

ARUP

A Global Centre of Rail Excellence in Wales

ENVIRONMENTAL SCOPING REPORT

September 2019



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1 Introduction

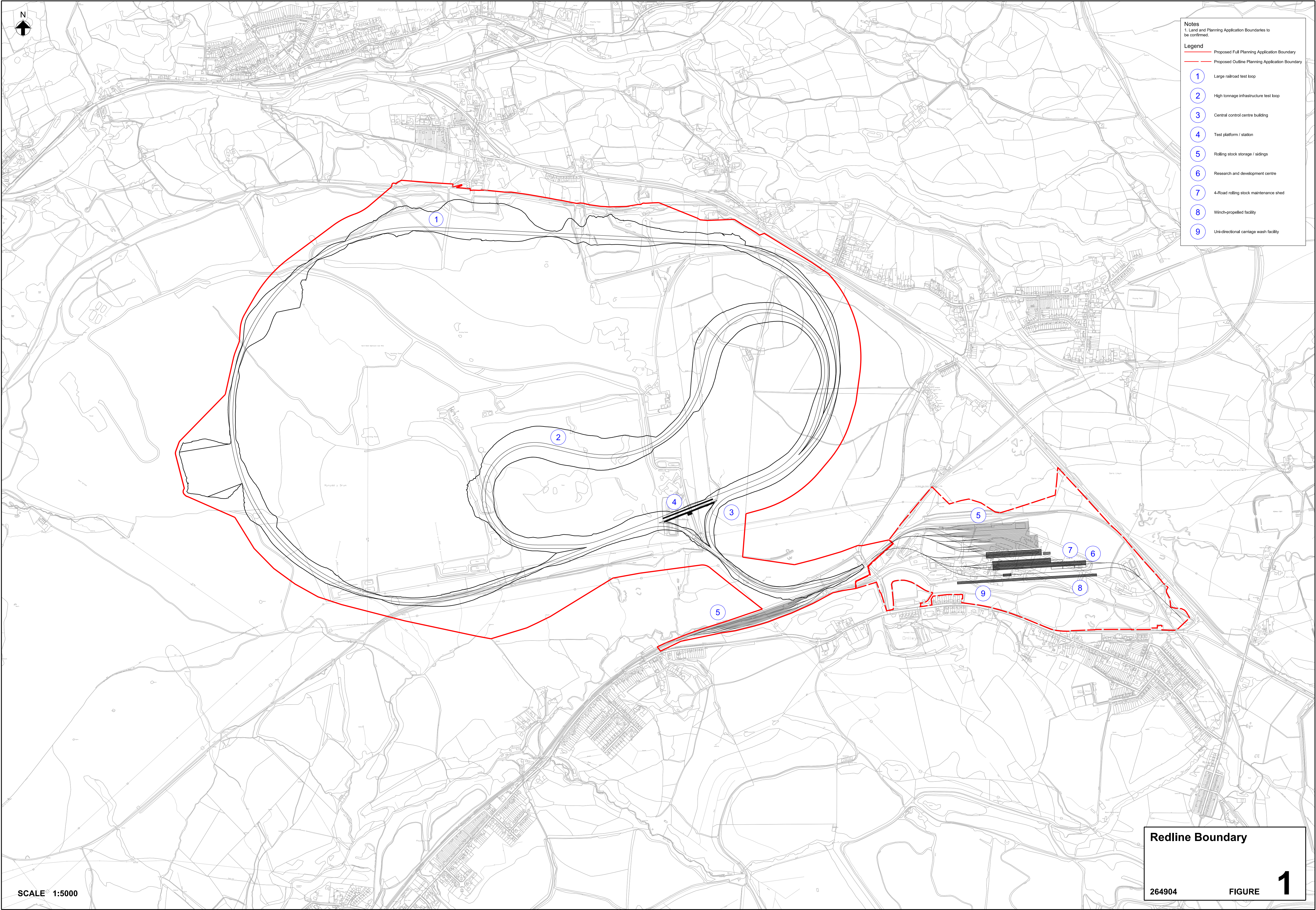
1.1 Background

1. The Welsh Government is proposing to develop a rail testing and storage facility, known as Global Centre of Rail Excellence (GCRE) at the site of the Onllwyn and Nant Helen Open Cast mine. A planning application is therefore being prepared which will include the following development:
 - **Rolling stock and infrastructure testing facility** – two test tracks of loop configuration; one smaller one (4.5km), inside the larger loop (6.9km).
 - **Ancillary Development:** Landscaping, infrastructure works (e.g. energy, water) and access.
 - **Storage facilities** – storage for rolling stock for up to 400 units.
2. The planning application is a hybrid application; a full application for the testing facility and ancillary development with the storage facility being outline at this stage.
3. The project is considered to be Environmental Impact Assessment (EIA) development as defined by the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017, hereafter referred to as the EIA Regulations. As such the planning application will require an accompanying Environmental Statement (ES) to be prepared in accordance with the EIA Regulations.
4. In preparation for undertaking an EIA, Welsh Government submits this report as a request to Neath Port Talbot County Borough Council (NPTCBC) and Powys County council (PCC) for an EIA scoping opinion under Part 4 of the EIA Regulations. The report sets out information to assist in reaching a scoping opinion.
5. The key issues to be addressed have been identified as those upon which the Project will have potentially significant environmental effects during both the construction and operational stages of the development.

1.2 Site context

6. The planning application site boundary is shown on Figure 1. For the purposes of this Scoping report, the elements of the Global Centre of Rail Excellence are referred to as ‘the Project’.
7. The Project site is within the Dulais Valley straddling the Neath Port Talbot and Powys border, with the Brecon Beacons National Park Authority boundary immediately to the north. The site is predominantly brownfield land that has been heavily worked due to the open cast mining. Much of the site has been revegetated.

8. The site's existing topography is such that mining activities are screened from view from within the nearby settlements of Onllwyn, Seven Sisters, Ystradgynlais, Caehopkin, Abercrave or Coelbren.
9. Whilst the site is currently being mined by Celtic Energy, the company will cease mining operations in 2021, at which point Celtic Energy will be required to restore the land in accordance with regulatory requirements and agreements with Powys County Council. This includes s106 agreements and planning conditions that need to be discharged.



- Notes**
1. Land and Planning Application Boundaries to be confirmed.
- Legend**
- Proposed Full Planning Application Boundary
 - Proposed Outline Planning Application Boundary
- 1 Large railroad test loop
 - 2 High tonnage infrastructure test loop
 - 3 Central control centre building
 - 4 Test platform / station
 - 5 Rolling stock storage / sidings
 - 6 Research and development centre
 - 7 4-Road rolling stock maintenance shed
 - 8 Winch-propelled facility
 - 9 Uni-directional carriage wash facility

Redline Boundary

264904 **FIGURE 1**

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1.3 Rationale and alternatives for scheme

10. A lack of sufficient UK testing and trialling capacity has been a barrier to innovation¹. A draft report has been produced by Transport for London on behalf of the Test Facilities Steering Group titled 'Test Facilities Gap Analysis' and has identified a number of requirements for new test facilities.
11. While many so called secondary and tertiary test facilities already exist, for example, the UK Rail Test Centre university and industry partnership, these mainly cater for Railway Industry Readiness Levels (RIRLs) 1 to 4; as highlighted in Table 1.

Table 1: Railway Industry Readiness Level

1	Conception
2	Opportunity development
3	Proof of Concept
4	Industry specification
5	Prototype
6	Operational transition
7	Initial deployment
8	Roll out
9	Whole life management

12. There remain significant gaps in facility provision for stages 5 to 7, which are prototype to initial deployment (these can also be categorised as 'Primary Type' Approval facilities). These gaps have been identified as being crucial to delivering the planned pipeline of new vehicles in an authentic operational environment.
13. In particular, Table 2 highlights some of the specific testing facilities that do not exist or are insufficient.

Table 2: Gaps identified

Test	Features
Train endurance testing	100mph, electrified for 25kV operation, noise barriers, onsite monitoring workshop/laboratory
Infrastructure endurance testing	Up to 60mph, loop of 5-7 miles, electrified, good access for heavy machinery and plant.

¹ Rail Supply Group. *Fast Track for Growth: UK Rail Supply Industry*. p.23

High Speed Train Test loop	Up to 150mph for UK Mainline (250mph for HS2). Including EC standards (Technical Specifications for Interoperability).
Full station Environment	250m long platforms, station buildings, platforms, lighting, IT and information systems

14. Based on an Arup pre-feasibility study, there would also appear to be a particular gap in the UK for a dedicated facility serving metro and light rail systems.
15. Vehicle ride tests are currently undertaken on the mainline, which is not compliant with European (EN) standards. According to European standards, testing and trialling should be undertaken using dedicated facilities, but at present the situation requires that the customer supply the on-board test equipment.
16. With this market need for the facility established, options for the location for the Project have been explored with a number of other candidate locations across Wales identified but discounted for similar reasons. In the main, the sites either lacked a rail connection and/or were not large enough to accommodate a test track of sufficient size to meet speed and braking test requirements.

1.4 Report structure

17. This Scoping Report is structured as follows:
 - **Chapter 2: Project description** – a brief description of the scheme, including an overview of the site, its history and the purpose of the Project.
 - **Chapter 3: The EIA process** – the purpose and process of EIA;
 - **Chapter 4: The scoping process** – a description of the scoping process that has been followed for the scheme; and
 - **Chapters 5-17: The scoping results** - the results of the scoping exercise set out by environmental topic. This includes a description of the currently known baseline, the future baseline, identified key issues, assessment methods proposed, consultation that will be carried out and potential mitigation measures that could be considered.

2 Project description

2.1 Proposed project

18. The proposed site for the Project is approximately 483ha which is split between the full application area (429ha) and the outline application area (54ha) and includes the following components listed in Table 3 and represented on Figure 1.

Table 3 Project components

Proposed scheme component [x] refers to features on Figure 1	Description
[1] Large railroad test loop [2] High tonnage infrastructure test loop [3] Central control building	Electrified high speed outer rail testing loop (6.9 km), electrified low speed inner rail testing loop (4.5 km) and control building. The outer loop would extend around the perimeter of the open cast mine and an appropriate scheme of earthworks would be delivered (as part of the restoration strategy being carried out by Celtic Energy) in order to achieve the required gradients for the test track facility. The outer loop would enable the testing of moderate and higher-speed passenger trains up to a maximum 110 mph. The inner loop would enable testing of rail infrastructure and equipment, such as the track, structures (like bridges and tunnels), platforms and signalling, power or communications equipment. A multi-storey control building would be provided from which testing activities are managed. The building would also act as a hub for site personnel. Both loops would link with the existing branch line to the south. It is anticipated rolling stock would be delivered for testing using this link because it provides the most efficient mode of transport. Rolling stock may also be delivered via the strategic road network, depending on need and type.
[6] Research and development centre	The centre would provide opportunities for research and development, conferencing, storage, maintenance and decommissioning of rolling stock and network infrastructure.

[7] 4-road rolling stock maintenance shed [5] Rolling stock storage/sidings	The centre would have rail links with both testing loops and the existing branch line to the south west. This would facilitate the internal movement of rolling stock for testing and would also link with the wider site and testing loop control centre via internal access roads for use by operational personnel. The centre would provide buildings for up to 400 rolling stock vehicles shared between cold storage (without electricity supply) and warm storage (with electricity supply), buildings with two rail sidings for decommissioning rolling stock and buildings with four rail sidings for maintaining rolling stock as well as stationary testing. There would also be 10 rail sidings branching off the existing rail freight line to help manage incoming rolling stock for testing.
Mechanical low speed linear rail testing track [8] and uni-directional carriage wash facility [9]	The track would be 555 metres long and 15m wide and used for mechanical pulley-driven rolling stock, as opposed to the self-propelled rolling stock that would operate on the rail testing loops at the open cast mine. To be housed within a building or within an acoustically designed boundary enclosure.
Associated development	Across the site this will include land reformation, utilities infrastructure, access roads, car parking, drainage and landscaping.
Site Access	The existing access to the site via the A4109 would be upgraded and a network of internal roads created so that operational personnel could access the centre and the wider site associated with the control building and rail testing loops.

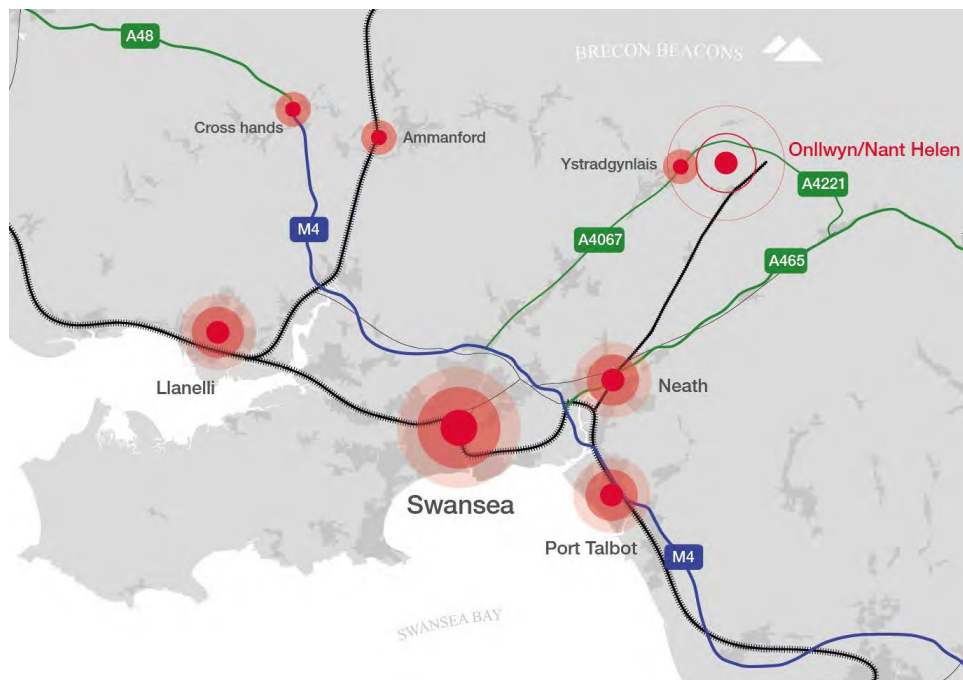
2.2 The site

19. The Project site consists of areas within the Nant Helen Open Cast mine plus the Onllwyn Distribution Centre (58ha) which serves as a preparation and washery facility. The project site has been extensively worked as an open cast coal mine and therefore consists of restored land, overburden mounds, coal stocking areas, barrel wash and plant maintenance areas, site office facilities and a void which is currently being mined.
20. The site has a number of important operational advantages for a development of this type:
 - The Neath and Brecon line runs from the site to Neath, where it connects with the Vale of Neath line. From this line a connection is possible to the South Wales Main line (SWML) at Swansea Burrows.
 - Road access exists at the nearby A465 Heads of the Valleys (which is being improved to dual carriageway in stages and is a strategic

connection from South Wales to the English Midlands and the broader motorway network) and Junction 43 of the M4 motorway.

- Port Talbot (connected to the SWML) provides a possible seaport connection.
21. Figure 2 below shows the location of the site in the context of the wider South Wales transport links.

Figure 2 - GCRE Location and Transport Links



2.3 Future baseline for site

22. Celtic Energy, which currently owns the Nant Helen mine have submitted a s73 (Town and Country Planning Act, 1990) application to Powys County Council for an amendment to the site restoration plans that were initially approved as part of a 2011 planning application to extend the coal working area of the site.
23. The restoration of the site would take place once the mine ceases operation in 2020. As the restoration will not be completed before the commencement of the assessments, obtaining data on baseline conditions of a restored site will not be possible. The EIA will therefore consider the existing (i.e. pre-restoration) conditions, although where relevant, future baseline (post restoration) will be considered based on information about the restoration plans known at the time of assessment. Each topic chapter will define this clearly within the assessment methodology sections, providing clear justification for which baseline is considered.
24. Figure 3 shows the redline boundary overlain on Celtic Energy's proposed restoration plan.



KEY

SITE BOUNDARY

5m CONTOURS

ACCESS

RETAINED
HARDSTANDING

POND / WETLAND

WATERCOURSES

HEDGEROW / HEDGEBANK

NATURAL REGENERATION

ACID GRASSLAND /
MARSHY GRASSLAND

ENCLOSED PASTURE

BROADLEAF
WOODLAND

Existing Features
ACID GRASSLAND /
MARSHY GRASSLAND

CONIFEROUS WOODLAND

Notes
1. Land and Planning Application Boundaries to be confirmed.

Legend
— Proposed Full Planning Application Boundary
- - - Proposed Outline Planning Application Boundary

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3 Approach to the EIA

3.1 Introduction

25. EIA is an important and systematic procedure that examines the environmental consequences of a development to ensure that they are understood, considered and given appropriate weighting in the planning process.
26. Due to the nature and size of the proposed project, it constitutes major development as defined by the Town and Country Planning (Development Management Procedure) (Wales) (Amendment) Order 2016.
27. EIA for major developments follows the requirements of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (the EIA Regulations), and an overview of the approach is set out below.

3.2 Screening

28. The procedure for Screening is set out within the EIA Regulations and is based on whether the project is listed within Schedule I or Schedule II. Schedule I projects always require EIA, whereas those within Schedule II may require EIA depending on their size, location and the likelihood of giving rise to significant environmental effects.
29. The Centre of Rail Excellence is not Schedule I development, but is Schedule II being the construction of a railway with an area of works that exceeds 1 hectare. Based on the size of the project, the sensitivity of the local environment and the potential to result in significant environmental effects, it has been considered by the project team that the development is EIA. No formal screening request has been sent to either Neath Port Talbot County Borough Council (NPTCBC) or Powys County Council (PCC), rather work has moved directly to the preparation of the Scoping request.

3.3 EIA process

30. The EIA will identify the likely significant environmental impacts (both positive and negative) of the Project and report these within in the ES which will provide the following relevant information, as required by the EIA Regulations:
 - A description of the development, including the physical characteristics of the whole development and the land use requirements during the construction and operational phases;
 - An outline of the main alternatives studied by the applicant with an indication of the main reasons for the choice, taking into account the environmental effects;

- A description of the aspects of the environment likely to be significantly affected by the proposed development;
- A description of measures designed to prevent, reduce and where possible offset any significant adverse effects on the environment along with a description of measures designed to enhance beneficial effects;
- A non-technical summary; and
- A description of any difficulties encountered by the applicant.

3.3.1 General EIA Methodology

31. The EIA will be undertaken in accordance with best practice including:
- **IEMA Quality Mark** – this is run by the Institute of Environmental Management and Assessment (IEMA) and is based around a set of EIA Commitments, which organisations registered to the scheme agree to comply with. Arup are registered with the Quality Mark. The IEMA EIA Quality Mark provides registrants with a benchmark for their EIA activities and allows them to demonstrate their commitment to effective practice; and
 - **National Planning Practice Guidance** - this draws together previous EIA guidance including the DCLG/DETR guidance documents on EIA such as ‘EIA: A guide to good practice and procedures’ (DCLG, 2006) and DETR Circular 02/99 Environmental Impact Assessment (1999).
32. Although all the information required to comply with Schedule 4 of the EIA Regulations will be covered, the ES will focus on the key environmental effects, having scoped out unnecessary detail on those issues of less relevance.

3.4 Definitions and Methodology

33. The following general definitions and methodology will apply to all EIA assessments undertaken unless otherwise specified by the individual topic specialists:

3.4.1 Spatial and temporal scope

34. Spatially, the area over which effects could occur is wider than the site. The appropriate study area will be determined for each environmental topic. Specific study areas will be defined in each subject section and will allow for assessment of indirect as well as direct effects, together with off-site factors, such as traffic routes.
35. In considering the environmental effects of the Project, it is necessary to identify both adverse and beneficial effects, direct and indirect, during construction and operation of the development. Specific temporal periods will be defined for the assessment of baseline conditions and the impacts of the proposals. It is recognised that some environmental design measures will take time to become established and effective.

36. There will be likely environmental effects from any decommissioning of the Project at the end of its life. However, at this stage it is anticipated that the Project would have an expected operational life of 50 years which would render attempts to predict environmental effects invalid. It is anticipated that effects during decommissioning would be similar to those of the construction phase, however it is proposed that they would be assessed in detail at the time of any decommissioning activities.
37. The EIA will also consider cumulative effects which are those that arise as a result of additive impacts from more than one project (under construction or reasonably foreseeable projects), combining together to have an effect on a receptor that may be larger than if the effect were considered separately. Broadly, reasonably foreseeable projects are those that are known to the planning system or are already consented (but not yet built).

3.4.2 Identification of potential receptors

38. Receptors are defined as the physical resource or user group that would experience an effect. The environmental effect would depend on the spatial relationship between the source and the receptor. Some receptors will be more sensitive to certain environmental effects than others. The baseline studies, including risk assessments, will identify the potential environmental receptors.

3.4.3 Prediction of Environmental Effects

39. Much of the predictive exercise will be undertaken based on the expert judgement of the assessment team. Whatever the predictive approach, the objective will be one of presenting a clear justification for the strategy adopted and stating all relevant assumptions, to allow independent review.

3.4.4 Significance of Effect

40. The significance of effect is assessed against a defined scale set out in

41. **Table 4.** These are specific to each subject area and will be included in the relevant sections. Broadly, significance of effect is a function of:
- The value of the resource (international, national, regional and local level importance);
 - The magnitude of the effect, be it adverse or beneficial;
 - The timescale involved, temporary or permanent; and
 - The sensitivity of the receptor and numbers affected.
42. To judge the importance of environmental effects and to ensure consistency between topics, significance criteria will be defined by the appropriate EIA specialists, following the generic framework shown in Table 4. Definition of terms follows good practice guidelines. The generic criteria identified here will be used to guide the evaluation unless otherwise stated in the topic areas.

Table 4 Significance Criteria for use within the EIA

Significance	Criteria Definition
Major	These effects are likely to be key factors or important considerations at a regional or district scale but, if adverse, are potential concerns to the project, depending upon the relative importance attached to the issue during the decision-making process. They are generally, but not exclusively associated with sites and features of national importance and resources/features which are unique and which, if lost, cannot be replaced or relocated.
Moderate	These effects, if adverse, could potentially be key decision-making issues although experienced at a more local level. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.
Minor	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in the detailed design of the project.
Negligible	Effects which are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

3.4.5 Cumulative and in-combination effects

43. For the purpose of the EIA, cumulative effects are considered to be those that arise as a result of the Project and other developments in the study area. The approach to the assessment of cumulative effects is set out in Section 17.
44. In-combination effects are multiple topic effects that arise from the Project and are experienced at the same time by a receptor. These in-combination effects will be considered within the topic chapters of the ES.

3.4.6 Mitigation measures

45. Where adverse effects can be reduced to acceptable levels through incorporation of practical and cost-effective design or management measures, these will be identified. Conversely, beneficial effects would be enhanced through relevant mitigation. All mitigation will be summarised in a mitigation schedule within the ES.

3.4.7 Residual effects

46. Residual effects are the effects that remain following the implementation of proposed mitigation measures. These will be clarified, and the appropriate level of significance assigned.

3.4.8 Monitoring

47. Where appropriate, monitoring procedures will be identified that will measure the effectiveness of the mitigation proposed to reduce/enhance any significant adverse or positive effects.

3.4.9 Limitations and Assumptions

48. In accordance with Schedule 4 of the EIA Regulations, difficulties encountered during assessment work and limitations and assumptions used for individual assessment areas will be set out in the ES.

4 Scoping

4.1 The purpose of scoping

49. The scoping process aims to identify what the likely effects of a proposed development are and to determine those that are likely to be significant and therefore included within the scope of the EIA.

4.2 Requesting a scoping opinion

50. The scoping opinion of a planning authority represents its opinion as to what information needs to be included with the ES and what assessments should be carried out in order to determine what effects the proposed development is likely to have on the environment. When considering this, the scale and nature of the proposed development, along with the site specific and local environmental baseline conditions should be considered. The aim of the process is therefore to ‘scope in’ only those issues considered to have potential to give rise to likely significant effects.
51. A comprehensive and focused scoping process that identifies the likely significant effects and any EIA methodologies that NPTCBC/PCC wishes to see employed will enable the production of the ES that provides a proportionate, concise and objective analysis that deals with all the significant areas of impact and highlights the key issues relevant to the decision-making process.
52. A scoping opinion is therefore being sought in order to reach agreement on the topics and issues that should be addressed as part of the EIA and reported in the ES. As required in the EIA Regulations (Part 4, Regulation 14), this scoping request includes the following information:
- A plan sufficient to identify the land;
 - A brief description of the nature and purpose of the development including its location and technical capacity;
 - The project’s likely significant effects on the environment; and
 - Such other information or representations as the person making the request may wish to provide or make.
53. The environmental topics that have been considered within this scoping report are:
- Socioeconomics;
 - Noise and vibration;
 - Air quality;
 - Traffic and transport;
 - Hydrology and flooding;
 - Ground conditions;

- Biodiversity;
 - Archaeology and Cultural Heritage
 - Landscape and visual;
 - Health and wellbeing;
 - Climate change; and
 - Major accidents and disasters.
54. For each topic, the likelihood of significant effects arising will be considered in terms of:
- Direct and indirect effects during construction;
 - Direct and indirect effects during operation;
 - Direct and indirect effects during decommissioning; and
 - Cumulative effects arising from the Project with other development that has extant planning permission or is under construction.
 - In-combination effects arising from the Project.

4.3 Assessment process

55. This request for a Scoping Opinion and the preliminary assessment is made in accordance with the following:
- European Council Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment; and
 - Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017.
56. This request for a Scoping Opinion and the preliminary assessment has had regard to the following:
- IEMA Quality Mark;
 - National Planning Practice Guidance (refer to section 3.3.1)
 - Policies and guidance relevant to the environmental topics being assessed.
57. Preliminary consultation with statutory bodies has already taken place and is reflected within the assessment scope of each environmental topic. Consultation will continue through the baseline data gathering and assessment phases.
58. The impact assessment will include an assessment of cumulative effects of the Project and other committed (or reasonably foreseeable) developments which, due to their geographical location and programme of construction may result in significant effects during construction and/or operation of the proposed Global Centre of Rail Excellence.

4.4 Scoping Results

59. The following sections set out, on a topic by topic basis, potential environmental effects of the Project. Where potential for significant effects has been identified, the scope for undertaking an environmental assessment is described. Where topics are considered not likely to result in significant effects, these have been scoped out and justification provided.
60. In summary the scope of the EIA for GCRE is set out in Table 5.

Table 5 Scope of EIA

Assessment topic	Summary of scope
Socio-economics	To include assessment of construction and operational effects on local residents, local businesses, community facilities, land use, local and regional economy, and tourism and recreational facilities.
Noise and vibration	To include noise and vibration associated with construction and construction traffic. Assessment related to the operation of the Project will include: - Assessment of operational noise and vibration associated with train movements both during the day and night. - Assessment of additional road traffic noise generated on the local highway network and within the site.
Air quality	Assessment of local air quality to include: - Review of existing air quality conditions; - Qualitative assessment of dust emissions during construction; - Assessment of air quality effects from construction and operational traffic; - Assessment of air quality effects from on-site rail testing of diesel trains during operation.
Traffic and Transport	The assessment will be based on a 'worst case' scenario whereby all materials would be brought to the site via road (it is more likely that the majority of materials would be brought to site by rail).

Assessment topic	Summary of scope
	To include an assessment of effects on highways and walking and cycling routes that surround the Project site. Potential effects on public transport will also be considered.
Hydrogeology and flooding	To consider effects of the Project during construction and operation on: - Surface water features (to include details of water quality and quantity). - Groundwater features. - Flood risk. - Drainage infrastructure.
Ground conditions	To consider effects of Project related to geology, hydrogeology and contamination during both construction and operation.
Biodiversity	The presence of statutory and non-statutory sites which could be indirectly affected during construction and operation. The presence of notable habitats within the site i.e. Habitats of Principal Importance in Wales and ancient woodland, which could be directly and indirectly affected during construction and operation. The presence of protected and or notable species, which could be directly and indirectly affected during construction and operation including from harm, mortality, disturbance and habitat fragmentation
Cultural heritage	To consider potential effects during construction and operation on above and below ground archaeological remains, built heritage, historic landscapes and any other features that contribute to the archaeological and historic interest of the area.
LVIA	To consider construction and operational effects on landscape character and visual receptors including residential receptors around the Project site and recreational receptors using Public Rights of Way. Views from within the Brecon Beacons National Park and SSSI will be assessed. A ZTV will be prepared for use within the assessment and viewpoints agreed with PCC and NPTCBC.

Assessment topic	Summary of scope
	Land modelling including excavation, transport and placement of material will be assessed for the construction phase.
Health and wellbeing	Consideration of construction and operational effects on the health and wellbeing outcomes of communities within the wards of Aber-Craf, Tawe-Uchaf, Onllwyn and Seven Sisters.
Climate change	To consider the impacts of greenhouse gas emissions from the Project and also the vulnerability of the Project to climate change. This will consider the resilience of the Project in the context of projected future changes in climate variables.
Major accidents and disasters	Whilst the likelihood of occurrence is considered to be low, the Project has the potential to give rise to major accident or disaster effects upon environmental receptors, and therefore the topic has been scoped in for further assessment to confirm that the vulnerabilities to major accidents and/or disasters is fully, robustly and clearly covered by existing legal requirements, codes and standards or by another chapter of the EIA.
Cumulative effects	Assessment of cumulative effects arising from the Project in combination with confirmed and other reasonably foreseeable projects in the local area will be considered within a separate ES chapter. In-combination effects (i.e. effects arising from the Project itself that combine together to affect the same receptor) will be considered within each topic chapter.
Decommissioning	Decommissioning effects are scoped out of the EIA due to the likely extended period of time likely to pass between construction and operation.

5 Socio-economic

5.1 Introduction

61. This section of the ES would consider the potential effects of the Project during construction and operation with a focus on the following broad receptor groups:
- Local residents;
 - Local businesses;
 - Community facilities;
 - Land use (existing and future);
 - The local and regional economy (employment and supply chain); and
 - Tourism and recreational facilities.
62. The assessment would consider both direct and indirect effects arising from the Project and liaison would be held with other topic chapters where necessary in considering indirect amenity effects on local residents, businesses and other sensitive receptors.

5.2 Study area

63. A local impact area (LIA) including an area covering a buffer zone of approximately 2km from the Project site. For the purpose of data collection, where available the following areas will be analysed: ward data for:
- Aber-Craf and Tawe-Uchaf in Powys; and
 - Onllwyn and Seven Sisters in Neath Port Talbot
64. This LIA will be used to consider largely direct effects emerging from the Project or those effects predicted to impact on receptors in the immediate vicinity.
65. A wider impact area (WIA) comprises the Powys and Neath Port Talbot Council areas. This WIA will be used to consider potential wider effects during construction and operation (e.g. employment effects and multiplier effects).
66. A regional impact area (RIA) including South East Wales (Rhondda Cynon Taff, Merthyr Tydfil, Caerphilly, Cardiff, Newport, Blaenau Gwent), will consider both the construction and operational impacts because of the nature of the Proposed Development.

5.3 Known baseline

67. The Project site lies on the border of Neath Port Talbot and Powys Council areas, close to the Brecon Beacons National Park.

68. The site is currently utilised as an open cast mining facility (the Nant Helen Mine) and also contains a preparation and washery facility (the Onllwyn Distribution Centre).
69. The Project site has been extensively worked as an open cast coal mine and therefore consists of restored land, overburden mounds, coal stocking areas, barrel wash and plant maintenance areas, site office facilities and a void which is currently being mined.
70. In advance of the project progressing, the current site owners have a duty to restore the site and therefore the future baseline (prior to development) will be one of a restored open cast mine facility. It is understood that this would include a large amount of re-profiling, particularly around the current open cast mining area. It is anticipated that this restoration will create a level site on which the project will be developed as specified in the restoration plans.
71. The Project site sits at the head of two valleys with the settlements of Onllwyn and Seven Sisters to the south and Abercrave to the north. The larger settlement of Ystradgynlais lies to the south west of the site.
72. The site is identified as an existing minerals site within the Powys Local Development Plan (LDP), recognising its long history with coal extraction and processing. Given the former / current uses, the site benefits from an active rail link which connects to the wider rail network to the south.
73. The site (red line area) is situated within the wards of Aber-Craf and Tawe-Uchaf in Powys, and Onllwyn and Seven Sisters in Neath Port Talbot. Key statistics for the wards form the following headline demographic information / context:
- Usual resident population of approximately 6,800 people across the wards.
 - Generally lower levels of people with higher level qualifications and a greater proportion of people with no qualifications.
 - Higher proportions of economically inactive residents.
 - Higher proportions of retirees when compared to data for the wider County / Wales.
74. The above data provides a snapshot of the situation in and around the site at the time of the 2011 Census. Where available, further estimates or mid-year data would be included in the assessment of socio-economic effects.
75. As part of the assessment, a desk-based study will be undertaken to provide a full socio-economic baseline of the study area, in comparison with the local (Powys / Neath Port Talbot) and wider (Regional) picture where data allows. Key areas of focus for the baseline will include:
- Population and community demographics;
 - Employment and economic activity;

- Business demographics;
 - Commuting patterns; and
 - Land use and recreation receptors.
76. The baseline will also include a policy review in relation to the site status, drawing from local sources such as the LDP and Definitive PRow Plans.

5.4 Key issues

77. The following section outlines the likely key issues/effects from a socio-economic perspective which will be explored further as part of the ES.

Construction

78. The following potential effects have been identified for the construction phase of the Project:
- Permanent and temporary loss of agricultural land / other land uses;
 - Potential impacts on the local Public Rights of Way (PRow) network;
 - Potential amenity effects and disruption to local businesses and residents;
 - Potential direct and indirect effects on community facilities;
 - Potential employment and training opportunities within the construction sector; and
 - Wider multiplier effects associated with construction staff living and working in the local area.

Operation

79. The following potential effects have been identified once the Project is in operation:
- Employment generation associated with the Project;
 - Potential investment benefits in terms of companies utilising the facility and therefore local accommodation / services;
 - Provision of improved landscape within the area;
 - Potential longer-term impacts on the local Public Rights of Way (PRow) network.
80. Consideration of potential effects in the context of the site history and current uses (the baseline situation) will be an important aspect of the assessment.

5.5 Assessment methodology

81. The socio-economic assessment will draw on relevant guidance, including Appendix 1 of the Department of the Environment Good Practice Guide on Environmental Assessment, which sets out the recommended approach to assessing the effects of a proposed scheme on human beings. The assessment will also utilise guidance such as the Employment Density Guide and Additionality Guide in determining the effects of employment generation.
82. It should be noted however that best practice and professional experience will be used in developing the assessment methodology and determining significance in the absence of any published guidance in relation to specific assessment criteria / thresholds.
83. A key element of developing the methodology is the process of agreeing the spatial scope of the assessment, considering the spatial impact over which the potential effects of the Project should be considered. Our initial work on spatial impact characterisation has considered various levels of study area for the different stages of the Project:
 - **Construction Phase** – This phase of the Project can be expected to attract workers from a wider area than the operational phase. A study produced by the Construction Industry Training Board concluded that the average daily commute for construction workers was 28 miles. In order to reflect the scale and nature of the Project we propose a study area which would consist of the local authorities within which the Project is located, as well as the wider region.
 - **Operational Phase** – Operational workers are expected to live more locally. For this Phase we propose a study area of the wards in closest proximity to the site.
 - **Local Area of Influence (LAI)** – this seeks to define an area over which to consider more localised effects on the physical environment (e.g. land use) and the local population (e.g. amenity effects). At this stage we propose to consider potential direct effects within the defined Project boundary (the red line) and potential indirect or amenity effects within approximately 1km from the site boundary.
84. The assessment will consider the potential direct and indirect effects of the Project for current and future residents and businesses within the study area, including any potential cumulative effects arising from the Project in combination with other planned developments. Effects will be considered both during the construction phase and once the Project is operational.
85. A framework will be developed for assessing the significance of potential socioeconomic effects, taking into account the sensitivity of the receptor and the magnitude of the effect. Appropriate significance criteria will be defined at that stage, based on industry accepted best practice.
86. A full socioeconomic baseline will be developed, drawing on published data sources including ONS Census 2011, the Annual Population Survey, and the

Welsh Index of Multiple Deprivation, as well as relevant documents published by Powys County Council and/or Neath Port Talbot. The baseline will inform the identification and assessment of socioeconomic effects.

87. The assessment of employment effects will draw where possible on the business case work completed for the project and may also refer to wider guidance such as the HCA Additionality Guide.
88. The assessment of amenity effects will draw on the findings of other ES topics, including Air Quality, Noise and Vibration, Traffic and Transport, and Landscape and Visual. The socioeconomic assessment will consider the potential for an amenity effect on a specific receptor where two or more significant environmental effects are identified. Consideration of amenity effects will be given where a receptor is considered to be sensitive to such an effect (e.g. those more reliant on their surroundings / more sensitive to changes in the local amenity).

5.6 Consultation

89. Consultation will be undertaken with relevant officers at Powys and Neath Port Talbot in order to understand the range of potential effects of the Project, and to inform the assessment.
90. Where appropriate, consultation will be undertaken by telephone or by email.

5.7 Potential mitigation

91. Where possible, the assessment of socio-economic effects will identify opportunities to mitigate potential adverse effects and to enhance the potential beneficial effects of the Project.
92. An assessment of residual effects following implementation of any identified mitigation measures will be provided.

6 Noise and Vibration

6.1 Introduction

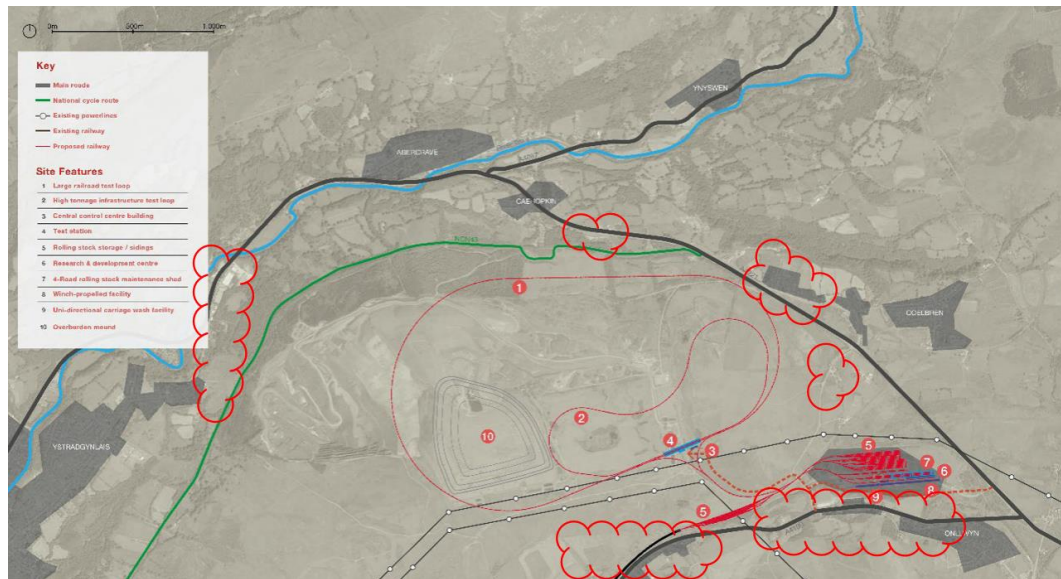
93. A noise and vibration assessment will be undertaken as part of the Environmental Impact Assessment for the Project. The Project has the potential to affect noise conditions in both construction and operation, and therefore both phases will be assessed in the ES for existing and planned receptors. The scope of the noise and vibration assessment is outlined in this chapter.

6.2 Known baseline

94. A noise survey was carried out by Hepworth Acoustics in 2010² to assess the noise impacts associated with proposals for working and restoring the site at that time. These measurement results will be reviewed, but more recent data is required to represent the existing noise conditions at sensitive receptors around the current application boundary.
95. It is proposed that a baseline noise survey is carried out to establish the character and levels of the existing environment within the locality. Up to six measurement locations will be chosen (subject to consultation with Councils), at representative closest sensitive receptors around the site of the scheme. The survey will be designed to capture data for the daytime, evening and night time periods using a combination of attended and logged measurements. Indicative areas where noise survey locations will be chosen are shown in Figure below for agreement with the Councils. These areas represent the closest dwellings or communities around the site boundary that could potentially be affected by noise from construction or operation.

2

<http://planning.npt.gov.uk/detail.asp?AltRef=P2011/0204&ApplicationNumber=P2011%2F0204&AddressPrefix=&Postcode=&CaseOfficer=&ParishName=&AreaTeam=&WardMember=&DateReceivedStart=&DateReceivedEnd=&DateDecidedStart=&DateDecidedEnd=&Locality=&AgentName=&ApplicantName=&ShowDecided=&DecisionLevel=&Sort1=FullAddressPrefix&Sort2=DateReceived+DESC&Submit=Search>

Figure 4: Indicative baseline noise survey areas around proposed scheme (shown in red)

96. Any planned development in the locality will be reviewed for new noise sensitive receptors that may need to be included in the assessments. Furthermore, any planned noisy land uses and activities will be reviewed for potential changes to the baseline environment at the existing sensitive receptors.
97. Since any potential effects from the construction of the development to existing sensitive receptors will be assessed to absolute limits recommended by standards, a baseline vibration survey will not be conducted.

6.3 Key issues

98. During construction, the use of construction plant machinery on site can give rise to high noise emissions which may be audible at surrounding residential and other sensitive areas. Movement of materials within the site, and to and from the site will potentially give rise to noise from construction traffic. The possible use of compacting equipment for earthworks near to any sensitive receptors also has the potential to cause effects. Therefore, both construction noise and vibration assessment are scoped in for the assessment, as well as effects from construction traffic.
99. The operation of the scheme will result in noise from trains using the track circuits during trials, and potentially noise from stabling when trains are stationary. The application includes the potential for high-speed running and this will be predicted using the appropriate methodologies to determine noise emission. The potential for night-time running will also be considered. Predictions of noise emission will be based on projected usage of the test circuits and other facilities and will represent a conservative schedule of operations (i.e. typical worst-case).
100. In addition, the following potential operational noise and vibration effects will be examined:

- the potential effects of disturbance from vibration if rail lines are aligned close to the boundary and near to any vibration sensitive receptors;
 - potential for noise emission from mechanical installations and any workshop or outdoor maintenance/fabrication activities to support the operation within the site;
 - additional road traffic noise generated on the local highway network or within the site.
101. The above potential effects will be assessed including combined effects of simultaneous activities.
102. Where such effects are identified as significantly adverse, planning and engineering mitigation will be recommended (in outline).

6.4 Assessment methodology

6.4.1 Policy and guidance

103. The following current policy and guidance is likely to be applicable and will be used to inform the assessment:

- **Technical Advice Note (TAN) 11: Noise (1997), Welsh Government, last updated 12 Oct 2017** – provides guidance on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development. It provides advice on the consideration of noise during the development plan and control (management) processes as well as noise exposure categories which should be taken into account during the consideration of proposals for residential development.

The TAN requires that for noise generating development, including industrial and commercial sources, local planning authorities must ensure this does not cause an unacceptable degree of disturbance. It will also be relevant to bear in mind that if subsequent intensification or change of use results in greater intrusion, consideration should be given to the use of appropriate conditions.

- **Control of Pollution Act 1974, HMSO** - gives local authorities powers to control noise or vibration pollution from construction sites
- **British Standard BS5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 Noise** - provides practical guidance on the control of construction site noise. This includes quantitative noise and vibration prediction methods based on the illustrative construction method. The Standard also provides quantitative criteria for the assessment of construction noise and vibration effects.
- **British Standards BS 4142 (2014) Methods for rating and assessing industrial and commercial sound** - The likelihood of complaints about

noise from industrial and commercial activities can be assessed, where the Standard is appropriate, using guidance in BS 4142: 2014. Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints and this is taken into account by the 'rating level' defined in BS 4142. Since background noise levels vary throughout a 24-hour period it will usually be necessary to assess the acceptability of noise levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the Project. In addition, general guidance on acceptable noise levels within buildings can be found in BS 8233: 2014 (see below).

- **British Standard BS 8233:2014 Guidance on sound insulation and noise reduction for buildings** provides guidance on noise control in and around buildings. For many common situations, this guide suggests criteria, such as suitable sleeping/resting conditions, and proposes noise levels that normally satisfy these criteria for most people. Technically it is applicable to new build developments or building refurbishments, but it also serves as useful guidance in determining acceptable levels of noise as part of assessment of existing building uses.
- **Design Manual for Roads and Bridges – Vol 11 Section 3 Part 7: HD 213/11 revision 1 (2011), TSO** - An approach to assessing noise and vibration effects from roads is described in Design Manual for Roads and Bridges (DMRB) relating to environmental assessment.
- **World Health Organization (WHO) - Guidelines for Community Noise (1999)** provides guidance on acceptable levels of noise in a variety of scenarios and arising from sources such as road, rail and air traffic, industries, construction and public work, and the neighbourhood.
- **WHO - Environmental Noise Guidelines for The European Region (2018)** The Guidelines set health-based recommendations on average environmental noise exposure. These are: road traffic noise, railway noise, aircraft noise, wind turbine noise and leisure noise.
- **WHO - Night Noise Guidelines for Europe (2009)** – these guidelines recommend that the population should not be exposed to night noise levels greater than 40dB $L_{night,outside}$, with an interim target of 55dB, during the part of the night when most people are in bed.

6.4.2 Assessment approach

104. The assessments will be undertaken in accordance with objective criteria from the standards and national and international guidance documents described above.
105. Construction noise levels will be assessed to examine the noisiest processes within each phase of the works and the duration of any impacts. Should any significant vibration generating operations be required (such as ground compaction and piling) an impact assessment using appropriate standards (for example BS 5228 Part 2) will be conducted for vibration sensitive

receptors. If required, mitigation measures will be recommended in order to adequately manage the impacts of construction noise and vibration.

106. The operational noise from locomotives or trains using the test circuits will be predicted using the prediction methodology described in the Calculation of Railway Noise³. High-speed train movements of electric and diesel locomotives will be included in the assessment as appropriate according to the operational parameters developed to represent the Project.
107. Changes in road traffic noise resulting from the Project will be determined based on the Calculation of Road Traffic Noise (CRTN)⁴ methodology. Operational road traffic noise will be assessed based on the approach for noise impacts set out in The Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 7 HD213/11 (described above – Paragraph 103).
108. The operation of workshop, utilities, buildings services plant, and any other noisy installations within the Project, will be assessed to determine the effect of these noise sources on surrounding receptors. Where possible, the likely noise levels will be estimated from existing data and the resulting noise levels determined at the closest receptors. To ensure that any noise from industrial and commercial sources would be acceptable at surrounding sensitive buildings, appropriate noise thresholds would be specified based on the existing background noise climate. In accordance with BS 4142, necessary, consideration will be given to possible tonality, impulsiveness or intermittency of the introduced noise.
109. The cumulative impacts of other developments in the area will be considered using information available from local planning records. In the absence of such information, but where considered potentially material, reasonable assumptions on local development plans will be made to estimate changes to the ambient noise environment and possible concurrent impacts.

6.4.3 Significance criteria

110. BS 5228-1:2009+A1:2014, is the recommended guidance relevant to construction noise. It provides a number of example methodologies for the assessment of significant effects from construction noise. Annex E describes the ‘ABC’ method of assessment, which is proposed for this assessment to establish the threshold of potential significant effect at residential receptors.
111. Under this approach, the adverse impact threshold is determined at an existing residential dwelling using the existing ambient noise level, rounded to the nearest 5dB and evaluated in relation to the thresholds set out in Table 6 below.
112. A potential significant effect is indicated where the construction site noise (L_{Aeq}) level exceeds the threshold level for the category appropriate to the ambient noise level. If the ambient noise level exceeds the highest threshold

³ Department of Transport (1995), Calculation of Railway Noise, HMSO

⁴ Department of Transport Welsh Office (1988), Calculation of Road Traffic Noise, HMSO

values given in Table 6 (i.e. the ambient noise level is higher than the Category C values), then a potential significant effect is deemed to occur if the construction site noise (L_{Aeq}) level for the period is greater than the ambient noise level.

Table 6 Potential significant effects at dwellings from on-site noise sources (from BS 5228-1:2009+A1:2014)

Assessment category and threshold value period	Threshold values in decibels (dB), $L_{Aeq,T}$		
	Category A	Category B	Category C
Weekday Daytime (07:00-19:00) Saturdays (07:00-13:00)	65	70	75
Night-time (23:00-07:00)	45	50	55
Weekday Evenings (19:00-23:00) Saturdays (13:00-23:00) Sundays (07:00-23:00)	55	60	65
<i>Category A: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are less than these values</i>			
<i>Category B: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are the same as Category A values</i>			
<i>Category C: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are higher than the Category A values</i>			

113. Depending on the availability of detail on construction programme and methodology, the construction noise assessment may necessarily be high level in nature, examining the noisiest likely processes within each phase of the works.
114. Noise effects from the operation of utilities, building services, and other similar commercial / industrial sources will be assessed in accordance with the assessment methods in BS4142:2014 and include consideration of the following factors:
- The difference between the ‘background noise level’ the ‘rating level’ of the new noise at the receiver location⁵;
 - The absolute level of noise; and
 - The character of the new noise compared to the character of the existing residual or ambient noise; and
 - The sensitivity of the receptor.
115. For operational road traffic noise, an approach to assessing significance criteria has been developed by reference to Volume 11, Section 3, Part 7: HD 213/11 revision 1 (2011) of the Design Manual for Roads and Bridges

⁵ BS4142 Clause 11 notes that ‘The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level’...e.g. ‘A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context’.

(DMRB). The DMRB approach to assessing the noise impact is to compare the noise levels for the ‘do something’ (with the development) scenario against noise levels for the ‘do minimum’ (without the development) scenario. This procedure will be used in the assessment by examining the changes in levels of road traffic noise that would result from the implementation of the scheme.

116. The scale or severity of any road traffic noise change, beneficial or adverse, requires description to indicate the degree of impact where possible. DMRB guidance on noise assessment states that a long-term change in traffic noise of less than 3 dB(A) is not generally noticeable and therefore would be considered imperceptible. A change threshold of 3 dB(A) in the long term has commonly been used in traffic noise assessments in the UK to approximate the threshold of significance. The magnitude criteria in Table 7 have been developed based upon DMRB, to assess noise effects arising from the operation of the scheme.

Table 7 Summary table of noise impact evaluation criteria for changes in traffic noise in the long term

Change in noise level, dB(A)	Impact category	Initial indicator of significance
>+10	Major adverse	Potentially significant increase
+5 to +10	Moderate adverse	
+3 to +5	Minor adverse	
0 to +3	Negligible	Unlikely to be significant
-3 to 0	Negligible	
-3 to -5	Minor beneficial	Potentially significant decrease
-5 to -10	Moderate beneficial	
<-10	Major beneficial	

117. The change in noise exposure arising from forecast changes in traffic flow on existing roads will be calculated using the CRTN ‘Basic Noise Level’ (BNL) at locations 10m from the kerb. This enables a direct comparison to be made of the change in noise level associated with particular sections of road.
118. The assessment of railway noise will follow the same approach as described above for road traffic noise with regard to identifying impact of introduced railway noise relative to the ambient noise level and also the initial indicator of significant effect, as shown in Table 7.

6.4.4 Determining overall significance of effect

119. The identified sources of noise and vibration will be evaluated to determine if there would be adverse impacts and the potential to cause significant effects according to the criteria described above for construction and operational impacts.

120. However, other factors specific to the individual receptors and the character of the noise impact should also be considered in reaching a final assessment decision. Therefore, if potentially significant effects are identified, the overall assessment of significance is evaluated using professional judgement based on the following factors:

Residential receptors:

- the magnitude of the impact and effect identified (based on overall noise or vibration level and/or noise change);
- the level and character of the existing noise environment;
- any unique features of the source or receiving environment in the local area;
- combined exposure to noise and vibration;
- duration of impact and effect (for construction); and
- the effectiveness of mitigation measures that could avoid or reduce the adverse effects.

Non-Residential receptors:

- the generic use (e.g. educational, healthcare, religious buildings or community uses);
- the times of use of the receptor in relation to the impacts;
- the design of the receptor (especially windows, doors and ventilation systems) and hence ability of receptor to experience changes in external noise environment without significant change in internal noise conditions);
- the layout - whether the most sensitive parts of the building are closest to and face the Project, or are located further away, or on the opposite side of a building;
- duration of impact and effect (for construction).

6.5 Consultation

121. The Councils⁶ will be consulted on the survey methodology and locations chosen to take measurements, and for information about local policy relating to operational plant noise criteria and during the preparation of the EIA technical assessment. The significance criteria for noise level change and health effects will also be subject to agreement, as outlined above. Information on any planned noise sensitive and noise generating development will also be sought, including planning conditions and noise impact assessments submitted with such applications.

⁶ Neath Port Talbot County Borough Council (NPTCBC) or Powys County Council (PCC), as appropriate

6.6 Potential mitigation measures

122. The various potential noise effects associated with the development will be assessed as part of the EIA to demonstrate that these issues have been properly considered. Construction noise, and in particular, noisy activities such as piling and earthworks can give rise to noise impacts. These can be minimised through the implementation of a Construction Environmental Management Plan (CEMP), which includes careful site planning and local noise control measures within it, so that it will be possible to ensure that noisy construction activities are locally controlled and screened to avoid or minimise adverse effects.
123. Construction noise as well as vibration impacts can also be controlled through a suitably worded planning condition and/or existing noise control legislation such as the Section 61 agreements process (Control of Pollution Act) process.
124. Operational utilities and building services noise also has the potential to give rise to noise impacts. Through detailed design, it is generally practicable to ensure that utility and building services noise levels are controlled at source, such as by use of silencers, enclosure etc. such that they do not give rise to significant adverse noise impacts at surrounding sensitive receptors. Appropriate noise mitigation controls to avoid or minimise significant effects would be secured by suitable conditions.
125. Noise from locomotive or trains circulating the tracks or stabling will be assessed and mitigation proposed in outline where practicable to avoid or minimise residual effects. Mitigation measures to be considered would include screening in the form of barriers or landscaped bunding, particularly where the track runs closest to receptors.
126. Similarly controls on any road traffic noise effects would be proposed where practicable in outline to avoid or minimise residual effects.

7 Air quality

7.1 Introduction

127. This section assesses existing baseline conditions for air quality in the area surrounding the Project and sets out the methodology proposed for assessing air quality impacts.

7.2 Known baseline

128. The Project lies in two local authorities: Powys County Council and Neath Port Talbot County Borough Council.

7.2.1 Industrial processes

129. Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met, and ensuring that any releases to the environment are minimised or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A or Part B processes and are regulated through the Pollution Prevention and Control (PPC) system^{7,8}. The larger, more polluting processes are regulated by the Natural Resources Wales (NRW), and the smaller less polluting ones by the local authorities. Local authorities focus on regulation for emissions to air, whereas NRW regulates emissions to air, water and land.
130. There are no Part A processes within 3km of the Project site.
131. Any impact of emissions from Part B processes, and Part A processes over 3km from the site are assumed to be represented in the background concentrations used, and therefore will be taken into account in the assessment.

7.2.2 Local air quality

7.2.2.1 Powys County Council

132. Powys County Council (PCC) have not declared any AQMAs in the local authority area.
133. PCC carried out monitoring in Newtown in 2018. This is approximately 85km north-east of the project location and is therefore not considered representative of local air quality. The only other monitoring carried out is an AURN in Aston Hill which is approximately 90km north-east of the

⁷ Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

⁸ The Environmental Permitting (England and Wales) (Amendment) Regulations 2013, SI 2013/390

project location and is therefore not considered representative of local air quality.

7.2.2.2 Neath Port Talbot County Borough Council

134. As part of the review and assessment process, Neath Port Talbot County Borough Council (NPTCBC) declared an AQMA for Taibach Margam, Port Talbot in 2000 for exceedances of the annual mean PM₁₀ air quality objective.
135. NPTCBC carries out both automatic and passive monitoring at various locations in its area. However, the nearest monitoring sites to the Project are roadside diffusion tubes approximately 10km south-west in Pontardawe. These are not considered to be representative of the area where the Project is located as they are roadside rather than background sites.

7.2.3 Defra background concentrations

136. Defra publishes modelled background pollutant mapping⁹ for every 1km x 1km grid square across the UK. Background pollutant mapping has been reviewed for those grid squares in which the Project lies and is presented in Table 8.
137. In the absence of monitoring data near the Project site, it can be seen from the Defra's background concentrations that pollutant concentrations at the Project site are well below the annual mean NO₂, PM₁₀ and PM_{2.5} objectives (40µg/m³, 40µg/m³ and 25µg/m³ respectively).

Table 8: Defra's estimated background pollutant concentrations

Local authority	OS grid square		2019 concentrations (µg/m ³)			
	X	Y	NO ₂	NO _x	PM ₁₀	PM _{2.5}
Powys County Council	281500	211500	4.8	3.8	9.9	6.2
	281500	210500	4.8	3.8	8.9	5.9
	282500	211500	4.6	3.6	11.1	6.4
	282500	210500	4.7	3.7	8.9	5.9
	283500	211500	4.7	3.7	9.7	6.1
Neath Port Talbot County Borough Council	281500	209500	5.0	4.0	9.0	6.0

⁹ Defra, Background Pollutant Mapping, <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>

7.3 Key issues

138. During the construction phase, dust and vehicle emissions may be a concern due to earthworks, trackout and construction activity. This would need to be mitigated appropriately.
139. During the operational phase, the Project has the potential to have an impact on the existing air quality as a result of diesel train exhaust emissions, such as SO₂, NO₂, PM₁₀ and PM_{2.5}, if such trains were going to be tested at the facility.
140. The Project also has the potential to have an impact on existing air quality as a result of road traffic exhaust emissions, such as NO₂, PM₁₀ and PM_{2.5}, associated with vehicles travelling to and from the site during the operational phase. There may also be emissions arising from any on-site proposed combustion plant that may be provided.
141. Impacts on designated ecological sites, in particular those of international designation, will be assessed and discussed with the scheme ecologists to inform any Habitat Regulations Assessment required as part of the Project.

7.4 Assessment methodology

142. An assessment of local air quality will be undertaken following all relevant guidance produced by the Welsh Government and Defra, IAQM and EPUK. This will include:
 - A review of relevant legislation and policy at national, regional and local levels;
 - A review of the existing air quality conditions in the area and the main sources of pollutants;
 - A qualitative assessment of dust emissions during construction following the IAQM guidance¹⁰;
 - An assessment of the effects of traffic emissions on air quality, during the construction and operational phases. Traffic data will be screened following EPUK/IAQM land-use planning guidance¹¹;
 - An assessment of effects from on-site rail testing of diesel trains during the operational phase using LAQM.TG(16) guidance on assessing rail emissions from stationary and moving diesel locomotives, as a basis for screening the requirement for this type of assessment;
 - An assessment of the significance of these effects following the EPUK/IAQM land-use planning guidance; and

¹⁰ Institute of Air Quality Management, Guidance on the assessment of dust from demolition and construction v1.1, January 2016

¹¹ Moorcroft and Barrowcliffe. et al., Land-use Planning & Development Control: Planning for Air Quality. v1.2., January 2017

- Formulation of construction and operational mitigation measures, where necessary, to mitigate the effects of the Project on local air quality.

7.4.1 Sensitive receptor locations

143. The assessment will assess predicted concentrations in areas where the air quality objectives apply off-site. There are no sensitive receptors proposed to be on-site. The long term annual mean air quality objectives apply at locations where sensitive receptors are located which will include residential properties, hospitals and schools. There are residential properties within 50m of the site boundary. The short-term air quality objectives apply at other locations where general public is expected to be present for a short period of time (e.g. 1-hour or 24-hour). There are no locations that meet this criterion within 400m of the Project boundary.
144. The air quality impacts at designated ecological sites will be assessed at the Gorsllwyn, Onllwyn Site of Special Scientific Interest (SSSI) identified within 100m of the site boundary.

7.4.2 Construction

Construction dust

145. The IAQM guidance on the assessment of construction dust impacts¹¹ will be used in assessing the impact of constructing the buildings and infrastructure associated with the Project.
146. Effects during the construction phase will be temporary and will be assessed within 350m of the site boundary where receptors are present and within 20m of routes used by construction vehicles up to 500m from the Project site access, as well as any ecological receptors up to 50m from the site boundary.
147. The IAQM guidance¹⁰ considers the potential for dust emissions from the following activities:
- Demolition;
 - Earthworks i.e. soil stripping, ground levelling, excavation and land;
 - Construction; and
 - Trackout i.e. incidental movement of dust and dirt from the construction or demolition site onto the public road network.
148. For each of the above activities, the guidance¹⁰ considers three separate dust effects:
- Annoyance due to dust soiling;
 - Harm to ecological receptors; and
 - The risk of health effects due to a significant increase in PM₁₀ exposure.

149. The methodology takes into account the scale on which the above effects are likely to be generated (classed as small, medium or large). The distance of the closest receptors and background PM₁₀ concentrations are also taken into account in order to determine the sensitivity of the surrounding area. This is then taken into consideration to derive an overall site risk and identify suitable mitigation measures. Receptors can be either human or ecological and are chosen based on their sensitivity to dust soiling and PM₁₀ exposure.
150. The significance of local air quality effects will be determined using the IAQM guidance¹⁰ for the assessment of construction dust. This guidance states that where appropriate mitigation is implemented effectively no significant residual effects would be anticipated.

Construction traffic

151. The construction traffic assessment will be carried out using EPUK/IAQM guidance¹¹ appropriate for a site outside an AQMAs, such as the project. The assessment will consider sensitive receptors (human and ecological) within 200m of the local road network where changes in traffic and changes to the highway network meet the following criteria as a result of the Project:
- A change of LDV flows of more than 500 Annual Average Daily Traffic (AADT); and
 - A change of HDV flows of more than 100 AADT.
152. Once available, the construction traffic data will be screened using the above EPUK/IAQM criteria¹¹. Given the extent of the Project it is anticipated that a detailed assessment of construction traffic effects on air quality will be required.
153. The assessment will be undertaken using ADMS-Roads (version 4.1.1.0) atmospheric dispersion model from Cambridge Environmental Research Consultants (CERC). Traffic data will be obtained from transport planners for the Project in 24-hour Annual Average Daily Traffic (AADT) format with the calculated percentage of Heavy Duty Vehicles (HDVs) and average speed data (kph). Using this data, the latest vehicle emission factors released by Defra will be used to calculate road-traffic emissions.
154. The assessment at human receptors will focus on concentrations of NO_x, NO₂, PM₁₀ and PM_{2.5} for which air quality objectives and EU limit values are set in legislation. An assessment of nitrogen deposition at designated ecological sites will be undertaken for assessment against site-specific critical loads.
155. The assessment of air quality effects from construction traffic will include a baseline, and construction year with and without the Project under construction.
156. A comparison of the results from the scenarios for the peak traffic construction year with and without the construction of the Project will allow

the magnitude of change in pollutant concentrations arising as a result of the construction of the Project to be determined.

7.4.3 Operation

Operational traffic

157. The operational traffic assessment will consider sensitive receptors (human and ecological) within 200m of the local road network where changes in traffic and changes to the highway network meet the EPUK/IAQM criteria (section **Error! Reference source not found.**).
158. The assessment of operational traffic will follow the same methodology as that of the construction traffic. A screening assessment of traffic changes will be carried out to determine whether a detailed assessment of operational traffic emissions will be required.

Diesel trains

159. It is anticipated that there will be a mixture of diesel and electric trains tested at the Project site. The mixture of train type and hours of testing are currently not known and will be defined for the preparation of the ES.
160. There is no guidance for assessing rail emissions from new rail infrastructure used in a testing operation, which is the proposed operation of the Project. LAQM.TG(16) provides screening criteria and guidance for assessing emissions from existing rail infrastructure with heavy traffic of diesel passenger trains. It is proposed this screening criteria is used as a basis for assessing diesel trains.
161. Where sensitive receptors are located within 30m of the new rail infrastructure where diesel locomotives are expected to be moving and the background annual mean NO₂ concentrations is above 25µg/m³ an assessment of rail emissions will be scoped in.
162. Where sensitive receptors are located within 15m of a location where diesel locomotives will be stationary for 15 minutes or more, at least 3 times a day, an assessment of rail emissions will be scoped in.
163. Once data is available on the duration and frequency of testing and the type of trains that would be tested at the Project, this information will be discussed further with the EHO, in relation to the potential impact of emissions on sensitive receptors.
164. The assessment of emissions from diesel trains, if required after screening, would be undertaken using ADMS-Roads (version 4.1.1.0) atmospheric dispersion model from Cambridge Environmental Research Consultants (CERC).

165. The train tracks would be modelled as elevated road sources with emission factors calculated using Defra's Emission Factor Toolkit (EFT) v9.0¹². The train tracks would be modelled as road sources rather than line sources to account for turbulence generated by the trains themselves (traffic-produced turbulence).

Combustion plant

166. At the time of writing, no combustion plants, such as communal gas-fired boilers, Combined Heat and Power systems (CHP) gas-fired or biomass boilers will be provided for the Project, so no assessment of these features is proposed.
167. If a combustion plant is included at a later stage in the Project, an assessment of the air quality impacts associated with this would be required.

7.5 Consultation

168. Consultation will be undertaken with the Environmental Health Officer (EHO) at both Powys County Council and Neath Port Talbot County Borough Council to obtain their latest air quality monitoring information. Discussions will also be held to agree the sensitive receptors to be assessed and the emission factors, background pollutant concentrations and meteorological data to be used in the assessment.

7.6 Potential mitigation

169. Following the assessment of remediation, construction and operational air quality effects, mitigation measures will be recommended where required. It is likely that mitigation will be required for the construction phase to minimise the effect of construction dust on nearby properties.
170. It is likely that no mitigation would be required for operational traffic or diesel trains as the background concentrations are low and there are few sensitive receptors close to the project. However, should mitigation be required appropriate measures will be considered.

¹² Defra (2019) Emissions Factors Toolkit (EFT) v8.0.1; <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>; [Accessed: September 2019].

8 Traffic and transport

8.1 Introduction

171. This section sets out the proposed approach to the assessment of potential effects and their likely significance on land-based traffic and transport because of the proposed Project. The assessment will be supported by a separate Transport Assessment, the scope of which will be agreed separately with Neath Port Talbot (NPT) and Powys County and Borough Councils as the Local Highways Authorities.
172. The aims of scoping are to:
- Identify the transport routes which could potentially be impacted by the Project;
 - Evaluate potential construction and operation impacts and identify those impacts which may be significant; and
 - Outline the proposed scope of work and assessment methodology for traffic and transport effects associated with the Project.
173. The assessments will consider the proposed use of the site as a rail testing facility and the possibility for materials during construction to be brought into the site by rail. However, for robustness assessments will likely consider a scenario where all materials will be brought to the site via road to allow assessment of a ‘worst case’.

8.2 Known Baseline

8.2.1 Study area

174. The study area for the Traffic and Transport assessment is proposed to broadly reflect that of the Transport Assessment and encompass all highways, walking and cycling routes that surround the site. The number of junctions and size of the study area will be agreed with local highway authorities. The study area will likely include links in the vicinity of the following junctions:
- A4109/Heol Gaer/ Main Road
 - Heol Gaer/A4221
 - A4109/Unnamed Road
 - A4109/Onllwyn Road
 - A4221/Onllwyn Road
 - A4109/B4242
 - A4109/A4230/A465
 - A465/B4434

- A465/B4242
- A4067/A4221
- A4067/Heol Giedd
- A4067/A4068/Gunros Road
- A4067/B4599/Glan Yr Avon
- A4067/Ynysmeudwy Road

8.2.2 Local Highway Network

175. To the north the site is bounded by the A4221 with a posted speed limit of 40mph. Continuing west the A4221 joins the A4067 at a priority T junction. The A4067 runs roughly parallel to the sites north western boundary beyond a stretch of open woodland and to the south can be used to reach Swansea and the M4, or north towards the Brecon Beacons. To the east the A4221 continues beyond the site as the A4109 towards the A465 dual carriageway which provides a direct link south to Neath and the M4 or west to Merthyr Tydfil.
176. To the east of the site the A4221 forms a priority T junction with the A4019 which bounds the site to the south east in addition to a one-way slip road for traffic continuing on the A4019 (east) heading south along the southern boundary. The A4019 is a single carriage way road with a posted speed limit of 30 mph. South of the T junction with A4221 the road is crossed by a rail link with a limited height of 4.6m. Continuing south the A4019 forms two closely spaced priority T junctions with Main Road towards Banwen.
177. South of the junctions with Main Road the A4019 forms a junction with Onllwyn Road which bisects the site north to south connecting the A4221 and A4109. Onllwyn Road has a 7.5 tonne weight restriction for the northern portion. There are a number of minor junctions connecting to private entries from Onllwyn Road in addition to a T junction towards the east which provides access to the current site premises. Continuing south the A4109 can be used to join the A465 at a six-arm roundabout from which Neath can be reached. Junctions that will be considered for further assessment are shown on Figure 5.

8.2.3 Walking and Cycling

178. From the A4109/Onllwyn Road junction a continuous footpath adjoins the eastern carriageway of the A4019 south towards Severn Sisters. Footpaths also adjoin both carriageways to the north of the junction towards Banwen. At the T junction with Main Road the footpath continues on the eastern carriageway into Banwen and on the western carriageway towards the A4221 from which access can be gained into the site via an off-road public footpath. The footpath terminates before the rail bridge.
179. There are a number of Public Rights of Way (PRoW) which traverse the site, these PRoW's link east to west connecting a number of villages

including Penrhos and Onllwyn onto Banwen and north to south between Caehopkin and Severn Sisters. The PROW through and near the Project site are shown on Figure 6.

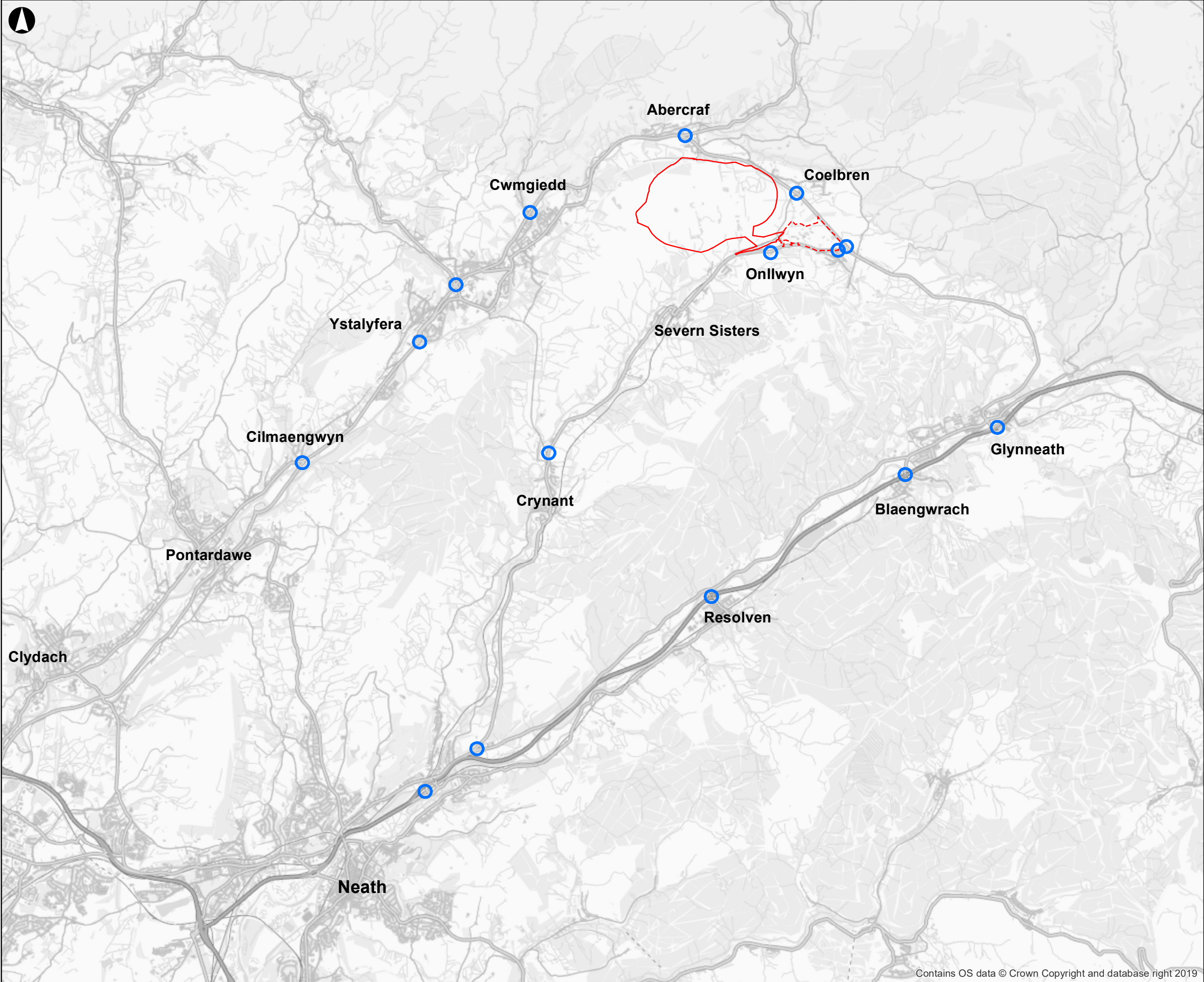
180. National Cycle Network 43 connects the north of the site to Swansea via on and off-road cycle routes.

8.2.4 Public Transport

181. There are bus stops on either side of Wembley Avenue/A4019 at the Onllwyn T junction. There is a bus shelter provided on both sides of the carriageway, however, there does not appear to be any timetable information present. The bus stop is within 400m of the existing site access from Onllwyn Road.
182. Two services stop at each stop as displayed in **Table 9** below. These services provide access to both Neath and Swansea in the south with services up to hourly as well as west towards Ynyswen and Ystradgynlais.
183. In addition there is a bus stop on Onllwyn Road before the junction with A4221, 0.9 miles from the current site access. The bus stop is demarked by a flag and timetable information and is serviced by buses going west to Ystradgynlais and Gurnos. However, there is a lack of segregated footway between the bus stop and the site.

Table 9: Buses serving Onllwyn

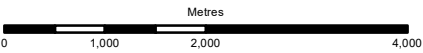
Operator	Service	Destination	Stop	Service frequency (in each direction)
New Adventure Travel	62a	Ynyswen - Ystradgynlais	Prices Row	60/120 minutes
New Adventure Travel	62	Coelbren - Gurnos	Prices Row	120 minutes
First Bus	58/X58	Swansea - Banwen	Coelbren Turn	60 minutes
First Bus	907	Neath - Coelbren	Coelbren Turn	Once per day



- Legend**
- Full planning boundary
 - Outline planning boundary
 - Junctions to be considered further

D1	2019-09-18	BS	AW	AW
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Issue	Date	By	Chkd	Appd
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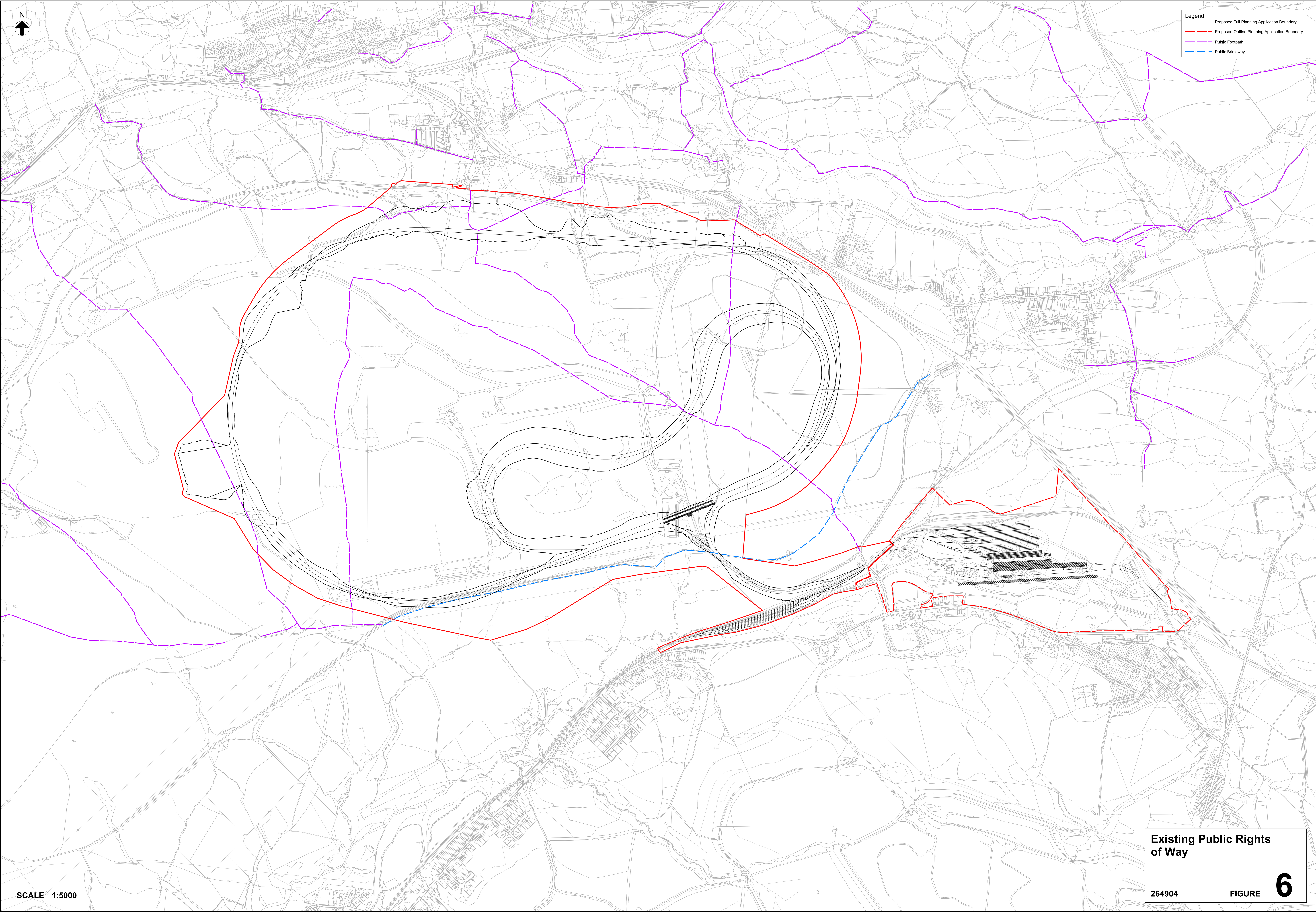
Fig 5. Local Highway Network

Scale at A3
1:75,000

Job No 264904-00	Drawing Status Draft
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Drawing No Fig 5	Issue D1
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- Legend**
- Proposed Full Planning Application Boundary
 - Proposed Outline Planning Application Boundary
 - Public Footpath
 - Public Bridleway

**Existing Public Rights
of Way**

264904

FIGURE

6

8.3 Key Issues

184. The key issues to be considered within the Transport Chapter of the EIA for this Project are as follows:

- The management of impacts on drivers, pedestrians and cyclists during construction and the methods for reducing these impacts; and
- Changes to routes and flows of traffic during the construction and operational phases and associated impacts on the capacity of junctions.

8.4 Assessment Methodology

185. A Transport Assessment (TA) will be prepared in accordance with national and local policy. The scope of the TA will be agreed with the local highway authority through the submission of a scoping note and subsequent combined meetings. The TA will consider the transport implication of the Project on the surroundings and present the potential mitigation that would be required.

186. If requested a travel plan will be submitted that will include measures to encourage travel by sustainable modes and aim to reduce the overall level of vehicular movement being generated by the site.

187. The assessment methodology for the Traffic and Transport chapter of the EIA is set out below.

8.4.1 Legislation and Guidance

188. The Traffic and Transport assessment will be undertaken with due regard to the following legislation and policy.

Legislation

- Institute of Environmental Assessment (now IEMA) – Guidance Note 1: Guidelines for the Environmental Assessment of Road Traffic: 1993;
- IEMA – The State of Environmental Impact Assessment Practice in the UK: 2011 (Ref. 9.22);
- DfT – The Design Manual for Roads and Bridges (DMRB): 1993 (Ref. 9.21). The DMRB sets out the relevant standards, advice notes and guidance relating to the design, environmental assessment and operation of the Highways Agency's (now Highways England) network (motorways and trunk roads);
- Welsh Government (WG) – Active Travel (Wales) Act 2013. This aims to make active travel the most attractive option for most shorter journeys and requires local authorities in Wales to produce active travel maps and deliver year on year improvements in active travel routes and facilities.

- WG – The Wellbeing of Future Generations (Wales) Act 2015.

Policy

- WG – Planning Policy Wales (PPW): Edition 9 (November 2016). PPW sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs);
- WG – TAN 8: Transport. This Technical Advice Note elaborates on the relationship between land use planning and transport infrastructure by outlining a range of key principles that should be adopted in new development;
- NPT CBC – Local Development Plan (LDP) 2011-2026: and
- Powys CC – LDP 2011-2026.

8.4.2 Methodology for Establishing Baseline Conditions

189. Following the submission of this scoping report discussions will be undertaken with NPT and PC regarding undertaking surveys to establish the baseline conditions.

8.4.3 Assessment of effects

190. The IEMA guidelines recommend that the impacts set out in Table 10 may be considered important when considering traffic from an individual development:

- Severance;
- Pedestrian delay;
- Pedestrian amenity;
- Fear and intimidation;
- Driver delay; and
- Accidents and safety.

191. There are other potential effects that could arise from the traffic impacts of the Project including noise, vibration, visual impact, heritage and conservation, ecological effects and air quality. These will be assessed within other chapters of the EIA relating to the specific discipline.

Significance Criteria

192.

193.

194. Table 10 below outlines the criteria by which potential effects are proposed to be assessed. The IEMA guidelines have been used as a basis for developing the assessment criteria.

Table 10: Assessment criteria

Impact	Assessment Criteria			
	Negligible	Minor	Moderate	Major
Severance	Change in traffic flow of up to 30%	Change in traffic flow of 30% to 60%	Change in traffic flow of 60% to 90%	Change in traffic flow of over 90%
Pedestrian delay	To be assessed on a case by case basis, with consideration given to the sensitivity and vulnerability of the receptor.			
Pedestrian amenity	To be assessed on case by case basis using professional judgement with consideration given to changes to traffic flow.			
Fear and intimidation	To be assessed on case by case basis using professional judgement with consideration given to the increase in HGV			
Driver delay	To be assessed on case by case basis using professional judgement and the results of the junction modelling assessments.			
Accidents and Safety	To be assessed on case by case basis using professional judgement with consideration given to accident assessment included within the TA and the forecast increase in traffic flows resulting from the development			

195. The assessment criteria set out in

196.

197. Table 10 indicates the key evidence needed to understand the assessment is an increase in traffic or HGV flows.

198. The following assessment criteria is set for raising the significance of effect on any link:

- An increase in total traffic flows on the link by 30% to represent the effect of the development from negligible to major; or
- An increase in HGV traffic of 10%.

199. This assessment criteria allows for simultaneous assessments to be conducted on any link whereby total traffic has increased because of the development proposals.

200. The sensitivity of a receptor can be defined by the degree by which it responds to change in its environment. The proposed assessment will predominately relate to the effect in an increase in traffic flow.

201. Paragraph 2.5 of the IEMA guidance indicates the following groups are susceptible to changes in traffic conditions. These groups are set out below alongside local examples that are proposed to be considered:

- Residences in the neighbouring villages Severn Sisters and Banwen;
- People in work places including the Ystradgynlais and Ystalyfera;
- Sensitive groups including children, elderly and disabled;

- Sensitive locations, e.g. Blaendulais Primary School and Dulais Valler Primary Care Centre;
- People walking on surrounding footways around and through the site;
- People cycling on neighbouring roads, footway/cycleways;
- Open spaces, recreational sites and shopping areas;
- Sites of ecological/nature conservation value; and
- Sites of tourist/visitor attraction such as the Brecon Beacons.

202. Table 11 below presents the receptor sensitivity based on paragraph 2.5 of the IEMA guidelines and adapted using professional judgements.

Table 11: Receptor Sensitivity

Receptor Sensitivity	Receptor Type
Major	Receptors of greatest sensitivity to traffic flow including roads without footways, schools/colleges/playgrounds, historic accident hotspots and retirement homes.
Moderate	Receptors sensitive to traffic flow including roads with limited/narrow footway or unsegregated cycleways, congested junctions, GPs/Hospitals/Shopping areas with roadside frontages, parks and recreational facilities.
Minor	Receptors with some sensitivity to traffic flow including residential streets with suitable footway provision, places with ecological/nature/heritage value and tourist/visitor attractions
Negligible	Receptors with low sensitivity to traffic flow and those located sufficiently away from affected roads and junctions.

203. The assessment criteria and the receptor sensitivity have been combined to determine overall significance in Table 12.

Table 12: Significance of Effects

Sensitivity of Receptor	Magnitude of Impact			
	Negligible	Minor	Moderate	Major
Negligible	Negligible	Negligible	Negligible	Minor
Minor	Negligible	Negligible	Minor	Moderate
Moderate	Negligible	Minor	Moderate	Major
Major	Minor	Moderate	Major	Major

204. Potential effects are therefore categorised as either Major, Moderate, Minor or Negligible significance. Major and moderate significance represents effects considered to be significant in IEMA guidelines.

8.5 Consultation

205. There will be ongoing consultation with NPT and Powys Highways to discuss the assessment methodology, forecast traffic impacts and potential mitigation strategy. The South Wales Trunk Roads Agent will be consulted regarding the potential impact on the M4 and the A465.

8.6 Potential Mitigation

206. Mitigation will be considered for the construction and operational phases of the project and will be presented within the Transport Assessment and outline Construction Traffic Management Plan (CTMP). The CTMP will be developed to minimise the impact of construction traffic arising from the project.
207. Mitigation measures may include the following:
- Temporary traffic management which may include Traffic Marshalls and signage, HGV driver information packs and temporary speed limits;
 - Providing sufficient off-road parking for construction vehicles and workers, avoiding footpaths and grass verges;
 - Travel planning for site personnel could be considered within the CTMP;
 - Junction mitigation schemes to provide capacity improvements;
 - Improvements to pedestrian facilities including the provision of new or improved routes and crossings;
 - Safety improvements.

9 Hydrology and flooding

9.1 Introduction

208. This section outlines the approach that will be adopted for the assessment of the impacts on the water environment, which may arise as a result of the construction and operation of the Project. This includes consideration of impacts to flood risk, surface waters, groundwater, foul drainage and storm drainage.

9.2 Known baseline

9.2.1 Study area

209. The study area for assessment has been based on a source – pathway – receptor approach. For direct effects on surface waters, the study area will include the geographical extent of the site boundary and all surface water features within 500m of the site boundary. Indirect effects on surface and ground waters will be considered up to 1km away where features have hydrological connectivity to the Project.

9.2.2 Scope of baseline

210. The water baseline considers the following:
- Existing surface water features including details of water quality and quantity;
 - Existing groundwater features;
 - Existing flood risk; and
 - The location of existing drainage infrastructure.

9.2.3 Surface Water Features

211. There are three WFD designated water bodies within the vicinity of the site. The water bodies are displayed in Figure 7.
212. The ‘Tawe – conf with Giedd to confluence with Twrch’ (GB110059032180) river Water Framework Directive (WFD) water body is located to the north and north west of the site. The waterbody is not designated as an artificial water body. As of 2018, the waterbody had an overall status of Good¹³ although received High status for components including fish, diatoms, dissolved oxygen, pH, phosphates and temperature.
213. The ‘Nant Llech – headwaters to confluence with Tawe’ (GB110059032240) river WFD water body is located to the east of the site. The waterbody is not designated as an artificial water body. As of 2018, the water body had an overall status of Good¹³ although received

High status for components including invertebrates, diatoms, nitrates, dissolved oxygen, pH, phosphates and temperature.

214. The ‘Dulais – headwaters to confluence with River Neath’ (GB110058032430) river WFD water body is located to the south of the site. The waterbody is not designated as an artificial water body. As of 2018, the water body had an overall status of Good¹³ although received High status for components including invertebrates, nitrates, dissolved oxygen, pH, phosphates and temperature.
215. There are three monitoring stations at the River Tawe located to the north of the site monitoring flow, chemistry and ecology. The stations are located approximately 900m west of the River Tawe confluence with the River Nant Llech.
216. There are three monitoring stations at the River Nant Llech located approximately 190m south of the River Nant Llech confluence with the River Tawe.
217. There are three monitoring stations at the River Dulais located to the south of the site monitoring flow, chemistry and ecology. The stations are located 4.6km, 7.9km and 8.4km south of the River Dulais headwater, respectively.
218. Within the site is the Nant Ystalwyn which confluent with the River Dulais approximately 150m south west of Y sticlau Road. Nant Ystalwyn flows from north east to south west and is not a designated WFD waterbody. Within the site there are field drains that drain into the Nant Ystalwyn that also flow in a north east to south west direction. Several small ponds are located to the south of the site.

9.2.4 Groundwater

219. The site is underlain by ‘Swansea Carboniferous Coal Measures’ (GB41002G201000) groundwater WFD body¹³. As of 2015, the water body has an overall status of poor attributed to poor chemical status.
220. The groundwater regime in the site boundary and its vicinity is likely to be fundamentally controlled by remnants of historical mining activities such as shafts or adits. The historical mine workings may act as preferential flow paths for groundwater flows and constitute major drainage network, which would discharge into surface water network.
221. It is understood that to accommodate the currently ongoing open cast mining activities, active dewatering is taking place. No details are currently available however this is likely to have an impact on local hydrogeology including groundwater levels and flow direction. When the dewatering stops, the groundwater regime is likely to restore to pre-

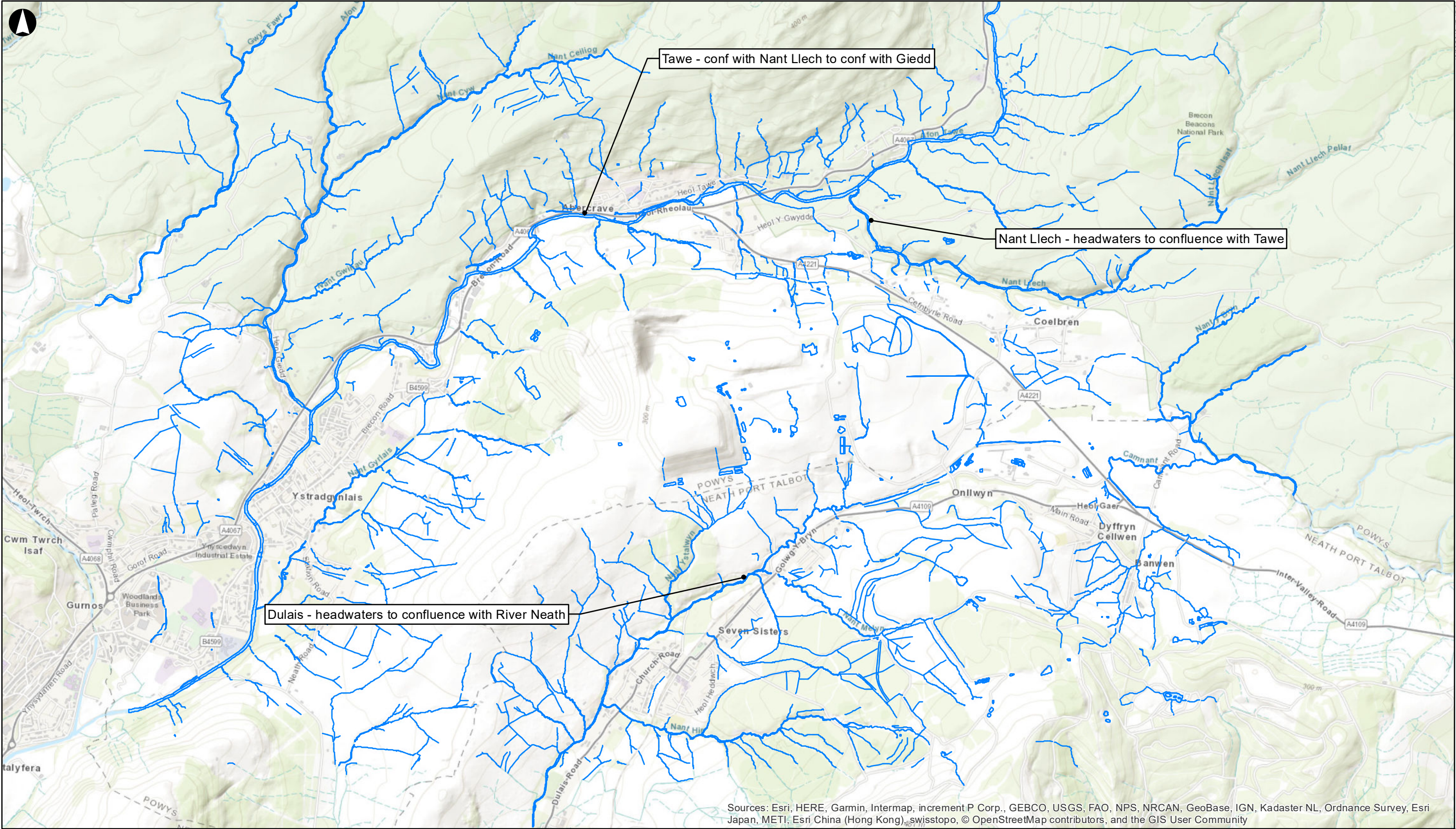
¹³ Natural Resource Wales, Cycle 2 Rivers and waterbodies [online]. Available at: <https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=4ef6ea25c5984c939636714dbfc9e25f3>

dewatering state. This is likely to result in increased groundwater levels to those currently present and potentially flooding of the void present in the western site area.

222. National Resources Wales have classified the underlying bedrock geology as being a Secondary A Aquifer. There are no Source Protection Zones within 1km of the proposed Project area.

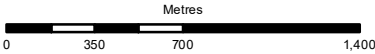
9.2.5 Flood Risk

223. Under TAN15, all of the site is within Zone A, defined as ‘Considered to be at little or no risk of fluvial or tidal/coastal flooding’.
224. Flood mapping produced by NRW indicates that the site is not within a flood zone and not at risk of flooding from rivers and seas. Flood risk is localised to the immediate area surrounding the River Dulais. The flood mapping indicates that the site contains areas at low to high risk of surface water flooding, the areas of medium or high risk are typically within the areas surrounding the coal mine and surrounding the small ponds located to the south of the site. The site is not expected to be at risk of reservoir flooding.



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Legend
— Surface Water Features



Coordinate System: British National Grid					
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Rev	Date	By	Chkd	Appd	

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Project Title
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Drawing Title
Surface Water Features

Scale at A3
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Role

Suitability

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Name

Figure 7

Rev
A

9.3 Key issues

225. For the construction and operational use of the scheme to have an effect upon the water environment a pollutant, water resources or flood risk linkage must be present, comprising a source, pathway and a receptor all need to be present. Table 13 lists potential pollutant and flood risk linkages.

Table 13: Potential pollutant and flood risk linkages from the scheme

Sources	Pathways	Receptors
Foul and storm water generated on site; Contaminants stored on site during construction or operation; Dewatering and piling activities during construction; Exposed soil during construction; and In-channel & floodplain works (e.g. culverting, reprofiling of channels).	Temporary or permanent foul and surface water drainage systems; Existing flow pathways or new pathways created by the scheme in groundwater and surface waters.	The physical and chemical quality of surface water features including ponds and tributaries to the Nant Ystalwyn and River Dulais; Aquatic organisms; and People.

226. Table 13 identifies there is potential for a source, pathway, receptor linkage on site and therefore there is potential for an impact upon the water environment.

9.4 Assessment methodology

227. The assessment of the potential impacts to the water environment will be carried out in accordance with relevant guidance produced by UK and Welsh Governments, along with Natural Resource Wales. The assessment will include:
- A review of relevant legislation and policy at national, regional and local levels;
 - A review of the existing condition of all surface and ground water features that may be impacted by the Project along with any existing drainage infrastructure. A survey will be undertaken to understand the condition of baseline water features. These features will be assigned an importance in broad alignment with Table 3.70 of Design Manual for Roads and Bridges (DMRB) LA 113¹⁴ as shown in Table 14 of this report;

¹⁴ Design Manual for Road and Bridges: Volume 11, Section 3, Part 10, LA 113 Road drainage and the water environment (August 2019)

- Establishment of potential impacts upon the water environment from the construction and continued use of the scheme, considering any mitigation embedded in the scheme design;
 - An assessment of the potential magnitude of the effect from the construction and continued use of the scheme using the criteria from in broad alignment with Table 3.71 of DMRB LA 113¹⁴ as shown in Table 15 of this report;
 - An overall assessment of the significance of the potential effects based on the importance of the feature and the magnitude of potential impact in broad alignment with Table 3.8.1 of DMRB LA 104¹⁵ as shown in Table 16 of this report;
 - Where potential adverse effects are identified, additional mitigation measures will be identified and developed. A schedule for monitoring effects will be developed; and
 - An assessment of the residual effects of the scheme upon the water environment following inclusion of any additional mitigations proposed.
228. Compliance of the scheme with the objectives of the Water Framework Directive (WFD) will follow recent guidance and be considered in a standalone assessment. A Flood Consequences Assessment (FCA) will be undertaken as a standalone assessment. The WFD and FCA assessment will be appended to the Environmental Statement chapter.

Table 14: Criteria for estimating the importance of environmental attributes (adapted from DMRB LA 113: Table 3.70)

Importance	Criteria	Examples
Very High	Attribute has a high quality and rarity on regional or national scale	Surface water: Watercourse having a WFD classification shown in a RBMP and $Q95 \geq 1.0 \text{ m}^3/\text{s}$. Site protected/designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water)/Species protected by EC legislation Ecology and Nature Conservation [Ref 5.N]. Groundwater: Principal aquifer providing a regionally important resource and/or supporting a site protected under EC and UK legislation Ecology and Nature Conservation [Ref 5.N]. Groundwater locally supports GWDTE SPZ1 Flood risk: Essential infrastructure or highly vulnerable development
High	Attribute has a high quality and rarity on local scale	Surface water: Watercourse having a WFD classification shown in a RBMP and $Q95 < 1.0 \text{ m}^3/\text{s}$. Species protected

¹⁵ Design Manual for Roads and Bridges: Volume 11, Section 2, Part 4, LA 104, Environmental assessment and monitoring (July 2019)

Importance	Criteria	Examples
		under EC or UK legislation Ecology and Nature Conservation [Ref 5.N]. Groundwater: Principal aquifer providing locally important resource or supporting a river ecosystem. Groundwater supports a GWDTE SPZ2 Flood risk: More vulnerable development
Medium	Attribute has a medium quality and rarity on local scale	Surface water: Watercourses not having a WFD classification shown in a RBMP and Q95 >0.001m3/s. Groundwater: Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ3 Flood risk: Less vulnerable development
Low	Attribute has a low quality and rarity on local scale	Surface water: Watercourses not having a WFD classification shown in a RBMP and Q95 ≤0.001m3/s. Groundwater: Unproductive strata Flood risk: Water compatible development

229. The magnitudes of potential effects have been assessed using the criteria set out below.

Table 15: Criteria for estimating the magnitude of an impact (adapted from DMRB LA 113: Table 3.71)

Magnitude	Criteria
Major Adverse	Results in loss of attribute and/or quality and integrity of the attribute.
Moderate Adverse	Results in effect on integrity of attribute, or loss of part of attribute
Minor Adverse	Results in some measurable change in attributes, quality or vulnerability
Negligible	Results in effect on attribute but of insufficient magnitude to affect the use or integrity
Minor Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring
Moderate Beneficial	Results in moderate improvement of attribute quality
Major Beneficial	Results in major improvement of attribute quality

Table 16: Significance matrix (adapted from DMRB LA 104: Table 3.8.1 (as referenced in DMRB LA 113))

Magnitude of impact (degree of change)						
		No change	Negligible	Minor	Moderate	Major
Environmental value (sensitivity)	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Table 17: Definitions of significance values

Score	Comment
Very Large Adverse	Where the Proposed Development would result in degradation of the water environment, because it results in predicted very significant adverse impacts on at least one water attribute and/or on several water attributes
Large Adverse	Where the Proposed Development would result in degradation of the water environment because it results in predicted highly significant adverse impacts on water attribute and/or significant adverse impacts on several water attributes
Moderate Adverse	Where the Proposed Development may result in degradation of the water environment because it results in predicted moderate adverse impacts on at least one attribute
Slight Adverse	Where the proposal may result in a degradation of the water environment because it results in a predicted slight impact on one or more attributes. More than one attribute may be affected.
Neutral	Where the net impact of the Proposed Development is neutral, because it results in no appreciable effect, either positive or negative, on the identified attributes.
Slight Beneficial	All other situations where the Proposed Development provides an opportunity to enhance the water environment or provide an improved level of protection to an attribute.
Moderate Beneficial	Where the Proposed Development provides an opportunity to enhance the water environment because it results in a moderate improvement for an attribute.
Large Beneficial	It is unlikely that any Proposed Development incorporating the construction of a new or improved trunk road would fit into this category. However, proposals could have a large positive impact if it is predicted that it would result in a 'very'

Score	Comment
	or 'highly' significant improvement to a water attribute(s), with insignificant adverse impacts on other water attributes.

9.5 Consultation

230. The following parties will be consulted during the preparation of the assessment:

- Natural Resource Wales (NRW);
- Dwr Cymru Welsh Water (DCWW); and
- Relevant local authorities – Neath Port Talbot Council and Powys County Council.

9.6 Potential mitigation

231. Mitigation measures will be identified where necessary to avoid, reduce or offset any significant adverse effects on identified receptors. Where appropriate, strategies will be proposed to ensure that post development conditions have no significant adverse impacts. Potential mitigation measures to be considered in the assessment include:

- The production of, and adherence to, a Construction Environmental Management Plan (CEMP), which details the management of water across the site during construction;
- Maintaining vegetation adjacent to the streams within the redline boundary and avoiding culverting where possible, and incorporating good practice culvert design where culverts are necessary; and
- Utilising Sustainable Drainage Systems (SuDS) to attenuate surface water runoff across the scheme and to buffer potentially contaminated runoff from immediate discharge to the wider water environment.

10 Ground conditions

10.1 Introduction

232. The ground conditions assessment will address the potential effects related to geology, hydrogeology and contamination that will need to be considered in light of the proposed Project.

10.2 Known baseline

10.2.1 Site location and description

233. The Project site is located at approximate National Grid Reference SN 82135 11212, approximately 1.5km north west of the village of Onllwyn, South Wales. It is located on top of a hill with the valleys of the Dulais and the Towe Rivers to the south and north of the proposed scheme area.
234. Parts of the site are within the operational Nant Helen open cast coal mine and other parts are within previously mined areas. Railway lines associated with the coal transport and a coal sorting, washing, and distribution facility are located to the east of the mine adjacent to the villages of Onllwyn and Dyffryn Cellwen.
235. It is understood that the open cast mine will cease operation in 2020 and the mine site will then be restored. As the restoration will not be completed before the commencement of the assessments obtaining data on baseline conditions of a restored site will not be possible. It is therefore proposed that for the purpose of the environmental risk assessments the baseline is set at current (pre-restoration) conditions, which would represent worst case scenario.

10.2.2 Site history

236. Historically, prior to the commencement of the open cast mining operations in the 1940s, the Project area was an open heathland associated with Mynydd y Drum. The areas to the north and south were however impacted by mining from at least the 1880s as indicated by the earliest historical plans. The mining to the north comprised coal and iron stone workings. Most notably numerous collieries that existed to the north of the site indicate both surface workings and also drift mine entries southwards towards the site. The historical plans indicate that mining activities ceased by the 1960s. Open cast mining of the site area has taken place in a series of phases from the 1940's to present.
237. In the south of the Project site is a south west to north east trending linear feature labelled as an 'old tramway', indicating previous coal mining activity also in that area.

238. Quarries and clay pits were also present in the area to the north of the Project site. The Neath and Brecon Railway was constructed by the 1800s approximately 500m to the south running east to west.

10.2.3 Geological and mining setting

239. The Project site is underlain by the South Wales Middle Coal Measures strata which comprise grey coal bearing mudstones and siltstones with seatearths and minor sandstones. In addition, some superficial deposits are also present in this area consisting of more recently deposited Devensian glacial till.
240. It is suspected that given the extent of recent open cast mining across the site and previous historic mining activities, much of the natural geology will have been disturbed to some degree. It is anticipated that the superficial deposits and much of the weathered upper levels of the coal strata will have been stripped from the location of the open cast site prior to the coal measures being worked and either placed in stockpiles ready for the restoration stage of the site or used as backfilled where mining ceased.
241. From aerial imagery the current workings are present directly to the west of the Project site, whereas to the east of the site the land forms appear modified. It is possible that the overburden has been stockpiled in these areas potentially for the purpose of future restoration works. Historic mapping review has indicated that former workings to the north comprised both surface and drift workings. Review of the geological map indicates the presence of made ground in these areas to the north of the site presumably as a result of mining works. In addition, the presence of drifts along the northern edge of the site indicates underground workings may have extended southwards beneath the site and therefore the east of the proposed scheme area may be affected by underground workings.
242. No designated sites of geological interest are located within the area of the proposed Project. There area however has two Geological Conservation Review (GCR) Sites approximately 100m to the east of the Project area (at the nearest point). These are Nant Llech GCR and associated Nant Llech Plant Beds. The western boundary of these GCR sites runs along the Brecon Beacons National Park and the Forest Fawr UNESCO designated Geopark boundary, of which these GCR sites form part of.

10.2.4 Hydrogeological and hydrological setting

243. The River Dulais flows in a northeast to southwest direction to the south of the proposed Project area and the River Tawe in a northeast to southwest direction to the north of the Project area, with numerous tributaries originating within or in a close vicinity to the Project area e.g. Nant Ystalwyn or Nant Pen-rhos.
244. Groundwater regime in the Project area and its vicinity is likely to be fundamentally controlled by remnants of historical mining activities such as shafts or adits. The historical mine working may act as preferential flow

paths for groundwater flows and constitute major drainage network, which would discharge into surface water network.

245. It is understood that to accommodate the currently ongoing open cast mining activities, active dewatering is taking place. No details are currently available however this is likely to have an impact on local hydrogeology including groundwater levels and flow direction. When the dewatering stops, the groundwater regime is likely to restore to pre-dewatering state. This is likely to result in increased groundwater levels to those currently present and potentially flooding of the void present to the west of the Project.
246. National Resources Wales have classified the underlying bedrock geology as a Secondary A Aquifer. There are no Source Protection Zones within 1km of the proposed Project boundary.
247. Radon maps indicate that the Project area may be impacted by an elevated radon potential with 1-3% of homes above the action level. Ground gas is also likely to be a concern with respect to the proposed Project due to the presence of substantial deposits of made ground, coal bearing strata and possible mine workings at or near to the site surface, which may provide preferential flow paths for the gas migration to the surface or into the proposed scheme area.

10.2.5 Potential for contamination

248. It is anticipated that in general the made ground will comprise re-worked natural soils and rock, on this basis it is not anticipated that significant deposits of contaminated materials will be present within the Project boundary. However, excavated coal measures are likely to contain high concentrations of coal debris and possibly lower grade coal which could result in a combustion risk. In addition, aerobic or biological oxidation of pyrites within the mining can cause acidification of groundwater or leachates. These acidic conditions can lead to increased mobility of some metals which may impact local surface or groundwater.
249. There is potential for other materials aside from mine waste to have been deposited on site. These could include materials and machinery used in the operation of the mine or mines and may include hydrocarbons from fuel or oils. Although there is no evidence to suggest that other waste materials (general waste, unlicensed household waste etc.) have been included in previous mine works infilling operations, there remains a possibility that this occurred in historic areas.
250. Coal washing waste is likely to have been deposited within the proposed scheme area, including residues from the washery which may contain elevated levels of hydrocarbons, heavy metals, and high sulphates.
251. The presence of coal bearing strata, potential historic mine workings, significant thicknesses of made ground/re-worked natural soils with high coal content, and the potential for other buried materials presents a high risk of elevated ground gases being encountered within the Project site.

10.3 Key issues

252. Historical and on-going mining activities have resulted in the presence of made ground across the Project area. Depending on how these materials were deposited/placed there could be significant future ground movements due to consolidation of the backfill. It may be necessary to improve the ground prior to development. This could comprise excavation of existing fill and re-working this to an earthworks specification or may include other ground improvement techniques. Proposed structures may require piling or ground improvement techniques.
253. Sulphates in mine waste may also cause aggressive ground conditions in relation to buried concrete and additional measures may be required in relation to the proposed concrete mixes to counter this. Sulphates can also result in ground heave.
254. Made ground present within the Project area may be a potential source of contamination and pose a risk to human health and controlled waters. Intrusive construction works may result in mobilisation of contaminants and migration towards controlled water receptors (i.e. groundwater or surface water courses). Introduction of piled foundations may create new preferential flow paths for contamination migration towards groundwater.
255. Termination of current open cast mining activities and associated dewatering will result in higher groundwater levels. This may impact the ground stability particularly in areas of previous exploration, which may have been backfilled with poorly compacted fill.
256. The presence of potential sub-surface mine workings within the proposed scheme area present possible issues with subsidence should these workings be near the surface and there may be associated shafts within these workings. The drift mine entrances would suggest that these features are relatively close to the surface.
257. Current proposals indicate several significant cuttings along both of the proposed railroad test loops. The proposed cuttings will need to be assessed with regards to slope stability and possible rock fall mitigation.
258. Current proposals indicate the large railroad test loop to encroach on the existing void which will be partially backfilled. On this basis an impact assessment will need to be made as to the stability of the extraction face in this area if this is to remain. This face may require stabilisation depending on the location of the proposed track in relation to the crest of the extraction face.
259. Whilst not yet determined, there may also be a requirement for noise mitigation measures such as noise bunds to be constructed, these could require significant earthworks.

10.3.1 Issues scoped out

260. It is proposed that contaminated land sites identified as being fully outside the study area (defined as 250m distance from a site boundary), will be scoped out of requiring further assessment. It is considered unlikely that viable pollution linkages associated with these sites would be intercepted by the proposed Project¹⁶ although potential pollutant linkages will be considered on a case by case basis.

10.4 Assessment methodology

10.4.1 Study Area

261. The study area that has been used for this assessment includes an area extending up to 250m away from the boundary of the Project area. This distance is considered to be appropriate in order to establish the current baseline for the ground conditions at the site, impact by historical mining activities and includes all those sites that have plausible pollutant linkages. Notwithstanding this, potential pollutant linkages have been considered on a case by case basis, for example, if sources of contamination are identified outside the study area but there is potential for that contamination to migrate towards the Project area, for instance via groundwater.
262. The study area of 1km allowing to identify sensitive controlled water receptors, for example source protection zones or water abstraction points, to any potential contamination originating within the Project area has been applied.
263. The geology study area has been determined on the basis of the regional geology of the area.

10.4.2 Methodology

264. The identification of baseline method will include:
- Confirmation of information gathered from the relevant statutory bodies and the local planning authorities;
 - Review of current and historical plans;
 - Review of published geological maps and memoirs;
 - Review of published mineral resources plans and local development plans;
 - Review of Coal Authority data;
 - Site walkover survey; and
 - Discussions with current site owners Celtic Energy Ltd.

¹⁶ Guidance for the Safe Development of Housing on Land Affected by Contamination, RD66, EA, NHBC and CIEH, 2008

265. The assessment of risks associated with contaminated land will be based on the risk management framework provided in the Model Procedures for the Management of Land Contamination (CLR 11). This will involve preparation of a Conceptual Site Model for the baseline conditions, which will form the basis for generic and, if required, detailed risk assessments.
266. The impacts and effects on the geology/geomorphology and land contamination arising from construction of the Project will be assessed by review of baseline conditions in the context of the extent, method and programme of the proposed construction activities that will be required.
267. Assessment of the likely impact on the geology/geomorphology and land contamination arising from the operation of the Project will be undertaken by review of baseline conditions in the context of the final end use.
268. Potential interrelationships have been identified between the ES chapters concerned with water resources, nuisance (noise), air quality (dust) and climate change. The assessment of effects will take into account these interrelationships.

10.4.3 Significance Criteria

269. The significance of impacts will be assessed by attributing a value or sensitivity to each receptor impacted, in combination with the magnitude of impact that will occur to it. The sensitivity of each receptor will be assessed in line with Table 18, and the magnitude of impact in accordance with Table 19.
270. The significance of impact will be then assessed by considering the sensitivity of the receptor in combination with the magnitude of impact in accordance with Table 20.

Table 18 Criteria and EIA Definitions of Sensitivity or Value

Value (sensitivity)	Typical Descriptors
Very high	Geology/ Mineral Resources: Very rare and of very high national and regional geological/geomorphological importance with no potential for replacement (e.g. designated sites of national importance including active quarries and mining activities of national importance). Groundwater: Groundwater with a high quality and rarity on a regional or national scale with limited potential for substitution (e.g. principal aquifer/(high productivity) providing potable water to a large population). Surface water: European Community (EC) Designated Salmonid/Cyprinid fishery Water Framework Directive (WFD) Class 'High' Site protected/designated under EC or UK wildlife legislation (SAC, SPA, WPZ, Ramsar Site, salmonid water)/species protected by EC legislation. Land Contamination: Human health (High sensitivity land use scenario e.g. residential with gardens and allotments). Ground stability Human health

Value (sensitivity)	Typical Descriptors
High	Geology/ Mineral Resources: Of medium national and high regional geological/ geomorphological importance with limited potential for replacement (e.g. currently non-designated GCR site, regionally important site, active quarries and mining activities of regional or local importance). Groundwater: Groundwater with a high quality and rarity on a local scale with limited potential for substitution, or attribute with a medium quality or rarity on a regional or national scale with limited potential for substitution (e.g. principal aquifer/(high productivity) providing potable water to a small population and/or large resource potential). Surface water: WFD Class 'Good' Major Cyprinid Fishery Species protected under EU or UK habitat legislation Land Contamination: Human health (Lower sensitivity land use scenario e.g. mixed use (residential without gardens), public open space)
Medium	Geology / Mineral Resources: Of low regional and high local geological/ geomorphological importance with some potential for replacement (e.g. allocated RIGS or recommended RIGS). Groundwater: Groundwater with a medium quality and rarity on a local scale with limited potential for substitution, or attribute with a low quality and rarity on a regional or national scale with limited potential for substitution (e.g. secondary aquifer unit supporting abstraction for agricultural or industrial use and/or moderate resource potential). Surface Water: WFD Class 'Moderate' Contamination: Receptor which is of regional importance. Human health (Low sensitivity land use scenario e.g. commercial, industrial)
Low (or Lower)	Geology / Mineral Resources: Of local geological/geomorphological importance with potential for replacement (e.g. non-designated exposure/former quarries and mining activities). Groundwater: Groundwater with a low quality and rarity on a local scale with limited potential for substitution (e.g. non-aquifer unit that does not afford protection to underlying water bearing units). Surface Water: WFD Class 'Poor' Land Contamination: Human health (Lower sensitivity land use scenario e.g. construction site). Receptor which is of local importance. Ground stability Structures, infrastructure
Negligible	Geology / Mineral Resources: Of little local geological/geomorphological interest. Land Contamination: Receptor with low importance and rarity.

Table 19 Criteria and EIA Definitions of Impact Magnitude

Magnitude of Impact	Typical Criteria Descriptors
Major	Geology / Mineral Resources: The proposals are very damaging to the geological environment/soils resource of the area. May result in loss or damage to areas designated as being of regional or national geological interest. Loss of resource and/or quality and integrity of resource. Severe damage to key characteristics, features or elements. Impacts cannot be mitigated for (e.g. destruction of a designated site (RIGS)). (Adverse) Controlled Waters (aquifers/surface water): Reduction of water quality rendering groundwater or surface water unfit to drink and/or substantial adverse impact on groundwater dependent environmental receptors. Discharge of hazardous substances to groundwater. (Adverse) Land Contamination: Major effect upon receptor. Severe or irreversible effect on human health. Temporary severe or irreversible effect on ground/surface water quality. (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Moderate	Geology / Mineral Resources: The proposals may adversely affect the geological/hydrogeological conditions/soils resource existing at the site but will not result in the loss of, or damage to, areas designated as being of regional or national geological interest. Loss of resource, but not adversely affecting the integrity. Partial loss of/damage to key characteristics, features or elements. Some mitigation may be possible but will not prevent scarring of the geological environment, as some features of interest will be lost or partly destroyed. (Adverse) Controlled Waters (aquifers/surface water): Reduced reliability of a supply at a groundwater or surface water abstraction source. Discharge of non-hazardous substances to groundwater and surface water resulting in pollution (i.e. contaminants present above the EQS) (Adverse) Land Contamination: Moderate effect upon receptor. Long term or short term moderate effect on human health. Moderate effect on ground/surface water quality, reversible with time. (Adverse) Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Minor	Geology / Mineral Resources: The proposals will not affect areas with regional or national geological interest/soils resource but may result in the loss of, or damage to, areas of local geological/soils resource interest. Cannot be completely mitigated for but opportunities exist for the replacement of lost or damaged areas which may be of similar local geological/soils interest. (Adverse) Controlled Waters (aquifers/surface water): Marginal reduced reliability of a supply at a groundwater or surface water abstraction source. Discharge of non-hazardous substances to groundwater and surface water not resulting in pollution (i.e. contaminants present below the EQS) (Adverse) Land Contamination: Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.). Slight effect on ground/surface water quality, reversible with time. (Adverse) Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).

Magnitude of Impact	Typical Criteria Descriptors
Negligible	Geology / Mineral Resources: The proposals will result in very minor loss or damage to local area of geological interest/soils resource such that mitigation is not considered practical. Very minor loss or detrimental alteration to one or more characteristics, features or elements. (Adverse) Controlled Waters (aquifers/surface water): Non-measurable change to quality, level and flow. (Adverse) Land Contamination: Results in no discernible change or an impact on attribute of sufficient magnitude to affect the use/integrity. (Adverse) E.g. Soil contaminants present, but risk assessment suggests negligible/ low risk to human health. (Adverse) Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

271. The criteria for assessing the significance of the impact takes account of the following factors:

- The value of the resource (international, national, regional and local level importance);
- The magnitude of the impact;
- The duration involved;
- The reversibility of the effect; and
- The number and sensitivity of receptors.

272. The level of significance that merits further consideration / mitigation has been determined following the procedures set out in Chapter 6 '*Approach to EIA*', ES Volume I. In terms of the EIA Regulations, significant effects are generally those where the significance of the effect is 'moderate' or greater.

Table 20 Approach to Evaluating Significance of Effect

		Magnitude of Impact				
		No Change	Negligible	Minor	Moderate	Major
Value/ Sensitivity	Very high	Neutral	Slight	Moderate or large	Large or Very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or Large	Large or Very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral	Neutral or slight	Neutral or slight

10.5 Consultation

- 273. Consultation will be undertaken with the Environmental Health Departments of Neath Port Talbot County Borough Council and Powys County Council and Natural Resources Wales to agree the approach to the assessment and to identify sensitive receptors or sources of contamination to be included in the assessment.
- 274. The Coal Authority will be consulted with respect to historical mining activities.

10.6 Potential mitigation

- 275. Pollution control and health and safety practice informed by the results of risk assessments would be likely to be considered sufficient to mitigate any potential effects from the presence of contamination and/or made ground during construction.
- 276. At this stage, the design is being progressed on the basis that all soils will be retained on site for reuse where feasible. Measures would be taken to establish acceptable reuse and import criteria and procedures defined for ensuring that the suitability of material can be demonstrated and verified. A discovery strategy would be developed to enable unforeseen ground conditions to be addressed if or when encountered during construction.
- 277. Sources found to constitute ongoing sources of contamination presenting a significant risk to identified receptors would be subjected to remediation in accordance with a remediation strategy produced for the Project.
- 278. A detailed mining risk assessment would be completed to qualify the risks arising from historical mining activities present within the area of the proposed structures and infrastructure and associated construction activities. This would look at historic records, mining abandonment plans, historic borehole records etc. Comprehensive ground investigations may be required to locate workings. There may be requirements for remedial works to mining works and shafts.
- 279. A detailed hydrogeological risk assessment would be undertaken at the detailed design stage, which would incorporate findings of the mining risk assessment.
- 280. The detailed design would include stability risk assessments to ensure the stability of all cutting faces and the existing void in the vicinity of the track.
- 281. The detailed design of structures and infrastructure containing concrete or metal elements will consider ground aggressivity to ensure the integrity of the building materials.
- 282. As part of the detailed design, an assessment of potential risks associated with deep piled foundations with respect to human health and controlled waters will be undertaken.

283. Inter-relationships with the Water Resources chapter relating to discharges to controlled waters will be considered.

11 Biodiversity

11.1 Introduction

284. The Ecology Chapter of the ES will report on the findings of an Ecological Impact Assessment (EcIA) of the Project. It will document the habitats, species and sites of nature conservation interest on and around the site and provide an evaluation of the ecological value of these.
285. Potential impacts resulting from the construction and operation phases of the Project will be assessed and reported in terms of their significance for the integrity and conservation status of any valuable ecological receptors.
286. Avoidance, mitigation, compensation and/or enhancement measures will be proposed to avoid and or reduce negative impacts and achieve biodiversity gains, where feasible and appropriate. The predicted residual effects of the Project will then be quantified and consequences for decision making discussed in view of the mitigation, compensation and/or enhancement measures proposed, and the value of any ecological receptors affected.

11.2 Known Baseline

287. Historical biodiversity data was obtained from a number of sources including a search by the relevant biodiversity records centre, the Multi-Agency Geographic Information system for the Countryside (MAGIC) and existing ecological reports produced for the site. Biodiversity data available from these sources is detailed below, in addition to the methodologies used.

11.2.1 Desk Study

288. The Biodiversity Information Service (BIS) provided desk study data records on 21st November 2018. Records for non-statutory designated sites and protected or notable¹⁷ species and habitats were provided within a 2 km search radius from the site (from the last 10 years). Statutory designated sites within 5 km were identified using MAGIC¹⁸. A search was also undertaken for international/European sites designated for bat roosts within 10 km.
289. Results are detailed in Table 21 and summarised below:
- Thirteen statutory designated sites were identified within 5 km of the site. One is a Special Area of Conservation (SAC) and the others are all Sites of Special Scientific Interest (SSSIs) and one site is also

¹⁷ '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, under 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).

¹⁸ <https://magic.defra.gov.uk/>

designated as a National Nature Reserve (NNR). None occur within the site, although one SSSI is adjacent to the site. They are detailed in Table 21 below.

- Eighteen non-statutory sites were identified, all of which are adopted Sites of Importance for Nature Conservation (SINCs). Three occur within the site and two are immediately adjacent to the site. They are detailed in Table 22 below.
- Two hundred and fifty-seven areas of ancient woodland were identified within 5 km of the site, with one area of woodland being within the site.
- Habitats listed as Habitats of Principal Importance (HPI) under the provisions of Section 7 of the Environment (Wales) Act 2016 were also identified. These included: blanket bog and limestone pavement, both approximately 5 km from the centre of the site.
- No protected/notable species were recorded within the site, but records exist for bats, other mammals, birds, invertebrates, reptiles, amphibians, non-native invasive plants, vascular plants, fungi, bryophytes and lichens. These are detailed in Table 23.

11.2.2 Existing Ecological Reports

290. The ES that was prepared for the site in 2011 by Celtic Energy¹⁹ and additional surveys that were conducted on site in 2015 and 2016 (commissioned by Celtic Energy)²⁰, were reviewed to obtain information on any additional habitats/vegetation communities present, and evidence of protected/notable species from within the site.

291. Results are detailed in Table 24 and summarised below:

- Habitats recorded on site included plantation woodland, broadleaved woodland, hedgerows, scrub, acid marshy/grassland, mire, ephemeral/short perennial, watercourses and standing water.
- The previous surveys undertaken found no signs of badger, otter, water vole, dormice, great crested newt or marsh fritillary butterfly.
- Reptiles (including common lizard *Zootoca vivipara* and slow worm *Anguis fragilis*) and amphibians including common toad *Bufo bufo* (a Section 7 species under the Environment (Wales) Act 2016), were recorded on site.
- A range of invertebrate species were recorded including Red Data Book and Nationally Scarce species.
- Numerous birds were recorded which were considered likely to be breeding within and adjacent to site. Six of these species are listed as

¹⁹ Environmental Statement (2011), Celtic Energy

²⁰ Bat box service inspection report (2016) Sylvan Ecology.

Section 7 species under the Environment (Wales) Act 2016 and five species were red listed on the Birds of Conservation Concern 3 (BoCC)²¹.

- Crossbills *Loxia curvirostra* were recorded during field surveys, which are listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), but no evidence of breeding was recorded.

²¹ BoCC 3 has now been superseded by BoCC 4, which will be used in any subsequent assessments undertaken as part of the EIA.

Table 21 Statutory designated sites within 5 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 Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> 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 <i>Quercus petraea</i> woodland, ash <i>Fraxinus excelsior</i> woodland (some of which is referable to Annex I type 9180 <i>Tilio-Acerion</i> 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 <i>Festuca altissima</i> and the ferns <i>Dryopteris aemula</i>, <i>Hymenophyllum tunbrigense</i> and <i>Asplenium viride</i>.	3 km east
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 <i>Carum verticillatum</i>, meadow thistle <i>Cirsium dissectum</i> and sharp-flowered rush <i>Juncus acutiflorus</i>. These plants form a clearly defined community of extremely limited distribution in Europe, occurring only along the southern Atlantic seaboard.	30 m east
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 <i>Podabrus alpinus</i> has been recorded from the wood.	100 m north-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 <i>Trollius europaeus</i>, meadow thistle, whorled caraway and marsh arrowgrass <i>Triglochin palustris</i>.	800 m east

Site Name	Designation	Features	Approximate Distance and Orientation from Site
		Notable species in the eastern field include greater butterfly-orchid <i>Platanthera chlorantha</i> , saw-wort <i>Serratula inctorial</i> , dyer's greenweed <i>Genista tinctora</i> and petty whin <i>G. anglica</i> . Over 100 species of flowering plants and ferns having been recorded. The area also supports invertebrates, especially butterflies.	
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 <i>Nardus stricta</i> , heath rush <i>Juncus squarrosus</i> , deergrass <i>Scirpus cespitosus</i> and sheep's-fescue <i>Festuca ovina</i> . This changes into grass heath communities of brown bent <i>Agrostis canina</i> , red fescue <i>Festuca rubra</i> , lousewort <i>Pedicularis sylvatica</i> and heath spotted-orchid <i>Dactylorhiza inctoria</i> spp. <i>Ericetorum</i> , which in turn grade into purple moor-grass/sedge associations.	1.7 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. A large part of the site supports a sward dominated by purple moor-grass <i>Molinia caerulea</i> , sedges <i>Carex</i> spp. And common cottongrass <i>Eriophorum angustifolium</i> . Other species include bog pimpernel <i>Anagallis tenella</i> , round-leaved sundew <i>Drosera rotundifolia</i> ., few-flowered spike-rush <i>Eleocharis quinqueflora</i> , common butter-wort <i>Pinguicula vulgaris</i> and devil's-bit scabious <i>Succisa pratensis</i> . Additional interest is provided by stands of alder <i>Alnus glutinosa</i> and by ditches which support species such as hemp-agrimony <i>Eupatorium cannabinum</i> , bogbean <i>Menyanthes trifoliata</i> , bog pondweed <i>Potamogeton polygonifolius</i> and the locally uncommon fern <i>Osmunda regalis</i> .	2.5 km north-west
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 <i>Nardus stricta</i> . Small areas still support heather <i>Calluna vulgaris</i> and bilberry <i>Vaccinium myrtillus</i> . 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 <i>Galium boreale</i> , dwarf willow <i>Salix herbacea</i> , lesser meadow-rue <i>Thalictrum minus</i> and roseroot <i>Sedum rosea</i> , together with a rich moss and liverwort flora.	3 km north

Site Name	Designation	Features	Approximate Distance and Orientation from Site
Dyffrynnoedd 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.	3 km south-east
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.	4 km north-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
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 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 <i>Carex pulicaris</i>, carnation sedge <i>Carex panicea</i> and tawny sedge <i>Carex hostiana</i>.	4.5 km south-west
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.	4 km north-east

Site Name	Designation	Features	Approximate Distance and Orientation from Site
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 <i>Convallaria majalis</i>, soft-leaved sedge <i>Carex montana</i>, mountain melick <i>Melica nutans</i>, lesser meadow-rue <i>Thalictrum minus</i> and the nationally rare hairy greenweed <i>Genista pilosa</i>. These areas of sheltered, deep heather provide suitable habitat for nightjar <i>Caprimulgus europaeus</i>, 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.	4 km north-east

Table 22 Non-statutory designated sites within 2 km of the site

Site Name	Designation	Approximate Distance and Orientation from Site
Dyffryn Cellwen	SINC	On site
Gorsllwyn Meadows	SINC	On site
Onllwyn Coal Washery	SINC	On site
Adjacent to Gors Llwyn	SINC	Immediately east
Intervalley Road, Banwen	SINC	Immediately south
Banwen Pond	SINC	200 m south-east
Aberhenwaun Uchaf	SINC	400 m south-west
Glyn yr Hebog Top Field 1-5	SINC	500 m north-west
Glyn yr Hebog Wood 1 Afon Tawe	SINC	500 m north-west
Sarn Helen	SINC	600 m south
Glyn yr Hebog (The Waun)	SINC	800 m south-west
Land behind Marigold Place	SINC	1 km south-west
Heol Heddwch	SINC	1 km south
Blaendulais Marshy Grassland	SINC	1.4 km south-west
Nant y Cafn	SINC	1.5 km south-west
Ynysdawle	SINC	1.5 km south
Coed Glynn Gwennws, Pen-y-Cae	SINC	2.4 km north-east
Rhos Common	SINC	4 km south-east

Table 23 Protected species within 2 km of the site

Species / Group	Scientific Name	Status ²²	Number of Records	Closest record (m)
Bats				
Unidentified bat	<i>Chiroptera</i>	EPS, WCA	10	1032
Noctule bat	<i>Nyctalus noctula</i>	EPS, WCA	11	1303
Pipistrelle species	<i>Pipistrellus</i> spp.	EPS, WCA	13	1303

²² EPS = European Protected Species as listed under Schedule 2 of the Conservation of Habitats and Species Regulations (2017).

HDir = Animals and plants that receive protection under the Council Directive 92/43/EEC (The Habitats Directive).

BDir = Birds that receive protection under the Directive 2009/147/ED (The Birds Directive).

WCA = Species protected under Schedule 1 (birds), Schedule 5 (animals) or Schedule 8 (plants) of the Wildlife and Countryside Act (1981) as amended.

WCA9 = Species listed under Schedule 9 (invasive non-native plants) of the Wildlife and Countryside Act (1981) as amended.

S7 = Species listed on Section 7 of the Environment (Wales) Act 2016.

Species / Group	Scientific Name	Status ²²	Number of Records	Closest record (m)
Brown long-eared bat	<i>Plecotus auritus</i>	EPS, WCA	7	1599
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	EPS, WCA	27	1633
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	EPS, WCA	10	1855
Daubenton's bat	<i>Myotis daubentonii</i>	EPS, WCA	7	1887
Other mammals				
Brown hare	<i>Lepus europaeus</i>	S7	3	1348
Otter	<i>Lutra lutra</i>	EPS, WCA, S7	27	1812
Hedgehog	<i>Erinaceus europaeus</i>	S7	32	1969
Birds				
Kestrel	<i>Falco tinnunculus</i>	S7	27	291
Red kite	<i>Milvus milvus</i>	WCA, BDir	44	828
Hawfinch	<i>Coccothraustes coccothraustes</i>	S7	1	1308
Cuckoo	<i>Cuculus canorus</i>	S7	23	1348
Dunnock	<i>Prunella modularis</i>	S7	51	1374
House sparrow	<i>Passer domesticus</i>	S7	81	1374
Mistle thrush	<i>Turdus viscivorus</i>	BDir	31	1374
Redwing	<i>Turdus iliacus</i>	WCA, BDir	17	1374
Starling	<i>Sturnus vulgaris</i>	BDir, S7	68	1374
Lesser black-backed gull	<i>Larus fuscus</i>	BDir	6	1408
Bullfinch	<i>Pyrrhula pyrrhula</i>	S7	24	1545
Mallard	<i>Anas platyrhynchos</i>	BDir	33	1545
Reed bunting	<i>Emberiza schoeniclus</i>	S7	27	1545
Skylark	<i>Alauda arvensis</i>	BDir, S7	26	1545
Lesser spotted woodpecker	<i>Dendrocopos minor</i>	S7	1	1668
Merlin	<i>Falco columbarius</i>	BDir, WCA	1	1668
Common crossbill	<i>Loxia curvirostra</i>	WCA	24	1756
Woodcock	<i>Scolopax rusticola</i>	BDir	12	1812
Grasshopper warbler	<i>Locustella naevia</i>	S7	12	1880
Lesser redpoll	<i>Acanthis cabaret</i>	S7	32	1880

Species / Group	Scientific Name	Status ²²	Number of Records	Closest record (m)
Peregrine	<i>Falco peregrinus</i>	BDir, WCA	18	1993
Song thrush	<i>Turdus philomelos</i>	BDir, S7	57	1993
Reptiles and Amphibians				
Common lizard	<i>Zootoca vivipara</i>	WCA	14	1374
Common toad	<i>Bufo bufo</i>	WCA	12	1451
Common frog	<i>Rana temporaria</i>	WCA	32	1713
Grass snake	<i>Natrix helvetica</i>	WCA	8	1766
Fish				
Brown / sea trout	<i>Salmo trutta</i>	S7	2	1664
Atlantic salmon	<i>Salmo salar</i>	HDir, S7	2	1923
Invertebrates				
Marsh fritillary	<i>Euphydryas aurinia</i>	EPS, WCA, S7	49	1760
Broom moth	<i>Ceramica pisi</i>	S7	7	1812
Small heath	<i>Coenonympha pamphilus</i>	S7	16	1880
Vascular plants				
Small-flowered Sticky Eyebright	<i>Euphrasia officinalis subsp. anglica</i>	S7	1	1451
Bluebell	<i>Hyacinthoides non-scripta</i>	WCA	47	1555
Globeflower	<i>Trollius europaeus</i>	S7	1	1969
Fungi, bryophytes & lichens				
Parmotrema perlatum	<i>Parmotrema perlatum</i>	S7	6	1408
Invasive non-native species				
Yellow archangel	<i>Lamium galeobdolon subsp. montanum</i>	WCA9	7	1613

Table 24 Summary of previous surveys undertaken to inform the ES that was prepared for the site in 2011, and additional surveys that were conducted on site between 2012 and 2016.

Survey	Methodology	Results
Extended Phase 1 Habitat Survey	An Extended Phase 1 habitat survey was undertaken on a number of visits between April and August 2010 of the site and surrounding areas, in accordance with standard JNCC Phase 1 Habitat Survey methodology ²³ .	Plantation woodland, broadleaved woodland, hedgerows, scrub, acid marshy/grassland, mire, ephemeral/short perennial, watercourses and standing water were present.
Phase 2 Vegetation Survey	Grassland vegetation and areas dominated by purple moor grass <i>Molinia caerulea</i> were subject to National Vegetation Classification (NVC) surveys, in accordance with standard NVC methodology ²⁴ . A minimum of 5 replicate 2 m x 2 m quadrats were surveyed in each identified area of homogeneous vegetation in July 2010.	Five NVC community types were present within the site in 2010: • M3 <i>Eriophorum angustifolium</i> bog pool community; • U4b <i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Galium saxatile</i> grassland; <i>Holcus lanatus</i> – <i>Trifolium repens</i> sub-community; • U5d <i>Nardus stricta</i> – <i>Galium saxatile</i> grassland; <i>Calluna vulgaris</i> – <i>Danthonia decumbens</i> sub-community; • U5 <i>Nardus stricta</i> – <i>Galium saxatile</i> grassland; and • M25 <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire.
Bryophyte and Lichen Survey	A bryophyte and lichen survey was undertaken on an area of translocated bog and surrounding engineered mounds over two days in August 2012. NVC surveys were also carried out in areas of lichen heath.	Although the bryophyte and lichen communities on site were relatively diverse, no protected or notable species were identified.
River Corridor Survey	A survey to describe the physical characteristics of the watercourses on and near the site was undertaken following the methods outlined in the River Habitat Survey handbook ²⁵ . An assessment was made of approximate bank height and angle, the nature of the substrate, flow characteristics and width of each watercourse along homogenous	The majority of the watercourses within the site have been previously destroyed and restored to stone-line channels that only discharge water during heavy rain. One of two natural watercourses is a remnant section of the Nant Gylais, which above and below this undisturbed section has been lost to

²³ Joint Nature Conservation Committee (JNCC), 2010: Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit.

²⁴ Joint Nature Conservation Committee (JNCC), 2006: National Vegetation Classification: A User's handbook.

²⁵ Environment Agency (2003) River Habitat Survey in Britain and Ireland, Version 1.

Survey	Methodology	Results
	sections with a new description etc being made where the character of the watercourse changed.	previous opencasting. The Nant Penrhos is a wooded gorge, disturbed in part by deep mine tips.
Badger Survey	Signs of badger presence, including setts, latrines, paths, prints, hairs and snuffle holes were searched for on and adjacent to the site, in accordance with best practice survey guidance ²⁶ .	No signs of badgers were identified during the survey.
Bat Surveys	All trees and buildings within and adjacent to the site were assessed for their suitability to support roosting bats in June 2010, in-line with good practice guidelines of the time²⁷. Trees that were assessed from the ground as being suitable for bats were subject to aerial inspections. Activity surveys in the form of walked transects and the deployment of static detectors were also undertaken. Twenty bat boxes were installed on site in 2014 and 2015 as mitigation for previous expansion of the Nant Helen mine. These were inspected for signs of use by bats in 2015 and 2016, using a torch²⁰.	Only one tree was identified from aerial surveys as being suitable for roosting bats and a single pipistrelle was found in a small cavity. Seven bat species (common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle <i>Pipistrellus nathusii</i>, brown long-eared, noctule, serotine <i>Eptesicus serotinus</i> and Leisler's <i>Nyctalus leisleri</i>) were recorded commuting / foraging within and adjacent to the site, with most records comprising pipistrelles. In 2015, two boxes were found to be occupied by a pipistrelle bat. In 2016, 3 boxes were found to be occupied by a pipistrelle bat.
Dormouse Survey	One hundred dormouse nest tubes were deployed in July 2010 in four representative areas of suitable habitat on site. The tubes were then checked for presence/signs of dormice once per month in August, September, October and November 2010. Additionally, an inspection of hazel nuts was undertaken, to determine whether they had been opened by dormice. This followed best practice survey guidance ²⁸ .	No dormice or signs of dormice were identified during the nest tube checks and no hazel nuts were found to have been opened by dormice.
Otter Survey	Three watercourses (Nant Penrhos, Nant Gylrais and an unnamed watercourse) were surveyed in July and September 2010 for their suitability to support otters and for any signs of otter presence, including	No signs of otter were identified in proximity to any of watercourses or waterbodies that were surveyed.

²⁶ The Mammal Society (1989) Surveying Badgers: An Occasional Publication of The Mammal Society No.9. London:

²⁷ Collins *et al.* (ed) (2012) Bat Surveys for Professional Ecologists: Good Practice Guidelines (2nd edn). The Bat Conservation Trust, London.

²⁸ English Nature (2006) The Dormouse Conservation Handbook. 2nd Ed. Peterborough:

Survey	Methodology	Results
	spraints, feeding remains and holts. Surveys were undertaken in accordance with best practice guidance ²⁹ .	
Water Vole Survey	Watercourses and waterbodies were surveyed for signs of water voles in accordance with existing survey guidance ³⁰ .	The watercourses were found to be generally unsuitable due to being dry for extended periods. No signs of water vole were identified in proximity to any of watercourses or waterbodies that were surveyed.
Breeding Bird Survey	Specific honey buzzard <i>Pernis apivorus</i> surveys were undertaken on five visits between July and August 2010. Observations were also made for other raptor species and a search for old nests was conducted. Breeding bird surveys were undertaken on five visits between April and July 2010 using an abbreviated form of the Common Bird Census (CBC) methodology³¹. An additional survey was undertaken in March 2010 to record any early breeding species. Surveys at dusk were undertaken on three occasions in June and July 2010 to record crepuscular species.	No nesting honey buzzards were recorded on or adjacent to the site. Neither goshawk <i>Accipiter gentilis</i> nor peregrine were recorded but three old buzzard <i>Buteo buteo</i> nests were found. No barn owl <i>Tyto alba</i> were identified during bat survey work but tawny owl <i>Strix aluco</i> were heard. Twenty-one species were recorded as breeding/possibly breeding within and adjacent to site. Six of these species were Section 7 species under the Environment (Wales) Act 2016 (at the time Section 42 species, published under the Natural Environment Act (NERC) 2006) and five species were red listed on the Birds of Conservation Concern 3 (BoCC). No crepuscular species were recorded.
Wintering Bird Survey	A wintering bird survey was undertaken on four visits between November 2009 and February 2010, in accordance with current best practice survey guidance ³² .	Crossbills were recorded, which are listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), but no evidence of breeding was recorded. Five species listed as Section 7 species under the Environment (Wales) Act 2016 (at the time Section 42 species, published under the NERC 2006) were recorded, four of which were also red listed on BoCC 3.
Reptile Survey	One hundred and ninety artificial refugia (roofing felt) were deployed along 22 transects between May and July 2010. The artificial refugia,	Common lizard and slow worm were both recorded in low numbers across the site.

²⁹ Scottish Natural Heritage (2008) Otters and Development. Scotland: Scottish Natural Heritage.

³⁰ Wildlife and Conservation Research Unit (2011) Water vole Conservation Handbook 2nd Ed. Abingdon: Wildlife Conservation Research Unit.

³¹ Bibby, B.B., 2000. Bird Census Techniques. London: Academic Press.

³² Gilbert, G.G., Gibbons, D.W. and Evans, J.,1998. Bird Monitoring Methods: A manual of techniques. Bedfordshire, RSPB.

Survey	Methodology	Results
	along with any natural refugia (e.g. log piles) were checked a minimum of six times between June and October 2010 in suitable weather conditions, in accordance with best practice survey guidance ³³ .	
Great Crested Newt Survey	Bottle trapping, torching and egg searching were undertaken on all waterbodies on site in 2009 and 2010, in accordance with best practice survey guidance ³⁴ .	All surveys in 2009 and 2010 were negative for great crested newts. Good populations of palmate newt <i>Lissotriton helveticus</i> were identified on site. Common toad and common frog <i>Rana temporaria</i> were also present.
Invertebrate Surveys	Sweep netting and a direct searching survey was undertaken in August 2009. Moth trapping was conducted on five evenings between May and September 2010 in representative habitat types across the site. Seven routes on site were walked to record butterflies on six visits in 2010 between May and July. Surveys for marsh fritillary <i>Euphydryas aurinia</i> adults carried out during May-June 2010 and larval webs were searched for in August and September 2010.	Eighty-six invertebrate species were recorded including one Red Data Book and one Nationally Scarce species. Ninety-two moth species and nineteen other invertebrates were recorded during the moth trap surveys, including one nationally scarce moth and 11 UK Biodiversity Action Plan (UKBAP) and Section 7 species (previously Section 42 species published under the NERC Act 2006). Thirteen butterfly species were recorded, two of which are Section 7 species, under the Environment (Wales) Act 2016 (previously Section 42 species published under the NERC Act 2006). No adult or larval marsh fritillary were identified on site.

³³ JNCC (1998), Herpetofauna Workers' Manual. Peterborough: Joint Nature Conservation Committee.

³⁴ Froglife (2001). Great Crested Newt Conservation Handbook.

11.2.3 Current Survey work

292. A review of previous surveys undertaken on the site, in addition to existing records (detailed above in Section 11.2.1 and 11.2.2), and consultation with key organisations/advisers (as detailed in Section 11.5) was undertaken to confirm the scope of ecology surveys required to inform the Project and EIA application.
293. The additional ecological surveys undertaken need to ensure that sufficient information is obtained on all likely ecological receptors that could be valuable and therefore a material consideration of the EIA application.
294. An initial site visit was also undertaken on the 26th November 2018 by Arup ecologists, which comprised a walk/drive around the site. This enabled a broad assessment of the habitat types present, and their likely suitability to support protected and or notable species and therefore helped inform the scope of ecological surveys required.
295. The majority of the additional surveys planned to inform the EIA application for the Project will be a repeat of existing surveys (to inform previous development within the site). It has been acknowledged that the existing ecological survey data for the site, although useful, is out of date; with the latest existing survey data from 2012, and the majority of survey data from 2010. Therefore, in accordance with best practice guidance³⁵, a repeat of the surveys was deemed necessary. Best practice guidance acknowledges the potential changes in habitats and species populations, particularly mobile species.
296. Table 25 details the planned ecological surveys, and which will be completed by the end of November 2019. As detailed in Section 11.5, the scope of ecological surveys has been approved by the relevant species team in NRW, and county ecologist at Neath Port Talbot Council.

Table 25: Surveys planned between November 2018 and November 2019

Survey	Methodology	Survey Extent
Extended Phase 1 Habitat Survey	An Extended Phase 1 habitat survey will be carried out on the site, in accordance with the JNCC phase 1 habitat survey methodology ²³ . This will include the assessment of habitats suitability to support protected species. The survey commenced in November 2018 and will be completed in October 2019.	Red line boundary.
Phase 2 Vegetation Survey	The objective was to describe the plant communities in habitats judged to be of highest value for nature conservation using NVC methods ²⁴ . The vegetation types initially selected for study were identified from a Phase 1 Habitat Survey plan produced by Arup. Other habitats were also present but considered less likely to be of nature	Red line boundary.

³⁵ CIEEM (2019). Advice note: on the lifespan of ecological reports and surveys.

Survey	Methodology	Survey Extent
	conservation significance, and although initially not included in the scope for the NVC survey, some were later included. The survey was undertaken over several days in July 2019. A total of 127 quadrats were recorded. The quadrat areas were generally selected as being representative samples of the stand in which they occurred. The survey aimed to collect a minimum of five quadrats from each of the main plant communities, aiming to provide a reasonable representation of the vegetation type. Some unusual or poorly represented communities were sometimes described by just one or two quadrats. The quadrat data will be analysed using the appropriate software and published reference sources, to determine NVC communities and sub communities present.	
Badger Survey	A baseline survey has been undertaken in accordance with survey guidance²⁶, including field boundaries, hedgerows and fence lines. This involved a search for signs of badger presence, including setts, latrines, paths, prints, hairs and snuffle holes. Any setts found have been classified as either a Main, Annex, subsidiary or outlier sett. Survey visits were undertaken during spring/summer 2019. A further visit is planned in autumn 2019. Trail cameras may be used to monitor any setts found, if likely to be affected by the Project.	Red line boundary.
Bat Surveys - roosts	All trees and buildings within and adjacent to the site were assessed for their suitability to support roosting bats in summer 2019. Potential roost features in either trees or buildings will be categorised as being of high, moderate or low suitability for use by bats in accordance with the Bats: Good Practice Survey Guidelines³⁶. Trees/buildings that were assessed from the ground as having moderate or greater potential for bat roosts, were then subject to aerial inspections and or emergence surveys.	Red line boundary.
Bat Surveys – transect and static monitoring	Bat transect surveys are being undertaken monthly from April to October 2019. Two transects were walked each month, and all bat activity recorded using bat detectors.	Red line boundary.

³⁶ Collins *et al.* (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.

Survey	Methodology	Survey Extent
	Static bat activity monitoring is also being undertaken on a monthly basis, from April to October (inclusive), in accordance with best practice survey guidance ³⁶ . Sixteen ultrasonic bat detectors are deployed in suitable habitat within the site and left in-situ for five consecutive nights to record calls by foraging/commuting bats within the site.	
Dormouse Survey	Dormouse surveys are being undertaken using nest tubes and boxes (approximately 300), installed in suitable habitat on site during spring 2019. The tubes and boxes are being checked on a monthly basis by a suitably licenced ecologist to record dormice or their nests if present, in accordance with best practice survey guidance²⁸. These checks will continue to November 2019.	Red line boundary.
Otter Survey	All waterbodies have been searched for signs of otter and potential otter lay ups and or couches, in accordance with best practice survey guidance²⁹. The first survey comprised three visits between mid-May and the end of June 2019. These comprised an initial assessment of habitat suitability, and searches for signs of otter within suitable habitats. A second survey was undertaken over three days in August 2019, also to assess habitat suitability and to search for signs of otter.	Red line boundary.
Water Vole Survey	All waterbodies are being searched for signs of water vole and potential resting/breeding habitat such as burrows. Two visits have been undertaken between mid-April and the end of September. This is in accordance with updated survey guidance ³⁷ .	Red line boundary.
Breeding Bird Survey	Breeding bird surveys were undertaken in accordance with current best practice including the CBC³¹ Techniques and Bird Monitoring methods³². This comprised walking transects (the same as those used for bat surveys) to sample all accessible habitat and recording all signs of breeding using the BTO standard activity recording codes. Surveys were undertaken on three occasions between April and June 2019, between dawn and 10 am. One of the three visits was walked in the opposite direction.	Red line boundary.
Specialist bird surveys	Specialist bird surveys for honey-buzzard and goshawk were undertaken, in accordance with survey guidance ³² . Honey Buzzard survey were undertaken from May until August 2019, completing 10 surveys days in total. Goshawk surveys were undertaken between March and July	

³⁷ The Mammal Society (2016) The Water Vole Mitigation Handbook (The Mammal Society Mitigation Series). Eds Fiona Mathews and Paul Chanin. London.

Survey	Methodology	Survey Extent
	2019, with two vantage point surveys undertaken in March to identify any displaying goshawk, and two transect surveys through woodland to identify any goshawk nests, in June and July 2019.	
Wintering Bird Survey	A wintering bird survey, comprising monthly visits between October 2018 and March 2019, was undertaken across the site. Transects were walked, and any bird species noted. This was undertaken in accordance with best practice survey guidance ³² .	Red line boundary.
Reptile Survey	250 refugia (roofing felt) were deployed in late spring 2019. Seven checks will be undertaken in suitable weather, with the last check at the end of September 2019. This is in line with best practice survey guidance ³³ .	Red line boundary.
Great Crested Newt Survey	Great crested newt surveys were undertaken for two days in April 2019. All 44 waterbodies within the site were subject to a Habitat Suitability Assessment (HSI)³⁸. Waterbodies scoring above 0.5 (equating to below average and above) were then sampled for the presence of great crested newt environmental DNA (eDNA) in accordance with the approved methodology endorsed by the Statutory Environmental Bodies³⁹ To fit with desired programme for the project (and limited great crested newt survey period), presence / absence surveys on waterbodies sampled for eDNA following standard methodology set out in the Great Crested Newt Mitigation Guidelines³³, were started prior to obtaining eDNA results, pre-empting any positive results from the eDNA surveys. In the event that any positive results were obtained, a further two presence/absence surveys would have been undertaken, however all eDNA results were negative.	Red line boundary.
Invertebrate Surveys	Four survey visits were undertaken between April and September 2019. An initial survey visit identified habitats likely to be of greatest importance for invertebrates. Follow up survey visits included surveys of these areas, including terrestrial and aquatic habitats with butterfly transect counts, marsh fritillary surveys (July-September) and moth trapping.	Red line boundary.

³⁸ Amphibian and Retile Groups of the UK (2010) Great crested Newt Habitat Suitability Index. Froglife.

³⁹ Biggs *et al.*, (2014) Using eDNA to develop a national citizen science-based monitoring programme for the great crested newt (*Triturus cristatus*), biological conservation.

Survey	Methodology	Survey Extent
Arboreal mammals	Transect and feeding stations were set up within woodland in early summer 2019; surveys and associated baiting of stations will continue until early autumn 2019. Signs of target species (i.e. red squirrel and pine martin) will be searched for during transects, and in video footage (including red squirrel nests, paw prints, pine martin scats, and sightings).	Red line boundary.
Fungi	A survey will be undertaken which will focus on species of principal importance for conservation in Wales, under Environment (Wales) Act 2016. Three walk-over survey visits will be spread between September and November 2019, which will coincide with the main fungi fruiting season. Each visit will involve a walk-through survey of the fungi survey plots. This would involve walking a series of transects through vegetation considered to be of highest potential value for grassland fungi, such as old, short-grazed, semi-improved acid grassland (especially if anthills are present, indicating a long history without disturbance).	Red line boundary.

11.3 Key Issues

297. 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 sites which could be indirectly affected during construction and operation. Further assessment of hydrological connectivity from the Project to these sites will be required to confirm this.
- The presence of notable habitats within the site i.e. Habitats of Principal Importance in Wales and ancient woodland, which could be directly and indirectly affected during construction and operation.
- The presence of protected and or notable species, which could be directly and indirectly affected during construction and operation including from harm, mortality, disturbance and habitat fragmentation.

298. The significance of these potential impacts during construction and operation will be informed by data emerging from ongoing survey work in 2019, and detailed project information as the project develops.

11.4 Assessment Methodology

299. The assessment would be carried out in accordance with the CIEEM Guidelines⁴⁰. The assessment would collate all of the existing baseline information obtained through desk-based study and field surveys and predict all of the significant impacts of the Project on 'Important Ecological Features (IEFs)', with the embedded mitigation in place. Where significant adverse impacts are predicted, measures to mitigate these impacts would be developed such that the residual impacts of the Project would not be significant.
300. In addition, measures would be developed to address the legislative and policy requirements associated with those species and habitats for which significant impacts are not expected, but which nevertheless warrant mitigation.
301. 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 habitats⁴¹, 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.

11.4.1 Assessing Potential Effects, Identifying Mitigation Measures and Assessing Residual Effects

302. The approach outlined below would be followed to assess likely significant effects, identify outline mitigation measures and assess likely residual effects:
- Consideration of best practice/guidance;
 - Professional judgement;
 - Consideration of the baseline information obtained, the Project details and issues raised through consultation with interested parties;
 - Prediction of potential effects based on baseline information and the Project details;
 - Identification of effects which, in particular, could be considered to be potentially significant in terms of the EIA Regulations⁴²;
 - Quantification of potential effects;

⁴⁰ Chartered Institute of Ecology and Environmental Management (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal. 2nd Edition.

⁴¹ Under Section 7 of the Environment (Wales) Act 2016 the Welsh Government have published a list of species and habitats of principal importance for conservation in Wales.

⁴² Welsh Government (2016). Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations.

- Identification of appropriate mitigation measures; and
- Prediction of residual effects based on baseline information, the Project details and mitigation measures.

11.4.2 Significance Criteria

303. The following section outlines the criteria that would be used to determine the assessment of effects.
304. In accordance with the EIA Regulations⁴² and the guidance set out in the CIEEM Guidelines⁴⁰, it is considered inappropriate to attempt to investigate in detail all potential ecological issues in relation to the application site. It is therefore necessary, under the EIA Regulations⁴², to focus on those activities that could potentially generate significant ecological effects; this is determined by considering 'IEF' - specifically habitats, species, ecosystems and their function. In accordance with the BS42020:2013 Biodiversity - Code of Practice for Planning and Biodiversity⁴³ the assessment would follow the CIEEM Guidelines⁴⁰.

11.4.3 Determining the Importance of an IEF

305. In order to determine the likelihood of a significant ecological effect, it is first necessary to identify whether an ecological feature is sufficiently important for a significant impact upon it to be material in decision-making. To achieve this, where possible, animal species and their populations would be valued on the basis of a combination of their rarity, status and distribution, using contextual information where it exists. Habitats and plant communities will be evaluated against existing selection criteria, wherever possible (such as those developed to aid the designation of SSSIs or non-statutory designated sites). Only those features that it is considered could experience significant effects (i.e. impacts that could adversely affect the integrity⁴⁴ of the habitat or the favourable conservation status⁴⁵ of a species' local population) are classified as being 'IEF' and would be considered in the impact assessment (see Table 26).
306. In accordance with the CIEEM Guidelines⁴⁰, the importance of an ecological feature has been considered using a defined a geographic frame of reference, as shown in Table 26 below.

⁴³ British Standards Institute (2013). BS42020:2013 Biodiversity - Code of Practice for Planning and Biodiversity.

⁴⁴ The Office of Deputy Prime Minister (2005) 'Government Circular: Biodiversity and geological conservation – statutory obligations and their impact within the planning system' defines integrity as follows: "The integrity of a site is the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it has been classified".

⁴⁵ Conservation status, based on the Habitats Directive, is defined as follows: "for habitats, conservation status 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 or its typical species within a given geographical area; and for species."

Table 26 Determining the Importance of an 'IEF'

Importance of IEF	Criteria
International/European	A statutory designated site of International or European importance for nature conservation: for example, a Special Area of Conservation (SAC), Special Protection Area (SPA) or Ramsar site. Or a site that supports a population of a mobile species that, whilst not designated, is deemed to be functionally-linked to a statutory designated site of International or European importance. Or a species population or assemblage that is considered to be of International or European importance.
National	A statutory designated site of National importance for nature conservation such as a SSSI. Or a species population or assemblage of National importance (i.e. value to Wales).
Regional	A statutory designated site of Regional importance to nature conservation such as a National Park. It would also include species populations and assemblages of Regional importance, (i.e. value at the Brecon Beacon National Park level).
County / District/ Metropolitan	A non-statutory designated site of County/District/Metropolitan importance to nature conservation. This would include Sites of Importance for Nature Conservation (SINCs), Local Wildlife Sites (LWSs) and Sites of Biological Importance (SBIs). It would also include species populations and assemblages of County, District or Metropolitan importance (i.e. value at the Powys or Neath Port Talbot level).
Local	A habitat or species assemblage of Local importance.
Site / Within the Zone of Influence	A site or species assemblage of Site importance. Whilst such features are not considered sufficiently important to be material in decision-making, they do contribute to the biodiversity value of a site.
Negligible	A site or species assemblage of limited importance to nature conservation.

11.4.4 Impact Characterisation

307. Once the IEFs are identified and valued within the ecological Zone of Influence (ZoI), it is then necessary to investigate potential impacts on those features in order to understand how they might be affected by the Project.

11.4.4.1 Zone of Influence for Ecological Features

308. All plant and animal species, habitats and integrated plant and animal communities that occur within the 'zone of impact' of the Project are defined

as potential 'ecological receptors'. The zone of impact for ecological features varies, depending on the nature and behaviour of the receptors, and also the type of impact that may affect them. As a general rule in this Chapter, the assessment of individual receptors is considered for the whole of the site plus the distances listed in Table 27.

Table 27: Maximum Zone of Impact from Scheme Boundary for Ecological Features

Ecological Feature	Maximum Zone of Impact from the Site Boundary
Internationally designated sites (including faunal species included as part of the designation), e.g. SAC.	5 km
European sites e.g. SACs, for which bats and birds are a qualifying feature.	10 km
Nationally designated sites (including faunal species included as part of the designation), including Sites of SSSIs and NNRs.	5 km
Locally designated sites – Ancient woodland and SINCs	1 km
Protected species	Up to 2 km (species dependant)
Notable species	Up to 2 km (species dependant)
Invasive species	Within site only

309. The impact assessment would be based on an understanding of the likely activities associated with the Project, the biophysical changes that could be predicted as a result of these activities, and the area over which such effects might be experienced by different features. These impacts would be considered for the construction and operational phase of the Project. They would be characterised and described in detail using the following parameters:

- Significance – including positive and negative effects;
- Extent – the area over which the impact occurs;
- Magnitude – the size or amount of an impact, determined on a quantitative basis if possible;
- Duration – the time for which the impact is expected to last prior to recovery or replacement of the resource or feature;
- Timing – some changes may only cause an impact if they coincide with critical life-stages or seasons;

- Frequency – the number of times an event occurs;
- Reversibility – an irreversible (permanent) impact is one from which recovery is not possible with a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A reversible (temporary) impact is one from which spontaneous recovery is possible or for which mitigation is both possible and where an enforceable commitment has been made; and
- Cumulative effects.

11.4.5 Assessing Significance

310. A 'significant effect' is an effect that either supports or undermines conservation objectives for an 'IEF' and encompasses impacts on the structure and function of ecosystems, individual habitats and/or on species abundance/distribution. Effects are considered significant at a range of scales from International to Local.
311. The ecological significance of an impact is not dependent on the value of the feature in question. 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 would be considered to represent a significant impact at a county level.

11.5 Consultation

312. Members of Natural Resources Wales (NRW) south Wales species team and the Ecologist at Neath Port Talbot Council (NPTCBC) were consulted during a meeting 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 to inform the EIA for the sites' restoration would be required for the present 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.
313. The planning inspectorate stated, in a meeting with the Arup project team, on the 15th November 2018, that all protected species/habitat surveys would need to be undertaken prior to submission of the EIA application.
314. Further consultation is proposed, with NRW, the Brecon Beacon National Park (BBNP), Powys County Council (PCC) and NPTCBC will be undertaken. In particular, it is anticipated that consultation with these organisations will take place to confirm impact assessments, proposed mitigation and opportunities for enhancements, for IEF included within the ES.

11.6 Potential mitigation

315. Mitigation will follow the mitigation hierarchy. The following sequential process should be adopted in the development of the design and during construction: avoid; mitigate; compensate; and enhance, in line with best practice.
316. The design will need to avoid notable habitats, or habitats known to support protected/notable species, where possible. Opportunities, where possible, should be sought to enhance existing habitat features, and also create new habitats which are appropriate to the local area for example through the planting and use of native trees, shrubs and seed mixes. Existing and new habitat features should also be well-connected through the site, and with the wider area to maintain and enhance ecological connectivity, particularly for use by mobile species.
317. Sufficient information is not currently available to detail any specific mitigation measures required during construction however the following broad recommendations will be made to avoid impacts to IEF:
- Limit night working/lighting during the construction phase to avoid artificial lighting of bat foraging and or roosting habitats in proximity to woodlands, hedgerows, trees and watercourses or where this is not possible, ensure that any lighting does not illuminate these habitats;
 - The implementation of standard pollution control measures in accordance with best practice guidance, during construction to protect local water and air quality;
 - Installation of fencing around retained habitats including mature trees, which are in close proximity to construction areas to avoid accidental damage;
 - The covering/protecting of any open excavations during night-time to avoid injury/entrapment of mammals such as badger;
 - The provision of a Suitably Qualified Ecologist (SQE) for the duration of construction (and associated clearance works) to ensure any required ecological mitigation is implemented accordingly and provide advice as and when required;
 - The provision of tool box talks by the SQE/s to all contractors working on site during clearance and construction;
 - The timing of construction works to avoid sensitive periods of species known to occur within/adjacent to the site; and
 - The use of construction methods which avoid impacts to notable habitats and or species within the site.
318. As discussed above in paragraph 314, Opportunities, where possible, should be sought to enhance existing habitat features, and also create new habitats which are appropriate to the local area. These could include the following:

- Opportunities could be sought to create bat and bird roosting opportunities within the new buildings on site, both in attic voids and exteriors of the buildings and/or roosting opportunities could be created on the exterior, for example through the incorporation of bat boxes into the walls, creating gaps under ridge tiles and or under new fascias, barge boards and soffits etc.
- Bird and bat boxes could also be installed in suitable locations in the retained habitats of the site, as well as buildings. These would be sited in such a manner that predators such as cats cannot reach them and be at least 4 m (preferably 5 m) above ground level. Boxes would ideally be of 'woodcrete' construction (such as those manufactured by Schwegler Ltd), since these are much more robust and longer-lived than traditional wooden boxes and require less after care.
- Habitat for reptiles could be created within the site in the form of reptile 'refugia' or 'hibernacula' (which will provide hibernation opportunities for reptiles) which can be constructed using materials available within the site such as soil, rubble and brash. These would be raised or partially buried in the ground. Hibernacula would be seeded or covered in turfs and these can be located in various locations from within a wood (good winter refuges) to open habitat (good summer refuges) but optimum refuges would receive both sun and shade; and
- Opportunities could be investigated to create and or enhance new habitats such as woodland, hedgerows, species rich grassland and wetland (including water bodies and marshy grassland). This would also include consideration of how any planting can enhance habitat connectivity for mobile species known to occur within the site.

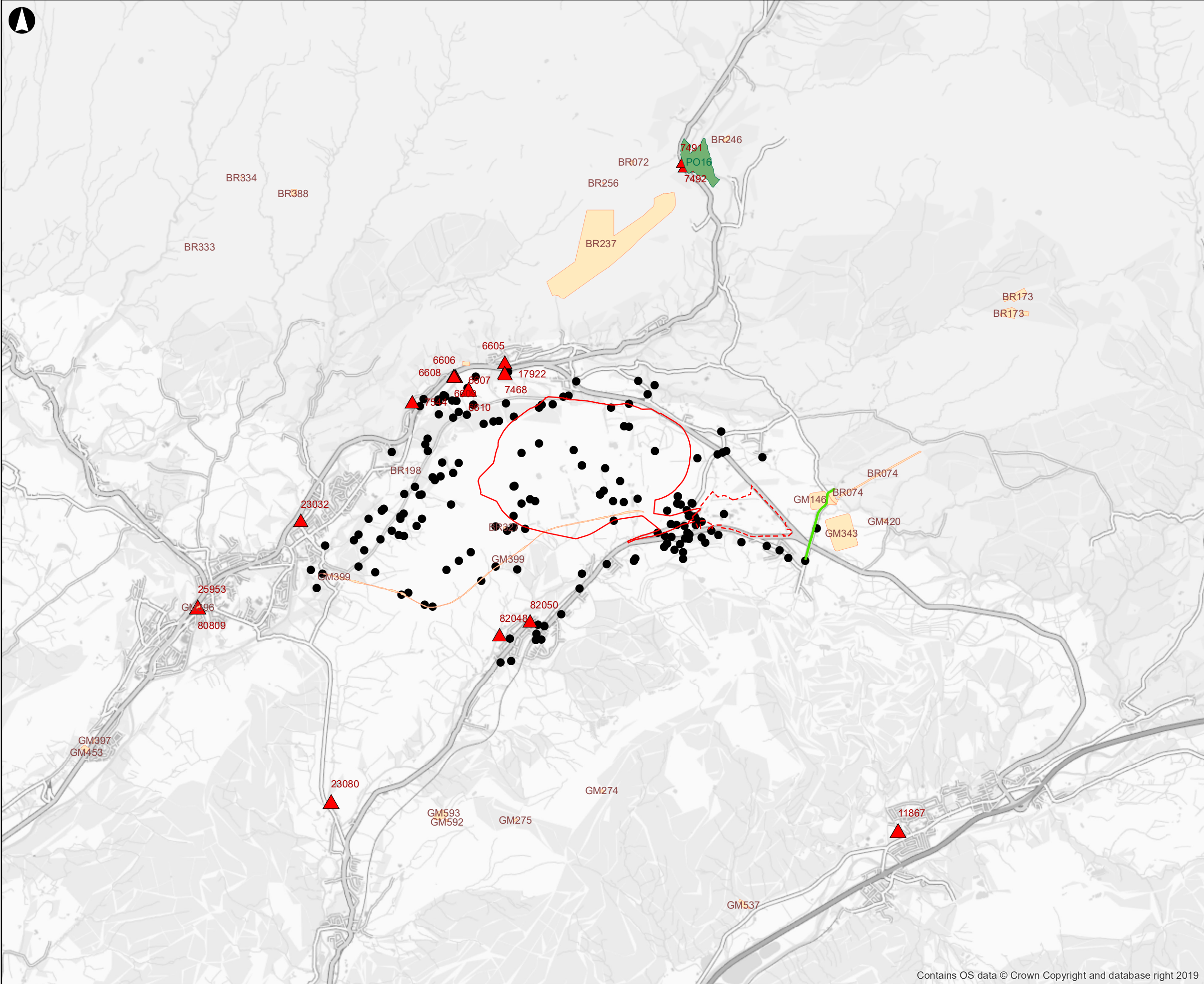
12 Cultural heritage

12.1 Introduction

319. The Cultural Heritage assessment will review baseline information relating to all above and below ground archaeological remains, built heritage, historic landscapes and any other features that contribute to the archaeological and historic interest of the area.
320. This Scoping Assessment outlines the proposed approach and methodology that will be adopted for the assessment of potential significant effects on heritage assets arising from the construction and operation of the proposed scheme. This assessment has been carried out in line with current best practice guidance produced by Cadw and the Chartered Institute for Archaeologists (CIfA) policy and includes a review of all relevant national, regional and local planning policy.

12.2 Known baseline

321. To inform this scoping report an initial review of the historic environment baseline has been carried out to identify the potential for significant effects arising from the proposed scheme and to identify the approach that will be required to assess these. Figure 8 shows the known heritage assets in relation to the Project boundary.
322. Given the topography of the area it is possible for views of the site to range for longer distances in some areas than others. In order to allow full consideration of potentially affected heritage assets a 5km outer study area buffered from the site boundary will be used to identify those heritage assets most likely to be sensitive to changes in their setting (World Heritage Sites, Grade I and II* Listed Buildings and Historic Parks and Gardens and Scheduled Monuments). A smaller inner study area of 1km from the boundary of the site will be used to identify Historic Landscape Areas, Grade II Listed Buildings and Grade II Historic Parks and Gardens.
323. The site is located on Mynydd y Drum, a long ridge dividing the Swansea Valley to the north from the Dulais Valley to the south. Its landscape context, which will have constrained the types of land use in the past, is different to the valleys on either side of it. This, in addition to the density of known non-designated heritage assets within and around the site, has informed the decision to use a study area of 500m buffered from the site boundary for the assessment of non-designated heritage assets. This will be used to inform an assessment of the archaeological potential of the site.
324. There is one Scheduled Monument located within the site boundary. The Tramroad at Ystradgynlais (GM399) which was built 1832-7 to transport limestone from the Brecon Forest Tramroad to the Ynyscedwyn Ironworks. The tramroad is a linear feature, with only a small section of it located within the proposed full planning application boundary.



Legend

- Full planning boundary
- Outline planning boundary
- Reg. Parks & Gardens
- Scheduled Monument
- Roman_road
- Listed buildings
- Non-designated assets

P0	2019-10-09	RC	RE	RE
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Issue	Date	By	Chkd	Appd

Metres

0 650 1,300 2,600

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Client

Transport for Wales

Job Title

Gobal Rail Centre of Excellence

Fig 8. Known Heritage Assets

Scale at A3

1:50,000

Job No	Drawing Status
264904-00	Preliminary

Drawing No	Issue
Fig 8	P0

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325. There are no other designated heritage assets within the site but there are non-designated heritage assets, including prehistoric features, evidence of post-medieval farming and later post-medieval industries.
326. While the mining and industrial heritage of the 19th and 20th centuries is itself part of the historic environment, recent open cast mining will have removed all traces of earlier archaeological features within the area excavated. Outside of this area, however, archaeological survival of all periods is possible.
327. Beyond the site itself there are Listed Buildings, Scheduled Monuments and a Historic Park and Garden within the inner and outer study areas. Within 1km there are one Scheduled Monument, 11 Grade II Listed Buildings and one Grade II* Listed Building, and within the larger 5km study area there are five Grade II* Listed Buildings, one Grade I Listed Building, 23 Scheduled Monuments and one Grade II* Historic Park and Garden. Located particularly close to the site is the Bryn Llechwen ring cairn (BR327), a funerary monument probably of Bronze Age date. The cairn is at 281526, 210344.46.
328. Of the 25 Scheduled Monuments, including the one within the site, nine of these are of prehistoric date and include several ritual or funerary monuments including a stone row (BR072), standing stone (BR333), stone circle (BR388) and four cairns (BR327, GM275, GM592 and BR334). There is also a prehistoric settlement site (BR256) and an Iron Age Hillfort (BR246). Views and intervisibility often make an important contribution to the significance of prehistoric heritage assets, which makes them particularly vulnerable to changes in their setting. A full assessment will be made to identify the nature of these assets' setting.
329. There are four Scheduled Monuments of Roman date within the study area, three located to the east of Onllwyn where a Roman road (BR074), marching camp (GM343) and fort (GM146) are located. To the south, close to the line of another Roman road, was a signal station (GM274). The connections between these and other features of Roman date is important to the setting of these features, as are views related to their defensive nature which will need to be assessed in detail.
330. There is only one Scheduled Monument of medieval date – a settlement site located south-west of Seven Sisters (GM593). There are, however, 11 Scheduled Monuments of post-medieval date, all of which, with the exception of pillow mounds⁴⁷ at Pant Mawr (BR173), are industrial in nature (GM399, BR198, BR201, BR222, BR237, GM420, GM396, GM453, GM397 and GM537).
331. Listed Buildings include structures relating to agriculture and industry as well as those which had religious or domestic purposes.

⁴⁶ Cadw (2006) *Bryn Llechwen ring cairn*. Available at: <http://cadwpublic-api.azurewebsites.net/reports/sam/FullReport?lang=en&id=4241> (Accessed 13 November 2018).

⁴⁷ Pillow Mound: Earthwork feature related to rabbit farming.

332. The Grade II* Historic Park and Garden is laid out around Craig-y-Nos Castle and Country Park to the north-east of the Project.

12.3 Key issues

333. During construction, any works involving the excavation or soil stripping outside of the areas previously opencast would result in the removal of any archaeological remains present within their footprint, which includes both known and unknown features. The presence of archaeological features (both designated and non-designated) within the site suggests the potential for further previously undiscovered archaeological remains to be discovered, although this would exclude all areas previously subjected to opencast mining.
334. The removal of any archaeological remains would result in a permanent adverse effect, the significance of which would depend on the value of the heritage asset affected (see methodology below). In the case of the Scheduled Monument, or any hitherto unknown features of regional or national significance, this would likely result in a major adverse effect which would be significant. The current design suggests that the track embankment would cross over the scheduled Tramroad at Ystradgynlais (GM399), which it is assumed would involve the stripping of turf and topsoil at a minimum which is likely to be a major adverse effect. Should a construction methodology be put in place which would avoid the need to remove any of the Scheduled Monument this may be reduced.
335. Beginning during the construction phase, but extending throughout the operational phase, there is the potential for significant adverse effects on the setting of heritage assets. This is most likely in the case of prehistoric ritual sites such as the Bryn Llechwen ring cairn (BR327), defensive sites of all periods and designed landscapes such as the Historic Park and Garden, where the setting of the asset may be particularly sensitive to change. Changes to the setting of heritage assets can constitute permanent significant adverse effects depending on the nature of the asset's significance and the extent to which their setting is changed by the Project.
336. There may be temporary effects during construction arising from noise, dust and increased vehicle movements. However, these are not likely to be significant.

12.4 Assessment methodology

337. A historic environment desk-based assessment will be carried out to inform the Cultural Heritage chapter. This will be carried out in line with the relevant legislation, national and local planning policies with regard to archaeology and cultural heritage and will be undertaken with reference to the best-practice standards and guidance for the field.
338. The historic environment desk-based assessment will seek to identify, predict and evaluate the significance of potential effects to designated and non-designated heritage assets.

339. Data will be collected from readily available archeologically and historical sources including:
- Cadw datasets of designated heritage assets;
 - NMRS datasets held by RCAHMW for archaeological sites and events;
 - Historic Environment Record data held by Glamorgan and Gwent Archaeological Trust (GGAT) and Clwyd-Powys Archaeological Trust (CPAT);
 - Historic maps, documents and local history publications held at Glamorgan Archives, West Glamorgan Archives, Powys County Archives Office and the National Library of Wales;
 - Online sources; and
 - Site Walkover survey.
340. The extent of the study area has been informed by a review of the topography, initial desk-based research, the nature of the development and professional judgement and is focused on potential significant effects. The assessment will consider impacts upon all heritage assets within the study area.

12.4.1 National legislation and policy

341. The Historic Environment (Wales) Act (2016) received Royal Assent and became law on 21st March 2016. It is the first legislation enacted specifically for the Welsh historic environment. The Act makes important changes to the two main UK laws that provide the legislative framework for the protection and management of the historic environment: the *Ancient Monuments and Archaeological Areas Act* (1979) and the *Planning (Listed Buildings and Conservation Areas) Act* (1990). It also incorporates stand-alone provisions establishing: statutory historic environment records, a list of historic place names and an advisory panel for the historic environment.
342. *The Historic Environment (Wales) Act (2016)*:
- gives more effective protection to listed buildings and scheduled ancient monuments;
 - improves the sustainable management of the historic environment; and
 - introduces greater transparency and accountability into decisions taken on the historic environment.
343. Most of the Act's provisions are now in force, but a few still require further preparatory work or secondary legislation before they can be brought into effect. The Act stands at the centre of an integrated suite of legislation, policy, advice and guidance for the historic environment; including:
- *Planning Policy Wales, Chapter 6: The Historic Environment* (Edition 9, 2016);

- *Technical Advice Note 24: The Historic Environment* (May 2017 — replacing the previous Welsh Office circulars on the historic environment);
 - Best-practice guidance (detailed below).
344. Together, these give Wales flexible and effective systems for the sustainable management of the Welsh historic environment, reflecting current conservation principles and practice.

12.4.2 Local Planning Policy

345. The Project straddles the administrative boundary between Powys and Neath Port Talbot Councils.
346. The Powys LDP (2011-2026, adopted April 2018) includes the objective “to protect, preserve and/or enhance the distinctive historic environment, heritage and cultural assets of Powys, in particular local assets that are not statutorily protected or designated under national legislation, and to ensure that development respects local distinctiveness” (Objective 13.2 Landscape and the Historic Environment).
347. Further relevant policies are DM2: The Natural Environment, part 5: Trees, Woodlands and Hedgerows of Significant Public Amenity, Natural or Cultural Heritage and DM4 – Landscape, which includes consideration of the historic qualities of landscapes.
348. The Neath Port Talbot LDP (2011-2026, adopted January 2016) has several policies grouped around the topic of Culture and Heritage. Relevant to this assessment are:
- Policy SP21 Built Environment and Historic Heritage
 - Policy BE 1: Design
 - Policy BE 2: Buildings of Local Importance

12.4.3 Standards and best-practice guidance for the assessment of Cultural Heritage

- Cadw (2017) Setting of Historic Assets in Wales;
- Cadw (2017) Heritage Impact Assessment in Wales;
- Cadw (2017) Managing Change to Registered Parks and Gardens in Wales;
- Cadw (2011) Conservation Principles of the Sustainable Management of the Historic Environment in Wales;
- CIfA (2014) Code of Conduct;
- CIfA (2017) Standard and guidance for historic environment desk-based assessment; and

- Highways Agency (2007) Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 2.

12.4.4 Assessing significance of effect

349. The assessment will be undertaken in accordance with standards and best-practice guidance in the documents listed above, including the methodology set out in DMRB Volume 11, Section 3, Part 2 Cultural Heritage HA 208/07 and Cadw Heritage Impact Assessment in Wales. The significance of impacts, whether for construction or operational phases, will be based on consideration of the magnitude of the impact and the importance, condition and reliability of the individual interests to be affected, both on and off site. Potential effects include direct impact upon buried assets and indirect impacts on non-designated and designated heritage assets because of changes to their settings. The assessment will also be informed by more recent standards and guidance described above.
350. In line with the DMRB methodology, a determination will be made of the value of heritage assets located within and surrounding the site.

Table 28: Value of heritage assets

Value	Typical Descriptors
Very High	World Heritage Sites (including nominated sites). Assets of acknowledged international importance. Assets that can contribute significantly to acknowledged international research objectives
High	Nationally important assets (scheduled monuments, listed buildings, registered parks and gardens)
Medium	Designated (conservation areas) or non-designated assets that are of regional importance
Low	Assets of local importance. Assets compromised by poor preservation and/ or poor survival of contextual associations. Assets of limited value, but with potential to contribute to local research objectives.
Negligible	Assets with very little or no surviving archaeological interest.

351. The approach to assessing the magnitude of impacts on heritage assets considers the change upon the asset. This takes into account the severity of the impact of the Project, together with the vulnerability of the asset to change.

Table 29: Magnitude of impact

Magnitude of Impact	Description of Impact
Major	Complete destruction/demolition of site or feature. Change to the site or feature resulting in a fundamental change in our ability to understand and appreciate the resource and its historical context and setting.
Moderate	Change to the site or feature resulting in an appreciable change in our ability to understand and appreciate the resource and its historical context and setting.
Minor	Change to the site or feature resulting in a small change in our ability to understand and appreciate the resource and its historical context and setting.
Negligible	Negligible change or no material change to the site or feature. No real change in our ability to understand and appreciate the resource and its historical context and setting.
No Change	No change

352. According to the DMRB methodology, significance of effect upon the heritage resource is assessed according to the matrix approach described by the tables above. The effects may be either adverse or beneficial, depending on the nature of the impact. It should be noted that the initial assessment is made for the Project without mitigation; the residual effect as a result of mitigation is determined separately. In all cases, professional judgement will be used in conjunction with the descriptors in Table 30, to arrive at a final judgement of the significance of effect.

353. Moderate or Major effects are considered to be significant.

Table 30: Significance of effect upon heritage assets

		MAGNITUDE OF CHANGE				
		No Change	Negligible	Minor	Moderate	Major
ENVIRONMENTAL VALUE	Very High	Neutral	Minor	Moderate or Major	Major	Major
	High	Neutral	Minor	Minor or Moderate	Moderate or Major	Major
	Medium	Neutral	Negligible or Minor	Minor	Moderate	Moderate or Major
	Low	Neutral	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
	Negligible	Neutral	Negligible	Negligible or Minor	Negligible or Minor	Minor

12.5 Consultation

354. Cadw should be consulted regarding any effects on nationally significant heritage assets, including Scheduled Monuments. The Archaeological Trusts, GGAT and CPAT, should be consulted regarding any potential effects on non-designated heritage assets and Grade II Listed Buildings.

12.6 Potential mitigation

355. Adverse impacts to heritage assets arising from the construction of the Project would require archaeological mitigation. This includes potential impacts on known and previously unrecorded non-designated archaeological remains and the designated tramroad.
356. The current plans for the layout of the track would result in adverse impacts on the Scheduled Monument. If possible measures to avoid or minimise effects (preservation in situ) on the Scheduled Monument should be integrated into the design.
357. For both the Scheduled Monument and any non-designated archaeological remains, should preservation *in situ* not be possible, a programme of mitigation potentially including excavation or other forms of archaeological recording is likely to be required. Although this will allow the preservation by record of the asset this is unlikely to reduce the significance of effect due to the nature of archaeological remains.

358. Any effects on the Scheduled Monuments would require Scheduled Monument Consent from Cadw prior to any intrusive works taking place.
359. Changes to the setting of heritage assets cannot be effectively mitigated as changes to the character of their setting, including the planting of screening, can still result in adverse effects.

13 Landscape and Visual

13.1 Introduction

360. This section sets out the proposed approach and methodology to be used in undertaking a Landscape and Visual Impact Assessment (LVIA) for the Project. The report outlines the known baseline conditions and any likely significant effects that are anticipated.

13.2 Known baseline

361. The study area will be informed by the production of a map showing the Zone of Theoretical Visibility (ZTV). The ZTV will be limited to a 2km buffer from the Project boundary to capture receptors with the potential to be significantly affected.
362. The Brecon Beacons National Park lies approximately 300m from the Project at its closest point to the north of the site boundary.
363. Nant Llech SSSI is located within 150m of the Project site boundary, to the north-east on the far side of the A4221. Gorsllwyn, Onllwyn SSSI is located within 400m of the Proposed Scheme boundary to the east.
364. Built-up areas surrounding the Project site include Abercrave, Coelbren, Dyffryn Cellwen, Seven Sisters and Swansea.
365. The Ancient Woodland Inventory identifies areas of Ancient Semi Natural Woodland and Plantation on Ancient Woodland Site within the Project boundary.
366. The River Dulais is located to the south of the Project and the River Tawe to the north. A network of tributaries and ephemeral watercourses encroach into the Project boundary.
367. Special Landscape Areas (SLAs) relevant to the study area include only include Neath Port Talbot Special Landscape Area 2: Dulais Valley.
368. Several existing Footpaths and Bridleways cross the Project site and the surrounding area. The intentions for these Public Rights of Way in relation to both the restoration plans for the mining site and the development of the Project will need to be investigated further.
369. Sustrans Cycle Route 43 runs through the Project site to the north. The intentions for this route in relation to both the restoration plans for the mining site and the development of the Project will need to be investigated further.

13.3 Key issues

370. The proximity of high sensitivity visual receptors including residential receptors within built-up areas and recreational receptors using Public

Rights of Way on and around the Project site, is likely to result in significant visual impacts at both construction and operation. Further investigations into the site topography and the preparation of a ZTV will be required to confirm this.

371. It is anticipated that due to the proximity of Brecon Beacons National Park and several SSSIs, there is the potential for significant landscape impacts at both construction and operation. It is anticipated that any impact on Ancient Woodland that is located within the site boundary will likely result in significant impacts to landscape character due to the high value assigned to it within its wider context.
372. Due to the scale of the development, land modelling including the excavation, transport and placement of material has the potential to have significant impacts during the construction phase of the Project.
373. It is anticipated that there will be significant effects to both landscape character and visual receptors at operation however, the severity of these effects will need to be informed by further information about the Project such as design speed, operating hours and operational equipment that forms part of the Project.

13.4 Assessment methodology

374. The LVIA will be undertaken in accordance with the third edition of Guidelines for Landscape and Visual Impact Assessment (GLVIA3) published by the Landscape Institute in collaboration with the Institute of Environmental Management and Assessment (IEMA).
375. To inform the LVIA, understand baseline conditions and form Landscape Character Areas appropriate to the size and scale of the proposed Scheme, both LANDMAP and local authority Special Landscape Areas (SLAs) will be researched. This will ensure that effects upon sensitive landscapes without a statutory designation are captured.
376. Viewpoint photography will be prepared in accordance with the Landscape Institute's Technical Guidance Note 06/19 Visual Representation of Development Proposals.
377. Visual effects will be assessed based on winter views when there is least leaf cover and therefore minimum screening. Summer photography has been captured as part of an initial site survey however, due to project programme, it will not be possible to include summer photography for any further viewpoints that result from project design changes or consultation.
378. Assessment of day-time effects at construction and operation will be undertaken as part of the LVIA.
379. Assessment of night-time effects at construction and operation will be undertaken as part of the LVIA. This assumes that 24/7 operation of the test facility will be required and accounts for future worst-case scenario. It is currently unknown whether night time working will be required for the

construction of the Project and therefore night-time effects may also need to be assessed.

380. The LVIA will be based upon the planning drawings to be submitted with the application and will make appropriate worst-case assumptions on the nature of the Project. It will be based upon information known at the time of writing.

It is understood that the open cast mine will cease operation in 2020 and the mine site will then be restored. As the restoration will not be completed before the commencement of the assessments, obtaining data on baseline conditions of a restored site will not be possible. The landscape assessment will therefore be based on a baseline that is set at current (pre-restoration) conditions, which would represent worst case scenario. Future baseline will be considered within the LVIA based on information about the restoration plan known at the time of writing.

13.4.1 Study Area

381. The production of a Zone of Theoretical Visibility (ZTV) plan will inform the study area in conjunction with site survey work. Based on an initial site survey it is assumed that a 2km buffer from the project boundary will capture significant effects.
382. The study area for night-time effects will be developed in consultation with Brecon Beacons National Park Authority.

13.4.2 National Legislation and Policy

383. Ancient woodland has been identified within the red line boundary of the initial Project proposals. Planning Policy Wales identifies Ancient Woodland as irreplaceable and states: “In the case of a site recorded on the Ancient Woodland Inventory, authorities should consider the advice of Natural Resources Wales (NRW). Planning authorities should also have regard to the Ancient Tree Inventory.”

13.4.3 Local Planning Policy

384. The Proposed Scheme falls within the areas covered by both Powys and Neath Port Talbot Councils. For the purposes of this report, the key relevant policies within Powys Local Development Plan and Neath Port Talbot Local Development Plan have been identified.
385. Key Policies within the Powys LDP (2011-2026, adopted April 2018) are listed below:

Policy DM4 – Landscape

386. Proposals for new development outside the Towns, Large Villages, Small Villages and Rural Settlements defined in the Settlement Hierarchy must not, individually or cumulatively, have an unacceptable adverse effect, on

the valued characteristics and qualities of the Powys landscape. All proposals will need to:

- 1) Be appropriate and sensitive in terms of integration, siting, scale and design to the characteristics and qualities of the landscape including its: topography; development pattern and features; historical and ecological qualities; open views; and tranquillity; and
- 2) Have regard to LANDMAP, Registered Historic Landscapes, adjacent protected landscapes (National Parks and Areas of Outstanding Natural Beauty) and the visual amenity enjoyed by users of both Powys landscapes and adjoining areas.

387. Key Policies within the Neath Port Talbot LDP (2011-2026, adopted January 2016) are listed below:

Policy EN2 Special Landscape Areas identifies 6 Special Landscape Areas (SLA) within which, development “will only be permitted where it is demonstrated that there will be no significant adverse impacts on the features and characteristics for which the Special Landscape Area has been designated.”

Whilst the site is not located within any Special Landscape Areas, Neath Port Talbot Special Landscape Area 2: Dulais Valley is considered relevant to the proposed scheme as its boundary abuts the Powys Council boundary and it is therefore assumed that the SLA would continue were it not for the boundary. The defining features of the Dulais Valley Special Landscape Area shall be explored as part of the baseline studies.

13.5 Consultation

388. Both Powys Council and Neath Port Talbot Council shall be consulted to agree and confirm Landscape Character Areas and Visual Receptor viewpoints.
389. Brecon Beacons National Park Authority shall be consulted with regards to night-time effects of the Project during construction and operation.
390. It is advised that Natural Resources Wales and Brecon Beacons National Park Authority are also consulted with regards to the proximity of the Project to the Brecon Beacons National Park.
391. Advice should be sought from Natural Resources Wales if the chosen design option impacts upon Ancient Woodland.

13.6 Potential mitigation

392. Potential mitigation measures should include planting and earthworks to integrate the scheme into the surrounding landscape. This should be treated as an opportunity to enhance or restore defining features or the character of the landscape wherever possible and should be integrated into the design layout of the Project.

393. Where deemed appropriate, earthworks and planting should be proposed to visually screen the Project and reduce the significance of effect for visual receptors. These mitigation features require careful consideration as early as possible in the design process to ensure they integrate the Project within its landscape context as well as functioning as a visual barrier.

14 Health and Wellbeing

14.1 Introduction

394. A health and wellbeing assessment is a means of assessing the health consequences of a proposed project and to use this information to feed back into the design to maximise the positive and minimise the negative health and well-being impacts of the proposal.
395. Health assessment is multidisciplinary and cuts across the traditional boundaries of health, public health, social sciences and environmental sciences. The most commonly used definition of health assessment is taken from the World Health Organisation (WHO) Gothenburg Consensus Paper:
- '.....a combination of procedures, methods and tools by which a policy, programme or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population'.⁴⁸*
396. The broader understanding of health is captured by the WHO definition:
- 'Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'.⁴⁹*
397. Environmental, social, economic and fixed factors, which are collectively known as 'health determinants' influence health and well-being. The key determinants of health can be characterised as:
- Pre-determined factors such as age, genetic make-up and gender are fixed and strongly influence a person's health status;
 - Social and economic circumstances such as poverty, unemployment and other forms of social exclusion strongly influence health, and improving them can significantly improve health;
 - How the environment in which people live, work and play is managed - its air quality, built environment, water quality – can damage health, or provide opportunities for health improvement;
 - Lifestyle factors such as physical activity, smoking, diet, alcohol consumption and sexual behaviour, can have significant impacts on health;
 - Accessibility of services such as the National Health Service (NHS), education, social services, transport (especially public transport) and leisure facilities influence the health of the population.
398. Of these, only the pre-determined factors are unlikely to be influenced by a development proposal. The health and well-being assessment will therefore consider all relevant health determinants other than the pre-determined factors.

⁴⁸ WHO European Centre for Health Policy (1999). Health impact assessment: main concepts and suggested approach. Gothenburg consensus paper. WHO Regional Office for Europe.

⁴⁹ World Health Organisation (WHO) (2007). Constitution of the World Health Organisation, Geneva, 1946.

14.2 Known baseline

399. Health determinants which can influence health and well-being include population and demographics, housing and housing composition, employment, economic activity, skills, education, deprivation, leisure and recreation. Detailed baseline information related to the study area will be gathered for the EIA.
400. The study area for the assessment will include the adjacent wards of Aber-Craf and Tawe-Uchaf (in Powys) and Onllwyn and Seven Sisters (in Neath Port Talbot) which will be used as the study area for this assessment. Key demographic information / context for these wards includes:
- Usual resident population of approximately 6,859⁵⁰ across the wards;
 - Generally lower levels of people with higher level qualifications and a greater proportion of people with no qualifications;
 - Higher proportions of economically inactive residents, particularly in Onllwyn ward; and
 - Higher proportions of retirees (20.3%) when compared to Wales (16.1%)⁴.
401. The above data provides a snapshot of the demographic situation in and around the site at the time of the 2011 Census. Where available, further estimates or mid-year data would be included in the assessment.
402. Public Health Wales gathers health information about the population of Wales which is usually presented at Local Authority level. In terms of general risk factors to health (cardiovascular health), statistics for Powys and Neath Port Talbot include the following for the years 2016/17 – 2017/18 (age-standardised rates):

Risk factor	Neath Port Talbot	Powys	Wales
Percentage of adults who smoke	25.8	18.4	19
Percentage of working age adults of healthy weight	33.1	44.7	39.2
Percentage of adults meeting physical activity guidelines	49	65.9	53.2
Percentage of adults eating five fruit or vegetable portions a day	16.1	29.7	23.8

⁵⁰ Census 2011 data

Risk factor	Neath Port Talbot	Powys	Wales
Percentage of adults eating five fruit or vegetable portions a day	21.3	17.8	19

403. This demonstrates an interesting difference between NPT and Powys, with Powys performing better than NPT and the Wales average in all risk factors.

14.3 Assessment methodology

Policy review

404. National, regional and local policies, plans and strategies relevant to health, including National Institute for Health and Care Excellence (NICE)⁵¹ public health guidance will be reviewed to provide a rationale for the health and well-being assessment. This will also be framed within the context of the Well-being of Future Generations Act, 2016. The policy review for the assessment will include local policies relevant to health such as:

- Health and wellbeing strategies; and
- Sustainable community strategies.

405. The aim will be to identify the local health policy and review how the Project may impact on local policies, both positively and negatively.

Geographical scope

406. The geographical scope of the assessment will vary between different health determinants being assessed, however generally data will be assessed from the ward level and from the wider local authority areas. This is consistent with the socioeconomic assessment study area.
407. The study area includes the wards within Powys of Aber-Craf (W39000787) and Tawe-Uchaf (W393000850) and the wards within Neath Port Talbot of Onllwyn (W39000497) and Seven Sisters (W39000505). Much of the Project site sits within Powys.

Baseline data gathering

408. Baseline data will be collated from a range of sources to provide an overview of the existing population, existing health profile, socioeconomic conditions in the local community and the physical environment in the Project area.
409. This gathering of baseline data will be coordinated with other workstreams within the EIA such as socioeconomic assessment and the air and noise assessments.

⁵¹ <https://www.nice.org.uk/guidance/published?type=ph>

410. The data reviewed will include, but is not limited to:

- Public Health Wales publications such as Welsh Health Survey lifestyle Trends (2015) and Health Maps Wales;
- Health Board Maps, Demography (2016);
- Office for National Statistics, Census 2011 data

Identification of health determinants

411. As discussed above, health determinants are factors that can influence the health of a community. Guidance produced by the Welsh Health Impact Assessment Support Unit (WHIASU) includes a list of potential health determinants that should be considered. These have been reviewed and based on the characteristics of the Project and the existing known baseline it is proposed that the following determinants are covered within the ES:

Health determinant	Related Issues
Lifestyle/social and community determinants	
Social capital cohesion	Mental health and wellbeing Sense of place and views
Community safety	Crime Safety
Healthcare services and other community facilities	Equitable access Facilities that promote health and wellbeing
Transport and connectivity	Provision for active travel Equitable access
Open space and nature	Opportunities for exercise Equitable access
Environmental determinants	
Air quality	Changes in local environmental conditions
Noise environment	
Visual amenity	
Climate change	Changes in temperatures Changes in rainfall Changes in seasonal averages
Economic determinants	
Employment and Economy	Access to work, training and education

Local community to be considered

412. The health and well-being assessment will consider health and well-being status and current health problems of all people within the local community. However, vulnerable and/or disadvantaged groups can often experience health impacts more acutely than other groups within communities.

413. Vulnerable and/or disadvantaged groups within the local community will be identified following a more detailed review of local population statistics.

These groups include people who may be particularly sensitive to changes that can affect their health and include for example, older people, children and young people, those who suffer from chronic conditions, or those who are geographically isolated. WHIASU guidance includes a list of potential vulnerable and disadvantage groups. These are listed in Table 31 along with an indication of whether they would likely experience differential or disproportionate effects from the Project.

414. These terms are defined as:

- **Disproportionate effect:** there may be a disproportionate effect where a vulnerable or disadvantaged group of people make up a greater proportion of those affected than in the wider population within the study area.
- **Differential effect:** there may be a differential effect where a vulnerable or disadvantaged group of people are affected differently to the general population as a result of vulnerabilities or restrictions they face.

Table 31 Vulnerable and disadvantaged groups and their relevance to the assessment

Vulnerable and disadvantaged groups	Relevance to assessment (high/medium/ low)	Justification
Age related groups:		
Children and young people	High	The local communities include children and young people which need to be considered.
Older people	High	Older people within the local communities are likely to have experienced a great deal of change
Income related groups:		
People on low income	High	There are a higher proportion of people within the study area on low incomes
Economically inactive	Medium	The study area has a lower proportion of people that are economic inactive than the Welsh average.
Unemployed/ workless	High	Employment generated by the Project could potentially benefit the existing unemployed who are seeking employment.

Vulnerable and disadvantaged groups	Relevance to assessment (high/medium/ low)	Justification
People who are unable to work due to ill health.	High	Any adverse project impacts could exacerbate existing health conditions and would therefore have a differential and disproportionate effect on this group.
Groups who suffer discrimination or other social disadvantage:		
People with physical or learning disabilities /difficulties	Low	The Project is unlikely to have differential or disproportionate effects on this group of people than the rest of the population.
Refugee groups	Low	The communities around the Project site are unlikely to include refugee families (or in very low numbers)
People seeking asylum	Low	The communities around the Project site are unlikely to include asylum seekers (or in very low numbers)
Travellers	Low	The study area is not known to contain traveller sites (to be confirmed).
Single parent families	Low	Whilst there are likely a proportion of single parent families within the study area, the Project is unlikely to have differential or disproportionate effects on this group of people than the rest of the population.
Lesbian and gay and transgender people	Low	The Project is unlikely to have differential or disproportionate effects on this group of people than the rest of the population.
Black and minority ethnic groups	Low	The Project is unlikely to have differential or disproportionate effects on this group of people than the rest of the population.
Religious groups.	Low	The Project is unlikely to have differential or disproportionate effects on this group of people than the rest of the population.

Vulnerable and disadvantaged groups	Relevance to assessment (high/medium/ low)	Justification
Geographical groups:		
People living in areas known to exhibit poor economic and/or health indicators	Medium	The study area has a slightly higher self-reported level of bad or very bad health than the average across Wales (10% compared to 8%).
People living in isolated/over-populated areas	High	The communities within the study area are isolated, rural communities.
People unable to access services and facilities.	High	The communities within the study area are isolated, rural communities which may be require travel to access services and facilities.

Linking health determinants to health impacts

415. Using available literature, including previous health studies and recent research, an evidence base will be collated to identify links between the selected determinants and health impacts.
416. Impacts may be direct or indirect and links may be causal or compounding. Key reference material is likely to include:
- Government health policies, programmes and strategies;
 - Previous health assessments for masterplans;
 - Public health reports and research papers from a range of sources, including:
 - Public Health Wales;
 - WHO;
 - National Institute for Health and Care Excellence (NICE);
 - Health Development Agency (HDA).

Significance criteria

417. There is no established or widely accepted framework for assessing the 'significant' health effects of a development proposal. The health significance of an environmental impact is typically a function of the 'magnitude' and 'duration' of the change to health determinants, the extent

of the population exposed to this change and the sensitivity of the people (receptors or population) who will experience the effect.

418. Based on the literature review links will be made between the identified impacts on the selected determinants and potential health effects/outcomes. Assessment is made as to whether the effect on health determinants is direct or indirect; positive or negative; and permanent or temporary. This approach permits the assessment to provide a relative scale of effects in order to give a sense of the importance of the potential health effects.
419. Health inequalities and the potential for disproportionate impacts on certain vulnerable groups will be taken into account in the assessment.
420. The criteria that have been used in order to define significance of effects are set out in Table 32.

Table 32: Impact Significance Matrix

Significance level	Criteria
Major +++/- -- (positive or negative)	Health effects are categorised as a major positive if they prevent deaths/prolong lives, reduce/prevent the occurrence of acute or chronic diseases or significantly enhance mental wellbeing would be a major positive. Health effects are categorised as a major negative if they could lead directly to deaths, acute or chronic diseases or mental ill health. The exposures tend to be of high intensity and/or long duration and/or over a wide geographical area and/or likely to affect a large number of people (e.g. over 500) and/or sensitive groups e.g. children/older people. They can affect either or both physical and mental health and either directly or through the wider determinants of health and wellbeing. They can be temporary or permanent in nature. These effects can be important local, district, regional and national considerations. Mitigation measures and detailed design work can reduce the level of negative effect though residual effects are likely to remain.
Moderate ++/-- (positive or negative)	Health effects are categorised as a moderate positive if they enhance mental wellbeing significantly and/or reduce exacerbations to existing illness and reduce the occurrence of acute or chronic diseases. Health effects are categorised as a moderate negative if the effects are long-term nuisance impacts, such smell and noise, or may lead to

	exacerbations of existing illness. The negative impacts may be nuisance/quality of life impacts which may affect physical and mental health either directly or through the wider determinants of health. The exposures tend to be of moderate intensity and/or over a relatively localised area and/or of intermittent duration and/or likely to affect a moderate-large number of people e.g. between 100-500 or so and/or sensitive groups. The cumulative effect of a set of moderate effects can lead to a major effect. These effects can be important local, district and regional considerations. Mitigation measures and detailed design work can reduce and in some/many cases remove the negative and enhance the positive effects though residual effects are likely to remain.
Minor/Mild +/- (positive or negative)	Health effects are categorised as minor/mild either, positive or negative, if they are generally lower level quality of life or wellbeing impacts. Increases or reductions in noise, odour, visual amenity, etc. are examples of such effects. The exposures tend to be of low intensity and/or short/intermittent duration and/or over a small area and/or affect a small number of people e.g. less than 100 or so. They can be permanent or temporary in nature. These effects can be important local considerations. Mitigation measures and detailed design work can reduce the negative and enhance the positive effects such that there are only some residual effects remaining.
Neutral/No Effect ~	No health effect or effects within the bounds of normal/accepted variation.

14.4 Consultation

421. Consultation will be undertaken with Neath Port Talbot and Powys public health officers in order to understand the range of potential effects of the

Project, and to inform the assessment. Where appropriate, consultation will be undertaken by telephone or by email.

14.5 Potential mitigation

- 422. Where impacts are identified in the health and well-being assessment, recommendations will be proposed to reduce any negative impacts and maximise any positive impacts on health outcomes from the Project.
- 423. Recommendations will be fed into the design process through on-going discussions and meetings with the design team to ensure that issues related to health influence the final design. Commentary will be provided on how the design of the scheme has responded to any recommendations arising out of the health assessment.
- 424. Where mitigation has been identified through other EIA topic assessments (e.g. air and noise) that will serve to improve health outcomes, this mitigation will be cross-referenced within the health assessment.

15 Climate change

15.1 Introduction

425. The climate change assessment will look at the impact of the Project on climate and the vulnerability of the Project to climate change, as per the requirements of EU Directive 2014/52 and the 2017 EIA Regulations.
426. This section of the Scoping Report sets out the scope of the climate change assessment which consists of two parts:
- effects on climate – this considers the impacts of greenhouse gas (GHG) emissions from the Project; and
 - vulnerability of the Project to climate change – this considers the resilience of the Project in the context of projected future changes in climate variables.
427. The combined effects of the Project and potential changes in climate variables on the receiving environment during construction and operation are considered for each topic in the relevant chapters of the ES.

15.2 Known baseline

Effects on climate

428. GHG emissions associated with the Project will be compared to a counterfactual baseline scenario in which no development is undertaken.
429. There are currently no existing site uses that are significant sources of GHG emissions. There is currently vegetation on site which is a GHG emissions sink.

Vulnerability of the scheme to climate change

430. The baseline environment for Climate Change Resilience (CCR) assessments will include consideration of the following;
- Current climate conditions – established for a range of relevant climate variables, based on the long-term average of historical weather data for 1961-1990. This data will be used as a comparator for projected future climate conditions.
 - Future climate conditions – predicated on projections of a range of future emissions scenarios and probability ranges.
431. The description of future climate conditions will be based upon climate change projection data from the United Kingdom Climate Projections 2018 (UKCP18). UKCP18 data is the most comprehensive and widely used data set covering the UK and are available for the full range of future emission scenarios and time period up to the 2099.

432. Overall, the trends for South Wales are expected to include;

- **High temperatures** - Increase in mean daily temperatures in the summer and winter, increase in the number of hot days (days when daily mean temperature is >25°C) and increased insolation;
- **Low temperatures** – Decrease in the number of frost days (days when daily minimum temperature <0°C);
- **High precipitation** – Increase in mean daily rainfall in the winter, increase in the number of days with heavy rain;
- **Low precipitation** – Decrease in mean daily rainfall in the summer, increase in the annual number of dry spells; and
- **Extreme weather** – Increase in extreme wind events⁵². Increase in the number of lightning days, particularly in Autumn⁵³.

15.3 Key issues

Effects on climate

433. Anthropogenic GHG emissions arising from the burning of fossil fuels and changing land uses are key contributors to climate change. The UK and Wales have adopted legally binding GHG reduction targets through the Climate Change Act (2008) and the Environment (Wales) Act (2016). Both Wales and the UK have recently signalled intentions to regulate a target of net zero GHG emissions by 2050.
434. The effects on climate will be assessed through a GHG assessment, which will identify the principal emissions sources arising from the construction, operation and maintenance of the Project. The construction process contributes to GHG emissions through the extraction, production and delivery of materials and on-site energy consumption. During the operation phase of the Project, use-related emissions will contribute significantly to whole life emissions of the project. Key impact areas will likely include provision of heating and cooling in buildings included within the development and operation of rolling stock being tested in the facility.
435. A key driver of this project is to support innovation rail technology which will contribute to decarbonisation of the rail and transport sectors. The assessment will include commentary on how the development will contribute to GHG emissions reductions across the rail sector in future periods.

⁵² IPCC (2014) Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, https://ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap23_FINAL.pdf [Accessed June 2018] page 1279

⁵³ UK Climate Projections (2010) Future changes in lightning from the UKCP09 ensemble of regional climate model projections, <http://ukclimateprojections.metoffice.gov.uk/media.jsp?mediaid=87950&filetype=pdf> [Accessed June 2018]

Vulnerability of the scheme to climate change

436. A climate change resilience (CCR) assessment will be undertaken to assess the vulnerability of the scheme to climate change. Key issues related to adaptation to climate change include flooding risks due to changes in the amount, frequency and timing of precipitation, as well as sea level rise and storm surges. Increases in average temperatures and frequency of extreme temperature and other weather events also have the potential to impact the Project and other environmental receptors. These will need to be taken into consideration during the design stages; both for general layout and detailed design.
437. Issues related to climate predominantly concern the operational phase and how buildings and infrastructure have been designed and developed to integrate climate change resilience. Flood risk be assessed within the water resources assessment of the EIA and will therefore be cross-referenced rather than duplicated in this chapter.
438. The impacts of climate change are already being experienced, particularly in terms of increased frequency and severity of extreme weather events such as storms and heatwaves. The measures set out in the Construction Environmental Management Plan should be set within the context of the current climate. Due to the short temporal phase of construction, it is anticipated that these measures will appropriately address climate change risks during the construction phase. The construction phase has therefore been scoped out of the CCR assessment.

15.4 Assessment methodology

Effects on climate

439. GHG emissions will be quantified using the principal steps outlined in PAS2080:2016 Carbon management in infrastructure. As shown in Figure 9, below.



Figure 9 Principal steps of GHG emissions quantification⁵⁴

440. In order to adequately capture direct and indirect emissions associated with the Project, a lifecycle approach will be adopted. Lifecycle phases are outlined in Figure 10, below. The GHG emissions assessment scope will include before use stages (A) and the use stage (B). In order to maintain consistency with other chapters in the EIA the before use stages will be referred to as the construction phase, with use stages being referred to as the operational phase.

⁵⁴ Construction Leadership Council & the Green Construction Board (2016) PAS 2080:2016 Carbon management in infrastructure. BSI Limited, London, UK. <https://shop.bsigroup.com/forms/PASs/PAS-2080/> [Accessed June 2018]

WHOLE LIFE CARBON ASSESSMENT INFORMATION														
PROJECT LIFE CYCLE INFORMATION										SUPPLEMENTARY INFORMATION BEYOND THE PROJECT LIFE CYCLE				
[A1 – A3]			[A4 – A5]		[B1 – B7]					[C1 – C4]			[D]	
PRODUCT stage			CONSTRUCTION PROCESS stage		USE stage					END OF LIFE stage			Benefits and loads beyond the system boundary	
[A1]	[A2]	[A3]	[A4]	[A5]	[B1]	[B2]	[B3]	[B4]	[B5]	[C1]	[C2]	[C3]	[C4]	
Raw material extraction & supply	Transport to manufacturing plant	Manufacturing & fabrication	Transport to project site	Construction & installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Deconstruction Demolition	Transport to disposal facility	Waste processing for reuse, recovery or recycling	Disposal	Reuse Recovery Recycling potential
					[B6] Operational energy use									
					[B7] Operational water use									

Table 33 Sources of emissions included in GHG assessment scope

Emissions source	Activities included in emissions estimate	Activities excluded from emissions estimate
Stage A – Construction		
Buildings and other assets	Embodied emissions from manufacture and construction activities – based on RICS (2014) benchmarks	Emissions from the planning and design project phases
Public realm	Embodied emissions from manufacture and construction – based on Green Guide for Specification (2008) benchmarks Land use change (removal of vegetation) – based on estimates of stored carbon in soil and vegetation in the UK ⁵⁶	
Transport	Workforce transport to site – based on workforce estimates in socio-economic assessment Transport of building materials to site – estimated based on RICS (2014) benchmarks	
Stage B – Operation		
Buildings	Emissions associated with electricity and natural gas consumption in buildings – based on CIBSE benchmarks Embodied emissions from maintenance and repair – estimated based on RICS (2014) data	Emissions associated with water consumption during operation Emissions associated with treatment of waste and wastewater generated during operation
Public realm	Emissions associated with electricity consumption from public realm lighting – based on CIBSE benchmarks Embodied emissions from maintenance and repair – included in Green Guide for Specification (2008) benchmarks	
Rolling stock testing	Emissions from fuel and electricity consumption by	

⁵⁶ Ostle, Nicholas & Levy, Peter & D. Evans, C & Smith, P. (2009). UK land use and soil carbon sequestration. Land Use Policy 26:S274-S283. Land Use Policy. 26. 10.1016/j.landusepol.2009.08.006.

Emissions source	Activities included in emissions estimate	Activities excluded from emissions estimate
	rolling stock on the test site – estimated using Environmental Product Declarations (EPDs) ⁵⁷	
Transport	Vehicles in the local area of the site affected by the Project, as per the Transport Assessment	
Stage C – End of life		
Buildings	Emissions from end of life disposal – estimated based on RICS (2014) benchmarks	
Public realm	Emissions from end of life disposal – included in Green Guide for Specification (2008) benchmarks	

444. The IEMA guide to assessing greenhouse gas (GHG) emissions and evaluating their significance⁵⁸ publishes the over-arching principle:

“The GHG emissions from all projects will contribute to climate change; the largest inter-related cumulative environmental effects...as such any GHG emissions or reductions from a project might be considered to be significant...”

445. In accordance with this guidance, any carbon emissions associated with the proposed development can be deemed significant. Accordingly, initiatives to mitigate emissions will be integrated into design, as discussed in Section 15.6 on potential mitigation, below.

Vulnerability of the Project to climate change

446. The approach and methodology for the climate change resilience assessment is as follows:

- analysis of relevant climate change and weather data, emissions scenarios and probability levels;
- assessment of climate hazards;
- identification of potential risks from these climate hazards to the assets and occupants of the Project;
- consideration of the resilience of the Project within the context of any incorporated mitigation measures, including resilience measures

⁵⁷ EPDs are unlikely to be available for particular rail vehicles being tested, however information for similar vehicles will be used as a proxy. Impacts for rail vehicles are typically reported on a per passenger kilometre basis, these values will be converted for the purposes of this assessment.

⁵⁸ IEMA (2017) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance

which are embedded within the design due to regulations and design guidelines; and

- identification of need for any further resilience measures to protect the Project against the effects of climate change.

447. The significance of the risks identified in the CCR assessment is based on the likelihood of a hazard having an impact on the Project, and the consequence of the impact. The potential likelihood and consequence of impacts to the Project will be assessed using a qualitative scale.

15.5 Consultation

448. Regular liaison with the design team for the Project will be necessary to acquire data and to develop mitigation solutions for minimisation of GHG emissions.

449. For the CCR assessment, engagement with the water resource specialist will be undertaken to understand specific risks and mitigation measures associated with flooding. Consultation with other EIA topic leads will be undertaken to ensure that climate change is integrated into the baseline of all topic assessments.

15.6 Potential mitigation

Effects on climate

450. PAS 2080 outlines the GHG emissions reduction hierarchy shown in Figure 11 below. This will be adopted when identifying opportunities to reduce emissions across the project lifecycle.

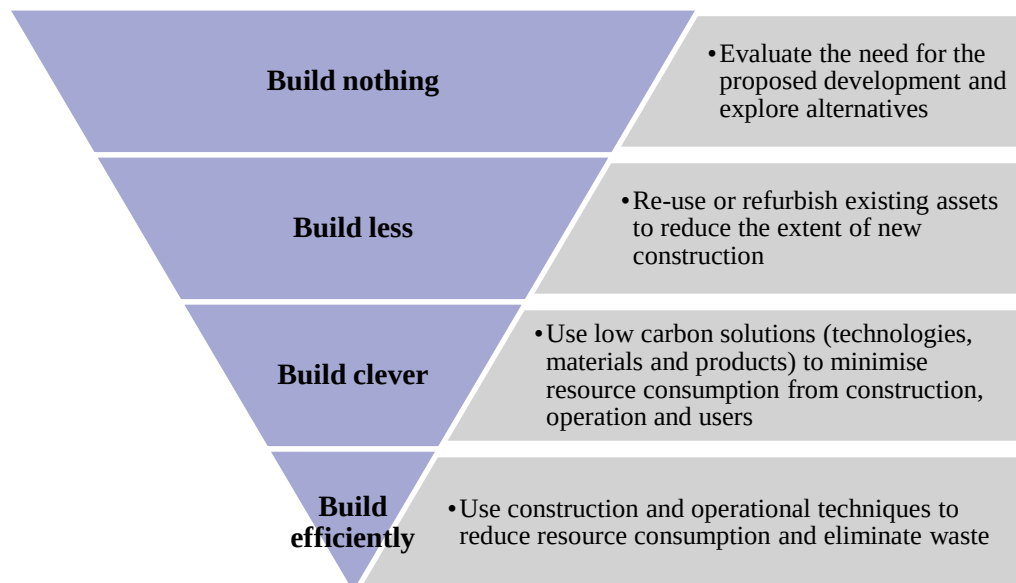


Figure 11 Carbon emissions reduction hierarchy⁵⁹

451. The GHG emissions assessment will be used to identify emissions ‘hot-spots’ relating to the Project and to develop opportunities for mitigation.
452. As there are no existing assets on the site, it is expected that mitigation activities will be focused on the ‘build clever’ and ‘build efficiently’ tiers of the emissions reduction hierarchy.
453. Measures proposed to mitigate the impact of GHG emissions from the construction of the Project may include:
- Reduce the quantity of materials required through efficient design;
 - Implement the principles of ‘designing out waste’ to reduce the embodied emissions associated with the manufacture of materials that are subsequently wasted;
 - Select alternative materials with lower emissions intensities e.g. recycled materials, cement substitutes; and
 - Select local material suppliers to reduce the transport distances and associated emissions from freight.
454. Measures proposed to mitigate the impact of GHG emissions from the operation of the Project may include:
- Take a ‘fabric first’ approach to building design in order to improve the thermal efficiency of buildings and reduce heating and cooling energy requirements during operation;
 - Select energy efficient infrastructure, equipment and fittings in order to reduce energy demand during operation;

⁵⁹ Construction Leadership Council & the Green Construction Board (2016) PAS 2080:2016 Carbon management in infrastructure. BSI Limited, London, UK. <https://shop.bsigroup.com/forms/PASs/PAS-2080/> [Accessed June 2018]

- Install renewable energy generation and connect to low carbon energy sources (e.g. heat networks) where possible, in order to reduce the emissions intensity of the energy consumed;
- Select durable materials with low requirements for maintenance and replacement over the operational life of the development, with consideration of appropriate selection of materials based on the design life of the asset; and
- Develop strategies to encourage the use of low carbon transport modes, including active and public transport, to reduce emissions from transport.

455. The earlier in the design process that mitigation of GHG emission is considered, the greater the opportunity for realising reductions during the delivery and operation of the Project. Therefore, the initial assessment provides an opportunity to maximise GHG emissions reductions.

Vulnerability of the Project to climate change

456. Measures to improve the resilience of the development to future climate change impacts should be integrated into the design. These will be explored during the assessment stage.
457. However, due to the uncertainties involved in adapting to future climate change, a pathways approach is recommended for monitoring and managing climate risks into the future. This involves maintaining a degree of flexibility in addressing climate change risks by implementing a long-term decision-making strategy for investing in climate adaptation measures based on environmental or social trigger points⁶⁰.

⁶⁰ CoastAdapt (2017) What is a pathways approach to adaptation? Accessed June 2018 at <https://coastadapt.com.au/pathways-approach>

16 Major Accidents and Disasters

16.1 Introduction

458. The EIA Regulations 2017, in accordance with European Directive 2014/52/EU, has introduced the requirement for EIA (under Part 1 Regulation 5(3)b) to assess the ‘expected effects deriving from the vulnerability of the proposed development to risks of major accidents or disasters that are relevant to the proposed development’.
459. The term major accidents and disasters refers to events both internal and external to a Proposed Development that have the potential to cause significant harm to the environment.
460. The study area is taken as the site of the Project.

16.2 Baseline conditions

461. The Project site has been extensively worked as an open cast coal mine and therefore consists of restored land, overburden mounds, coal stocking areas, barrel wash and plant maintenance areas, site office facilities and a void which is currently being mined.
462. The historic and current mining operation are likely to have created pollution pathways for potential contaminants affecting the ground conditions and the water environment. Ground investigations will be undertaken to determine the current ground conditions and the character of the water environment. This will be documented in the Water chapter and Ground Conditions chapter of the ES.

16.3 Potential effects

463. The design, construction and operation of the Proposed Development must comply with legal requirements, codes and standards, including but not limited to the following:
- Health and Safety at Work Act, 1974⁶¹;
 - The Management of Health and Safety at Work Regulations (1999)⁶²;
 - CDM 2015 Regulations; and
 - The Workplace (Health, Safety and Welfare) Regulations 1992⁶³.
464. This helps to control any health and safety risks that could arise from the Proposed Development at acceptable levels.

⁶¹ Health and Safety at Work Act 1974. Available at: <https://www.legislation.gov.uk/ukpga/1974/37>

⁶² The Management of Health and Safety at Work Regulations (1999). Available at: <http://www.legislation.gov.uk/uksi/1999/3242/contents/made>

⁶³ The Workplace (Health, Safety and Welfare) Regulations (1992). Available at: <http://www.legislation.gov.uk/uksi/1992/3004/contents/made>

465. Whilst the legislation is not explicit, the language of the revised EIA regulations is aimed towards hazardous industries or operations (those with a 'high vulnerability' to major accidents).
466. Due to the nature of the Project as a high speed rail test facility, it is considered that it has the potential to be a source of a major accident which could cause damage to an environmental receptor. The potential effects associated with the Project and relating to major accidents and disasters cover both the construction and operational phase. These include:
- The potential for the Project to increase the risk of a major accident or disaster, as the result of a pollution event and/or pollution pathways with the restored open cast coal mine;
 - The potential for a major collision on the local highway network during the construction of the Project;
 - The potential for a major accident or disaster associated with ground stability and land slip during construction and operation; and
 - The potential for train derailment during operation.
467. The risk of cyber-attacks and terrorism incidents is expected to be assessed and managed through appropriate operational management plans and through consultation with relevant security experts within the Police Service of Wales. Therefore, the assessment of security will not form part of the scope of the EIA.
468. The potential for land slip, collisions on the highway, train derailment and associated safety are considered to be low likelihood events and will be key components considered throughout the scheme design. The assessment will identify relevant events and determine whether a significant environmental effect is possible. The potential for pollution risks will be assessed in the Water chapter and the assessment of ground conditions will be documented in the Geology and Soils chapter.

16.4 Assessment methodology

16.4.1 Study Area

469. In the absence of a recognised methodology (see below), the study area will include a 2km buffer from the site boundary. This study area is based on a spatial zone of influence of the Project on other projects which may be considered as vulnerable to major accidents and natural disasters.

16.4.2 Methodology

470. The assessment will be undertaken in two stages:
471. **Stage 1 – Risk Identification Screening:** During Stage 1 we will seek to identify a list of potential major accidents and disasters relevant to the study area. We will then refine the list based on the location and use of the

development and whether there is a likely connection between the Project and the potential hazard source. This is the first step in the source-pathway-receptor approach.

472. In determining whether potential adverse effects are ‘significant’, we will consider the following:
- The geographic extent of the effects. Effects beyond the boundary of the Project are more likely to be considered significant;
 - The duration of the effects. Effects which are permanent (i.e. Irreversible) or long lasting are more likely to be considered significant;
 - The severity of the effects in terms of number, degree of harm to those affected and the response effort required. Effects which trigger the mobilisation of substantial civil emergency response effort are more likely to be considered significant;
 - The sensitivity of the identified receptors; and
 - The effort required to restore the affected environment. Effects requiring substantial clean-up or restoration efforts are more likely to be considered significant.
473. Where there is considered to be no credible pathway to the receptor or where the risk is considered to be of low likelihood and low consequence, it will be screened out of the assessment.
474. High likelihood, high consequence risks will also be screened out as these should be addressed elsewhere and are usually of a scale and nature which are implicitly outside the scope of the Project to address.
475. **Stage 2 – Assessment:** We will then consider the likelihood of the worst case environmental effect occurring for each risk event. At this stage we will take into consideration any mitigation measures which are embedded within the Project and identify the likely environmental impacts on receptors. Where the embedded mitigation does not reduce the potential impact to a level which is considered to be as low as reasonably practicable, then additional mitigation will be considered, and the residual impact/risk identified.

16.5 Consultation

476. The National Risk Register of Civil Emergencies outlines health, safety and security risks in the UK, which, if realised, could cause major accidents and disasters. Consultation with NRRCE will be undertaken during the EIA.
477. The Health and Safety Executive will also be consulted with during the EIA.

16.6 Potential mitigation

478. It is anticipated that mitigation measures for risks associated with potential major accidents and disasters will be embedded within the Proposed

Scheme's design and included within the Construction (Design and Management) Register as the design of the Proposed Scheme is progressed.

17 Cumulative Effects

17.1 Introduction

479. Cumulative effects considered within this assessment are those that arise as a result of additive impacts from more than one project (under construction or reasonably foreseeable projects), combining together to have an effect on a receptor that may be larger than if the effect were considered separately. Broadly, reasonably foreseeable projects are those that are known to the planning system or are already consented (but not yet built).
480. The ES will include an assessment of cumulative effects arising from the Project in combination with confirmed and other reasonably foreseeable projects in the local area.

17.2 Assessment methodology

17.2.1 Relevant guidance

481. There is currently no standard methodology for cumulative effects assessment (CEA) although there is a range of guidance available. The following guidance has been taken into consideration during the preparation of this CEA:
- Advice Note 17: Cumulative effects assessment relevant to nationally significant infrastructure projects (Planning Inspectorate, 2015).
 - Advice Note Nine: Rochdale Envelope (Planning Inspectorate, 2012).
482. Whilst GCRE is not classified as a nationally significant infrastructure scheme the Planning Inspectorate guidance is the most relevant guidance available.
483. Planning Inspectorate Advice Note 17 (Planning Inspectorate, 2015) provides a systematic approach to cumulative effects assessment which can be split into four distinct phases explained in Table 34. The guidance notes that the recommended process focusses on cumulative effects with ‘other developments’. It should not be confused with the assessment of interrelationships between topics, which are assessed within the individual specialist topic chapters.

Table 34 Stages of Cumulative Effects Assessment

CEA Stage	Key Activities
Stage 1: Establish the Zone of Influence (ZOI) and identify long list of ‘other developments’	Identify the ZOI for each of the environmental topics covered by the EIS; Identify a long list of other developments in the vicinity of the Project which may have cumulative effects;

	Undertake desktop review of available environmental information for identified cumulative developments
Stage 2: Identify short list of ‘other developments’.	Identify which of the identified other developments from Stage 1 has the potential to give rise to significant cumulative effects by virtue of overlaps in temporal scope, due to the scale and nature of the ‘other development’/receiving environment; or any other relevant factors.
Stage 3: Information gathering	Information related to the shortlisted cumulative developments is gathered and reviewed
Stage 4: Assessment	CEA of shortlisted cumulative development is undertaken. Each individual ‘other development’ is reviewed in turn to identify whether there is potential for significant cumulative effects; Mitigation measures are identified.

17.2.2 Zone of Influence

484. The Zone of Influence (ZOI) refers to the spatial area over which an effect from a project is likely to be experienced. The ZOI for the Project varies for each environmental topic and these are set out in Table 35 below along with the identification of what type of impact is likely. The ZOI generally mirrors the study area defined within each of the topic sections.

Table 35: Zone of Influence, potential impacts and receptors for ES environmental topics

Environmental topic	Zone of Influence for assessments	Potential impact (construction and operation)	Receptor/ resource
Air quality*	Within 200m of site boundary	Reduction in air quality from: - dust emissions during construction; - exhaust emissions from vehicles during construction and operation; - emissions from plant	People living and working within the study area distance (i.e. 200m)
Noise	Within 600m of construction works	The increase in noise from construction and/or operation.	Residential and commercial facilities within the assessment area.
Traffic	Local highways network (as defined in the Section 5.2)	Increased traffic and congestion	Road users, pedestrians
Biodiversity	Footprint of construction works and immediately adjoining land	Disturbance, fragmentation, loss, wildlife casualties, creation of barriers to movement, lighting	Protected species, habitats, ecologically designated sites
Ground conditions	Within 300m of site boundary	Groundwater, human health	Groundwater quality and flow, human health of people living and working

Environmental topic	Zone of Influence for assessments	Potential impact (construction and operation)	Receptor/ resource
			within the study area distance
Water Resources	500m	Generation of silt and oil laden runoff which may contaminate water resources. Changes to flood risk as a result of the construction activities and existence of Project.	Surface water, groundwater, structures, assets and people within any flood risk zones.
Heritage	Redline boundary and a study area of up to 250m surrounding the site	Change in setting of cultural heritage Loss of heritage assets	Setting of heritage resource Visitors to/users of the heritage asset
Socio-economics	Onllwyn, Seven Sisters, Abercrave	Potential benefit of construction spend, displacement of construction workers, demands on accommodation and other businesses and amenity effects.	People Employers / employees Businesses
Landscape and Visual Impact	2km core study area in LVIA.	Change to the character of landscape and to visual amenity.	Landscape Character areas (LCAs) including designated features. People's views.

*only related to construction dust

17.2.3 Establishing the long list of 'other developments'

485. The Planning Inspectorate guidance recommends that a wide range of future projects is included within the CEA which can be tiered (from Tier 1 – 3) according to how far advanced the development is within the planning system and to the level of detail that is likely to be available for each tier. These are set out in Table 36.

Table 36 Project tiering for the purpose of CEA

Tier 1	- Projects under construction; - Permitted application(s) but not yet implemented; - Submitted application(s) but not yet determined;	Decreasing level of detail likely to be available. 
Tier 2	Projects on CC Programme of Projects where a scoping report has been submitted;	
Tier 3	Projects on CC Programme of Projects where a scoping report has not been submitted;	

	- identified in the CC Local Development Plan (LDP) recognising that much information on any relevant proposals may be limited; and - identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.	
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486. The less information that is available for the future projects (i.e. environmental impacts predicted, project definition), the less likely that the CEA will be able to make any robust assessment in relation to these projects.

487. Whilst projects that are Tier 2 and Tier 3, as defined by the Planning Inspectorate guidance will be referenced within the CEA assessment, it is considered that there is limited value in including schemes for which there is no environmental assessment information available as it will not be possible to assess environmental effects.

17.2.4 Assessment criteria

488. The CEA does not aim to assign significance levels to any of the cumulative effects identified. Rather, a judgement will be made on whether the cumulative effects are likely to be more or less significant than the effects identified for the Project alone.

17.2.5 Topics scoped out of the CEA

489. The following topics have been scoped out of the CEA:

- Traffic - For future baseline likely future developments are included within the traffic model and are therefore already considered within the transport assessment. Effects related to traffic are therefore not considered further within the CEA;
- Air quality - operational effects are based on traffic data, which includes from known future developments. Therefore, any cumulative operational effects are inherent within the results outlined in the air quality and noise chapters of this report. No further cumulative effects would be anticipated, therefore operational air quality effects will not be considered further. Cumulative effects related to construction are considered as these are not inherent within the topic chapter assessment;
- Noise – as above for air quality.

17.2.6 Limitations and assumptions

490. Assessment of cumulative effects is limited by the level of information that is available for each of the topic assessments. When consideration is given

to effects that may arise as a result of impacts from other developments, the assessment becomes limited by the amount of information that is made publically available.

17.2.7 Consultation

491. The initial long list of projects that will be considered within the CEA will be obtained through consultation with NPTCBC and PCC.
492. Environmental information relating to each of the developments identified by will be obtained from publicly available information.