7 Biodiversity

7.1 Introduction

7.1.1 This chapter of the ES assesses the likely significant effects of the proposed development on the ecological resources within the site and surrounding vicinity. The assessment has been carried out in accordance with guidance set out in the Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (Chartered Institute of Ecology and Environmental Management's (CIEEM), 2019) ('the CIEEM Guidelines')[1].

7.1.2 A full description of the proposed development is given in Chapter 3: Project description but in summary: the Welsh Government is proposing to develop a rail testing, maintenance, research, development and storage facility, known as the Global Centre of Rail Excellence (GCRE). The project 'red line' boundary considered in this assessment is shown in Figure 7.1. and is hereafter referred to as the 'Site'.

7.1.3 This Chapter documents survey work undertaken in relation to habitats and species in addition to reporting the value of receptors and assessing the effects arising from the site construction (and associated enabling works such as vegetation clearance), and the operation of the proposed development. This Chapter also documents measures to mitigate and compensate these effects. Enhancement measures, which go beyond mitigating effects, are also identified. The residual effects following the inclusion of these measures are then assessed. Decommissioning has been scoped out of the Project's EIA, since it is anticipated that the proposed development would remain in perpetuity, and therefore will not be considered in this Chapter of the ES.

7.1.4 This Chapter has been informed by the baseline ecology survey data, reports and associated drawings included in Appendices C-P, Volume 2, in addition to existing ecology reports produced in association with Celtic Energy's 2011 ES. Ecology surveys were completed between November 2018 and November 2019.

7.2 Review of the Proposed Development

7.2.1 The following are considered key issues that will be considered in detail within the ecology chapter of the ES:

- The presence of statutory and non-statutory designated sites, which could be indirectly affected during construction and on completion.

[1] CIEEM (2019) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, Version 1.1. Chartered Institute of Ecology and Environmental Management.

- The presence of notable habitats[2] within the Site, which could be directly and or indirectly affected during construction and operation including from disturbance, degradation, fragmentation and loss.
- The presence of protected and or notable species, which could be directly and or indirectly affected during construction and operation including from harm, mortality, disturbance, habitat loss / degradation and fragmentation / physical barriers to species movements.

7.2.2 As detailed in Section 2.7 of this ES, the baseline will consider the Nant Helen Complementary Restoration Earthworks (in accordance with the planning application reference no. 20/0738/FUL), which facilitates a suitable landform for GCRE and the restoration works (in accordance with the planning application (reference no. 19/1899/REM, which amends a 2011 application that were initially approved to extend the coal working area of the site).

7.3 Legislation, policy context and guidance

Legislation

7.3.1 A framework of international, European, national and local legislation and planning policy guidance exists to protect and conserve wildlife and habitats. This is described in the following sections.

Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019

7.3.2 The Conservation of Habitats and Species Regulations (Amendment) (Eu Exit) Regulations 2019 (the 'Habitats Regulations') transpose the requirements of Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) into law within England and Wales. These regulations provide for the designation and protection of sites of European importance know as European Sites or the National Site Network.

7.3.3 European Sites comprise:

[2] 'Notable' species and habitats considered in this report include species and habitats of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales listed in response to the requirements of Section 7 of the Environment (Wales) Act 2016, in addition to any species considered to be of significance for nature conservation such species listed in red data books, the Royal Society for the Protection of Birds (RSPB) 'Birds of Conservation Concern' lists and or Local Biodiversity Action Plans (LBAPs).

1. Special Areas of Conservation (SACs), including candidate sites, designated under the Conservation of Habitats and Species (Amendment) (Eu Exit) Regulations 2019[3].
2. Special Protection Areas (SPAs) including candidate sites, designated under the Wildlife and Countryside Act 1981 (as amended)[4].
3. Ramsar Sites designated under the Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 are also considered as European Sites as a matter of UK Government policy along with proposed SACs and SPAs.

7.3.4 The Habitats Regulations require that consideration is given to the implications of plans and projects (developments) on European Sites. Specifically Regulation 63(1) states:

1. "A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which:

(a) is likely to have a significant effect on a European site or European marine site (either alone or in combination with other plans or projects), and;

7.3.5 (b) is not directly connected with or necessary to the management of that site.

2. must make an appropriate assessment of the implications for that site in view of that site's conservation objectives".

7.3.6 The formal consideration of effects on European Sites is therefore undertaken by the determining authority such as the Local Planning Authority under the Town and Country Planning Act 1990. The determining authority is known as the Competent Authority with the Regulations.

7.3.7 The Habitats Regulations also convey special protection to a number of species, which are listed in Schedule 2 of the Regulations and are referred to as European Protected Species (EPS). Those relevant to the Scheme include:

1. All UK resident bat species;
2. Common dormouse (*Muscardinus avellanarius*);
3. Great crested newt (*Triturus cristatus*);
4. Otter (*Lutra lutra*);

[3] The Habitats Regulations transposes the requirements on Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora in to UK law.
[4] The Wildlife and Countryside Act 1981 transposes the requirements of Directive 79/409/EEC on the Conservation of Wilde Birds (Birds Directive) in to UK law. The Birds Directive has been updated through Directive 2009/147/EC on the Conservation of Wild Birds.

5. Marsh fritillary butterfly (*Euphydryas aurinia*).

7.3.8 Regulation 43 makes it an offence to:

1. Deliberately capture, injure or kill any wild animal of a EPS;
2. Deliberately disturb wild animals of such a species;
3. Deliberately take or destroy the eggs of such a species;
4. Damage or destroy a breeding site or resting place of such an animal.

7.3.9 Disturbance in the context of the offences above is disturbance, which is likely to impair the ability of the animals to survive, to breed or reproduce, to nurture their young, to hibernate, to migrate; or to affect significantly the local distribution of the species.

7.3.10 Licences can be granted by the relevant Statutory Nature Conservation Organisation (SNCO) for developments (sometime referred to as EPS Licences or Derogation Licences) providing the purposes of the licence is for "preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment".

Ramsar Convention 1971

7.3.11 Wetlands of International Importance (Ramsar Sites) declared under the Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 are considered European Sites as a matter of UK and Local Government Policy.

Wildlife and Countryside Act 1981 (as amended)

7.3.12 A network of nationally designated sites has been established through the designation of Sites of Special Scientific Interest (SSSIs) under the Wildlife and Countryside Act 1981. The protection afforded by the Act means it is an offence to carry out or permit to be carried out any operation listed within the notification without the consent of the Statutory Nature Conservation Organisation (Natural Resources Wales). The protection afforded to SSSIs is used to underpin the designation of areas at a European Level.

7.3.13 The Wildlife and Countryside Act also places obligations on Welsh Ministers and other public bodies with regard to the conserving and enhancing of the features of SSSIs in the exercise of their functions.

7.3.14 The Wildlife and Countryside Act 1981 provides protection to both EPSs and other species including wild birds, water voles and reptiles.

7.3.15 All wild birds, their nests and eggs are protected, with some rare species afforded extra protection from disturbance during the breeding season (these species are listed in Schedule 1 of the Act). It is illegal to take any wild bird or damage or destroy the nests and eggs of

breeding birds. There are certain exceptions to this in respect of wildfowl, game birds and certain species that may cause damage.

7.3.16 In England and Wales water voles are listed on Schedule 5 of the Wildlife and Countryside Act 1981, receiving full protection since 2008. The Wildlife and Countryside Act 1981 together with amending legislation, lists the following offences:

1. Intentionally killing, injuring or taking a water vole by any method.
2. Intentionally or recklessly damaging or destroying a water vole place of shelter or protection.
3. Intentionally or recklessly damaging disturbing a water vole whilst it is occupying such a structure or place it uses for shelter or protection.
4. Intentionally or recklessly obstructing access to a water vole's place of shelter or protection.
5. Selling, offering for sale, or possessing or transporting for the purposes of sale, any live or dead water vole, or any part or derivative, or advertising any of these for buying or selling.

7.3.17 All native reptile species in the UK are subject to partial protection from intentional or reckless killing or injury only.

7.3.18 The Act also includes provisions for the control of invasive non-native species (INNS). Under these provisions it is an offence to:

1. Release or allow to escape into the wild any animal which is not ordinarily resident or a regular visitor to Great Britain, or is included in Schedule 9 of the Act.
2. Plant or otherwise cause to grow in the wild any plant which is included in Schedule 9 of the Act.

7.3.19 People undertaking works in proximity to invasive non-native plant species should take all reasonable steps and exercise all due diligence to avoid committing an offence.

The Invasive Alien Species (Enforcement and Permitting) Order 2019

7.3.20 The order came into effect on the 1st December 2019 to allow for enforcement of EU Regulations (Regulation (EU) No. 1143/2014 on the prevention and management of the introduction and spread of invasive alien species in England and Wales) also known as the IAS Regulations.

7.3.21 It lists 66 species which are of European Union concern. There are currently 19 species listed in the Order (16 of these species are found in Wales). Species include:

- Chinese mitten crab (*Eriocheir sinensis*)

- Red Swamp crayfish (*Procambarus clarkii*)
- Crayfish signal (*Pacifastacus leniusculus*)
- Spiny cheek crayfish (*Orconectes limosus*)
- Muntjac deer (*Muntiacus reevesi)*
- Ruddy duck (*Oxyura jamaicensis)*
- Egyptian goose (*Alopochen aegyptiacus*)
- Grey squirrel (*Sciurus carolinensis*)
- Himalayan balsam (*Impatiens glandulifera)*
- Fanwort (otherwise known as Carolina water shield) (*Cabomba caroliniana*)
- Giant hogweed (*Heracleum mantegazzianum*)
- Water hyacinth (*Eichhornia crassipes*)
- Parrots Feather (*Myriophyllum aquaticum*)
- Floating pennywort (*Hydrocotyle ranunculoides*)
- Floating water primrose (*Ludwigia peploides*)
- Water Primrose (*Ludwigia grandiflora*)
- Giant rhubarb (*Gunnera tinctoria*)
- Curly waterweed (*Lagarosiphon major*)
- Nuttall's waterweed (*Elodea nuttallii*)

7.3.22 This Order allows for the enforcement of, including the relevant licences, permits and rules for keeping invasive alien species.

7.3.23 The amendments remove these Invasive Alien Species (IAS) of Union concern from the ambit of the provisions relating to invasive non-native species in sections 14 and 14ZA of the Wildlife and Countryside Act 1981. This is to make the legislation more transparent and easier to use by bringing all the offences relating to species of Union concern into one place.

7.3.24 Criminal offences are introduced for breaches of the main restrictions of The IAS Regulation, as well as offences relating to:

- False statements;
- Altering, or not meeting, the conditions of permits and licences;
- Attempts to commit offences;

- Obstruction; and
- Offences for companies and partnerships.

7.3.25 It is also an offence to:

- Allow the escape or release into the wild an animal that is not normally a resident or regular visitor to Great Britain, or an animal listed in Part 1 of Schedule 2, including species of crabs, ducks and squirrel.
- Plant, or allow to grow in the wild, plants listed in Part 2 of Schedule 2.
- Sell, or be involved in the sale of, any plant listed in Part 3 of Schedule 2, including Water Primrose and Floating Pennywort.

7.3.26 If found guilty of an offence a person may be liable to imprisonment of up to two years, or a fine. Permits and licences may be made void where an offence is committed and a person may be banned from being granted a permit or licences again for up to 5 years.

7.3.27 The legislation in relation to the remaining species listed in Schedule 9 of the Wildlife and Countryside Act 1981 remains unchanged.

National Park and Access to the Countryside Act 1949 (as amended)

7.3.28 Local Nature Reserves (LNRs) can be given protection against damaging operations through powers within the National Parks and Access to the Countryside Act 1949. However, this protection is usually conveyed through inclusion of protection within local planning policy relating to these sites and other non-statutory sites such as Sites of Importance for Nature Conservation.

The Protection of Badgers Act 1992

7.3.29 Badger (*Meles meles)* and their setts are protected under the Protection of Badgers Act 1992 which makes it an offence to kill, injure or take a badger, or interfere with a sett.

7.3.30 Interference with a sett includes damaging or destroying it, obstructing access to it, causing a dog to enter it, or disturbing the badgers which are occupying it.

Hedgerow Regulations 1997

7.3.31 The Hedgerow Regulations 1997 set out a framework for the protection of hedgerows against removal where they are deemed to be important either due to their age, ecological or archaeological features. Approval is required from the local authority prior to the removal of hedgerows. Local authorities can enforce the retention of Important Hedgerows through the issuing of Retention Notices.

Salmon and Freshwater Fisheries Act 1975 (as amended)

7.3.32 The Salmon and Freshwater Fisheries Act (SAFFA) is legislation that aims to protect freshwater fish, with a particularly strong focus on salmon and trout. The legislation covers a broad range of topics, but of particular relevance to development are those sections covering water pollution, habitat disturbance and fish migration routes.

7.3.33 Under Section 2 (4) it is an offence to wilfully disturb spawn, spawning fish or spawning areas and under Section 4 (1) it is an offence to knowingly permit the flow of poisonous matter and polluting effluents into river courses that are poisonous or injurious to fish or the spawning grounds, spawn or food of fish.

7.3.34 Sections 9 to 15 are concerned with fish passage and migration routes. It is the duty of the waterway owner that when constructing dams, screens or sluices to provide and maintain a facilitating fish pass for migrating salmon or trout. Section 9 allows the regulator to serve notice on the owner or occupier of a dam or obstruction, to install a fish pass where necessary. This section applies to dams which are either new or have been altered to create an increased obstacle to the passage of migratory salmonids. It is also applicable where dams in a state of disrepair have been rebuilt over at least one half of their length.

Eels (England and Wales) Regulations 2009

7.3.35 This implements Council Regulation (EC) No 1100/2007 of 18 September 2007 establishing measures for the recovery of the stock of European eel. The regulations are focussed on the management of commercial eel fisheries (licences, catch returns and restocking) and the passage/migration of eels. The regulations afford powers to the regulators (Environment Agency and Natural Resources Wales) to implement eel recovery measures in all freshwater and estuarine waters in England and Wales.

7.3.36 Part 4 of the regulations is concerned with the passage of eels and makes it a legal requirement to notify the regulator of the construction, alteration or maintenance of any structure likely to affect the passage of eels. This include water intakes and outfalls, dams and weirs, sluices or any other in-river obstruction. Where any such structure exists, the owner, occupier or person in charge of the land on which the dam, structure or obstruction lies may be required to construct and operate an eel pass to allow the free passage of eels.

Wild Mammals (Protection) Act 1996

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

Natural Environment and Rural Communities (NERC) Act 2006

7.3.38 The Act is primarily intended to implement key aspects of the Government's Rural Strategy published in July 2004; it also addresses a wider range of issues relating broadly to the natural environment. The Act also makes provision in respect of biodiversity, pesticides harmful to wildlife and the protection of birds, and in respect of invasive non-native species. It alters enforcement powers in connection with wildlife protection and extends time limits for prosecuting certain wildlife offences. It addresses a small number of gaps and uncertainties which have been identified in relation to the law on sites of special scientific interest. It also amends the functions and constitution of National Park authorities, the functions of the Broads Authority and the law on rights of way (DEFRA website September 2016).

The Environment (Wales) Act 2016

7.3.39 The Environment (Wales) Act 2016 replaces the duties on public bodies in Wales to conserve and enhance biodiversity in the exercise of their functions. This duty includes consideration of the resilience of ecosystems in terms of their diversity, connectivity, adaptability, scale and condition. The Act also reinforces the duties in relation to the lists of species and habitats of importance and duties to conserve and enhance those species and habitats. Within this Chapter these are referred to as Section 7 Habitats and Species, although revised lists have not been published to date.

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

7.3.40 The Well-being of Future Generations Act requires public bodies in Wales to consider the long-term impacts of decisions on the social, cultural, environmental and economic well-being of both current and future generations.

7.3.41 In particular the Act includes a number of goals including to maintain and enhance a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change.

EIA Directive 2014/52/EU

7.3.42 The Directive 2014/52/EU states that EIAs shall identify, describe and assess the direct and indirect significant effects of climate change relevant to the project. The regulations implementing this directive were transposed into UK legislation in May 2017; The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations, 2107.

Policy Context

7.3.43 The Neath Port Talbot County Borough Council (NPTCBC) Adopted Local Development Plan (LDP) 2011-2026 includes a number of policies relating to nature conservation, in particular:

7.3.44 Policy EN 6 Important Biodiversity and Geodiversity Sites Development proposals that would affect Regionally Important Geodiversity Sites (RIGS), Local Nature Reserves (LNRs), Sites of Interest for Nature Conservation (SINCs), sites meeting SINC criteria or sites supporting Local Biodiversity Action Plan (LBAP) or S42 habitats or species (now referred to as Section 7 habitats and species, in response to the requirement of the Environment (Wales) Act 2016) will only be permitted where:

1. They conserve and where possible enhance the natural heritage importance of the site; or
2. The development could not reasonably be located elsewhere, and the benefits of the development outweigh the natural heritage importance of the site.

7.3.45 Mitigation and / or compensation measures will need to be agreed where adverse effects are unavoidable.

7.3.46 5.3.34. “Where harm to biodiversity sites is unavoidable, effective mitigation measures will be required to ensure that there is no reduction in the overall value of the area or feature. Where mitigation is not possible, compensation measures will normally be required to offset harm as far as practicable. However, compensation measures are considered to be a last resort option”.

7.3.47 5.3.35. “The Biodiversity Supplementary Planning Guidance (SPG) will indicate how biodiversity should be taken into account in the planning process and will also give details of the procedure for providing off-site compensation if necessary.”

7.3.48 Policy EN 7 Important Natural Features: “Development proposals that would adversely affect ecologically or visually important natural features such as trees, woodlands, hedgerows / field boundaries, watercourses or ponds will only be permitted where:

1. Full account has been taken of the relevant features in the design of the development, with measures put in place to ensure that they are retained and protected wherever possible; or
2. The biodiversity value and role of the relevant feature has been taken into account and where removal is unavoidable, mitigation measures are agreed.”

7.3.49 The Powys County Council (PCC) LDP includes a number of policies relating to nature conservation, in particular:

7.3.50 Policy DM2 – The Natural Environment: "Development proposals shall demonstrate how they protect, positively manage and enhance biodiversity and geodiversity interests including improving the resilience of biodiversity through the enhanced connectivity of habitats within, and beyond the site".

7.3.51 "Development proposals which would impact on the following natural environment assets will only be permitted where they do not unacceptably adversely affect:

1. The important site designations, habitats and species afforded the highest levels of protection through European legislation including:

A. European Sites (SAC, SPA and Ramsar).

I. Development proposals likely to have a significant effect on a European site, when considered alone or in combination with other proposals or plans, will only be permitted where it can be demonstrated that:

a) The proposal is directly connected with or necessary for the protection, enhancement and positive management of the site for conservation purposes; or

b) The proposal will not adversely affect the integrity of the site.

II. Where it cannot be demonstrated that development proposals would not adversely affect the integrity of the site and there is no satisfactory alternative solution, permission will be refused unless:

a) There are imperative reasons of over-riding public interest; and

b) Appropriate compensatory measures are secured.

B. European Protected Species afforded strict protection by the Conservation of Habitats and Species (Amendment) (Eu Exit) Regulations 2019 (Habitats Directive Annex IV Species)."

7.3.52 "Development proposals likely to have an adverse effect on a European Protected Species will only be permitted where it can be demonstrated that:

I. The proposal is for the purposes of preserving public health or public safety or there are imperative reasons of over-riding public interest; and

ii. There is no satisfactory alternative; and

iii. The action authorised will not be detrimental to the maintenance of the habitat or population of the species concerned at a favourable conservation status in their natural range.

2. The important site designations, habitats and species afforded levels of protection in line with national policy and legislation including:

A. National Nature Reserves and Sites of Special Scientific Interest;
B. Protected Species including those listed in Wildlife and Countryside Act 1981 (as amended) and the Protection of Badgers Act 1992;
C. Habitats and Species of principal importance for the purpose of maintaining and enhancing biodiversity conservation in Wales as listed in Section 7 of the Environment (Wales) Act 2016; and
D. National Biodiversity Action Plan Habitats and Species."

7.3.53 "Development proposals likely to have an adverse effect on the conservation value of nationally protected sites, habitats or species, either directly, indirectly or in combination, will only be permitted where it can be demonstrated that:

i. The proposal contributes to the protection, enhancement or positive management of the site, habitat or species; or

ii. There is no suitable alternative to the proposed development; and

a) It can be demonstrated that the benefits from the development clearly outweigh the special interest of the site, habitat or species; and

b) Appropriate compensatory measures are secured; and

c) The population or range and distribution of the habitat or species will not be adversely impacted.

3. The locally important site designations, habitats and species including:

A. Local Nature Reserves;

B. Local Biodiversity Action Plan Habitats and Species; and

C. Regionally Important Geodiversity Sites and Geological Conservation Review Sites."

7.3.54 "Development proposals likely to have an adverse impact upon these sites, habitats or species will only be permitted where it can be demonstrated that:

i. They conserve and where possible enhance the natural heritage importance of the site, habitat or species; or

ii. The development could not reasonably be located elsewhere; and

The benefits of the development outweigh the natural heritage importance of the site, habitat or species; and

7.3.55 Mitigation and/or compensation measures are provided where adverse effects are unavoidable.

7.3.56 Policy DM7 – Dark skies and External lighting: "Development proposals involving external lighting will only be permitted when a lighting scheme has been provided that demonstrates that the lighting will not individually or cumulatively cause:

1. Unacceptable levels of light pollution especially in the countryside.
2. An unacceptable adverse effect on the visibility of the night sky.
3. A nuisance or hazard to highway users including pedestrians, and local residents.
4. An unacceptable disturbance to protected species."

7.3.57 4.2.48 "Thought needs to be given on how external lighting schemes can avoid potential impacts to nocturnal wildlife, particularly protected species, such as bats, otters and badgers. Dark wildlife movement corridors should be left, e.g. no external lighting of boundary habitat features, wildlife corridors, and watercourses."

7.3.58 4.2.49 "Protected species are a material planning consideration. The way in which protected species are considered in the planning process is detailed in TAN 518. The LDP does not repeat this guidance on how to deal with protected species and in this instance relies upon national guidance."

Planning Policy Wales (PPW) (Edition 11)

7.3.59 Planning Policy Wales[5] (WG, 2021) sets the national policies in relation to development control through the Town and Country Planning Act 1990. This is supported by a series of Technical Advice Notes (TAN), of particular relevance is Technical Advice Note 5 (WG, 2009) which sets out the consideration of nature conservation in the determination of planning applications.

7.3.60 PPW 11 sets out that "planning authorities must seek to maintain and enhance biodiversity in the exercise of their functions. This means that development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net

[5] https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf

benefit for biodiversity" (para 6.4.5). This policy and subsequent policies in Chapter 6 of PPW 11 respond to the Section 6 Duty of the Environment (Wales) Act 2016.

7.3.61 A recent letter from WG to Local Planning Authorities (LPAs) clarified that in light of the PPW 11, and the Environment (Wales) Act 2016, where biodiversity enhancement is not proposed as part of an application, significant weight will be given to its absence, and unless other significant material considerations indicate otherwise it will be necessary to refuse permission.

Future Wales

7.3.62 Future Wales – the National Plan 2040 provides the National Development Framework for Wales, setting out the direction for development in Wales until 2040. It addresses national priorities through the planning system, including sustaining and developing a vibrant economy, achieving decarbonisation and climate resilience, developing strong ecosystems and improving the health and well-being of communities in Wales. It is a spatial plan and therefore sets out a direction of where development and infrastructure should be located for the good of the communities in Wales.

7.3.63 The principles of the Well-being of Future Generations Act are embedded within the plan, to facilitate sustainable development. Importantly, it sets out how biodiversity needs to be safeguarded, and how actions should secure the maintenance and enhancement (net gain) of biodiversity, ecosystem resilience and green infrastructure, and part of development proposals.

United Kingdom Biodiversity Action Plan (UK BAP)

7.3.64 In 1992 the UK signed the Convention on Biological Diversity at the Rio Convention pledging the UK to develop national strategies for the conservation and sustainable use of biological diversity. The UK Government subsequently produced Biodiversity: The UK Action Plan in 1994, which described the biological resources of the UK as a whole and in turn led to the production of Biodiversity Action Plans for individual habitats and species.

7.3.65 Biodiversity policy within the UK has been revised through the publication of the UK Post-2010 Biodiversity Framework (JNCC, 2012) which covers the period from 2011 to 2020. A total of 65 Priority Habitats and 1150 Priority Species have been identified as the most in need of protection. Such species and habitats present in Wales have been listed as species and habitats of principal importance for conservation in response to the requirements of the Environment (Wales) Act 2016. They are hereafter referred to as Section 7 (S7) species.

Wales Action Plan for Pollinators (2013)

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

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

Powys Local Biodiversity Action Plan

7.3.68 The Powys Local Biodiversity Action Plan[6] was published by the Carmarthenshire Biodiversity Partnership. It includes 17 Habitat and 28 Species Action Plans with a number of actions relating to the protection of biodiversity within the county.

Neath Port Talbot Biodiversity Action Plan

7.3.69 No information is currently available on the Neath Port Talbot LBAP. The report is unpublished, due to containing confidential information on partners, and currently being revised to tie in with WG's new Nature Recovery Plan. As such the NPTCBC ecologist has recommended using the published list of habitats and species of principal importance for the purpose of maintaining and enhancing biodiversity conservation in Wales, in response to Section 7 requirements of the Environment (Wales) Act 2016 (i.e. Section 7 habitats and species).

Relevant guidance

7.3.70 A range of guidance documents are available for biodiversity, but the principal assessment sources include:

- Guidelines for Ecological Impact Assessment in the UK and Ireland, Versions 1.1 (CIEEM, 2019)[1].

[6] https://en.powys.gov.uk/article/2553/Local-biodiversity-action-plan. Accessed online 12/11/2019.

7.3.71 Guidance for specific species, groups and other ecological features is discussed in individual relevant sections or is provided in the ecological baseline reports (Volume 2, Appendices C-P).

7.4 Study Area

7.4.1 The Study Area used for all ecological baseline reports encompasses the majority of land within the Onllwyn and Nant Helen open cast operational site, and the area surrounding and adjacent to this.

7.4.2 The development footprint for the project, is shown in Figure 7.1. As the Study Area encompasses and is larger than the Project Site, it provides an adequate baseline for the surveys detailed in this report, and for further assessment in the EIA.

7.5 Scoping

7.5.1 Consultation has taken place with PCC and NPTCBC, and NRW as detailed in Section 7.6 below on the scope and timing of ecological surveys, required for the Project.

7.5.2 A formal scoping opinion request was submitted on 27th September 2019 to PCC/NPTCBC. Their scoping opinion is detailed below in Table 7-1 along with the response to address these comments.

Table 7.1: Formal scoping opinion for the proposed application for GCRE with accompanying response from EIA ecologist

Scoping opinion clause	Comment	Response
PCC ecologist	PCC ecologist has reviewed the information submitted and the proposed and is satisfied that the proposed scope of the surveys identified is appropriate and the approach/methodologies identified in Chapter 11 is in accordance with current guidelines and best practice. The Scoping Report identifies the presence of a European designated site within 5km of the proposed development - Coedydd Nedd a Mellte SAC identified by the Scoping Report as approximately 3km east of the proposed development - sufficient information will need to be provided within the ES to enable the competent authority to determine whether there would be a potential for an impact to the SAC as a result of the construction and/or operation phase of the proposed development, should the assessment identify the potential for an impact to the SAC and or its associated features then sufficient information will be required to be submitted to enable the competent authority to undertake a Habitats Regulations Assessment of the proposed development. The first stage of this - Screening Stage - is to determine whether there would be a likely significant effect (in the absence of mitigation) if a likely significant effect either alone or in combination with other plans or projects cannot be ruled out then it will be necessary for the proposed development to be subject to an Appropriate Assessment to determine whether there would be an adverse effect to the integrity of the designated site in light of its conservation objectives. Further information regarding the HRA process in relation to DNS and required information can be found at https://gov.wales/sites/default/files/publications/2019-08/developments-ofnational-significance-guidance-habitats-regulations-assessment.pdf Section 11.6 of the Environmental Scoping Report identifies potential mitigation that may need to be implemented during the construction phase of the proposed development, I appreciate that these are indicative at this time as not all surveys have been completed and the full extent of potential impacts to biodiversity have not yet been identified. Having reviewed the proposed potential mitigation measures I note that these generally refer to mitigation required during the construction phase of the proposed development the ES will also need to include mitigation measures in relation to the operation phase of the proposed development. Chapter 17 of the Report considers assessment of Cumulative Effects of the proposed development in relation to other projects known to the planning system or are already consented (but not yet built). I note that with regards to biodiversity the zone of influence for assessments has been identified as the 'footprint of construction works and immediately adjoining land' however with regards to air quality a Zone of Impact (ZoI) of 200m of the development boundary and in relation to water resources a Zone of Impact (ZOI) of 500m has been identified - as both of these are linked to condition of biodiversity features then it is	A Statement to inform a Habitat Regulations Assessment will be issued to the LPA, as the competent authority; who will undertake a formal assessment of the likely significant impacts on European sites and their qualifying features which may be affected by the Project. The Zone of Impact used in this assessment is between 1 km and 15 km, for the various potential ecological receptors, with the exception of Invasive species, which are not a valued receptor but include within the assessment due to the legal protection they are afforded. The impacts on ecological receptors in this assessment include construction impacts and operational impacts. Enhancement measures are detailed for all ecological receptors within this Chapter including LBAP and S7 species and habitats.

Scoping opinion clause	Comment	Response
	considered that the ZoI in relation to assessment of cumulative effects to biodiversity should also be extended to take these factors into account. I welcome the statement within the Biodiversity section of the Scoping Report that 'Measures to enhance biodiversity in the area affected by the Project and those which help to deliver local and national policy targets would also be identified; including measures which enhance Section 7 species and habitats, which the local authorities and public bodies are required to seek 'to maintain and enhance biodiversity' in addition to maintaining 'a resilient ecosystem' under the Environment (Wales) Act 2016.' The requirement to identify enhancements for biodiversity through development proposals has been further clarified by the letter form Welsh Government to Wales LPA Heads of Planning dated 23rd October 2019 which states that 'where biodiversity enhancement is not proposed as part of an application, significant weight will be given to its absence, and unless other significant material considerations indicate otherwise it will be necessary to refuse permission.'	
NPTCBC ecologist	Advises that the ecology section of the scoping report provided appears to be largely appropriate; however, a few items, set out below, will also need to be addressed as part of the EIA: • The list of surveys that are being undertaken to inform the scheme appear appropriate. It should however be particularly noted that the surveys should include the identification of the presence of S7 Environment (Wales) Act (S42 NERC Act 2006)/ LBAP habitats and species, sites that meet SINC criteria, in addition to protected species. • A balance of S7/LBAP/SINC habitat loss/gain to the scheme should be included. • It is welcomed that it is intended to include an assessment of the impacts upon areas identified as sites of importance for nature conservation (SINC) but it should also be noted that in line with the NPT LDP and Biodiversity & Geodiversity SPG all areas that would meet the criteria of a SINC should also be assessed and considered in the same way. NB details of identified SINCs are available from SEWBReC and the criteria are available from the Wales Biodiversity Partnership website. • No mention of an assessment of ecosystem resilience (Section 2 Environment (Wales) Act 2016) is included, it is recommended that an assessment is undertaken to ensure the aspects of ecosystem resilience are able to be appropriately considered in line with the Act; this shall particularly consider: (a) diversity between and within ecosystems; (b) the connections between and within ecosystems; (c) the scale of ecosystems; (d) the condition of ecosystems (including their structure and	S7 / SINC / UKBAP habitats have been considered in this ES chapter, as well as Powys LBAP. NPTCBC currently do not have a published LBAP report due to containing confidential information and also, being updated to reflect WGs Nature Recovery Plan. The requirement of habitat loss / gain will be included in an Ecological Protection Plan and Habitat Management Plan. The design of habitats, together with their long-term management and monitoring, aims to protect and enhance ecosystem resilience, in accordance with the Environment (Wales) Act 2016.

Scoping opinion clause	Comment	Response
	functioning); (e) the adaptability of ecosystems. • Also, an assessment of impacts upon bird habitat (Section 9a Habitat Regulations); should be included. It is welcomed that up to date surveys are being undertaken to ensure appropriate data is available to inform this assessment. • In relation to the significance criteria to be used for the assessment please note the NPT LDP policy requirements and the requirements of the Environment (Wales) Act 2016 in relation to what the LPA needs to consider as part of planning submission. For example all S7 habitats/SINCs/LBAP habitats and species impacted by the scheme will require mitigation as well as protected species and designated sites. These should not be ruled out too early in the assessment process on the basis of criteria applied.	
NRW	Confirmed that the ecological evaluation should include: direct and indirect; secondary; cumulative; short, medium and long term; permanent and temporary; positive and negative, and construction, operation and decommissioning phase and long-term site security impacts on nature conservation resource, landscape and public access. Any maps, drawings and illustrations that are produced to describe the project should be designed in such a way that they can be overlaid with drawings and illustrations produced for other sections of the ES such as biodiversity. We would advise that information is provided to the local authority considering how the restoration works will work alongside the new proposal. Any habitat surveys should accord with the Nature Conservation Committee (NCC), Phase 1 survey guidelines (NCC (1990) Handbook for Phase 1 habitat survey. NCC, Peterborough). We advise that Phase 1 surveys are undertaken and completed during the summer to ensure the best chance of identifying the habitats present. We advise that all targeted species surveys comply with current best practice guidelines and in the event that the surveys deviate or there are good reasons for deviation that full justification for this is included within the ES. Should protected species be found during the surveys, information must be provided identifying the species-specific impacts in the short, medium and long term together with any mitigation and compensation measures proposed to offset the impacts identified. We advise that the ES set out how the long-term site security of any mitigation or compensation will be assured, including management and monitoring information and long term financial and management responsibility. Where a European Protected Species is identified and the development proposal will contravene the legal protection they are afforded, a licence should be sought from NRW. The ES must include consideration of	The impact assessment is undertaken in accordance with CIEEM guidance, and considers the various types of impacts i.e. direct and indirect etc. Plans include details of the Project i.e. red line boundary. This ES chapter considers the impacts from restoration works (recently revised submission by Celtic Energy) and the earthworks, as well as impacts from GCRE. All targeted species surveys have been undertaken in accordance with relevant best practice guidance, and any limitations are detailed within each survey report. Where impacts on EPS (or species protected under the Wildlife and Countryside Act 1981 (as amended)) are confirmed, a licence will be obtained from NRW. The ES details the requirements for a Habitat management plan to ensure the long-term maintenance of habitat and species mitigation / compensation. A search with the local biodiversity records centre has been undertaken, in addition to desk top review of existing ecological reports and interrogation of online sources, to identify potential ecological receptors.

Scoping opinion clause	Comment	Response
	the requirements for a licence and set out how the works will satisfy the three requirements as set out in the Habitat Regulations. We recommend that the developer consults the local authority Ecologists on the scope of the work to ensure that regional and local biodiversity issues are adequately considered, particularly those habitats and species listed in the relevant Biodiversity Action Plans and that are considered important for the conservation of biological diversity in Wales. We would expect the developer to contact other relevant people/organisations for biological information/records relevant to the site and its surrounds. We note that the design will need to avoid notable habitats, or habitats known to support protected/notable species, where possible. It is also noted that opportunities, where possible should be sought to enhance existing habitat features and create new habitats which are appropriate for the local area. It should be acknowledged that parts of the restored habitat within the proposed development fall within an area covered by the Ystradgynlais Marsh fritillary metapopulation (a section 7 species). It should be noted that a large part of the proposed development is on land is registered as part of Mynydd y Drum Common and that encouraging and facilitating appropriate cattle grazing regime within this area of the common could serve in part as positive habitat management for grassland and heath as well as enhance habitat for Marsh fritillary metapopulation. We observe that an area of high tonnage test loop appears to be proposed near bog/ fen/mire habitat and upon an area of deep peat according to our information. We would advise that the appropriate surveys be carried out with regards to deep peat and negative impact on the deep peat avoided where possible.	The presence of marsh fritillary has been considered in this Chapter. Deep peat is shown on the Geological Survey solid and drift geological map as occurring within the Project site (Figure 6.2). This area of deep blanket peat covering Mynydd y Drum was largely removed and disposed of during surface mining in the late 1980s and early 1990s. A small area of deep peat was salvaged in 1993 and used to create the current area of peatland and fen / mire in the restored workings. The impact on this feature, from habitat fragmentation is considered within the Nant Helen Complementary Earthworks, and further effects from potential habitat disturbance as a result of the GCRE Project in Sections 7.22 and 7.23. Impacts from GCRE are considered to be limited to potential disturbance / degradation, since it will not be directly affected during the GCRE works.

7.6 Consultation

7.6.1 Members of Natural Resources Wales (NRW) south Wales species team and the Ecologist at Neath Port Talbot Council (NPTCBC) were consulted during a meeting in connection with the GCRE project, held with members of the Arup project team, on the 10th December 2018. During the meeting, the survey scope was discussed. NRW confirmed all the surveys previously undertaken by Celtic Energy to inform the 2011 EIA (for the Site's restoration) would need to be updated for the Project. This included previous species surveys with negative results, due to the mobile nature of these species and presence of suitable habitat. In addition, they confirmed that an arboreal mammal survey would be required due to the presence of red squirrel (*Sciurus vulgaris*) 3 km from the Site.

7.6.2 The NPTCBC Ecologist was also consulted regarding the LBAP habitats and both the NPTCBC and PCBC Ecologists were consulted on the local SINCs on 21st November 2018. Specific consultation with the NPTCBC was undertaken on the 8th January 2020 to confirm the LBAP habitats and species. They confirmed that reference to Section 7 habitats and species would be satisfactory.

7.6.3 The above consultation comments are detailed in Table 7.2 below, along with how these comments have been incorporated into this ES Chapter, where relevant to the Project.

Table 7.2: Response to representations from stakeholders on scope of biodiversity assessment.

Stakeholder	Comment	Response
NRW and NPTCBC	Requested that all the ecological surveys undertaken to inform Celtic Energy's 2011 ES were repeated to inform the ES of the Project. In addition, that arboreal mammal surveys were undertaken.	Amphibian, arboreal mammals, bat roost (tree, buildings and structures), bat activity (static and transects), badger, breeding bird (including specialist surveys for goshawk and honey buzzard), dormouse, extended Phase 1 habitat, fungi, reptiles, National Vegetation Classification (NVC) (including bryophytes and lichen), riparian mammal (otter and water vole), wintering birds surveys have all been undertaken.

7.7 Methodology

Overview

7.7.1 The assessment presented within this Chapter is undertaken in accordance with the guidance for ecological assessment provided by

the Chartered Institute of Ecology and Environmental Management (CIEEM)[1].

7.7.2 The assessment considers the potential impacts on statutory and non-statutory nature conservation sites, habitats and species of conservation importance. The methodology for establishing baseline conditions is set out in the following sections along with the methods for evaluating receptors and assessing impacts.

7.8 Sources of Baseline Data

7.8.1 Details of survey methodologies used to collate data for the 'existing ecological baseline' (as described in Section 7.14) are provided in Appendix 7A. This includes an Extended Phase 1 habitat Survey, National Vegetation Classification (NVC) survey, fungi survey, invertebrate survey, amphibian survey, reptile survey, breeding bird survey, wintering bird survey, bat roosting and activity survey, notable mammal survey, badger survey and otter survey.

7.8.2 Additionally, the habitat creation and restoration plan, provided as part of the Nant Helen Complementary Earthworks application forms part of the Future Baseline which is relevant to the GCRE project impact assessment, since the site's restoration is a condition of earthworks planning application. This is shown in Figure 7.11, in addition to the existing baseline information.

7.9 Evaluation of Receptors and Assessment of Impacts

Zone of Impact for Ecological Features

7.9.1 All plant and animal species, habitats and integrated plant and animal communities that occur within the 'Zone of Impact (ZoI)' of the proposed development are defined as potential 'ecological receptors'. The zone of impact for ecological features varies, depending on the nature and behaviour of the receptors, and the type of impact that may affect them. As a rule, in this Chapter, the assessment of individual receptors is considered for the whole of the site plus the distances listed in Table 7.3.

Table 7.3: Maximum Zone of Impact from Scheme Boundary for Ecological Features

Ecological Feature	Maximum Zone of Impact from the Site Boundary
Statutory designated European sites (including faunal species included as part of the designation), e.g. SAC.	5 km
Statutory designated European sites for which bats are a qualifying feature.	10 km

Ecological Feature	Maximum Zone of Impact from the Site Boundary
Statutory designated European sites for which marsh fritillary are a qualifying feature.	15 km
Statutory Nationally designated sites (including faunal species included as part of the designation), including Sites of SSSIs and National Nature Reserves (NNRs).	5 km
Non-statutory designated sites - LNRs and Site of Importance for Nature Conservation (SINCs).	1 km
Protected species	Up to 2 km (species dependant)
Notable species	Up to 2 km (species dependant)
Non-native Invasive species	Within the site only

7.9.2 The maximum ZoI for international and national sites was established, in consultation with NRW and NPTCBC Ecologist (during an initial meeting), at 5 km due to potential hydrological impacts such as pollution of watercourses. For locally designated non-statutory sites a 1 km distance was chosen as a maximum ZoI as these sites are designated for the value of their habitats, rather than mobile species which could be impacted upon over larger area e.g. bats. Regarding fauna, it is largely the behaviour of species, including movement in the landscape combined with the nature of the development, which determines the 2 km maximum ZoI.

7.9.3 For marsh fritillary, the maximum ZoI is 15 km, due to this species existing in metapopulations and being known to range up to 15 km from its primary habitat[7].

7.10 Determining Value

7.10.1 The CIEEM guidelines recommend that the value of ecological receptors or features is determined based on a geographic frame of reference. For this assessment, the following geographic frame of reference is used to determine the importance of ecological features[8]:

Table 7.4: Criteria used for determining ecological value of a feature.

Importance of ecological feature	Criteria
International and European	Natura 2000 sites including: SPAs; potential SPAs (pSPAs); SAC; candidate or potential SACs (cSACs or pSACs); and Wetlands of International Importance (Ramsar sites). Biogenetic Reserves, World Heritage Sites and Biosphere Reserves.

[7] Warren M.S. 1994. The UK status and suspected metapopulation structure of a threatened European butterfly, the marsh fritillary *Eurodryas aurinia*. Biol. Conserv. 67: 239–249.

[8] Descriptions have been adapted from Interim Advice Note 130/10 - Ecology and Nature Conservation: Criteria for Impact Assessment (Highways Agency, 2010) which follows a similar geographic frame of reference as the CIEEM guidelines but includes further definition on criteria.

Importance of ecological feature	Criteria
	Areas, which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Resident, or regularly occurring, populations of species, which may be considered important at an International or European level.
National	Designated sites including: SSSIs; Marine Protected Areas (MPAs) including Marine Conservation Zones (MCZs); and National Nature Reserves (NNRs). Areas, which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Areas of habitats of principal importance for conserving biodiversity (i.e. listed in response to the requirements of the Environment (Wales) Act 2016). Areas of Ancient Woodland e.g. woodland listed within the Ancient Woodland Inventory. Resident, or regularly occurring, populations of species, which may be considered important at National level.
County	Designated sites including: Sites of Nature Conservation Importance (SNCIs); County Wildlife Sites (CWSs); and Local Nature Reserves (LNRs) designated in the county or unitary authority area context. Areas which meet the published selection criteria[9] for those sites listed above but which are not themselves designated as such. Areas of habitats identified in the NPTCBC and or Powys Local Biodiversity Action Plan (LBAP)[6], which are a priority for conservation within the County. Resident, or regularly occurring, populations of species, which may be considered important at a County level.
Local	Designated sites including: LNRs designated in the local context. Trees that are protected by Tree Preservation Orders (TPOs). Areas of habitat; or populations / communities of species considered to appreciably enrich the habitat resource within the local context (such as veteran trees), including features of value for migration, dispersal or genetic exchange.

7.11 Valuing Habitat and Species

7.11.1 In accordance with the CIEEM guidelines[1], in assigning a level of value to each habitat or species considered in the assessment, it is necessary to consider its distribution and status, including a consideration of trends based on available historic records. Rarity is an important consideration because of its relationship with threat and vulnerability although since some species are inherently rare, it is necessary to consider rarity in the context of status. A habitat or species that is rare or declining should be assigned a greater level of

[9] Wildlife Sites Guidance Wales (Wales Biodiversity Partnership, 2008) - A Guide to Develop Local Wildlife Sites System in Wales.

importance than one that is rare but known to have a stable distribution or population.

7.11.2 Those ecological features which have been identified as being of sufficient value to be material to decision-making (e.g. those considered to be of 'Local' importance or above), and which it is considered could experience significant effects as a result of the proposed development (i.e. effects that could adversely affect the integrity of the habitat or the favourable conservation status of a species' local population), have been classified as 'Important Ecological Features' (IEF) (as outlined in CIEEM Guidelines), and thus will be considered in the detailed assessment. Other ecological features (i.e. those which are of less than 'Local' importance will be scoped out, and not subject to any further assessment within this document).

7.11.3 In accordance with the CIEEM Guidelines, where there is the potential for a breach of legislation in relation to protected species (regardless of their value), those species are also considered as IEF.

7.11.4 Following identification and valuation of the IEF, it is then necessary to investigate potential impacts on those features in order to understand how they might be affected by the proposed development.

7.11.5 **Predicting and Characterising Ecological Impacts**

7.11.6 In accordance with CIEEM guidelines, when describing impacts reference is made to the following:

- Positive or negative – an impact that either increases or reduces quality of the environment or factor being assessed;
- Magnitude – the size of an impact in quantitative terms where possible;
- Extent – the area over which an impact occurs;
- Duration –the time for which an impact is expected to last;
- Reversibility - a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A temporary impact is one from which a spontaneous recovery is possible; and
- Timing and frequency – whether impacts occur during critical life stages or seasons and how often impacts occur.

7.11.7 Both direct and indirect impacts are considered: direct ecological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat occupied by a species during the construction process. Indirect ecological impacts are attributable to an action, but which affect ecological resources through impacts on an intermediary ecosystem, process or receptor, e.g. a pollution event reducing the food source for a species such as otter or water vole.

7.12 Significance Criteria

7.12.1 In accordance with the CIEEM guidelines, a significant impact, in ecological terms, is defined as 'an impact (whether negative or positive) on the integrity[10] of a defined site or ecosystem and/or the conservation status[11] of habitats or species within a given geographical area, including cumulative and in-combination impacts'. It is important to note however that in accordance with the CIEEM guidelines, the actual determination of whether an impact is ecologically significant is made irrespective of the value of the receptor in question. In this respect the CIEEM methodology differs from some other approaches to EIA.

7.12.2 The value of a feature that will be significantly affected is used to determine the geographical scale at which the impact is significant, e.g. an ecologically significant impact on a feature of county importance will be considered to represent a significant impact at a county level. This in turn is used to determine the implications in terms of legislation, policy and / or development management.

7.12.3 The assessment relies on professional judgement and guidance as provided within CIEEM Guidelines.

7.12.4 Any significant impacts remaining after mitigation (the residual impacts), together with an assessment of the likelihood of success of the mitigation, are the factors to be considered against legislation, policy and development management in determining the application.

7.13 Limitations and Assumptions

Limitations

7.13.1 The findings presented in this assessment represent those at the time of survey and reporting, and data collected from available sources. Ecological surveys are limited by factors, which affect the presence of plants and animals, such as the time of year, migration patterns and behaviour.

7.13.2 The ecological surveys presented in this ES were conducted at the optimal survey periods and using methodologies that are accepted by NRW and other statutory bodies. The results of the ecological survey allow evaluation of nature conservation value, assessment of significance of potential impacts that may arise from the proposed

[10] Integrity is the coherence of ecological structure and function, across a site's whole area that enables it to sustain a habitat, complex of habitats and/or the levels of populations of species.
[11] Conservation status for habitats is determined by the sum of the influences acting on the habitat and its typical species that may affect its long-term distribution, structure and functions as well as the long-term survival of its typical species within a given geographical area. Conservation status for species is determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within a given geographical area.

development and consideration of appropriate mitigation measures. Every effort has been made to ensure that the findings in the ES study present, as accurate as possible interpretation, of the status of flora and fauna of the Site.

7.13.3 Limitations for specific species and surveys are detailed for each baseline report (Volume 2, Appendices C-P). None of the limitations are considered to be significant or to have compromised the validity of the surveys or assessment.

Assumptions

7.13.4 A number of assumptions have been made when undertaking the impact assessment. Professional judgement has been used at all times, including during the interpretation of desk study and survey results, assessment of potential effects, the significance of effects and the likely effects of mitigation measures.

7.13.5 The assumptions that have been made are as follows:

- The desk study and survey data collected is sufficiently robust for informing the evaluation and impact assessment of ecological receptors; and
- The evaluation and impact assessment of each ecological receptor is based on the likely ecological conditions at the time of construction and operation.

7.14 Existing Baseline and Future Baseline Conditions

7.14.1 Appendix 7B details the ecological baseline recorded during surveys in 2019, within the Study Area, including the Nant helen site and Washery area which occur within the red line boundary of the GCRE project and which is hereafter referred to as the ‘existing baseline’. This existing baseline information was used to assess impacts from the Nant Helen Complementary Earthworks Project (which was granted planning in 2020), although it is noted that the washery site included in the study area for the earthworks application was not within the red line boundary for this project.

7.14.2 A ‘Future Baseline’ has been used to assess potential impacts from the GCRE project (Figure 7.11). The Future Baseline considers the Site at the time of the GCRE Project commencing, which is not anticipated to be more than two years from the completion of the Nant Helen earthworks but with the habitats detailed in Nant Helen restoration plan (which includes habitats required as part of the Nant Helen earthworks and Celtic Energy restoration applications) having been created, and newly established. In addition, the Future Baseline, includes habitats which are adjacent to the Nant Helen earthworks, and which will be retained and protected during the earthworks. Some of these newly created habitats and retained habitats will also be

subject to some enhancements through long term management. These retained habitats which now form part of the Future Baseline, also include habitats within the washery, which are not directly affected by the Nant Helen Earthworks.

7.14.3 Figure 7.11 illustrates the Future Baseline habitats relevant to the GCRE project (i.e. within the ZoI), and Table 7.16 in Appendix 7S, describes the habitats and likely species present (and the assumptions made), in addition to the assumed status of habitats and species in nature conservation terms. It also details the protected sites present within the site boundary and within the wider ZoI for the GCRE project.

7.14.4 Habitats of the Future Baseline created as part of the Nant Helen earthworks and Celtic Energy application which occur within the Nant Helen site, comprise: acid grassland, enclosed pasture and broadleaved woodland, hedgerows, heathland, peatland-mire complex, wetland and lichen / fungi rich habitats. These will be subject to long term management.

7.14.5 Newly created habitats, replacing those lost during the Nant Helen earthworks will be quickly established by mobile species. Where habitats are enhanced, such as those which occur adjacent to the GCRE works in the Nant Helen site, including marshy grassland, acid grassland / heathland and wetland, it is considered likely that in the long term these will support higher numbers of some species including notable species recorded within the area of the Site such as dingy skipper. New species could also move into the Site such as marsh fritillary. However, at the time of GCRE commencing, it is unlikely that habitats will have been enhanced sufficiently to support higher numbers / new species, and therefore it is considered appropriate to assume the same species and population sizes are present within these newly created habitats, as those in the existing baseline (and therefore that marsh fritillary are absent from the GCRE site).

7.14.6 Within the Nant Helen site, the GCRE project site also supports retained habitats unaffected by the Nant Helen Complementary Restoration Earthworks (detailed in the existing baseline) which now occur within the GCRE project ZoI. This includes habitats such as acid grassland, marshy grassland, heathland, wetlands, broadleaved and conifer woodland, and watercourses (Afon Dulais, Afon Llech, Afon Tawe, Afon Camnant and their tributaries). Some of these habitats will also be subject to long term management to enhance their ecological value, as part of the Nant Helen Complementary Earthworks and Celtic Energy restoration applications.

7.14.7 Species within retained habitats within the Nant Helen site are anticipated to be the same as the existing baseline, as they will be protected during the Nant Helen earthworks.

7.14.8 The Washery site, which is adjacent to the Nant Helen site and therefore unaffected by the Nant Helen earthworks, is included within

the GCRE Project boundary. Within the Washery there is a mosaic of habitats, namely: marshy grassland, species rich grassland (neutral and acid), heathland, waterbodies, scrub, plantation and woodland, in addition to buildings, existing railway sidings and hardstanding. A tributary of the Afon Dulais also lies partially within the Washery site (in the area of the sidings).

7.14.9 Habitats within the Washery are known to support common amphibians (common frog, common toad, smooth and palmate newt), reptiles (common lizard), breeding birds (skylark, linnet, grasshopper warbler, willow warbler, dunnock, lapwing, house sparrow, bullfinch and reed bunting), wintering birds (starling, house sparrow and mistle thrush), roosting bats (tree with low suitabilty and buildings with low to moderate suitability) and foraging bats (largely common and soprano pipistrelle, and noctule and myotid bats). No evidence of badger, otter or notable mammals was found in the Washery, and habitat present were considered to offer limited opportunities for these species. No suitable habitats for water vole or dormouse have been recorded.

7.14.10 In addition, protected sites, as detailed in existing baseline, which are retained and protected as part of the Nant Helen Complementary Restoration Earthworks Project, and occur within the ZoI of the GCRE Project, will be included within the Future baseline. Details of statutory and non statutory designated sites are detailed below in pararaphs 7.14.11 – 7.14.12.

Statutory Designations

7.14.11 Fifteen statutory designated sites occur within 15 km of the Site. They comprise three Special Area of Conservation (SAC) within 15 km, and 12 Sites of Special Scientific Interest (SSSI), one of which is also designated as a National Nature Reserve (NNR), within 5 km. They are detailed in Table 7.5 and 7.6 below and shown in Figures 7.2 and 7.3.

Table 7.5: European Statutory designated sites within 15 km of the Site.

Site Name	Designation	Features	Approximate Distance and Orientation from Site
Coedydd Nedd a Mellte	SAC	Annex I habitats that are a primary reason for selection of this site include Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles. Coedydd Nedd a Mellte is a very large and diverse example of old sessile oak wood in south Wales. The woods extend along a series of deeply incised valleys and ravines, and contain complex mosaics of sessile oak *Quercus petraea* woodland, ash *Fraxinus excelsior* woodland (some of which is referable to Annex I type 9180 *Tilio-Acerion* forests of slopes, screes and ravines), and transitions to lowland woodland types. The whole site is biologically rich, with many woodland plant communities represented and rich bryophyte and lichen assemblages. Notable higher plant species include wood fescue *Festuca altissima* and the ferns *Dryopteris aemula, Hymenophyllum tunbrigense* and *Asplenium viride*.	2.9 km south-east
Cwm Cadlan	SAC	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinia caeruleae*) for which this is considered to be one of the best areas in the United Kingdom. Alkaline fens for which this is considered to be one of the best areas in the United Kingdom.	9.5 km east
Blaen Cynon	SAC	The SAC comprises four compartments. The site is designated for its population of marsh fritillary and is known to contribute towards supporting a metapopulation of the marsh fritillary in the Penderyn/Hirwaun area.	9.2 km to the east (closest compartment)

Table 7.6: Nationally Statutory designated sites within 5 km of the Site

Site Name	Designation	Features	Approximate Distance and Orientation from Site
Nant Llech	SSSI	The Nant Lech, flowing off the Millstone Grit rocks and on to Coal Measure shales has carved a steep-sided valley of special interest on account of its rich variety of woodland and cliff plant communities. A range of woodland types has formed in response to variations in soil moisture content and soil chemistry. Bird life is rich and the uncommon soldier beetle (*Podabrus alpinus*) has been recorded from the wood.	100 m north-east

Site Name	Designation	Features	Approximate Distance and Orientation from Site
Gors Llwyn, Onllwyn	SSSI	This site contains a range of peat-depositing vegetation communities. Peat deposition has been sufficiently great in part of the site to form a dome shaped mass of peat above the general water table, known as a raised mire. There are very few other examples of this formation known in mid and south Wales. North-east of the complex of mires is an area of acidic pasture. Drier ridges divide up a series of wet flushes which support a range of wetland species e.g. whorled caraway (*Carum verticillatum*), meadow thistle (*Cirsium dissectum*) and sharp-flowered rush (*Juncus acutiflorus*). These plants form a clearly defined community of extremely limited distribution in Europe, occurring only along the southern Atlantic seaboard.	40 m east
Caeau Ton-y-Fildre	SSSI	The site comprises two unimproved herb-rich pastures on the north bank of Nant y Bryn. The western field supports a wide range of species characteristic of damp, flushed peaty pasture, including globeflower (*Trollius europaeus*), meadow thistle, whorled caraway and marsh arrowgrass (*Triglochin palustris*). Notable species in the eastern field include greater butterfly-orchid (*Platanthera chlorantha*), saw-wort (*Serratula tinctorial*), dyer's greenweed (*Genista tinctora*) and petty whin (*G. anglica*). Over 100 species of flowering plants and ferns having been recorded. The area also supports invertebrates, especially butterflies.	260 m east
Waun Ton-y-Spyddaden	SSSI	A series of small, unimproved, herb-rich hay meadows lying on a very gentle slope. The site demonstrates well the effects of traditional management on the moorland vegetation to be found on the better soils in this part of Wales. A vivid gradation in plant communities can be seen as the slope descends from north to south. At the top end is a typical moorland community of mat-grass (*Nardus stricta*), heath rush (*Juncus* squarrosus), deergrass (*Scirpus cespitosus*) and sheep's-fescue (*Festuca ovina*). This changes into grass heath communities of brown bent (*Agrostis canina*), red fescue (*Festuca rubra*), lousewort (*Pedicularis sylvatica*) and heath spotted-orchid (*Dactylorhiza maculata* spp. e*ricetorum*), which in turn grade into purple moor-grass/sedge associations.	2.2 km north-east
Rhos Hen-Glyn-Isaf	SSSI	This site comprises an extensive and varied area of damp/wet heathy pasture above the valley of the River Giedd, near Ystradgynlais. It is noted for its wide variety of plant species, including several that are uncommon in Brecknock.	2.7 km north-west

Site Name	Designation	Features	Approximate Distance and Orientation from Site
		A large part of the site supports a sward dominated by purple moor-grass, sedges and common cottongrass (*Eriophorum angustifolium*). Other species include bog pimpernel (*Anagallis tenella*), round-leaved sundew (*Drosera rotundifolia*)., few-flowered spike-rush (*Eleocharis quinqueflora*), common butter-wort (*Pinguicula vulgari*) and devil's-bit scabious (*Succisa pratensis*). Additional interest is provided by stands of alder (*Alnus glutinosa*) and by ditches which support species such as hemp-agrimony (*Eupatorium cannabinum*), bogbean (*Menyanthes trifoliata*), bog pondweed (*Potamogeton polygonifolius*) and the locally uncommon fern (*Osmunda regalis*).	
Mynydd Du	SSSI	This is an important upland site of special interest for its vegetation, open water and birdlife. In addition to the Old Red Sandstone there are significant outcrops of Carboniferous Limestone and Millstone Grit. The summit ridges are notable for their extensive grassland, dominated in the main by matgrass. Small areas still support heather *Calluna vulgaris* and bilberry *Vaccinium myrtillus.* The north and east facing cliffs of Bannau Sir Gaer and Bannau Brycheiniog support an interesting arctic-alpine flora, with such species as northern bedstraw (*Galium boreale*), dwarf willow (*Salix herbacea*), lesser meadow-rue (*Thalictrum minus*) and roseroot (*Sedum rosea*), together with a rich moss and liverwort flora.	3 km north
Ogof Ffynnon Ddu	SSSI	The site contains part of an extensive cave system which has at least 40 kilometres of passages, the largest length in any Welsh cave, situated within a vertical range of 300 metres, which is the greatest in any cave in Britain. A number of rare crustacean species restricted to subterranean habitats are of particular note.	3.3 km north-east
Ogof Ffynnon Ddu - Pant Mawr	SSSI, NNR	The undulating upland plateau above the cave system supports the finest limestone pavement in mid and south Wales. It is rich in plant species, including such rarities as lily-of-the valley (*Convallaria majalis*), soft-leaved sedge (*C. montana*), mountain melick (*Melica nutans*), lesser meadow-rue (*Thalictrum minus*) and the nationally rare hairy greenweed (*Genista pilosa*). These areas of sheltered, deep heather provide suitable habitat for nightjar (*Caprimulgus europaeus*), offering probably one of the last breeding localities in Brecknock for this summer-visiting bird. Also present within the site are a number of peat-bottomed pools with a well-developed upland dragonfly and damselfly population.	3.3 km north-east
Nant y Rhos	SSSI	The site consists of a single, gently sloping enclosure on the west side of the Nant y Rhos, 2.5 km south-east of Ystalyfera, at an altitude of 140 m above sea level. The geology of this area comprises Middle Coal Measure shales, overlain for the most part by boulder clay. The site is of special interest for its	3.5 km south-west

Site Name	Designation	Features	Approximate Distance and Orientation from Site
		species-rich fen meadow vegetation, which includes large populations of meadow thistle and whorled caraway. Most of the site supports vegetation that is dominated by purple moor-grass, accompanied by a range of characteristic associates including meadow thistle, flea sedge (*Carex pulicaris*), carnation sedge (*C. panicea*) and tawny sedge (*C. hostiana*).	
Craig y Rhiwarth	SSSI	The west-facing limestone escarpment of Craig y Rhiwarth on the east bank of the Afon Tawe, above Craig-ynos, supports some of the finest limestone plant communities in Brecknock. The limestone is covered in places by acidic boulder clay, where communities of plants demanding more acidic conditions are confined and contrast with the calcicolous communities elsewhere. Areas of acidic glacial drift support contrasting oak and birch woodland and contribute to the great species diversity of the site, with over 170 species of higher plants and a similar number of lower plants known to grow here.	3.6 km north-east
Dyffrynoedd Nedd a Mellte a Moel Penderyn	SSSI	Dyffrynnoedd Nedd a Mellte, a Moel Penderyn is of special interest for its extensive and diverse semi-natural woodland, important populations of several flowering plants and supporting outstanding assemblages of mosses, liverworts and lichens. The site includes a range of geological features, well-exposed in the cliffs and rocky river beds. These include exposures at Moel Penderyn, Craig y Ddinas and Bwa Maen and geomorphological features within parts of the valleys of the Hepste and Mellte are also of special interest. This site includes the wooded valleys of the rivers Nedd and Mellte, and their tributaries above Pontneddfechan, as they pass through a Millstone Grit and limestone plateau, and Moel Penderyn, which lies to the east. The plateau lies at about 300 m, the rivers having eroded deep, narrow valleys with gorges, river cliffs, block scree and waterfalls.	2.9 km south-east
Caeau Nant y Llechau	SSSI	This is the largest area of traditional unimproved hay meadow known in Brecknock. The collection of gently sloping, south-east facing fields on the upper valley side of the Nedd support a wealth of plant species. Developed on boulder clay overlying millstone grit, flushed in part by springs and drained by a number of well wooded streams, the varying topography is reflected in the diverse flora, with over 110 species of higher plants recorded from the grassland areas.	4.5 km east

Non-Statutory Designations

7.14.12 Eight non statutory sites occur within 1km of the GCRE boundary. These are adopted Sites of Importance for Nature Conservation (SINCs). They are listed in Table 7.7 below.

Table 7.7: Non-statutory designated sites within 1 km of the Site

Site Name	Designation	Features	Approximate Distance and Orientation from Site
Gorsllwyn Meadows	SINC	This site is mostly marshy grassland with areas of upland fen/swamp and wet woodland. The site as a whole contains at least 50 indicator species of purple moorgrass and rush pastures. notable species include marsh helleborine (*Epipactis palustris*), brookweed (*Samolus valerandi*), marsh arrowgrass, marsh cinquefoil (*Potentilla palustris*), Marsh pennywort (*Hydrocotyle vulgaris*), bogbean and water horsetail (*Equisetum fluviatile*).	Partially within the site boundary; occurs in the northern part of the Washery.
Onllwyn Coal Washery	SINC	A site of open mosaic on previously developed land adjacent to the Onllwyn Washery, which is largely made up of a raised area of reclaimed coal tip. The site supports over 82 plant species. Notable species include sand sedge (*Carex arenaria*), a significant indicator species of Open Mosaic Coal Tip Habitats.	Partially within the site boundary; occurs in the north eastern part of the Washery
Dyffryn Cellwen	SINC	A small area of unimproved marshy grassland near Dyffryn Cellwen, which is grazed by horses. Part of the site is very wet and supports a significant population of marsh cinquefoil. Other notable species include marsh arrowgrass, whorled caraway, lesser skullcap (*Scutellaria minor*), sneezewort (*Achillea ptarmica*) and devil's-bit scabious.	Within the site; occurs in the south eastern part of the Washery.
Intervalley Road, Banwen	SINC	This site comprised a marshy grassland field, crossed by a small ditch, an abandoned railway line supportng sparse species-rich neutral grassland and adjacent areas of marshy and species-poor semi-improved grassland with small areas of dense and scattered scrub and planted trees. The site was bordered to the east and north by roads and to the west by a line of trees and rugby ground.	Immediately adjacent; south of the Washery.
Adjacent to Gorsllwyn	SINC	The site comprises a series of fields supporting marshy grassland, acid grassland and semi-improved neutral grassland, bordered to the north by a small stream, the south and east by a road and open to the west. There is a small ditch to the south and small areas of dense and scattered scrub are present.	Immediately adjacent, north of the Washery.
Banwen Pond	SINC	This former colliery site includes marshy, acid and neutral grasslands, heath and scrub along with a large fishing pond and smaller wildlife ponds	500 m south of the Site.

Site Name	Designation	Features	Approximate Distance and Orientation from Site
Aberhenwaun Uchaf	SINC	The site supports extensive marshy grassland with areas of acid grassland, semi-improved neutral grassland and scattered scrub. The qualifying features include lowland meadow, lowland dry acid grassland and purple moor grass and rush pasture. Devil's bit sacbious is also present.	350 m south.
Land behind Marigold Place	SINC	The site is dominated by purple moor grass with mosaics of wet heath and acid grassland. Qualifying features include purple moor grass and rush pasture, lowland meadows, lowland dry acid grassland and invertebrates including dingy skipper, marsh fritillary ad narrow-bordered bee hawkmoth. Devil's bit sacbious is also present.	800 m south.

7.14.13 The Future Baseline also incorporates likely changes as a result of climate change. Current and future climate baselines are outlined in Chapter 15 for key climate parameters, including winter and summer temperature and precipitation, using UK Climate Projections 2018 (UKCP18).

7.15 Evaluation of Receptors – Future Baseline

7.15.1 This section evaluates the nature conservation importance of the habitats and species present in the vicinity of the GCRE Project in terms of their importance in an international, national, regional, county and local context.

7.15.2 As discussed in Section 7.14, the Future Baseline will be used for the impact assessment of the GCRE Project, which will comprise the Site as described in the Nant Helen Complementary Earthworks ES in addition to the existing baseline of the Washery site.

7.15.3 Table 7.16 in Appendix 7S details the Evaluation of all ecological receptors within the ZoI of the GCRE project. This also details a summary of the existing baseline evaluation, in relation to the Future Baseline evaluation, to provide context.

7.15.4 Figure 7.10 illustrates the Future Baseline habitat evaluation.

7.15.5 Ecological receptors of the Future Baseline, which have been affected by the Nant Helen Complementary Earthworks, will be subject to mitigation / compensatory measures including the creation and enhancement of habitats to ensure there is no overall significant impact on ecological receptors within the Site, or in connecting habitats. As such the evaluation of these ecological receptors for the Future Baseline does not change from that of the existing baseline as described in Table 7.16 in Appendix 7S.

7.15.6 Ecological receptors which are unaffected by the Nant Helen Complementary Earthworks will retain the same ecological value, also detailed in Table 7.16 in Appendix 7S. It is noted however that when assessed separately, some of the ecological receptors such as species groups, are valued lower than the existing baseline due to the site supporting less suitable habitats for these species.

7.15.7 Potential changes to protected sites, habitats and species groups are summarised below:

Sites

7.15.8 No statutory or non statutory sites will be directly affected by the Nant Helen earthworks, but will be protected during the works. The GCRE project considers the same protected sites as those detailed within the existing baseline, and are valued as follows:

7.15.9 Three European sites (all SACs), within the GCRE ZoI are protected under the Habitat Regulations 2019, and by National and Local Planning Policy; as such they are of **International value**.

7.15.10 Twelve SSSIs, within the GCRE ZoI, are protected under the Wildlife and Countryside Act 1981 (as amended), and by National and Local Planning Policy; as such they are of **National value.**

7.15.11 Eight SINCs, within the GCRE ZoI, are protected under National and Local Planning Policy; as such they are of **County value.**

Habitats

7.15.12 Habitats recreated as part of the Nant Helen earthworks restoration project, will be subject to management to maintain and enhance their value – all habitats should aim to qualify as Section 7 / UK BAP habitats and as a mosaic qualify the site as a SINC. It is acknowledged that some habitats namely peatland – mire and fungi rich habitats, will take longer to establish (between 20 – 30 years), however the mosaic of habitats created within the Site, providing they are created and managed in accordance with landscape and ecology recommendations, (and be sufficiently species rich) should still meet the criteria as habitats of conservation significance i.e. Section 7 / UK BAP and or SINC habitats.

7.15.13 The retained habitats within the Nant Helen site such as broadleaved woodland (including ancient woodland, waterbodies, acid grassland, marshy grassland and heathland) will continue to be of **County value**, being Section 7 / UK BAP habitats and qualifying these areas as a SINC. Additionally, these retained habitats will be subject to management measures which will enhance their value in the longer term.

7.15.14 Washery habitats, which will not be directly affected by the Nant Helen earthworks, will be the same value as the existing baseline i.e. Section 7 / UK BAP, and will therefore be of **County value**.

7.15.15 As such, the site is considered to have an overall **County value** for habitats.

Fungi

7.15.16 As discussed above under 'Habitats' above, fungi rich habitats will take between 20 – 30 years to establish, and as such at the time of the Project commencing newly created areas for fungi habitat within the Nant Helen site are considered to provide limited value for fungi, and likely to be of **Less than Local Value**.

7.15.17 Where habitats are retained within the Nant Helen Site, these will continue to support fungi rich habitats, and therefore be of **County value.** This includes areas of acid grassland such as extensive areas within the smaller track loop.

7.15.18 Habitats within the Washery which are fungi rich, will be of **County value**.

7.15.19 Although the newly established habitats are considered to be of lower value to fungi during their early years of establishment, since a number of fungi rich habitats will still exist within the GCRE site, it is considered to have an overall **County value** for fungi**.**

Invertebrates

7.15.20 Retained habitats within the Nant Helen site will continue to support notable invertebrate species and would therefore retain the same value i.e **County Value**. Newly created habitats are likely to quickly establish with invertebrate species within the site, and would therefore provide a similar value as the existing baseline (i.e. **County Value)**.

7.15.21 It is possible, that in the long term the value of enhanced habitats within the Nant Helen site will be more favourable to invertebrates including those not currently present in the Site but which are known to be present in the wider area such as marsh fritillary. In the short term however, and at the time of GCRE commencing, these habitats are considered to be of similar value to invertebrates as the existing baseline and marsh fritillary are assumed to be absent.

7.15.22 The Washery, which is unaffected by the Nant Helen earthworks, will have the same value as the existing baseline for invertebrates i.e. **County value.**

7.15.23 As such, the site is considered to have an overall **County value** for invertebrates**.**

Amphibians

7.15.24 Retained habitats within the Nant Helen site will continue to support notable amphibian species and would therefore retain the same value i.e **Local Value**. Newly created habitats are likely to quickly establish with amphibian species within the site, although it is noted that newly created acid grassland is likely to have limited value for amphibians**.**

7.15.25 It is possible, that in the long term the value of enhanced habitats within the Nant Helen Site will be more favourable to amphibians due to the increase in the number of wetland habitats, although at the time of GCRE commencing it is likely a similar population size would be present. Therefore, these habitats would be of **Local value** for amphibians.

7.15.26 The Washery, which is unaffected by the Nant Helen earthworks, will have the same value as the existing baseline for amphibians i.e. **Local value**.

7.15.27 As such, the site is considered to have an overall **County value** for amphibians**.**

Reptiles

7.15.28 Retained habitats within the Nant Helen site will continue to support notable reptile species and would therefore retain the same value i.e **Local Value**. Newly created habitats are likely to quickly establish with reptile species within the site.

7.15.29 It is possible, that in the long term the value of enhanced habitats within the Nant Helen Site will be more favourable to reptiles due management of habitats, although at the time of GCRE commencing it is likely a similar population size would be present. Therefore these habitats would be of **Local value** to reptiles.

7.15.30 The Washery, which is unaffected by the Nant Helen earthworks, will have the same value as the existing baseline for reptiles i.e. **Local value.**

7.15.31 As such, the site is considered to have an overall **Local value** for reptiles**.**

Breeding Birds

7.15.32 Retained habitats within the Nant Helen site will continue to support notable breeding bird species and would therefore retain the same value i.e **County Value**. Newly created habitats are likely to quickly establish with breeding bird species within the site.

7.15.33 It is possible, that in the long term the value of enhanced habitats within the Nant Helen Site will be more favourable to breeding birds due management of habitats, although at the time of GCRE commencing it is likely a similar population size, and variety of species, would be present. Therefore these habitats would be of **County value.**

7.15.34 The Washery, which is unaffected by the Nant Helen earthworks, will have the same value as the existing baseline i.e. **County value**.

7.15.35 As such, the site is considered to have an overall **County value** for breeding birds**.**

Wintering Birds

7.15.36 Retained habitats within the Nant Helen site will continue to support notable wintering bird species and would therefore retain the same value i.e **County Value**. Newly created habitats are likely to quickly establish with wintering bird species within the site.

7.15.37 It is possible, that in the long term the value of enhanced habitats within the Nant Helen Site will be more favourable to wintering birds due management of habitats, although at the time of GCRE commencing it is likely a similar population size, and variety of

species, would be present. Therefore these habitats would be of **County** value to Wintering birds.

7.15.38 The Washery, which is unaffected by the Nant Helen earthworks, will have the same value as the existing baseline i.e. **County** value.

7.15.39 As such, the site is considered to have an overall **County value** for wintering birds.

Badger

7.15.40 Retained habitats within the Nant Helen site will continue to support badgers and would therefore retain the same value i.e **Less than Local Value**. Newly created habitats will also be suitable for badgers. These will have a **Less than local** value for badgers.

7.15.41 The Washery, which is unaffected by the Nant Helen earthworks, will have the same value as the existing baseline i.e. **Less than Local** value.

7.15.42 As such, the site is considered to have an overall **Less than Local value** for badgers**.**

Otter

7.15.43 Retained habitats within the Nant Helen site will continue to support otter and would therefore retain the same value i.e **Local Value**. Newly created habitats are likely to be used by otter, particularly wetland habitats. These habitats would be of **Local value.**

7.15.44 It is possible, that in the long term the value of enhanced habitats within the Nant Helen Site will be more favourable to otter due management of habitats, although at the time of GCRE commencing it is likely a similar population size, would be present. Therefore these habitats would be of **Local value** to otter.

7.15.45 The Washery, which is unaffected by the Nant Helen earthworks, will have the same value as the existing baseline i.e. **Local value**.

7.15.46 As such, the site is considered to have an overall **Local value** for otter**.**

Roosting bats

7.15.47 Retained habitats within the Nant Helen site will continue to support roosting bats and would therefore retain the same value i.e **Local Value**. Newly created woodland habitats are likely to take some time to be utilised by roosting bats.

7.15.48 It is possible, that in the long term the value of enhanced habitats within the Nant Helen Site will be more favourable to roosting bats due management of habitats, and natural development of features within trees / buildings for bats etc , although at the time of GCRE

commencing it is likely that there would be less opportunities for roosting bats. Therefore these habitats would be of **Less than Local** value to roosting bats.

7.15.49 The Washery, which is unaffected by the Nant Helen earthworks, will have the same value as the existing baseline i.e. **Local** value

7.15.50 Although the newly established are considered to be of lower value to roosting bats during their early years of establishment, since a number of potentially suitable roosting habitats will still exist within the GCRE site, it is considered to have an overall **Local value** for roosting bats**.**

Foraging bats

7.15.51 Retained habitats within the Nant Helen site will continue to support foraging bats and would therefore retain the same value i.e **County Value**. Newly created habitats are likely to be quickly utilised by foraging bats within the site.

7.15.52 It is possible, that in the long term the value of enhanced habitats within the Nant Helen Site will be more favourable to foraging bats due management of habitats, although at the time of GCRE commencing it is likely a similar population size / range of species, would be present. Therefore these habitats would be of **County** value to foraging bats.

7.15.53 The Washery, which is unaffected by the Nant Helen earthworks, will have a lower value than the existing baseline when considered separately i.e**. Local value,** due to the low bat activity index and absence of rarer bat species.

7.15.54 As such, the site is considered to have an overall **County value** for foraging bats**.**

Notable Mammals

7.15.55 Retained habitats within the Nant Helen site will continue to support notable mammal species and would therefore retain the same value i.e **Local Value**. Newly created habitats are likely to quickly utilised by notable mammals.

7.15.56 It is possible, that in the long term the value of enhanced habitats within the Nant Helen Site will be more favourable to notable mammals due management of habitats, although at the time of GCRE commencing it is likely a similar population size, range of species, would be present. Therefore these habitats would be of **Local Value.**

7.15.57 The Washery, which is unaffected by the Nant Helen earthworks, will have a lower value than than the existing baseline, when considered separately due to supporting sub-optimal habitats for notable mammal species. i.e. **Less than Local Value.**

7.15.58 As such, the overall value of notable mammals within the GCRE ZoI, will be **Local value.**

INNS

7.15.59 It is an offence to spread them from the site, as plants listed under Schedule 9 plants of the Wildlife and Countryside Act 1981 (as amended), however these species are not considered to be a valued ecological receptor. INNS are however included to ensure legal compliance.

7.16 Embedded Mitigation

Construction

7.16.1 An Outline Construction Environmental Management Plan (CEMP) will be submitted with the planning application and will be developed by the appointed the contractor. The CEMP will ensure that industry standard working methods and mitigation measures set out in the Environment Agency's Pollution Prevention Guidelines (PPG) (withdrawn), Guidance for Pollution Prevention (GPP) and Institute of Air Quality Management (IAQM) guidance are implemented. All construction activities will be carried out in accordance with Construction Industry Research and Information Association (CIRIA) best practice guidance.

7.16.2 The CEMP will include details of the management of water and sediment across the site and provisions to minimise the likelihood of run-off, provide containment of spillage and capture or treat wastewaters where necessary. These mitigation measures are intended to prevent impacts upon surface water or groundwater quality.

7.16.3 The CEMP will include details of the management of dust and vehicle emissions through the production and implemention of dust and traffic management plans, which will eliminate impacts on air quality. Measures will comprise management of earthworks / exposed soils, appropriate storage of materials, regular inspections, wheel washing systems, covering vehicles carrying materials during transport and use of sprinkler or water bowsers to dampen excavations and or haul routes.

7.16.4 The CEMP will include details of the management of noise and vibrations, through the production and implementation of a management plan. This will include the sensitive siting of noisy equipment away from sensitive receptors and all plant and machinery habing silencers fitted. Construction activity will typically be confined to 08.00-18.00 hours, Monday to Friday and 08.00-13.00 hours on Saturdays, and where working is requiried outside of these hours for safety or engineering practicability reasons, the works to be carried

out during these extended hours will be discussed and agreed with the local Environmental Health Officer and Suitably Qualified Ecologist (SQE) in advance of the works commencing.

7.16.5 The CEMP will include details of best practice measures implemented during construction to protect ecology. In particular these include:

- **Ecological Protection Plan (EPP):** a plan will be prepared prior to any site clearance / construction works commencing on Site, and be submitted to the LPA and NRW for approval. The plan will include details of mitigation measures, which are required during site clearance / construction to ensure the protection of adjacent protected sites, notable habitats and protected / notable species.
- **Toolbox Talks** will be provided by a suitably experienced ecologist to all site personnel to inform them of ecological features at the Site including INNS, protected and notable species prior to the commencement of construction works. An associated registry of attendance will be signed and kept as a record and a copy of the toolbox talk left at the Site office.
- **Lighting:** If any task lighting is required outside daylight hours (typically 30 minutes after sunrise and up to 30 mins before sunset), directional lighting (towards the ground) with minimal upward spill will be implemented, to avoid light spill into adjacent habitats to avoid disturbance to commuting and foraging nocturnal protected species.
- **Species buffers:** Where protected / notable species are found during pre-construction checks (including for example nesting birds, resting / breeding otter, bat roosts and or badger setts), an appropriate buffer (based on best practice guidance for relevant species where available) will be demarcated and no construction works will take place within this area, until the SQE has confirmed otherwise. If it is not possible to avoid disturbing any protected species found within / adjacent to the site, a licence will be sought from NRW which includes the necessary mitigation.
- **Excavations:** Good practice working methods will be adhered to which prevent any adverse impacts to otters, badgers or other mammals at the Site. Materials or plant will not be left overnight in an area that may prohibit access for to commuting otters and or badgers and excavations will not be left uncovered overnight. If any excavations are required to be left open overnight, a ramp will be provided / created to allow any animals to escape.
- **Trees:** Measures to protect trees to be retained within and immediately adjacent to the Site and access route will be implemented in line with the British Standard BS5837:2012 and recommendations made within the Arboricultural Impact Assessment.
- **Vegetation Clearance**

- **Breeding Birds:** vegetation clearance within the breeding bird season (March-August inclusive) should be avoided to prevent damage or destruction of occupied nests or harm to breeding birds. If this cannot be achieved, works within the core bird nesting season will require an inspection for breeding birds and their occupied nests by a suitably experienced ecologist no more than 24 hours prior to any works commencing. If nesting birds are found during the pre-construction checks, a buffer around the nest will be implemented of at least 5 metres as agreed with the ecologist and further work within the immediate and surrounding area will be delayed until young have fledged and left the nest, and the nest is no longer in use.
- **Invasive Non-Native Species:** All equipment and footwear will be cleaned thoroughly before entering the site with a suitable disinfectant. In addition, all equipment and footwear will be thoroughly cleaned and disinfected when leaving site.

- **Expert Advice:** If any protected species or signs of protected species such as a badger sett, or INNS are encountered during the works, all work in the vicinity is to stop immediately and a suitably qualified ecologist contacted as soon as possible for advice.
- **Access:** to the working areas will be via designated tracks only, and storage of materials will be at pre-agreed locations**.**
- **Traffic:** Any traffic plans produced will ensure that vehicle traffic is restricted to agreed low limits.
- **Litter:** All tools, food, litter and construction materials and packaging that may constitute a hazard to otters and other Section 7 mammals, as well as roosting birds and reptiles, will be removed daily from the site or placed within a secure location.

Design Mitigation

7.16.6 Measures have been built into the proposed development which seek to minimise the impact on the water environment once the development is operational. The measures include good culvert design, a series of SuDS features (referred to as a ‘treatment train’) as well as measures to manage point source pollution from the washery site. These are detailed within the Water Chapter (Chapter 11) and Figure 7.9.

7.16.7 This will include culverts designed to CIRIA Guide C786 standard to allow the same volume and rate of flow as the existing watercourse. Further design measures include bottomless culverts that are oversized relative to the existing channel dimensions where the risk of scour can

be managed safely. This would help to maintain natural processes and the ecological connectivity of the stream corridor.

7.16.8 Culverts, at appropriate locations, will provide wildlife corridors beneath the railway track, particularly for passage to local bat species. Although the exact design specification and location of culverts which provide wildlife corridors won't be provided until the detailed design stage indicative locations are shown in Figure 7.9.

7.16.9 The SuDS features would manage surface water run-off across the testing track, washery site, development roads and car parks. The appropriate SuDS features required to mitigate impacts has been calculated based on the Simple Index Approach, as specified in the SuDS manual, and will be subject to Sustainable Drainage Approval body approval (SABS). The Simple Index Approach is the recognised method of assessing water quality within the Welsh Government Statutory Standards for SuDS.

7.16.10 SuDS, as details within the Drainage Strategy and shown on Figure 7.9, will also provide biodiversity value through the use of native planting, as guided by input from landscape and ecology experts to ensure the creation of species rich wetland habitats.

7.16.11 The track drainage design would adhere to Network Rail Standard NR/L2/CIV/005 module 9 on drainage design. The standard states that environmental issues related to a new or existing drainage system will be identified and a potential form of mitigation proposed and supplied. The standard further states that where the quality of discharge is a risk and non-compliant to legislation, a relevant treatment shall be proposed.

7.16.12 Landscape design will comprise native tree and shrub planting to within the Site, to provide screening and new habitat. This is detailed within the Landscape Chapter (Chapter 9) and shown in Figure 7.9. Planting and other landscape measures will be implemented during the earliest, suitable planting season. Tree and shrub species will be comprise locally sourced broadleaved native species. Furthermore, tree and plants will be sourced in accordance with Defra / NRW and industry guidance to prevent the spread of disease and INNS.

7.16.13 As detailed in the Noise Chapter (Chapter 10) noise mitigation will be integrated into the design through the construction of noise barriers at locations where noise levels during operation are modelled as being above existing levels.

7.16.14 In addition, the re-use of suitable materials within undeveloped areas including colliery spoil within the washery and embankments will provide a suitable substrate for the natural establishment of local grassland flora, heathland, lichen and fungi assemblages.

7.17 Assessment of Effects

7.17.1 Potential impacts of the Project on the biodiversity present (as detailed in the Ecological Baseline Section) are likely to occur in a number of ways both during construction and operation.

7.17.2 These impacts to biodiversity may be both temporary and permanent, and direct and indirect. The direct effects are habitat loss and severance, habitat damage / degradation from disturbance, disturbance to species and species mortality. Indirect effects are of displaced individuals on the occupancy of alternative habitat, including reduced foraging success, increased competition and predation, genetic isolation and inbreeding, which can lead to local extinctions.

7.17.3 A scheme wide summary of the main potential impacts is provided below.

Habitat Loss

Habitat Loss

7.17.4 Construction for the Project will result in some habitat loss, within the Washery site, an area of the Site which has been unaffected by the Nant Helen Complementary Restoration Earthworks Project; although this will be largely be within existing areas of development.

7.17.5 The areas within the Washery area which would require clearance to facilitate development, largely comprise buildings or other man made habitats associated with the current operations of the Washery. It is acknowledged that some of the affected habitats are notable, and support protected and notable species, which may be directly and or indirectly affected by habitat loss. Habitat loss will affect one SINC within the washery but will not affect any protected sites in the site or the wider area.

7.17.6 Areas within the Nant Helen site will have been previously cleared as part of the Nant Helen Complementary Earthworks Project, and left to re-establish as grassland and woodland. As such these will be lost where new railway infrastructure is installed. The proposed road in the eastern extent of the Nant Helen site will also require further habitat loss comprising marshy grassland and acid grassland, as well as some mixed woodland.

7.17.7 The operation of the Site as a rail testing, maintenance, research, development and storage facility will result in no further habitat loss.

7.17.8 Opportunities exist within the Washery for small-scale habitat creation, inlcuding species rich grassland and wetland, to mitigate for habitat loss (some of which would also complement services such as drainage), creation of species rich grassland within the sidings area, in

addition to the enhancement of the retained marshy grassland and acid grassland within the Washery.

7.17.9 Landscaping will also create species rich broadleaved woodland across the site, and SuDS will provide new wetland habitats.

7.17.10 These retained and newly created habitats will provide opportunities suitable for a variety of fauna which are present in the local area.

7.17.11 Management and monitoring of any created / enhanced habitats will be crucial to ensure that the intended mitigation for this Project is implemented and successful.

Habitat Severance / Fragmentation

7.17.12 The majority of habitats within the Nant Helen site which are affected by the GCRE Project comprise newly established short grassland and woodland post construction of the Nant Helen Complementary Restoration Earthworks, particularly in the area of the proposed test tracks. No effects from habitat fragmentation are anticipated to these areas as habitat connectivity will be maintained. The proposed road in the eastern part of the Nant Helen site will be located through marshy grassland, acid grassland and an area of connecting waterbodies which are proposed as part of the Nant Helen Complementary Restoration Earthworks application, and will therefore be fragmented.

7.17.13 Habitat loss within the Washery will be within an area largely comprised of man made habitats and small areas of semi-natural habitats (which are not considered to provide significant value as habitat corridors such as neutral grassland alongside buildings and access tracks), and therefore it is not anticipated that this will result in any habitat severance / fragmentation.

7.17.14 Consideration will need to be given to actions during construction which may act as a barrier to species movement (as well as during operation), which are discussed below under ‘Species disturbances’. In addition, the construction of infrastructure such as fencing will need to be considered, and its long-term impacts on habitat re-establishment and species movement (i.e. during operation).

7.17.15 Barrier effects can lead to isolation both within and between populations of species and from specific resources vital for survival. This may also lead to indirect effects such as reduced foraging success, increased competition, genetic isolation and inbreeding, which could lead to local extinctions.

7.17.16 Mitigation will need to ensure that species present within the area of the Site, are able to continue to forage / commute / disperse within the local area. In addition, it will need to ensure that no animals are trapped as a result of project infrastructure, and also that any migration routes such as those of amphibians travelling between ponds, are not disrupted. Where larger species can travel across the

track, it will be essential to consider collision impacts and mitigate for these appropriately. Collision risk is discussed further under 'Species Harm and Mortality' below.

Habitat Damage / Disturbance

7.17.17 Habitats adjacent to the Site, or hydrologically connected i.e. aquatic habitats, are sensitive to changes in air and water quality during both construction and operation such as pollution events from fuel and chemical spills, dust, vehicle emissions, and from sediment run-off with high sediments loads. In addition, there is the potential for habitats to be physically disturbed as a result of construction machinery.

7.17.18 Any wetland habitat, and those in hydrological connectivity are likely to be sensitive to changes in water quality, which may occur as a result of pollution events. Species supported by these habitats may also be affected as result.

7.17.19 Changes in air quality can affect habitats and vegetation, particularly those sensive to increases in nitrogen oxides (NOx), sulphur dioxide (SO_2) and ammonia (NH_3), which can be absorbed directly (the relevant assessment benchmark for pollutant concentrations 'in the air' is referred to as a critical level) or indirectly i.e. through deposition, which affects the soil pH or causes nutrient enrichment of the soil. In addition, construction works may generate dust from the earthworks and or the use of access roads for vehicular movements.

7.17.20 Habitats within / adjacent to areas of construction works may be damaged through the spread of invasive, non-native species (INNS) from locations within the Site, and which would reduce the quality of any habitats where INNS newly establish. Furthermore, legal offences would result from any INNS being spread from the Site.

7.17.21 Any habitat damage may indirectly affect species, if this habitat becomes unavailable for foraging / commuting etc, and or directly if any species are harmed by pollution events.

7.17.22 The risk of pollution events and surface run-off can be reduced significantly through the implementation of best practice pollution prevention and control measures during construction and operation, together with measures such as the use of fencing to demarcate retained habitats or areas of INNS which are not to be disturbed. Where disturbance to INNS is likely, additional control measures will need to be implemented such as appropriate disposal of disturbed INNS and cleaning of machinery, equipment and footwear. Management and monitoring post construction will also be required to ensure INNS are controlled within the Site.

Species Disturbance

7.17.23 Construction activities (including associated activities such as site clearance), and operation may result in effects such as noise, vibration and lighting, and which may significantly impact sensitive species such as bats, otter, badger, breeding / wintering birds etc. Disturbance from lighting, noise and vibrations are particularly significant to bats or badgers, which may abandon roosts / setts, alter foraging / commuting flight paths, and alter foraging based on a change in foraging resource. Such effects could result in reduced foraging / breeding success, and the use of critical energy reserves.

7.17.24 Vibration effects are anticipated during construction as a result of piling which will be required for the maintenance shed and associated buildings, ancillary and carriage wash buildings, and Overhead Line equipment (OLE) foundations. In addition the proposed acoustic barriers are likely to require piling. These could have impacts on ecological receptors, particularly sensitive species such as roosting bats and badger, and will need to be considered. Task lighting during construction is anticipated to be required during winter months only. Any lighting in winter months is considered to be less significant for some sensitive species (for example bat foraging / commuting will be significantly less at this time).

7.17.25 During operation permament lighting is proposed around buildings, between sidings, platforms and access roads. There will be no lighting around either of the test tracks however. Noise levels may be significantly higher during train operation, and therefore affect sensitive species in the vicinity of the tracks; although there will be no significant vibrations during operation (see Chapter 10; Noise).

Species Mortality / Harm

7.17.26 Harm / mortality can occur to species as a result of construction activities including any site clearance. There is an increased risk to less mobile species, and or species that have young or which are in hibernation. Entrapment to species, for example in any open excavations created during construction (particularly if left overnight and during periods of the year when certain species are more active) may also result in harm / mortality to mobile species.

7.17.27 Harm / mortality could also occur during operation particularly as a result of collision with trains and site traffic, although the levels of traffic are not anticipated to be significantly different to those currently associated with mining activities on the site. Collision risk is likely to be much greater at the location of the test track, due to the regular use of the tracks by trains and speed of the trains. Furthermore, where regularly used dispersal / migration routes for species such as amphibians travelling between ponds are present, there could be increased impacts from collisions.

7.17.28 Collisions between animals and operating trains will be minimised to an extent through the installation of fencing around the operational site. However, it is acknowledged that standard fencing will not be a barrier to movement by smaller species such as amphibians, and others such as badgers have the ability to dig underneath such structures. Species such as bats and birds, will be at risk of collision during flight, particularly if any habitats suitable for foraging / nesting etc. establish along the railway.

7.18 Assessment of Impacts and Significance

7.18.1 The following sections characterise and evaluate the significance of potential impacts of the scheme on ecological receptors during the construction and operational phases.

7.18.2 In accordance with the CIEEM guidelines, impacts have only been assessed in relation to those features of local or greater ecological value and / or are subject to legal protection, which are also potentially vulnerable to impacts from the proposed scheme.

7.18.3 On this basis, the following receptors have been taken forward for detailed assessment:

- Statutory Designated Sites – Three SACs: Coedydd Nedd a Mellte, Cwm Cadlan, and Blaen Cynon, 12 SSSIs: Nant llech, Gors Llwyn Onwllwyn, Caeau Ton-y-Fildre, Waun Ton-y-Spyddaden Rhos Hen-Glyn-Isaf, Mynydd Du, Ogof Ffynnon Ddu, Ogof Ffynnon Ddu - Pant Mawr, Nant y Rhos, Craig y Rhiwarth, Dyffrynoedd Nedd a Mellte a Moel Penderyn and Caeau Nant y Llechau.
- Non-statutory Designated Sites - eight SINCs: Gorsllwyn Meadows, Onllwyn Coal Washery, Dyffryn Cellwen, Banwen Pond, Intervalley Road, Adjacent to Gorsllywn and Aberhenwaun Uchaf and Land behind Marigold Place.
- Mosaic of habitats (as detailed in the Future baseline) –marshy grassland, enclosed pasture, acid grassland, broadleaved woodland, waterbodies, peat-mire habitat, heathland / acid grassland, neutral grassland, scrub, mixed woodland, short ephemeral vegetation. Also buildings, hardstanding and bare ground
- Protected and Notable species including:
  - Fungi;
  - Invertebrates;
  - Amphibians;
  - Reptiles;
  - Breeding birds;
  - Wintering birds;

- Badger;
- Otter;
- Roosting bats;
- Commuting / foraging bats;
- Notable mammals; and
- Invasive species.

7.18.4 As detailed in the existing baseline survey information (Appendix B) dormouse and water vole were considered unlikely to be present within the site, and habitats of the Future baseline would also not be suitable.

7.18.5 In generic terms, the potential ecological impacts of the construction and operation of the scheme may be categorised as follows:

- Habitat loss during construction and operation;
- Habitat severance during construction and operation (and impacts to species);
- Habitat disturbance / degradation (including impacts on water quantity or quality or from changes associated with air quality) during construction and operation;
- Disturbance / displacement to fauna (e.g. visual impact, noise and lighting) during construction and operation; and
- Mortality / injury to fauna during construction (e.g. direct impacts during vegetation clearance, trapping within excavations, collisions with site vehicles / plant).

7.19 Assessment of Construction and Operational Impacts

Statutory Designated Sites

7.19.1 A draft Habitat Regulations Assessment (HRA) has been prepared and is detailed in Appendix 7W Likely effects on European sites (together with nationally and locally designated sites) are discussed below.

Habitat Loss and Degradation

7.19.2 Potential effects could occur to nearby SACs during construction and operation. Coedydd Nedd a Mellte SAC's closest compartment is 2.9 km from the proposed works. Cwm Cadlan is 9.5 km from the proposed works. The closest compartment of Blaen Cynon is located 9.2 km from the Site. Impacts to European Sites are also detailed within the separate HRA included in Appendix 7W, Volume 2.

7.19.3 Coedydd Nedd a Mellte SAC is designated for its important woodland and Cwm Cadlan SAC is designated for its Molinia meadows and alkaline fen habitat. Due to their distance from the site potential effects on these two SACs are limited to [1] water quality effects: pollutants (fuel, chemical spills, dusk and vehicle and train emissions) from construction or during operation of GCRE or high sediment load in surface water runoff from construction areas; and [2] air quality effects both during construction and operation (vehicle traffic and operation of trains): increases in levels of nitrogen oxides (NOx), sulphur dioxide (SO2) and ammonia (NH3), which can be absorbed directly or indirectly.

7.19.4 Cwm Cadlan SAC and Blaen Cynon SAC are not hydrologically connected to the Project area, and therefore there is no pathway for effects from changes in water quality. There is the potential for changes in water quality to adversely affect Coedydd Nedd a Mellte SAC, since it is located is in the downstream catchment of the Site during construction and or operation, although at 2.9 km from the proposed works it is considered that any pollution / sedimentation of connecting watercourses would have been diluted, and any effects would not be significant to the SAC.

7.19.5 Standard best practice pollution control measures as detailed in Section 7.16, and which will be incorporated into a CEMP, will avoid adverse effects as a result of changes in water quality, and ensure the protection of Coedydd Nedd a Mellte SAC, therefore complying with UK legislation.

7.19.6 As discussed in the Air quality chapter (see Chapter 14; air quality), only SACs within 2km were screened in based on existing air quality guidance, therefore excluding Coedydd Nedd a Mellte SAC, Cwm Cadlan SAC and Blaen Cynon from the assessment. The closest SAC is Coedydd Nedd a Mellte SAC which occurs 2.9km to the south east of the site. The air quality assessment reports potentially significant effects from nitrogen deposition on ecological receptors, including protected sites; however, considering that effects of nitrogen deposition on the nearest SSSI (Gorsllwyn), which occurs immediately to the south east of the washery, are only significant at 50m or less from the development, it is considered that effects from nitrogen deposition on any other protected sites which occur at further distances to the south east (including Coedydd Nedd a Mellte SAC, Cwm Cadlan SAC and Blaen Cynon SAC) would not be significant.

7.19.7 Blaen Cynon is designated for its population of marsh fritillary; a species which exists in metapopulations and are known to range up to 15 km from its primary habitat[7]. Marsh fritillary are also known to be present in the SINC: Land at Marigold Place, approximately 900 m south of the Site, the Wildlife Trust Nature Reserve, approximately 1.5 km north west of the Site, at Rhos Common, Crynant, approximately 3.5 km south west of the Site, in addition to being present in Ystradgynlais further to the north. These marsh fritillary

sites are considered to contribute to a significant metapopulation within the region.

7.19.8 Potential effects could occur to this species, if they were to occur within any habitats of the Site or adjacent habitats. Although purple moor grass and rush pasture (or Rhos pasture) that supports the larval foodplant devil's-bit scabious (and therefore the habitat often used by this species) is present within and adjacent to the Site, invertebrate surveys[12] found no evidence of marsh fritillary using habitats within the Site. Surveys assessed the majority of Rhos pasture habitat within the Site as being unsuitable for this species (due to being in poor condition as a result of agricultural improvement and overgrazing and having little or no growth of the larval food plant). Devil's-bit-scabious was however, abundant in the south west of the Nant Helen site (adjacent to the Afon Dulais, approximately 1 km south of the Site), as well as occasional plants being present in other areas of marshy grassland.

7.19.9 Therefore, marsh fritillary, or metapopulations of this species (associated with local populations), are not considered to be using the Site. Furthermore, although there would be a loss of marshy grassland / Rhos pasture habitat within the Site, this would exclude the area with abundant devil's bit scabious in the south west of the Site and be limited to degraded Rhos pasture, which supports little or none of this food plant. The extent of degraded habitat lost would also be a very small proportion of what is available within the wider area.

7.19.10 The loss and disturbance of habitats proposed through the Nant Helen earthworks, is detailed in the Ecology Chapter of the Environmental Impact Assessment for the Nant Helen Complementary Earthworks project. As such, the potential construction impact is greatly reduced and considered to have no likely effect on the habitats associated with the marsh fritillary within the suitable habitat in the wider area in relation to the GCRE Project.

7.19.11 Potential construction and operational impacts to known or suitable marsh fritillary habitat could comprise indirect effects for example from changes in air or water quality. The likelihood of effects is considered to be low, due to the distance of these habitats from the Site however as discussed above in regard to other SACs, standard best practice will avoid such effects and ensure the protection of these marsh fritillary sites. No direct effects to marsh fritillary or suitable habiat are anticipated, during construction due to the distance of suitable / known habitat from the Site, and their assumed absence from the Site.

7.19.12 During operation, there is the potential risk of marsh fritillary mortality as a result of collision with high speed trains which will be

[12] Further ecological details provided in the: Nant Helen Invertebrate Report; Arup (2019) prepared for Celtic Energy

in operation. There is also the potential risk of collision of marsh fritillary with vehicles within the Site during operation. The potential risk from train / vehicle traffic is dependant on individuals of this species being present within the Site. Currently, the Site supports no suitable habitat however the future baseline supports marshy grassland managed to increase its species richness, and as such has the potential to support a higher abundance of devil's bit scabious and be more suitable for marsh fritillary.

7.19.13 Impacts on butterfly mortality from collison with trains, has not been well researched although studies on vehicle traffic collision have shown that there can be a significant risk of mortality to butterflies dependant on various factor such as the presence of species rich verges[13]. It is acknowledged, however, that the risk of collision with train traffic is likely to be significantly lower than with road / highway traffic, due to the lower number of trains travelling at one location on a track. In addition, potential collision with vehicles on roads within the Site, is considered to be a low risk since the proposed roads will not be used frequently.

7.19.14 Therefore despite the potential presence of marsh fritillary within habitats adjacent to the train tracks and roads, the anticipated low volume of train and vehicle traffic is not considered to be a significant collision risk to local marsh fritillary populations, or metapopulations. In addition, there would be no potential adverse impacts on the Blaen Cynon SAC metapopulations. More importantly, the enhancement of marshy grassland within the Site for marsh fritillary is considered to be a significant benefit to important metapopulations of this species and should outweigh the potential low risk of species mortality from collision.

7.19.15 Any impacts on SSSIs, would also be of significance at an National level, due to their designated status. The Nant Llech SSSI (designated for its stream and associated cliff communities and woodland), Gors Llwyn SSSI (designated for its mire and acid pasture) and Caeau Ton-y-Fildre SSSI (designated for its unimproved herb-rich pastures) are hydrologically connected to the Site. As such there is the potential for these SSSIs to be adversely affected by changes in water quality (both surface and groundwater) during construction for example as a result of pollution events and or surface run-off with a high sediment load, in addition to changes in water quantity for example increasing run off as a result of the removal of vegetation or additional discharges. It is not anticipated that the proposed construction acivities would affect the groundwater regime, and or groundwater dependant ecosystems such as these SSSIs however (details provided in Chapter 11; water).

[13] Skórka, Piotr & Lenda, Magdalena & Moroń, Dawid & Kalarus, Konrad & Tryjanowski, Piotr. (2013). Factors affecting road mortality and the suitability of road verges for butterflies. Biological Conservation. 159. 148–157. 10.1016/j.biocon.2012.12.028

7.19.16 During operation, potential impacts to water quality and ground water quality could occur through accidental spills from train or vehicle traffic. As discussed in the Water Chapter, these impacts can be mitigated through best practice design mitigation (detailed in Section 7.16) such as the track drainage systems and SuDS. There are potential risks of pollution as a result of effluent from the washery site during operation, which will require detailed mitigation measures regarding the drainage system here to be provided at the reserved matters stage. There is also the potential for pollutants within surface water features to infiltrate into groundwater. Measures such as slab tracks to direct effluent into specific drainage systems will ensure there is no seepage of pollutants into groundwater. Further mitigation measures are detailed within Section 7.21 and 7.22 (and Chapter 11; water), which will ensure there are no significant residual effects on SSSIs as a result of changes in water quality on SSSIs.

7.19.17 Changes to groundwater and surface water quality during operation may impact designated sites. The changes in extent of hardstanding through the proposed test track and washery site may result in increases in the volume of surface water run off. In addition, there is the potential for the removal of existing discharge to surface water features resulting in a change of surface water quantity. No additional discharges are proposed however and surface water run off will be treated by the SuDS design (i.e. ponds and swales), ensuring that any water discharged into surface waters will maintain the existing hydrological regime.

7.19.18 These SSSIs could also be affected by changes in air quality as a result of increases in dust, or pollutants such as nitrogen oxides (NOx), sulphur dioxide (SO2) and ammonia (NH3). Air quality assessments have identified potential impacts from air quality as a result of train emissions (namely NOx), and dust, during construction and operation, although these effects are only considered likely to effect nearby ecological receptors such as Gors Llwyn (see Chapter 14; air quality). Effects from car emissions during construction and operation have been screened out of the air quality assessment.

7.19.19 Standard best practice pollution control measures as detailed in Section 7.16, will avoid adverse effects as a result of dust and or changes in water quality, as discussed above.

7.19.20 Modelling has shown potential impacts on Gors Llwyn SSSI, as a result of an increase in nitrogen deposition above 1% of the lower critical load. Significant effects are possible up to 100 m from the Site boundary (and into the SSSI). Gors Llwyn SSSI habitats within the area modelled for air quality impacts support raised bog, one of the most sensitive habitats to nitrogen deposition (with critical loads being 5-10 kg N/ha/yr) along with associated habitats such as marshy grassland. Studies have shown that nitrogen deposition impacts on bog habitats may comprise loss of species such as ling heather (*calluna vulgaris)* and dominance by some species such as hare's tail

cottongrass (*Eriophorum vaginatum*). General effects on from nitrogen deposition on sensitive habitats comprises the dominance of nitrogen loving species, which can outcompete other plants particularly those which are sensitive to changes in nitrogen – leading to the plant communities associated with the SSSI/habitat becoming more simplified in structure and less diverse in species.

7.19.21 At the closest point of modelling with Gorsllywn SSSI (and predicted highest levels of nitrogen deposition), the baseline nitrogen levels are 17.7 kg N/ha/yr and modelled to increase from 17.6 kg N/ha/yr to 17.8 kg N/ha/yr as a result of the train operations within the site, therefore with a 0.6% change of 0.1 kg N/ha/yr). However in relation to the lower critical load, there is a 2.1% change. This demonstrates that although the % change is greater than 1%, it is a very small change in relation to high baseline levels, and even without the development there would be a significant changes in nitrogen deposition required to reduced levels to the lower critical load. Guidances states that where baselines are already high, scope for further declines in air quality will necessarily be limited[14], since if a site is currently exceeding its critical loads and not achieving its relevant biodiversity objectives, then damage to the site is already likely to be occurring or has already happened.

7.19.22 It is also acknowledged that the air quality modelling was based on highly conservative assumptions in relation to the type of diesel trains and likely emissions. Should other trains be used, it is highly likely the emission of nitrogen dioxides would be reduced (by at least a third), and therefore levels of nitrogen deposition reduced significantly. Therefore any effects would potentially not be significant should other lower emission diesel trains be used. In addition, any significant effects will be temporary as after 5 years, it is proposed that diesel trains will be replaced with zero emission trains (i.e. electric or hydrogen) if it is possible to do so. If this is not possible, low emission diesel trains will be used; therefore ensuring that there are significantly lower diesel emissions during operation after 5 years. With the use of lower emission diesel or zero emission trains it is anticipated that there would be no significant effects on Gorsllywn SSSI.

7.19.23 Considering the above, it is not anticipated that there would be actual adverse effects on Gorsllwyn SSSI, although it is recommended that a precautionary approach is taken with regard to air quality impacts as a result of emissions by updating modelling data, further to any additional information being provided on the train operation to confirm potential effects from nitrogen deposition. Unless it can be shown that there are no significant changes further mitigation should be implemented to manage potential increases in nitrogen deposition for example through sympathetic grazing, which can help reduce small quantities of nitrogen through accumulation in livestock and

[14] CIEEM (2021) Advisory note: Ecological Assessments of Air Quality Impacts

maintain habitats in favourable condition by reducing the dominance of competitive species. Long term monitoring of the key habitats would also be required, and adjustments made to management in discussion with NRW subject to the results of any monitoring. This would need to complement existing grazing undertaken as part of the SSSI management.

7.19.24 Further mitigation is detailed in Sections 7.21 and 7.22, in addition to 7.25 (monitoring) to address potential temporary effects from nitrogen deposition on Gorsllwyn SSSI, and to protect the SSSI in accordance with relevant UK legislation.

Non Statutory Designated Sites

7.19.25 Two SINCs: Onllwyn Coal Washery and Dyffryn Cellwen occur within the Site boundary, in the northern and southern part of the Washery. One SINC, Gorsllywn Meadow, falls partially within the Site boundary, in the northern part of the Washery site. There are also five other SINCs within 1 km of the Site. Any effects would be of significance at a County level, should they occur. A small area of the Onllwyn Coal Washery is within the development footprint, and therefore habitats will be lost as a result (the total extent is approximately 1 ha, of open mosaic grassland habitat and marshy grassland). There is no development within the boundary of the Gorsllywn Meadow SINC, or Duffryn Cellwen SINC and therefore there will be no habitat loss within these designated habitats, although there is the potential for impacts from habitat degradation. Habitat degradation could take the form of direct physical disturbances during construction from vehicles etc, although standard best practice mitigation such as the implementation of Heras fencing around these local sites will be implemented. There is also the potential for habitat pollution to all three SINCs, as a result of changes in water quality or air quality – as discussed above in regard to SACs and SSSIs, in addition to changes water quantity as a result of an increase insurface run off. There are also potential impacts on SINCs within the wider area, as as a result of changes in water quality / quantity, including Adjacent to Gors Llwyn, Intervalley Road, Banwen Pond, Onllwyn coal washery, Gorsllwyn meadows, Blaendulais mashy grassland, Land at marigold Place and Aberhenwaun SINCs which comprise marshy grassland (as well as other habitats), and are likely to be hydrologically connected to the Site. As discussed in Chapter 11; Water, it is not anticipated that there would be any impacts on the hydrological or groundwater regime therefore impacts on SINCs are not anticipated. Potential pollution / sedimentation or changes in surface water quantity will be treated through the implementation of standard best practice mitigation during construction and the implementation of SuDS during operation, in addition to specific treatment of effluent where required as discussed in Section 7.16 and 7.21.

7.19.26 Air quality effects on the majority of SINCs are considered to be negligible due their distance fom the Site, and have been screened out within the Air Quality Chapter assessment (Chapter 14). SINCs: Onllwyn Coal Washery, Dyffryn Cellwen and Gorsllywn Meadow which occur within the Site boundary, due to their proximity could be affected by changes in air quality however. As discussed within the Air quality chapter, and above in relation to SSSIs (paragraphs 7.20.18 – 7.20.22), significant effects on these SINCs is possible, via dust during construction and emissions during operation. Based on modelling although conservative assumptions have been made in relation to the type of diesel train used and subsequent emission levels. Additionally, it is acknowledged that potential effects are likely to be temporary for the 5 year period until all trains are zero emission or significantly reduced as described in 17.19.22.

7.19.27 Modelling has shown potential impacts on two of the three SINCs within the site boundary including Gorsllywn meadows and Onllwyn coal washery, as a result of an increase in nitrogen deposition above 1% of the lower critical load, during operation. These SINCs support purple moor grass and rush pastures and acid grassland which have critical loads of 10 – 15 kg N/ha/yr. These habitats are therefore less sensitive to nitrogen deposition, compared to others such as bog habitats within the nearby Gorsllwyn SSSI although impacts could comprise the dominance of competitive species, and result in a less species rich grassland. Similarly to modelling for the SSSI, there are only small changes in nitrogen deposition in relation to the baseline however.

7.19.28 There is a % change of 0.9 kg N/ha/yr (gorswllwyn meadows), 0.7 kg N/ha/yr (onllwyn coal washery – receptor point 1) and 0.9 kg N/ha/yr (onllwyn coal washery – receptor point 2). However in relation to the lower critical load, there is a 1.6% change for gorsllwyn meadows SINC, and for onllwyn coal washery there is a 1.3% change (receptor point 1) and 1.6% change (receptor point 2).

7.19.29 This demonstrates that although the % change is greater than 1%, it is a very small change in relation to high baseline levels, and even without the development there would be a significant changes in nitrogen deposition required to reduced levels to the lower critical load. A stated in CIEEM guidance, if these sites are already being damaged by high levels of nitrogen, it is likely that small increases are unlikely to result in significant effects on these SINC habitats.

7.19.30 It is also acknowledged that the air quality modelling was based on highly conservative assumptions in relation to the type of diesel trains and likely emissions. Should other trains be used, it is highly likely the emission of nitrogen dioxides would be reduced (by at least a third), and therefore levels of nitrogen deposition reduced significantly. Therefore any effects would potentially not be significant should other lower emission diesel trains be used. In addition, any significant effects will be temporary as after 5 years, it is proposed that diesel

trains will be replaced with zero emission trains (i.e. electric or hydrogen) if it is possible to do so. If this is not possible, low emission diesel trains will be used; therefore ensuring that there are significantly lower diesel emissions during operation after 5 years. With the use of lower emission diesel or zero emission trains it is anticipated that there would be no significant effects on SINCs within the site boundary.

7.19.31 Similary to the conclusion on likely effects to the SSSI from nitrogen deposition, it is not anticipated that there would be actual adverse effects on the two SINCs within the site. However, it is recommended that a precautionary approach is taken with regard to air quality impacts as a result of emissions by updating modelling data, further to any additional information being provided on the train operation to confirm potential effects from nitrogen deposition. Unless it can be shown that there are no significant changes further mitigation should be implemented to manage potential increases in nitrogen deposition for example through sympathetic grazing and long term monitoring habitats. As detailed above under 'SSSIs' sympathetic grazing can help reduce small quantities of nitrogen through accumulation in livestock and maintain habitats in favourable condition by reducing the dominance of competitive species. Long term monitoring would be required to ensure any grazing is successful in maintaining species diversity.

7.19.32 The implementation of best practice mitigation as detailed in Section 7.16 is considered sufficient to address potential impacts from dust and changes in water quality on SINCs.

7.19.33 Additional measures are required as detailed in Sections 7.21 and 7.22, in addition to 7.25 (monitoring) to address potential temporary effects from nitrogen deposition.

7.19.34 A Wildlife Trust Reserve is located approximately 1.5 km west of the Site. With the implementation of standard best practice mitigation measures for water and air quality, similarly to SINCs, potential adverse effects will be avoided. No effects from nitrogen deposition are anticipated during operation due to the distance of the Wildlife Trust site from the project boundary. Potential effects on marsh fritillary and mitigation are discussed above in paragraphs 7.19.7 – 7.19.14.

7.19.35 There are a number of areas of ancient woodland, within 1 km of the Site. There is one area of recorded ancient woodland within the Project boundary[15]. As previously discussed in the separate technical note (Appendix 7R, Volume 2), the area of conifer plantation to be lost as a result of the project, is not PAW due to previous mining activities in this area. Another area of confirmed ancient woodland is

[15] in accordance with the Ancient Woodland Inventory: https://naturalresources.wales/evidence-and-data/research-and-reports/ancient-woodland-inventory/?lang=en

within the Site boundary and occurs adjacent to the existing track which is proposed for upgrades to facilitate vehicle movement during the construction and operation of GCRE. There is a risk that this habitat would be affected by air quality changes, namely increases in dust during construction and nitrogen deposition as a result of train emissions during operation. It should not be disturbed / lost as a result of the GCRE development however.

7.19.36 Modelling has shown potential impacts on the area of ancient woodland within the Site boundary (AW8) and others within the vicinity of the Site (AW4, 5, 6 and 7) within the site boundary, as a result of an increase in nitrogen deposition above 1% of the lower critical load, during operation. AW8 supports broadleaved woodland which has a critical load of 10 - 20 kg N/ha/yr), therefore being less sensitive to nitrogen deposition, than other habitats such as bog within the nearby Gorsllwyn SSSI. AW8 has been shown to support mature oak woodland (NVC category W11 *Quercus petraea – Betula pubescens – Oxalis acetosella* woodland). Frequent ground flora species include creeping soft-grass, bluebell and wood sorrel. Mosses and liverworts were recorded within the woodland including mosses: *Mnium hornum, Polytrichastrum formosum, Plagiothecium undulatum, Kindbergia praelonga, Rhytidiadelphus squarrosus, Dicranum majus, Hypnum cupressiforme, Brachythecium rutabulum, Eurhynchium striatum Plagiothecium undulatum* and liverworts *Lophocolea bidentata, Chiloscyphus polyanthos (L.) Corda* and *Diplophyllum albicans.* No survey information is available on the other ancient woodlands (AW4, 5, 6 and 7) as identified in the ancient woodland inventory/map, to verify their status as ancient woodland or describe the woodland structure and composition, since these were outside of the study area.

7.19.37 Impacts from nitrogen deposition on woodland vegetation composition is not well understood, however reports have documented an increase in nitrogen deposition resulting in reductions in soil carbon-nitrogen ratio, acidification and increased nitrate leaching[14]. There are potential effects on woodland through the increase in nitrogen tolerant species which out compete many bryophytes (mosses and liverworts) and plants, degrading the ecological integrity of the woodland. Trees can also suffer from discolouration/bleaching and increased susceptibility to drought, frost and diseases. In addition woodland fungi and lichen have been shown to be particularly sensitive to nitrogen deposition including ectomycorrhizal species (associated with tree roots). Adverse effects on ectomycorrhizal species can affect tree health, and effects on lichen can affect invertebrates communities present[16].

7.19.38 Similarly to modelling for the SSSI and SINCs, there are only small changes in nitrogen deposition in relation to the baseline. For AW8

[16] https://www.woodlandtrust.org.uk/media/1687/ammonia-impacts-on-ancient-woodland.pdf

the baseline nitrogen levels are 19 kg N/ha/yr and modelled to increase from 17.6 kg N/ha/yr to 17.8 kg N/ha/yr as a result of the train operations within the site (with a 1.3% change of 0.1 kg N/ha/yr). However in relation to the lower critical load, there is a 2.3% change. The other woodlands (AW4-7) have changes between 1.0 and 1.3% in relation to the lower critical load, therefore showing that these are much less in relation to AW8.

7.19.39 This demonstrates that although the % change is greater than 1%, it is a very small change in relation to high baseline levels, and even without the development there would be a significant changes in nitrogen deposition required to reduced levels to the lower critical load. As stated in CIEEM guidance, if these sites are already being damaged by high levels of nitrogen, it is likely that small increases are unlikely to result in significant effects on these habitats.

7.19.40 It is also acknowledged that the air quality modelling was based on highly conservative assumptions in relation to the type of diesel trains and likely emissions. Should other trains be used, it is highly likely the emission of nitrogen dioxides would be reduced (by at least a third), and therefore levels of nitrogen deposition reduced significantly. Therefore any effects would potentially not be significant should other lower emission diesel trains be used. In addition, any significant effects will be temporary as after 5 years, it is proposed that diesel trains will be replaced with zero emission trains (i.e. electric or hydrogen) if it is possible to do so. If this is not possible, low emission diesel trains will be used; therefore ensuring that there are significantly lower diesel emissions during operation after 5 years. With the use of lower emission diesel or zero emission trains it is anticipated that there would be no significant effects on ancient woodlands within vicinity of the site.

7.19.41 Similary to the conclusion on likely effects to the SSSI and SINCs from nitrogen deposition, it is not anticipated that there would be actual adverse effects on the ancient woodland sites. However, it is recommended that a precautionary approach is taken with regard to air quality impacts as a result of emissions by updating modelling data, further to any additional information being provided on the train operation to confirm potential effects from nitrogen deposition. Unless it can be shown that there are no significant changes further mitigation should be implemented to manage potential increases in nitrogen deposition, such as dedicated woodland management prescriptions. This will include management such as grazing which ensures ground flora does not become dominated by nitrogen loving species, and will also reduce accumulation of nitrogen through the use of livestock. Long term monitoring of the key habitats would also be required, and adjustments made to management in discussion with NRW subject to the results of any monitoring.

7.19.42 As discussed above in relation to SINCs, the implementation of best practice mitigation as detailed in Section 7.16 is considered sufficient

to address potential impacts from dust and changes in water quality on ancient woodland, however additional measures are required as detailed in Sections 7.21, 7.22, in addition to 7.25 (monitoring) to address potential temporary effects from nitrogen deposition.

Habitats

Habitat loss

7.19.43 Habitats within Nant Helen will have been cleared as part of the Nant Helen Complementary Earthworks, and will support establishing acid grassland and some woodland on the newly created embankments and cuttings (which form part of the Future Baseline, along with adjacent habitats which have been retained or created – see Figure 7.11). As such, areas of newly established acid grassland and a small area of woodland will be lost from the tracks (approximately 66 ha, including the working width of the railway track) where new railway infrastructure is installed. The proposed road in the eastern extent of the Nant Helen site, and partly within the washery will also require further habitat loss (4 ha). Habitats affected by the road will comprise largely marshy grassland, acid grassland and new waterbodies in addition to smaller areas of mixed woodland.

7.19.44 GCRE works will also affect habitats within the Washery (see Figure 7.11) (approximately 7 ha) and around the sidings (approximately 4 ha) The majority of habitat loss in the washery will comprise buildings, hardstanding, tarmac surfaces and spoil / bare ground (man-made habitats created for the Washery operations) i.e. habitats with negligible conservation value. Other habitats likely to be lost, due to being in the footprint of the development will include neutral grassland, acid grassland, dry heath – acid grassland mosaic, scrub, ponds and ephemeral vegetation. Species rich acid, neutral and marshy grassland are considered to be notable habitats of conservation value. Habitat loss will be limited to very small areas of these habitats however. There will also be loss of habitats from the area of the sidings namely marshy grassland, and a smaller amount of ephemeral habitats and mixed woodland. A detailed breakdown of habitats is provided in Table 7.18 in Appendix 7T.

7.19.45 Habitats affected may support eyebright (*Euphrasia arctica ssp borealis*) - a notable species recorded in the NVC surveys, in the washery acid grassland habitats. None of the other notable vascular plants will be affected however.

7.19.46 Table 7.8 below details the extent of loss against each habitat type (across the washery, sidings and Nant Helen site), in addition to habitat retention and creation. A summary of habitat loss is also provided below (and explained in Table 7.17 in Appendix 7T):

- Marshy grassland = 17.80 ha

- Acid grassland = 51.33 ha
- Neutral grassland = 1.76 ha
- Dry heath – acid grassland = 0.98 ha
- Enclosed pasture = 4.17 ha
- Mixed woodland = 0.76 ha
- Broadleaved woodland = 18.96 ha
- Scrub = 1.62 ha
- Ephemeral vegetation = 5.30 ha
- Waterbodies / wetland habitats = 1.86 ha
- Total habitat loss = 104.54 ha

7.19.47 Due to the collective value of habitats within the Site, effects of habitat loss would be significant at a **County level,** in the absence of mitigation.

7.19.48 The operation of the Site as a rail testing, maintenance, research, development and storage facility will result in no further habitat loss.

7.19.49 Embedded mitigation is detailed in Section 7.16 (and illustrated on Figure 7.9), and details how the Site design will incorporate new landscaping and drainage in the form of SuDS, in addition to the creation of other habitats in undeveloped areas including acid grassland and marshy grassland (See Figure 7.9). This will include the track embankments in the Nant Helen site, around the sidings and within the washery. Areas of acid grassland will also provide suitable conditions for the establishment of acid grassland, and lichen and heathland communities. In addition, areas of short acid grassland, including where coillery spoil has been re-used will be suitable for the establishment of fungi.

7.19.50 As shown in Figure 7.9, affected waterbodies will be relocated eastwards within retained marshy grassland to avoid impacts of the proposed road.

7.19.51 In summary habitat creation / retention comprises:

- Marshy grassland = 10.05 ha of the existing marshy grassland SINC within the GCRE boundary (Gorsllwyn meadows and duffryn cellwen) retained within the washery will be enhanced through long term management. Additionally 51.65 ha will be retained within the GCRE project boundary.
- Acid grassland = 74.68 ha created around the sidings and on track slopes/embankments. This will be suitable for heathland, lichen and fungi establishment. 12.01 ha (of the existing SINC onllwyn coal washery) will be retained within the washery and subject to long term management.

- Mixed woodland = 1.98 ha will be retained and subject to enhancements through management.
- Broadleaved woodland = 23.08 ha will be created as a result of the site's landscaping for screening purposes. In addition 2.51 ha will be retained within the GCRE project boundary (north of the tracks).
- Waterbodies / wetland habitats = 50. 90 ha of ponds and wetland habitat will be created within the site. This includes SuDs which will comprise ponds, swales and ditches.
- Total habitat creation = **148.66 ha**
- Total habitat retention and enhancement = **24.04 ha**

7.19.52 In addition, retained and newly created habitats will be enhanced for example through their long term protection and sympathetic management.

Table 7.8: Table summarising loss per habitat type against habitat creation and habitat retention. This doesn't include calculations for buildings and areas of hardstanding or bare ground, and excludes the habitats proposed as part of the Nant Helen Restoration plan (which form part of the previous earthworks application). Numbers are shown in the detailed breakdown of habitat loss/gain in Tables 7.17 and 7.18 in Appendix 7T. It should also be noted that calculations are approximate since they are based on approximate GIS polygons within the Future baseline plan (7.9) and the habitat creation/enhancement plan (7.11).

Habitats affected (excluding buildings and hardstanding)	Total extent of habitat within red line boundary of GCRE	Habitat loss (Ha)	Habitat creation (ha)	Habitat retention and enhancement (Ha)	Habitats retained and protected (Ha)	Description of changes to habitat
Marshy grassland	139.98	17.80		10.05 (existing SINC)	51.65	Small areas of marshy grassland will be lost from the sidings and the Nant Helen site as a result of GCRE infrastructure and the access road. A small area of marshy grassland will also be lost as a result of landscaping planting required for GCRE. There will be no loss of marshy grassland from the washery site, and these areas will be retained and subject to management to enhance their value for nature conservation.
Acid grassland	231.94	51.33	74.68	12.01 (existing SINC)		Small areas of acid grassland will be lost from the washery and sidings and the Nant Helen site as a result of the GCRE infrastructure. A small area of acid grassland will also be lost as a result of landscaping planting required for GCRE. There will be larger area of acid grassland lost from the Nant Helen site at the locations of the tracks, where there will be newly establishing grassland on the recently formed earthworks. An area of existing acid grassland which forms the Onllwyn coal washery SINC will be retained and subject to long term management to enhance its value

						for nature conservation. New acid grassland will establish on the embankments and cuttings of the tracks within the Nant Helen site replacing lost acid grassland and woodland which forms part of the landscaping for the Nant Helen earthworks application.
Neutral grassland	1.76	1.76				A small area of neutral grassland which occur around the periphery of the washery buildings will be lost as a result of GCRE infrastructure: buildings and access road.
Dry heath / acid grassland	24.11	0.98				A small area of dry heath / acid grassland will be lost from the Washery.
Enclosed pasture	62.82	4.17				A small area of enclosed pasture will be lost as a result of landscaping planting required for GCRE.
Mixed woodland	4.18	0.76		1.98		A small area of mixed woodland (semi-natural and plantation) will be lost from the washery and the sidings as a result of GCRE infrastructure including the access road. A small area of plantation which is retained in the washery will be subject to management to enhance its value for nature conservation.

Broadleaved woodland[17]	27.11	18.96	23.08		2.51	New planting proposed as part of the Nant Helen earthworks habitat creation and enhancement will be lost where it is located on the northern track. There will be new broadleaved woodland creation as part of landscaping that is required for GCRE.
Conifer	2.60				2.60	An area of conifer will be retained north of the main track.
scrub	2.13	1.62				A small area of scrub will be lost from the washery site.
Ephemeral vegetation	5.30	5.30				A small area of ephemeral vegetation will be lost from the washery site.
Waterbodies / wetland features	8.70	1.86	50.90			Three ponds location within the smaller GCRE track will be disturbed/lost as a result of the access track but will be relocated east of the track. There are a large number of waterbodies and wetland features such as ditches/swales that will be created for GCRE as part of the SuDS design.
Total	505.56	**104.54**	**148.66**	**24.04**	56.76	

[17] including new planting lost from Nant Helen habitat creation and enhancement plan, and new landscaping comprising broadleaved woodland planting.

7.19.53 Additional mitigation measures are detailed in Sections 7.21 and 7.22 which will ensure there will be no significant residual effects on habitats as a result of the proposals. Section 7.25 details the specific requirements of long term management and monitoring of retained and newly created habitats to ensure they establish as species rich habitats. Additionally Section 7.23 describes how further measures can be implemented to provide enhancements to habitats.

Habitat Severance / Fragmentation

7.19.54 The majority of habitats within the Nant Helen site which are affected by the GCRE Project comprise newly established short grassland post construction of the Nant Helen Complementary Restoration Earthworks, particularly in the area of the proposed test tracks. No effects from habitat fragmentation are anticipated to these areas. The proposed road in the eastern part of the Nant Helen site will however be located through an area of connecting waterbodies which are proposed as part of the Nant Helen Complementary Restoration Earthworks application (and form the Future Baseline), and will therefore be fragmented. As detailed above under 'habitat loss' impacts to waterbodies will be mitigated for through the re-siting of this habitat.

7.19.55 In addition, the development within the Nant Helen site will include infrastructure which could act as an additional barrier, to the establishment of habitats and movement of species including high palisade fencing (during construction and operation) around the perimeter of the Site, stock fencing along the interior perimeter of the tracks (and enclosing grazed pasture) and noise barriers located at various locations around the track (within the Washery and Nant Helen site) (see also the Noise Chapter for further details). Palisade fencing will be approximately 1.8 m high and noise barriers will be 2 m high. Locations of fencing / barriers is shown on the Illustrative masterplan.

7.19.56 Species such as otter, badger, reptiles and Section 7 mammals, have been recorded within and adjacent to the Site, and are known to use habitat corridors present, for foraging / commuting, migrating and or dispersing to finding new territories, and may therefore be affected by the severance / fragmentation of habitats. Disturbances during construction and operation such as noise, lighting and vibration may also act as barriers to species movement within and across the Site. Specific impacts to species as a result of habitat severance / fragmentation are considered in the relevant species sections below.

7.19.57 Habitat loss within the Washery is within an area largely comprised of man made habitats and small areas of semi-natural habitats (which are not considered to provide significant value as habitat corridors such as neutral grassland alongside buildings and access tracks), and therefore

it is not anticipated that this will result in any habitat severance / fragmentation.

7.19.58 There will be new culverts and realignment in one section of a tributary of the Afon Dulais, where it occurs in the sidings. At this section the stream has a stony channel, and at the time of the survey was dry in sections. The majority of this section was also very overgrown at the time of the survey with bramble and other tall ruderals and scrub. The adjacent habitats were grazed pasture. No signs of protected species were found within this section of the Afon Dulais. If designed inappropriately, culverts can cause local scour, prohibit fish passage and impair downstream transport of sediment. However, the proposed culverts would be designed to CIRIA Guide C786 standard to allow the same volume and rate of flow as the existing tributary. The watercourse is not considered to provide optimal habitat for fish passage. As such the proposed culvert is not considered to fragment the Afon Dulais, or affect the hydrology of adjacent habitats.

7.19.59 The Afon Dulais tributary will be realigned in close proximity of the Dulais headwaters. The realignment will cause modification of a natural system and as such further mitigation measures will be required. Mitigation will need to ensure that the natural features of the stream are protected and that the volume and flow rate is maintained.

7.19.60 Due to the collective value of habitats within the Site, effects of habitat fragmentation / severance would be significant at a **County** level, in the absence of mitigation

7.19.61 In addition to embedded mitigation measures, further mitigation measures, namely relating to the re-alignment of the Afon Dulais tributary, are also detailed in Section 7.21, 7.22 and 7.25. It is considered that providing these mitigation measures are implemented, there should be no significant residual effects as a result of habitat fragmentation / severance. Impacts to species from barrier effects are discussed in the relevant sections below.

Habitat Disturbance / Degradation

7.19.62 Construction and associated site clearance could result in disturbance to habitats adjacent to the Site boundary. Habitats may be physically disturbed for example by construction machinery / vehicles or affected by changes in air and or water quality for example from pollution events, surface run-off, vehicle emissions and dust. Changes in air and water quality may also occur during operation, particularly as a result of train operation within the Site (see Chapter 14; Air Quality and Chapter 11; Water).

7.19.63 Wetland habitats within the Site or in connectivity to the Site, such as ponds, wet heathland, marshy grassland and mire are sensitive to changes in ground and surface water quality / quantity. These changes can occur during construction and or operation as a result of pollution

events or changes in surface run-off (and increased sediment mobilisation). In addition, changes in the volume of surface run off and volume of groundwater may impact wetland habitats. Impacts to wetland habitats would also have an adverse effect on any notable species that these habitats support.

7.19.64 As discussed in the Water Chapter, the majority of accidental spills occur from train or vehicle traffic during construction and operation. These spills can be addressed by best practice construction methods during operation and track drainage systems and SuDS during operation, as outlined in Section 7.16. There are potential risks of pollution as a result of effluent from the Washery site. These risks will require detailed mitigation measures regarding the Washery drainage system to be provided at the reserved matters stage. There is also the potential for pollutants within surface water features to infiltrate into groundwater. Measures such as slab tracks to direct effluent into specific drainage systems will ensure there is no seepage of pollutants into groundwater.

7.19.65 Water levels within the Site will also be managed through SuDS and it is not anticipated that there would be any impacts on groundwater levels as a result of the proposed works during construction or operation.

7.19.66 Wetland and terrestrial habitats in proximity to construction / operational activities such as ancient woodland, marshy grassland, acid grassland, heathland and peatland – bog habitats could also be affected by changes in air quality, depending on the extent of air pollution, and proximity of these habitats from the source. The Air Quality assessment details that impacts from air quality are unlikely as a result of vehicle emissions during construction and operation, and have therefore been screened out. There are potential impacts from dust although these are limited to during construction and only considered likely to affect nearby receptors. Potential effects from dust can be addressed by best practice design mitigation as detailed in Section 7.16. Additionally the air quality assessment identified potential significant impacts on sensitive habitats within designated sites, particularly bog, marshy grassland and mature woodlands (i.e. within SSSIs, SINCs and ancient woodland), as a result of nitrogen deposition. These are discussed under ‘protected sites’ above (7.19.20-7.19.22; 7.19.26 – 7.29.31; and 7.19.36 – 7.29.41), and it is considered unlikely that any increases in nitrogen would result in significant effects on habitats within these protected sites, and if they do occur it will be a temporary effect until lower emission diesel or zero emission trains are used (which is anticipated). However, taking a precautionary approach, management post construction has been recommended to mitigate for potential temporary effects on sensitive habitats such as grazing and woodland management, which will control the dominance of nitrogen loving plants and maintain species diversity within these habitats.

7.19.67 Other habitats within proximity of the train operation which could be affected by changes in nitrogen, comprise either those within other SINCs (such as dyffryn cellwen) which is shown not to be significantly affected by air quality modelling and other retained habitats in the area of Nant Helen or the Washery which largely comprises marshy grassland, acid grassland, broadleaved woodland including newly established habitats as part of the Nant Helen Restoration works. These will be subject to the same management (as conditioned by the Nant Helen earthworks application) which is proposed to mitigate for effects within protected sites i.e. grazing and woodland management, and as such no further measures are considered required to address potential effects as a result of nitrogen deposition on these habitats.

7.19.68 Disturbances and degradation of habitats also has the potential to impact on species present within the Site, and adjacent areas. Specific impacts to species are considered in the relevant species sections below.

7.19.69 Japanese knotweed is present at one location within the Washery, and therefore there is the potential risk that this will be disturbed and spread within / from the Site. The implementation of best practice design and construction mitigation including the production of an INNS management plan, as discussed in Section 7.16 will ensure that any potential disturbance of INNS is avoided.

7.19.70 Due to the collective value of habitats within and adjacent to the Site, effects of habitat disturbance would be significant at a **County level,** in the absence of mitigation

7.19.71 With the implementation of best practice mitigation during design and construction, the majority of potential disturbance / degradation effects on habitats will be avoided. As discussed in the Water Chapter, further mitigation will be required to treat effluent from the Washery site, and is discussed further in Sections 7.21 and 7.22. In addition, further measures are required to protected sensitive habitats within protected sites from potential effects of nitrogen deposition, and which are also detailed in Sections 7.21, 7.22 and 7.25, including monitoring. It is considered that with the implementation of this additional mitigation, there should be no residual significant effect on habitats as a result of disturbance/degradation.

Fungi

Habitat Loss and Disturbance

7.19.72 As previously discussed under ‘Habitats’ in paragraphs 7.19.43 to 17.19.48, the GCRE Project area within Nant Helen site will largely affect newly establishing acid grassland, marshy grassland and some new woodland planting. With the exception of the marshy grassland the other habitats will be newly planted post Nant Helen earthworks,

and will therefore have limited or negligible value for fungi. Areas of marshy grassland within the Nant Helen site are considered unlikely to support a high number or diverse range of fungi (see Figure 7.7). As such no fungi rich habitat are likely to be affected by construction within the Nant Helen site.

7.19.73 Construction and associated site clearance within the Washery will result in the loss and or disturbance of small areas of valuable fungi habitats. Two areas of confirmed 'county' importance for fungi (area 3 and 6) and one area of 'local' importance (area 5), are within the Site boundary in the Washery area (as shown in Figure 7.7). Only part of area 3 is within the development footprint however, and will therefore be lost / disturbed during construction.

7.19.74 The partial loss / disturbance of the fungi habitat is considered to be significant at a **County level.**

7.19.75 Habitat loss will be permanent since the affected areas will support development which will remain in perpetuity. It is acknowledged however that construction works will involve the re-use of suitable materials including coal spoil within the Site (where fungi communities currently exist), therefore providing a suitable substrate for the establishment of a diverse fungi assemblages at other locations within the Washery (such as at the location of the sidings). Furthermore embankments of the test track, will provide a large area for the establishment of acid grassland, which will also be suitable habitat for fungi to establish. These habitats are shown in Figure 7.9. However, whilst fungi habitats will re-establish, it is likely to take a longer period of time (approximately 20-30 years), than the majority of newly created habitats and mitigation measures should therefore also be put in place to allow for this such as a long-term management and monitoring plan.

7.19.76 Mitigation measures to address the habitat loss / disturbance are detailed in Sections 7.21, 7.22 and 7.25. It is considered that with the implementation of this additional mitigation, there should be no residual significant effect on fungi rich habitats as a result of habitat loss / disturbance in the long term.

Invertebrates

Habitat Loss

7.19.77 Newly established grassland and woodland on embankments and cuttings created by the Nant Helen earthworks will be lost as a result of the GCRE project, at the location of new tracks, and also marshy grassland and waterbodies at the location of the new road.

7.19.78 Invertebrates including potentially notable species are considered likely to quickly utilise new habitats such as established grassland, woodland and waterbodies created as part of the earthworks, and

therefore forming part of the Future Baseline. Species are likely to comprise similar species to those currently present in similar habitat in the Nant Helen site such as dingy skipper. Although habitats created as part of the Nant Helen earthworks restoration will be subject to further enhancements as part of the Nant Helen earthworks, it is considered likely that at the time of GCRE commencing this habitat will provide the same value for invertebrates as the existing baseline.

7.19.79 Construction within the Washery site will result in the small-scale loss of habitats (species-rich ruderal grassland, acid grassland, waterbodies, mixed woodland and heathland), some of which are of county importance to invertebrates due to supporting rare / notable species namely: the small blue and dingy skipper butterfly which occurs in open areas with ruderal vegetation such as grassland in the eastern part of the washery (partially designated as Onllwyn coal washery SINC). Habitats which support other rare species such as rare flea beetle (*M. rustica*), the scarce blue damselfly banded general soldier fly rare reed beetle (*P rustica*) rare crane fly (*T. marginella*) rare weevil (*G. veronicae* and *B. lutulentus)* will be protected (these are associated with marshy grassland of gorsllwyn meadows SINC)

7.19.80 In the absence of mitigation, the loss / degradation of notable invertebrate habitat is considered to be significant at a **County level.**

7.19.81 As discussed under 'Habitats' in paragraphs 7.19.49 – 7.19.53 there will be small-scale habitat creation within the Washery including species rich grassland, as well as enhancements of retained habitats namely marshy grassland. Embankments of the test track will provide newly establishing acid grassland habitat. Across the site SuDs and landscaping will also provide additional habitats. Newly created habitats, providing they meet the specific species-requirements, are likely to be rapidly utilised by notable invertebrates present within the Site and adjoining habitats, and become even more favourable in the long term if subject to management.

7.19.82 Furthermore retained habitats within the Washery, which will be enhanced as part of the GCRE project and retained habitats within the Nant Helen Site, which will be enhanced as part of the Nant Helen Complementary Earthworks, will continue to provide suitable habitat to notable invertebrates within the local area.

7.19.83 As such any habitat loss is not considered to have a significant impact on notable invertebrates.

7.19.84 Additional mitigation measures are detailed in Sections 7.21 and 7.22 which will ensure there will be no significant residual effects on invertebrate habitats as a result of the proposals. Section 7.25 details the specific requirements of long term management and monitoring of retained and newly created habitats to ensure they establish as species rich habitats, and are suitable for notable invertebrates present locally. Additionally Section 7.23 describes how further measures can be implemented to provide enhancements to habitats.

Habitat Fragmentation / Severance

7.19.85 Habitat loss within the Nant Helen or washery site will not result in any fragmentation of key habitat corridors for notable invertebrates.

7.19.86 No effects from habitat fragmentation / severance are anticipated on notable invertebrate populations as a result of the proposed construction or operation phase of GCRE.

Habitat Disturbance / Degradation

7.19.87 Habitats important for notable invertebrates may also be adversely affected if construction / operation activities were to inadvertently damage / degrade habitats.

7.19.88 Aquatic habitats will be particularly sensitive to changes in water quality, which could occur during construction or operation. Some habitats may also be more sensitive to changes in air quality, particularly effects of nitrogen deposition. In addition it is possible that invertebrate habitats could by physically disturbed for example by machinery, during construction and potentially during operation.

7.19.89 As discussed above under 'Habitats' in paragraphs 7.19.62 to 7.19.71, when considering embedded mitigation, physical disturbance to habitats will be avoided and there are limited residual effects of air quality or water quality, including potential effects to water quality within the area of the washery and also temporary effects to sensitive habitats as a result of nitrogen deposition. However additional mitigation measures have been recommended to ensure habitats are protected from changes in water and or air quality.

7.19.90 Adverse effects from habitat degradation / disturbance are likely to be of low magnitude, and not significant to local invertebrate populations.

7.19.91 Mitigation measures to address the habitat degradation / disturbance are detailed in Sections 7.21 and 7.22. Monitoring of habitats is also recommended in Section 7.25. It is considered that with the implementation of this additional mitigation, there should be no residual significant effect on local invertebrates populations as a result of habitat disturbance / degradation.

Harm / Mortality

7.19.92 As discussed under 'Statutory Designated Sites' in paragraphs 7.19.7 to 7.19.14 there are potential effects of harm / mortality on some of the notable invertebrates occurring within the Site, in particular butterflies (including marsh fritillary), due to collision risk with trains and vehicles during operation of the GCRE Project. Any collision risk is likely to be low due to the low volume of train and vehicle traffic within the site however.

7.19.93 Habitats within the future baseline will be more species rich, and support food plants for a range of butterflies, including potentially devil's bit scabious, the food plant of marsh fritillary. The enhanced species richness of habitats within the Site will be a significant contribution to enhancing biodiversity within the Site, and supporting important marsh fritillary metapopulations within the area (as well as other local invertebrate populations). This likely increase in invertebrates within the Site is therefore considered to outweigh the low risk of collision during the operation of GCRE.

7.19.94 As such adverse effects on invertebrate populations from harm / mortality are not considered to be significant at population levels**.** No additional mitigation is considered to be necessary for potential harm / motality risks to butterly populations.

Amphibians

Habitat Loss

7.19.95 The GCRE development in the Washery will be largely within areas of existing development and man-made habitats. Construction and associated site clearance within the Washery, which will be required for the GCRE Project, will however result in the small-scale loss of amphibian habitat, including aquatic (breeding) and terrestrial (resting, foraging and hibernation) habitat. In particular these will comprise: a small number of ponds and ditches for breeding, and small areas of connecting terrestrial habitat including grassland / heathland and scrub. In addition there will be the loss of newly established grassland and planted woodland in the area of the new test tracks in the Nant Helen site, where embankments and cuttings have been formed as result of the Nant Helen Complementary Earthworks Project, and new waterbodies, marshy and acid grassland will be lost as a result of the new road in the eastern part of the Nant Helen site. These areas are not considered likely to support notable amphibian species or populations. No further clearance within the Site will be required during operation.

7.19.96 In the absence of mitigation, effects of habitat loss on populations of amphibians would be significant at a **Local level.**

7.19.97 As discussed under 'Habitats' in paragraphs 7.19.49 to 7.19.53 there will be small-scale habitat creation within the Washery, namely species rich grassland, as well as enhancements of retained habitats including marshy grassland. Embankments of the test track will provide establishing acid grassland habitat, will also provide a large extent of suitable habitat for amphibians within the local area. Across the site SuDs and landscaping will also provide additional habitats. Newly created habitats, providing they meet the specific species-requirements, are likely to be rapidly utilised by amphibians present within the Site and adjoining habitats, and become even more favourable in the long term if subject to management. The potential

loss of a waterbody at the location of the new road will be mitigated for through the re-siting of the waterbody further east.

7.19.98 Furthermore retained habitats within the Washery, which will be enhanced as part of the GCRE project and retained habitats within the Nant Helen Site, which will be enhanced as part of the Nant Helen Complementary Earthworks, will continue to provide suitable habitat to notable amphibians within the local area.

7.19.99 As such any habitat loss is not considered to have a significant impact on notable amphibians.

7.19.100 Additional mitigation measures are detailed in Sections 7.21 and 7.22 which will ensure there will be no residual effects on amphibian habitats as a result of the proposals. Section 25 details the specific requirements of long term management and monitoring of retained and newly created habitats to ensure they establish as species rich habitats, and are suitable for amphibian species present locally. Additionally Section 7.23 describes how further measures can be implemented to provide enhancements to habitats for amphibians.

Habitat Severance / Fragmentation

7.19.101 No impacts to local amphibian populations, from habitat fragmentation / severance within the Washery, are considered likely as a result of the GCRE construction or operation, since the development footprint is similar to the existing operational Washery.

7.19.102 As detailed above under ‘habitat loss’ new habitats proposed as part of the Nant Helen Complementary Restoration Earthworks Project, such as waterbodies, and which form part of the Future Baseline, will be fragmented by the new road in the eastern part of the Nant helen Site. This habitat loss will be mitigated for through the re-siting of this habitat to avoid impacts from the new road.

7.19.103 The test tracks within the Nant Helen site, during construction will create a more significant barrier to movement by amphibian species, this will be a temporary effect however habitats either side of the tracks will provide suitable breeding and terrestrial habitat, of a sufficient extent to support local amphibian populations temporarily during construction. Post construction and during operation of GCRE, the tracks are not considered to be a barrier to amphibian movement, although as discussed below common toad, being less agile, may find it more difficult to cross and therefore be at a higher mortality risk from train collision[18].

7.19.104 As such adverse effects on amphibians from habitat fragmentation are not considered to be significant at population levels**.**

[18] Budzic, K. A., & Budzic, K. M. (2014). A preliminary report of amphibian mortality patterns on railways. *Acta Herpetologica*, *9*, 103–107

Habitat Disturbance / Degradation

7.19.105 Habitats important for amphibians may also be adversely affected if construction / operation activities were to inadvertently damage / degrade habitats.

7.19.106 Aquatic habitats will be particularly sensitive to changes in water quality, which could occur during construction or operation. Some habitats may also be more sensitive to changes in air quality, particularly effects of nitrogen deposition. In addition it is possible that amphibian habitats could by physically disturbed for example by machinery, during construction and potentially during operation.

7.19.107 As discussed above under 'Habitats' in paragraphs 7.19.62 to 7.19.71, when considering embedded mitigation, physical disturbance to habitats will be avoided and there are limited residual effects of air quality or water quality, including potential effects to water quality within the area of the washery and also temporary effects to sensitive habitats as a result of nitrogen deposition. However additional mitigation measures have been recommended to ensure habitats are protected from changes in water and or air quality.

7.19.108 Adverse effects from habitat degradation / disturbance are likely to be of low magnitude, and not significant to local amphibian populations.

7.19.109 Mitigation measures to address the habitat degradation / disturbance are detailed in Sections 7.21 and 7.22. Monitoring of habitats is also recommended in Section 7.25.

7.19.110 It is considered that with the implementation of this additional mitigation, there should be no residual effect on local invertebrates populations as a result of habitat disturbance / degradation.

Harm / Mortality

7.19.111 It is considered possible that construction activities would result in harm / mortality to common amphibians largely during any vegetation clearance, which will be required. This will be limited to small-scale clearance within the Washery and areas of newly establishing acid grassland within the Nant Helen site at the location of the track, in addition to retained marshy grassland within the Nant Helen site at the location of the new road.

7.19.112 During operation, there is the risk of amphibian mortality as a result of collision with trains which will be in operation on the GCRE test tracks. There is also the potential risk of collision with vehicles, to a lesser extent, during construction and operation. Although effects on amphibians have not been well-studied, evidence has shown that mortality rates from train collision is high in amphibians, and the

highest proportion of deaths are of common toad and common frog[19]. Highest mortality rates are also associated with peaks of activity such as migration (particularly in spring). It is likely that high rates of amphibian mortality on roads associated with periods of high rainfall[20], would also occur on high-speed railway lines. Common toad are considered likely to be more susceptible to mortality from train due to their limited agility[18].

7.19.113 Evidence from previous surveys undertaken suggest a low amphibian population exists within the Site. It is also acknowledged, that the risk of collision with train traffic is likely to be lower than with road traffic, due to the lower number of trains travelling at one location on a track. Potential collision with vehicles on roads within the Site, is considered to be a low risk since these roads will not be used frequently.

7.19.114 As such adverse effects on amphibian from harm / mortality are not considered to be significant at population levels**.**

7.19.115 It is not an offence to injure or harm widespread species of amphibians, however, mitigation measures recommended in Section 7.21 and 7.22, for legally protected reptiles, are considered appropriate to protect amphibians also.

Reptiles

Habitat Loss

7.19.116 Construction and associated site clearance, which will be required for the GCRE Project, will result in the small scale loss of suitable reptile habitat within the Washery including small areas of heathland, scrub, and short ruderal grassland. In addition there will be the loss of newly established grassland and planted woodland in the area of the Nant Helen site, where embankments and cuttings have been formed as result of the Nant Helen Complementary Restoration Earthworks Project and areas of marshy grassland and acid grassland where the new road is proposed. Due to the limited extent of habitats affected, it is not considered likely that they would support significant numbers of reptiles. There will be no further habitat loss during operation.

7.19.117 In the absence of mitigation, effects of habitat loss on populations of reptiles would be significant at a **Local** level.

7.19.118 As discussed under ‘Habitats’ in paragraphs 7.19.49 to 7.19.53 there will be small-scale habitat creation within the Washery, including species rich grassland as well as enhancements of retained habitats,

[19] Santos S.M., Carvalho F., Mira A. (2017) Current Knowledge on Wildlife Mortality in Railways. In: Borda-de-Água L., Barrientos R., Beja P., Pereira H. (eds) Railway Ecology. Springer, Cham

[20] Heske, E. J. (2015). Blood on the tracks: Track mortality and scavenging rate in urban nature preserves. *Urban Naturalist, 4*, 1–13.

namely marshy grassland. Embankments of the test track will provide grassland habitat, this will also provide a large extent of suitable habitat for reptiles within the local area. Across the site SuDs and landscaping will also provide additional habitats. Newly created habitats, providing they meet the specific species-requirements, are likely to be rapidly utilised by reptiles present within the Site and adjoining habitats, and become even more favourable in the long term if subject to management.

7.19.119 Furthermore retained habitats within the Washery, which will be enhanced as part of the GCRE project and retained habitats within the Nant Helen Site, which will be enhanced as part of the Nant Helen Complementary Earthworks, will continue to provide suitable habitat to reptiles within the local area.

7.19.120 As such any habitat loss is not considered to have a significant impact on reptile populations.

7.19.121 Additional mitigation measures are detailed in Sections 7.21 and 7.22 which will ensure there will be no residual effects on reptile habitats as a result of the proposals. Section 7.25 details the specific requirements of long term management and monitoring of retained and newly created habitats to ensure they establish as species rich habitats, and are suitable for reptile species present locally. Additionally Section 7.23 describes how further measures can be implemented to provide enhancements to habitats for reptiles.

Habitat Severance / Fragmentation

7.19.122 No impacts to local reptile populations, from habitat fragmentation / severance within the Washery, are considered likely as a result of the GCRE construction or operation, since the development footprint is similar to the existing operational Washery.

7.19.123 The test tracks within the Nant Helen site, during construction will create a more significant barrier to movement by reptile species, this will be a temporary effect and habitats either side of the tracks will support suitable breeding and terrestrial habitat for local reptile populations temporarily. Post construction and during operation of GCRE, the tracks within these test tracks are not considered to be a barrier to reptile movement, although as discussed below there is a mortality risk associated with animals crossing trainlines.

7.19.124 As such adverse effects on reptiles from habitat fragmentation / severance are not considered to be significant at population levels**.**

Habitat Disturbance / Degradation

7.19.125 Habitats important for reptiles may also be adversely affected if construction / operation activities where to damage / degrade habitats.

7.19.126 Some habitats may also be more sensitive to changes in air quality, particularly effects of nitrogen deposition. In addition it is possible

that reptile habitats could by physically disturbed for example by machinery, during construction and potentially during operation.

7.19.127 As discussed above under 'Habitats' in paragraphs 7.19.62 to 7.19.71, when considering embedded mitigation, physical disturbance to habitats will be avoided and there are limited residual effects of air quality or water quality, including potential effects to water quality within the area of the washery and also temporary effects to sensitive habitats as a result of nitrogen deposition. However additional mitigation measures have been recommended to ensure habitats are protected from changes in water and or air quality.

7.19.128 Adverse effects from habitat degradation / disturbance are likely to be of low magnitude, and not significant to local reptile populations.

7.19.129 Mitigation measures to address the habitat degradation / disturbance are detailed in Sections 7.21 and 7.22. Monitoring of habitats is also recommended in Section 7.25.

7.19.130 It is considered that with the implementation of this additional mitigation, there should be no residual effect on local reptile populations as a result of habitat disturbance / degradation.

Harm / Mortality

7.19.131 It is considered possible that construction activities would result in harm / mortality to common reptiles largely during any vegetation clearance, which will be required. This will be limited to small-scale clearance within the Washery, and areas of newly establishing acid grassland and retained marshy grassland within the Nant Helen site.

7.19.132 During operation, there is the small risk of reptile mortality as a result of collision with high speed trains which will be in operation at Nant Helen. There is also the potential risk of collision with vehicles within the Site during construction and operation. Impacts on reptile mortality from collison with trains, has not been well researched and available articles[2122] do not relate to comparable species present on the Site. Similar studies on impacts to amphibians[18] have however indicated that more agile species are at a lower risk of collision, and this is thought to be the case for species on site including common lizard and common slow worm, which could easily and quickly travel across the tracks.

7.19.133 It is acknowledged however, that the risk of collision with train traffic is likely to be lower than with road traffic, due to the lower number of trains travelling at one location on a track. Potential collision with

[21] Kornilev, Y., Price, S., & Dorcas, M. (2006). Between a rock and a hard place: Responses of eastern box turtles (*Terrapene carolina*) when trapped between railroad tracks. *Herpetological Reviews, 37,* 145–148.
[22] S. C. V. (1996). *Mortalidad de vertebrados en líneas de ferrocarril*. Documentos Técnicos de Conservacion SCV 1, Sociedad Conservación Vertebrados, Madrid.

vehicles on roads within the Site, is considered to be a low risk since these roads will not be used frequently.

7.19.134 Adverse effects on reptile populations as a result of harm / mortality are considered to to of low magnitude, and not significant.

7.19.135 It is an offence to intentionally injure or harm any reptile. Mitigation measures are recommended in Section 7.21 and 7.22, which will ensure compliance within UK legislation. Mitigation will include the design and implementation of a reptile trapping and relocation strategy which includes the identification of a suitable receptor site in connecting habitats.

Birds

Breeding and Wintering birds

Habitat Loss

7.19.136 As set out within the baseline section and associated baseline report for Breeding Birds (Appendix 7I, Volume 2), a range of species were recorded. Key species, including Section 7 species and those listed on Schedule 1 of the Wildlife and Countryside Act are summarised in the Table 7.9 below, including numbers of territories recorded, relevant transect number and associated habitats:

Table 7.9: Summary of bird species recorded within the study area and associated habitats

Species	Conservation Status	Number of Breeding Pairs	Transect Number	Associated Habitats
Lapwing *Vanellus vanellus*	S7	2	2	Old colliery pools (outside GCRE footprint)
Curlew *Numenius arquata*	S7	1	3	One pair west of washery, marshy grassland
Cuckoo *Cuculus canorus*	S7	8	1,4,5	Open grassland and scrub
Skylark *Alauda arvensis*	S7	139	1,2,3,4,5	All grassland types
Starling *Sturnus vulgaris*	S7	1	5	Near residential properties in Seven Sisters (outside GCRE footprint)
Song thrush *Turdus philomelos*	S7	23	1,2,3,4,5	Woodland edges and scrub
Dunnock *Prunella modularis*	S7	5	1,3,5	Woodland edges and scrub

House sparrow *Passer domesticus*	S7	5	3	Around Washery and associated entrance road
Tree pipit *Anthus trivialis*	S7	3	1,2,4	Open grassland with scattered scrub
Bullfinch *Pyrrhula pyrrhula*	S7	6	3,4	Woodland edges and scrub
Linnet *Linaria cannabina*	S7	7	2,3,4	Open grassland with scattered scrub
Lesser redpoll *Acanthis cabaret*	S7	14	2,3,4	Woodland edges and scrub
Crossbill *Loxia curvirostra*	Schedule 1	3	1,4	Mature coniferous woodland
Yellowhammer *Emberiza citrinella*	S7	1	5	Open grassland with scattered scrub
Reed bunting *Emberiza schoeniclus*	S7	32	2,3,4,5	Wetland fringe habitats

7.19.137 Across the winter of 2018/2019, wintering bird surveys undertaken recorded 34 species. With the exception of kestrel, the Section 7 species recorded were common to those observed on site during the breeding bird surveys.

7.19.138 The full list of S7 included kestrel *Falco tinnunculus* (single bird), skylark with returning breeding birds notable from February, starling (small flocks, up to 42 birds on one visit), song thrush (up to seven birds), dunnock (maximum four birds), house sparrow (maximum 15 birds), linnet (maximum four birds) and reed bunting (maximum five birds). No particularly large aggregations of birds or otherwise rare/notable features were recorded. See Appendix 7J for full details.

7.19.139 For this impact assessment, it is assumed a similar range of species will in time occupy the site as described above under Future Baseline, with the Nant Helen Complementary Earthworks restoration in place.

7.19.140 Site clearance, required for the GCRE Project, will include small-scale habitat loss in the Washery site. This will comprise small areas of habitats such as acid grassland, scrub and trees which provide nesting and overwintering habitat for a range of bird species, some of which are notable species although are known to be common and widespread within the local area. These may include habitat used by widespread S7 species such as dunnock, linnet and skylark that were recorded in this area during the breeding bird surveys. Additionally, demolition of structures could affect the small population of house sparrow recorded in this area.

7.19.141 In addition, there will be the loss of newly established grassland and woodland in the Nant Helen site and existing marshy grassland and waterbodies in the area of the Nant Helen site. These areas are not considered likely to support significant numbers of breeding birds /

wintering or population sizes but could still support small numbers of ground nesting species such as skylark. There will be no further habitat loss during operation.

7.19.142 Taking a precautionary approach, in the absence of mitigation, effects of habitat loss on local populations of breeding / wintering birds would be significant at a **County level**.

7.19.143 As discussed under 'Habitats' in paragraphs 7.19.49 to 7.19.53 there will be small-scale habitat creation within the Washery including species rich grassland, as well as enhancements of retained habitats, namely marshy and acid grassland. Embankments of the test track will provide establishing acid grassland habitat, will also provide a large extent of suitable habitat for breeding / wintering birds within the local area. Across the site SuDs and landscaping will also provide additional habitats. Newly created habitats, providing they meet the specific species-requirements, are likely to be rapidly utilised by birds present within the Site and adjoining habitats, and become more favourable in the long term as management prescriptions are deployed. The potential loss of a waterbody at the location of the new road will be mitigated for through the re-siting of the waterbody further east.

7.19.144 Furthermore retained habitats within the Washery, which will be enhanced as part of the GCRE project and retained habitats within the Nant Helen Site, which will be enhanced as part of the Nant Helen Complementary Earthworks, will continue to provide suitable habitat to breeding and wintering birds within the local area.

7.19.145 Considering the S7 bird species recorded, the provision of a net positive balance of species-rich grassland, will benefit some key species including skylark, lapwing and curlew. Retained and regenerating scattered scrub across the site, combined with grassland habitats will provide suitable habitat for tree pipit, dunnock and linnet populations. These same habitats will also be used by meadow pipit populations and it this species and dunnock that are most likely hosts of local cuckoo populations. Whilst the only yellowhammer territory recorded during baseline was over 1km west of GCRE, newly created grassland habitats and associated scrub will also be suitable for this species.

7.19.146 The provision of a net positive balance of wetland habitats, including swales and drainage ponds around the track loops, with associated native wetland planting, will also benefit key bird populations. These will include reed buntings that are present in good numbers in the local area and ponds may be used by lapwing and other waterbirds. It should be noted that lapwing recorded in baseline surveys used pools with a relatively high level of existing disturbance from mining activity and may therefore habituate to any operational phase disturbance from GCRE.

7.19.147 Retained and planted woodland and associated woodland edge ecotones will provide habitat suitable for local populations of bullfinch, song thrush and lesser redpoll. Retained coniferous woodland will be suitable for common crossbill populations, noting these tend to be nomadic with nesting locations and timings varying between years associated with local cone crop availability.

7.19.148 Habitats created, notably species-rich grassland subject to grazing, will provide foraging habitat for many species including the S7 species starling. This species was not found to nest within the GCRE area, but providing adequate foraging opportunities both in the breeding and wintering period is relevant given results obtained during baseline surveys.

7.19.149 The washery was found to support a small colony of house sparrows with nests found in and around existing structures and adjacent habitats. To assist this small colony, house sparrow nesting boxes (minimum 10) will be installed on the fabric of new structures and/or in adjacent habitats as directed by the project ecologist.

7.19.150 Considering the above habitat provisions, habitat loss is not considered to have a significant impact on local bird populations.

7.19.151 Additional mitigation measures are detailed in Sections 7.21 and 7.22 which will ensure there will be no residual effects on breeding / wintering habitats as a result of the proposals. Section 7.25 details specific requirements of long-term management and monitoring of retained and newly created habitats to ensure they establish as species rich habitats and are suitable for bird species present locally. Additionally, Section 7.23 describes how further measures can be implemented to provide enhancements to habitats for breeding / wintering birds.

Habitat Severance / Fragmentation

7.19.152 The GCRE development is not anticipated to create any barriers to movement by birds, as a result of habitat loss, additional infrastructure or train operation. As such there will be no adverse effects on local bird populations from habitat severance / fragmentation.

7.19.153 However, as discussed below under ‘Harm and Mortality’ there is a mortality risk associated with train collision during the operation of GCRE.

Habitat Degradation

7.19.154 Habitats important for breeding / wintering may also be adversely affected if construction / operation activities were to degrade habitats.

7.19.155 Aquatic habitats will be particularly sensitive to changes in water quality, which could occur during construction or operation. Some habitats may also be more sensitive to changes in air quality, particularly effects of nitrogen deposition. In addition it is possible

that habitats could by physically disturbed for example by machinery, during construction and potentially during operation.

7.19.156 As discussed above under 'Habitats' in paragraphs 7.19.62 to 7.19.71, when considering embedded mitigation, physical disturbance to habitats will be avoided and there are limited residual effects of air quality or water quality, including potential effects to water quality within the area of the washery and also temporary effects to sensitive habitats as a result of nitrogen deposition. However additional mitigation measures have been recommended to ensure habitats are protected from changes in water and or air quality.

7.19.157 Adverse effects from habitat degradation / disturbance are likely to be of low magnitude, and not significant to local bird populations.

7.19.158 Mitigation measures to address the habitat degradation / disturbance are detailed in Sections 7.21 and 7.22. Monitoring of habitats is also recommended in Section 7.25.

7.19.159 It is considered that with the implementation of this additional mitigation, there should be no residual effects on local bird populations as a result of habitat disturbance.

Bird Disturbance

7.19.160 Disturbance during construction, for example as a result of lighting or vibrations (from piling activities) and noise have the potential to result in displacement of breeding / wintering birds within the Site, and in adjacent habitats. Displacement of breeding birds is likely to result in abandonment of nests / young, and therefore reduced breeding success.

7.19.161 During operation, there is also the potential for disturbances from the activities associated with the proposed GCRE Project, in particular noise associated with the operation of trains on the test track within Nant Helen as well as from the lighting of buildings (largely within the Washery), access tracks and OLE foundations.

7.19.162 Taking a precautionary approach, in the absence of mitigation, effects of disturbance on local populations of breeding / wintering birds would be significant at a **County level**.

7.19.163 Common crossbill, has been recorded breeding within the Site, and barn owl, potentially breeding nearby the Site, are Schedule 1 species and afforded protection against disturbance whilst breeding. It should be noted that no active barn owl roosts were actually found in baseline surveys and common crossbill records were some distance away from areas affected by the GCRE works, in and around mature coniferous woodland to the north and south.

7.19.164 It is also acknowledged that there are some species such as curlew and lapwing, which are of conservation significance are more sensitive to disturbances. During baseline surveys a single pair of curlew were

found north west of the washery, with two pairs of lapwing on colliery pools close to Nant Helen mine workings.

7.19.165 Whilst pairs may be displaced, impacts from disturbance during construction will be temporary are not anticipated to significant affect local bird populations in the medium or long term. Additionally, it is noted that where any birds are displaced, they may be able to continue to use suitable habitats in the wider area, including retained and newly created habitats formed as part of GCRE, the Nant Helen Complementary Earthworks project or Nant Helen restoration works.

7.19.166 Impacts from noise during operation will be similar to the existing levels (Chapter 10; noise), and it is therefore anticipated that operational noise will not be a significant disturbance to breeding or wintering birds present within the local area, given habituation to current levels. Furthermore, the design incorporates noise barriers which will reduces noise levels to adjacent habitats including those known / likely to support Schedule 1 species such as common crossbill in coniferous woodland stands.

7.19.167 Operational lighting proposals are largely concentrated in the Washery, although the specific details are currently not available to assess impacts. However, it is assumed that light spill will be controlled and no known roosts of owls or other sensitive species are known in these areas.

7.19.168 Embedded mitigation comprising sensitive vegetation clearance outside of the nesting period as detailed in Section 7.16, will disturbance to nesting birds, and compliance with UK legislation.

7.19.169 To ensure compliance with UK legislation, additional mitigation measures are recommended in Sections 7.21 and 7.22 in the form of pre-construction surveys where vegetation clearance / demolition is proposed during the nesting season, to confirm the absence of nesting birds including Schedule 1 birds.

7.19.170 It is considered that with the implementation of this additional mitigation, there should be no residual effects on local bird populations as a result of disturbance.

Harm / Mortality

7.19.171 Construction activities particularly vegetation clearance may result in harm or mortality to breeding birds. Breeding birds will be particularly susceptible during vegetation clearance due to being less mobile, and either sitting on eggs or with young. Embedded mitigation comprising sensitive vegetation clearance as detailed in Section 7.16, will avoid any harm / mortality of nesting birds during construction.

7.19.172 During operation, there is a risk of bird mortality as a result of collision with trains which will be in operation at Nant Helen. There is also the risk of collision with vehicles on Site, to a lesser extent,

during operation. Effects on birds as a result of train collisions have not been well studied[19], but available evidence indicates that low-flying species, particularly those that are less agile in flight such as barn owl, would be more susceptible to collision (as reported in studies of effects on barn owls by roads[23]) as well as species which are likely to perch on railway infrastructure such as raptors[19]. It is acknowledged, however, that the risk of collision with train traffic is likely to be lower than with road / highway traffic, due to the lower number of trains travelling at one location on a track.

7.19.173 Potential collision with vehicles on roads within the Site, is considered to be a low risk since these roads will not be used frequently. The risk of collision with OLE, and associated electrocution is considered unlikely to be significant, since the Site doesn't support any bird species prone to collision with such static structures.

7.19.174 Barn owl are known to be present in habitats adjacent to the Site and have previously been recorded within the Washery though none were recorded when the inside of structures was inspected during 2019. Other species, considered to be of greater risk to collision i.e. raptors such as buzzard, are common and widespread species within the local area.

7.19.175 Collision impacts to species of conservation significance such as barn owl, will be of greater significance compared to more common and widespread species.

7.19.176 Taking a precautionary approach, effects of harm / mortality on barn owl would be significant at a **County level.** Due to the low risk from collision to other bird species within the Site, and being largely common and widespread, any effects of harm / mortality on these bird populations is not considered to be significant. It is an offence to intentionally kill, injure or take any wild bird or take, damage or destroy the nest (whilst being built or in use) or its eggs.

7.19.177 Additional mitigation measures are detailed in Sections 7.21 and 7.22 which will ensure compliance with UK legislation. This includes the specific requirements to create alternative barn owl nesting habitat (at least one barn owl box) at least 3 km away from the active tracks. This may be located on land controlled by the applicant or by agreement with local landowners. With this in place, no significant effect on local barn owl or other bird populations is likely to occur.

[23]Shawyer, C. and Dixon, N. (1999) Impacts of Roads on Barn owl *Tyto alba* populations. Highways Agency.

Badger

Habitat Loss / Fragmentation

7.19.178 Two badger (outlier) setts occur within the north eastern part of the Site, between the larger and smaller test tracks, which are outside of the Development footprint, and should therefore not be affected by habitat loss (although development is in proximity to these setts, as discussed in disturbance – paragraph 7.19.185). Construction and associated site clearance required for GCRE will be largely within the Washery site where no badger setts have been recorded, although suitable foraging habitats are present. In addition, there will be clearance within the Nant Helen site in newly established areas of grassland and woodland on embankments / cuttings formed by the Nant Helen Complementary Restoration Earthworks, in addition to grassland at the location of the new access road. These habitats are unlikely to support setts, due to the majority being newly created, and existing habitats having no evidence of badger to date; however, these area may potentially provide foraging habitat to badgers. It is noted however that limited badger activity was recorded within the study area and recorded activity was largely concentrated north west of the GCRE site, within woodland outside of the development site (with the exception of outlier setts found within the Nant Helen site). No clearance will be required during operation.

7.19.179 As described under ‘Habitats’ in paragraphs 7.19.49 to 7.19.53 there will be small-scale habitat creation within the Washery part of the Site as part of the GCRE Project, and additional habitats within the Nant Helen site. Furthermore retained habitats within the Washery, which will be enhanced as part of the GCRE project and retained habitats within the Nant Helen Site, which will be enhanced as part of the Nant Helen Complementary Earthworks, will continue to provide suitable habitat to badger within the local area. As such any habitat loss is not considered to have a significant impact on local badger populations.

7.19.180 During construction of the test tracks within Nant Helen, there is likely to be a temporary barrier to movement by badger (at least in parts of the Site). Post construction and during operation of GCRE, fencing around the site infrastructure, which would comprise palisade fencing, could be a barrier to badger movement, although it is considered likely that badgers will dig beneath fencing. Where this occurs, there is a mortality risk associated with animals crossing trainlines, and which is discussed below under ‘Harm and Mortality’.

7.19.181 Adverse effects on local badger populations as a result habitat fragmentation / loss are considered to to of low magnitude, and not significant.

7.19.182 Additional mitigation measures are detailed in Sections 7.21 and 7.22 which will ensure there will be no residual effects on badger habitats as a result of the proposals. Section 7.25 details the specific

requirements of long term management and monitoring of retained and newly created habitats.

Disturbance

7.19.183 Disturbances for example as a result of increased noise, lighting or vibrations during construction have the potential to result in displacement of badger within the Site, and in adjacent habitats.

7.19.184 During operation, there is also the potential for disturbances from the activities associated with the proposed GCRE Project, in particular from noise associated with the operation of trains on the test track within Nant Helen as well as from the lighting of buildings (largely within the Washery), access tracks and OLE foundations.

7.19.185 Based on the approximate distance of the two known setts from the Site, and proposed earthworks, it is considered likely that there would be disturbance to any badgers using these setts, particularly as a result of any piling operations, which are anticipated during construction. Impacts from disturbance during construction, will be temporary and of low magnitude, and as such are not anticipated to significant affect badgers. Additionally it is acknowledged however that the setts are likely to be used infrequently by badgers, and any badgers displaced from these setts, would have sufficient habitat within the Site and wider area to create new setts.

7.19.186 Impacts from noise during operation will be similar to the existing levels (Chapter 10; noise), and it is therefore anticipated that operational noise will not be a significant disturbance to badgers present within the local area. Furthermore the design incorporates noise barriers which will reduces noise levels to adjacent habitats. Operational lighting proposals are largely concentrated in the Washery, although the specific details are currently not available to assess impacts. As such a precautionary approach is recommended, and further mitigation recommended to avoid / minimise any light spill on badgers.

Badgers are protected from disturbance by UK legislation. Mitigation measures to address disturbance effects are detailed in Sections 7.21 and 7.22, namely the licensed closure of setts prior to construction, which will also ensure compliance within UK legislation. In addition, sensitive lighting is recommended during operation.

Harm / Mortality

7.19.187 Any excavations created during construction could result in animals becoming trapped or injured, when moving through the Site at night. There is also the potential for animals to collide with construction traffic within the Site. Embedded mitigation comprising covering open excavations and limiting vehicle traffic to low speeds as detailed in Section 7.16, will avoid harm / mortality of badger during construction.

7.19.188 It is also acknowledged, that badger are a mobile species, and suitable habitat occurs within the Site for sett excavation. Therefore, badger setts, additional setts could be present in the vicinity of the Site, at the time of construction and site clearance.

7.19.189 During operation, there is the small risk of badger mortality as a result of collision with moving trains which will be in operation, particularly those travelling at high speeds around the test tracks in the Nant Helen part of the site. There is also the risk of collision with vehicles on Site during contruction and operation. There is also the risk of collision with vehicles on Site during operation. The risk of collision with trains / road traffic is considered to be a low risk due to the limited activity of badger within the GCRE site (recorded to date), and which is concentrated around outlier setts in proximity to the smaller tracks, as well as woodland west / north west of the GCRE boundary

7.19.190 Adverse effects on local badger populations as a result of harm / mortality are considered to to of low magnitude, and not significant. However, badgers are protected from harm, by UK legislation and mitigation would be required to ensure legal compliance.

7.19.191 Mitigation measures to address the harm and mortality effects are detailed in Sections 7.21 and 7.22, namely the undertaking of pre-construction surveys and provision of suitable wildlife underpasses beneath tracks, which will ensure compliance within UK legislation.

Otter

Habitat Loss

7.19.192 No evidence of otter using the Site has been found. Otter have been recorded west of the Site, along the Afon Dulais (approximately 1km away). It is considered that this species would use the Site for foraging / commuting purposes infrequently due the nature of the Site.

7.19.193 The presence of otter, although likely to be infrequent within the Site cannot be ruled out due to the presence of suitable waterbodies, and connecting terrestrial habitat, some of which could also be used as breeding / resting places by otter. Any activity within the site is considered likely to be infrequent however.

7.19.194 Site clearance, which will be required for the GCRE Project, with small-scale habitat loss within the Washery, including the removal of some waterbodies, and adjacent grassland and scrub habitats. In addition there will be the loss of newly established grassland, planted woodland, and waterbodies in the area of the Nant Helen site, which will have been formed as part of the Nant Helen Complementary Restoration Earthworks Project in addition to some retained marshy grassland. These areas are not considered likely to provide key habitats for otter, although they may travel across these areas when

searching for suitable feeding / resting places. There will be no further habitat loss during operation.

7.19.195 In the absence of mitigation, effects of habitat loss on local populations of otter would be significant at a **Local level**.

7.19.196 As discussed under 'Habitats' in paragraphs 7.19.49 to 7.19.53 there will be small-scale habitat creation within the Washery including species rich grassland, as well as enhancements of retained habitats, namely marshy grassland. Embankments of the test track will provide establishing acid grassland habitat. Across the site SuDs and landscaping will also provide additional habitats. Newly created habitats, providing they meet the specific species-requirements, are likely to be rapidly utilised by otter present within the Site and adjoining habitats, and become even more favourable in the long term if subject to management. The potential loss of a waterbody at the location of the new road will be mitigated for through the re-siting of the waterbody further east.

7.19.197 Furthermore retained habitats within the Washery, which will be enhanced as part of the GCRE project and retained habitats within the Nant Helen Site, which will be enhanced as part of the Nant Helen Complementary Earthworks, will continue to provide suitable habitat to otter within the local area.

7.19.198 As such any habitat loss is not considered to have a significant impact on local otter populations.

7.19.199 Additional mitigation measures are detailed in Sections 7.21 and 7.22 which will ensure there will be no residual effects on otter habitats as a result of the proposals. Section 25 details the specific requirements of long term management and monitoring of retained and newly created habitats. Additionally Section 7.23 describes how further measures can be implemented to provide enhancements to habitats for otter.

Habitat Severance / Fragmentation

7.19.200 Part of a tributary of the Afon Dulais will be re-aligned, and a new culverts will be installed (in the area of the sidings). Otter signs have been recorded further along the Afon Dulais, west of the site (approximately 1km) however the affected section provides limited suitability for otter due to being being overgrown with ruderal/scrub vegetation. The design of the new culvert along the Afon Dulais, as detailed in Section 7.16 will avoid impacts on foraging / commuting otter, should they be present, although additional mitigation measures are required to ensure tributary habitats are re-instated post re-alignment to provide suitable connecting habitat for otter and other wildife.

7.19.201 During construction of the test tracks within Nant Helen, there is likely to be a temporary barrier to movement by otter. Post

construction and during operation of GCRE, fencing around the site infrastructure, which would comprises palisade fencing, could be a barrier to otter movement, although it is considered likely that otter travel into the site via the Afon Dulais and connecting tributaries in the south of the site, which would remain open to otter. As discussed below under 'Harm and Mortality' there is a mortality risk associated with otter crossing the tracks, should they be present in the site.

7.19.202 Adverse effects on local otter populations from habitat loss or fragmentation are not considered to be significant.

7.19.203 Additional mitigation measures are detailed in Sections 7.21, 7.22 and 7.25 which will ensure there will be no residual effects on otter habitats as a result of the proposals. This includes the specific requirements of long term management and monitoring of retained and newly created habitats.

Habitat Disturbance / Degradation

7.19.204 Habitats important for otter may also be adversely affected if construction / operation activities where to damage / degrade habitats.

7.19.205 Aquatic habitats will be particularly sensitive to changes in water quality, which could occur during construction or operation. Some habitats may also be more sensitive to changes in air quality, particularly effects of nitrogen deposition. In addition it is possible that otter habitats could by physically disturbed for example by machinery, during construction and potentially during operation.

7.19.206 As discussed above under 'Habitats' in paragraphs 7.19.62 to 7.19.71, when considering embedded mitigation, physical disturbance to habitats will be avoided and there are limited residual effects of air quality or water quality, including potential effects to water quality within the area of the washery and also temporary effects to sensitive habitats as a result of nitrogen deposition. However additional mitigation measures have been recommended to ensure habitats are protected from changes in water and or air quality.

7.19.207 Adverse effects from habitat degradation / disturbance are likely to be of low magnitude, and not significant to local otter populations.

7.19.208 Mitigation measures to address the habitat degradation / disturbance are detailed in Sections 7.21 and 7.22. Monitoring of habitats is also recommended in Section 7.25.

7.19.209 It is considered that with the implementation of this additional mitigation, there should be no residual effect on local otter populations as a result of habitat disturbance / degradation.

Disturbance

7.19.210 Construction activities may result in disturbance to otters for example through artificial lighting if works during winter require task lighting

and noise. Piling may be required at some locations, during construction, which could also adversely affect any otter present in the Site.

7.19.211 During operation, there is also the potential for disturbances from the activities associated with the proposed GCRE Project, in particular noise from the operation of trains on the test track within Nant Helen as well as from the lighting of buildings (largely within the Washery), access tracks and OLE foundations.

7.19.212 Impacts from disturbance during construction, will be temporary and of low magnitude, and as such are not anticipated to significant affect local otter populations. Additionally, it is noted that otter occurrence is likely to be infrequent within the site and where any otter are displaced, they would be able to continue to use suitable habitats in the wider area however, including retained and newly created habitats.

7.19.213 Impacts from noise during operation will be similar to the existing levels (Chapter 10; noise), and it is therefore anticipated that operational noise will not be a significant disturbance to otter present within the local area. Furthermore the design incorporates noise barriers. Operational lighting proposals are largely concentrated in the Washery, although the specific details are currently not available to assess impacts. As such a precautionary approach is recommended, and further mitigation recommended to avoid / minimise any light spill on otter habitats.

Otters and their resting / breeding places are protected from disturbance by UK legislation. Recommended mitigation for otter is detailed in Sections 7.21 and 7.22 to ensure compliance with UK legislation including the undertaking of pre-construction checks to ensure the absence of otter resting / breeding sites within the vicinity of the works. In addition, sensitive lighting is recommended during operation.

Harm / Mortality

7.19.214 Any excavations created during construction could result in animals becoming trapped or injured, when moving through the site at night. There is also the potential for animals to collide with construction traffic within the Site. Embedded mitigation comprising covering open excavations and limiting vehicle traffic to low speeds as detailed in Section 7.16, will avoid harm / mortality of otter during construction.

7.19.215 During operation, there is the small risk of otter mortality as a result of collision with high speed trains which will be in operation at Nant Helen. There is also the risk of collision with vehicles on Site during operation. However, otter presence within the Site, is likely to be infrequent and as such it is considered to be a very low risk of collision with train / road traffic.

7.19.216 Adverse effects on local otter populations from harm / mortality are not considered to be significant.

7.19.217 Mitigation measures to address the harm and mortality effects are detailed in Sections 7.21 and 7.22, namely the undertaking of pre-construction surveys and provision of suitable wildlife underpasses beneath tracks, which will ensure compliance within UK legislation.

Bats

Habitat Loss / Fragmentation

7.19.218 Site clearance, which will be required for the GCRE Project, will include small-scale habitats loss within the washery. This will comprise habitats suitable for foraging bats such as acid grassland, heathland and scrub. Bat species recorded foraging / commuting in this part of the Site include common and soprano pipistrelle as well as noctule and myotid bats, which are common and widespread species in the local area. No bat roosts have been recorded within the Washery during comprehensive surveys, although one tree was identified as having low suitability for roosting bats further to climbing inspections and a number of buildings were also assessed as having low to moderate suitability.

7.19.219 In addition there will be the loss of newly established grassland, some woodland and waterbodies in the area of the Nant Helen site, which will have been created as part of the Nant Helen Complementary Restoration Earthworks Project, in addition to loss of retained marshy grassland where the road is proposed. It is acknowledged however that newly established and woodland are unlikely to support roosting bats.. The potential roosting habitats, previously identified in the existing baseline including a tree with moderate suitability, will have been cleared as part of the Nant Helen Complementary Earthworks, and therefore no further mitigation is required for roosting bats in this part of the site for the GCRE project. Habitats within the Nant Helen site are not considered likely to provide key habitats for bats, although small numbers may forage in these areas. There will be no further habitat loss within the Washery site or the Nant Helen site during operation.

7.19.220 It is acknowledged that bats are a mobile animals, and suitable foraging roosting habitat occurs within the Washery. As such, bat roosts, although not recorded during recent surveys, could be present within washery trees / buildings assessed as having suitability. The likelihood of bats using these potential roost sites, will increase as time passes and if a sufficient amount of time has passed between surveys and commencement of construction further surveys will be required to confirm presence / absence. There is a risk that if bats were using any trees / buildings to roost they would be subject to harm or

mortality. Potential mortality effects as a result of habitat loss are discussed in detailed under 'Harm and Mortality' below.

7.19.221 As discussed under 'Habitats' in paragraphs 7.19.49 to 7.19.53 there will be small-scale habitat creation within the Washery including species rich grassland, as well as enhancements of retained habitats, namely marshy grassland. Embankments of the test track will provide establishing acid grassland habitat, will also provide a large extent of suitable habitat for bats within the local area. Across the site SuDs and landscaping will also provide additional habitats. Newly created habitats, providing they meet the specific species-requirements, are likely to be rapidly utilised by bats present within the Site and adjoining habitats, and become even more favourable in the long term if subject to management. The potential loss of a waterbody at the location of the new road will be mitigated for through the re-siting of the waterbody further east.

7.19.222 Furthermore retained habitats within the Washery, which will be enhanced as part of the GCRE project and retained habitats within the Nant Helen Site, which will be enhanced as part of the Nant Helen Complementary Earthworks, will continue to provide suitable foraging and roosting habitats, to bats within the local area.

7.19.223 The GCRE development is not anticipated to create any barriers to movement by bats, as a result of habitat loss, additional infrastructure or train operation. However, during the as discussed below there is a mortality risk associated with train collision and potential disturbance during the operation of GCRE.

7.19.224 Adverse effects on local bat populations from habitat fragmentation / loss are not considered to be significant.

7.19.225 Bats and their resting / breeding places are protected by UK and European legislation. Additional mitigation measures are detailed in Sections 7.21 and 7.22 which will ensure there will be no significant residual effects on roosting and foraging bats as a result of the proposals, and compliance with UK legislation. Section 7.25 details the specific requirements of long term management and monitoring of retained and newly created habitats to ensure they establish as species rich habitats, and are suitable for bat species present locally. Additionally Section 7.23 describes how further measures can be implemented to provide enhancements to habitats for roosting and foraging / commuting bats.

Habitat Disturbance / Degradation

7.19.226 Habitats important for bats may also be adversely affected if construction / operation activities where to damage / degrade habitats.

7.19.227 Aquatic habitats will be particularly sensitive to changes in water quality, which could occur during construction or operation. Some habitats may also be more sensitive to changes in air quality,

particularly effects of nitrogen deposition. In addition it is possible that bat foraging/roosting habitats could by physically disturbed for example by machinery, during construction and potentially during operation.

7.19.228 As discussed above under 'Habitats' in paragraphs 7.19.62 to 7.19.71, when considering embedded mitigation, physical disturbance to habitats will be avoided and there are limited residual effects of air quality or water quality, including potential effects to water quality within the area of the washery and also temporary effects to sensitive habitats as a result of nitrogen deposition. However additional mitigation measures have been recommended to ensure habitats are protected from changes in water and or air quality.

7.19.229 Adverse effects from habitat degradation / disturbance are likely to be of low magnitude, and not significant to local bat populations.

7.19.230 Mitigation measures to address the habitat degradation / disturbance are detailed in Sections 7.21 and 7.22. Monitoring of habitats is also recommended in Section 7.25.

7.19.231 It is considered that with the implementation of this additional mitigation, there should be no residual effects on bat foraging/roosting habitats as a result of habitat disturbance / degradation.

Disturbance

7.19.232 Disturbances during construction for example as a result of lighting, noise or vibrations (from piling activities) have the potential to result in displacement of foraging / commuting bats within the Site, and in adjacent habitats (and roosting bats if these were present at the time of construction).

7.19.233 During operation, there is also the potential for disturbances (including lighting and noise) from the activities associated with the proposed GCRE Project, in particular from noise associated with the operation of trains on the test track within Nant Helen as well as from the lighting of buildings (largely within the Washery), access tracks and OLE foundations.

7.19.234 A range of bat species are known to forage / commute within the Site, and adjacent habitats, including rare species, and which may be disturbed by construction / operation activities if they were to occur between dusk and dawn when bats are active. Woodland bat species such as *Rhinolophus*, *Myotis* and *Plecotus*, are known to be particularly disturbed by lighting, even high-pressure sodium and white LED lighting at low densities[24]. Some bat species such as *Nyctalus* and *pipistrellus* species are attracted to short wave light

[24] Altringham J., Kerth G. (2016) Bats and Roads. In: Voigt C., Kingston T. (eds) Bats in the Anthropocene: Conservation of Bats in a Changing World. Springer, Cham

however, due to the increased abundance of insect prey. Any lighting from isolated sources are not likely to be far reaching, although depending on the extent of high intensity lighting effects on foraging bats may be significant.

7.19.235 As discussed above under 'Habitat loss' bat roosts have not been recorded within or adjacent to the Site, but it is possible they may be present at the time of construction and or operation. Any disturbances from piling activities are only likely to affect bat roosts (that are present in the vicinity of the works,) since they will take place during day-time hours.

7.19.236 Adverse effects on the majority of local bat populations, which are common and widespread, from disturbances are not considered to be significant. Adverse effects on rarer species such as the greater horseshoe bat could be significant at a **County** level.

7.19.237 Impacts from disturbance during construction, will be temporary and of low magnitude, and as such are not anticipated to significant affect local bat populations. Additionally, it is noted that where any bats are displaced, they would be able to continue to use suitable habitats in the wider area however, including retained and newly created habitats.

7.19.238 Impacts from noise during operation will be similar to the existing levels (Chapter 10; noise), and it is therefore anticipated that operational noise will not be a significant disturbance to any bats roosting / foraging within the local area. Furthermore the design incorporates noise barriers which will reduces noise levels to adjacent habitats. Operational lighting proposals are largely concentrated in the Washery, although the specific details are currently not available to assess impacts. As such a precautionary approach is recommended, and further mitigation recommended to avoid / minimise any light spill on roosting and foraging / commuting bats.

7.19.239 Bats and their roosts are protected from disturbance by UK legislation. Recommended mitigation is detailed in Sections 7.21 and 7.22 to ensure compliance with UK legislation including the undertaking of pre-construction checks to ensure the absence of bat roosts within the vicinity of the works. In addition, sensitive lighting is recommended during operation.

Harm / Mortality

7.19.240 Roosting bats would be subject to an increased risk of mortality during construction activities namely building demolition and vegetation clearance which is likely to be required prior to / during construction. No roosts have been recorded within the Washery, where further vegetation clearance / demolition is proposed, although as detailed above under 'Habitat loss' is possible they may be roosting within buildings / vegetation at the time of construction (due to the presence of suitable roosting habitats), and could therefore be at risk from harm or mortality. Newly established habitats within the Nant

Helen site which will be affected by the GCRE project will not be suitable for roostibg bats at the time of construction. It is assumed that all suitable habitats within the GCRE footprint in the Nant Helen site will have been cleared as part of the Nant Helen Complementary Earthworks, and therefore there is no risk of harm / mortality to previously identified potential bat roosts in the Nant Helen site.

7.19.241 During operation, there is a risk of bat mortality as a result of collision with trains which will be in operation at Nant Helen, as well as with construction and operational traffic. Very little information is available on collision risk to bats from trains, however, the effects of collision with road traffic has been relatively well-studied. Due to bat flight patterns and behavioural traits, they are highly vulnerable to moving vehicles when either foraging along roads or when attempting to cross roads on commuting flights[24]. It is therefore considered likely that bats would be similarly affected by trains, particularly where they are travelling at high speeds. It is acknowledged, however, that the risk of collision with train traffic is likely to be lower than with road / highway traffic, due to the lower number of trains travelling at one location on a track. Potential collision with vehicles on roads within the Site, is considered to be a low risk since these roads will not be used frequently.

7.19.242 There is considered to be no risk of collision with OLE, and associated electrocution, since bats will be able to avoid static structures.

7.19.243 Effects of harm / mortality on rarer species such as greater horseshoe bats would be significant at a **County level.** Any effects of harm / mortality on more common and widespread species would not be significant.

7.19.244 Bats are protected from harm, by UK legislation. Recommended mitigation for potential harm / mortality impacts to bats is detailed in Sections 7.22 and 7.23 to ensure compliance with UK legislation, including the undertaking of pre-construction surveys and provision of suitable wildlife underpasses beneath tracks.

Notable Mammal Species

Habitat Loss

7.19.245 Construction and associated site clearance within the Washery, which will be required for the GCRE Project, will result in the loss of suitable mammal habitat including heathland, scrub and grassland. In addition there will be the loss of newly established grassland in the area of the Nant Helen site, which will have been created as part of the the Nant Helen Complementary Restoration Earthworks Project and retained marshy grassland as a result of the proposed road. These areas are not considered likely to provide key habitats for notable mammal species, although they may cross these areas when travelling

between more suitable habitats. There will be no further habitat loss during operation.

7.19.246 As discussed under 'Habitats' in paragraphs 7.19.49 to 7.19.53 there will be small-scale habitat creation within the Washery including species rich grassland, as well as enhancements of retained habitats, namely marshy grassland. Embankments of the test track will provide establishing acid grassland habitat, will also provide a large extent of suitable habitat for notable mammals within the local area. Across the site SuDs and landscaping will also provide additional habitats. Newly created habitats, providing they meet the specific species-requirements, are likely to be rapidly utilised by notable mammals present within the Site and adjoining habitats, and become even more favourable in the long term if subject to management.

7.19.247 Furthermore retained habitats within the Washery, which will be enhanced as part of the GCRE project and retained habitats within the Nant Helen Site, which will be enhanced as part of the Nant Helen Complementary Earthworks, will continue to provide suitable habitats for notable mammals within the local area.

7.19.248 As such any habitat loss is not considered to have a significant impact on notable mammals.

7.19.249 Additional mitigation measures are detailed in Sections 7.21 and 7.22 which will ensure there will be no significant effects on notable mammals as a result of the proposals. Section 7.25 details the specific requirements of long term management and monitoring of retained and newly created habitats. Additionally Section 7.23 describes how further measures can be implemented to provide enhancements to habitats for notable mammals.

Habitat Fragmentation / Severance

7.19.250 No impacts to notable mammal species (polecat, brown hare and European hedgehog), from habitat fragmentation / severance within the Washery, are considered likely as a result of the GCRE construction or operation, since the development footprint is similar to the existing operational Washery.

7.19.251 The test tracks within the Nant Helen site, during construction will create a more significant barrier to movement by notable mammal species, however this will be a temporary effect and habitats either side of the railway lines will support suitable habitat for notable mammal species. Post construction and during operation of GCRE, the test tracks are not considered to be a barrier to the movement of notable mammals, although as discussed below under 'Harm and Mortality' there is a risk of mortality from collision with high speed trains during operation.

7.19.252 As such adverse effects on populations of notable mammal species from habitat fragmentation are not considered to be significant.

Habitat Disturbance / Degradation

7.19.253 Habitats important for notable mammals may also be adversely affected if construction / operation activities where to damage / degrade habitats.

7.19.254 Aquatic habitats will be particularly sensitive to changes in water quality, which could occur during construction or operation. Some habitats may also be more sensitive to changes in air quality, particularly effects of nitrogen deposition. In addition it is possible that habitats for notable mammals could by physically disturbed for example by machinery, during construction and potentially during operation.

7.19.255 As discussed above under 'Habitats' in paragraphs 7.19.62 to 7.19.71, when considering embedded mitigation, physical disturbance to habitats will be avoided and there are limited residual effects of air quality or water quality, including potential effects to water quality within the area of the washery and also temporary effects to sensitive habitats as a result of nitrogen deposition. However additional mitigation measures have been recommended to ensure habitats are protected from changes in water and or air quality.

7.19.256 Adverse effects from habitat degradation / disturbance are likely to be of low magnitude, and not significant to local notable mammal populations.

7.19.257 Mitigation measures to address the habitat degradation / disturbance are detailed in Sections 7.21 and 7.22. Monitoring of habitats is also recommended in Section 7.25.

7.19.258 It is considered that with the implementation of this additional mitigation, there should be no residual significant effect on notable mammal populations as a result of habitat disturbance / degradation.

Harm / Mortality

7.19.259 It is considered possible that construction activities would result in harm / mortality to notable mammal species as a result of vehicle collision or entrapment. This would only be within the Washery, and related to species such as European hedgehog which could occur at this location. Embedded mitigation comprising covering open excavations and limiting vehicle traffic to low speeds as detailed in Section 7.16, will avoid harm / mortality of notable mammls during construction.

7.19.260 During operation, there is the risk of mortality of notable mammal species as a result of collision with trains which will be in operation at Nant Helen, as well as collision with vehicles on Site during construction and operation. Although effects on mammals have not been well-studied[19] evidence has shown that mortality rates from train collision are higher for small sized mammals in comparison with

larger mammals, and the most affected are lagomorphs (including brown hare) and carnivores, and to a lesser extent undulates and insectivorous mammals (including West European hedgehog)[25]. Notable mammals species have been recorded in low numbers within the Site. It is acknowledged, also, that the risk of collision with train traffic is likely to be lower than with road traffic, due to the lower number of trains travelling at one location on a track. Potential collision with vehicles on roads within the Site, is considered to be a low risk since these roads will not be used frequently

7.19.261 Adverse effects on notable mammal populations as a result of harm / mortality are considered to to of low magnitude, and not significant

7.19.262 Mitigation measures to address the harm / mortality of notable mammal species, and ensure compliance with UK legislation are detailed in Sections 7.21 and 7.22.

Invasive species

7.19.263 The site is known to support Japanese knotweed, montbretia, rhododendron and cotoneaster species. These plants are listed under Schedule 9 plants of the Wildlife and Countryside Act 1981 (as amended) and The Invasive Alien Species (Enforcement and Permitting) Order 2019, and which make it is an offence to spread them from the site. Mitigation measures are required to ensure compliance with UK legislation. These are detailed in Sections 7.21 and 7.22.

7.20 Potential effects due to Climate Change

7.20.1 This section, in addition to Chapter 15; Climate change, considers effects related to climate change as per the requirements of EU Directive 2014/52 and the 2017 EIA Regulations. The combined effects relating to ecological receptors of the proposed development and potential climate change include the following:

- Drier / drought conditions;
- Increased temperatures;
- Increased wind speed;
- Increase in frequency and intensity of heavy rainfall events and flooding;
- Variation in temperature and rainfall patterns; and
- Increase in frequency of extreme weather events.

[25] Van der Grift, E. A. (1999). Mammals and railroads: Impacts and management implications. *Lutra, 42*, 77–98.

7.20.2 Impacts are considered on the Future Baseline, which as set out in paragraph 7.15.5. During construction and operation, the above climate changes have the potential to influence effects of the proposed development on ecological receptors within the Site, namely: habitat loss, fragmentation and degradation (through the inability of plants to survive changes in temperature and weather patterns i.e droughts / flooding and high wind). These changes to habitats would also increase the likelihood of soil erosion, surface run-off and flooding within catchments. Rare or endangered species at the edge of their distribution are likely to be susceptible to changes in climate particularly increases in temperature, and changes in habitat / prey availability.

7.20.3 Therefore mitigation to address impacts from the GCRE Project during construction and operation, also needs to consider the additional impacts of climate change. The promotion of resilient ecosystems, a requirement of the Environment (Wales) Act 2016, will also support the provision of ecosystems including habitats and species populations, which are more resilient to the likely impacts of climate changes.

7.20.4 Mitigation measures to address the climate change impacts are detailed in Sections 7.21 and 7.22. Mitigation will include management and monitoring to control INNS within the Site.

7.21 Construction Mitigation

7.21.1 Embedded mitigation measures to be implemented during construction are detailed in Section 7.16.

7.21.2 The following additional mitigation measures will be implemented prior to or during the Construction Phase.

7.21.3 All additional mitigation measures will be incorporated into the CEMP and EPP.

Site Clearance / Construction

Habitats and Protected Sites

- A review of the final design will be undertaken prior to submission of reserved matters, specifically relating to factors likely to affect air quality such as levels of diesel emissions, train speed / frequency of use and annual hours of operation in order to determine the requirement for updating the existing air quality assessment. Should an update of the air quality assessment still find that there are likely significant effects (or if the possibility for significant effects is not ruled out) on ecological receptors including nearby SSSIs, SINCs and ancient woodland, due to nitrogen deposition being >1% of the lower critical load for the habitats they support, additional mitigation measures will be provided to protect all affected ecological receptors. Based on the

existing worst case scenario which has been modelled it is assumed that mitigation would be acceptable to address the likely temporary effects for 5 years of diesel emissions. Mitigation measures are likely to comprise specific habitat management including grazing and woodland management within areas of affected SINC grasslands, SSSI bog/grassland habitats and ancient woodland. Additional management may be required within Gorsllwyn also, which is already grazed by livestock, depending on the extent/frequency of grazing. In addition specific vegetation/habitat monitoring would be required until lower diesel or zero emission trains are used (i.e. after 5 years or at whatever point this occcurs), and at least 5 years afterwards to confirm whether there have been adverse effects on ecological receptors in vicinity of the train operation. Management of these areas including the Gorsllwyn SSSI will be within ownership of the applicant.

- Consultation will be undertaken with the relevant teams within NRW regarding impacts on the Gors Llwyn and Nant Llech SSSI, and SSSI assents obtained where these are deemed a requirement.
- The LPA will be consulted regarding impacts on SINCs, which are considered likely to be affected by the Project, namely Onllwyn Coal Washery and Dyffryn Cellwen and Gorsllywn Meadow.
- The EPP as detailed in Section 7.16 will be prepared, and will:
    - Detail mitigation measures required during construction to protect important ecological receptors that are being retained on or adjacent to the Site, and which may be subject to incidental damage. This will include notable habitats immediately adjacent to the works, including those which occur within SINCs, such as marshy grassland, species rich grassland, waterbodies, river corridor and heathland in the Washery, and retained and newly created habitats within the Nant Helen Site such as marshy grassland, species rich grassland, woodland and waterbodies. This will be implemented through the use of measures such as Heras fencing and buffer zones. Trees, hedgerow and woodland will be treated in accordance with BS5837 (2005).
    - Detail temporary construction works including access and working compounds, ensuring that no equipment, machinery will be brought into the retained habitats areas, or stored under retained tree canopies, and ground levels will not be altered within any of the demarcated zones of protection.
    - Detail the translocation of notable vascular plants where habitats are to be lost, and new habitats are available for them to re-establish.
    - Detail elements of working which will need to be overseen by a SQE.

- Detail the treatment of the realigned tributary to ensure it provides naturalistic features of an equivalent or greater value to that of the existing watercourse, and provide connecting habitat for otter and other wildlife.
- Detail the specific species mitigation to be implemented, as detailed below.

Protected and Notable Species

- Pre-construction surveys are anticipated to be required for badger and otter, where suitable habitat occurs within 50 m of the construction works.
- Where there is suitable habitat within the vicinity for Schedule 1 nesting birds, such as common crossbill or barn owl, pre-consutruction checks should also be undertaken within an appropriate distance from the works. Survey areas will depend on the species, and will need to be confirmed by the LPA ecologist.
- Pre-construction checks will also be undertaken of vegetation clearance areas where it is likely to support nesting birds, reptiles, or any Section 7 mammals such as West European hedgehog.
- A reptile trapping and relocation programme will be implemented, in accordance with a reptile method statement will be undertaken by a SQE. A suitable receptor site for reptile translocations will need to be identified prior to any reptile mitigation taking place, and be agreed by the LPA ecologists and the sites landowner. An indicative location for reptile translocation, immediately west of the Site within marshy grassland is shown in Figure 7.9. This area currently supports a mosaic of acid grassland and marshy grassland. Although this area was not surveyed as part of the reptile surveys, the Phase 1 Habitat survey shows that this area supports similar habitats to those where common lizard were found. To increase the area's carrying capacity for reptiles, it will be subject to short term enhancements in the form of the creation of a number of reptile refugia (six locations are shown in Figure 7.9) which will be suitable for common lizard and slow worm.
- Badger setts located within the test tracks will be closed temporarily during the site clearance and construction, until construction is complete and suitable underpasses for badger have been constructed along with suitable connecting landscaping. This will need to be undertaken under a protected species licence from NRW, which will be obtained prior to construction commencing.
- Licences will be sought from NRW as required for any other European and Nationally protected species, where these are found during pre-construction checks or where the final design confirms likely impacts on these species. Mitigation will be implemented accordingly as detailed in accompanying Method Statements.

- Details of species translocations will be included within the EPP, to ensure their protection during site clearance. For species this will include reptiles and potentially some vascular plants (eyebright spp) which occur in the Washery grasslands.
- Where there is a delay to site clearance / construction, and more than 18 months has lapsed, the LPA will need to confirm whether any of the ecological surveys undertaken will need to be repeated prior to site clearance / construction commencing. It is anticipated that there would be the requirement to update bat surveys of buildings and trees, within 60 m of the development.

Invasive (legally controlled) species

- An INNS Management Plan will be drawn up prior to site clearance, to ensure that legally controlled plant species are not spread outside of the site during, and post construction. This will be submitted for prior approval by the LPA and NRW.

7.22 Post Construction / Operation

7.22.1 Mitigation measures will be implemented post construction to avoid / reduce likely impacts on ecological receptors in the Site during the operation of the Project, in addition to further reducing and or offsetting likely impacts from the Project during site clearance and or construction (such as habitat loss). The creation of more diverse species-rich habitats post construction, and their appropriate long-term management supports the requirements of the Environment Act (Wales) 2016, by supporting the resilience of ecosystems, and in turn also the requirements of climate change legislation.

7.22.2 The following mitigation measures will be incorporated in to the scheme design to reduce the scale of effects during the operational phase:

Sites

- Should an updated air quality assessment determine the likely significant impacts on sensitive ecological receptors (or not be able to rule out such potential), namely: Gorsllywn SSSI, discussions should take place with NRW regarding mitigation within the SSSI including the potential changes to grazing.

Habitats

- An indicative habitat creation and restoration plan has been prepared to mitigate / compensate for the habitat loss, and disturbance likely to occur to the future baseline, as shown in Figure 7.9.

- The plan comprises those habitats proposed for habitat retention within the Washery including acid and marshy grassland, in addition newly created habitats including new SuDS and landscaping which will also provide value to ecology within the Site. Additionally, the Figure shows areas of small scale habitat creation using existing coillery substrates within the Site to create habitat for species rich grassland, for establishment by heathland and lichen / fungi communities.
- Within the Washery, enhancement will form the largest proportion of habitat mitigation for the GCRE Project, since the majority of land outside of the development footprint within the Washery supports notable habitats, and further habitat creation may compromise their value.
- The plan also includes habitats which will be created within the Nant Helen site. This includes new SuDS and landscaping, and creation of species rich acid grassland on track embankments which will allow for the establishment heathland, lichen and fungi habitats.
- The Nant Helen part of the site will also need to support landscaping which delivers species specific mitigation (see 'Protected and Notable Species' recommendations below which detail landscaping requirements for badger, bat and otter culverts).
- Habitat enhancement will largely focus on areas of marshy grassland and acid grassland within the Washery, including areas of anthills; which have largely been left undisturbed and support a diverse assemblage of plants and invertebrates, as well as other species. Enhancement of these habitats will be delivered through long-term management such as light grazing (subject to grazing agreements) and or manual control, to remove encroaching scrub and maintain short grassland swards, as well as to an extent, disturb the ground, to provide a variety of microclimates suitable for a diversity of plants / invertebrates.
- Should an updated air quality assessment determine the likely significant impacts on SINCs within the Washery, discussions should take place with NRW and the LPA regarding mitigation within the SSSI including the potential changes to grazing regimes or whether the proposed grazing is sufficient.
- Habitat creation within the Washery will focus on creating species rich wetland features which also provide drainage functions within the Site (where possible, on disturbed areas and not within existing notable habitats), including swales and lagoons providing SuDS, surrounded by species rich grassland and short perennial vegetation. Wetland features will provide habitat for species such as the scarce blue tailed damselfly.
- Where possible, coal spoil / susbtrate available in the Washery area will be re-used for newly created grassland habitats, so that a

similar assemblage of species establishes. At these locations of the land will be profiled to provide a varied topography, with sheltered areas and more exposed areas for basking by invertebrates and reptiles etc. They will be left to be colonised by plants in the local area, such as bird's-foot trefoil and black medick which are favoured foodplants for invertebrates such as dingy skipper and six-belted clearwing. The establishment / enhancement of short grassland will also provide a pioneering habitat for heathland, lichen and fungi.

- The above habitat creation will in places re-use calcareous substrates available within the Site, or where these are not available, additional calcareous substrate will be brought into the Site. This will facilitate the establishment of base-rich grassland habitats and in particular vascular plants such as kidney vetch, the favoured food plant of the small blue butterfly, a notable invertebrate within the Washery. To aid the establishment of kidney vetch, additional seeds will be sown in these areas.
- New landscaping will be small-scale within the Washery, and will only be established where this is the only available option to provide screening to residential areas; since additional planting increases the likelihood of scub / trees enchroachment on sensitive habitats such as marshy grassland and short ruderal grassland.
- Re-profiled land at the locations of embankments and cuttings in the Nant Helen site, will provide a large surface area for the establishment of grassland and fungi, lichen and heath habitats. Where these areas do not need to support infrastructure associated with the GCRE Project, they will be left for grassland to establish. Long-term management will be required to ensure that trees / scrub from adjacent habitats do not establish, within the new short ruderal grassland grassland.
- Sustainable Drainage Systems (SuDS) which forms part of the Sites embedded Mitigation. Whilst the main function of SuDS will be to manage rainfall using landscape and vegetation to control the flow, volume and quality of the surface water runoff, it will also create diverse wetland habitats for example through the use of a range of native wetland plants in swales and rain gardens.
- Where required, landscaping will comprise the planting of native broadleaved tree and shrub species, which provide benefit to a range of species known to occur within the Site. The species mix will consider climate modelling, and likely changes in climate such as higher temperatures, and ensure that selected species are resilient to such changes.
- Additionally, retained conifer and mixed woodland within the site will be enhanced through the gradual removal of conifer species and replacement with broadleaved tree species, to increase light levels and species diversity.

- Newly established and existing, retained habitats will be subject to long-term management to enhance their ecological value and which will be detailed in an EMMP.
- The EMMP will include:
  - Details of the ecological baseline, including ecological survey results (where relevant). It will also detail information of existing landownership, management and use, as well as geology / ground conditions, hydrology and topography, which will be essential to inform habitat establishment proposals.
  - Details of the newly established habitats and the enhancement of existing habitats. It will include details of how these habitats will provide suitable habitat for notable species.
  - Suitable prescriptions, for the management of newly created habitats and existing habitats (to be enhanced), which maintains and enhances their value for biodiversity post development. This will include specific management measures for notable habitats and species within the site including notable plants / fungi, invertebrates, amphibians, reptiles, breeding birds, wintering birds, foraging / commuting bats, otter and notable mammals. This will include information on methods / equipment / timing etc.
  - To protect and enhance important ecological features within and adjacent to the site, the management plan will also detail how INNS will be eradicated from the site, and long-term management that is required to ensure INNS do not re-establish.
  - A programme detailing the duration of each survey / habitat creation / management activity, what time of year it will need to be undertaken, and how frequently.
  - The duration of the EMMP is to be agreed with the LPAs / NRW and anticipated to be for 25 years. A programme detailing all management prescriptions for the first 25 years post-construction, which will be subject to review and extension.
  - Full details for the monitoring of the site post development, to provide information on changes in habitat condition / species populations and additional mitigation / management measures that may be required. In addition, mechanisms to feedback and agree / implement such remedial measures will be detailed for example the establishment of an ecological management committee of relevant stakeholders and regular meetings.

Protected and Notable Species

- To reduce collision risk for bats, otter and badger, wildlife crossings for these species will need to be provided in the final design. New culverts which are required for drainage, and detailed in the final design, will provide passage to bats known to occur in the local area, at least in locations where they are likely to travel across the tracks, for example where there is existing or new habitat connectivity (i.e. as a result of the proposed Nant Helen Complementary habitat creation and enhancement plan). The exact size and location of the structures will be designed at detailed design stage. Height is considered to be the most important factor for bats using culverts, as well as being sited at locations where they are likely to cross barriers such as tracks and roads. The Site supports both woodland adapted species such as brown long-eared bats, Myotis species and greater horseshoe bat, which require culvert heights of approximately 3 m, and generalist edge adapted species such as pipistrelle species, which require culverts heights of approximately 6 m. Open air species, such as noctule and serotine, which also occur within the Site, are likely to fly high above the track (and are unlikely to use culverts). As such the height of culverts of at least some of the culverts will need to be at least 3 m to accommodate pipistrelles and other generalist bat species. Other road schemes in Wales[26] have designed culverts / underpasses for woodland adapted species, in particular greater horseshoe bats with 2 m height x 3 m width, due to monitoring of other road schemes recording greater horseshoe continuing to cross roads where culverts have a height of 1.8 m. Due to the presence of this species within the Site, a 2 m height should be the minimum for other culverts which are designed to accommodate bat passage within the Site. Lighting of culverts will be avoided. Landscaping will be designed to encourage species through culverts from the adjacent habitats. Figure 7.9 details indicative locations, which will be confirmed at the reserved matters stage of the application, along with details of the culvert design (including technical drawings) and associated planting, based on likely bat foraging / commuting corridors.
- Culverts designed to accommodate bat passage, will also facilitate otter movement, using similar designs to other WG road schemes. The otter ledges will be located 150 mm above the 1 in 100 year flood level including 25% for climate change. Due to the low number of otter recorded within the Site, and largely dry nature of the watercourses / ditches (with the exception of future high rainfall events), it is not considered necessary to provide ledges in all culverts.

[26] Arup (2020) A40 Redstone Cross Environmental Statement. Welsh Government.

- Furthermore, culverts adapted for bats and otter, due to being largely dry, are likely to provide passage to badger, for the majority of the time. Culvert can be adapted to provide a dry run and in certain circumstances the provision of a Class H 1050 mm diameter concrete pipe may be appropriate.
- As shown in culvert design on other road schemes[26] in Wales and detailed in best practice guidance[27,28,] culverts to a length of 20 m should comprise at least a 600 mm cylindrical pipe, to accommodate badgers and otter. In crossings over 20 m in length, the width of the pipe should increase to 900 mm.
- Fencing used in the final design will also prevent crossing by wildlife, in particular otter and badger, consistent with similar specifications used in other road schemes in Wales. The fencing which will be at least 1.6 m high, without any crank on the top, will prevent otters, badgers and other wildlife from accessing the track and to guide them to the culvert passages. A Figure will be provided at the reserved matters stage of the application, with details of fencing location, and tie in with the culvert locations, as detailed above.
- A lighting design and associated plan will be produced in accordance with Bat Conservation Trust's (BCT) 'Bats and Lighting' publication[29], and will avoid light disturbance to bats, and other nocturnal or crepuscular species such as otter and badger. The plan will aim to avoid lighting of key wildlife corridors such as tree lines, waterbodies, rivers and streams, used by these species. Any lighting will be directional with minimal upwards or backwards light spill and minimising light spill onto adjacent, retained habitat features. Lighting onto any associated landscaping which is designed to direct species through culverts, will also need to be considered within this lighting plan.
- To compensate for the potential loss of one breeding barn owl pair, as a result of train collision, at least one barn owl nest box will need to be installed in suitable habitat further than 3 km from the Site in accordance with guidance[30]. A suitable location will be provided as part of the reserved matters application, further to discussions with the local bird groups, Wildlife Trust and LPA ecologists to identify a suitable location and agreement being obtained with the landowner.

[27] The Highways Agency (2001) Design Manual for Roads and Bridges (DMRB) Volume 10 Section 4 Part 4 HA 81/99 Nature Conservation Advice in Relation to Otters. Although this guidance has been superseded by updated DMRB guidance, it is still considered relevant.
[28] The Highways Agency (2001) Design Manual for Roads and Bridges (DMRB) Volume 10 Section 4 Part 2 HA 81/99 Nature Conservation Advice in Relation to Badger. Although this guidance has been superseded by updated DMRB guidance, it is still considered relevant.
[29] http://www.bats.org.uk/data/files/bats_and_lighting_in_the_uk__final_version_version_3_may_09.pdf
[30] https://www.barnowltrust.org.uk/barn-owl-nestbox/

- At least ten house sparrow nest boxes will be provided in the area of the washery as mitigation for the loss of nesting opportunities within the washery buildings.
- Long-term management will target retained and newly created habitats for notable species known to occur within or adjacent to the site including vascular plants, fungi, invertebrates (particularly dingy skipper, six belted clearwing, small blue and scarce blue tailed damselfly), breeding / wintering birds, foraging bats, reptiles, amphibians and notable mammal species. Specific details for management to enhance the nature conservation value of the site, will be provided within an EMMP.

7.23 Enhancements

7.23.1 The project offers significant opportunities to provide further ecological enhancements within the scheme design post construction, for operation, and in doing so meet the requirements of PPW 11 and the Environment Act (Wales) 2016, for biodiversity enhancement and the promotion of ecosystem resilience. This will also support the resilience of ecosystems to likely future threats of climate change.

Habitats

7.23.2 Retained and newly created habitats within the Washery and Nant Helen site (as shown in Figure 7.9) will be enhanced through long-term management. In addition to mitigating / compensating for habitat loss across the site, such long-term management should provide the opportunity for the creation of more diverse, species rich habitats, and therefore enhancements; in particular, enhancements of marshy grassland and short ruderal grassland habitats, which provide greater benefits to biodiversity including notable species within the Site.

7.23.3 Opportunities will be sought to create green / brown roofs on buildings within the Washery, where this does not compromise other requirements of these buildings; it is anticipated that roof spaces of the decommissioning building and carriagewash will support essential services, and roofs of the larger depots will provide a rainwater harvesting function. The creation of green / brown roofs would not be suitable if this compromises the main objective of sustainable drainage. Smaller roofspaces such as those of the staff accommodation and control block, are not anticipated to house any additional infrastructure and or services and as such are likely to provide opportunities for the creation of green / brown roofs. Planting will include food plants for notable invertebrates such as six-belted clearwing, small blue and dingy skipper.

Species

7.23.4 An artificial otter holt will be provided along the Afon Dulais, at least 100 m west of the development, or an alternative site to be identified by the ECoW in consultation with NRW, to provide a suitable breeding site for otters due to the presence of foraging / commuting otter in this area. An indicative location is shown in Figure 7.9 on land which is within ownership of the applicant.

7.23.5 A range of bat boxes and / or bat bricks in buildings and bridges (no less than 20) will be provided on mature trees, and where possible buildings and bridge structures, within the Site, and or adjacent habitats (subject to landowner agreement). The number and location will be selected by the ECoW and would be informed by the number of appropriate trees, buildings and bridge structures within / adjacent to the Site. These should be of woodcrete construction, such as Schwegler models, which are more durable and require minimal maintenance. Indicative locations are shown in Figure 7.9 on land which is within ownership of the applicant.

7.23.6 A range of bird boxes (no less than 30) will be provided on mature trees, and where possible buildings and bridge structures, within the Site, and or adjacent habitats (subject to landowner agreement). The number and location will be selected by the ECoW and will be informed by the number of appropriate trees and buildings within / adjacent to the Site. Swift (*Apus apus*) boxes and house sparrow boxes should be prioritised for buildings, and grey wagtail / dipper (*Cinclus cinclus)* boxes for bridges and culverts. Similar to bat boxes, these should be of woodcrete construction, such as Schwegler models, which are more durable and require minimal maintenance. Indicative locations are shown in Figure 7.9 on land which is within ownership of the applicant.

7.23.7 At least 15 artificial reptile refugia, which provide shelter to hibernating and active reptiles, will be created within the Site. using materials available post site clearance / construction such as timber logs, brash, grubbed up tree roots, inert hardcore, bricks or building rubble. The number and location will be selected by the ECoW and would be informed by available suitable habitat. Indicative locations are shown in Figure 7.9 on land which is within ownership of the applicant.

7.24 Ecosystem Resilience

7.24.1 A separate assessment of ecosystem resilience has been undertaken, which considers the existing ecosystem resilience of the Future Baseline and how likely this is to change as a result of the implementation of the scheme.

7.24.2 The assessment considers the key attributes of resilience; diversity, extent, condition and connectivity, for each broad ecosysystem type.

7.24.3 Table 7.20 in Appendix 7V, shows the resilience assessment along with an indication of how the scheme will change this resilience (increase + / decrease -).

7.24.4 There are no decreases in resilience as a result of the scheme. The resilience of the majority of the broad ecosystems, including grassland, woodland and wetland, are likely to increase as a result of the increase extent as a result of habitat creation and increase in condition as a result of favourable long term management. Positive changes in ecosystem resilience are subject to habitats being protected and enhanced, and newly created in accordance with the EPP and EMMP, and long term monitoring will also be essential to ensure changes are favourable.

7.25 Monitoring Proposals

7.25.1 Monitoring (in addition to the supervision of the works outlined above and the auditing of mitigation measures) will be undertaken during the construction period and post-construction (period to be defined by the LPA / NRW), in accordance with the EMMP. The monitoring will include:

- Condition monitoring of newly established / enhanced habitats on an annual basis for a period of 5 years. The specific attributes of each habitat, for monitoring, will be detailed in the EMMP to include: extent, vegetation composition, vegetation structure and physical structure. Targets for each attribute will also be detailed. Where habitats aim to support notable species, attributes and targets will also account for this. Methods of monitoring will be determined once the attributes / targets have been set, but will follow published methods[31,32,33].
- Monitoring of notable species, of county value, including: vascular plants, fungi, invertebrates, breeding birds and bat activity (with surveys following relevant best practice, and based on previous surveys undertaken to establish the baseline). It is proposed that these monitoring surveys will be in year 1, 3 and 5 post construction. Species, attributes, targets and monitoring methods will be agreed, in consultation with the LPA and NRW.
- Should an updated air quality assessment determine the likely significant impacts (or if significant effects cannot be ruled out) on sensitive ecological receptors, namely: Gorsllywn

[31] JNCC, 2010. Handbook for Phase 1 habitat survey – a technique for environmental audit (2010) 2016.
[32] Jerram, R. & Drewitt, A. (1998). Assessing vegetation condition in the English uplands. Peterborough: English Nature Research Reports, No. 264.
[33] JNCC (2009). Common Standards Monitoring Guidance for Upland habitats, Version July 2009.

SSSI, Gorsllwyn meadows and Onnllwyn coal washery SINCs, and areas of ancient woodland within the vicinity of track (as identified in the air quality assessment; chapter 14), the following will also be required:

1. Vegetation monitoring will be used to support an assessment of whether air quality impacts are contributing to changes in the habitats present. The monitoring proposals should be reviewed with the LPAs and NRW to agree the aims, objectives and techniques to be used; and

2. Air quality should also be monitored including measuring the concentrations of pollutants in the atmosphere at the location of sensitive ecological receptors. As above, the monitoring proposals should be reviewed with the LPA and NRW to agree the aims, objectives and techniques to be used.

- Monitoring results will be reported through a Steering Group, led by the site owner in partnership with NPTCBC and PCC, NRW, and invited interested parties such as users / managers, advisory consultants / independent experts and local interested parties (e.g. Commoners representative) as appropriate. The site owner and the local authorities shall agree where additional remedial measures are required to ensure the objectives of the EMMP are implemented. .

7.26 Residual Effects

7.26.1 Table 7.19 (detailed in Appendix 7U) provides a summary of the evaluation of impacts, with and without mitigation.

7.26.2 Providing the measures as detailed in Section 7.21, 7.22 and 7.25 are implemented prior to, during and post construction, it is considered likely that the scale of all impacts from the Project, on protected sites, and the majority of habitats and species, would be reduced sufficiently and there would be no significant residual impacts on the majority identified ecological receptors.

7.26.3 It is acknowledged that for some habitats i.e. fungi communities, there will initially be an adverse effect as a result of the habitat loss / disturbance. However it is likely that the newly proposed habitats to be created on / off site will establish over 20-30 years and therefore there will be no residual effects after this time. The extent of potential fungi habitat, associated with grassland habitats predominantly, will be greater to compensate for this.

7.26.4 The above habitat establishment will be dependent on the appropriate long term management and monitoring, which will be detailed within the EMMP.

7.26.5 It is also acknowledged that despite the provision of wildlife crossing to provide safe passage to species within the Site, namely bats, birds, otter, badger and invertebrates, it is unlikely to remove the collision risk completely. However, providing wildlife crossings are included in the design at suitable locations, the residual effects are not considered to be significant to any populations of these species.

7.26.6 The proposed long-term monitoring will confirm any residual effects to habitats and or species, and where necessary identify further mitigation measures that may be required.

With the inclusion of enhancement measures (as detailed in section 7.23) which will also be detailed within the EMMP, it is considered likely that there would be an overall positive residual effect from the project for some habitats and species; namely marshy grasslands and wetlands, short grassland and invertebrates.