

## 6. Air Quality

### 6.1. Introduction

6.1.1. This section of the ES considers the effects of the Proposed Development on air quality. Air quality may be affected by the Proposed Development during both the construction period and once complete. During construction, dust and particulate matter may be generated by dust-raising activities. Once complete, there may be changes in emissions from traffic using the Proposed Development, which could affect air quality at receptors near affected roads. In addition, it is important to ensure that new receptors within the proposed development will not be exposed to poor air quality.

6.1.2. The key air pollutants that are addressed in this assessment are nitrogen dioxide and fine particulate matter as these pollutants are the most likely to be present at concentrations close to or above air quality criteria in an urban environment.

6.1.3. To determine the potential air quality impacts, this assessment includes:

- An examination of information on existing pollutant sources and measured ambient concentrations (including consideration of current and future committed developments) in the vicinity of the Site and comparison with relevant air quality criteria;
- Identification of potential constraints to the Proposed Development and nearby sensitive receptors which could be affected;
- A qualitative assessment of air quality impacts and effects during the construction phase;
- A quantitative assessment of ambient local air pollutant concentrations due to additional traffic emissions associated with the Proposed Development for selected receptors; and
- Recommendations for mitigation to prevent or reasonably minimise any potentially significant effects identified by the assessment.

### 6.2. Assessment criteria & methodology

#### Previous assessment

6.2.1. An air quality assessment was conducted in 2005 as part of a previous Environmental Impact Assessment in support of an outline planning application to deliver 4,000 new homes across the Coed Darcy site (reference P2005/0393). However, the findings from this assessment will be out of date for the purposes of this assessment.

6.2.2. An ES scoping report has been produced by Atkins in June 2021. All relevant scoping responses have been reviewed in the assessment, as noted in Table 6.1.

**Table 6.1: Scoping Response**

| Issue Raised                                                                                                                                              | Respondent                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Clean Air Plan for Wales: Healthy Air, Healthy Wales and Environmental Bill should be referenced in the ES                                                | Included                                                                                                                                                                                          |
| Use of site-specific monitoring data is preparable for the verification                                                                                   | No site-specific monitoring data are available to inform the air quality assessment at this stage, therefore a suitably conservative adjustment factor has been used in lieu for the verification |
| Dust control should be critical in light of the previous use of the site and the known contamination. Ongoing monitoring of construction dust is advised. | Construction dust assessment has been included. Mitigation measures have been suggested in line with IAQM guidance.                                                                               |
| No mention of biomass or CHP plants                                                                                                                       | None are proposed                                                                                                                                                                                 |

## Air Pollutants

### *Nitrogen Dioxide (NO<sub>2</sub>)*

- 6.2.3. Nitrogen dioxide (NO<sub>2</sub>) is generally produced by the oxidation of nitric oxide (NO) in ambient air (i.e. is not formed directly and as such is known as a 'secondary' pollutant). NO and NO<sub>2</sub> are collectively termed nitrogen oxides (NO<sub>x</sub>). Just over a third of the UK NO<sub>x</sub> emissions are from road transport. The majority of NO<sub>x</sub> emitted from vehicles is in the form of NO, which oxidises rapidly in the presence of ozone to form NO<sub>2</sub>. In high concentrations NO<sub>2</sub> can affect the respiratory system, whereas NO does not have any observable effect on human health at the range of concentrations found in ambient air. Deposition of nitrogen derived from NO<sub>x</sub> emissions contributes to eutrophication of sensitive habitats.

### *Particulate Matter*

- 6.2.4. Particulate matter in vehicle exhaust gases consists of carbon nuclei onto which a wide range of compounds are absorbed. These particles have an effective aerodynamic diameter of less than 10 micrometres (µm). Particles in this size range are referred to as PM<sub>10</sub>. Diesel engines produce the majority of particulate emissions from the vehicle fleet. In 2018, approximately 11 percent of PM<sub>10</sub> emissions in the UK are derived from road transport<sup>1</sup>. Particulate matter appears to be associated with a range of symptoms of ill health including effects on the respiratory and cardiovascular systems, on asthma and on mortality. Reviews by the World Health Organisation (WHO) and Committee on the Medical Effects of Air Pollutants (COMEAP) have suggested exposure to a finer fraction of particles (PM<sub>2.5</sub>, which typically make up around two thirds of PM<sub>10</sub> emissions and concentrations) give a stronger association with the observed ill health effects.

<sup>1</sup> Naei.beis.gov.uk. n.d. Pollutant Information - NAEI, UK. [online] Available at: [http://naei.beis.gov.uk/overview/pollutants?pollutant\\_id=24](http://naei.beis.gov.uk/overview/pollutants?pollutant_id=24)

## *Ammonia (NH<sub>3</sub>)*

- 6.2.5. Ammonia (NH<sub>3</sub>) is a highly reactive gas that is predominantly emitted from agricultural sources, although road transport is also a source of emissions<sup>2</sup>. Ammonia can be directly taken up through the stomata of plant species, and can particularly affect sensitive lichens and bryophytes. In addition, excess nitrogen can cause eutrophication effects at sensitive habitats.

## *Dust*

- 6.2.6. Dust is defined within the Institute of Air Quality Management's (IAQM) 'Guidance on the Assessment of Dust from Demolition and Construction'<sup>3</sup> (IAQM Construction Dust Guidance) as solid particles that are suspended in air or have settled out onto a surface after having been suspended in air. It includes particles that give rise to soiling (deposited dust) and to human health and ecological effects.
- 6.2.7. The IAQM Construction Dust Guidance<sup>3</sup> states that there is evidence that major construction sites can lead to an increase in annual PM<sub>10</sub> concentrations and the number of exceedances of the short term 24-hour objective for PM<sub>10</sub>. In addition, demolition and construction activities have the potential to cause higher than normal levels of dust deposition in the surrounding area. Dust emissions from a construction site may be mechanically generated due to land preparation (e.g. demolition, land clearing and earth moving) or as a result of release from site plant and movement of road vehicles on temporary roads, and open ground and haul routes.

## Legislative Context

### *UK Air Quality Legislation*

- 6.2.8. There are two types of air quality legislation that apply in Wales:
- The EU (Withdrawal Agreement) Act 2020 which implements the legally binding, mandatory limit values originally set by the EU Directive 2008/50/EC<sup>4</sup> on ambient air quality and cleaner air for Europe; and
  - Regulations implementing national air quality objectives as set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS)<sup>5</sup>: Air Quality (Wales) Regulations 2000 (SI

<sup>2</sup> Naei.beis.gov.uk. n.d. Pollutant Information - NAEI, UK. [online] Available at: [http://naei.beis.gov.uk/overview/pollutants?pollutant\\_id=21](http://naei.beis.gov.uk/overview/pollutants?pollutant_id=21)

<sup>3</sup> Institute of Air Quality Management (IAQM) (2014). Guidance on the assessment of dust from demolition and construction. Available at: <http://iaqm.co.uk/text/guidance/construction-dust-2014.pdf>

<sup>4</sup> Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe Available at: <https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A32008L0050>

<sup>5</sup> Defra (2011). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Available at: <https://www.gov.uk/government/publications/2010-to-2015-government-policy-environmental-quality/2010-to-2015-government-policy-environmental-quality#appendix-5-international-european-and-national-standards-for-air-quality>.

2000/1940 (W.138)) and Air Quality (Amendment) (Wales) Regulations 2002 (SI 2002/3182 (W.298))<sup>6,7</sup>.

- 6.2.9. The EU (Withdrawal Agreement) Act 2020 implements the air quality limit values that are included in the EU Directive on ambient air quality and cleaner air for Europe (2008/50/EC) and were previously included in air quality regulations (Statutory Instrument (SI) 2010 No. 1433)<sup>8</sup>, and as amended (SI 2016 No. 1184)<sup>9</sup>. The Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 (SI 2019 74)<sup>10</sup> and the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 (SI 2020 1313)<sup>11</sup> amend the Air Quality Regulations (SI 2010 No.1001) to account for EU withdrawal.
- 6.2.10. The air quality criteria in the context of this assessment for the protection of human health are presented in Table 6.2.

**Table 6.2: Relevant human health air quality criteria**

| Pollutant                                                                                                                                                                                                               | Objectives                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nitrogen Dioxide – NO <sub>2</sub>                                                                                                                                                                                      | Hourly mean concentration should not exceed 200 µg/m <sup>3</sup> more than 18 times a year.<br><br>Annual mean concentration should not exceed 40 µg/m <sup>3</sup> .                                                    |
| Particulate Matter – PM <sub>10</sub>                                                                                                                                                                                   | 24-hour mean concentration should not exceed 50 µg/m <sup>3</sup> more than 35 times a year<br><br>Annual mean concentration should not exceed 40 µg/m <sup>3</sup>                                                       |
| Particulate Matter – PM <sub>2.5</sub>                                                                                                                                                                                  | UK (Except Scotland) annual mean concentration should not exceed 25 µg/m <sup>3</sup> †<br><br>Exposure reduction^ (UK urban areas): target of 15% reduction in concentrations at urban background between 2010 and 2020* |
| † UK AQS objective is 25 µg/m <sup>3</sup> to be met by 2020. EU limit value is 25 µg/m <sup>3</sup> to be met by 2015, with a requirement in urban areas to bring exposure down to below 20 µg/m <sup>3</sup> by 2020. |                                                                                                                                                                                                                           |
| ^ Limit value exposure reduction target of 20% reduction between 2010 and 2020.                                                                                                                                         |                                                                                                                                                                                                                           |

<sup>6</sup> The Air Quality (Wales) Regulations 2000: <http://www.legislation.gov.uk/wsi/2000/1940/contents/made>

<sup>7</sup> The Air Quality (Wales) (Amendment) Regulations 2002: <http://www.legislation.gov.uk/wsi/2002/3182/contents/made>

<sup>8</sup> The Air Quality Standards (Wales) Regulations 2010. Available at: <http://www.legislation.gov.uk/wsi/2010/1433/contents/made>

<sup>9</sup> The Air Quality Standards (Amendment) Regulations 2016. Available at: <https://www.legislation.gov.uk/uksi/2016/1184/contents/made>

<sup>10</sup> The Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 (legislation.gov.uk). Available from: <https://www.legislation.gov.uk/uksi/2019/74/contents/made>

<sup>11</sup> The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 (legislation.gov.uk). Available at: <https://www.legislation.gov.uk/uksi/2020/1313/contents/made>

\* 25 µg/m<sup>3</sup> is a cap to be seen in conjunction with 15% reduction

- 6.2.11. Responsibility for achieving the national air quality criteria lies with the Government, although local authorities should contribute to this through local action plans designed to reduce pollution levels in Air Quality Management Areas (AQMA), and through the recent targeted feasibility studies<sup>12</sup>, including clean air zones where appropriate, to supplement the government's air quality plan for nitrogen dioxide in the UK<sup>13</sup>.

#### *Environmental Bill*

- 6.2.12. The Environment Bill will be part of a new legal framework for environmental protection, and is expected to achieve Royal Assent before the end of 2021. It will establish a legally binding duty on government to set a new air quality target for fine particulate matter in secondary legislation by 31 October 2022.

#### *National Air Quality Strategy*

- 6.2.13. The 2007 AQS for England, Scotland, Wales and Northern Ireland<sup>14</sup> sets out the national air quality standards and objectives for a number of local air pollutants. The standards are set by expert organisations with regard to scientific and medical evidence on the effects of the particular pollutant on health, and define the level of pollution below which health effects are expected to be minimum or low risk even for the most sensitive members of the population. The objectives are targets for air pollution levels to be achieved by a specified timescale, which take account of the costs and benefits of achieving the standard, either without exception or, for certain short-term averaging period standards, with a permitted number of exceedances. Local authorities have a responsibility (under Part IV of the Environment Act 1995, see below) to review and assess local pollution levels against these objectives.
- 6.2.14. It should be noted that the AQS objectives only apply in locations likely to have 'relevant exposure' i.e., where members of the public are exposed for periods equal to or exceeding the averaging periods set for the standards. For this assessment, locations of relevant exposure including building façades of residential premises, schools, public buildings and medical facilities; places of work (other than certain community facilities) are excluded.
- 6.2.15. In January 2019, the UK Government published a Clean Air Strategy<sup>15</sup>, which sets out actions to improve air quality by reducing pollution from a wide range of sources. Within the strategy, the Government proposes an ambitious target to reduce the population exposed to concentrations of PM<sub>2.5</sub> above 10 µg/m<sup>3</sup> by 50% by 2025.

<sup>12</sup> DEFRA, UK plan for tackling roadside nitrogen dioxide concentrations, July 2017, Available at: <https://uk-air.defra.gov.uk/library/no2ten/index>

<sup>13</sup> Department for Environment, Food and Rural Affairs (Defra), 2007. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. <http://archive.Defra.gov.uk/environment/quality/air/airquality/strategy/documents/air-qualitystrategy-vol1.pdf>

<sup>14</sup> Department for Environment, Food and Rural Affairs (Defra), 2007. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. <http://archive.Defra.gov.uk/environment/quality/air/airquality/strategy/documents/air-qualitystrategy-vol1.pdf>

<sup>15</sup> DEFRA, Clean Air Strategy. 2019. [online] Available at:

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/770715/clean-air-strategy-2019.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf)

## *Local Air Quality Management*

- 6.2.16. Under Part IV of the Environment Act 1995 all local authorities are responsible for Local Air Quality Management (LAQM), the mechanism by which the Government's AQS objectives are to be achieved. As part of this LAQM role, local authorities are required to periodically review air quality in their area and to assess present and likely future air quality against the objectives defined in Regulations. Where a local authority anticipates an objective is expected to be breached within their area, they must designate an AQMA and develop an action plan to improve pollution levels and work towards achieving the AQS objectives. Under the current LAQM regime, a local authority is responsible for regular review and assessment of local air quality, reports on which are published following public consultation and review by the Department for Environment, Food and Rural Affairs (DEFRA).

## *Ecological Criteria*

- 6.2.17. The EU (Withdrawal Agreement) Act 2020 implements the air quality limit values that are included in the EU Directive and sets a critical level for annual mean concentrations of nitrogen oxides (NO<sub>x</sub>) to protect sensitive vegetation. Assessment of compliance with this critical level is undertaken at locations more than 20 km from towns with more than 250,000 inhabitants or more than 5 km from other built-up areas, industrial installations or motorways or major roads with traffic counts of more than 50,000 vehicles per day. This objective does not apply in those areas where assessment of compliance with the limit value is not required. UK statutory nature conservation agencies' (Natural Resource Wales) policy is to apply the criterion of 30 µg/m<sup>3</sup> on a precautionary basis as a benchmark only, in all designated conservation sites.
- 6.2.18. Critical loads for nitrogen (N) deposition have been set by the United Nations Economic Commission for Europe. A critical load is a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur, according to present knowledge. Critical loads vary by type of habitat and species. The critical load for deposition (eutrophication) is given as a range and is quoted in units of kg/ha/year, however the lower value of the critical load range is typically used in assessment as a precautionary principle.

## *Dust Deposition*

- 6.2.19. There are no national standards or guidelines for dust deposition currently set for the UK, nor by the European Union or any international organisation. This is mainly due to the difficulty in setting a standard that needs to relate to dust being a perceptual problem rather than being specifically related to health effects. Typically, site action levels for dust deposition are set at 200 mg/m<sup>2</sup>/day averaged over a 4-week period using a passive deposition gauge<sup>16</sup>.

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<sup>16</sup> IAQM (2018) Guidance on Monitoring in the Vicinity of Demolition and Construction Sites. Available at: [https://iaqm.co.uk/text/guidance/guidance\\_monitoring\\_dust\\_2018.pdf](https://iaqm.co.uk/text/guidance/guidance_monitoring_dust_2018.pdf)

## Planning Policy

### *National Planning Policy*

#### *Clean Air Plan for Wales*

6.2.20. The Clean Air Plan for Wales<sup>17</sup> aims to improve air quality and reduce the impacts of air pollution on human health, biodiversity, the natural environment and the economy. A key action within the plan is to develop a Clean Air Act for Wales to create a fit for purpose legislative and regulatory air quality management framework. A White Paper for this proposed Bill was published in January 2021<sup>18</sup>. This plan sets out “a 10-year pathway to achieving cleaner air” and has been structured around four core themes, with actions proposed under each of the following themes:

- People: Protecting the health and well-being of current and future generations.
- Environment: Taking action to support our natural environment, ecosystems and biodiversity
- Prosperity: Working with industry to reduce emissions, supporting a cleaner and more prosperous Wales
- Place: Creating sustainable places through better planning, infrastructure and transport.”

#### *Future Wales – The National Plan 2040*

6.2.21. The development plan for Wales “Future Wales – the National Plan 2040”<sup>19</sup> provides the framework for planning change and development in Wales over the next two decades towards sustainable living and efficient use of resources. It includes 11 Outcomes that it wants to achieve, including, of relevance to air quality, allowing people to live and work in healthy places, and having sustainable travel with lower emissions.

### *Planning Policy Wales*

6.2.22. The 11th edition of Planning Policy Wales<sup>20</sup> was released on the 24th February 2021. It sets out the current land use planning policy for Wales, providing the policy framework for the effective preparation of local planning authorities’ development plans. This is supplemented by a series of Technical Advice Notes, while procedural advice is given in circulars and policy clarification letters.

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<sup>17</sup> Welsh Government, 2020, The Clean Air Plan for Wales – Health Air, Healthy Wales. Available at: <https://gov.wales/sites/default/files/publications/2020-08/clean-air-plan-for-wales-healthy-air-healthy-wales.pdf#:~:text=The%20aim%20of%20the%20EE%80%80Clean%20Air%20Plan%20for,current%20and%20future%20generations.%20Creating%20sustainable%20places%20>

<sup>18</sup> Welsh Government, 2021, White Paper on a Clean Air (Wales) Bill. Available at: [white-paper-on-a-clean-air-wales-bill\\_0.pdf](https://gov.wales/sites/default/files/publications/2021-02/white-paper-on-a-clean-air-wales-bill_0.pdf) (gov.wales)

<sup>19</sup> Welsh Government, Future Wales The National Plan 2040, February 2021. Available at: <https://gov.wales/sites/default/files/publications/2021-02/future-wales-the-national-plan-2040.pdf>

<sup>20</sup> Welsh Government, Planning Policy Wales, February 2021. Available at: [https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11\\_0.pdf](https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf)

6.2.23. Air quality is specifically considered within Air Quality and Soundscape with section 6.7.6 stating that “In proposing new development, planning authorities and developers must, therefore:

- Address any implication arising as a result of its association with, or location within, air quality management areas, noise action planning priority areas or areas where there are sensitive receptors;
- not create areas of poor air quality or inappropriate soundscape; and
- seek to incorporate measures which reduce overall exposure to air and noise pollution and create appropriate soundscapes.”

*Regional Planning Policy*

*Joint Transport Plan for South West Wales*

6.2.24. The Joint Local Transport Plan for South West Wales (2015 - 2020)<sup>21</sup> is the result of the joint working between the four local authorities (Carmarthenshire, Neath Port Talbot, Swansea and Pembrokeshire) in south Wales. It replaces the individual local transport plans previously adopted by the four councils.

6.2.25. Policy E2 under Reducing Greenhouse gas emissions and other environmental impacts from transport states that City Region partners will “facilitate and promote improved rail and bus services, walking, cycling and car sharing to encourage modal shift and improve air quality”

*Local Planning Policy*

*Local Development Plan (2011-2026)*

6.2.26. The Local Development Plan (LDP)<sup>22</sup> is the development plan for Neath Port Talbot, and provides the basis for decisions on land use planning up to 2026.

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<sup>21</sup> Npt.gov.uk, Joint Transport Plan For South West Wales 2015 – 2020. Available at:  
[https://www.npt.gov.uk/media/4062/joint\\_ltp\\_300115.pdf?v=20170627002133](https://www.npt.gov.uk/media/4062/joint_ltp_300115.pdf?v=20170627002133)

<sup>22</sup> Npt.gov.uk, 2016, Local Development Plan (2011-2026). Available at:  
[https://www.npt.gov.uk/media/7321/ldp\\_written\\_statement\\_jan16.pdf?v=20170727124344](https://www.npt.gov.uk/media/7321/ldp_written_statement_jan16.pdf?v=20170727124344)

*Strategic Policy SP 16 Environmental Protection states that “Air, water and ground quality and the environment generally will be protected and where feasible improved through the following measures:*

- 1. Ensuring that proposals have no significant adverse effects on water, ground or air quality and do not significantly increase pollution levels;*
- 2. Giving preference to the development of brownfield sites over greenfield sites where appropriate and deliverable; and*
- 3. Ensuring that developments do not increase the number of people exposed to significant levels of pollution.”*

- 6.2.27. Policy EN 8 Pollution and Land Stability states that 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 to air pollution among others will not be permitted. It also states that proposals which would create new problems or exacerbate existing problems will not be acceptable unless mitigation measures are included to reduce the risk of harm to public health, biodiversity and/or local amenity to an acceptable level.

*Local Development Plan 2011-2026 – Pollution Supplementary Planning Guidance*

- 6.2.28. The Supplementary Planning Guidance (SPG)<sup>23</sup> sets out a more detailed topic or site-specific guidance on the way in which the policies of the LDP will be applied in particular circumstances or areas. While only policies in the LDP have special status in determining planning applications, SPG may be taken into account as a material consideration.

*Air Quality Strategy*

- 6.2.29. Neath Port Talbot's Local Air Quality Strategy<sup>24</sup>, “AirWise - clean air for everyone”, was published in November 2013. It sets out the Council's strategic policy for achieving cleaner air in partnership with the whole community. It also links in with the Council's aims and values and in particular with those relating to " Sustainable Communities and Environment" and “Prosperity for All,” which includes improving air quality and regenerating the area's physical and industrial environment.
- 6.2.30. The Section 1.6 explains about the achieving the long-term aims of the Airwise Strategy which includes:

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<sup>23</sup> Neath Port Talbot County Borough Council, Local Development Plan 2011 – 2026, October 2016. Available at : [https://www.npt.gov.uk/media/7468/spg\\_pollution\\_oct16.pdf](https://www.npt.gov.uk/media/7468/spg_pollution_oct16.pdf)

<sup>24</sup> Neath Port Talbot, AirWise Clean Air for Everyone, November 2013. Available at: <https://www.npt.gov.uk/media/4170/airwise.pdf?v=20171010104554>

*To ensure air quality in Neath Port Talbot allows residents and visitors to enjoy time outdoors without risk to their health;*

*To ensure air quality throughout the County Borough is better than the standards required by EU and UK legislation;*

*To achieve consistently good air quality in Port Talbot so that we 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”.*

## Guidance/ Best Practice

### *LAQM Technical Guidance*

- 6.2.31. Guidance concerning local air quality management is given in DEFRA's technical guidance LAQM.TG(16)<sup>25</sup>. The guidance provides relevant methods concerning treatment and interpretation of data for local authorities in relation to the LAQM regime but is frequently applied when undertaking assessments for planning applications.

### *Planning Guidance*

- 6.2.32. Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)'s 'Land-use Planning and Development Control: Planning for Air Quality' (2017)<sup>26</sup> guidance (IAQM Planning Guidance) sets out to ensure that air quality is adequately assessed in the land-use planning and development control processes. It comprises an initial screening stage to determine the need for an air quality assessment. If further assessment is required, a number of more stringent criteria are provided to help establish the need for further work, which may be either qualitative or quantitative, simple or detailed, depending on the impact of the development on, for instance, traffic flow. It also provides a framework for describing the magnitude of changes in local air pollutant concentrations at individual receptors (the impact) and gives advice on how overall significance may be assessed using professional judgement (the effect).

### *Construction Dust Guidance*

- 6.2.33. The IAQM Construction Dust Guidance<sup>3</sup> provides a framework for a risk-based approach to the assessment of dust emissions from demolition and construction land development schemes and outlines options for mitigation depending on the level of 'dust risk' identified for a site through the assessment process.

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<sup>25</sup> Department for Environment Food & Rural Affairs, Local Air Quality Management, Technical Guidance (TG16), April 2021. Available at: <https://laqm.defra.gov.uk/documents/LAQM-TG16-April-21-v1.pdf>

<sup>26</sup> Environmental Protection UK and Institute of Air Quality Management (2017), 'Land-Use Planning & Development Control: Planning for Air Quality', <http://iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf>

## *Air Quality Impacts on Nature Sites Guidance*

- 6.2.34. The IAQM Air Quality Impacts on Nature Sites Guidance<sup>27</sup> focuses on air quality assessments in support of Habitats Regulations Assessments (HRA), but it is also applicable when assessing the air quality impact on national or local designated nature conservation sites. It provides practical guidance for assessing the air quality impacts of development on designated nature conservation sites.

## *Assessment of Road Traffic Emissions under the Habitats Regulations Guidance*

- 6.2.35. Natural England (NE) have published their internal guidance detailing 'Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations'<sup>28</sup> to assist practitioners in the assessment of the potential impacts from road traffic emissions on the qualifying features of European Sites.

- 6.2.36. The IAQM Air Quality Impacts on Nature Sites Guidance<sup>29</sup> focuses on air quality assessments in support of Habitats Regulations Assessments (HRA), but it is also applicable when assessing the air quality impact on national or local designated nature conservation sites. It provides practical guidance for assessing the air quality impacts of development on designated nature conservation sites.

## Assessment methodology

### *Existing air quality information*

- 6.2.37. A summary of existing air quality has been provided which updates the information previously collated for the ES Scoping Report. Existing air quality has been assessed for the air quality study area (defined in Section 6.3.1). The air quality study area for the occupational phase is determined based on traffic change screening criteria detailed in the Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)'s 'Land-use Planning and Development Control: Planning for Air Quality' (2017) guidance<sup>26</sup> (IAQM Planning Guidance).

- 6.2.38. Information on existing ambient air quality (baseline conditions), and identification of potential air quality constraints to the Proposed Development have been determined through reference to the following sources:

- AQMA mapping<sup>30</sup>;

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<sup>27</sup> Institute of Air Quality Management (2020), 'A guide to the assessment of air quality impacts on designated nature conservation sites', <http://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2020.pdf>

<sup>28</sup> Natural England (2018), Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations', <http://publications.naturalengland.org.uk/publication/4720542048845824>

<sup>29</sup> Institute of Air Quality Management (2020), 'A guide to the assessment of air quality impacts on designated nature conservation sites', <http://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2020.pdf>

<sup>30</sup> Defra AQMA interactive map [Online]. Available at: <http://uk-air.DEFRA.gov.uk/aqma/maps>

- Local authority Local Air Quality Management (LAQM) reports<sup>31,32</sup>;
- Background data from Defra's UK Air Information Resource (UK – AIR) website<sup>33</sup>;
- Pollution Climate Mapping (PCM) model data (based on a 2018 reference year)<sup>34</sup>;
- Lle Geo-Portal for Wales<sup>35</sup>; and
- Critical loads and habitat types obtained from the Air Pollution Information System (APIS)<sup>36</sup> website.

## *Construction assessment*

6.2.39. The IAQM Construction Dust Guidance<sup>3</sup> provides a method for assessing the risk of impacts occurring at receptors due to dust emissions during the construction phase of a development. The method used is deliberately conservative and further assessment is necessary for most schemes. There are four key steps in the assessment process, as follows:

- Step 1 (screening) - identification of the number of human receptors within 350 m of the boundary of the application site and/or within 50 m of the route(s) used by construction vehicles on the public highway up to 500 m from the application site entrance. Ecological receptors should also be identified within 50 m of either the boundary of the application site and/ or of the routes(s) used by construction vehicles on the public highway up to 500 m from the application site entrance. No further assessment is required if there are no receptors. 'Human' receptors include residential dwellings and other premises that may have a particular sensitivity to dust deposition or to the health effects of PM<sub>10</sub> e.g. vehicle showrooms, museums, long-term car parks, hospitals, schools and residential care homes. 'Ecological' receptors include sites with statutory designations e.g. 'Ramsar' sites, Special Protection Areas (SPA), Special Areas of Conservation (SAC) and Sites of Special Scientific Interest (SSSI), as well as non-statutory sites such as local wildlife sites and/or locations with very specific ecological sensitivities;
- Step 2 - Assessment of the risk of dust effects by considering the area around the applicant site in the context of potential dust impacts and distances to nearby receptors in relation to proposed activities in terms of demolition, earthworks, construction and trackout. Trackout can be defined as the deposition of dust and dirt from a construction site onto the public road network where it may then be re-suspended in the air by vehicles using the road network;

<sup>31</sup> Neath Port Talbot County Borough Council, 2020 Air Quality Progress Report, September 2020. Available at:

<https://www.npt.gov.uk/media/15338/npt-aq-progress-report-2020.pdf?v=20210309102532>

<sup>32</sup> Swansea Council, 2018 Air Quality Progress Report, September 2019. Available at:

<https://www.swansea.gov.uk/article/2850/Local-air-quality-management-reports>

<sup>33</sup> Uk-air.defra.gov.uk. Background Mapping Data For Local Authorities - Defra, UK. [online] Available at: <https://uk-air.defra.gov.uk/data/laqm-background-home>

<sup>34</sup> Uk-air.defra.gov.uk. 2020 NO<sub>2</sub> and PM Projections Data (2018 Reference Year) - Defra, UK. [online] Available at: <https://uk-air.defra.gov.uk/library/no2ten/2020-no2-pm-projections-from-2018-data>

<sup>35</sup> <https://lle.gov.wales/home?lang=en>

<sup>36</sup> UK Air Pollution Information System [online]. Available at: <http://www.apis.ac.uk/>

- Step 2A - Dust emission magnitude classes of 'large', 'medium' and 'small' are used to define the level of risk arising from each activity depending on the nature and scale of operation;
- Step 2B - The sensitivity of the surrounding area is defined as 'high', 'medium', and 'low' for dust soiling effects, human health impacts, and ecological impacts separately, taking into account the sensitivity of receptors, distance and number of receptors from dust generating activities, and other site specific factors (defined in the IAQM Construction Dust Guidance). In addition, for the effect on human health, background PM<sub>10</sub> concentrations are taken into account. The definitions are provided in Tables 2, 3 and 4 of the IAQM Construction Dust Guidance<sup>3</sup>;
- Step 2C - Tables 6 to 9 in the IAQM Construction Dust Guidance<sup>3</sup> are used to define the risk of dust impacts for each activity based on the dust emission magnitude and sensitivity of area, and are reproduced in Table 6.3 to Table 6.5 below.

**Table 6.3: Risk of Dust Impacts Demolition**

| Sensitivity of the Area | Dust emission Magnitude |             |             |
|-------------------------|-------------------------|-------------|-------------|
|                         | Large                   | Medium      | Small       |
| High                    | High Risk               | Medium Risk | Medium Risk |
| Medium                  | High Risk               | Medium Risk | Low Risk    |
| Small                   | Medium Risk             | Low Risk    | Negligible  |

**Table 6.4: Risk of Dust Impacts – Earthworks and Construction**

| Sensitivity of the Area | Dust emission Magnitude |             |            |
|-------------------------|-------------------------|-------------|------------|
|                         | Large                   | Medium      | Small      |
| High                    | High Risk               | Medium Risk | Low Risk   |
| Medium                  | Medium Risk             | Medium Risk | Low Risk   |
| Small                   | Low Risk                | Low Risk    | Negligible |

**Table 6.5: Risk of Dust Impacts – Trackout**

| Sensitivity of the Area | Dust emission Magnitude |        |       |
|-------------------------|-------------------------|--------|-------|
|                         | Large                   | Medium | Small |

|        |             |             |            |
|--------|-------------|-------------|------------|
| High   | High Risk   | Medium Risk | Low Risk   |
| Medium | Medium Risk | Low Risk    | Negligible |
| Small  | Low Risk    | Low Risk    | Negligible |

- Step 3 - Identification of site-specific mitigation in terms of the identified risks.
- Step 4 - Assessment of the significance of the dust effects, after the application of the site-specific mitigation. Once mitigation has been applied, there should not be any significant adverse effects.

## *Construction Traffic Assessment*

- 6.2.40. The need for an assessment of the effect of construction vehicle emissions on local air quality has been evaluated against criteria given in 2017 EPUK/IAQM Land-Use Planning and Development Control Guidance<sup>26</sup>. An air quality assessment would be required where there is a change of Heavy Duty Vehicle (HDV) flows of more than 100 per day measured as an annual average daily traffic flow (AADT), or more than 25 within an AQMA. The construction period is expected to last approximately 10 years depending on phasing, however, the number of HDVs per day travelling to and from the application site is not expected to exceed the screening criteria identified above. Consequentially the effect of construction vehicle emissions during the construction phase is not considered to be significant and is not required to be assessed.

## *Operational Assessment*

### *Local Air Quality Assessment*

- 6.2.41. An assessment of the impacts on local air quality from traffic emissions once the Proposed Development is complete and operational has been undertaken to determine if there are any significant effects.
- 6.2.42. The need for assessment of operational impacts of the Proposed Development has been determined based on the criteria given in the 2017 EPUK / IAQM Land-Use Planning and Development Control Guidance<sup>26</sup>. An air quality assessment may be required if the development comprises:
- 10 or more residential units or a site area of more than 0.5 ha; or
  - More than 1,000 m<sup>2</sup> of floor space for all other uses or a site area greater than 1 ha.

Coupled with either:

- More than 10 parking spaces; or
  - A centralised energy facility or other centralised combustion process.
- 6.2.43. One or more of these criteria were exceeded and further screening was undertaken using traffic change criteria in the 2017 EPUK / IAQM Land-Use Planning and Development Control Guidance<sup>26</sup> to determine the need for an air quality assessment of the effect of the operation of the Proposed Development due to changes in traffic flow, composition and speed. The relevant traffic change criteria are:

- Change of Light- Duty Vehicles (LDV) of 500 AADT or more (more than 100 LDV AADT within or adjacent to an AQMA); and
- Change of Heavy-Duty Vehicles (HDV)<sup>37</sup> of 100 AADT or more (more than 25 HDV AADT within or adjacent to an AQMA).

6.2.44. The Proposed Development is estimated to result in changes of LDV flows in excess of 500 AADT on a number links in the surrounding area as well as introducing new receptors where they have potential exposure to pollution.

6.2.45. An assessment of air quality concentrations has been undertaken using the detailed dispersion modelling software ADMS-Roads (version 5.0). The model uses information on traffic flows, speeds and fleet composition, vehicle emission rates, road alignment and width, and local meteorological data to estimate NO<sub>x</sub>, NH<sub>3</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations at identified receptor locations.

#### *Assessment Scenarios*

6.2.46. Traffic data was provided by Atkins Transportation for the following three scenarios:

- Base year (2019);
- Opening year (2026) without the Proposed Development (do-minimum (DM)), giving consideration to current and future committed developments in the vicinity; and
- Opening year (2026) with the Proposed Development (do-something (DS)), giving consideration to current and future committed developments in the vicinity.

6.2.47. A base year of 2019 was used in the air quality assessment, to ensure comparison with a relatively recent set of representative monitoring data which were not affected by the COVID-19 global pandemic in 2020. Monitoring and meteorological datasets for 2021 were not available at the time of undertaking the air quality assessment.

6.2.48. The earliest year for opening of the Proposed Development is expected to be 2024 rather than 2026. However, in neither future year is the Proposed Development likely to be fully occupied given that it will be built in phases over the subsequent years. For the purposes of this air quality assessment (and to ensure a conservative analysis) it was assumed that the Proposed Development will be fully occupied in 2026, which is a more pragmatic approach than assuming the highly unrealistic case that the Proposed Development is complete and operational in the earliest opening year of 2024.

#### *Traffic conditions*

6.2.49. Traffic conditions vary throughout the course of a day and between weekdays and weekends, hence 24-hour generic profiles for both weekday and weekend days have been applied in the model to improve the estimation of vehicle emissions in each hour of the year. The ADMS-Roads model was set up with an emission rate entered into the model for each road link and a time varying emissions file created

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<sup>37</sup> A HDV is any vehicle with a gross weight in excess of 3.5t, including heavy goods vehicles and coaches

containing the hourly traffic profile. Traffic data used in the assessment is presented in Appendix 6.1 and shown in Figure 6.2.

## *Emission Factors*

- 6.2.50. Vehicle exhaust emissions of NO<sub>x</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> for each road link in each modelled scenario were calculated using Defra's Emissions Factors Toolkit (EFT, version 10.1, August 2020) for the 2019 base and 2026 opening year (without the Proposed Development and with the Proposed Development) scenarios. The emission calculations assumed a road type of either "Urban – not London" or "Motorway – not London" for the modelled roads based on the defined classes in the EFT User Guide<sup>38</sup> and speeds provided by Atkins Transportation.
- 6.2.51. NH<sub>3</sub> emissions were calculated using National Atmospheric Emission Inventory (NAEI) emission rates for 2019. In all cases a precautionary approach was adopted, using the highest emissions rates for each vehicle type. The emission rate for Petrol Light Goods Vehicles (LGVs) was used for LDVs whilst the emission rate for Artic Heavy Goods Vehicles (HGVs) was used for HDVs. The NAEI emission rates for 2019 were used for the opening year, as data were not provided for future years.

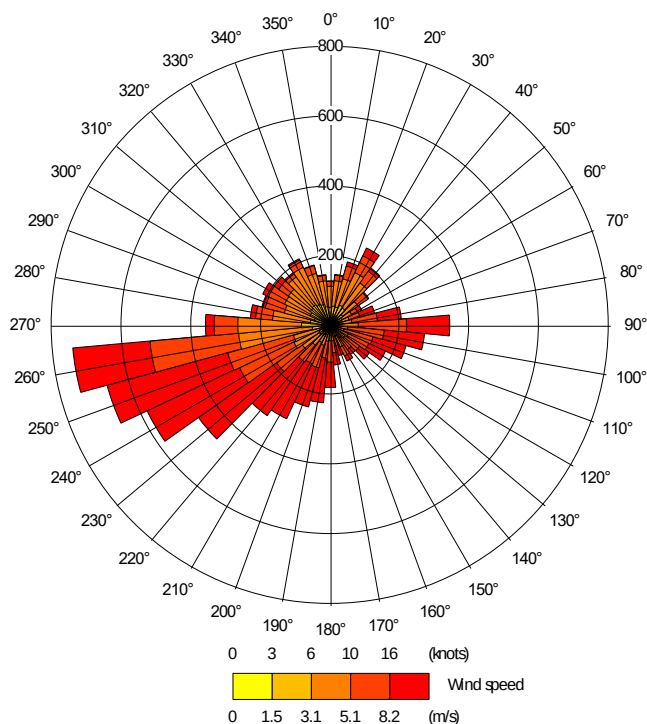
## *Meteorological Data*

- 6.2.52. Hourly sequential meteorological data for the nearest suitable meteorological station, in this case Mumbles Head, were used in the model for the year 2019 (to match the traffic model base year). The weather station is approximately 12 kilometres south west of the Site and is representative of conditions in the study area.
- 6.2.53. The basic data include date, hour, direction that the wind is blowing from, wind speed, how many eighths ('oktas') of the sky are covered by cloud, and surface air temperature.
- 6.2.54. A windrose for Mumbles Head in 2019 is presented in Figure 6.1, which indicates that the prevailing wind is from the west-southwest, which is reasonably typical for the UK.

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<sup>38</sup> DEFRA, August 2020, Emissions Factors Toolkit v10.1 User Guide. Available at: <https://laqm.defra.gov.uk/documents/EFTv10.1-user-guide-v1.0.pdf>

**Figure 6.1: Windrose for Mumbles Head Meteorological Site in 2019**



## Receptors

6.2.55. A total of 47 discrete receptors were included in the model. These comprised 18 existing human health receptors, 3 proposed receptors at the boundary of the Site, and 26 ecological receptors. Receptors HH6, HH7 and HH9 have been included in the absence of residential properties in the area. The assessed receptors are summarised in Appendix 6.2 and are shown in Figure 6.2.

## *Model Inputs and Assumptions*

6.2.56. The air dispersion model scenarios have been based on the following key inputs and assumptions:

- Ordnance Survey maps, to define the modelled road geometry and receptor locations;
- Road widths, manually determined from Google Earth Pro aerial photography;
- Traffic data in 24 hour Annual Average Daily Traffic (AADT) format for the base year (2019) and opening year (2026) without and with the Proposed Development scenarios;
- Surface roughness defined as 0.5 m for the modelled area (representative of parklands or open suburbia) and as 0.5 m for the meteorological station (agricultural area);
- Model default values used for surface albedo (0.23) and Priestly-Taylor parameter (1);

- The Monin-Obukhov length for both the modelled area and the meteorological station have been set at 30 metres to represent cities and large towns.

## *Model Uncertainty*

6.2.57. Any air dispersion modelling exercise has inherent areas of uncertainty, including:

- input data (traffic data, 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.

6.2.58. Uncertainty associated with vehicle emissions data has been minimised by using the most recent version of the ADMS-Roads modelling software (version 5.0).

6.2.59. Uncertainty associated with model algorithms and empirical relationships have been minimised by using algorithms and relationships within a dispersion model (ADMS-Roads) that has been independently validated and judged as fit for purpose.

6.2.60. Hourly sequential meteorological data have been used to estimate future concentrations provided by an approved supplier and which has been subject to robust quality checks. The key limiting assumption is that conditions in the future will be the same as in the past; however, in reality no two years are the same. To address some of this uncertainty, the meteorological data used in the model was for the same year as traffic data.

6.2.61. There is greater uncertainty associated with estimating future concentrations of ammonia than for NO<sub>x</sub> or PM, given that emission factors are derived from the NAEI emission rates rather than the EFT which provides emission rates by road type and speed and for future years. However, a conservative approach for the ammonia emission rates was adopted to ensure a robust assessment.

6.2.62. Given the above, the approach taken to this assessment is robust and in line with good practice.

## *Model Verification*

6.2.63. Model verification is the process of determining the local area performance of the base year model in comparison with measured data. The verification step involves comparison of modelled pollutant concentrations at suitable monitoring sites with monitored values that are representative of the base model period (in this case 2019).

6.2.64. Where there is a disparity between modelled and measured concentrations, and where further improvements to input data are not possible, then if required, an appropriate adjustment factor can be determined to correct for systematic bias. This adjustment is applied to the base year and future year model outputs.

6.2.65. Model verification is discussed in Appendix 6.3.

*Comparison with Air Quality Criteria – Nitrogen Dioxide*

6.2.66. To derive total annual mean NO<sub>2</sub> concentrations from the modelled road NO<sub>x</sub> concentrations, and hence allow a comparison with the air quality criteria, the method described in the Department for Environment, Food & Rural Affairs (Defra) LAQM Technical Guidance<sup>39</sup> was used. The total annual mean NO<sub>2</sub> is calculated from the modelled road NO<sub>x</sub> and background NO<sub>2</sub>. The conversion was carried out using the NO<sub>x</sub> to NO<sub>2</sub> conversion spreadsheet Version 8.1 available from the tools on the Defra UK-AIR website<sup>40</sup>. In addition to the modelled road NO<sub>x</sub> and background NO<sub>2</sub> data, the NO<sub>x</sub> to NO<sub>2</sub> conversion spreadsheet requires a local authority area to be specified to determine regional oxidant concentrations, and a traffic mix to determine the proportion of primary NO<sub>2</sub>. The local authority used was 'Castell-nedd Port Talbot - Neath Port Talbot', and the traffic mix was "All other urban UK traffic".

6.2.67. As only annual mean NO<sub>2</sub> estimates have been generated using the air dispersion model, commentary on potential impacts on hourly mean NO<sub>2</sub> concentrations, which has its own criterion, is possible with reference to Defra's LAQM Technical Guidance<sup>25</sup>. The guidance suggests that if annual mean concentrations of NO<sub>2</sub> do not exceed 60 µg/m<sup>3</sup> then it is unlikely that hourly mean concentrations would exceed the criterion set for the hourly mean.

*Comparison with Air Quality Criteria – Particulates (PM<sub>10</sub>)*

6.2.68. To determine total annual mean concentrations of PM<sub>10</sub> at human health receptors, the modelled road contribution is added to the background concentration to give the total concentration for comparison with the annual mean assessment criterion.

6.2.69. Annual mean PM<sub>10</sub> concentrations are used to derive the number of exceedances of the 24-hour mean PM<sub>10</sub> criterion, of which 35 are allowed. The method described in Defra's LAQM Technical Guidance<sup>25</sup> was applied. This method is based on the relationship between the number of 24-hour exceedances of 50 µg/m<sup>3</sup> and the annual mean concentration derived from UK Automatic Network Sites. This is described in Equation 1.

**Equation 1: Calculation of PM<sub>10</sub> 24-Hour Mean Exceedances**

Number of exceedances of 24-hour mean of 50 µg/m<sup>3</sup> =  $-18.5 + 0.00145 * a3 + (206/a)$

where 'a' = total annual mean PM<sub>10</sub> concentration

6.2.70. It is noted that there is a known limitation of the equation when the annual mean PM<sub>10</sub> concentrations are below 14.8 µg/m<sup>3</sup>. It can be considered that when annual mean PM<sub>10</sub> concentrations are below 14.8 µg/m<sup>3</sup> there would not be a risk of the 24-hour mean PM<sub>10</sub> objective being exceeded.

<sup>39</sup> Department for Environment Food & Rural Affairs, Local Air Quality Management, Technical Guidance (TG16), April 2021. Available at: <https://laqm.defra.gov.uk/documents/LAQM-TG16-April-21-v1.pdf>

<sup>40</sup> Available at: <https://uk-air.defra.gov.uk/>

## Criteria of Magnitude Effect

- 6.2.71. The magnitude of effect is presented as the change in pollutant concentrations in the opening year. This is the change in annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations, plus the change in the number of exceedances per year of the daily PM<sub>10</sub> objective.
- 6.2.72. Descriptors for the magnitude of impact of changes in ambient concentrations of pollutants in relation to AQS objectives at individual receptors, and guidance for the interpretation of the significance of these effects, are provided in the 2017 EPUK / IAQM Land-Use Planning and Development Control Guidance<sup>26</sup>. Changes in concentration are grouped according to the percentage change relative to an Air Quality Assessment Level (AQAL), and the description of that change, in terms of whether it is slight, moderate, substantial, or negligible, depends upon the absolute concentration in the future year. The term AQAL is used to include relevant air quality criteria, which in this case is the annual mean AQS objective. Percentage values are rounded to zero decimal places before application of the impact descriptors. The descriptors are provided in Table 6.3 in the guidance (repeated in Table 6.6 below for application to annual mean NO<sub>2</sub> and particulate matter).

**Table 6.6: Descriptors for changes in annual mean NO<sub>2</sub> and particulate matter concentrations**

| Long Term Average Concentration at Receptor | Percentage Change in Concentration Relative to AQAL |             |             |             |
|---------------------------------------------|-----------------------------------------------------|-------------|-------------|-------------|
|                                             | 1                                                   | 2 -5        | 6 -10       | >10         |
| 75% or less of AQAL                         | Negligible                                          | Negligible  | Slight      | Moderate    |
| 76 – 94% of AQAL                            | Negligible                                          | Slight      | Moderate    | Moderate    |
| 95 – 102% of AQAL                           | Slight                                              | Moderate    | Moderate    | Substantial |
| 103 – 109% of AQAL                          | Moderate                                            | Moderate    | Substantial | Substantial |
| 110% or more of AQAL                        | Moderate                                            | Substantial | Substantial | Substantial |

- 6.2.73. For the purposes of this assessment, changes of negligible or slight impact are deemed, individually, to be not significant. However, as explained in the 2017 EPUK / IAQM Land-Use Planning and Development Control Guidance<sup>26</sup>, any judgement on the overall significance of effect of a development must take into account such factors as:
- The existing and 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 underrating the predictions of impacts.

## *Designated Habitats Assessment*

- 6.2.74. Assessment of potential effects of changes in nitrogen deposition rates has been undertaken at identified sensitive ecological designations, in accordance with IAQM Air Quality Impacts on Nature Sites Guidance<sup>27</sup>. The background nitrogen deposition rate at each designated site has been obtained from the APIS website. The critical load for habitats considered in the assessment for each site was agreed with the project biodiversity experts, and the NH<sub>3</sub> and NO<sub>2</sub> to nitrogen deposition conversion rate for forest habitats was used to err on the side of caution, given that this rate is higher than for grassland habitats. It was assumed that there was no change in nitrogen deposition rates in future years, a conservative assumption, given that there should be a gradual decline in NO<sub>x</sub> concentrations. NH<sub>3</sub> emissions from road traffic have been included in the nitrogen deposition rates calculated and to determine the NH<sub>3</sub> contribution at the Crymlyn Bog/ Cors Crymlyn SAC site only, due to the presence of bryophytes which are sensitive to ammonia.
- 6.2.75. Where the change in nitrogen deposition is expected to be greater than 1% of the lower level of the critical load the project biodiversity experts have been consulted to assess the impact and consequently the significance of the change in nitrogen deposition rates.
- 6.2.76. Background N dep rates and relevant critical loads for each ecological site are detailed in Table 6.10.

## **6.3. Baseline environment**

### Study Area

- 6.3.1. The Site lies within the Neath Port Talbot administrative area. The air quality study area comprises a distance of 200m from roads affected by a change in traffic, as identified in the LAQM.TG (16)<sup>25</sup> and EPUK/IAQM Land- Use Planning and Development Control Guidance<sup>26</sup>. For the construction dust assessment, the study area includes a distance of 350 m of the boundary of the Site and/ or within 50 m of the route(s) used by construction vehicles on the public highway up to 500 m from the Site entrance.
- 6.3.2. There are numerous sensitive human health receptors in proximity to the Site within relevant public exposure, particularly to the south. The closest receptors are located at the existing Phase 1 area adjacent to the southern application site boundary.

### Local Air Quality Management (LAQM)

- 6.3.3. All local authorities are required by Part IV of the Environmental Act 1995 to review air quality in their area and to assess present and likely future air quality against objectives set out in the Government's Air Quality Strategy (AQS). Where a local authority finds that one or more AQS objectives are expected to be breached, it must designate an Air Quality Management Area (AQMA) and develop an action plan to reduce concentrations of the pollutants which exceed the objectives.
- 6.3.4. The Site lies within the administrative area of Neath Port Talbot County Borough Council (NPT).

- 6.3.5. NPT has declared one AQMA for exceedances of the 24-hour mean AQS objective for PM<sub>10</sub><sup>41</sup>. The Neath Port Talbot AQMA is located approximately 7.7 km south east of the Site and is considered unlikely to be affected.

## LAQM air quality monitoring

### *Continuous monitoring data*

- 6.3.6. Six Continuous Monitoring Stations (CMS) are operated in Neath Port Talbot by Neath Port Talbot County Borough Council. None of the CMS are considered representative of conditions within the Site, as they are located over 2 km away.

### *Passive monitoring data*

- 6.3.7. NPT undertake passive monitoring of nitrogen dioxide using diffusion tubes at 27 sites. None of these sites are within 200m of the Site or modelled road network, therefore were not considered further in the assessment due to their distance from the Site.

## Site specific air quality monitoring

- 6.3.8. A 3 month site-specific diffusion tube survey was undertaken during August to October 2021. The locations are shown on Figure 6.3. Average monthly NO<sub>2</sub> concentrations for August and September are shown in Table 6.7, data for October are not yet available. The two month average concentration at each site was annualised to provide an annual average concentration that could be compared with the national air quality annual mean objective in accordance with DEFRA TG(16) guidance. Annualisation used continuous monitoring data from Swansea Roadside, Narberth, Hafod-yr-ynys Roadside and Cardiff Newport Road continuous monitoring stations. The concentrations were adjusted back to the base year 2019 using a roadside NO<sub>2</sub> projection factor. The annualised monitoring results demonstrate that baseline NO<sub>2</sub> concentrations were well below the annual mean NO<sub>2</sub> national air quality objective (40 µg/m<sup>3</sup>), ranging between 15.9 and 29.1 µg/m<sup>3</sup>.

**Table 6.7 – Annualised and Adjusted Monitored Nitrogen Dioxide (NO<sub>2</sub>) Concentrations (µg/m<sup>3</sup>)**

| Location | Aug  | Sept | Period Mean | 2019/21 Roadside Projection Ratio - Rest of UK (HDV <10% | Annualisation factor | Bias Adjustment | Annual Mean |
|----------|------|------|-------------|----------------------------------------------------------|----------------------|-----------------|-------------|
| 1        | 13.0 | 10.7 | 11.9        | 1.115                                                    | 1.45                 | 0.89            | 17.1        |
| 2        | -    | 18.7 | 18.7        | 1.115                                                    | 1.21                 | 0.89            | 22.3        |
| 3        | 21.8 | 18.7 | 20.2        | 1.115                                                    | 1.45                 | 0.89            | 29.1        |

<sup>41</sup> Uk-air.defra.gov.uk. AQMA Details - Defra, UK. [online] Available at: [https://uk-air.defra.gov.uk/aqma/details?aqma\\_ref=76](https://uk-air.defra.gov.uk/aqma/details?aqma_ref=76)

| Location | Aug  | Sept | Period Mean | 2019/21 Roadside Projection Ratio - Rest of UK (HDV <10% | Annualisation factor | Bias Adjustment | Annual Mean |
|----------|------|------|-------------|----------------------------------------------------------|----------------------|-----------------|-------------|
| 4        | 18.0 | 22.5 | 20.2        | 1.115                                                    | 1.45                 | 0.89            | 29.1        |
| 5        | 10.3 | 11.7 | 11.0        | 1.115                                                    | 1.45                 | 0.89            | 15.9        |

Note: monthly concentrations are annualised to 2019 following TG (16) guidance and use a Roadside Projection Ratio.

## DEFRA mapped concentrations

- 6.3.9. Estimates of background pollutant concentrations in the UK are available on the DEFRA UK-AIR website<sup>33</sup>. The background estimates, which are a combination of measured and modelled data, are available for each one-kilometre grid square throughout the UK for a reference year of 2018 and future year estimates up to 2030. These background estimates include contributions from all source sectors, e.g. road transport, industry and domestic and commercial heating systems.
- 6.3.10. The mapped background concentrations used for the base year of 2019 and the planned opening year of 2026 are shown in Table 6.8 for the grid squares in which the identified receptors are located
- 6.3.11. The data indicate that background concentrations for NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> are well below relevant AQS objectives for human health both in 2019 and 2026.

**Table 6.8: DEFRA mapped background concentrations, 2019 and 2026 (µg/m<sup>3</sup>)**

| Grid reference | 2019 Background Concentrations (µg/m <sup>3</sup> ) |                 |                  |                   | 2026 Background Concentrations (µg/m <sup>3</sup> ) |                 |                  |                   |
|----------------|-----------------------------------------------------|-----------------|------------------|-------------------|-----------------------------------------------------|-----------------|------------------|-------------------|
|                | NO <sub>x</sub>                                     | NO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> | NO <sub>x</sub>                                     | NO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> |
| 270500_193500  | 10.9                                                | 8.4             | 10.7             | 6.9               | 8.2                                                 | 6.5             | 9.9              | 6.3               |
| 270500_197500  | 21.0                                                | 15.4            | 13.4             | 8.6               | 14.4                                                | 10.9            | 12.6             | 7.9               |
| 271500_193500  | 11.6                                                | 9.0             | 11.0             | 7.0               | 8.6                                                 | 6.8             | 10.2             | 6.4               |
| 271500_194500  | 10.4                                                | 8.1             | 10.7             | 6.9               | 7.9                                                 | 6.2             | 9.9              | 6.3               |
| 271500_195500  | 11.4                                                | 8.8             | 11.0             | 7.1               | 8.7                                                 | 6.8             | 10.2             | 6.4               |
| 271500_196500  | 14.8                                                | 11.2            | 11.9             | 7.5               | 11.1                                                | 8.6             | 11.1             | 6.9               |
| 271500_197500  | 17.5                                                | 13.1            | 12.6             | 8.0               | 12.4                                                | 9.5             | 11.7             | 7.4               |

| Grid reference | 2019 Background Concentrations (µg/m³) |                 |                  |                   | 2026 Background Concentrations (µg/m³) |                 |                  |                   |
|----------------|----------------------------------------|-----------------|------------------|-------------------|----------------------------------------|-----------------|------------------|-------------------|
|                | NO <sub>x</sub>                        | NO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> | NO <sub>x</sub>                        | NO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> |
| 272500_193500  | 12.2                                   | 9.4             | 11.1             | 7.1               | 8.9                                    | 7.0             | 10.3             | 6.5               |
| 272500_194500  | 18.0                                   | 13.5            | 13.1             | 8.1               | 12.1                                   | 9.3             | 12.3             | 7.4               |
| 272500_195500  | 19.4                                   | 14.4            | 12.9             | 8.0               | 13.0                                   | 10.0            | 12.1             | 7.4               |
| 272500_196500  | 19.8                                   | 14.7            | 13.1             | 8.3               | 13.4                                   | 10.3            | 12.2             | 7.6               |
| 273500_193500  | 18.4                                   | 13.7            | 12.5             | 7.9               | 13.4                                   | 10.2            | 11.7             | 7.2               |
| 273500_194500  | 16.3                                   | 12.2            | 12.2             | 7.8               | 11.9                                   | 9.2             | 11.4             | 7.2               |
| Average        | 15.5                                   | 11.7            | 12.0             | 7.6               | 11.1                                   | 8.6             | 11.2             | 7.0               |

## Pollution Climate Mapping (PCM)

- 6.3.12. DEFRA's PCM model<sup>34</sup> is used to demonstrate compliance with air quality limit values and provides projected roadside concentrations of pollutants, for the years 2018-2030 inclusive, based on a 2018 reference year.
- 6.3.13. There are PCM links in the vicinity of the Site as identified in Table 6.9 and shown in Figure 6.3, including links on the A4230, A48 and M4. The annual mean NO<sub>2</sub> roadside concentrations for A4230 and A48 are shown to be compliant in the base year of 2019 (and the subsequent years) with the air quality limit value of 40 µg/m³. The PCM links on the M4 although not compliant in the base year 2019, are expected to be compliant by 2021 as shown in Table 6.11 below.

**Table 6.9: DEFRA PCM model roadside annual mean NO<sub>2</sub> concentration for PCM links in the study area (µg/m³)**

| Road Name | PCM Census ID | Maximum Annual Mean NO <sub>2</sub> Concentrations (µg/m³) 2019 |
|-----------|---------------|-----------------------------------------------------------------|
| A4230     | 802020657     | 19.6                                                            |
|           | 802074084     | 21.9                                                            |
| A48       | 802030523     | 30.1                                                            |
|           | 802050518     | 25.8                                                            |
| M4        | 801077075     | 40.1 (compliant by 2020, with concentration of 37.9 µg/m³)      |

| Road Name | PCM Census ID | Maximum Annual Mean NO <sub>2</sub> Concentrations (µg/m <sup>3</sup> ) 2019 |
|-----------|---------------|------------------------------------------------------------------------------|
|           | 802050523     | 42.2 (compliant by 2021, with concentration of 37.4 µg/m <sup>3</sup> )      |
|           | 802074085     | 42.8 (compliant by 2021, with concentration of 37.9 µg/m <sup>3</sup> )      |

## Nitrogen Deposition

- 6.3.14. All designated ecological sites within the study area contain habitats sensitive to oxides of nitrogen (NO<sub>x</sub>) and nitrogen deposition, or species dependent upon those habitats. Critical loads for nitrogen deposition and background deposition rates are available from the Air Pollution Information System (APIS) website<sup>42</sup>. The critical loads for nitrogen deposition and background nitrogen deposition rates for relevant habitats within designated sites are shown in Table 6.10.

**Table 6.10: Qualifying Features, Nitrogen Deposition Critical Loads and Background Nitrogen Deposition (kg N/ha/yr) at Designated Sites**

| Receptor ID | Site Name & Designations                                                 | Habitant Type                                | Critical Load Range | APIS Background N dep (max) |
|-------------|--------------------------------------------------------------------------|----------------------------------------------|---------------------|-----------------------------|
| ECO1        | Crymlyn Bog / Cors Crymlyn_SSSI                                          | Transition mires and quaking bogs (H7140)    | 5-10                | 17.1                        |
| ECO2        | Crymlyn Bog/Cors Crymlyn SAC and Ramsar, Pant- Y-Sais SSSI, NNR and LNR, | Transition mires and quaking bogs (H7140)    | 5-10                | 17.1                        |
| ECO3        | Crymlyn Bog and Pant Y Sais NNR                                          | Valley mires, poor fens and transition mires | 10-15               | 17.1                        |
| ECO4        | Cwm- du Wood_AW                                                          | Broadleaved woodland                         | 10-20               | 23.0                        |
| ECO5        | Ancient 1_AW Woodland                                                    | Broadleaved woodland                         | 10-20               | 23.0                        |
| ECO6        | Ancient 2_AW Woodland                                                    | Broadleaved woodland                         | 10-20               | 23.0                        |
| ECO7        | Ancient 3_AW Woodland                                                    | Broadleaved woodland                         | 10-20               | 23.0                        |

<sup>42</sup> <http://www.apis.ac.uk/> [Accessed November 2021]

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Coed Darcy



| Receptor ID | Site Name & Designations          | Habitant Type                                             | Critical Range | Load | APIS Background N dep (max) |
|-------------|-----------------------------------|-----------------------------------------------------------|----------------|------|-----------------------------|
| ECO8        | Gelli-bwch Plantation_AW          | Broadleaved woodland                                      | 10-20          |      | 23.0                        |
| ECO9        | Earls Wood_AW                     | Broadleaved woodland                                      | 10-20          |      | 17.1                        |
| ECO10       | Ancient Woodland 4_AW             | Broadleaved woodland                                      | 10-20          |      | 17.1                        |
| ECO11       | Craig-dew_AW                      | Broadleaved woodland                                      | 10-20          |      | 17.1                        |
| ECO12       | Red Jacket Fen_LWS / SINC         | Valley mires, poor fens and transition mires              | 10-15          |      | 17.1                        |
| ECO13       | Junction 44 Heathlands_LWS / SINC | Dry heaths                                                | 10-20          |      | 23.0                        |
| ECO14       | Jersey Marine Woods_LWS / SINC    | Broadleaved woodland                                      | 10-20          |      | 17.1                        |
| ECO15       | Tennant Canal_LWS / SINC          | Dune slack pools (permanent oligotrophic waters)          | 10-20          |      | 23.0                        |
| ECO16       | Neath Canal_LWS / SINC            | Dune slack pools (permanent oligotrophic waters)          | 10-20          |      | 17.1                        |
| ECO17       | Earlswood Grasslands_LWS / SINC   | Non-Mediterranean / dry acid and neutral closed grassland | 10-15          |      | 17.1                        |
| ECO18       | Amazon Woodland_LWS / SINC        | Dune slack pools (permanent oligotrophic waters)          | 10-20          |      | 17.1                        |
| ECO19       | Neath Estuary_LWS / SINC          | Broadleaved woodland                                      | 10-20          |      | 17.1                        |
| ECO20A/B    | Earlswood Area_LWS / SINC         | Dry heaths                                                | 10-20          |      | 17.1                        |

| Receptor ID | Site Name & Designations               | Habitant Type                                            | Critical Range | Load | APIS Background N dep (max) |
|-------------|----------------------------------------|----------------------------------------------------------|----------------|------|-----------------------------|
| ECO21A/B/C  | Fabian Way Wildflower Verge_LWS / SINC | Non-Mediterranean dry acid and neutral closed grassland  | 10-15          |      | 17.1                        |
| ECO22       | Pentrefynnon_LWS SINC                  | /Non-Mediterranean dry acid and neutral closed grassland | 10-15          |      | 23.0                        |
| ECO23       | Red Jacket Fen_LWS SINC                | Valley mires, poor fens and transition mires             | 10-15          |      | 17.1                        |

## Constraints

6.3.15. There is a Peak Gen Balancing Services Plant located within Llandarcy Business Park on the eastern boundary of the Site, which generates emissions of air pollutants as a result of its generating plant. An air quality assessment was undertaken for this plant in 2018<sup>43</sup>. This assessment showed that there was the potential for the 1-hour mean objective for NO<sub>2</sub> to be exceeded in proximity to the plant. This has been taken into account when developing the masterplan to ensure no sensitive receptors are within the area of potential exceedance.

6.3.16. There are no other constraints to the development.

## Summary of air quality baseline conditions

6.3.17. A review of baseline air quality information indicates that the Site is not within an AQMA. There is no local authority monitoring data near to the Site although Site specific monitoring data indicates that there are not currently any exceedances of AQS objectives at sensitive locations near to the Site and background concentrations are well below their respective AQS objectives.

6.3.18. Annual mean roadside NO<sub>2</sub> concentrations on links on the A4230, A48 and M4 produced by the DEFRA PCM model are shown to be below the air quality limit value in 2021 with decreasing concentrations in subsequent years.

## **6.4. Inherent design mitigation**

6.4.1. The development of the masterplan has taken into consideration the location of sensitive receptors from potential sources of emissions to air from the Peak Gen Balancing Services Plant, as noted under the constraints to development section.

<sup>43</sup> [Peak Gen Llandarcy 2018 \(planninginspectorate.gov.uk\)](https://planninginspectorate.gov.uk/peak-gen-llandarcy-2018/)

## 6.5. Potential environmental impacts & effects

### Construction phase

- 6.5.1. In accordance with IAQM Construction Dust Guidance<sup>3</sup>, an initial screening assessment was carried out to determine the location and number of sensitive receptors within relevant distances of the Site's boundary.
- 6.5.2. More than 100 human health receptors are located within a buffer of 350 m from the boundary of the Site. The buffers are shown in Figure 6.4.
- 6.5.3. The ecological sites Cors Crymlyn / Crymlyn Bog Site of Special Scientific Interest (SSSI), Crymlyn Bog and Pant Y Sais National Nature Reserve (NNR), Crymlyn Bog RAMSAR and Crymlyn Bog / Cors Crymlyn Special Area of Conservation (SAC) are located adjacent to western boundary of the Site.
- 6.5.4. Table 6.11 shows the assumed dust emission magnitude for each construction activity. There are no demolition activities associated with the Proposed Development. Earthworks were classed as "large", considering the area of the Site is greater than 10,000 m<sup>2</sup>. Construction activities are categorised as "large" as the total volume will be more than 100,000 m<sup>3</sup>. Estimates of vehicle movements for the construction of the Proposed Development suggest that there could be approximately 20 HDV outward movements per day, which results in a "medium" emission magnitude for trackout. At this stage the routes construction vehicles will take are not yet known, hence the buffers around two potential routes are provided as shown in Figure 6.3.

**Table 6.11: Dust emission magnitude**

| Activity     | Dust Emission Magnitude |
|--------------|-------------------------|
| Demolition   | N/A                     |
| Earthworks   | Large                   |
| Construction | Large                   |
| Trackout     | Medium                  |

- 6.5.5. There are more than 100 high sensitivity receptors and one high sensitive ecological receptor (Crymlyn Bog SAC) within 20m of the application site boundary, and consequently the sensitivity of the surrounding area to dust soiling is high. As annual mean PM<sub>10</sub> concentrations are below 24 µg/m<sup>3</sup> in the area (see Table 6.8), the sensitivity of the surrounding area to human health impacts is medium. There are no ecological sites near to the routes potentially affected by trackout dust.
- 6.5.6. The potential risk of dust soiling and human health impacts, given the dust emissions magnitudes and sensitivities described above, are summarised in Table 6.12. Overall, the Site can be considered as high risk.

**Table 6.12: Summary of expected dust risk**

| Sensitivity of surrounding area |        | Summary of dust risk |             |              |             |
|---------------------------------|--------|----------------------|-------------|--------------|-------------|
|                                 |        | Demolition           | Earthworks  | Construction | Trackout    |
| Dust Soiling                    | High   | N/A                  | High Risk   | High Risk    | Medium Risk |
| Human Health                    | Medium | N/A                  | Medium Risk | Medium Risk  | Low Risk    |
| Ecological                      | High   | N/A                  | High Risk   | High Risk    | N/A         |

## Operational Phase

### *Nitrogen Dioxide*

- 6.5.7. Total annual mean NO<sub>2</sub> concentrations and changes in concentrations of NO<sub>2</sub> at modelled receptors in 2026 are presented in Table 6.13.
- 6.5.8. The results indicate that annual mean NO<sub>2</sub> concentrations are estimated to be below the AQS objective of 40 µg/m<sup>3</sup> at all selected receptors in 2026, either without or with the Proposed Development. The highest annual mean NO<sub>2</sub> concentration is 37.2 µg/m<sup>3</sup> at receptor HH1 on Cefn Parc and approximately 17 m from the M4, with the Proposed Development in place. The greatest change at an existing receptor is 1.4 µg/m<sup>3</sup> at receptor HH9 on B4290.
- 6.5.9. All of the receptors are expected to experience a negligible impact with the exception of HH1 which is expected to experience a slight impact.
- 6.5.10. As estimated annual mean NO<sub>2</sub> concentrations do not exceed 60 µg/m<sup>3</sup> at any receptor, it is unlikely that the 1-hour mean AQS objective would be exceeded.
- 6.5.11. All of the proposed receptors within the Site (PR1 to PR3) are expected to have concentrations below the AQS objective, with the highest concentration estimated to be 22.3 µg/m<sup>3</sup> at the boundary of the Site.

**Table 6.13: Annual mean NO<sub>2</sub> concentrations (µg/m<sub>3</sub>) and impact**

| Receptor ID | 2026 Background | 2026 DM | 2026 DS | Change | Impact     |
|-------------|-----------------|---------|---------|--------|------------|
| HH1         | 10.3            | 36.6    | 37.2    | 0.6    | Slight     |
| HH2         | 10.3            | 18.7    | 19.0    | 0.3    | Negligible |
| HH3         | 10.3            | 19.1    | 19.4    | 0.3    | Negligible |
| HH4         | 10.3            | 21.9    | 22.4    | 0.5    | Negligible |

| Receptor ID | 2026 Background | 2026 DM | 2026 DS | Change | Impact     |
|-------------|-----------------|---------|---------|--------|------------|
| HH5         | 10.3            | 16.7    | 17.2    | 0.5    | Negligible |
| HH6         | 10.0            | 18.9    | 19.5    | 0.6    | Negligible |
| HH7         | 10.0            | 14.7    | 15.0    | 0.3    | Negligible |
| HH8         | 10.0            | 22.5    | 22.9    | 0.4    | Negligible |
| HH9         | 10.0            | 16.6    | 18.0    | 1.4    | Negligible |
| HH10        | 10.3            | 19.2    | 19.4    | 0.2    | Negligible |
| HH11        | 10.3            | 27.8    | 28.3    | 0.5    | Negligible |
| HH12        | 6.8             | 8.3     | 8.6     | 0.3    | Negligible |
| HH13        | 6.8             | 8.4     | 8.6     | 0.2    | Negligible |
| HH14        | 6.8             | 7.7     | 7.8     | 0.1    | Negligible |
| HH15        | 6.2             | 7.8     | 7.9     | 0.1    | Negligible |
| HH16        | 9.2             | 12.4    | 12.5    | 0.1    | Negligible |
| HH17        | 8.6             | 30.8    | 31.3    | 0.5    | Negligible |
| HH18        | 8.6             | 26.3    | 26.7    | 0.4    | Negligible |
| PR1         | N/A             | N/A     | 9.7     | N/A    | N/A        |
| PR2         | N/A             | N/A     | 22.3    | N/A    | N/A        |
| PR3         | N/A             | N/A     | 12.5    | N/A    | N/A        |

Particulate matter ( $PM_{10}$ )

6.5.12. Total annual mean  $PM_{10}$  concentrations, the number of exceedances of the daily mean standard (in brackets) and changes in concentrations of  $PM_{10}$  for selected receptors are presented in Table 6.14. The results indicate that total annual mean concentrations of  $PM_{10}$  are estimated to be well below the AQS objective of  $40 \mu\text{g}/\text{m}^3$  at all receptors, either with or without the Proposed Development in place. Likewise, no exceedances of the daily mean AQS objective ( $50 \mu\text{g}/\text{m}^3$ , not to be exceeded more than 35 times a year) are expected to occur at any receptor.

6.5.13. The Proposed Development is expected to result in a negligible impact in annual mean  $PM_{10}$  concentrations at all selected receptor locations compared to the without Proposed Development scenario.

**Table 6.14: Annual mean PM<sub>10</sub> concentrations (µg/m<sup>3</sup>) and impact**

| Receptor ID | 2026 Background | 2026 DM  | 2026 DS  | Change | Impact     |
|-------------|-----------------|----------|----------|--------|------------|
| HH1         | 12.2            | 16.8 (1) | 16.9 (1) | 0.1    | Negligible |
| HH2         | 12.2            | 13.8 (0) | 13.9 (0) | 0.1    | Negligible |
| HH3         | 12.2            | 14 (0)   | 14 (0)   | <0.1   | Negligible |
| HH4         | 12.2            | 14.4 (0) | 14.5 (0) | 0.1    | Negligible |
| HH5         | 12.2            | 13.6 (0) | 13.8 (0) | 0.2    | Negligible |
| HH6         | 12.1            | 14 (0)   | 14.2 (0) | 0.2    | Negligible |
| HH7         | 12.1            | 13 (0)   | 13 (0)   | <0.1   | Negligible |
| HH8         | 12.1            | 14.1 (0) | 14.2 (0) | 0.1    | Negligible |
| HH9         | 12.1            | 13.9 (0) | 14.5 (0) | 0.6    | Negligible |
| HH10        | 12.2            | 14.8 (0) | 14.9 (0) | 0.1    | Negligible |
| HH11        | 12.2            | 15.2 (0) | 15.2 (0) | <0.1   | Negligible |
| HH12        | 10.2            | 10.7 (0) | 10.8 (0) | 0.1    | Negligible |
| HH13        | 10.2            | 10.7 (0) | 10.8 (0) | 0.1    | Negligible |
| HH14        | 10.2            | 10.5 (0) | 10.5 (0) | <0.1   | Negligible |
| HH15        | 9.9             | 10.4 (0) | 10.5 (0) | 0.1    | Negligible |
| HH16        | 11.4            | 12.1 (0) | 12.1 (0) | <0.1   | Negligible |
| HH17        | 11.1            | 14.8 (0) | 14.8 (0) | <0.1   | Negligible |
| HH18        | 11.1            | 14 (0)   | 14 (0)   | <0.1   | Negligible |
| PR1         | N/A             | N/A      | 10.9 (0) | N/A    | N/A        |
| PR2         | N/A             | N/A      | 14.3 (0) | N/A    | N/A        |
| PR3         | N/A             | N/A      | 11.9 (0) | N/A    | N/A        |

## Particulate Matter (PM<sub>2.5</sub>)

- 6.5.14. Total annual mean PM<sub>2.5</sub> concentrations and changes in concentrations of PM<sub>2.5</sub> for modelled receptors are presented in Table 6.15.
- 6.5.15. The results indicate that total annual mean concentrations of PM<sub>2.5</sub> are estimated to be well below the AQS objective of 25 µg/m<sup>3</sup> at all selected receptors, either with or without the Proposed Development in place. Furthermore, impacts on annual mean PM<sub>2.5</sub> concentrations as a result of the Proposed Development can be described as negligible at all receptor locations.

**Table 6.15: Annual mean PM<sub>2.5</sub> concentrations (µg/m<sup>3</sup>) and impact**

| Receptor ID | 2026 Background | 2026 DM | 2026 DS | Change | Impact     |
|-------------|-----------------|---------|---------|--------|------------|
| HH1         | 7.6             | 10.5    | 10.5    | <0.1   | Negligible |
| HH2         | 7.6             | 8.6     | 8.6     | <0.1   | Negligible |
| HH3         | 7.6             | 8.7     | 8.7     | <0.1   | Negligible |
| HH4         | 7.6             | 8.9     | 9.0     | 0.1    | Negligible |
| HH5         | 7.6             | 8.5     | 8.5     | <0.1   | Negligible |
| HH6         | 7.4             | 8.5     | 8.6     | 0.1    | Negligible |
| HH7         | 7.4             | 7.9     | 8.0     | 0.1    | Negligible |
| HH8         | 7.4             | 8.6     | 8.7     | 0.1    | Negligible |
| HH9         | 7.4             | 8.4     | 8.7     | 0.3    | Negligible |
| HH10        | 7.6             | 9.1     | 9.1     | <0.1   | Negligible |
| HH11        | 7.6             | 9.5     | 9.5     | <0.1   | Negligible |
| HH12        | 6.4             | 6.7     | 6.8     | 0.1    | Negligible |
| HH13        | 6.4             | 6.7     | 6.8     | 0.1    | Negligible |
| HH14        | 6.4             | 6.6     | 6.6     | <0.1   | Negligible |
| HH15        | 6.3             | 6.6     | 6.6     | <0.1   | Negligible |
| HH16        | 7.2             | 7.6     | 7.6     | <0.1   | Negligible |
| HH17        | 6.9             | 9.2     | 9.2     | <0.1   | Negligible |

| Receptor ID | 2026 Background | 2026 DM | 2026 DS | Change | Impact     |
|-------------|-----------------|---------|---------|--------|------------|
| HH18        | 6.9             | 8.7     | 8.7     | <0.1   | Negligible |
| PR1         | N/A             | N/A     | 6.9     | N/A    | N/A        |
| PR2         | N/A             | N/A     | 8.9     | N/A    | N/A        |
| PR3         | N/A             | N/A     | 7.4     | N/A    | N/A        |

## Nitrogen deposition

- 6.5.16. NOx concentrations were estimated at 26 ecological receptor points and are presented in Table 6.16.
- 6.5.17. The results indicate that total annual mean concentrations of NOx are estimated to be below 30 µg/m<sup>3</sup> at the majority of selected receptors, either with or without the Proposed Development in place.
- 6.5.18. Concentrations in excess of 30µg/m<sup>3</sup> either with or without the Proposed Development in place are estimated at receptor points ECO4, ECO5, ECO6, ECO7, ECO15, ECO17, ECO19, ECO20A, ECO21A and ECO21B.

**Table 6.16: Annual mean NOx concentrations (µg/m<sup>3</sup>)**

| Receptor ID | Annual Mean NOx (µg/m <sup>3</sup> ) |       |       |                  |
|-------------|--------------------------------------|-------|-------|------------------|
|             | Base                                 | DM    | DS    | Change (DS - DM) |
| ECO1        | 14.0                                 | 9.8   | 10.0  | 0.2              |
| ECO2        | 29.0                                 | 17.2  | 18.4  | 1.3              |
| ECO3        | 26.5                                 | 16.4  | 17.7  | 1.3              |
| ECO4        | 268.6                                | 139.6 | 142.6 | 3.0              |
| ECO5        | 109.1                                | 59.1  | 61.0  | 1.9              |
| ECO6        | 107.4                                | 58.1  | 61.4  | 3.3              |
| ECO7        | 97.3                                 | 52.6  | 53.5  | 0.9              |
| ECO8        | 41.7                                 | 24.1  | 25.5  | 1.4              |
| ECO9        | 24.1                                 | 16.5  | 16.6  | 0.1              |
| ECO10       | 13.6                                 | 9.5   | 9.7   | 0.2              |

| Receptor ID | Annual Mean NOx (µg/m³) |       |       |                  |
|-------------|-------------------------|-------|-------|------------------|
|             | Base                    | DM    | DS    | Change (DS - DM) |
| ECO11       | 12.1                    | 8.7   | 8.8   | 0.1              |
| ECO12       | 22.0                    | 14.2  | 14.4  | 0.2              |
| ECO13       | 47.6                    | 27.7  | 28.0  | 0.3              |
| ECO14       | 29.9                    | 17.6  | 18.9  | 1.3              |
| ECO15       | 214.3                   | 111.2 | 114.4 | 3.2              |
| ECO16       | 22.9                    | 15.4  | 15.5  | 0.1              |
| ECO17       | 56.0                    | 38.1  | 38.7  | 0.5              |
| ECO18       | 12.1                    | 8.9   | 8.9   | 0.0              |
| ECO19       | 123.4                   | 67.7  | 69.3  | 1.6              |
| ECO20A      | 66.3                    | 37.8  | 38.9  | 1.0              |
| ECO20B      | 32.0                    | 19.3  | 19.7  | 0.4              |
| ECO21A      | 58.5                    | 33.2  | 33.5  | 0.4              |
| ECO21B      | 58.2                    | 33.5  | 34.6  | 1.1              |
| ECO21C      | 26.2                    | 16.4  | 17.4  | 1.0              |
| ECO22       | 48.4                    | 27.9  | 28.2  | 0.3              |
| ECO23       | 22.3                    | 14.3  | 14.5  | 0.2              |

- 6.5.19. Nitrogen deposition rates were estimated at 26 ecological receptor points and are presented in Table 6.17.
- 6.5.20. The results indicate that total nitrogen deposition rates are estimated to be in excess of the site relevant critical load at all nature conservation sites considered, either with or without the Proposed Development in place.
- 6.5.21. Changes in nitrogen deposition with the Proposed Development in place are in excess of 1% of the critical load at all designated nature conservation sites except ECO 10, 11, 12, 18 and 23.

**Table 6.17: Annual mean nitrogen deposition rates (N kg/ha/yr)**

| Receptor ID | Total N Dep (N kg/ha/yr) (inc NH <sub>3</sub> ) |       |       |                  | Change in N Dep % of CL | Change >1%                                               |
|-------------|-------------------------------------------------|-------|-------|------------------|-------------------------|----------------------------------------------------------|
|             | Base                                            | DM    | DS    | Change (DS - DM) |                         |                                                          |
| ECO1        | 17.9                                            | 17.8  | 17.8  | 0.06             | 1.1%                    | Change > 1% and significance to be assessed by ecologist |
| ECO2        | 21.7                                            | 20.4  | 20.8  | 0.42             | 8.4%                    | Change > 1% and significance to be assessed by ecologist |
| ECO3        | 20.9                                            | 19.9  | 20.3  | 0.43             | 4.3%                    | Change > 1% and significance to be assessed by ecologist |
| ECO4        | 158.6                                           | 159.0 | 162.3 | 3.25             | 32.5%                   | Change > 1% and significance to be assessed by ecologist |
| ECO5        | 78.2                                            | 77.5  | 79.8  | 2.37             | 23.7%                   | Change > 1% and significance to be assessed by ecologist |
| ECO6        | 63.9                                            | 61.9  | 64.6  | 2.66             | 26.6%                   | Change > 1% and significance to be assessed by ecologist |
| ECO7        | 43.1                                            | 39.3  | 39.7  | 0.37             | 3.7%                    | Change > 1% and significance to be assessed by ecologist |
| ECO8        | 29.5                                            | 28.1  | 28.6  | 0.49             | 4.9%                    | Change > 1% and significance to be assessed by ecologist |
| ECO9        | 22.4                                            | 23.2  | 23.3  | 0.15             | 1.5%                    | Change > 1% and significance to be assessed by ecologist |
| ECO10       | 18.2                                            | 18.0  | 18.1  | 0.07             | 0.7%                    | Not significant                                          |
| ECO11       | 17.8                                            | 17.7  | 17.7  | 0.03             | 0.3%                    | Not significant                                          |
| ECO12       | 19.0                                            | 18.9  | 19.0  | 0.09             | 0.9%                    | Not significant                                          |
| ECO13       | 38.6                                            | 37.8  | 38.1  | 0.36             | 3.6%                    | Change > 1% and significance to be assessed by ecologist |
| ECO14       | 22.1                                            | 20.8  | 21.2  | 0.44             | 4.4%                    | Change > 1% and significance to be assessed by ecologist |
| ECO15       | 130.8                                           | 130.3 | 133.7 | 3.40             | 34.0%                   | Change > 1% and significance to be assessed by ecologist |
| ECO16       | 21.9                                            | 21.8  | 21.9  | 0.14             | 1.4%                    | Change > 1% and significance to be assessed by ecologist |
| ECO17       | 45.0                                            | 54.2  | 54.9  | 0.73             | 7.3%                    | Change > 1% and significance to be assessed by ecologist |
| ECO18       | 17.6                                            | 17.5  | 17.5  | 0.02             | 0.2%                    | Not significant                                          |
| ECO19       | 97.0                                            | 98.0  | 100.4 | 2.35             | 23.5%                   | Change > 1% and significance to be assessed by ecologist |
| ECO20A      | 51.3                                            | 52.5  | 54.0  | 1.51             | 15.1%                   | Change > 1% and significance to be assessed by ecologist |

| Receptor ID | Total N Dep (N kg/ha/yr) (inc NH <sub>3</sub> ) |      |      |                  | Change in N Dep % of CL | Change >1%                                               |
|-------------|-------------------------------------------------|------|------|------------------|-------------------------|----------------------------------------------------------|
|             | Base                                            | DM   | DS   | Change (DS - DM) |                         |                                                          |
| ECO20B      | 22.2                                            | 20.9 | 21.0 | 0.13             | 1.3%                    | Change > 1% and significance to be assessed by ecologist |
| ECO21A      | 28.4                                            | 25.9 | 26.0 | 0.13             | 1.3%                    | Change > 1% and significance to be assessed by ecologist |
| ECO21B      | 28.2                                            | 25.7 | 26.0 | 0.35             | 3.5%                    | Change > 1% and significance to be assessed by ecologist |
| ECO21C      | 20.8                                            | 19.9 | 20.3 | 0.34             | 3.4%                    | Change > 1% and significance to be assessed by ecologist |
| ECO22       | 30.2                                            | 28.4 | 28.5 | 0.11             | 1.1%                    | Change > 1% and significance to be assessed by ecologist |
| ECO23       | 19.0                                            | 18.8 | 18.9 | 0.10             | 1.0%                    | Not significant                                          |

6.5.22. The ammonia concentration at Crymlyn Bog/Cors Crymlyn SAC is presented in Table 6.18.

6.5.23. The results indicate that total annual mean concentrations of NH<sub>3</sub> are estimated to be in excess of the critical level for NH<sub>3</sub> (1 µg/m<sup>3</sup>) either with or without the Proposed Development in place.

**Table 6.18: Annual mean NH<sub>3</sub> concentrations (µg/m<sup>3</sup>)**

| Receptor ID | Background NH <sub>3</sub> (µg/m <sup>3</sup> ) | Annual Mean NH <sub>3</sub> (µg/m <sup>3</sup> ) |     |     |                  |
|-------------|-------------------------------------------------|--------------------------------------------------|-----|-----|------------------|
|             |                                                 | Base                                             | DM  | DS  | Change (DS - DM) |
| ECO2        | 0.8                                             | 1.0                                              | 1.3 | 1.5 | 0.3              |

## 6.6. Additional mitigation, compensation & enhancement measures

### Construction phase

6.6.1. Construction works associated with the Proposed Development have the potential to generate dust emissions, which will require effective control/minimisation for the duration of construction through a Construction Environmental Management Plan (CEMP) or similar.

6.6.2. Selected mitigation measures given in the IAQM Construction Dust Guidance<sup>3</sup> which are applicable to a high risk construction site, such as this, are described below. Suggested measures include:

- 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 site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- 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 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate;
- 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;
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
- Use water-assisted dust sweepers on the access and local roads, to remove any material tracked out of the site;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable); and
- Access gates to be located at least 10 metres from receptors where possible.

6.6.3. Stakeholder communication is recommended, with community engagement both before and during work, and the clear display of contact details for those responsible for dust issues on site. Any complaints and exceptional incidents should be logged along with the appropriate measures taken to reduce emissions.

- 6.6.4. Daily site management of emission control measures should be undertaken, with visual inspections of activities and control measures carried out especially during dry conditions. This should include recording of activities, controls, weather (wind direction, precipitation) and ground conditions, and observations of surface dust deposits at and beyond the application site boundary near sensitive receptors.
- 6.6.5. A Travel to Work Plan is also recommended to be prepared which seeks to reduce vehicle trips made by construction workers. The Travel to Work Plan for the Proposed Development should aim to keep the numbers of additional vehicle movements generated by the development to a minimum, for example by encouraging the use of sustainable means of transport.
- 6.6.6. With appropriate mitigation measures in place, any adverse effects resulting from the construction works should be minimised such that there is no significant residual effect on nearby receptors.

#### Operational phase

- 6.6.7. The results of the local air quality assessment indicate that the operational development is not likely to have a significant adverse effect on local air quality, and that the introduction of new sensitive receptors associated with the Proposed Development is unlikely to result in exposure to pollutant concentrations in excess of relevant AQS objective values.
- 6.6.8. The effect on ecological receptors in within the study area has also been assessed and the significance of this effect on ecological sites is considered in the biodiversity chapter.
- 6.6.9. However, consideration should nevertheless be given to the application of good design and good practice measures for example, the provision of electric vehicle charging points, cycle parking provisions and encouragement to take up sustainable modes of transport.

### **6.7. Residual environment impacts & effects**

- 6.7.1. With appropriate mitigation measures in place, any adverse effects resulting from the construction works would be minimised such that there would not be any significant residual effect on the existing residential receptors.
- 6.7.2. The operational assessment has shown that the effect on air quality at existing human health receptors is not expected to be significant. The significance of the effect on ecological receptors is considered in the biodiversity chapter.

### **6.8. Cumulative effects**

- 6.8.1. In this assessment, the committed development Heritage Gate which consists of approximately 140 dwellings, has been assessed. The traffic flows as a result of this development have been included both in the 2026 DM and 2026 DS scenarios.

## 6.9. Assessment summary

- 6.9.1. This air quality assessment included a review of existing air quality conditions, a qualitative assessment of construction dust and dispersion modelling to estimate the impacts and potential for significant effects due to the operation of the Proposed Development.
- 6.9.2. The construction phase of the Proposed Development has the potential to generate dust and PM<sub>10</sub> emissions, which may have a short-term adverse impact at nearby human health receptors. With appropriate mitigation measures in place however, these works should not result in a significant residual effect at these receptors. The measures should be secured within a Construction Environmental Management Plan or Dust Management Plan for the site.
- 6.9.3. Any effect on air quality from construction traffic will be temporary and not significant with no further assessment required since the vehicle movements do not exceed the relevant threshold.
- 6.9.4. The local air quality assessment for the operation of the Proposed Development was carried out using detailed dispersion modelling at selected receptors in the vicinity of roads likely to be affected by changes in road traffic movements. Annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations were estimated at sensitive human health receptors. Estimated concentrations of all pollutants were shown to be below relevant AQS objectives at all receptors (including receptors to be constructed as part of the Proposed Development), in all scenarios. Impacts on NO<sub>2</sub> concentrations as a result of the operation of the Proposed Development were modelled to be slight at one modelled location (HH1). Impacts on NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations as a result of the operation of the Proposed Development were modelled to be negligible at all other modelled receptors.
- 6.9.5. Annual mean NO<sub>x</sub> concentrations and nitrogen deposition rates were estimated at designated conservation sites, and additionally annual mean ammonia concentrations were estimated at Crymlyn Bog SAC.
- 6.9.6. Construction and operational phase impacts and effects are summarised in Table 6.19.

**Table 6.19: Assessment summary**

| Topic              | Mitigation measures                           | Designed into the Proposed Development | Delivery condition (outline/RM) | via Delivery legal obligation | via Paragraph reference the ES | Proposed in Monitoring Arrangement                                |
|--------------------|-----------------------------------------------|----------------------------------------|---------------------------------|-------------------------------|--------------------------------|-------------------------------------------------------------------|
| Construction Phase | Standard mitigation measures detailed in IAQM | No                                     | No                              | Yes                           | Section 0                      | Daily monitoring recommended, to be determined by contractor with |

# Environmental Statement

Coed Darcy



| Topic                                      | Mitigation measures                                   | Designed into the Proposed Development | Delivery condition (outline/RM) | Delivery via legal obligation | Delivery via | Paragraph reference in the ES | Proposed Monitoring Arrangement   |
|--------------------------------------------|-------------------------------------------------------|----------------------------------------|---------------------------------|-------------------------------|--------------|-------------------------------|-----------------------------------|
|                                            | Construction Guidance for high risk sites             |                                        |                                 |                               |              |                               | consultation with local authority |
| Operational Phase (Human Health receptors) | Application of good design and good practice measures | Yes                                    | No                              | No                            |              | Section 0                     | None                              |