

14 Air Quality

14.1 Introduction

- 14.1.1 This chapter describes the likely significant effects of the proposed development on air quality. It outlines the methodology of assessment, the baseline conditions and the likely significant air quality effects associated with the construction and operation of the proposed development. Mitigation measures which would be implemented to minimise the effect of the proposed development on air quality are also described, where relevant.

14.2 Review of proposed development

- 14.2.1 The development proposals for GCRE are described in detail in Chapter 3 of the ES. In relation to air quality the proposed development is likely to generate changes to the amount of traffic which has the potential for causing an adverse air quality impact due to the emissions from construction dust, construction and operational traffic.
- 14.2.2 The proposed development involves the testing of new rail locomotives and rail infrastructure. In the short to medium term, both activities would include the use of diesel locomotives introducing a new source of air pollutant emissions into the locality. Pollutants relevant to the assessment include particulate matter (PM₁₀ and PM_{2.5}) and nitrogen dioxide (NO₂).

14.3 Legislation, policy context and guidance

14.3.1 The key national, regional and local legislation and policy, as well as technical guidance have been considered in relation to this assessment.

Legislation

National objectives

14.3.2 The current Air Quality Strategy for England, Scotland, Wales and Northern Ireland¹ was published in 2007. This set the strategy for meeting the air quality objectives. The Local Air Quality Management (LAQM) system, required to be undertaken by local planning authorities under the Environment Act 1995, assesses where the UK objectives may be exceeded. Where exceedances are recorded an Air Quality Management Area (AQMA) must be declared by the local authority and an Air Quality Action Plan (AQAP) prepared to implement measures to improve air quality in these areas.

Air Quality Standards and Limit Values

14.3.3 Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment, i.e. effects occur after a prolonged period of exposure to elevated concentrations. Other pollutants have standards expressed as 24-hour, 1-hour or 15-minute average concentrations due to the acute way in which they affect health or the natural environment, i.e. after a relatively short period of exposure. Some pollutants have standards expressed in terms of both long and short-term concentrations.

14.3.4 The air quality Limit Values (LV) and Welsh air quality standards applicable to the proposed development are shown in Table 14-1. Other pollutants have been screened out of this air quality assessment, since they are not likely to cause exceedances of their respective standards.

Table 14-1: Air quality standards for human health and vegetation

Pollutant	Averaging period	Limit Value / Welsh standard
Human health		
Nitrogen Dioxide (NO ₂)(a)	Annual mean	40µg/m ³
	1-hour mean	200µg/m ³ not to be exceeded more than 18 times a year (99.8 th percentile)
Fine Particulate Matter (PM ₁₀)(a)	Annual mean	40µg/m ³

¹Defra et al 2007, Air Quality Strategy for England, Scotland, Wales and Northern Ireland

	24-hour mean	50µg/m ³ not to be exceeded more than 35 times a year (90.4 th percentile)
Very Fine Particulate Matter (PM _{2.5})(a)	Annual mean	25µg/m ³
Protection of vegetation		
Oxides of Nitrogen (NO _x)	Annual mean	30µg/m ³
(a) The Air Quality Standards (Wales) Regulations 2010, No. 1433		

14.3.5 The United Nations Economic Commission for Europe (UNECE) and the World Health Organisation (WHO) have set a critical level for NO_x (30µg/m³), for the protection of vegetation. Therefore, the statutory nature conservation agency's (Natural Resources Wales, NRW) policy is to apply the 30µg/m³ criterion as a benchmark, on a precautionary basis, in internationally designated conservation sites and in Sites of Special Scientific Interest (SSSI).

14.3.6 In addition, critical loads for nitrogen deposition have been set that represent the exposure below which there should be no significant harmful effects on sensitive elements of the ecosystem.

Policy context

Well-being of Future Generations (Wales) Act 2015

14.3.7 The Act² has well-being goals and objectives to achieve through implementation of sustainable development. Changes in air quality can have an impact on the health of ecological habitat and humans. As such, the goals to create 'a resilient Wales' and 'a healthier Wales' are applicable.

14.3.8 In order for Welsh Ministers to understand the progress being made to achieving the well-being goals, national indicators have been set. One of these national indicators relates to levels of NO₂ in the air. The Well-being of Future Generations Act aims to reduce pollution exposure by assessing a weighted population average to NO₂ on an annual basis.

Planning Policy Wales, Edition 11, December 2021

14.3.9 The 11th edition of Planning Policy Wales³ (PPW11) was published in February 2021. It sets out land-use and planning policy for Wales. The

² Wellbeing of Future Generations (Wales) Act 2015

³ Welsh Government (2021) Planning Policy Wales Edition 11 (PPW11)

new planning policy incorporates principles derived from the Well-being of Future Generations (Wales) Act 2015.

- 14.3.10** The policy document is set out in themes, with air quality predominantly addressed in the Distinctive and Natural Places theme. Air Quality and Soundscape section of PPW11 highlights the importance that air quality has in a positive experience of place, public health, amenity and well-being. Specific reference is made to the contribution the planning system should make to achieving a healthier Wales through reducing population exposure to air pollution, whilst also tackling high pollution hotspots. Additionally, preventing the creation of any new or worsening of existing air quality pollution problems is important.

Local planning policy

Neath Port Talbot County Borough Council Local Development Plan

- 14.3.11** Neath Port Talbot County Borough Council (NPTCBC) adopted their Local Development Plan (LDP)⁴ in January 2016 with it covering the years 2011-2026. The LDP recognises the importance of good air quality for health, quality of life and amenity. Policies relevant to air quality include:

SP16 Environmental Protection – “Air, water and ground quality and the environment generally will be protected and where feasible improved through the following measures: ... Ensuring that proposals have no significant adverse effects on water, ground or air quality and do not significantly increase pollution levels; Ensuring the developments do not increase the number of people exposed to different levels of pollution.”

EN 8 Pollution and Land Stability – “Proposals which would be likely to have an unacceptable adverse effect on health, biodiversity and/or local amenity or would expose people to unacceptable risk due to the following will not be permitted: ... Air pollution.

EN 9 Developments in the Central Port Talbot Area – “Developments in the central Port Talbot Area that could result in breaches of air quality objectives during their construction phase, will be required to be undertaken in accordance with a Construction Management Plan submitted as part of the planning process and agreed by the council.

Pollution: Supplementary Planning Guidance

- 14.3.12** This guidance⁵ provides details about pollution issues in NPTCBC and sets out the relevant matters that will need to be taken into consideration when developments are being planned in the County

⁴ Neath Port Talbot County Borough Council Local Development Plan 2011-2026

⁵ Pollution (Supplementary Planning Guidance) 2016

Borough. Concerns about air quality relate to two main areas: direct impacts on human health and amenity and ecological impacts affecting natural habitats and species.

AIRWISE Clean Air for Everyone (2013) – Neath Port Talbot County Borough Council

14.3.13 Airwise is NPTCBC's Strategy for improving air quality. The aims of the Airwise Strategy are:

- To ensure air quality in Neath Port Talbot allows residents and visitors to enjoy time outdoors without risking their health;
- To ensure air quality throughout the Council Borough is better than the standards required by UK legislation;
- To achieve consistently good air quality in Port Talbot so that the local authority can revoke the Air Quality Management Area status by compliance with LAQM air quality objectives;
- To better inform the public on issues relating to air quality; and
- To reduce nuisance dust and thereby improve quality of life.

Powys County Council Local Development Plan (2011-2026)

14.3.14 The Powys County Council (PCC) Local Development Plan (LDP)⁶ was adopted in 2018 and sets out the local planning policy. There is one policy relevant to air quality:

DM14 Air Quality Management – *“Development proposals will only be permitted where any resultant air pollution does not cause or lead to an unacceptable risk of harm to human health or the natural environment. Proposals will need to demonstrate that measures can be taken to overcome any significant adverse risk, with particular attention being paid to:*

- *National Air Quality Strategy objectives and any Air Quality Management Areas*
- *The critical levels for the protection of habitats and species within a European site or Site of Specific Environmental Interest in accordance with Policy DM2.*

Guidance

Institute of Air Quality Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction

14.3.15 The IAQM provide guidance to development consultants and environmental health officers (EHO) on how to assess air quality

⁶ Powys Local Development Plan 2011-2026

impacts from construction. The IAQM document⁷ provides a method for classifying the significance of effect from construction activities based on the ‘dust magnitude’ (high, medium or low) and proximity of the proposed development to the closest receptors. The guidance recommends that once the significance of effect from construction is identified, the appropriate mitigation measures are implemented. Experience has shown that once the appropriate mitigation measures are applied, in most cases the resulting dust impacts can be reduced to negligible levels.

Local Air Quality Management Policy and Technical Guidance

- 14.3.16** The 2016 policy note from Defra, LAQM.PG(16)⁸, provides additional guidance on the links between transport and air quality and the links between air quality and the land-use planning system. It summarises the main ways in which the land-use planning system can help deliver compliance with the air quality objectives. This is relevant to any external organisations who may wish to engage with the local authority to assist in the delivery of their statutory duties on managing air quality.
- 14.3.17** The LAQM Technical Guidance 16 (LAQM TG(16))⁹ is designed to support local authorities in carrying out their duties to review and assess air quality in their area. LAQM TG(16) is published at the UK level and is relevant to England, Scotland, Wales and Northern Ireland with the exception of London. It provides detailed guidance on how to assess the impact of measures using existing air quality tools. Where relevant, this guidance has been taken into account in this assessment.

EPUK/IAQM Land-Use Planning and Development Control

- 14.3.18** The 2017 Land-Use Planning & Development Control guidance document¹⁰ produced by the Environmental Protection UK (EPUK) and IAQM provides a framework for professionals operating in the planning system to provide a means of reaching sound decisions, with regards to the air quality implications of development proposals.
- 14.3.19** The document provides guidance on when air quality assessments are required by providing screening criteria regarding the size of a development, changes to traffic flows/composition energy facilities or combustion processes associated with the development.

⁷ IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction (Version 1.1)

⁸ Defra (2016) Local Air Quality Management Policy Guidance. PG(16)

⁹ Defra (2016) Local Air Quality Management Technical Guidance.TG(16)

¹⁰ EPUK/IAQM, (2017) Land-Use Planning & Development Control: Planning for Air Quality

IAQM A guide to the assessment of air quality impacts on designated nature conservation sites

- 14.3.20 The IAQM provide guidance¹¹ on how to assess ecological impacts on designated nature conservation sites. It provides a structure for working with professional ecologists in order to reach a determination of the impacts of air quality on designated sites. It however does not specifically provide guidance on the assessment of rail emissions.

¹¹ IAQM (2020) A guide to the assessment of air quality impacts on designated nature conservation sites version 1.1

14.4 Scoping and consultation

Scoping

14.4.1 This chapter has been scoped to include:

- Effects on human and ecological receptors due to the generation of construction dust during the construction phase; and
- Effects on ecological receptors during operation of the proposed development.

14.4.2 There were four responses relating to air quality, these are shown in Table 14-2.

Table 14-2: Response to scoping opinion

Scoping opinion clause	Response
<p>From: Neath Port Talbot – Air Quality Officer</p> <p>NPT have confirmed that they are content with the scope set out in the submissions. All potential impacts should be covered both during construction and operation, taking into account a long term need for monitoring.</p> <p>There is no mention of any potential increase in the use of the rail link both during construction and operation. This should be addressed through assessment of use of (and any potential increase in use of) the rail link, followed by an assessment of any impacts on air quality.</p>	<p>Additional rail emissions have been considered and screened out of assessment due to the location of emissions being more than 30m from residential receptors. This is discussed further in section 14.5.</p> <p>It is not considered that long term air quality monitoring is required for this development as the risk of exceedance of air quality objectives is low.</p>
<p>From: Powys County Council – Environmental Health Officer</p> <p>Confirmation they are satisfied with the proposed assessments in respect of air quality.</p>	N/A
<p>From: Powys County Council- Planning and Highways Consultant</p> <p>A zone of influence has been identified as being up to 200m in the biodiversity chapter due to air quality impacts during construction works.</p>	200m usually refers to the area beyond roads that will be assessed for changes in air pollutant concentrations due to changes in traffic emissions.
<p>From: Natural Resources Wales – Development Planning Advisor</p> <p>With regards to ecology - Evaluation of the impacts of the scheme should include: direct and indirect; secondary; cumulative; short, medium and long term; permanent and temporary; positive and negative, and construction, operation and decommissioning phase and long-term site security impacts on the nature conservation resource, landscape and public access.</p>	The impacts of the construction, operation and decommissioning of the proposed development on air quality will be considered.

Consultation

14.4.3 Further comments have been received through the Pre-application Consultation (PAC) process. This is summarised in Table 14-3.

Table 14-3: Response to representations from stakeholders on the air quality assessment

Stakeholder	Comment	Response
Powys County Council and Neath Port Talbot - Environmental Health Officers	Agreement that the assessment of rail impacts on human receptors can be screened out based on guidance outlined in LAQM TG(16).	No assessment of rail emission impacts on human receptors has been undertaken.
Powys County Council, Neath Port Talbot and NRW – Biodiversity Officers	<p>Provided that during construction the outline Construction Environmental Management Plan (CEMP) includes monitoring that allows for identification of and timely response to nuisance dust deposition levels (200mg/m²/day) it is considered there would be no significant impact on protected sites. Dust level deposition of 500mg/m²/day or over is considered damaging to Gorsllwyn Onllwyn SSSI.</p> <p>Agreement that traffic changes are unlikely to trigger any screening thresholds relevant for the assessment of air quality.</p> <p>Advise that impacts from rail emissions on designated habitats should be assessed to determine whether there is a change of more than 1% of the critical load at designated habitats.</p>	<p>Mitigation measures would include monitoring of dust levels. Proposed mitigation is outlined in section 14.10.</p> <p>An assessment of nitrogen deposition on nearby designated habitats has been carried out to determine whether there is change of more than 1% of the relevant critical load. The assessment is in section 14.5 and results are in 14.9.</p>

14.5 Methodology

Overview

14.5.1 This section outlines the approach for assessing the baseline air quality and likely significant effects on air quality from construction and operation of the proposed development.

14.5.2 The overall approach to the air quality assessment comprises:

- a review of the existing air quality conditions at the site and up to 2km of the proposed development;
- an assessment of the potential changes in air quality arising from the construction and operation of the proposed development due to changes in traffic and rail emissions; and
- formulation of mitigation measures, where necessary, to ensure any adverse effects on air quality are minimised.

Methodology for establishing baseline conditions

14.5.3 Existing or baseline air quality refers to the concentration of pollutants of interest for this assessment NO₂, PM₁₀ and PM_{2.5} that are already present in the environment. These are present from various sources, such as industrial processes, commercial and domestic activities, traffic and natural sources.

14.5.4 A desk-based review of the following data sources has been undertaken to determine baseline conditions of air quality at and in the vicinity of the proposed development and the study area in this assessment.

- NPTCBC Air Quality Progress Report¹²;
- Powys County Council Air Quality Progress Report¹³
- Defra Local Air Quality Management website¹⁴;
- UK Air Information Resource website¹⁵; and
- Natural Resources Wales (NRW) register on industrial installations¹⁶.

¹² Neath Port Talbot County Borough Council (2019) Air Quality Progress Report [Accessed: June 2020]

¹³ Powys County Council (2019) Air Quality Progress Report [Accessed: June 2020]

¹⁴ Defra; *Local Air Quality Management (LAQM) Support* ; Available at <http://laqm.defra.gov.uk> [Accessed: January 2020]

¹⁵ Defra; *UK Air Information Resource*; Available at <https://uk-air.defra.gov.uk/interactive-map> [Accessed: January 2020]

¹⁶ NRW Environmental permits industrial sites Available at: <http://lle.gov.wales/catalogue/item/EnvironmentalPermittingRegulationsIndustrialSites/?lang=en> [Accessed: June 2020]

- 14.5.5 The review included the local authority air quality monitoring data for recent years (2014-2019) and local background pollutant concentrations.

Methodology for construction dust assessment

- 14.5.6 Construction dust effects have been assessed using the qualitative approach described in IAQM guidance⁷, which 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).

- 14.5.7 For each of the above activities, the guidance 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.

- 14.5.8 The methodology accounts for the scale at which the above effects are likely to be generated (classified as small, medium or large). The distance of the closest human and ecological receptors and background PM₁₀ concentrations are taken into account in order to determine the sensitivity of the surrounding area. An overall risk factor is derived based on the sensitivity of the area, background concentrations and the likely magnitude of construction dust effects. Appropriate mitigation measures will be identified and proposed to reduce the risk to air quality during construction. Further detail on the construction dust assessment methodology and assessment tables are included in Appendix 14A.

Methodology for Operational Assessment

- 14.5.9 There is potential for emissions to air from both road and rail operations associated with the proposed development.

Screening of traffic emissions

- 14.5.10 The EPUK/IAQM screening criteria¹⁰ for areas in or outside an AQMA were used as appropriate across the road network. Meeting any of the respective criteria indicates that detailed dispersion modelling of road traffic emissions is likely to be required.

- 14.5.11 The screening criteria in relation to change in traffic flows and road realignment are as follows:

- For an area within or adjacent to an AQMA:
 - A change of Light Duty Vehicle (LDV) flows of more than 100 Annual Average Daily Traffic (AADT) movements;
 - A change of Heavy-Duty Vehicle (HDV) flows of more than 25 AADT movements; and
 - Realign roads, i.e. changing the proximity of receptors to traffic lanes 5m where change is 5m or more and the road is within an AQMA.
- For areas elsewhere:
 - A change of LDV flows of more than 500 AADT movements; and
 - A change of HDV flows of more than 100 AADT movements.

14.5.12 When the traffic data provided is considered against the above criteria, that road emissions can be scoped out if considered alone. However, as there will also be emissions from rail sources, road emissions are considered in conjunction with rail emissions to understand the potential cumulative impact on sensitive receptors.

Screening of rail emissions

14.5.13 LAQM TG(16)⁹ provides guidance on when an assessment of rail emissions is appropriate with regards to human health. There are two scenarios considered as potentially causing exceedances:

- Stationary locomotives: Locations where diesel or steam locomotives are stationary for periods of 15 minutes or more and relevant exposure within 15m could potentially cause an exceedance of the short term mean SO₂ objective; and
- Moving locomotives: Rail lines that are identified with heavy traffic of diesel passenger trains, relevant exposure within 30m of moving locomotives and background NO₂ concentrations above 25 µg/m³ could potentially cause an exceedance of the annual mean NO₂ objective.

14.5.14 There is no relevant exposure within 15m of the rail for the SO₂ objective or NO₂ background concentrations above 25µg/m³ therefore an assessment of the impacts of rail emissions on air quality relevant to human health has been screened out.

14.5.15 There is no screening criteria or guidance for assessing the impacts of rail emissions on designated ecological habitats. Due to the close proximity of several designated habitats including the Gorsllwyn Onllwyn SSSI to the proposed development the potential impacts of emissions from rail on air quality for designated habitats has been assessed.

Methodology for the Assessment of rail emissions

- 14.5.16 Three distinct track layout features are proposed with the facility, namely:
- The rolling stock test track;
 - The infrastructure test track; and,
 - The sidings and facilities in and around the old washery site (the washery).
- 14.5.17 For the purposes of assessing air quality during its operation, only two of the three features will include diesel trains operating on them (and therefore emissions), namely: the rolling stock test track and the sidings area (washery).
- 14.5.18 As a result, only these two features have been considered and assessed in this assessment. The infrastructure test track will not feature diesel trains and therefore has not been included in the operational air quality assessment.
- 14.5.19 Further features are described in detail in the project description in Chapter 3.

Rolling stock test track

- 14.5.20 The rolling stock test track will be used to test trains at speeds of up to 110mph (with an average of 70mph) and is expected to be operational 24 hours per day for 252 days of the year. The proposed train fleet use is also expected to consist of 70% electric-powered, 20% hydrogen-powered and 10% diesel-powered for the first 5 years. Thereafter, trains are 75% electric and 25% hydrogen-powered.
- 14.5.21 For the purposes of the air quality assessment, diesel train-use on the rolling stock test track is assumed to operate 25 days per year.

Infrastructure test track

- 14.5.22 The high tonnage infrastructure test track would be used to test railway infrastructure at speeds of up to 40mph.
- 14.5.23 Infrastructure testing is expected to be operational 24 hours per day for 105 days of the year. Trains are expected to be 100% electric powered for the duration of the 60-year appraisal period, and therefore this track has not been considered in the assessment for emissions to air.

Washery facility

- 14.5.24 The facility on the site of the old washery will include a maintenance shed, train wash and railway sidings. The facility will see sporadic

train movements around the site - primarily during the day - between the sidings, maintenance shed, train wash and the test tracks.

- 14.5.25** Diesel emissions are likely to consist of shunting trains moving at very low speeds (around 5mph) around the facility and the train wash. It is assumed that there are up to four movements per day.
- 14.5.26** For the purposes of the air quality assessment and potential impact to sensitive receptors, it is assumed that the train movements consist of:
- 14.5.27** A train from eastern sidings backing out to the western sidings then moving through the train wash to the eastern headshunt and back.

Rail emission calculations

- 14.5.28** Estimates for the number of diesel powered rail movements for the rolling stock test loop and washery facility were provided by the rail design team as outlined in sections 14.5.20 to 14.5.27. The estimates were used to calculate total annual distances travelled by diesel locomotives on the rolling stock test loop and washery facility.
- 14.5.29** Estimates of rail movements were combined with emission factors from the Strategic Rail Authority report on rail and road emissions modelling¹⁷ to calculate rail emission rates for use in the dispersion model.
- 14.5.30** The Inter-city IC125 emission rates were chosen for the diesel locomotive movements on the rolling stock test track, as in the absence of detailed information on the diesel train type being used at the proposed development, these are the highest emission factors and therefore add to a conservative assessment of impacts. Shunting train emissions factors were used solely for the washery areas.
- 14.5.31** Rail emission factors and calculated emission rates used in the assessment are shown in Table 14-4.

Table 14-4: Rail emission factors and rates

Modelling source	Train type	NOx Emission factor*	NOx Emission rate (g/km/s)
Rolling stock test facility	IC125	194.8 g/km	0.0611
Washery facility	Shunting class	12.6 g/kWh	0.0479
*Emission factor from the Strategic Rail Authority report on Rail and road emissions ¹⁷ .			

- 14.5.32** The modelled sources used in the model are shown in Figure 14.1.
- 14.5.33** Only emissions for NOx have been calculated as is it considered to be the pollutant of greatest concern. Emissions of SO₂ have not been included as due to the low sulphur content present in diesel fuel, the

¹⁷ Strategic Rail Authority 2001. Rail and road emission model.

impacts from SO₂ emissions with such short operating frequency, as well as the spatial and temporal variation, are considered to be negligible.

Dispersion model setup

- 14.5.34 This section details the inputs and set-up for the operational traffic dispersion modelling using ADMS-Roads version 5.0.

Sensitive human receptors

- 14.5.35 A desk-top study was undertaken to identify the sensitive receptors at and around the proposed development. Sensitive receptors include those residential properties/schools/hospitals that are likely to experience a change in pollutant concentrations due to the operation of the proposed development. The nearest sensitive human receptors are 130m from the operational test track and therefore an assessment of air quality impacts on human receptors has been screened out as discussed in section 14.5.14.

Sensitive ecological receptors

- 14.5.36 The proposed development is located near Nant Lech and Gorsllywyn Onllywyn SSSIs. Nant Lech SSSI is located more than 200m from the operational test track. Gorsllywyn Onllywyn SSSI is located approximately 100m from the stabling track.
- 14.5.37 There are also six Sites of Importance for Nature Conservation (SINCs) within 200m of the operational test track. These sites are Intervalley Road Banwen, Adjacent to Gors Llwyn, Onllwyn Coal Washery, Dyffryn Cellwen and Gorsllwyn Meadows.
- 14.5.38 To the north of the proposed development, there are also large areas of Ancient Woodland (AW) comprising ancient semi natural woodland and plantation on an ancient woodland site.
- 14.5.39 The Coedydd Nedd a Mellte Special Area of Conservation (SAC) is located approximately 3km south-east of the operational test track and therefore has not been assessed further in this chapter, as it is unlikely to be affected by emissions to air from the proposed development.
- 14.5.40 These ecological habitats are shown in Figure 14.2 and the modelled receptors are shown in Figure 14.3. Details of the ecological habitats are in Table 14- 5 and Table 14-6.

Table 14- 5: Designated habitats

Habitat name	Designation	Habitat	Critical load kg N/ha/yr	Total N deposition kg N/ha/yr
Intervalley Road, Banwen	SINC	Purple Moorgrass and rush pastures	10-15	17.8*
Site adjacent to Gors Llwyn	SINC	Purple moor-grass and rush pastures	10-15	17.8*
Onllywyn coal washery	SINC	Marshy grassland	10-15	17.8*
Dyffryn Cellwen	SINC	Purple moor-grass and rush pastures	10-15	17.8*
Gorsllwyn Meadows	SINC	Purple moor-grass and rush pastures	10-15	17.8*
Ancient semi natural woodland	Ancient woodland	Broadleaved, mixed and yew woodland	10-20	17.8*
Plantation on ancient woodland site	Ancient woodland	Broadleaved, mixed and yew woodland, coniferous woodland	5-15	17.8*
Gorsllwyn Onllwyn	SSSI	Raised bog-blanket bog	5-10	17.8
*Assumed value based on location derived data in absence of site-specific data.				

Table 14-6: Ecological receptors

Receptor ID	X	Y	Habitat name
AW1	281619	211792	Plantation on Ancient Woodland Site
AW2	281768	211885	Plantation on Ancient Woodland Site
AW3	281921	211914	Plantation on Ancient Woodland Site
AW4	282495	212108	Ancient Semi Natural Woodland
AW5	282838	212062	Ancient Semi Natural Woodland
AW6	283235	212056	Ancient Semi Natural Woodland
AW7	283656	212054	Ancient Semi Natural Woodland
AW8	283229	211779	Ancient Semi Natural Woodland
E1	284717	210723	Gorsllwyn Meadows
E2	284849	210636	Onllwyn Coal Washery
E3	285099	210524	Onllwyn Coal Washery
E4	285229	210611	Onllwyn Coal Washery
E5	285087	210353	Dyffryn Cellwen
E6	285503	210211	Intervalleey Road, Banwen
E7	285575	210299	SINC adjacent to Gorsllwyn
T0	285366	210493	Gorsllwyn Onllwyn
T10	285374	210500	Gorsllwyn Onllwyn
T20	285380	210506	Gorsllwyn Onllwyn

Receptor ID	X	Y	Habitat name
T50	285403	210527	Gorsllwyn Onllwyn
T100	285440	210561	Gorsllwyn Onllwyn
T150	285477	210595	Gorsllwyn Onllwyn
T200	285514	210629	Gorsllwyn Onllwyn

Local air quality modelling

14.5.41 The inputs to the modelling process included:

- Traffic data;
- Rail movements;
- Receptor locations;
- Meteorological data; and
- Background concentrations.

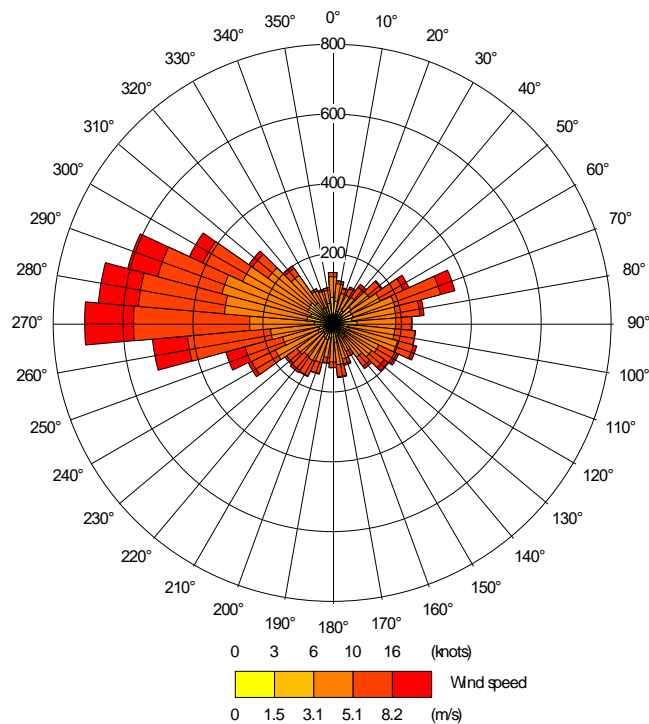
Meteorological data

14.5.42 The meteorological data used in this assessment were measured at Rhoose airport meteorological station. The data was collected over the period 1st January 2019 to 31st December 2019 (inclusive). Rhoose airport is located approximately 50km south east of the proposed development. This meteorological site was chosen due to its proximity to the proposed development.

14.5.43 Most dispersion models of roads do not use meteorological data if modelling calm wind conditions, as dispersion of air pollutants is more difficult to calculate in these circumstances. ADMS-Roads treats calm wind conditions by setting the minimum wind speed to 0.75m/s. Defra's LAQM.TG16 guidance⁹ recommends that the meteorological data file is tested in a dispersion model and the relevant output log file checked to confirm the number of missing hours and calm hours that cannot be used by the dispersion model. This is important when considering predictions of high percentiles and the number of exceedances. The guidance recommends that meteorological data should only be used if the percentage of usable hours is greater than 75% and preferably 90%.

14.5.44 Hourly sequential observation data was used. The dataset includes 8,653 lines of usable hourly data, out of a total of 8,760 lines of data. This corresponds to 98.8% of the year. This is above the 90% threshold, so meets the requirements of the Defra guidance and is adequate for dispersion modelling. shows the windrose for Rhoose airport. It can be seen that the predominant wind direction is westerly in the wind rose Diagram 14.1.

Diagram 14-1: Windrose for Rhooose airport, 2019



Other parameters

14.5.45 The extent of mechanical turbulence (and hence, mixing) in the atmosphere is affected by the surface/ground over which the air is passing. Typical surface roughness values range from 0.0001m (for water or sandy deserts) to 1.5 (for cities, forests and industrial areas). In this assessment, a value of 0.25m has been selected for the dispersion site and this value is described in ADMS representing a surface roughness of “agricultural areas” which is appropriate for the mixed terrain around the proposed development. For the meteorological site, a surface roughness value of 0.02m was used to represent the surrounding area.

14.5.46 The minimum Monin-Obukhov length is a model parameter which describes the extent to which the urban heat island effect limits stable atmospheric conditions. A Monin-Obukhov length of 10m has been used in this dispersion modelling study for the local study area, which is described as representative of “Small towns<50,000”. The same Monin-Obukhov length was used for the meteorological station site.

NO_x to NO₂ conversion

14.5.47 The dispersion model predicts NO_x concentrations which comprise nitric oxide (NO) and nitrogen dioxide (NO₂). NO_x is emitted from combustion processes, primarily as NO with a small percentage of NO₂. The emitted NO reacts with oxidants in the air (mainly ozone) to form NO₂. NO₂ is associated with effects on human health. The air

quality standards for the protection of human health are based on NO₂ rather than total NO_x or NO. A suitable NO_x: NO₂ conversion has been applied to the modelled NO_x concentrations in order to determine the impact of the NO_x emissions on ambient concentrations of NO₂.

- 14.5.48 LAQM.TG16 details an approach for calculating the conversion of NO_x to NO₂. This approach takes into account the difference between ambient NO_x concentrations with and without the proposed development, the concentration of ozone and the different proportions of primary NO₂ emissions in different years. This approach is available as a spreadsheet calculator, with the most up-to-date version being version 8.1, released in August 2020¹⁸.

Model verification

- 14.5.49 Model verification refers to the comparison of modelled and measured pollutant concentrations at the same locations to determine the performance of the model. Verification is often carried out on the process concentration from road emissions.
- 14.5.50 There is no local monitoring in the vicinity of the proposed development, therefore verification of modelling results was not carried out.

Assessment of significance

- 14.5.51 For the assessment of impacts and significance at sensitive human receptors, the approach described in the EPUK/IAQM guidance¹⁰ has been used (Table 14-7). This is considered to be best practice for undertaking air quality assessments.
- 14.5.52 Impact descriptors are determined based on the magnitude of incremental change as a proportion of the relevant assessment level, in this instance the air quality standards. The change is then examined in relation to the predicted total pollutant concentrations in the assessment year and its relationship with the relevant air quality standard (Table 14-1).

Table 14-7: Impact descriptors from EPUK/IAQM guidance

Predicted concentration relative to air quality standard	% Change in concentrations relative to air quality standard			
	1%	2-5%	6-10%	> 10%
< 75%	Negligible	Negligible	Minor	Moderate
76-94%	Negligible	Minor	Moderate	Moderate

¹⁸ Defra NO_x to NO₂ calculator (version 8.1), <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc>

Predicted concentration relative to air quality standard	% Change in concentrations relative to air quality standard			
	1%	2-5%	6-10%	> 10%
95-102%	Minor	Moderate	Moderate	Major
103-109%	Moderate	Moderate	Major	Major
> 110%	Moderate	Major	Major	Major
Changes of less than 0.5% are described as negligible. Slight and substantial impacts from the EPUK/IAQM guidance have been called 'minor' and 'major' respectively for this assessment.				

14.5.53 The impact descriptors at each of the assessed receptors have been used as a starting point to make a judgement on the overall significance of effect of the proposed development, however other influences have also been accounted for, such as:

- The existing future air quality in the absence of the proposed development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

14.5.54 In circumstances where the proposed development can be judged in isolation, the guidance suggests that a 'moderate' or 'major' impact is likely to give rise to a significant effect and a 'negligible' or 'minor' is not likely to result in a significant effect.

14.5.55 With regards to impact on ecological receptors, the IAQM guidance¹⁰ recommends that concentrations of oxides of nitrogen (NO_x) are used as the main basis for evaluating the potential for significant effects. An increase in annual mean NO_x concentration of more than 0.3µg/m³ cannot be dismissed as imperceptible. If the increase is not imperceptible at an ecological site, and the NO_x critical level (30µg/m³) is exceeded, then changes in nutrient nitrogen deposition should be calculated to assist the evaluation of significance.

14.5.56 Where changes in nitrogen deposition are more than 1% of a habitat's critical load this information should be passed to an ecologist to evaluate whether there is a significant effect.

14.6 Assumed construction practices

14.6.1 An outline construction environmental management plan (CEMP) has been prepared for the proposed development (Appendix 3A). The mitigation measures include those for minimising the emissions of dust and particulate matter through prevention or reducing at source.

- 14.6.2 The outcome of the assessment will feed into the outline CEMP to ensure that the CEMP includes all the necessary mitigation measures based on the risk of dust soiling, human health and ecological impact from the construction of the proposed development.

14.7 Limitations and assumptions

Limitations

- 14.7.1 Air quality dispersion modelling has inherent limitations and areas of uncertainty, as below:
- Traffic data used in the model;
 - Traffic emissions data;
 - Simplifications in model algorithms and empirical relationships that are used to simulate complex physical and chemical processes in the atmosphere;
 - Background concentrations; and
 - Meteorological data.

Assumptions

- 14.7.2 The following assumptions have been made in undertaking this assessment:
- The speeds for the modelled road network were based on the designated speed limits; modelled road speeds were reduced to 20kph for all junctions and roundabouts (to represent congested conditions following the LAQM TG(16) guidance).
 - All calculated diesel rail emissions assumed the train type was IC125 for the rail test track and shunting class for the washery area. IC125 had the highest emission rates available in the Strategic Rail Authority model which allowed for a pessimistic emission rate to be used in the modelling process in the absence of more detailed information about the types of trains using the site.

14.8 Baseline environment

Baseline ambient air quality refers to the concentrations of pollutants of interest for this NO₂, PM₁₀ and PM_{2.5} that are already present in the atmosphere from various sources such as industrial processes, commercial and domestic activities, agriculture, traffic and natural sources.

Industrial processes

- 14.8.1** 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(1), A(2), Part B processes or Medium Combustion Plant, regulated through the Pollution Prevention and Control (PPC) system^{19,20}. The larger, more polluting processes are regulated by NRW and the smaller, less polluting ones by the local authorities. Local authorities tend to regulate only for emissions to air, whereas NRW regulates emissions to air, water and land.
- 14.8.2** A review of the Annual Progress Reports for NPTCBC and PCC does not identify any planning applications for new installations within 2km of the proposed development.
- 14.8.3** A review of the industrial sites database under Environmental Permitting Regulation does not identify existing installations within 2km²¹.
- 14.8.4** The impact of industrial processes is assumed to be included in the background monitoring and Defra background concentrations.

Road traffic

- 14.8.5** In recent decades, transport atmospheric emissions on a national basis have grown to match or exceed other sources in respect to many pollutants, particularly in urban areas. Vehicle emissions are likely to be the dominant source of air pollution in the study area. The main pollutants associated with road traffic are NO₂, PM₁₀ and PM_{2.5}.

¹⁹ Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

²⁰ The Environmental Permitting (England and Wales) (Amendment) Regulations 2013, SI 2013/390

²¹ Natural Resources Wales. Environmental Permitting Regulations – Industrial Sites. <http://lle.gov.wales/catalogue/item/EnvironmentalPermittingRegulationsIndustrialSites/?lang=en>

Rail traffic

- 14.8.6 A single track branch line exists connecting the existing Celtic Energy facility to Swansea. This is estimated to be used once per day and is considered to have a negligible contribution to air pollution in the study area.

Local authority air quality monitoring

- 14.8.7 NPTCBC and PCC undertake air quality monitoring using automatic monitors and passive diffusion tubes in their respective administrative regions. No automatic or diffusion tube monitoring sites are within 2km of the proposed development.
- 14.8.8 PCC have not declared any AQMA in the local authority area.
- 14.8.9 PCC carried out monitoring in Newtown in 2018 and 2019. This is approximately 85km north-east of the proposed development and is therefore not considered representative of local air quality. The only other monitoring carried out is an Automatic Urban and Rural Network (AURN) monitor in Aston Hill which is approximately 90km north-east of the proposed development and is therefore not considered representative of local air quality.
- 14.8.10 As part of the review and assessment process, NPTCBC declared an AQMA for Taibach Margam, Port Talbot in 2000 for exceedances of the annual mean PM₁₀ air quality objective.
- 14.8.11 NPTCBC carries out both automatic and passive monitoring at various locations in its area. However, the nearest monitoring sites to the proposed development 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.

Background air quality mapping

- 14.8.12 Defra publishes background pollutant mapping²² for every 1km x 1km grid square across the UK. Background pollutant mapping has been reviewed for those grid squares in which the proposed development lies and is presented in Table 14-8.
- 14.8.13 In the absence of any monitoring within 2km of the proposed development, background air quality concentrations are considered to be representative of air quality concentrations. These concentrations are all well below the relevant air quality objective levels for each pollutant and it is considered unlikely the proposed development will exceed the air quality objectives.

²² Defra, Background Pollutant Mapping, <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017>

Table 14-8: Defra estimated background pollutant concentrations for the proposed development grid squares

Local authority	OS grid square		2019 concentrations ($\mu\text{g}/\text{m}^3$)				2020 concentrations ($\mu\text{g}/\text{m}^3$)			
	X	Y	NO ₂	NO _x	PM ₁₀	PM _{2.5}	NO ₂	NO _x	PM ₁₀	PM _{2.5}
Powys County Council	281500	211500	3.8	4.8	9.9	6.2	3.6	4.6	9.8	6.1
	281500	210500	3.8	4.8	8.9	5.9	3.6	4.5	8.9	5.8
	282500	211500	3.6	4.6	11.1	6.4	3.5	4.4	11.0	6.3
	282500	210500	3.7	4.7	8.9	5.9	3.5	4.5	8.8	5.8
	283500	211500	3.7	4.7	9.7	6.1	3.6	4.5	9.6	6.0
Neath Port Talbot County Borough Council	281500	209500	4.0	5.0	9.0	6.0	3.8	4.8	8.9	5.9

14.9 Assessment of effects

Assessment of effects from construction

Construction traffic

- 14.9.1** Traffic data for the assessment was screened using the criteria for roads not located within an AQMA set out in section 14.5.11. The changes in traffic flows due to the proposed development during the construction phase are shown in Table 14-9. There is no change in traffic speeds. A detailed assessment of construction traffic emissions can be screened out as none of the screening criteria are met as a result of the construction of the proposed development.
- 14.9.2** The impact of construction traffic on sensitive human and ecological receptors is considered to be negligible.

Table 14-9: Construction traffic

Scenario	Additional LDV due to the proposed development	Additional HDV due to the proposed development	Screened in/out
Construction (2022)			
A4067 North	38	13	Screened out
A4067 South	10	0	Screened out
A4221 West of washery	48	13	Screened out
A4221 East of washery	25	93	Screened out
A4109 North of Onllwyn	0	0	Screened out
A4109 South of Onllwyn	117	26	Screened out
Onllwyn Road	117	26	Screened out
A4109 North of Glynneath	25	93	Screened out
A4109 West of A465	13	93	Screened out

Construction dust assessment

- 14.9.3** The proposed development is largely laying of foundations for rail track and associated infrastructure. Dust can be generated due to activities such as demolition, earthworks, construction and trackout. There will be minimal earthworks as this will be delivered by the restoration of Nant Helen. Earthworks for this development would be limited to foundations for the new rail infrastructure and buildings.

Sensitive receptors

- 14.9.4** Receptors are defined as those properties that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction of the proposed development.
- 14.9.5** An 'ecological receptor' refers to any sensitive habitat affected by dust soiling. This includes direct impacts on vegetation or aquatic ecosystems of dust deposition, and the indirect impacts on fauna.

Dust emission magnitude

- 14.9.6** Each dust-generating activity has been assigned a dust emission magnitude using a conservation approach. The dust emission magnitude for each activity is shown in Table 14-10.
- 14.9.7** The Onllwyn washery will be demolished to make space for the proposed rail infrastructure, much of the earthworks for the development will be delivered via the Nant Helen development and construction will be limited to laying of the rail infrastructure and associated buildings.

Table 14-10: Dust emission magnitude for construction activities

Activity	Dust emission magnitude	Reasoning
Demolition	Small	Potentially dusty construction material as concrete forms part of the material to be demolished, estimated total volume to be demolished <20,000 m ³ .
Earthworks	Small	Estimated total site area where earthworks might occur <2,500 m ² , clay soil at the site, total material moved will be <20,000 tonnes, <5 heavy earth moving vehicles active at any one time.
Construction	Small	The total volume of buildings to be constructed is <25,000 m ³ , potentially dusty construction materials.
Trackout	Small	<10 HDV outward movements in any one day, the surface material is tarmac, which has a low potential for dust release. No unpaved road is expected.

Sensitivity of area

- 14.9.8** The site is primarily within the existing Nant Helen Open Cast mine plus the Onllwyn Washery and Distribution Centre. There are more than 10 high-sensitivity receptors within 20m of the site boundary. High-sensitive receptors can be defined as where users can expect to enjoy a high level of amenity such as residential properties. The people or property would be expected to be present continually, or at least regularly for extended periods. It can also be noted that there is a scheduled monument that is within 20m of the red line boundary, this is considered to have low sensitivity to dust.

- 14.9.9** As such, the area's sensitivity to dust soiling has been classified as *high* in accordance with the IAQM guidance⁷. The construction dust distance buffers are shown in Figure 14.4.
- 14.9.10** The average Defra background PM₁₀ concentrations for the grid squares where the proposed development is located (Table 14-8) all fall below the 24µg/m³ threshold. The sensitivity of the area has therefore been assigned as *Low* as there are less than 10 high-sensitivity receptors within 20m of the proposed development.
- 14.9.11** There is a medium-sensitivity ecological receptor within 20m of the site boundary (the Gorsllwyn Onllwyn SSSI). Medium-sensitivity receptors are defined as locations where there is a particularly important plant species and locations with a national designation where features may be affected by dust deposition.
- 14.9.12** There are also several areas of AWs within 20m of the site boundary. The sensitivity of these AWs to ecological impacts is considered to be medium.
- 14.9.13** There are six low-sensitivity ecological receptors known as SINC's (see section 14.5 for details) within 50m of the site boundary. Low-sensitivity receptors are defined locations with a local designation where the features may be affected by dust deposition.
- 14.9.14** As such, the area's sensitivity to ecological impacts has been classified as *medium* considered worse-case in accordance with the IAQM guidance.

Risk of impacts

- 14.9.15** Taking into consideration the dust emission magnitude and the sensitivity of the area, the proposed development has been classified as *medium* risk to dust soiling, *negligible* risk to human health impacts and *low* risk to ecological impacts from demolition, earthworks, construction and trackout (Table 14-11).
- 14.9.16** Specific mitigation to minimize risk of dust soiling and human health impacts of the proposed development is described in section 14.10. Overall, *low risk* mitigation will be considered for the proposed development with *medium risk* demolition specific measures.

Table 14-11 Summary dust risk table prior to mitigation

Activity	Risk of Dust Soiling	Human Health Risk	Ecological
Demolition	Medium Risk	Negligible	Low Risk
Earthworks	Low Risk	Negligible	Low Risk
Construction	Low Risk	Negligible	Low Risk
Trackout	Low Risk	Negligible	Negligible

Assessment of effects from operation

Operational traffic

- 14.9.17** Traffic data for the assessment were screened using the criteria for roads not located within an AQMA set out in section 14.5.11. The changes in traffic flows due to the proposed development during the operational phase are shown in Table 14-12. There is no change in traffic speeds. A detailed assessment of operational traffic emission impacts on human health can be screened out as none of the screening criteria are met as a result of the operational traffic from GCRE.
- 14.9.18** The impact of operational traffic on sensitive human receptors in isolation is considered to be negligible and therefore not significant.
- 14.9.19** For cumulative purposes emissions from traffic were calculated to inform the assessment of rail emissions on designated sensitive receptors.

Table 14-12: Traffic data summary

Scenario	Additional LDV due to the proposed development	Additional HDV due to the proposed development	Screened in/out
Operation (opening year 2026)			
A4067 North	47	0	Screened out
A4067 South	13	0	Screened out
A4221 West of washery	60	0	Screened out
A4221 East of washery	31	60	Screened out
A4109 North of Onllwyn	0	0	Screened out
A4109 South of Onllwyn	146	0	Screened out
Onllwyn Road	146	0	Screened out
A4109 North of Glynneath	31	60	Screened out
A4109 West of A465	16	60	Screened out

Operational rail – Human impacts

- 14.9.20** Screening criteria for impacts of rail emissions on human health are outlined in sections 14.5.13 and 14.5.15.
- 14.9.21** There are no human receptors within 30m of the proposed test tracks. There is one human receptor within 30m of the proposed connection to the branch line. The branch line would have a maximum of one

train movement on it per day and cannot be considered as a line with heavy traffic of diesel locomotives on it. Background NO₂ concentrations are 3.6 - 4.0 µg/m³ across the proposed development area.

- 14.9.22 There are no human receptors within 15m of the stabling tracks where locomotives will be stationary.
- 14.9.23 Due to the distance of receptors from the test tracks and the infrequency of locomotives on the branch line, an assessment of rail emission impacts on human receptors can be screened out and the impact can be considered negligible. An assessment of train emissions at human receptors has not been undertaken.

Operational rail – Impacts on designated ecological sites

- 14.9.24 Following consultation with the local planning authorities and NRW, an assessment of potential rail impacts on designated habitats was carried out. In order to capture all potential pollutant sources, the assessment has also included cumulative emissions from the local road network.
- 14.9.25 The nitrogen deposition in the baseline year and modelled opening year and the magnitude of change between Do-Minimum and Do-Something scenarios for ecological receptors are in Table 14-13.
- 14.9.26 The maximum increase in nutrient deposition as a result of the proposed development in 2026 is predicted to be 0.6kg N/ha/year at receptor AW3. At this location, as a percentage of the lower critical load for the relevant habitat (5kg N/ha/yr), there is a 12.8% increase in nitrogen deposition. This receptor point is located 22m north of the proposed test track.
- 14.9.27 There are no reductions in nitrogen deposition anticipated as a result of the proposed development.
- 14.9.28 Increases in nitrogen deposition are predicted to be above 1% of the lower critical load at the following habitats (highlighted in bold in Table 14-13):
- All assessed ancient woodlands;
 - Gorsllwyn Meadows and Onnllwyn coal washery SINC; and
 - Gorsllwyn Onllwyn SSSI.
- 14.9.29 It should be noted that the modelling of train emissions has been undertaken assuming the use of highly conservative emissions data, in the absence of more detailed site-specific train fleet and emissions data. For example, the NO_x emissions data for the IC125 locomotive selected for use in the assessment provide the highest emissions of any locomotive presented in the SRA¹⁷ reference source. The emissions are nearly 50% greater than the second highest emitting locomotive

provided in this source. Should further operational emissions data therefore become available, this assessment and conclusions could be revisited.

14.9.30 It should also be noted that the design for the proposed development is that diesel trains will operate for a period of five years, after which zero emission trains will be used. The assessment therefore does not reflect a permanent increase in emissions at these locations.

14.9.31 These predicted changes at receptors are also not necessarily considered to be significant; rather they cannot be considered to be insignificant at this stage without ecological evaluation by a biodiversity specialist. Further discussion of the impacts of the proposed development on nitrogen deposition at these locations, focussing on the specific habitat types in the receptor locations, is included in the biodiversity chapter (ES chapter 7).

Table 14-13: Nitrogen deposition results

Receptor ID	Lower critical load	Nitrogen deposition (kg N/ha/yr)					
		Baseline	2026 DM	2026 DS	Change	Change %	Change as a % of critical load
AW1	5	19.0	17.6	17.8	0.2	1.3	4.5
AW2	5	19.0	17.6	17.8	0.3	1.5	5.3
AW3	5	19.0	17.6	18.2	0.6	3.6	12.8
AW4	10	19.1	17.5	17.6	0.1	0.6	1.1
AW5	10	19.1	17.5	17.7	0.1	0.7	1.3
AW6	10	19.1	17.6	17.7	0.1	0.7	1.2
AW7	10	19.1	17.6	17.7	0.1	0.5	1.0
AW8	10	19.0	17.6	17.8	0.2	1.3	2.3
E1	10	18.4	17.7	17.8	0.2	0.9	1.6
E2	10	18.4	17.7	17.8	0.1	0.7	1.3
E3	10	18.4	17.7	17.8	0.2	0.9	1.6
E4	10	18.5	17.7	17.8	0.1	0.3	0.6
E5	10	18.4	17.7	17.8	0.1	0.5	0.9
E6	10	17.9	17.7	17.8	0.1	0.3	0.6
E7	10	18.5	17.7	17.8	0.1	0.4	0.6
T0	5	18.8	17.8	17.9	0.1	0.6	2.1
T10	5	18.5	17.7	17.8	0.1	0.4	1.6
T20	5	18.6	17.7	17.8	0.1	0.5	1.8
T50	5	18.5	17.7	17.7	0.1	0.3	1.2
T100	5	18.5	17.7	17.7	0.0	0.2	0.8

Receptor ID	Lower critical load	Nitrogen deposition (kg N/ha/yr)					
		Baseline	2026 DM	2026 DS	Change	Change %	Change as a % of critical load
T150	5	18.4	17.7	17.7	0.0	0.2	0.7
T200	5	18.4	17.7	17.7	0.0	0.1	0.5

14.10 Mitigation and enhancement

Mitigation of effects from construction

14.10.1 This section presents the specific mitigation to minimise the risk of dust soiling, human health and ecological impacts required for the proposed development. These mitigation measures are included in the outline CEMP.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- Display the name and contact details of person(s) accountable for air quality and dust issues on the proposed development boundary. This may be the environment manager/engineer or the site manager;
- Display the head or regional office contact information; and
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real-time PM₁₀ continuous monitoring and/or visual inspections.

Site management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken;
- Make the complaints log available to the local authority when asked; and
- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log-book.

Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary;
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked; and
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Preparing and maintaining site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- Fully enclose specific operations where there is a high potential for dust production and the site is active for an extensive period;
- Avoid site runoff of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below; and
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating vehicle/machinery and sustainable travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles;
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable;
- Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate);

- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials; and
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; and
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste management

- Avoid bonfires and burning of waste materials.

Demolition

- Ensure effective water suppression is used during demolition operations;
- Avoid explosive blasting using appropriate manual or mechanical alternatives; and
- Bag and remove any biological debris or damp down such material before demolition.

Construction

- Avoid scabbling (roughening of concrete surfaces) if possible; and
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Record all inspections of haul routes and any subsequent action in a site log book; and
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

Mitigation of effects from operation

- 14.10.2 The impact from operation on designated ecological sites is considered to be temporary for the period it takes to switch all locomotives to zero emission engines. This period is currently estimated to be within five years of the proposed development opening.
- 14.10.3 During this period, low emission diesel locomotives should be chosen when none of the electric or hydrogen locomotives are available.

14.11 Residual effects

Residual effects from construction

- 14.11.1 The construction dust mitigation is designed to reduce the impact of construction dust on air quality to a negligible impact therefore no residual effects from construction are anticipated.

Residual effects from operation

- 14.11.2 The impact from operation on air quality for human health is considered to be negligible.
- 14.11.3 The impacts on designated ecological habitats are considered to be temporary. Once all trains using the test facility have switched to zero emission locomotives no operational residual effects are anticipated.

14.12 Assessment summary matrix

Potential Effect	Receptor (s)	Sensitivity of Receptor	Magnitude (prior to mitigation)	Significance (prior to mitigation)	Mitigation	Magnitude (following mitigation)	Significance (following mitigation)
Dust soiling and particulate matter concentrations during construction (construction dust assessment)	Residential properties and ecological habitats	High	Small	N/A.	See dust mitigation in section 14.10 and outline CEMP.	Negligible	Not significant.
Construction traffic emission impacts	Human and ecological receptors	High	Negligible	N/A	N/A	Negligible	Not significant.
Operational traffic emission impacts	Human and ecological receptors	High	Negligible	N/A	N/A	Negligible	Not significant.