulative Effects

11.12.1 No other developments have been identified which could generate cumulative effects with the Scheme during the construction or operation phase in respect of this chapter.

11.13 Inter-relationships

11.13.1 The use of material resources for construction of the Scheme together with the management of waste may also give rise to other effects, including detrimental effects on air quality, water quality, nature conservation, landscape and noise. The effects upon these receptors, as a result of the Scheme's construction, are considered with the relevant sections of the ES: Air Quality (Chapter 6), Landscape (Chapter 8), Nature Conservation (Chapter 9), Geology and Soils (Chapter 10), Noise (Chapter 12) and Water Quality (Chapter 15).

11.14 Summary

11.14.1 This Chapter has considered the potential environmental effects associated with the material resources and waste arisings for the Scheme, following IAN 153/11 guidelines for a Simple Assessment.

11.14.2 The likely significance of environmental effects from the use of material resources, and the generation and management of waste, resulting from the construction and operation of the Scheme are summarised in Table 11.14. The assessment has shown that the significance of environmental effects with mitigation in place is generally neutral. It is concluded that the use of material resources in the construction of the Scheme would not result in any significant adverse environmental effects.

11.14.3 Based on the outcomes of the Simple Assessment, it is considered that a Detailed Assessment is not necessary for the Scheme.

Table 11.15: A Summary of the Significance of Effects on the Receptors during Construction and Operation of the Proposed Scheme with Mitigation

Receptor	**Significance of Project Effects**	
	During Construction	**During Operation**
Primary material sources (on-site)	Neutral / slight adverse	n/a
Imported material sources (off-site)	Slight adverse	Neutral / slight adverse
Waste and materials management infrastructure (on-site)	Neutral / slight adverse	n/a
Waste and materials management infrastructure (off-site)	Neutral / slight adverse	Neutral / slight adverse
Local road network	Neutral / slight adverse	Neutral
Global Climate System	Neutral / slight adverse	Neutral / slight adverse