

Air Quality Assessment: Baglan Way

July 2022



Experts in air quality
management & assessment



Document Control

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Job Number	J10/12526/10
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Document Status and Review Schedule

Report No.	Date	Status	Reviewed by
J10/12526/10/1/F3	15 July 2022	Final	Dr Ben Marner (Director – Air Quality Modelling & Assessment)

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Executive Summary

The air quality impacts associated with the proposed factory development adjacent to Baglan Way in Port Talbot have been assessed. The proposed development will generate additional traffic on the local road network, but the assessment has shown that there will be no significant effects at any existing, sensitive receptor.

Overall, the operational air quality effects of the proposed development are judged to be 'not significant'.

Contents

1	Introduction	4
2	Policy Context	6
3	Assessment Criteria	12
4	Assessment Approach	15
5	Baseline Conditions.....	22
6	Impact Assessment.....	28
7	Recommended Mitigation.....	31
8	Conclusions	32
9	References.....	33
10	Glossary.....	36
11	Appendices	38
A1	EPUK & IAQM Planning for Air Quality Guidance.....	39
A2	Professional Experience.....	45
A3	Modelling Methodology	47

Tables

Table 1:	Air Quality Criteria for Nitrogen Dioxide, PM ₁₀ and PM _{2.5}	13
Table 2:	Description of Receptor Locations	17
Table 3:	Air Quality Impact Descriptors for Individual Receptors for All Pollutants ^a	19
Table 4:	Summary of Annual Mean NO ₂ Monitoring (2015-2019) (µg/m ³)	23
Table 5:	Number of Hours With NO ₂ Concentrations Above 200 µg/m ³	23
Table 6:	Summary of Annual Mean PM ₁₀ and PM _{2.5} Monitoring (2015-2019) (µg/m ³)	25
Table 7:	Number of Days With PM ₁₀ Concentrations Above 50 µg/m ³	25
Table 8:	Estimated Annual Mean Background Pollutant Concentrations in 2019 and 2022 (µg/m ³)	26
Table 9:	Modelled Annual Mean Baseline Concentrations of Nitrogen Dioxide (µg/m ³) at Existing Receptors	27
Table 10:	Modelled Annual Mean Baseline Concentrations of PM ₁₀ and PM _{2.5} at Existing Receptors (µg/m ³)	27
Table 11:	Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations in 2022 (µg/m ³)	28
Table 12:	Predicted Impacts on Annual Mean PM ₁₀ and PM _{2.5} Concentrations in 2022...	29
Table A3.1:	Summary of Model Inputs.....	47
Table A3.2:	Summary of Traffic Data used in the Assessment (AADT Flows)	48

Figures

Figure 1: Proposed Development Setting in the Context of Air Quality5

Figure 2: Study Area16

Figure 3: Receptor Locations17

Figure 4: Monitoring Locations24

Figure A3.1: Modelled Road Network & Speed.....49

Figure A3.2: Wind Rose.....50

1 Introduction

- 1.1 This report describes the potential traffic-related air quality impacts associated with the proposed industrial development of land off Baglan Way, in Neath Port Talbot. The proposed development will consist of a glass processing facility (no glass manufacturing will be undertaken on site). A summary of the proposed processes at the facility is set out below:

Cutting and shaping of glass to the specification of customers, and 'tempering' glass to a specification (tempered glass, otherwise known as safety glass, is used for its safety and strength properties).

The tempering process is done by cutting glass to a specific size, and then dependant on the type and thickness of the glass, it will be processed in accordance with specific thermal parameters/programs. The glass will be heated to roughly 650/700 degrees so that it is soft, as it exits the heated chamber air is forced into the outer surfaces of the glass forcing a stress into the glass this increases the strength of the glass by around four times, with these stresses causing the glass to shatter in the manner described above.

- 1.2 The proposed development lies close to the Neath Port Talbot Air Quality Management Area (AQMA) declared by Neath Port Talbot County Borough Council (NPTCBC) for exceedances of the 24-hour mean PM₁₀ objective, due a large number of industrial activities in Port Talbot. The proposed development will generate additional traffic on local roads, which may impact on air quality at existing residential properties along the affected road network, and this has been assessed. The main air pollutants of concern related to road traffic emissions are nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀ and PM_{2.5}).
- 1.3 The location and setting of the proposed development is shown in Figure 1, along with the nearby AQMA.
- 1.4 This report describes existing local air quality conditions (base year 2019), and the predicted air quality in the future assuming that the proposed development does or does not proceed. The assessment focuses on 2022, which is the earliest possible year of opening.
- 1.5 This report has been prepared taking into account all relevant local and national guidance and regulations, and follows a methodology agreed with NPTCBC.



J10/12526/10

2 Policy Context

- 2.1 All European legislation referred to in this report is written into UK law and remains in place.

Air Quality Strategy

- 2.2 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

Clean Air Strategy 2019

- 2.3 The Clean Air Strategy (Defra, 2019b) sets out a wide range of actions by which the UK Government, in partnership with the Governments of Scotland, Wales and Northern Ireland, will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

The Clean Air Plan for Wales

- 2.4 In August 2020, the Welsh Government published the Clean Air Plan for Wales (Welsh Government, 2020), which aims to *“improve air quality and reduce the impacts of air pollution on human health, biodiversity, the natural environment and our economy”*. The Plan sets out the following four themes, around which the plan is structured, with actions in order to enable collaborative approaches to reducing air pollution:

- 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; and
- Place: Creating sustainable places through better planning, infrastructure and transport.

- 2.5 The Plan details intentions to publish a Clean Air Zone Framework, stating an expectation *“to see Clean Air Zones established in towns and cities throughout Wales to reduce the impact of transport emissions on health. Some of these may be supported by a charging element. Clean Air Zones, where appropriate, would enable a range of co-ordinated actions to deliver significant reductions in public and environmental exposure to harmful airborne pollutants from all sources”*.
- 2.6 The Plan also includes plans to *“introduce LAQM policy changes by 2023 to ensure the regime is public health focused and proactively finding and tackling areas of pollution”*. These changes include a focus on the human health impacts of PM_{2.5}, stating *“In the current regime, monitoring of PM_{2.5} is encouraged but not mandatory. In the context of the known health impacts associated with PM_{2.5}, we propose to investigate the extent to which Local Authorities can support monitoring, reporting and action on PM_{2.5} as part of their existing LAQM functions”*.
- 2.7 The Plan states that the Welsh Government will *“publish and consult on a White Paper on a Clean Air Act for Wales before the end of this Senedd Term”*, which will include:
- *“New powers for smoke control linked to tackling air pollution from domestic burning (PM_{2.5})*
 - *A requirement for a Clean Air Plan / Strategy to be published / reviewed every 5 years*
 - *Potential new air quality targets (for example, taking account of WHO guidelines for air quality)*
 - *Clarified and strengthened local air quality management legislation*
 - *Strengthened powers to address road vehicle idling*
 - *Consolidated powers to implement Clean Air Zones / Low Emission Zones*
 - *Focused powers to protect vulnerable groups from the effects of air pollution*
 - *Enhanced air quality monitoring and modelling*
 - *A potential new duty on public bodies to adhere to guidance encouraging different ways of working and actions to reduce air pollution and support decarbonisation.”*

Reducing Emissions from Road Transport: Road to Zero Strategy

- 2.8 The Office for Low Emission Vehicles (OLEV) and Department for Transport (DfT) published a Policy Paper (DfT, 2018) in July 2018 outlining how the government will support the transition to zero a tailpipe emission road transport and reduce tailpipe emissions from conventional vehicles during the transition. This paper affirms the Government’s pledge to end the sale of new conventional petrol and diesel cars and vans by 2040, and states that the Government expects the majority of new cars and vans sold to be 100% zero tailpipe emission and all new cars and vans to have significant zero tailpipe emission capability by this year, and that by 2050 almost every car and van should have

zero tailpipe emissions. It states that the Government wants to see at least 50%, and as many as 70%, of new car sales, and up to 40% of new van sales, being ultra-low emission by 2030.

- 2.9 The paper sets out a number of measures by which Government will support this transition, but is clear that Government expects this transition to be industry and consumer led. The Government has since announced that the phase-out date for the sale of new petrol and diesel cars and vans will be brought forward to 2030 and that all new cars and vans must be fully zero emission at the tailpipe from 2035. If these ambitions are realised then road traffic-related NO_x emissions can be expected to reduce significantly over the coming decades, likely beyond the scale of reductions forecast in the tools utilised in carrying out this air quality assessment.

Environment Act 2021

- 2.10 The UK's new legal framework for protection of the natural environment, the Environment Act 2021 passed into UK law on 9th November 2021. The Act gives the Government the power to set long-term, legally binding environmental targets. It also establishes an Office for Environmental Protection (OEP), responsible for holding the government to account and ensuring compliance with these targets.
- 2.11 The Act requires the government to set at least one long-term target (spanning a minimum of 15 years), supported by interim targets set in a five year cycle, in each of four identified areas: Air Quality, Biodiversity, Water and Resource Efficiency and Waste Reduction. An additional target for mean levels of PM_{2.5} is also required. These targets must be set before November 2022 – a target scope for what these targets will involve has been outlined but they are not yet precisely defined. As the targets have not yet been either finalized or adopted by the Government, they cannot impact on current planning policy.

Planning Policy

National Policies

- 2.12 Land-use planning policy in Wales is established within the policy document Planning Policy Wales (PPW) (Welsh Government, 2021), which provides the strategic policy framework for the effective preparation of local planning authority development plans. With regard to pollution and health effects, it states:

“Planning authorities have a role to play in the prevention of physical and mental illnesses caused, or exacerbated, by pollution, disconnection of people from social activities (which contributes to loneliness) as well as the promotion of travel patterns which facilitate active lifestyles. The planning system must consider the impacts of new development on existing communities and maximise health protection and well-being and safeguard amenity. This will include considering the provision of, and access to, community and health assets, such as community halls, libraries, doctor’s surgeries and

hospitals. Health impacts should be minimised in all instances, and particularly where new development could have an adverse impact on health, amenity and well-being. In such circumstances, where health or amenity impacts cannot be overcome satisfactorily, development should be refused”.

“Planning authorities should develop and maintain places that support healthy, active lifestyles across all age and socio-economic groups, recognising that investment in walking and cycling infrastructure can be an effective preventative measure which reduces financial pressures on public services in the longer term. The way a development is laid out and arranged can influence people’s behaviours and decisions and can provide effective mitigation against air and noise pollution. Effective planning can provide calming, tranquil surroundings as well as stimulating and sensory environments, both of these make an important contribution to successful places”

“Green infrastructure can be an effective means of enhancing health and well-being, through linking dwellings, workplaces and community facilities and providing high quality, accessible green spaces. In all development and in public spaces especially, there should be sensitive management of light, and exposure to airborne pollution should be kept as low as reasonably practicable. The compatibility of land uses will be a key factor in addressing air quality and creating appropriate soundscapes which are conducive to, and reflective of, particular social and cultural activities and experiences, particularly in busy central areas of towns and cities. Equally, the provision of quiet, tranquil areas which provide peaceful sanctuaries in otherwise noisy environments can help to reduce general levels of pollution and promote both mental and physical well-being”.

- 2.13 PPW places a general presumption in favour of sustainable development, stressing the importance of local development plans, and states that the planning system should perform an environmental role to minimise pollution. Local development plans should enable consideration of the effects that the proposed development may have on air quality, as well as the effect that air quality may have on the proposed development. To prevent unacceptable risks from air pollution, planning decisions should ensure that new development is appropriate for its location.
- 2.14 PPW also places considerable emphasis on the Well-being of Future Generations Act (Welsh Government, 2015) with the intention to improve the social, economic, environmental and cultural well-being of Wales, and outlines how this can be achieved through the concept of ‘Placemaking’.
- 2.15 PPW is supported by a series of Technical Advice Notes (TANs) and National Assembly for Wales Circulars. Local planning authorities have to take PPW, TANs and Circulars into account when preparing Development Plans.
- 2.16 With respect to planning policy guidance, TAN 18 on transport (Welsh Government, 2007) makes reference to local air quality and the need for Air Quality Action Plans to be prepared for any Air Quality Management Areas declared.

- 2.17 The need for compliance with any statutory air quality limit values and objectives is stressed, and the presence of AQMAs must be accounted for in terms of the cumulative impacts on air quality from individual sites in local areas. New developments in AQMAs should be consistent with local air quality action plans.

Local Policies

- 2.18 The Neath Port Talbot County Borough Council Local Development Plan (Neath Port Talbot County Borough Council, 2016) was adopted in January 2016. Policy Sp16 of the Local Plan refers specifically to air quality and 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 level....

3. Ensuring that developments do not increase the number of people exposed to significant levels of pollution.”

- 2.19 NPTCBC has also published a Supplementary Planning Guidance (SPG) document on ‘Pollution’, which includes the following policies relevant to air quality in the study area.

- 2.20 Policy EN8 Pollution and Land Stability:

“Proposals which would be likely to have an unacceptable adverse effect on health, biodiversity and/or local amenity or would expose people to unacceptable risk due to the following will not be permitted:

Air Pollution...”

Air Quality Action Plans

National Air Quality Plan

- 2.21 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017); a supplement to the 2017 Plan (Defra, 2018) was published in October 2018 and sets out the steps Government is taking in relation to a further 33 local authorities where shorter-term exceedances of the limit value were identified. Alongside a package of national measures, the 2017 Plan and the 2018 Supplement require those identified English Local Authorities (or the GLA in the case of London Authorities) to produce local action plans and/or feasibility studies. These plans and feasibility studies must have regard to measures to achieve the statutory limit values within the shortest possible time, which may include the implementation of a CAZ. There is currently no straightforward way to take account of the effects of the 2017 Plan or 2018 Supplement in the

modelling undertaken for this assessment; however, consideration has been given to whether there is currently, or is likely to be in the future, a limit value exceedance in the vicinity of the proposed development. This assessment has principally been carried out in relation to the air quality objectives, rather than the limit values that are the focus of the Air Quality Plan.

Welsh Government Supplemental Air Quality Plan

- 2.22 The Welsh Government has produced a supplemental plan to the 2017 UK plan for tackling roadside nitrogen dioxide concentrations (Welsh Government, 2018). The document sets out the work done to date to identify how the Welsh Government will reduce concentrations of nitrogen dioxide around roads where levels are above legal limits. The plan expands on Section 7.6 (Additional Actions in Wales) of the 2017 UK plan for tackling roadside nitrogen dioxide concentrations, and sets out how the Welsh Government will comply within the shortest possible time with the limit values for nitrogen dioxide.

Local Air Quality Action Plan

- 2.23 The NPTCBC Air Quality Action Plan sets out a series of measures by which the Council will seek to achieve the air quality objectives in its AQMA. None of the policies are especially relevant to this assessment, being focussed on locations outside of the assessment study area.

3 Assessment Criteria

- 3.1 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations (2002). The objectives for use by local authorities are prescribed within the Air Quality (Wales) Regulations (2000) and the Air Quality (Amendment) (Wales) Regulations (2002).
- 3.2 The UK-wide objectives for nitrogen dioxide and PM₁₀ were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The PM_{2.5} objective was to be achieved by 2020. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 µg/m³ (Defra, 2021a). Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level. Measurements have also shown that the 24-hour mean PM₁₀ objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m³ (Defra, 2021a). The predicted annual mean PM₁₀ concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM₁₀ objective. Where predicted annual mean concentrations are below 32 µg/m³ it is unlikely that the 24-hour mean objective will be exceeded.
- 3.3 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2021a). The annual mean objectives for nitrogen dioxide and PM₁₀ are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM₁₀ is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.
- 3.4 EU Directive 2008/50/EC (The European Parliament and the Council of the European Union, 2008) sets limit values for nitrogen dioxide, PM₁₀ and PM_{2.5}, and is implemented in UK law through the Air Quality Standards Regulations (2010). The limit values for NO₂ are the same numerical concentrations as the UK objectives, whilst the limit values for PM₁₀ and PM_{2.5} are 40 µg/m³ and 20 µg/m³, respectively. Achievement of the limit values is a national obligation rather than a local one. In the UK, only monitoring and modelling carried out by UK Central Government meets the

specification required to assess compliance with the limit values. Central Government does not normally recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded, unless such studies have been audited and approved by Defra and DfT's Joint Air Quality Unit (JAQU).

3.5 The relevant air quality criteria for this assessment are provided in Table 1.

Table 1: Air Quality Criteria for Nitrogen Dioxide, PM₁₀ and PM_{2.5}

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour Mean	200 µg/m ³ not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m ³
PM ₁₀	24-hour Mean	50 µg/m ³ not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m ³ ^a
PM _{2.5} ^b	Annual Mean	25 µg/m ³

^a A proxy value of 32 µg/m³ as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM₁₀ objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM₁₀ objective are possible (Defra, 2021a).

^b The PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Screening Criteria

Road Traffic Assessments

- 3.6 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)¹ recommend a two-stage screening approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from road traffic generated by a development have the potential for significant air quality impacts. The approach, as described in Appendix A1, first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5 ha, or is non-residential and will provide less than 1,000 m² of floor space or cover a site area of less than 1 ha, and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment.
- 3.7 The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in Appendix A1) inside an AQMA are a change in flows of more than 25 heavy duty vehicles or 100 light duty vehicles per day; outside of an AQMA the thresholds are 100 heavy duty vehicles or 500 light duty vehicles. Where these criteria are exceeded, a detailed assessment is likely to be required,

¹ The IAQM is the professional body for air quality practitioners in the UK.

although the guidance advises that *“the criteria provided are precautionary and should be treated as indicative”*, and *“it may be appropriate to amend them on the basis of professional judgement”*.

- 3.8 While these screening criteria are specifically intended to act as a trigger for a detailed assessment, they can also sometimes be used to identify the extent of the road network that requires assessment. Where the change in traffic on a given road link is less than the relevant screening threshold, it is unlikely that a significant impact would occur, and these links can be disregarded unless there are additional development-related emissions affecting receptors along the link.

4 Assessment Approach

Consultation

4.1 The assessment follows a methodology agreed with NPTCBC via email correspondence between Calum Lewis (Environmental Health Officer at NPTCBC) and David Bailey (Air Quality Consultants) on 9 March 2022. Specifically, the following key points were agreed:

- traffic generated by the proposed development will be sufficiently great that dispersion modelling should be carried out;
- the model should be verified and adjusted based on 2019 results from local diffusion tubes; and
- the impacts of development generated traffic within the Port Talbot AQMA should be assessed qualitatively.

4.2 In addition, the Officer recommended that an assessment of factory process emissions be undertaken. As explained in Paragraph 1.2, it has not been possible, at the current stage, to assess on-site emissions from future factory processes since it is not yet known what these processes will be.

Study Area

4.3 The study area for the assessment has been identified using professional judgement, focussing on the areas where impacts are anticipated to be greatest. It includes all of the roads along which the development will lead to a potentially significant change in traffic flows. Specifically, the assessment has focussed on Baglan Way, and the A4241 between Seaway Parade and the M4. The study area is shown in Figure 2.

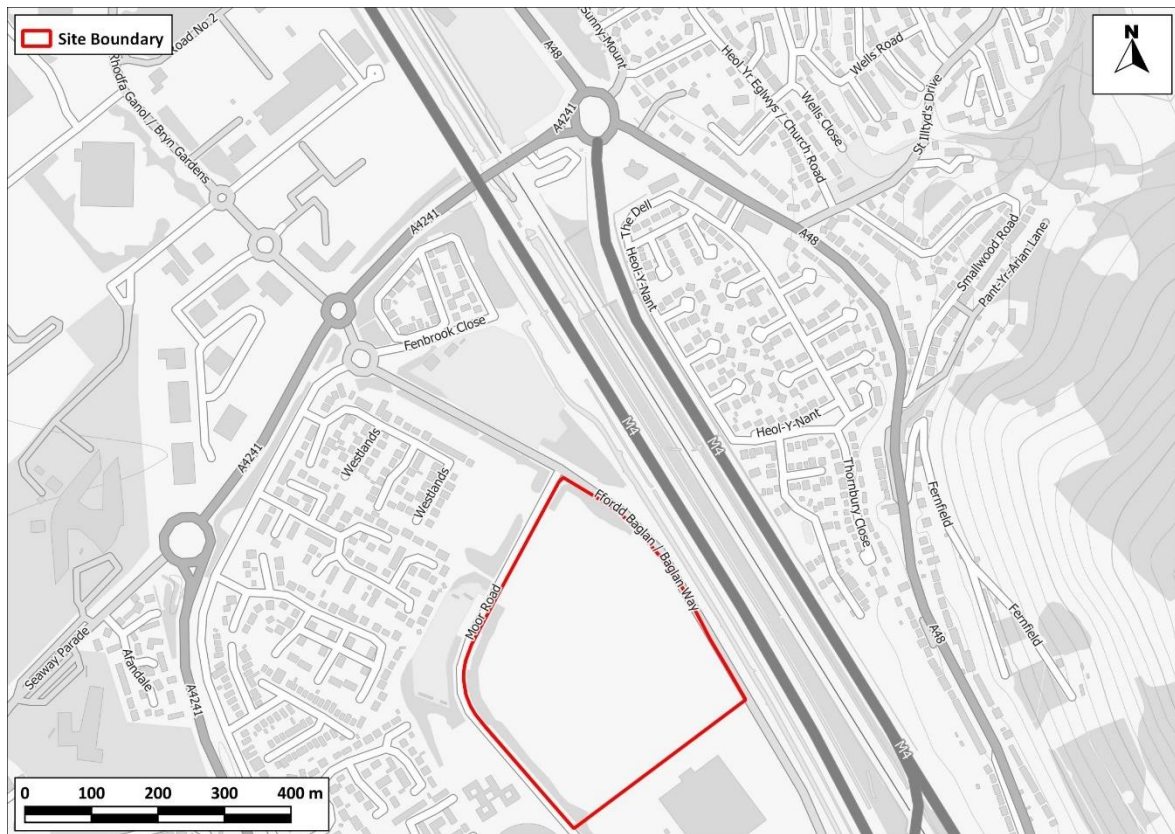


Figure 2: Study Area

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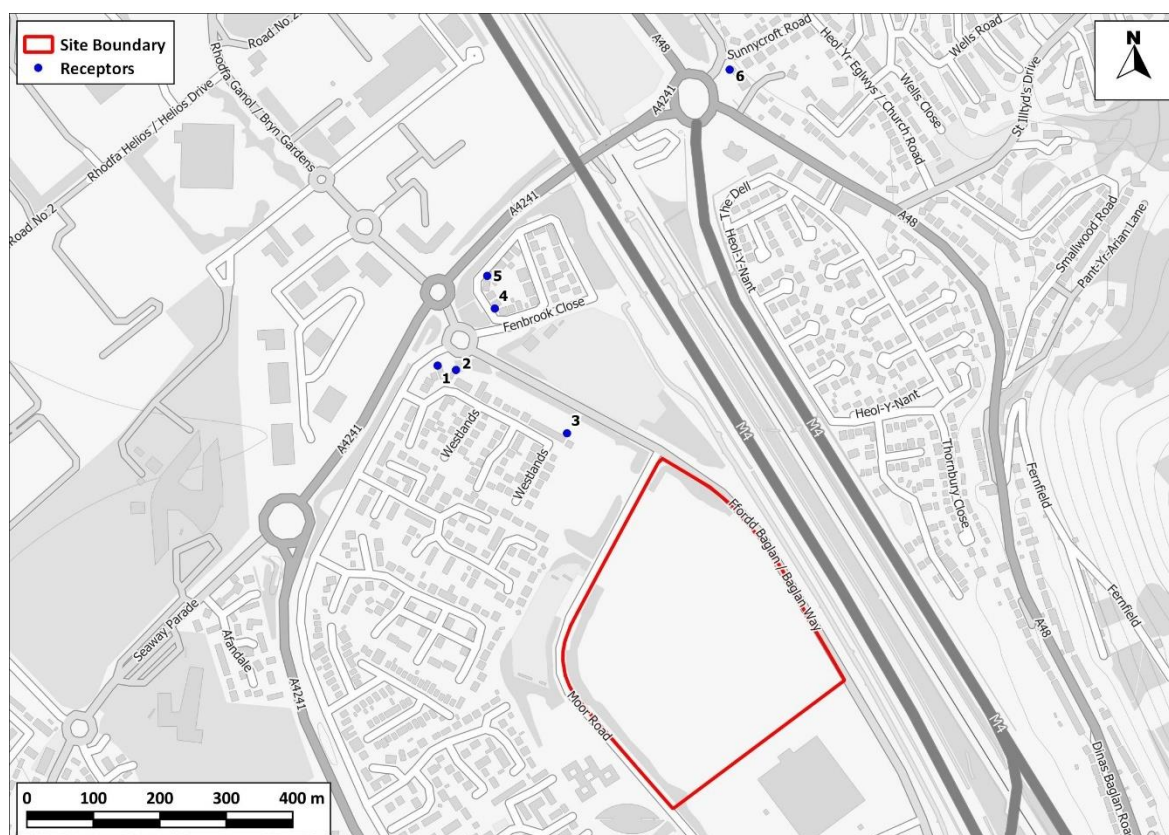
Receptors

- 4.4 Concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} have been predicted at a number of locations close to the proposed development. Receptors have been identified to represent a range of exposure, including worst-case locations (these being at the façades of the residential properties closest to the sources). When selecting receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested and where there is a combined effect of several road links, and close to those roads where the traffic increases as a result of the proposed development will be greatest.
- 4.5 Six existing residential properties have been identified as receptors for the assessment. These locations are described in Table 2 and shown in Figure 3. In addition, concentrations have been modelled at diffusion tube monitoring site DT25, in order to verify the model outputs (see Appendix A3 for verification method).

Table 2: Description of Receptor Locations

Receptor	Type	X coordinate	Y coordinate	Heights Modelled (m) ^a
Receptor 1	Residential	274505.3	191925.8	1.5
Receptor 2	Residential	274533.0	191919.3	1.5
Receptor 3	Residential	274700.1	191823.9	1.5
Receptor 4	Residential	274591.4	192011.8	1.5
Receptor 5	Residential	274579.9	192060.9	1.5
Receptor 6	Residential	274944.9	192371.5	1.5

^a A height of 1.5 m is used to represent ground-floor level exposure.

**Figure 3: Receptor Locations**

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- 4.6 Selected receptors may be representative of air quality conditions at a number of properties; consideration has been given to how many sensitive locations each modelled receptor represents when considering the impacts of the proposed development and the overall significance of effects.

Existing Conditions

4.7 Existing sources of emissions and baseline air quality conditions within the study area have been defined using a number of approaches:

- local sources have been identified through examination of the Council's Air Quality Review and Assessment reports;
- information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority. This covers both the study area and nearby sites, the latter being used to provide context for the assessment;
- background concentrations have been defined using Defra's 2018-based background maps (Defra, 2022d). These cover the whole of the UK on a 1x1 km grid. The background annual mean nitrogen dioxide maps for 2019 have been calibrated against concurrent measurements from national monitoring sites (AQC, 2020a). The calibration factor calculated has also been applied to future year backgrounds. Mapped background concentrations of PM₁₀ and PM_{2.5} have not been adjusted; and
- whether or not there are any exceedances of the annual mean limit value for nitrogen dioxide in the study area has been identified using the maps of roadside concentrations published by Defra (2020) (2022b), as well as from any nearby Automatic Urban and Rural Network (AURN) monitoring sites (which operate to the required data quality standards). These are the maps used by the UK Government, together with the AURN results, to identify and report exceedances of the limit value. The national maps of roadside PM₁₀ and PM_{2.5} concentrations (Defra, 2022b), which are available for the years 2009 to 2019, show no exceedances of the limit values anywhere in the UK in 2019.

Road Traffic Impacts

Screening

4.8 The first step in considering the road traffic impacts of the proposed development has been to screen the development and its traffic generation against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as described in Paragraph 3.6 and detailed further in Appendix A1. Where impacts can be screened out there is no need to progress to a more detailed assessment. The following sections describe the approach to dispersion modelling of road traffic emissions, which has been required for this project.

Modelling Methodology

4.9 Concentrations have been predicted using the ADMS-Roads dispersion model, with vehicle emissions derived using Defra's Emission Factor Toolkit (EFT) (v11.0) (Defra, 2022d). Details of the model inputs and the model verification are provided in Appendix A3.

Assessment Scenarios

- 4.10 Nitrogen dioxide, PM₁₀ and PM_{2.5} concentrations have been predicted for the following scenarios:
- base year 2019;
 - the earliest possible year of opening (2022) without the development; and
 - 2022 with the development.
- 4.11 Predictions for 2022 are based on a return to 'typical' activity levels and assume no impact as a result of the Covid-19 pandemic in this year, to ensure a worst-case assessment (as the influence of the pandemic has generally been to reduce concentrations of the pollutants considered in this assessment); see Paragraphs 4.16 and 4.17.

Impact Description

- 4.12 The approach developed jointly by EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has been used in describing the modelled impacts. The approach identifies impacts at individual receptors based on the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective. Table 3 sets out the method for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from the table presented in the guidance document. For the assessment criterion the term Air Quality Assessment Level or AQAL has been adopted, as it covers all pollutants, i.e. those with and without formal standards. Typically, as is the case for this assessment, the AQAL will be the air quality objective value. Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

Table 3: Air Quality Impact Descriptors for Individual Receptors for All Pollutants ^a

Long-Term Average Concentration At Receptor In Assessment Year ^b	Change in concentration relative to AQAL ^c				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Negligible	Moderate	Substantial	Substantial	Substantial

^a Values are rounded to the nearest whole number.

^b This is the "Without Scheme" concentration where there is a decrease in pollutant concentration and the "With Scheme" concentration where there is an increase.

^c AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, GLA target or an Environment Agency 'Environmental Assessment Level (EAL)'.

Uncertainty

- 4.13 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.
- 4.14 An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix A3). Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of base year (2019) concentrations.
- 4.15 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions. Historic versions of Defra's EFT tended to over-state emissions reductions into the future. However, analyses of the most recent versions of Defra's EFT carried out by AQC (2020b) (2020c) suggest that, on balance, these versions are unlikely to over-state the rate at which NO_x emissions decline in the future at an 'average' site in the UK. In practice, the balance of evidence suggests that NO_x concentrations are most likely to decline more quickly in the future, on average, than predicted by the current EFT, especially against a base year of 2016 or later. Using EFT v10.1 for future-year forecasts in this report thus provides a robust assessment, given that the model has been verified against measurements made in 2019.
- 4.16 Forecasts of future-year concentrations are usually based on measurements made during a recent year. They then take account of projected changes over time to factors such as the composition of the vehicle fleet and the uptake of other new technologies, as well as population increases etc.. In early 2020, activity in the UK was disrupted by the COVID-19 pandemic. As a result, concentrations of traffic-related air pollutants fell appreciably (Defra Air Quality Expert Group, 2020). While the pandemic may cause long-lasting changes to travel activity patterns, it is reasonable to expect a return to more typical activity levels in the future. 2020 is thus likely to present as an atypically low pollution year for roadside pollutant concentrations, as is 2021.
- 4.17 It is not currently possible to make robust predictions of the rate at which travel activity patterns will return to historically-normal levels; or the extent of any long-lasting changes to travel behaviour. The most robust approach to making future-year projections is thus to base these on measurements made during 2019, and to use activity forecasts made before the impact of the pandemic was understood, which is the approach that has been taken in this assessment.

Assumptions

- 4.18 It is necessary to make a number of assumptions when carrying out an air quality assessment; in order to account for some of the uncertainty in the approach, as described above, assumptions made have generally sought to reflect a realistic worst-case scenario. Key assumptions made in carrying out this assessment include:
- the assumption that the proposed development is complete and fully operational in 2022. This will have overestimated the traffic emissions and hence the 2022 “With Scheme” concentrations; and
 - that the Mumbles Head meteorological monitoring station appropriately represents conditions in the study area (this is discussed further in Appendix A3).

Assessment of Significance

- 4.19 There is no official guidance in the UK in relation to development control on how to assess the significance of air quality impacts. The approach developed jointly by EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. The overall significance of the air quality impacts is determined using professional judgement, taking account of the impact descriptors; the experience of the consultants preparing the report is set out in Appendix A2. Full details of the EPUK/IAQM approach are provided in Appendix A1.

5 Baseline Conditions

Relevant Features

- 5.1 The proposed development is located in Baglan Moor, Port Talbot. The application site is bounded by Baglan Way to the northeast, Moor Road to the northwest and southwest and a Warburtons warehouse to the southeast. It currently consists of undeveloped scrub/park land.

Local Air Quality Monitoring

- 5.2 NPTCBC operates six automatic monitoring stations within its area. The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Socotec (using the 50% TEA in acetone method). These include one deployed at Port Talbot fire station, another at the old fire station, one adjacent to College Green and a number adjacent to Neath Road. Diffusion tube 25 adjacent is considered to be most representative of conditions in the study area, being located in a roadside location adjacent to the A4241, outside of the AQMA.
- 5.3 Annual mean results for the years 2015 to 2019 are summarised in Table 4, while results relating to the 1-hour mean objective are summarised in Table 5. The monitoring locations are shown in Figure 4. The monitoring data have been taken from NPTCBC's 2020 Annual Status Report (Neath Port Talbot County Borough Council, 2020).

Table 4: Summary of Annual Mean NO₂ Monitoring (2015-2019) (µg/m³)

Site No.	Site Type	Location	2015	2016	2017	2018	2019
NPR	Roadside	Newton Primary Reception	-	-	-	-	7.9
NPP	Roadside	Newton Primary Playground	-	-	-	-	7.1
PT2	Industrial	Port Talbot Fire Station	17.0	21.0	16.0	15.0	15.0
OBC-125	Roadside	Commercial Street	-	-	-	-	18.8
3	Urban Background	11 College Green	14.5	14.0	13.2	12.1	12.9
7	Roadside	Moby's Neath Road	27.9	27.6	30.2	24.5	26.3
8	Roadside	185 Neath Road	28.1	27.5	29.0	24.9	23.9
9	Roadside	179 Neath Road	28.6	26.3	28.3	23.5	25.1
10	Roadside	187 Neath Road	28.0	26.1	28.9	24.6	26.1
11	Roadside	189 Neath Road	28.1	27.3	29.2	23.8	26.1
19	Industrial	Port Talbot Fire Station	16.6	16.8	15.6	13.7	15.7
25	Roadside	Old Fire Station	24.2	26.8	26.4	24.1	27.7
Objective			40				

Table 5: Number of Hours With NO₂ Concentrations Above 200 µg/m³

Site No.	Site Type	Location	2015	2016	2017	2018	2019
PT2	Industrial	Port Talbot Fire Station	0	0	0	0	0
Objective			18 ^c				

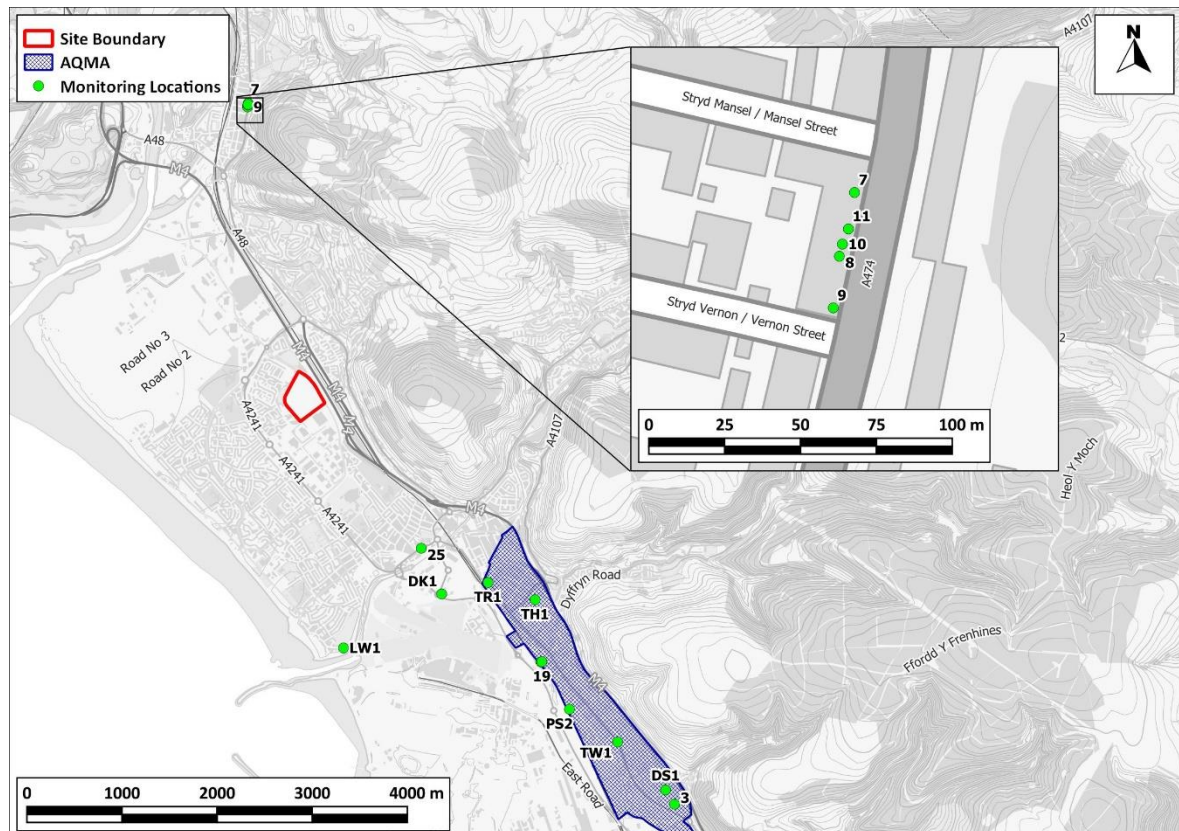


Figure 4: Monitoring Locations

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- 5.4 No exceedances of the annual mean or 1-hour mean nitrogen dioxide objective were measured from 2015 to 2019.
- 5.5 There are several industrial automatic monitoring stations, which measured PM₁₀ concentrations in 2019. The PT2 and PS2 monitors also measure PM_{2.5} concentrations. Annual mean results for the years 2015 to 2019 are summarised in Table 6, while results relating to the daily mean objective are summarised in Table 7. The annual mean PM₁₀ and PM_{2.5} concentrations were below the objectives for all years from 2015 to 2019. The 24-hour mean PM₁₀ objective was also not exceeded in any year.

Table 6: Summary of Annual Mean PM₁₀ and PM_{2.5} Monitoring (2015-2019) (µg/m³)

Site No.	Site Type	Location	2015	2016	2017	2018	2019
PM ₁₀							
PT2	Industrial	Port Talbot Fire Station	27	22	23	23	21
PS2	Industrial	Prince Street	-	23	25	23	20
DK1	Industrial	Port Talbot Docks	20	20	-	-	-
TR1	Roadside	Talbot Road	22	16	-	-	-
TH1	Industrial	Theodore Road	23	20	-	-	-
TW1	Industrial	Twll-yn-y-Wal Park	26	24	21	21	21
DS1	Industrial	Dyffryn School	20	18	21	-	22
Objective			40				
PM _{2.5}							
PT2	Industrial	Port Talbot Fire Station	10	9	10	11	11
PS2	Industrial	Prince Street	10	10	10	9	9
Objective			25 ^a				

^a The 25 µg/m³ PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Table 7: Number of Days With PM₁₀ Concentrations Above 50 µg/m³

Site No.	Site Type	Location	2015	2016	2017	2018	2019
PT2	Industrial	Port Talbot Fire Station	28	8	17	11	12
PS2	Industrial	Prince Street	-	9	18	12	8
DK1	Industrial	Port Talbot Docks	6	2	-	-	-
TR1	Roadside	Talbot Road	4	0	-	-	-
TH1	Industrial	Theodore Road	4	1	-	-	-
TW1	Industrial	Twll-yn-y-Wal Park	10	4	3	9	10
DS1	Industrial	Dyffryn School	5	0	2	-	2(31)
Objective			35 (50) ^a				

^a Values in brackets are 90.4th percentiles, which are presented where data capture is <85%.

Exceedances of Limit Value

- 5.6 The PT2 AURN monitoring site lies 3.5 km to the southeast of the application site, and shows no exceedance of the annual mean nitrogen dioxide limit value in 2019 (Table 4). Defra's roadside annual mean nitrogen dioxide concentrations (Defra, 2022b), which are used to identify and report exceedances of the limit value, identify exceedances of the limit value in 2019 along the M4. Defra's predicted concentrations for 2022 (Defra, 2020) do not identify any exceedances within the study

area in any scenario. As such, there is considered to be no risk of a limit value exceedance in the vicinity of the proposed development by the time that it is operational.

Background Concentrations

- 5.7 Estimated background concentrations in the study area are set out in Table 8 and are all well below the objectives. A range of values is presented as the study area covers multiple 1x1 km grid squares.

Table 8: Estimated Annual Mean Background Pollutant Concentrations in 2019 and 2022 ($\mu\text{g}/\text{m}^3$)

Year	NO ₂	PM ₁₀	PM _{2.5}
2019	10.5 - 13.6	12.4 - 13.2	8.0 - 8.2
2022	9.3 - 11.7	12.0 - 12.8	7.6 - 7.9
Objective	40	40	25 ^a

^a The 25 $\mu\text{g}/\text{m}^3$ PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Baseline Dispersion Model Results

- 5.8 Baseline concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} have been modelled at each of the existing receptor locations (see Figure 3 and Table 2 for receptor locations). The results, which cover both the existing (2019) and future year (2022) baseline (Without Scheme), are set out in Table 9 for nitrogen dioxide and Table 10 for PM₁₀ and PM_{2.5}. The modelled road components of nitrogen oxides have been increased from those predicted by the model based on a comparison with local measurements (see Appendix A3 for the verification methodology).

Table 9: Modelled Annual Mean Baseline Concentrations of Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$) at Existing Receptors

Receptor	2019	2022 Without Scheme
1	14.8	12.7
2	14.6	12.5
3	12.7	11.0
4	17.5	14.8
5	18.5	15.6
6	19.0	15.9
Objective	40	

Table 10: Modelled Annual Mean Baseline Concentrations of PM_{10} and $\text{PM}_{2.5}$ at Existing Receptors ($\mu\text{g}/\text{m}^3$)

Receptor	PM_{10} ^a		$\text{PM}_{2.5}$	
	2019	2022 Without Scheme	2019	2022 Without Scheme
1	12.6	12.2	8.1	7.8
2	12.6	12.2	8.1	7.7
3	12.5	12.0	8.0	7.7
4	13.4	12.9	8.3	8.0
5	13.5	13.0	8.4	8.0
6	13.4	13.0	8.4	8.0
Assessment Criterion	32 ^a		25 ^b	

^a While the annual mean PM_{10} objective is $40 \mu\text{g}/\text{m}^3$, $32 \mu\text{g}/\text{m}^3$ is the annual mean concentration above which an exceedance of the 24-hour mean PM_{10} objective is possible, as outlined in LAQM.TG16 (Defra, 2021a). A value of $32 \mu\text{g}/\text{m}^3$ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM_{10} objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

^b The $25 \mu\text{g}/\text{m}^3$ $\text{PM}_{2.5}$ objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

5.9 The predicted annual mean concentrations of nitrogen dioxide are well below the objectives in 2019 and 2022 at all receptors. The annual mean nitrogen dioxide concentrations are below $60 \mu\text{g}/\text{m}^3$ at every receptor in both 2019 and 2022; it is, therefore, unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded (see Paragraph 3.2).

5.10 The predicted annual mean concentrations of PM_{10} and $\text{PM}_{2.5}$ are well below the objectives in both 2019 and 2022 at all receptors. The annual mean PM_{10} concentrations are below $32 \mu\text{g}/\text{m}^3$ and it is, therefore, unlikely that the 24-hour mean PM_{10} objective will be exceeded.

6 Impact Assessment

Impacts within the Port Talbot AQMA

- 6.1 The Port Talbot AQMA was declared because of historic exceedances of the 24-hour PM₁₀ objective caused by industrial emissions. It was not declared in relation to emissions from road traffic. The development-related increases to traffic on roads within the AQMA will be above the screening criteria set by EPUK/IAQM for locations inside AQMAs. It should be understood that these screening criteria were defined in relation to exceedances of the nitrogen dioxide objectives and that roadside concentrations of nitrogen dioxide are much more sensitive to changes in traffic flows than concentrations of PM₁₀ are.
- 6.2 None of the objectives for PM₁₀ have been exceeded within the AQMA since 2013 (Neath Port Talbot County Borough Council, 2017). Based on the most recent measurements, there is no possibility that the increase in traffic from the proposed development could cause the PM₁₀ objectives to be exceeded. Furthermore, all of the predicted increases to traffic within the AQMA are too small to cause a significant change to ambient concentrations.
- 6.3 On the basis of these observations, the impacts within the AQMA are considered to be not significant.

Impacts outside the Port Talbot AQMA

- 6.4 Close to the proposed development, the increases in traffic exceed the EPUK/IAQM screening thresholds on a number of local roads, thus a detailed assessment is required, as set out below.

Nitrogen Dioxide

- 6.5 Predicted annual mean concentrations of nitrogen dioxide in 2022 for existing receptors are set out in Table 11 for both the “Without Scheme” and “With Scheme” scenarios. The impact at each receptor is also described using the descriptors given in Table 3.

Table 11: Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations in 2022 (µg/m³)

Receptor	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
1	12.7	12.9	1	Negligible
2	12.5	12.8	1	Negligible
3	11.0	11.1	0	Negligible
4	14.8	15.0	0	Negligible
5	15.6	15.8	0	Negligible
6	15.9	16.0	0	Negligible
Objective	40		-	-

^a % changes are relative to the objective and have been rounded to the nearest whole number.

- 6.6 The annual mean nitrogen dioxide concentrations are well below the objective at all receptors and the impacts are predicted to be *negligible*.

PM₁₀ and PM_{2.5}

- 6.7 Predicted annual mean concentrations of PM₁₀ and PM_{2.5} in 2022 for existing receptors are set out in Table 12 for both the “Without Scheme” and “With Scheme” scenarios. The impacts at each receptor are also described using the impact descriptors given in Table 3.

Table 12: Predicted Impacts on Annual Mean PM₁₀ and PM_{2.5} Concentrations in 2022

Receptor	Annual Mean PM ₁₀ (µg/m ³)				Annual Mean PM _{2.5} (µg/m ³)			
	Without Scheme	With Scheme	% Change ^a	Impact Descriptor	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
1	12.2	12.2	0	Negligible	7.8	7.8	0	Negligible
2	12.2	12.2	0	Negligible	7.7	7.8	0	Negligible
3	12.0	12.1	0	Negligible	7.7	7.7	0	Negligible
4	12.9	13.0	0	Negligible	8.0	8.0	0	Negligible
5	13.0	13.0	0	Negligible	8.0	8.0	0	Negligible
6	13.0	13.0	0	Negligible	8.0	8.0	0	Negligible
Criterion	32 ^b		-	-	25 ^c		-	-

^a % changes are relative to the criterion and have been rounded to the nearest whole number.

^b While the annual mean PM₁₀ objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM₁₀ objective is possible, as outlined in LAQM.TG16 (Defra, 2021a). A value of 32 µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM₁₀ objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

^c The PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

- 6.8 The annual mean PM₁₀ and PM_{2.5} concentrations are well below the relevant criteria at all receptors, with or without the proposed development. Furthermore, as the annual mean PM₁₀ concentrations are below 32 µg/m³, it is unlikely that the 24-hour mean PM₁₀ objective will be exceeded at any of the receptors.

Significance of Operational Air Quality Effects

- 6.9 The operational air quality effects without mitigation are judged to be ‘not significant’. This professional judgement is made in accordance with the methodology set out in Appendix A1, and takes account of the assessment that pollutant concentrations at all of the selected worst-case

existing receptors along the local road network will be well below the air quality objectives, and all of the impacts are predicted to be *negligible*.

7 Recommended Mitigation

- 7.1 The assessment has demonstrated that the overall air quality effect of the proposed development will be 'not significant; it will not introduce any new exposure into areas of unacceptable air quality, nor will the development-generated traffic emissions have a significant impact on local air quality. It is, therefore, not considered appropriate to propose further mitigation measures for this development.
- 7.2 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law). The local air quality action plan that NPTCBC is required to produce in order to address limit value exceedances in its area will also help to improve air quality.

8 Conclusions

- 8.1 The assessment has considered the impacts of the proposed development on local air quality in terms of emissions from road traffic generated by the completed development. The assessment has been based on measurements made during 2019, and pre-pandemic activity and emissions forecasts, to ensure a worst-case assessment that does not take into account temporary reductions in pollutant concentrations as a result of reduced activity levels during the Covid-19 pandemic.

Operational Impacts

- 8.2 The assessment has demonstrated that pollutant concentrations will be well below the objectives at all existing receptors in 2022, with or without the proposed development, and that the emissions from the additional traffic generated by the proposed development, will have a *negligible* impact on air quality conditions at all existing receptors along the local road network.
- 8.3 The overall operational air quality effects of the proposed development are judged to be 'not significant'.

Policy Implications

- 8.4 Taking into account these conclusions, it is judged that the proposed development is consistent with PPW, being appropriate for its location in terms of its effects on the local air quality environment. It also will not affect compliance with statutory air quality limit values or national objectives. The proposed development is also consistent with Policy Sp16 NPTCBC's Local Plan, as it will not significantly increase pollution levels.

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10 Glossary

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System model for Roads
AQAL	Air Quality Assessment Level
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
CAZ	Clean Air Zone
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
EU	European Union
EV	Electric Vehicle
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HGV	Heavy Goods Vehicle
HMSO	Her Majesty's Stationery Office
IAQM	Institute of Air Quality Management
JAQU	Joint Air Quality Unit
kph	Kilometres Per hour
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
LGV	Light Goods Vehicle
µg/m³	Microgrammes per cubic metre
NO	Nitric oxide
NO₂	Nitrogen dioxide

NOx	Nitrogen oxides (taken to be NO ₂ + NO)
NPPF	National Planning Policy Framework
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
OLEV	Office for Low Emission Vehicles
PM₁₀	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
PM_{2.5}	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPG	Planning Practice Guidance
PPW	Planning Policy Wales
RDE	Real Driving Emissions
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
TAN	Technical Advice Note
TEA	Triethanolamine – used to absorb nitrogen dioxide

11 Appendices

A1	EPUK & IAQM Planning for Air Quality Guidance.....	39
A2	Professional Experience.....	45
A3	Modelling Methodology	47

A1 EPUK & IAQM Planning for Air Quality Guidance

- A1.1 The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

“Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

- *the severity of the impacts on air quality;*
- *the air quality in the area surrounding the proposed development;*
- *the likely use of the development, i.e. the length of time people are likely to be exposed at that location; and*
- *the positive benefits provided through other material considerations”.*

Recommended Best Practice

- A1.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

“The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions”.

- A1.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m² of commercial floorspace;
- are carried out on land of 1 ha or more.

- A1.4 The good practice principles are that:

- New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable;
- Wherever possible, new developments should not create a new “street canyon”, as this inhibits pollution dispersion;

- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;
- The provision of at least 1 Electric Vehicle (EV) “rapid charge” point per 10 residential dwellings and/or 1000 m² of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;
- All gas-fired boilers to meet a minimum standard of <40 mgNO_x/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:
 - Spark ignition engine: 250 mgNO_x/Nm³;
 - Compression ignition engine: 400 mgNO_x/Nm³;
 - Gas turbine: 50 mgNO_x/Nm³.
- A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNO_x/Nm³ and 25 mgPM/Nm³.

A1.5 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

“It is important that obligations to include offsetting are proportional to the nature and scale of development proposed and the level of concern about air quality; such offsetting can be based on a quantification of the emissions associated with the development. These emissions can be assigned a value, based on the “damage cost approach” used by Defra, and then applied as an indicator of the level of offsetting required, or as a financial obligation on the developer. Unless some form of benchmarking is applied, it is impractical to include building emissions in this approach, but if the boiler and CHP emissions are consistent with the standards as described above then this is not essential”.

A1.6 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

- Support and promotion of car clubs;
- Contributions to low emission vehicle refuelling infrastructure;
- Provision of incentives for the uptake of low emission vehicles;
- Financial support to low emission public transport options; and
- Improvements to cycling and walking infrastructures.

Screening

Impacts of the Local Area on the Development

“There may be a requirement to carry out an air quality assessment for the impacts of the local area’s emissions on the proposed development itself, to assess the exposure that residents or users might experience. This will need to be a matter of judgement and should take into account:

- the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;*
- the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;*
- the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular nitrogen dioxide), that would cause unacceptably high exposure for users of the new development; and*
- the presence of a source of odour and/or dust that may affect amenity for future occupants of the development”.*

Impacts of the Development on the Local Area

A1.7 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

- 10 or more residential units or a site area of more than 0.5 ha residential use; and/or
- more than 1,000 m² of floor space for all other uses or a site area greater than 1 ha.

A1.8 Coupled with any of the following:

- the development has more than 10 parking spaces; and/or
- the development will have a centralised energy facility or other centralised combustion process.

A1.9 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

- the development will lead to a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of roads (i.e. changing the proximity of receptors to traffic lanes) where the change is 5m or more and the road is within an AQMA;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights or roundabouts;
- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; and
- the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor.

A1.10 The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.

A1.11 On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:

“Typically, any combustion plant where the single or combined NO_x emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NO_x gas boiler or a 30kW CHP unit operating at <95mg/Nm³.

In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable”.

- A1.12 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:

“The criteria provided are precautionary and should be treated as indicative. They are intended to function as a sensitive ‘trigger’ for initiating an assessment in cases where there is a possibility of significant effects arising on local air quality. This possibility will, self-evidently, not be realised in many cases. The criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement, bearing in mind that the objective is to identify situations where there is a possibility of a significant effect on local air quality”.

- A1.13 Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:

“The use of a Simple Assessment may be appropriate, where it will clearly suffice for the purposes of reaching a conclusion on the significance of effects on local air quality. The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence. Similarly, it may be possible to conduct a quantitative assessment that does not require the use of a dispersion model run on a computer”.

- A1.14 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Assessment of Significance

- A1.15 There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two stage process:

- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
- a judgement on the overall significance of the effects of any impacts.

- A1.16 The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either ‘significant’ or ‘not significant’. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts and, in such circumstances, several impacts that are described as '*slight*' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a '*moderate*' or '*substantial*' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

A1.17 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.

A1.18 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A2.

A2 Professional Experience

Dr Ben Marner, BSc (Hons) PhD CSci MEnvSc MIAQM

Dr Marner is the Director of Air Quality Modelling and Assessment at AQC and has over 20 years' relevant experience. He has been responsible for air quality and greenhouse gas assessments of road schemes, rail schemes, airports, power stations, waste incinerators, commercial developments and residential developments in the UK and abroad. He has acted as expert witness at public inquiries, where he has presented evidence on health-related air quality impacts, the impacts of air quality on sensitive ecosystems, and greenhouse gas impacts. He has developed a range of widely-used air quality models and contributed to the development of best practice. Dr Marner has provided support and advice to foreign governments, Highways England, Transport Scotland, Transport for London, Greater London Authority, the Joint Nature Conservation Committee, the Environment Agency, and numerous local authorities. He is a Member of the Institute of Air Quality Management and a Chartered Scientist. He currently advises the UK Government on air quality as part of its Air Quality Expert Group (AQEG), where his specific area of expertise relates to air quality assessment in the development control process.

Paul Outen, BSc (Hons) MEnvSc MIAQM

Mr Outen is a Principal Consultant with AQC, with over eleven years' experience in the assessment of air quality and odours. He undertakes air quality and odour assessments covering residential and commercial developments, industrial installations, road schemes, energy centres and mineral and waste facilities. These involve qualitative assessments, and quantitative modelling assessments using the ADMS dispersion models, for both planning and permitting purposes. He has also presented evidence at public hearings. Mr Outen has a particular interest in odour assessment, and has extensive experience in the assessment of odours across a wide range of industries throughout the UK, Europe and Asia. He also has experience in pollutant monitoring techniques. He regularly undertakes site audits for various installations to advise on pollution control and mitigation strategies. He is a Member of both the Institution of Environmental Sciences and Institute of Air Quality Management.

David Bailey, BSc (Hons) AMEnvSc

Mr Bailey is a Senior Consultant with AQC, having joined the Company in 2018. Prior to joining AQC he gained a degree in Environmental Science from the University of Brighton, where his studies included modules focused on Air Quality Management. He has experience in air quality and greenhouse gas assessments, with the use of the ADMS-Roads and ADMS-5 dispersion modelling software in many assessments. He has assessed a wide variety of schemes, including large residential EIA developments, gas power generation facilities and agricultural facilities, as well as

preparing detailed assessments for Local Authorities. He also has experience in diffusion tube and automatic monitoring, including data ratification.

Isabel Stanley, MSci (Hons)

Miss Stanley is a Consultant with AQC, having joined the company in October 2019. Prior to joining AQC she completed an MSci degree in Geology at the University of Bristol, where her studies included modules focusing on GIS, dispersion modelling and environmental geochemistry. She has undertaken numerous air quality assessments, including road traffic and plant emissions modelling, as well as indoor air quality plans and construction dust risk assessments.

A3 Modelling Methodology

Road Traffic

Model Inputs

- A3.1 Predictions have been carried out using the ADMS-Roads dispersion model (v5). The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width, where applicable). Vehicle emissions have been calculated based on vehicle flow, composition and speed data using the EFT (Version 10.1) published by Defra (2022d). Model input parameters are summarised in Table A3.1 and, where considered necessary, discussed further below.

Table A3.1: Summary of Model Inputs

Model Parameter	Value Used
Terrain Effects Modelled?	No
Variable Surface Roughness File Used?	Yes – 12km x 12km Cartesian grid at 50m resolution
Urban Canopy Flow Used?	No
Advanced Street Canyons Modelled?	No
Noise Barriers Modelled?	No
Meteorological Monitoring Site	Mumbles Head
Meteorological Data Year	2019
Dispersion Site Surface Roughness Length (m)	0.5
Dispersion Site Minimum MO Length (m)	30
Met Site Surface Roughness Length (m)	0.3
Met Site Minimum MO Length (m)	1
Gradients?	No

- A3.2 AADT flows, diurnal flow profiles, speeds, and vehicle fleet composition data have been provided by Apex Transport Planning Ltd, who have undertaken the transport assessment work for the proposed development. Traffic speeds have been estimated based on professional judgement, taking account of the road layout, speed limits and the proximity to a junction. The traffic data used in this assessment are summarised in Table A3.2. Diurnal and monthly flow profiles for the traffic have been derived from the national profiles published by DfT (2020).

Table A3.2: Summary of Traffic Data used in the Assessment (AADT Flows)

Road Link	2019		2022 (Without Scheme)		2022 (With Scheme)	
	AADT	%HDV	AADT	%HDV	AADT	%HDV
1-2	4,426	4.6	4,574	4.6	5,285	5.7
3-4	2,213	4.6	2,287	4.6	2,643	5.7
5	2,623	0.8	2,710	0.8	2,707	0.8
6	4,836	2.5	4,997	2.5	5,350	2.7
7	1,107	4.6	1,144	4.6	1,323	4.6
8	5,147	2.1	5,319	2.1	5,651	2.2
9	1,417	2.6	1,465	2.6	1,624	2.6
10	5,458	1.8	5,640	1.8	5,961	1.8
11-15	8,081	1.5	8,350	1.5	8,674	1.9
16-17	15,320	2.9	15,830	2.9	15,980	3.0
18-19	14,146	2.5	14,617	2.5	14,802	2.7
20	8,081	1.5	8,350	1.5	8,674	1.9
21	4,632	3.1	4,786	3.1	4,799	3.1
22	8,672	2.3	8,961	2.3	9,135	2.3
23	1,942	1.4	2,006	1.4	2,087	1.4
24	9,602	2.6	9,921	2.6	10,077	2.6
25	2,778	2.0	2,870	2.0	2,945	2.0
26	9,851	2.4	10,179	2.4	10,346	2.4
27-28	15,320	2.9	15,830	2.9	15,980	3.0
29-30	14,146	2.5	14,617	2.5	14,802	2.7
31-34	8,081	1.5	8,350	1.5	8,656	2.0
35	13,528	1.7	13,949	1.7	13,949	1.7
36	4,426	4.6	4,574	4.6	5,285	5.7
37-38	597	5.5	617	5.5	729	4.7
39	3,928	4.3	4,058	4.3	4,170	4.2
40-44	18,059	1.9	18,621	1.9	18,621	1.9
45	20,931	2.7	21,582	2.7	21,582	2.7
46	18,100	4.1	18,663	4.1	18,663	4.1
47	8,793	2.0	9,066	2.0	9,066	2.0

A3.3 Figure A3.1 shows the road network included within the model, along with the speed at which each link was modelled.

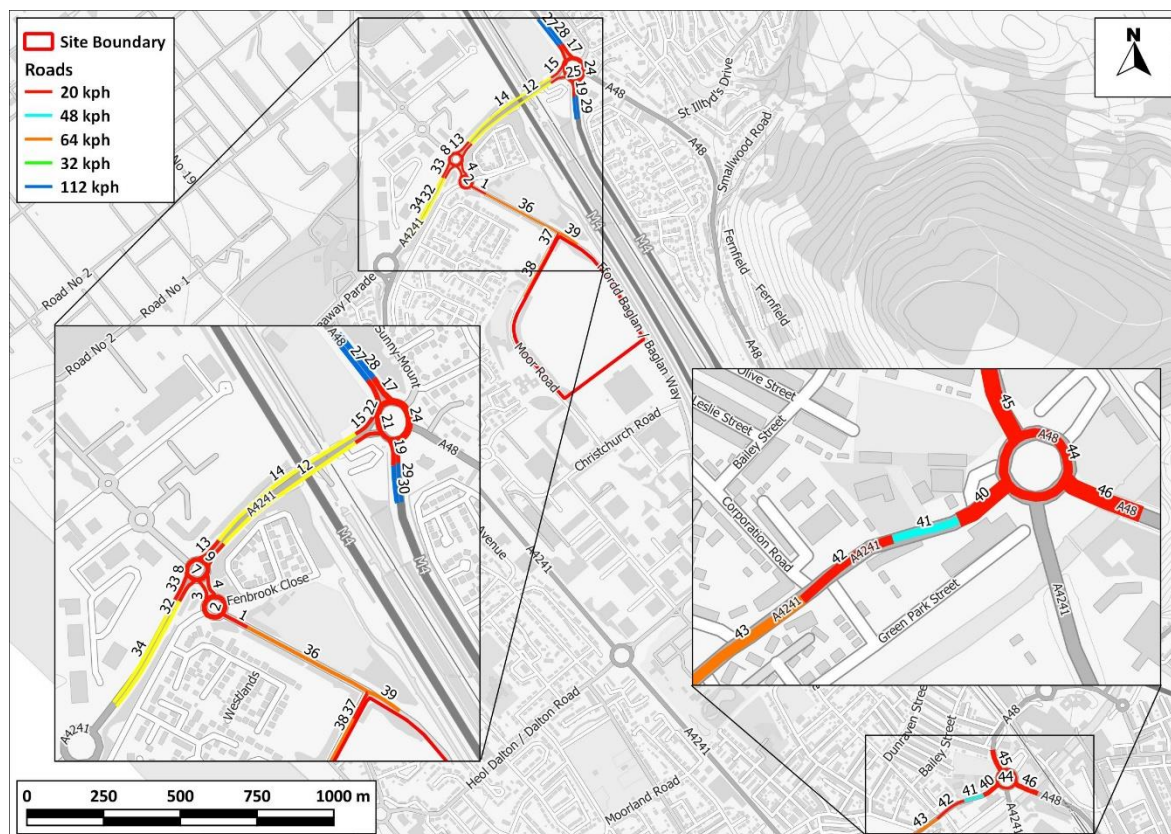


Figure A3.1: Modelled Road Network & Speed

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- A3.4 Hourly sequential meteorological data in sectors of 10 degrees from Mumbles Head for 2019 have been used in the model. The Mumbles Head meteorological monitoring station is located approximately 12 km to the west-southwest of the proposed development. Both the application site and the Mumbles Head meteorological monitoring station are located at near-coastal locations on the south coast of Wales where they will be influenced by the effects of coastal meteorology. The Mumbles Head site is very well placed to capture the meteorology affecting the Swansea Bay area, with the proposed development lying on the opposite side of the Bay from the meteorological monitoring station. Measurements from this site are considered to provide the most robust basis to predict meteorology within the model domain. A wind rose for the site for the year 2019 is provided in Figure A3.2. The station is operated by the UK Met Office. Raw data were provided by the Met Office and processed by AQC for use in ADMS.

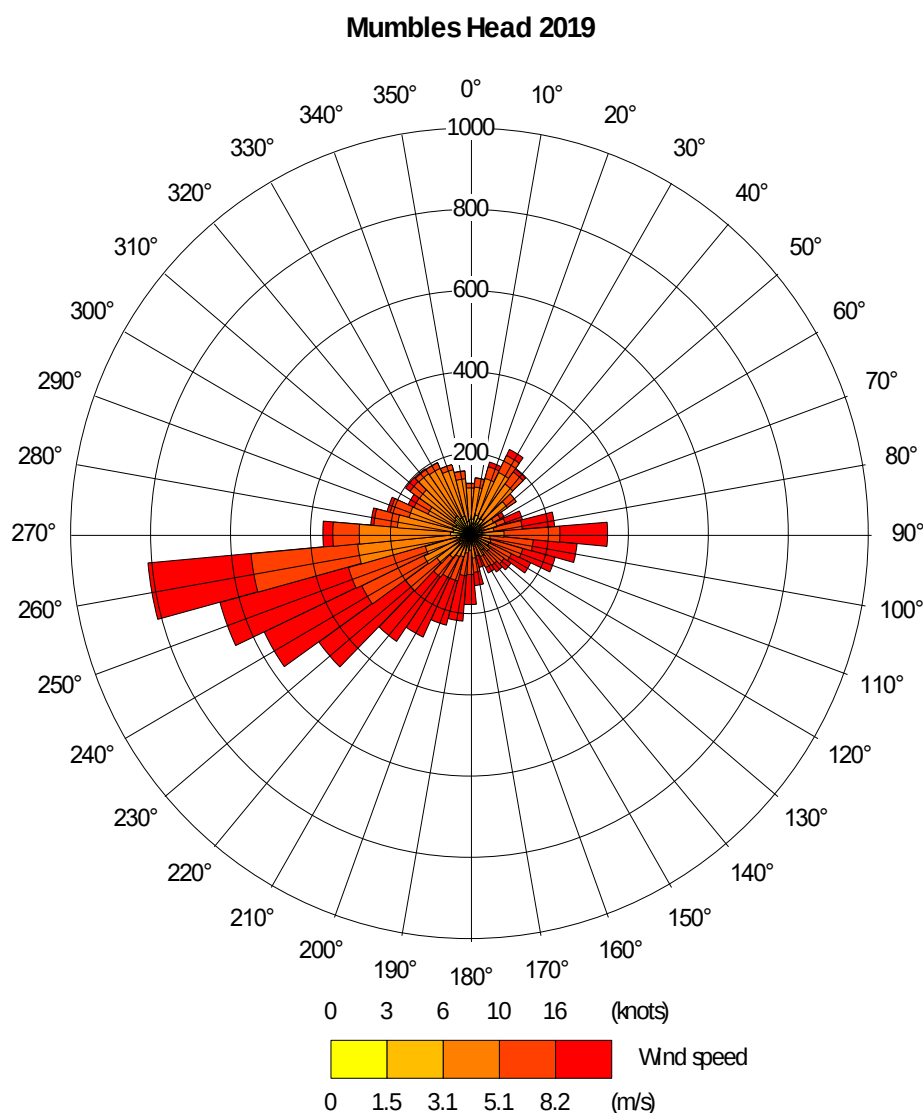


Figure A3.2: Wind Rose

Model Verification

- A3.5 Evidence collected over many years has shown that, in most urban areas, dispersion modelling relying upon Defra's EFT has tended to systematically under-predict roadside nitrogen dioxide concentrations. To account for this, it is necessary to adjust the model against local measurements. The model has been run to predict annual mean nitrogen dioxide concentrations during 2019 at the DT25 diffusion tube monitoring sites. This site has been selected because it is located in a roadside location which is similar to the study area. There are no other sites measuring nitrogen dioxide concentrations for which suitable traffic data were available and which are in a similarly-representative setting.

Nitrogen Dioxide

- A3.6 Most nitrogen dioxide (NO₂) is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides (NO_x = NO + NO₂). The model has been run to predict the annual mean NO_x concentrations during 2019 at diffusion tube monitoring site DT25. Concentrations have been modelled at 2 m, the height of the monitor.
- A3.7 The model output of road-NO_x (i.e. the component of total NO_x coming from road traffic) has been compared with the 'measured' road-NO_x. Measured road-NO_x has been calculated from the measured NO₂ concentration and the predicted background NO₂ concentration using the NO_x from NO₂ calculator (Version 8.1) available on the Defra LAQM Support website (Defra, 2022d).
- A3.8 An adjustment factor has been determined as the ratio of the 'measured' road contribution and the model derived road contribution. This factor has then been applied to the modelled road-NO_x concentration for each receptor to provide adjusted modelled road-NO_x concentrations. The total nitrogen dioxide concentrations have then been determined by combining the adjusted modelled road-NO_x concentrations with the predicted background NO₂ concentration within the NO_x to NO₂ calculator (Defra, 2022d).
- A3.9 The data used to calculate the adjustment factor are provided below:
- Measured NO₂ : 27.7 µg/m³
 - Background NO₂ : 16.4 µg/m³
 - 'Measured' road-NO_x (using NO_x from NO₂ calculator): 21.7 µg/m³
 - Modelled road-NO_x = 8.4 µg/m³
 - Road-NO_x adjustment factor: $21.7/8.4 = \mathbf{2.592^2}$
- A3.10 The factor implies that the unadjusted model is under-predicting the road-NO_x contribution. This is a common experience with this and most other road traffic emissions dispersion models.

PM₁₀ and PM_{2.5}

- A3.11 The approach described above for NO_x and nitrogen dioxide determines the road increment of concentrations by subtracting the predicted local background from the roadside measurements. This works well for NO_x because the differences between roadside and background concentrations typically represent a large proportion of the total measured value. The same is not true for PM₁₀ and PM_{2.5} concentrations, which are dominated by non-road emissions, even at the roadside. In practice, the influence of a local road on concentrations can often be smaller than the uncertainty in the mapped background concentration. As an example of this, 31% of all roadside and kerbside sites

² Based on un-rounded values.

in London which measured PM_{2.5} in 2019 with >75% data capture, recorded an annual mean concentration lower than the equivalent Defra mapped background value. Using measured background concentrations does not provide any significant benefit, owing largely to the spatial resolution of available measurements, but also because of measurement uncertainty. For example, hourly-mean PM_{2.5} concentrations measured at roadside sites are often lower than those measured at nearby urban background sites, while concentrations at urban background sites are often lower than those measured at rural sites.

- A3.12 For these reasons, it is not appropriate to calculate the annual mean road-increment to PM₁₀ and PM_{2.5} concentrations by subtracting either the mapped background or a local measured background concentration. This, in turn, means that the approach to model adjustment which is described for NO_x and NO₂ is not appropriate for PM₁₀ and PM_{2.5}. Historically, many studies have derived a model adjustment factor for NO_x and applied this to PM₁₀ and PM_{2.5}. This is also not appropriate, since there is no reason to expect the same bias in emissions of NO_x, PM₁₀ and PM_{2.5}.
- A3.13 While there is very strong evidence that EFT-based models have consistently under-predicted road-NO_x concentrations in urban areas, there is no equivalent evidence for PM₁₀ and PM_{2.5}. There is currently no strong basis for applying any adjustment to the model outputs. Predicted concentrations of PM₁₀ and PM_{2.5} have thus not been adjusted.

Post-processing

- A3.14 The model predicts road-NO_x concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background NO₂, has been processed through the NO_x to NO₂ calculator available on the Defra LAQM Support website (Defra, 2022d). The traffic mix within the calculator has been set to “All other urban UK traffic”, which is considered suitable for the study area. The calculator predicts the component of NO₂ based on the adjusted road-NO_x and the background NO₂.