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Planning Potential

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Author

This author holds a Masters in Air Pollution Management & Control and is a full member of both the Institute of Air Quality Management and Institute of Environmental Sciences.

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Report Prepared By

Aeolus Air Quality Consulting
66 Red Lane
Burton Green
Kenilworth
England
CV8 1PA
www.aeolusairquality.co.uk

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Glossary

Acronym	Definition
AQAP	Air Quality Action Plan
AQA	Air Quality Assessment
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Strategy
ASR	Annual Status Report
AURN	Automatic Urban and Rural Network
BCBC	Bridgend County Borough Council
Defra	Department for Environment, Food and Rural Affairs
DMP	Dust Management Plan
EPUK	Environmental Protection UK
EU	European Union
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LNR	Local Nature Reserve
NAQS	National Air Quality Strategy
NO	Nitric oxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NRMM	Non-road Mobile Machinery
PM	Particulate Matter
PP	Planning Potential
Ramsar Sites	Designated Wetland
SAC	Special Areas of Conservation
SPA	Special Protection Areas
SPG	Supplementary Planning Guidance
SSSI	Sites of Special Scientific Interest
WHO	World Health Organisation

1 Introduction

Planning Potential (PP) are assisting their client, Aldi Stores Limited (ASL), obtain planning permission for a proposed development on land located to the north of Salt Lake Car Park, Porthcawl. Hereafter called the proposed development, it involves the:

> *"Erection of a new, Aldi discount community food store (Use Class A1) with associated access, landscaping and parking on land located to the north of Salt Lake Car Park, Porthcawl. The proposed store will cover a gross area of approximately 2,045 sqm including a net sales area of 1,315 sqm. The development would also include 114 car parking spaces, which includes five parent and child spaces, seven disabled spaces, two click and collect spaces and four live, electric charging spaces.*
>
> *The site would be accessed via a new section of road from a spur at the south eastern corner of the existing Portway roundabout. The service yard will be located at the north eastern corner of the site, behind the store.*
>
> *The proposal also includes soft landscaping including a public realm area and the design of the store will include a waved style, feature roof finished with locally significant materials such as blue lias limestone and full height glazing."*

Aeolus Air Quality Consulting (AAQC) have been instructed by ASL to produce an air quality assessment to support the planning application. The planning application will be determined by Bridgend County Borough Council (BCBC).

The potential air quality impacts arising as a result of the proposed development have been assessed using the latest planning guidance from Environmental Protection UK (EPUK) with the Institute of Air Quality Management (IAQM)[1] and the Department for Environment, Food and Rural Affairs (Defra)[2].

1.1 Objectives

This report provides an assessment on the following key issues associated with the construction and operational phases of the proposed development:

- Nuisance, loss of amenity and health impacts associated with the construction phase of the proposed development on sensitive receptors;
- Characterising the baseline conditions at the site using monitored pollutant data from BCBC and background concentrations from Defra background maps;
- Assessing the suitability of the proposed development site for the addition of new commercial receptors;
- Assessing the potential air quality impacts arising as a result of the proposed development; and

[1] IAQM (2017): 'Land Use Planning and Development Control: Planning for Air Quality v1.2'.
[2] Defra (2016): 'Local Air Quality Management – Technical Guidance (TG16)'.

- Making recommendations for mitigation measures if required.

1.2 Proposed Development Location

The proposed development site is located within the jurisdiction of BCBC and comprises of an area of hardstanding and grassland. The site is bound by the promenade to the north and east, Portway roundabout to the west and a large undeveloped area of hard standing/grassland to the south. The proposed development location is illustrated in Figure 1.1.

The proposed development does not lie within or adjacent to any declared Air Quality Management Areas (AQMAs). The nearest AQMA is in Bridgend, over 8km to the northeast.

The nearest nationally designated ecological site is Merthyr Mawr Site of Special Scientific Interest (SSSI), located approximately 1.7km east of the proposed development site.

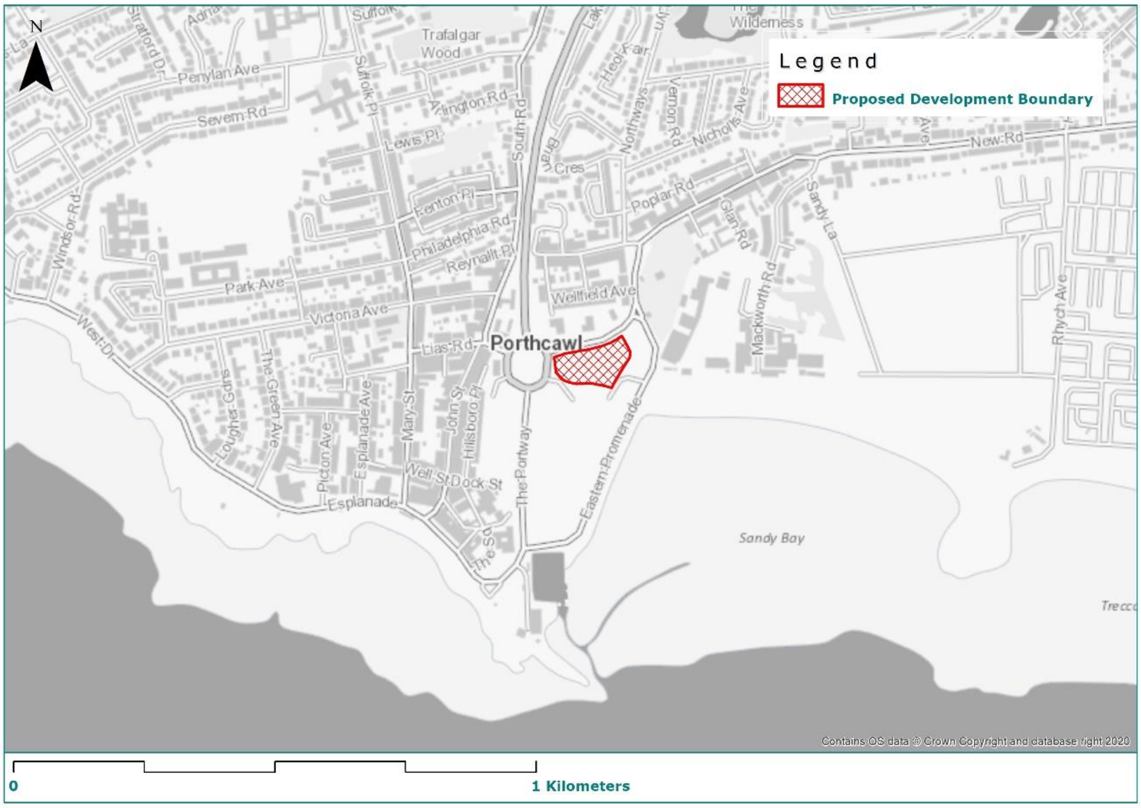

Figure 1.1: Proposed development site location

1.3 Key Pollutants

The key pollutant associated with the construction phase of the project will be ‘disamenity’ or ‘nuisance’ dust. Nitrogen dioxide (NO_2) and particulate matter ($PM_{2.5}$ and PM_{10}) may also be associated with emissions from non-road mobile machinery (NRMM) and construction related traffic.

The key pollutants associated with the operational phase of the proposed development will be road traffic emissions including NO_2 and particulate matter ($PM_{2.5}$ and PM_{10}). These pollutants are therefore considered as part of this assessment.

Further details of the key pollutants are presented below.

1.3.1 Nitrogen Dioxide

NO_2 and nitric oxide (NO) are collectively referred to as oxides of nitrogen (NO_x). During fuel combustion, atmospheric nitrogen combines with oxygen to form NO, which is not considered harmful. Through a chemical reaction with ozone (O_3), NO further combines with oxygen to create NO_2 which can be harmful to human health and vegetation. The foremost sources of NO_2 in the UK are combustion activities, mainly road transport and power generation.

1.3.2 Particulate Matter

Particulate matter as a term refers to a mixture of solid particles and liquid droplets suspended in the air. These particles come in many sizes and shapes and can be made up of hundreds of different chemicals. Some particles, such as dust, dirt, soot or smoke, are large or dark enough to be seen with the naked eye. Others can be so small that they can only be detected using an electron microscope. Fine dust, essentially particles up to 10 microns (µm), is commonly referred to as PM_{10}.

PM_{10} is known to arise from a number of sources such as construction sites, road traffic movement, industrial and agricultural activities. Very fine particles ($PM_{0.1}$ – $PM_{2.5}$) are known to be associated with pollutants such as NO_x and sulphur dioxide (SO_2) emitted from power plants, industrial installations and road transport sources.

$PM_{2.5}$ is generally associated with combustion and traffic sources and is more likely to be associated with the operational phase of the proposed development.

1.3.3 Disamenity Dust

'Dust' is generally regarded as particulate matter up to 75µm in diameter and in an environmental context can be considered in two size categories: coarser dust (particles greater than 10µm) and fine particulate matter (PM_{10} and $PM_{2.5}$) as described above.

Coarser dust (particles greater than 10µm) is generally regarded as 'disamenity dust' and can be associated with annoyance, although there are no official standards for dust annoyance[3]. Disamenity dust is more readily described than defined as it relates to the visual impact of short-lived dust clouds and the long-term soiling of surfaces.

Although it is a widespread environmental phenomenon, dust is also generated through many anthropogenic activities including materials handling, construction, demolition, and vehicle use. Dust is generally produced by mechanical action on materials and is carried by moving air when there is sufficient energy in the airstream. More energy is required for dust to become airborne than for it to remain suspended.

[3] Note that the expression 'nuisance dust' refers here to 'generally visible particulate matter' rather than specifically and in a legal sense to statutory nuisance, as defined in Section 79 of the Environmental Protection Act 1990.

2 Legislation, Policy and Non-Statutory Guidance

This section summarises all legislation, policy, statutory and non-statutory guidelines relevant to the proposed development. Furthermore, the latest regional and local planning policy guidance specifically applicable to the proposed development has been reviewed.

The UK left the EU on the 31/01/2020 and a new trade deal, the EU–UK Trade and Cooperation Agreement was signed on 30/12/2020. Following exit day on the 31/01/2020, the current framework of air quality legislation was converted into domestic law through the European Union (Withdrawal) Act 2018.[4]

2.1 International (European Union)

Whilst the UK has left the EU, it is pertinent to understand the origins of the current UK legislation. The European Union (EU) sets legally binding limit values for outdoor air pollutants to be met by EU countries by a given date. These limit values are based on the World Health Organisation (WHO) guidelines on outdoor air pollutants. These are legally binding and set out to protect human health and the environment by avoiding, preventing or reducing harmful air pollution effects.

Directive 2008/50/EC[5] on ambient air quality and cleaner air for Europe entered into force in June 2008. This merged the existing 'Daughter' Directives[6,7,8,9] (apart from the fourth Daughter Directive), maintaining existing air quality objectives set out by 'Daughter' Directives for:

- Sulphur dioxide (SO_2);
- Nitrogen dioxide (NO_2);
- Oxides of nitrogen (NO_x);
- Particulate matter ($PM_{2.5}$ and PM_{10});
- Lead (Pb);
- Benzene(C_6H_6);
- Carbon monoxide (CO); and
- Ozone (O_3).

Directive 2008/50/EC also includes related objectives, exposure concentration obligations and exposure reduction targets for $PM_{2.5}$ (fine particles). The 'Daughter'

[4] European Union. (2018): http://www.legislation.gov.uk/ukpga/2018/16/contents/enacted
[5] European Union. (2008), 'Ambient air quality assessment management', Framework Directive 2004/50/EC.
[6] European Union. (1999), 'Ambient air quality assessment management', Framework Directive 1999/30/EC.
[7] European Union. (2000), 'Ambient air quality assessment management', Framework Directive 2000/3/EC.
[8] European Union. (2002), 'Ambient air quality assessment management', Framework Directive 2002/3/EC.
[9] European Union. (2004), 'Ambient air quality assessment management', Framework Directive 2004/107/EC.

Directives were based upon requirements set out in the first EU Ambient Air Quality Framework Directive 96/92/EEC[10].

2.2 National (Wales)

The Air Quality Standards (Wales) Regulations 2010 implement the Directive 2008/50/EC and designates the Welsh Ministers as the competent authority for the purpose of the directive. Along with the local authority, the Welsh Ministers have the responsibility for assessing and taking action on air quality related issues. The air quality objectives applicable to LAQM in Wales are set out in the Air Quality (Wales) Regulations 2000, No. 1940 (Wales 138), Air Quality (Amendment) (Wales) Regulations 2002, No 3182 (Wales 298).

In England and Wales, Part IV of the 1995 Environment Act[11] sets guidelines for protecting air quality in the UK and forms the basis of the local air quality management. The Environment Act requires local authorities in the UK to review air quality in their area periodically and designate 'Air Quality Management Area' (AQMAs) if improvements are necessary. Where an AQMA is designated, local authorities are also required to produce an 'Air Quality Action Plan' (AQAP) detailing the pollution reduction measures that need to be adopted to achieve the relevant air quality objectives within an AQMA.

As part of the Environment Act, the UK Government was required to publish a National Air Quality Strategy (NAQS) to establish the system of 'local air quality management' (LAQM) for the designation of AQMAs. This led to the introduction of the first Air Quality Strategy (AQS) in 1997[12] which since has progressed through several revisions until it was replaced by the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007[13]. Each revision introduced strategies and regulations that considered measures for different pollutants by tightening existing objectives and by introducing new ones to establish a common framework to protect human health and the environment by achieving ambient air quality improvements. The Welsh Government amended the local air quality management (LAQM) regime in Wales in 2017 by issuing new statutory policy guidance in order to bring the system into line with the Well-being of Future Generations (Wales) Act 2015 ("the WFG Act").

2.2.1 National Planning Policy (Wales)

The Planning Policy for Wales (PPW)[14] sets out all relevant planning policy guidance in respect of the proposed crematorium. The most recent edition, 11, was published in 2021. For further details, please see the PPW.

2.2.2 Relevant Air Quality Objectives

A summary of the relevant Air Quality Objectives (AQO) and where they are applicable are presented in Table 2.1 and Table 2.2 respectively. The AQO listed in Table 2.1 are

[10] European Union. (1996), 'Ambient air quality assessment management', Framework Directive96/62/EC.
[11] Parliament of the United Kingdom. (1990), 'Environmental Protection Act', Chapter 43. Queen's Printer of Acts of Parliament.
[12] Department for Environment Food and Rural Affairs. (1997), 'The United Kingdom National Air Quality Strategy', Cm 3587, Department for Environment Food and Rural Affairs.
[13] Department for Environment Food and Rural Affairs. (2007), 'The Air Quality Strategy for England, Scotland, Wales and Northern Ireland', Cm 7169, Department for Environment Food and Rural Affairs.
[14] Planning Policy Wales, Edition 11 (2021)

only applicable at locations where a member of the public could be reasonably expected to spend the relevant averaging period. Further examples of this are presented in Table 2.2.

Table 2.1: AQO relevant to the proposed development

Pollutant	Averaging Period	AQO ($\mu g/m^3$)	Exceedance Allowance	Percentile Equivalent
Nitrogen Dioxide (NO_2)	Annual	40	-	-
	1-hour	200	18 per annum	99.8^{th}
Particulate Matter (as PM_{10})	Annual	40	-	-
	24-hour	50	35 per annum	90.4^{th}
Particulate Matter (as $PM_{2.5}$)[a]	Annual	25	-	-

Notes: [a] This is a target value set for a 15% reduction in concentrations at urban background aimed to achieve between 2010 and 2020

Source: Department for Environment Food and Rural Affairs (2016): 'Local Air Quality Management Technical Guidance' (TG.16).

Table 2.2: Examples of where the AQO should apply

Averaging period	Objectives should apply at	Objectives should not apply at
Annual	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
24 Hour	All locations where the annual mean objective would apply, together with hotels and gardens of residential properties[a].	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
1 Hour	All locations where the annual mean and 24 and 8-hour mean objectives apply.	Kerbside sites where the public would not be expected to have regular access.

Averaging period	Objectives should apply at	Objectives should not apply at
	Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably have expected to spend one hour or longer.	

Notes: [a] *"Such locations should represent parts of the garden where relevant public exposure to pollutants is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure to pollutants would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied* [a] This is a target value set for a 15% reduction in concentrations at urban background aimed to achieve between 2010 and 2020

Source: Department for Environment Food and Rural Affairs (2016): 'Local Air Quality Management Technical Guidance' (TG.16)

2.2.3 Statutory Nuisance

It is recognised that the planning system presents a way of protecting amenity. However, in cases where planning conditions are not applicable to a development/installation, the requirements of the Environmental Protection Act 1990 still apply. Under Part III of the Environmental Protection Act 1990, local authorities have a statutory duty to investigate any complaints of:

- *"any premises in such a state as to be prejudicial to health or a nuisance*
- *smoke emitted from premises so as to be prejudicial to health or a nuisance*
- *fumes or gases emitted from premises so as to be prejudicial to health or a nuisance*
- *any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance*
- *any accumulation or deposit which is prejudicial to health or a nuisance"*

Where the local authority establishes that any one of these issues constitutes a statutory nuisance and believes it to be unreasonably interfering with the use or enjoyment of someone's premises and/or is prejudicial to health, an abatement notice will be served on the person responsible for the offence or the owner / occupier. Failure to comply with the notice could lead to a prosecution. It is however considered as a defence if the best practicable means to prevent or to counteract the effects of the nuisance are employed.

2.3 Local (Bridgend Council)

2.3.1 Bridgend Local Development Plan 2006-2021

The Bridgend Local Development Plan 2006-2021[15] is a legal document which sets out the planning policies in the county borough up to 2021. It will be used to decide planning applications and to guide and promote development which is in the public interest. There are several policies which relate to air quality.

Strategic Policy SP2, "*Design and Sustainable Place Making*", states:

> *"All development should contribute to creating high quality, attractive, sustainable places which enhance the community in which they are located, whilst having full regard to the natural, historic and built environment by:*
>
> *....*
>
> 8. *Avoiding or minimising noise, air, soil and water pollution."*

Strategic Policy SP4, "*Conservation and Enhancement of the Natural Environment*", states:

> *"Development which will conserve and, wherever possible, enhance the natural environment of the County Borough will be favoured. Development proposals will not be permitted where they will have an adverse impact upon:*
>
> *....*
>
> - *The quality of its natural resources including water, air and soil".*

Policy ENV7, "*Natural Resource Protection and Public Health*", states:

> *"Development proposals will only be permitted where it can be demonstrated that they would not cause a new, or exacerbate an existing, unacceptable risk of harm to health, biodiversity and/or local amenity due to*
>
> 1. *Air pollution."*

[15] Bridgend Council. (2006), 'Bridgend Local Development Plan 2006-2021'

3 Methodology

This section sets out the approach taken to assess the potential impacts on air quality during the construction and operational phases of the proposed development.

3.1 Scope of the Assessment

The assessment is based on the scope of work presented in Table 3.1.

Table 3.1: Scope of Work

Scope	Consideration
Spatial	The assessment considers the impact of NO_2, PM_{10} and $PM_{2.5}$ emissions from local sources upon the proposed development site.
Temporal	The construction phase impacts resulting from the proposed development have been considered for the earliest possible construction year (2022). The operational phase impacts resulting from the proposed development have been considered for the earliest possible year of operation (2022).

3.2 Construction Phase

The proposed development has the potential to generate dust during the construction phase of the project. Although there are no standards (such as AQO) for dust disamenity or annoyance, various 'customs and practice' criteria have become established.

For the purposes of this assessment, IAQM's 2016 Construction Dust Risk guidance[16] has been used to carry out a construction dust risk assessment. The IAQM guidance provides a methodology (Appendix B) to evaluate potential risk of dust generation for a development and the level of mitigation required. The impact of the development is described using one of the following three categories: 'Low Risk', 'Medium Risk' and 'High Risk'. Based on the risk level, appropriate mitigation measures can be considered to minimise any risk of dust impacts from the construction phase.

3.3 Operational Phase

3.3.1 Point Source Emissions

The appointed energy consultant, Building Management Technology Ltd, have confirmed that the proposed development will not utilise any gas fired plant.

Heating of the retail space will be via an underfloor heating system or fan coil-based system, with hot water being supplied from three air source heat pumps along with

[16] Institute of Air Quality Management (2016): 'Guidance on the Assessment of Dust from Demolition and Construction'

reclaimed heat from the refrigeration equipment. Heating of the welfare areas will be via electric panel heaters.

Assessment of point source emissions can therefore be scoped out.

3.3.2 Road Source Emissions

3.3.2.1 Modelled Scenarios

The IAQM and EPUK planning guidance which informs this assessment contains indicative criteria on when to proceed to a detailed assessment. The criteria relating to changes in traffic flow are as follows:

A change of HDV flows of:

- More than 25 annual average daily traffic (AADT) flows within, or adjacent to, an AQMA;
- More than 100 AADT elsewhere.

A change of LDV flows of:

- More than 100 AADT within or adjacent to an AQMA;
- More than 500 AADT elsewhere.

The proposed development is not located within or adjacent to an AQMA; therefore, the less stringent criteria apply. Traffic data provided by the appointed transport consultant, Entran Ltd, states that the indicative criteria will be triggered on several links. A detailed assessment of road source emissions, using dispersion modelling, has therefore been scoped into this assessment.

A pre-application response produced by BCBC stated that any potential air quality impacts should be assessed using dispersion modelling. A proposed scope of works was sent to Craig Lewis on 17/05/2021. At the time of writing, no disagreement to the proposed scope has been received so it is considered to be acceptable to BCBC.

The earliest possible year of operation is 2022. Based on the above, the following scenarios have been considered:

- 2019 model verification;
- 2022 without proposed development; and
- 2022 with proposed development.

According to the guidance provided by Defra in their Air Quality Strategy, vehicle emissions are expected to decrease in future years as a result of advancement in abatement technologies. It is also expected that more stringent emission limits will be imposed upon manufacturers.

Based on the above, the 2022 scenarios are the worst case and therefore no additional future year scenario was considered in this assessment.

3.3.2.2 Dispersion Model Selection

This assessment has been carried out using the latest version of 'ADMS-Roads' (5.0.0.1), developed by Cambridge Environmental Research Consultants (CERC). This model is commonly used in planning application and regulatory assessment of traffic related emissions.

3.3.2.3 Traffic Data

Traffic data was provided by the appointed transport consultant, Entran Ltd.

Vehicle speeds at 'busy' junctions (defined by Defra as those with over 10,000 AADT) were assumed to be 20 kph and vehicle speeds at minor junctions were assumed to be 10 kph below the road speed limit.

Table 3.2 shows the traffic data for the 2022 without and with proposed development scenarios. Figure 3.1 shows the extent of the dispersion modelling network.

Table 3.2: Traffic data

Link Name	Without Proposed Development (2022)			With Proposed Development (2022)		
	AADT	HDV%	Speed (kph)	AADT	HDV%	Speed (kph)
A4106(N)	7652	1.0	64.4	9553	8.6	64.4
Eastern Prom	3289	2.0	48.3	3572	2.0	48.3
Site	28	0.0	32.2	3074	23.7	32.2
The Portway	4391	0.0	48.3	4444	0.0	48.3
Hilsboro Pl	596	0.0	48.3	596	0.0	48.3
Lias Rd	3984	1.0	48.3	4410	1.0	48.3
Roundabout	3323	0.9	20.0	4275	6.5	20.0

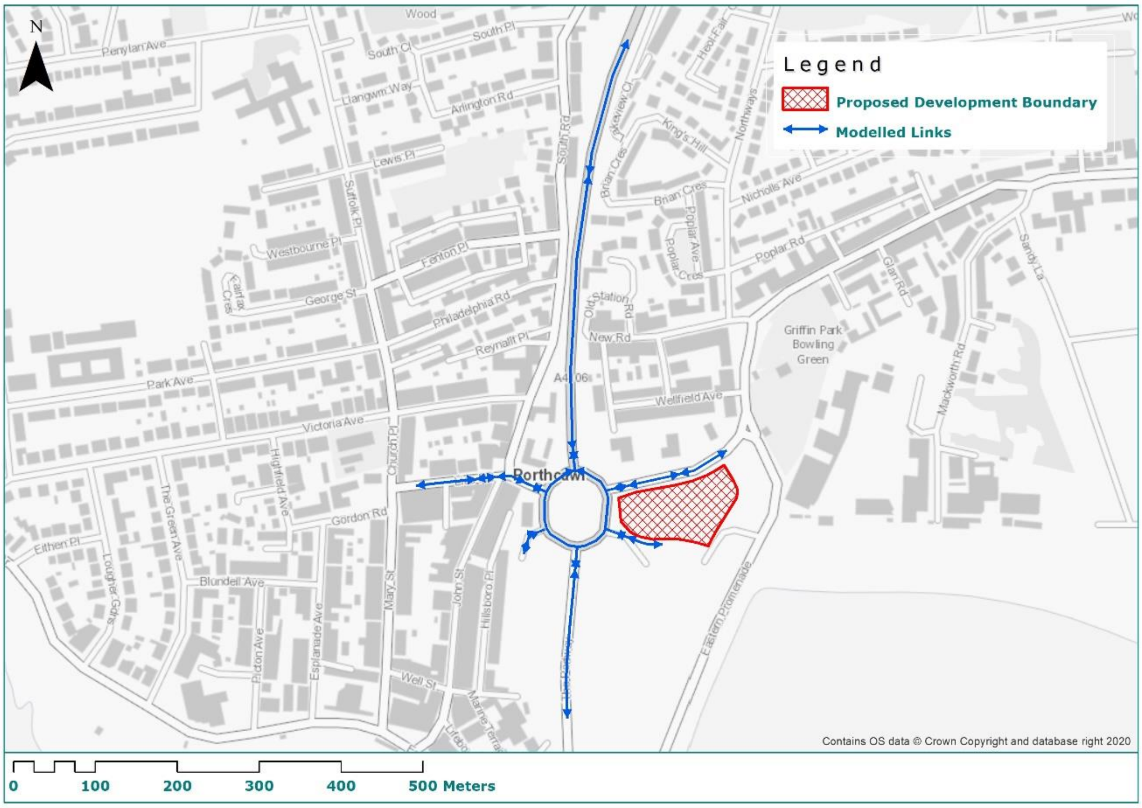

Figure 3.1: Modelled Road Network

3.3.2.4 Emission Factors

The NO_x, PM_{10} and $PM_{2.5}$ road source emissions are calculated from traffic flow data using the latest Defra Emission Factor Toolkit (EFT 10.0, August 2020). The EFT Version 10.0 has been developed for the UK by the National Atmospheric Emissions Inventory (NAEI) and Transport for London (TfL). The EFT is based on data collected from a number of sources including the European Environment Agency (EEA) COPERT (Computer Programme to calculate Emissions from Road Transport) emission calculator.

A typical national diurnal profile derived from the latest available DfT data is shown below in Figure 3.2. The profile applies a multiplying factor to calculated emissions data to represent changes in traffic patterns throughout the week.

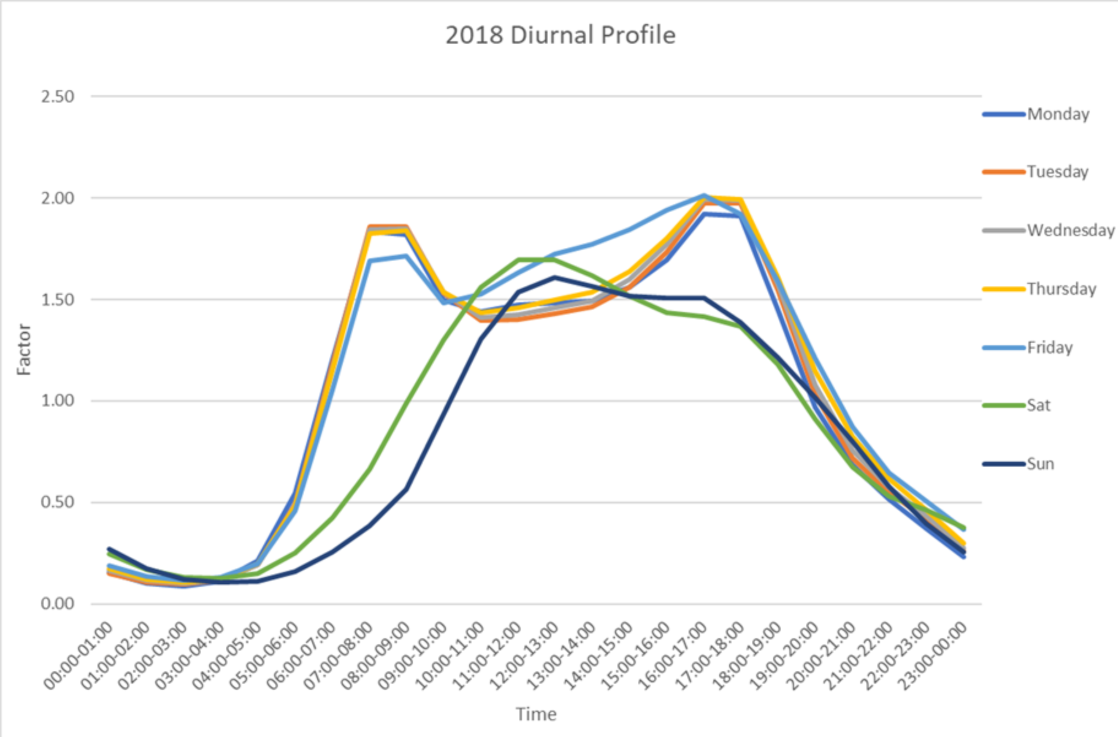

Figure 3.2: Diurnal traffic profile based on DfT 2018 traffic data

3.3.2.5 Meteorological Data

The key meteorological parameters for dispersion modelling are wind speed and wind direction. Other meteorological parameters, such as cloud cover, surface temperature, precipitation rate and relative humidity are also taken into account.

For dispersion modelling, hourly-resolved data are required and often it is difficult to find a local site that can provide reliable data for all the meteorological parameters at this resolution.

Following discussions with ADM Ltd, a reputable provider of meteorological data, Numerical Weather Prediction (NWP) data was provided for Porthcawl.

In order to account for a variety of meteorological conditions, the qualitative assessment and dispersion modelling have been carried out with the latest available meteorological data from the period 2018 to 2020.

Figure 3.3 below presents the wind rose for each modelling year.

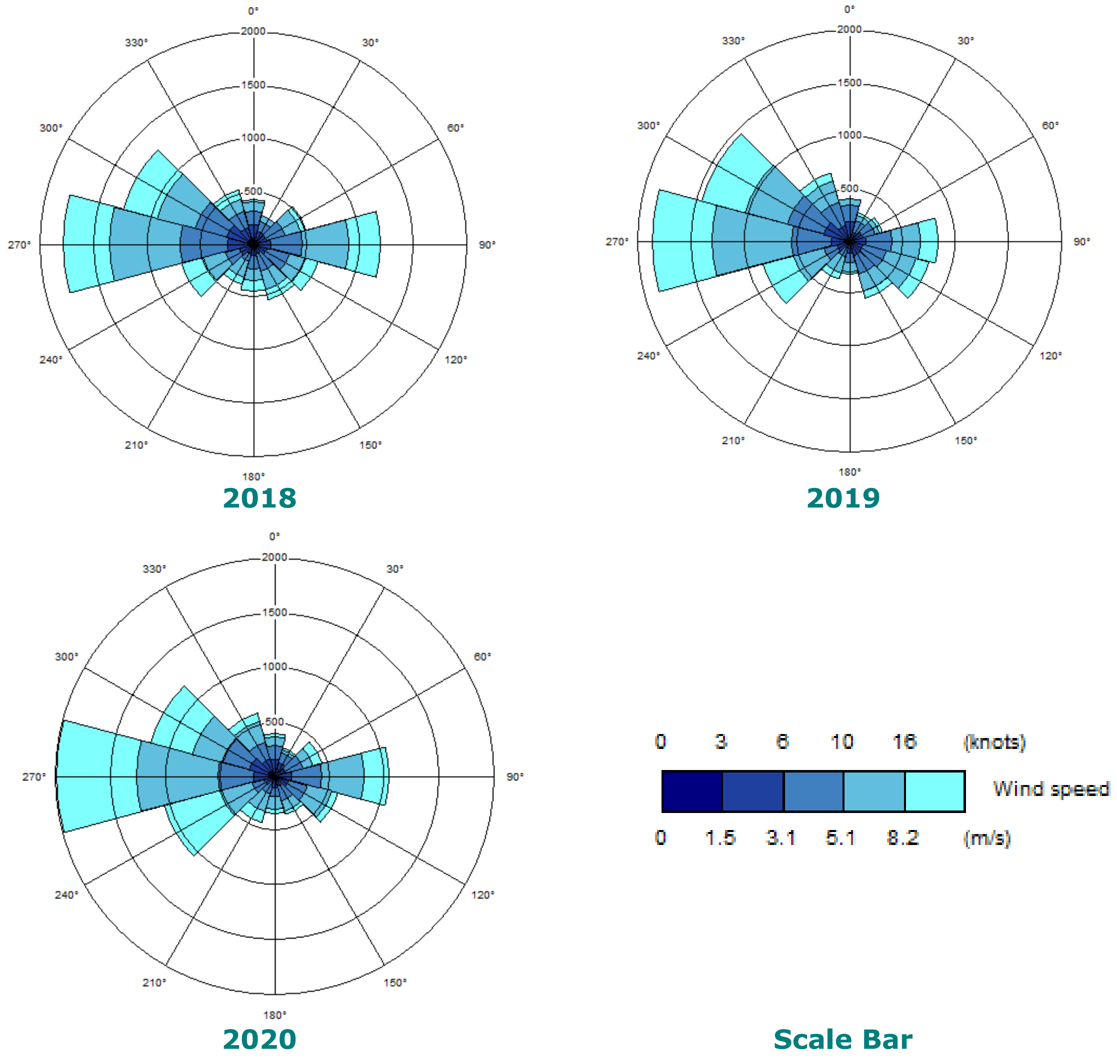

Figure 3.3: Porthcawl Windrose Plots 2018 - 2020

3.3.2.6 Surface Roughness

The roughness length (z0) was set to 0.5m (Parkland, open suburbia) for both the dispersion site and the meteorological site.

3.3.2.7 Minimum Monin-Obukhov Length

The Minimum Monin-Obukhov Length (MMOL) provides a measure of the stability of the atmosphere. An MMOL value of 10m (small towns) was used for both the dispersion site and the meteorological site. These values are considered appropriate for the nature of the surrounding areas.

3.3.2.8 NO_x to NO_2 Relationship

As discussed in Section 1.5.1, emissions of NO_x will comprise contributions from both NO and NO_2. This assessment uses the latest NO_x to NO_2 conversion factor toolkit (Version 8.1 released August 2020), provided by Defra as a Microsoft Excel based calculation tool which is available from Defra's web-based air quality resource centre[17]. This method is considered the most appropriate technique of determining NO_2 concentrations from road NO_x contributions.

3.3.2.9 Estimating Hourly and Daily Mean Concentrations

The latest Local Air Quality Management (LAQM) Technical Guidance TG (16) has been used for predicting 1 hourly and 24-hourly pollutant concentrations.

The guidance states that the one hour mean NO_2 AQO of 200µg/m^3 is not likely to be exceeded at any roadside locations if the annual mean concentration is below 60µg/m^3. Based on this guidance, the hourly mean NO_2 AQO is only considered when the annual mean NO_2 concentrations are over 60µg/m^3.

In accordance with the guidance, the short term 24 hourly PM_{10} mean concentration can be calculated using the following equation as presented below:

$$Number\ \ of\ 24\ hour\ mean\ exceedences = 18.5 + 0.00145\ x\ annual\ mean^3 + (\frac{206}{annual\ mean})$$

3.3.2.10 Modelled Receptors

Local Air Quality Management (LAQM) guidance clarifies where likely exceedances of the objectives should be assessed and states that Review and Assessment should focus on: *"Locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the relevant air quality objective"* [18].

Modelled receptors were selected at locations where the greatest change is likely to occur as a result of the proposed development. Table 3.3 details the modelled receptor details and their locations are illustrated in Figure 3.4.

Table 3.3: Modelled receptors

Receptor ID	X (m)	Y (m)	Z (m)
R1	281849	176887	1.5
R2	281851	176916	
R3	281944	176992	
R4	281958	176966	
R5	281864	176958	
R6	281921	177268	
R7	281903	177315	
R8	282054	176937	
R9	282029	176887	

[17] Department for Environment Food and Rural Affairs. Air Quality Information Resource (Air) Website, available at: http://uk-air.defra.gov.uk/
[18] Department for Environment, Food and Rural Affairs (2016), Local Air Quality Management – Technical Guidance (16)

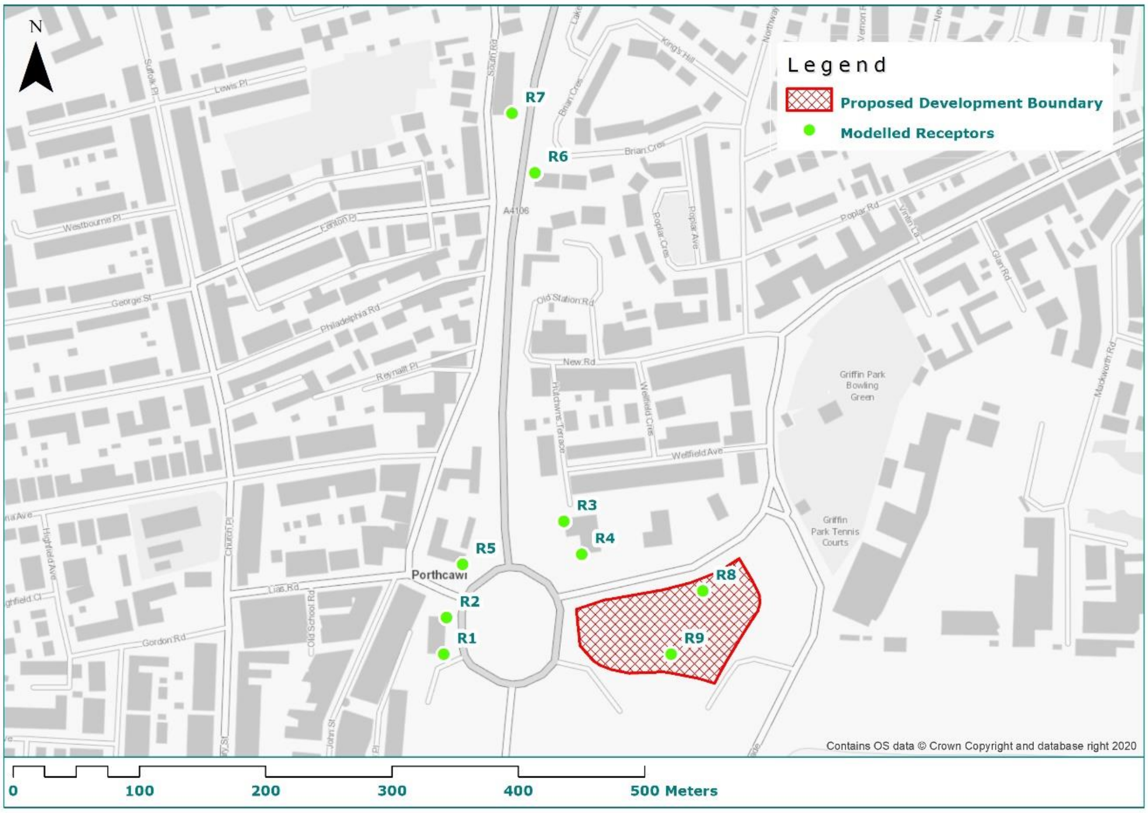

Figure 3.4: Modelled Receptors

3.3.2.11 Significance Criteria

For the purposes of this assessment, the IAQM and EPUK (2017) criteria have been used for calculating the magnitude descriptors for predicted change in annual mean concentrations at individual receptors (Table 3.4). The IAQM recognise that professional judgement is required in the interpretation of air quality assessment significance. Table 3.4 is intended to be used as a tool to assist with interpretation of the air quality assessment.

Table 3.4: Impact descriptors for predicted change in annual mean concentrations at individual receptors (Reproduced from EPUK and IAQM Guidance)

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (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

Notes: [1] AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.

[2] The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The numbers are treated with their likely accuracy in order to avoid assumption of false level of precision. For example, Changes of 0%, i.e. less than 0.5% will be described as Negligible.

[3] The Table is only designed to be used with annual mean concentrations.

[4] Descriptors are used for individual receptors only; the overall significance is determined using professional judgement. For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.

[5] When defining the concentration as a percentage of the AQAL, use the 'without development' concentration where there is a decrease in pollutant concentration and the 'with development;' concentration for an increase.

3.3.2.12 Modelling Assumptions and Uncertainties

Uncertainty in dispersion modelling predictions can be associated with a variety of factors, including:

- Uncertainties regarding vehicle emissions;
- Uncertainties with recorded meteorological data; and
- Simplifications made in the model algorithms or post processing of the data that describe atmospheric dispersion or chemical reactions.

Model verification, a two-stage process, is therefore applied. Further details of the model verification carried out for this assessment are presented within Appendix D.

Potential uncertainties in the model results were minimised as far as practicable and worst-case inputs used in order to provide a robust assessment. This included the following:

- Choice of model - ADMS-Roads is a widely used atmospheric dispersion model and results have been verified through a number of studies to ensure predictions are as accurate as possible;

- The earliest year of operation is 2022. Emissions from vehicles are expected to decrease in the future as set out in Section 3.3.1. Hence, the 2022 scenarios are considered to be the worst case and therefore no further future year scenario was considered in this assessment; and

- Modelled concentrations presented in this assessment are the maximum forecast over a three-year modelling period and are therefore representative of unfavourable meteorological conditions.

4 Baseline Conditions

The following section sets out the baseline conditions in relation to air quality at the proposed development site. For the purpose of this assessment, data has been obtained from the BCBC[19] Annual Status Report (ASR) for 2019 and the Defra air quality resource website[20].

4.1 BCBC Automatic Monitoring

In 2019, BCBC undertook automatic monitoring at one location within its jurisdiction. As the automatic monitor is over 16km away in Rhiwceiliog, it is not relevant and has not been considered further.

4.2 BCBC Non-Automatic (Diffusion Tube) Monitoring

BCBC undertook diffusion tube monitoring at 30 sites across its jurisdiction in 2019. As illustrated in Figure 4.1, two of these sites are located within 350m of the proposed development site. Table 4.1 presents the monitored NO_2 annual mean concentrations recorded at these sites for the latest three-year period available.

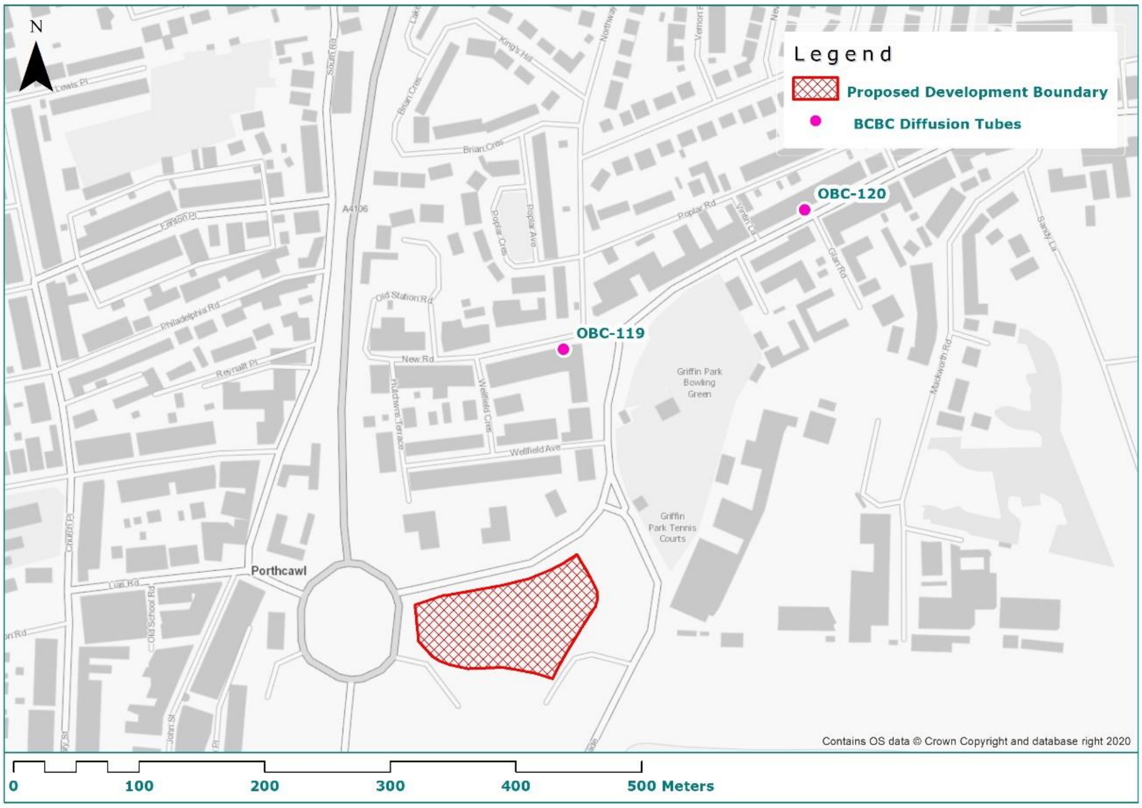

Figure 4.1: BCBC Diffusion Tube Locations

[19] Bridgend County Borough Council (2020).'Air Quality Annual Status Report for 2019'.
[20] Department for Environmental Food and Rural Affairs. Accessible at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

Table 4.1: BCBC Diffusion Tube NO_2 Annual Mean Concentrations

Site ID	Site Type	Annual mean NO_2 Concentration (µg/m3)		
		2017	2018	2019
OBC-119	Roadside	-	12.5	12.4
OBC-120	Kerbside	-	15.1	16.0

Notes: Exceedance of the NO_2 annual mean AQO of 40µg/m^3 are shown in **bold**

NO_2 annual means in excess of 60µg/m-^{3}, indicating a potential exceedance of the NO_2 hourly mean AQO are shown in **bold** and underlined.

a) Means were "annualised" in accordance with LLAQM Technical Guidance, when valid data capture is less than 75%

4.3 Defra Modelled Background Pollution Concentrations

Defra provides background pollution concentration estimates to assist local authorities in undertaking their 'Review and Assessment' work. This data is available to download from the Defra air quality resource website for NO_x, NO_2, PM_{10} and $PM_{2.5}$ for every 1km X 1km grid square for all local authorities. The current dataset is based on 2018 background data and future year projections are available for 2018 to 2030. The background dataset provides breakdown of pollution concentrations by different sources (both road and non-road sources).

Table 4.2 presents the predicted background concentrations for the latest year of available monitoring data (2019) from BCBC and the earliest anticipated year of operation (2022) for the proposed development.

Table 4.2: Defra Projected Background Concentrations at proposed development

Year	Annual mean Concentration (µg/m3)		
	NO_2	PM_{10}	$PM_{2.5}$
2019	6.1	10.6	6.6
2022	5.5	10.2	6.2

Note: Data presented within the table are the maximum derived from the following ordinance survey grid squares: 281500, 176500 and 282500, 176500.

4.4 Baseline Summary

As illustrated in Figure 4.2, there are two diffusion tube sites within 350m of the proposed development site. As these sites are at roadside locations, they are not considered representative of ambient air quality at the proposed development and modelled receptors.

The Defra background concentrations have therefore been used to inform ambient NO_2, PM_{10} and $PM_{2.5}$ concentrations at modelled receptor locations and the proposed development.

5 Potential Impacts

5.1 Construction Phase

The earliest construction year is likely to be 2022, subject to planning. As demolition works are not required, the potential risk from earthworks, construction and trackout have been considered. To assess the worst-case scenario, it has been assumed that all activities will be carried out for the duration of the construction period. Figure 5.1 shows the construction dust buffers based on the recommended distances by IAQM.

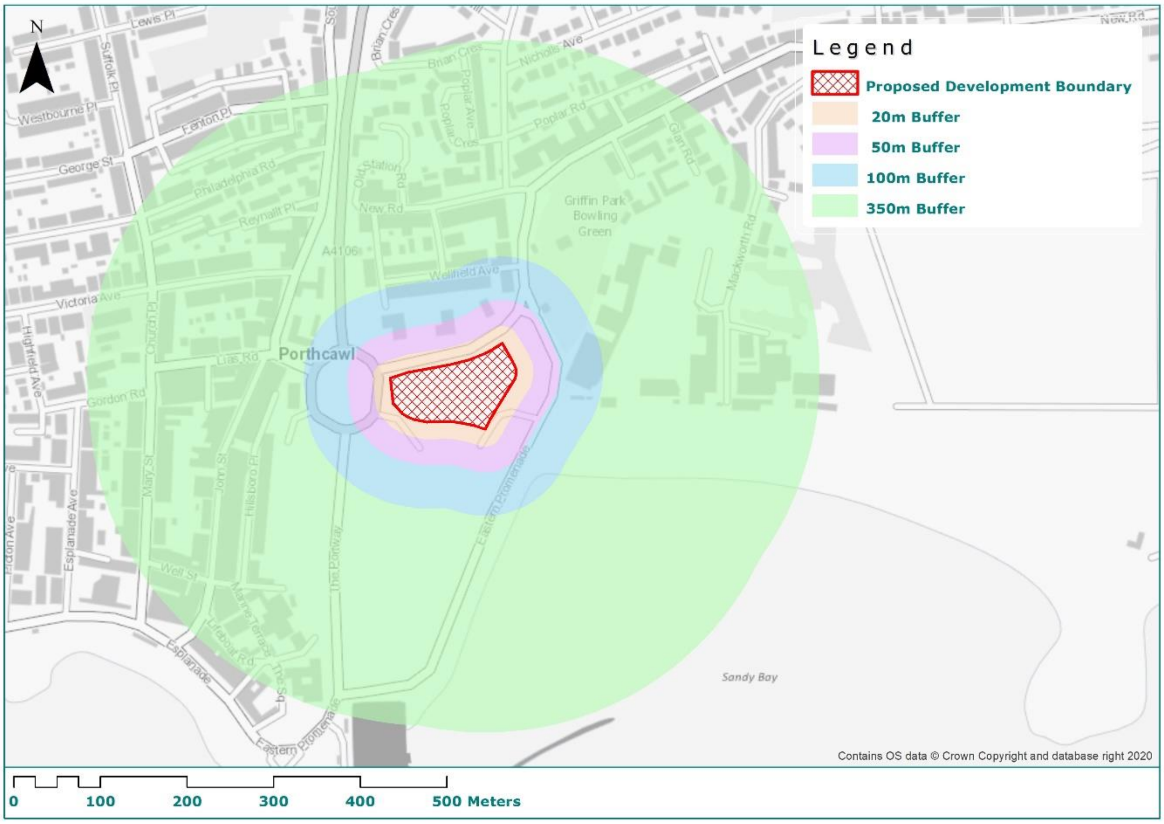

Figure 5.1: Construction Dust Risk Assessment Buffers

Magnitude and sensitivity descriptors that have been applied to assess the overall impact of the construction phase are presented in Appendix B.

The dust emission magnitude for earthworks is 'Large', with the total site area above 10,000m^2.

The dust emission magnitude for construction is 'Medium', with the total building volume between 25,000 and 100,000m^3.

It is anticipated that the outward daily peak HGV movements will be between 10 and 50 HDV movements, so the dust emission magnitude for trackout has been assigned as 'Medium'.

There are no ecological receptors within 50m of the site, therefore the risk of construction dust impacts upon ecological receptors is not considered further.

Table 5.1: Dust Emission Magnitude

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

It is considered that the residential receptors have a 'High' sensitivity to dust soiling and human health impacts. Table 5.2 presents the sensitivity of the surrounding area to effects caused by construction activities and is based on the criteria presented in Appendix B.

Table 5.2: Sensitivity of Study Area

Potential Impact	Sensitivity of the surrounding area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Low	Low	High
Human Health	N/A	Low	Low	Low

The overall risk of dust soiling and human health impacts to high sensitivity receptors are presented in Table 5.3. The risk is based on the criteria presented in Appendix B.

Table 5.3: Summary of the Risk of Construction Dust Effects

Sensitivity of Area	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Low Risk	Low Risk	Medium Risk
Human Health	N/A	Low Risk	Low Risk	Low Risk

Based upon the above, the largest risk associated with dust soiling is classified as 'Medium'. With respect to human health impacts the risk is no greater than 'Low'.

Mitigation measures appropriate for the proposed development have been presented in Appendix C.

Following the implementation of these mitigation measures, the impacts from the construction phase of the proposed development on dust soiling and human health are considered not to be significant.

5.2 Operational Phase

5.2.1 Impact at Existing Receptors

The potential air quality impacts from the operation of the proposed development at existing modelled receptors are detailed below.

Table 5.4 sets out NO_2, PM_{10} and $PM_{2.5}$ concentrations at the existing modelled receptors for both the without and with proposed development scenarios, as well as comparison against the relevant AQO.

Table 5.4: Modelled NO_2, PM_{10} and $PM_{2.5}$ Concentrations in 2022 (without proposed development, with proposed development) (µg/m³)

Receptor ID	Without Proposed Development 2022				With Proposed Development 2022			
	Annual Mean (µg/m³)			No. of exceedances of 24-hour mean PM_{10} AQO	Annual Mean (µg/m³)			No. of exceedances of 24-hour mean PM_{10} AQO
	NO_2	PM_{10}	$PM_{2.5}$		NO_2	PM_{10}	$PM_{2.5}$	
R1	9.2	10.3	6.5	3	10.6	10.5	6.7	3
R2	10.5	10.5	6.7	3	12.2	10.8	6.8	2
R3	8.4	10.3	6.5	3	9.4	10.5	6.6	3
R4	8.7	10.3	6.5	3	9.8	10.5	6.7	3
R5	9.7	10.4	6.6	3	11.2	10.7	6.8	3
R6	13.8	11.9	7.7	1	16.3	12.5	8.1	1
R7	11.2	11.3	7.3	2	13.2	11.7	7.6	1
AQO	40	40	25	35	40	40	25	35

Note: Exceedances of AQO highlighted in **Bold**.

The modelled concentrations forecast that all relevant AQO will be comfortably met at all modelled existing receptors.

According to Defra LAQM.TG (16) guidance, exceedance of the one-hour NO_2 mean objective is generally unlikely to occur where annual mean concentrations do not exceed 60µg/m³. The annual mean NO_2 concentration at all modelled receptors is comfortably lower than 60µg/m³ and it is unlikely the one-hour mean will be exceeded at all modelled receptor locations.

Significance has been determined for NO_2, PM_{10} and $PM_{2.5}$ using the IAQM/EPUK impact descriptors matrix illustrated in Table 3.4. This is shown below in Table 5.5, Table 5.6 and Table 5.7 respectively.

Table 5.5: NO_2 Annual Mean Concentration Changes and Associated Impact at Existing Modelled Receptors in 2022

Receptor ID	Predicted Annual Mean NO2 Concentration (µg/m³)	Long Term Average Concentration at Receptor	Pollutant Concentration Change (µg/m³)	% Change Relative to AQAL	Impact Descriptor
R1	10.6	75% or less of AQAL	1.42	2-5%	Negligible

Receptor ID	Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)	Long Term Average Concentration at Receptor	Pollutant Concentration Change ($\mu g/m^3$)	% Change Relative to AQAL	Impact Descriptor
R2	12.2	75% or less of AQAL	1.77	2-5%	Negligible
R3	9.4	75% or less of AQAL	1.02	2-5%	Negligible
R4	9.8	75% or less of AQAL	1.14	2-5%	Negligible
R5	11.2	75% or less of AQAL	1.48	2-5%	Negligible
R6	16.3	75% or less of AQAL	2.44	6-10%	Slight Adverse
R7	13.2	75% or less of AQAL	1.96	2-5%	Negligible

Table 5.6: PM_{10} Annual Mean Concentration Changes and Associated Impact at Existing Modelled Receptors in 2022

Receptor ID	Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)	Long Term Average Concentration at Receptor	Pollutant Concentration Change ($\mu g/m^3$)	% Change Relative to AQAL	Impact Descriptor
R1	10.5	75% or less of AQAL	0.20	<0.5%	Negligible
R2	10.8	75% or less of AQAL	0.25	1%	Negligible
R3	10.5	75% or less of AQAL	0.22	1%	Negligible
R4	10.5	75% or less of AQAL	0.21	1%	Negligible
R5	10.7	75% or less of AQAL	0.24	1%	Negligible
R6	12.5	75% or less of AQAL	0.68	2-5%	Negligible
R7	11.7	75% or less of AQAL	0.38	1%	Negligible

Table 5.7: $PM_{2.5}$ Annual Mean Concentration Changes and Associated Impact at Existing Modelled Receptors in 2022

Receptor ID	Predicted Annual Mean $PM_{2.5}$ Concentration (µg/m³)	Long Term Average Concentration at Receptor	Pollutant Concentration Change (µg/m³)	% Change Relative to AQAL	Impact Descriptor
R1	6.7	75% or less of AQAL	0.12	<0.5%	Negligible
R2	6.8	75% or less of AQAL	0.15	1%	Negligible
R3	6.6	75% or less of AQAL	0.13	1%	Negligible
R4	6.7	75% or less of AQAL	0.12	<0.5%	Negligible
R5	6.8	75% or less of AQAL	0.15	1%	Negligible
R6	8.1	75% or less of AQAL	0.40	2-5%	Negligible
R7	7.6	75% or less of AQAL	0.23	1%	Negligible

As shown in Table 5.5, there is a slight increase in NO_2 concentrations at all of the modelled receptors in the 2022 with proposed development future scenario. The impact descriptor is negligible at all but one receptor, which experiences a slight adverse impact.

As shown in Table 5.6 and Table 5.7, there is a very slight increase in PM_{10} and $PM_{2.5}$ concentrations at all of the modelled receptors in the 2022 with development future scenario. The impact descriptor is negligible at all modelled receptors.

Concentrations of all pollutants remain comfortably below their relevant AQO in both the without and with proposed development scenarios.

5.2.2 Commercial suitability

Modelled receptors R8 and R9 were placed on the façade of the proposed development. In the with proposed development 2022 scenario, concentrations of all pollutants remain comfortably below their relevant AQO at both receptors. The site is considered suitable for commercial occupation.

6 Mitigation Measures

6.1 Construction Phase

Particle generation from construction and demolition activities can be substantially reduced through carefully selected mitigation techniques and effective management. The most effective technique is to control at source, as once particles are airborne, it is difficult to prevent them from dispersing into the surrounding area. However, once airborne, water sprays are probably the most effective method for suppression.

Pre-project planning, implementation and on-site management issues are an essential requirement for effective dust control. This includes, for example, environmental risk assessments, method statements, training and satisfying planning requirements. Before the start of a project, it is also important to identify which construction activities are likely to generate dust and to draw up action plans to minimise emissions to the atmosphere. Dust emissions from construction sites will mainly be the sum of a large number of small activities. Therefore, attention to detail is a critical feature of effective management of the total site emissions.

Site specific mitigation measures should be set up based on the risk effects as outlined in Table 5.3. Examples of these measures are provided in the IAQM guidance document and summarised in Appendix C.

6.2 Operational Phase

6.2.1 Reducing Vehicle Emissions

The proposed development will include four active EV charging points with another 20 bays allocated for future expansion.

7 Conclusion

This report provides an assessment on the following key issues associated with the construction and operation phases of the proposed development on land located to the north of Salt Lake Car Park, Porthcawl:

- Nuisance, loss of amenity and health impacts associated with the construction phase of the proposed development on sensitive receptors;
- Characterising the baseline conditions at the site using monitored pollutant data from BCBC and background concentrations from Defra background maps;
- Assessing the suitability of the proposed development site for the addition of new commercial receptors;
- Assessing the potential air quality impacts arising as a result of the proposed development; and
- Making recommendations for mitigation measures if required.

An air quality assessment investigating the construction and operational air quality impacts was undertaken for the proposed development.

A qualitative assessment on the construction phase activities has been carried out. The largest risk of these activities towards dust soiling was considered to be 'Medium', while that towards human health was considered to be 'Low'. Following proper implementation of the measures recommended in Appendix C, the impact of emissions during construction of the development is likely to be 'Negligible' and therefore 'Not Significant'.

The annual mean and one hour mean NO_2 AQO is expected to be met at all modelled locations. The PM_{10} and $PM_{2.5}$ concentrations are forecast to meet their respective long and short term AQO by a considerable margin. Therefore, no mitigation measures are proposed for the operational phase of the proposed development, and it is considered suitable for the introduction of new commercial receptors.

It can therefore be concluded that the proposed development is not considered to conflict with national, regional and local planning guidance.

Appendix A: Operational Impact Assessment

Methodology

The EPUK & IAQM guidance refers to the Town and Country Planning (Development Management Procedure) Order (England) 2010 [(Wales) 2012] for a definition of a 'major' development when scoping assessments required for the planning process. Based on the guidance, a 'major' development is such development where:

- The number of dwellings is 10 or above;
- The residential development is carried out of a site of more than 0.5ha where the number of dwellings is unknown;
- The provision of more than 1,000m^2 commercial floorspace; or,
- Development carried out on land of 1ha or more.

It is recommended that consideration should be given to reduce impacts from any 'major' developments by considering:

- The impact of existing sources in the local area on the proposed development; and
- The impacts of the proposed development on the local area.

The assessment process involves two stages where:

Stage 1 scope out the need for an air quality assessment and **Stage 2** provide guidance of determining the level of assessment required for a project.

Table A 1 below sets out the Stage 1 criteria to determine the need to assess impacts arising from small developments and **Table A 2** provides more specific guidance as to when an air quality assessment is likely to be required to assess the impacts of the proposed development on the local area.

Table A 1: Stage 1 Criteria to Proceed to Stage 2

Criteria to Proceed to Stage 2	
A	If any of the following apply: • 10 or more residential units of a site area of more than 0.5ha • More than 1,000m^2 of floor space for all other uses or a site area greater than 1ha
B	Coupled with any of the following: • The development has more than 10 parking spaces • The development will have a centralised energy facility or other centralised combustion process

Table A 2: Indicative Criteria for Requiring an Air Quality Assessment

The development will	Indicative Criteria to Proceed to an Air Quality Assessment
1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans <3.5t gross vehicle weight).	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere.
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight).	A change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.
3. Realign roads, i.e. changing the proximity of receptors to traffic	Where the change is 5m or more and the road is within an AQMA.
4. Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or
5. Introduce or change a bus station.	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20 m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).
7. Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors. NB. this includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.	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. 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.

Appendix B: Construction Dust Risk Assessment Criteria

IAQM guidance framework on assessing the risk of dust proposes the construction phase should be split into phases dependent on their potential impacts, determining the risk for each individually. Therefore, this assessment has determined the risk of the four construction categories put forward by the IAQM guidance:

- Demolition;
- Earthworks;
- Construction; and
- Track out (transport of dust and dirt onto the public road network).

The IAQM guidance framework states that the risk of dust impacts from the four categories can be defined as 'negligible', 'low risk', 'medium risk' or 'high risk' depending upon the scale and nature of the construction activity and the sensitivity and proximity of receptors to the construction site boundary. This categorisation is used to put forward appropriate mitigation measures, reducing the level of effects from the dust impacts so they are not significant.

The assessment of dust impacts using the IAQM guidance considers three separate effects from dust:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to significant increase in exposure to PM_{10}.

Step 1 of the assessment is set out to screen for the requirement for a more detailed assessment for the proposed development. The screening criteria states:

A 'human receptor' within:

- 350 m of the boundary of the application site; or
- 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

An 'ecological receptor' within:

- 50 m of the boundary of the application site; or
- 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

Where there are no receptors and the level of risk is deemed 'negligible', there is no need for further assessment.

Step 2A of the assessment enables the overall dust emission magnitude (small, medium or large) from each dust source (demolition, earthworks, construction and trackout) to be identified in relation with the criteria outlined in Table B.1.

Table B.1: Dust emission magnitude

Source	Large	Medium	Small
Demolition	Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level.	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities <10 – 20 m above ground level.	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months.
Earthworks	Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes.	Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes.	Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months.
Construction	Total building volume >100,000 m^3, on site concrete batching or sandblasting.	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching.	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).
Track out	>50 HDV (>3.5t) outward movements[a] in any one day[b], potentially dusty surface material (e.g. high clay content), unpaved road length >100 m.	10-50 HDV (>3.5t) outward movements[a] in any one day[b], moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m.	<10 HDV (>3.5t) outward movements[a] in any one day[b], surface material with low potential for dust release, unpaved road length <50 m.
Notes:			

[a] Vehicle movement is a one-way journey. i.e. from A to B, and excludes the return journey.
[b] HDV movements during a construction project vary over its lifetime, and the number of movements is the maximum not the average.

Step 2B allows for the sensitivity of the area (high, medium or low) to be assessed and takes into account a number of factors:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10}, the existing local background concentration; and
- Site specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Receptor sensitivity has been based on the highest of any criteria being met thus, the assessment is considered as robust. The sensitivity of the area is further determined for dust soiling, human health and ecosystem effects by considering the criteria presented in Table B.2.

Table B.2: Magnitude of Receptor Sensitivity

Source	High	Medium	Low
Sensitivities of people to dust soiling effects	• Users can reasonably expect enjoyment of a high level of amenity; or • The appearance, aesthetics or value of their property would be diminished by soiling; and • The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • Indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks[b] and car showrooms.	• Users would expect[a] to enjoy a reasonable level of amenity, but would not reasonably expect[a] to enjoy the same level of amenity as in their home; or • The appearance, aesthetics or value of their property could be diminished by soiling; or • The people or property wouldn't reasonably be expected[a] to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • Indicative examples include parks and places of work.	• The enjoyment of amenity would not reasonably be expected[a]; or • Property would not reasonably be expected[a] to be diminished in appearance, aesthetics or value by soiling; or • There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. • Indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks[b] and roads.
Sensitivities of people to health effects of PM_{10}	• Locations where members of the public are exposed over a time period relevant to	• Locations where the people exposed are workers[d], and exposure is over a time period	• Locations where human exposure is transient.[e]

Source	High	Medium	Low
	the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).[c] • Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	• Indicative examples include public footpaths, playing fields, parks and shopping streets.
Sensitivities of receptors to ecological effects	• Locations with an international or national designation and the designated features may be affected by dust soiling; or • Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain. • Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.	• Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or • Locations with a national designation where the features may be affected by dust deposition. • Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.	• Locations with a local designation where the features may be affected by dust deposition. • Indicative example is a local Nature Reserve with dust sensitive features.

The final step, Step 2C allows for the risk of impacts to be defined. The dust emission magnitude derived in Step 2A is combined with the sensitivity of the area defined in step 2B to determine the risk of effects on:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to an increase in exposure to PM_{10}.

The criteria for each of the dust sources are presented in Table B.3, Table B.4, Table B.5 and Table B.6.

Table B.3: Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table B.4: Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table B.5: Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table B.6: Track out

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Appendix C: Construction Phase Mitigation Measures

The mitigation measures set out below are from IAQM's 2016 guidance for construction dust and are appropriate for the mitigation of the risk determined. The points below can be formerly adopted into a construction dust management plan.

Mitigation Measures:

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of person(s) account- able for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by BCBC.
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to BCBC when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the log book.
- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition monitoring locations with BCBC. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

- 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 actives for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.
- 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 un- surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.

- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.

- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

- Avoid bonfires and burning of waste materials.

- Avoid scabbling (roughening of concrete surfaces) if possible.

- 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.

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.

- Avoid dry sweeping of large areas.

- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.

- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.

- Record all inspections of haul routes and any subsequent action in a site log book.

- 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).

- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.

- Access gates to be located at least 10 m from receptors where possible.

Appendix D: Verification

Overview

Model verification is a process by which checks are carried out to determine the performance of a dispersion model at a local level, primarily by comparison of modelled results with monitoring data. Differences between modelled and monitored data may occur as a result of uncertainties associated with a number of model inputs including:

- Traffic flows, speeds and vehicle splits;
- Emissions estimates;
- Background concentrations;
- Meteorological data; and
- Surface roughness length and terrain.

The verification process benefits an assessment by investigating uncertainties and minimising them either through informed refinement of model input parameters or adjustment of the model output if it is deemed necessary.

Verification of NO_2 concentrations has been carried out using 2019 monitored results from BCBC diffusion tube OBC-120. NWP data for Porthcawl was used in the modelling, with all other inputs as per the main assessment.

Methodology

Guidance produced by Defra provides a methodology for model verification including calculation methods and directions on the suitability of monitoring data.

Verification of NO_2 concentrations has been carried out using 2018 results from the roadside diffusion tube monitoring site. No verification of PM_{10} or $PM_{2.5}$ has been carried out due to insufficient monitoring data within the study area.

In accordance with guidance, the model verification has been based on 2018 meteorological data. Background concentrations used in the model verification have been taken from Defra, consistent with the main model with individual background concentrations being obtained for each monitoring location. These are presented in Table D.1.

Table D.1: Background Concentrations used in Model Verification

Site Name	Annual Mean Concentration 2018 (µg/m³)	
	NO_x	NO_2
OBC-120	9.6	7.5

Table D.2 presents the monitored pollutant concentrations used within the verification.

Table D.2: Monitored Data used in Model Verification

Site Name	Type of Monitor	Annual Mean Concentration 2019 (µg/m³)	
		NO_x	NO_2
OBC-120	Diffusion Tube	25.1	16.0

Verification Results

Table D.3 and Figure D.1 present the results of the model verification for NO_2. It can be seen that the modelled NO_2 concentration is below the monitored value. On this basis it has been concluded that the model is under predicting annual mean NO_2 concentrations within the study area.

Table D.3: Model Verification Results for NO_2

Site Name	Monitored Total NO_2 (µg/m³)	Modelled Total NO_2 (µg/m³)	% Difference
OBC-120	16.0	8.91	-44.3

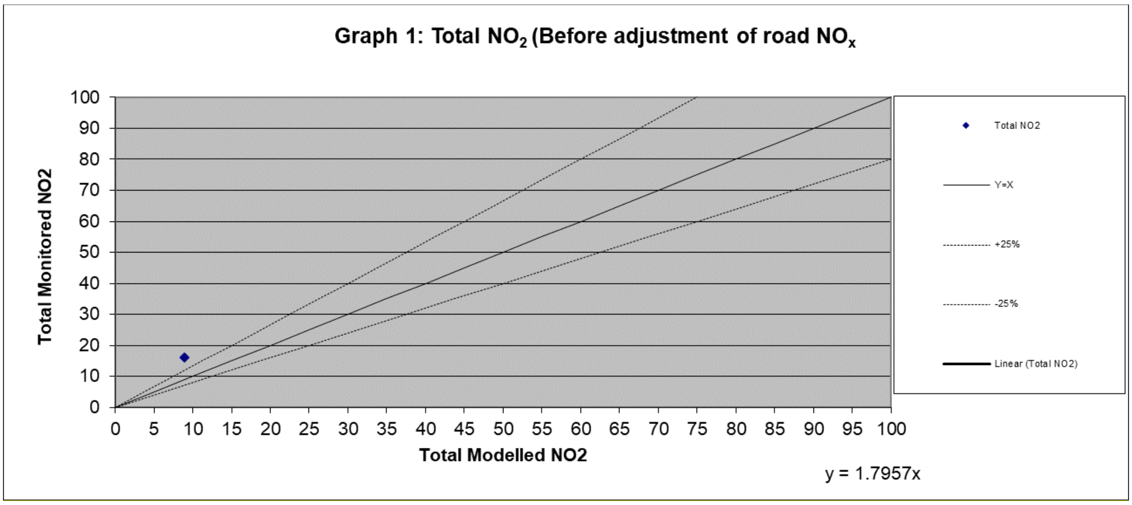

Figure D.1: Model Verification Results for NO_2

An adjustment factor of 6.197 has been applied to the modelled road NO_x contributions and added to background NO_x concentrations to give total corrected NO_x at each of the verification sites.

The final stage of the verification process involves applying the NO_x to NO_2 relationship presented in Section 3.3.2.8. Table D.4 presents the total adjusted modelled NO_2 and the monitored NO_2 after the adjustment factor has been applied. Figure D.2 presents the correlation between the total corrected NO_2 and the monitored NO_2. Following the application of the adjustment factor, all of the sites are within 10% of monitored concentrations, with a good overall agreement. This indicates that the model is performing acceptably.

Table D.4: Adjusted Modelled NO_2 Results

Site Name	Monitored Total NO_2 ($\mu g/m^3$)	Modelled Total NO_2 ($\mu g/m^3$)	% Difference
OBC-120	16.0	16.0	0.00

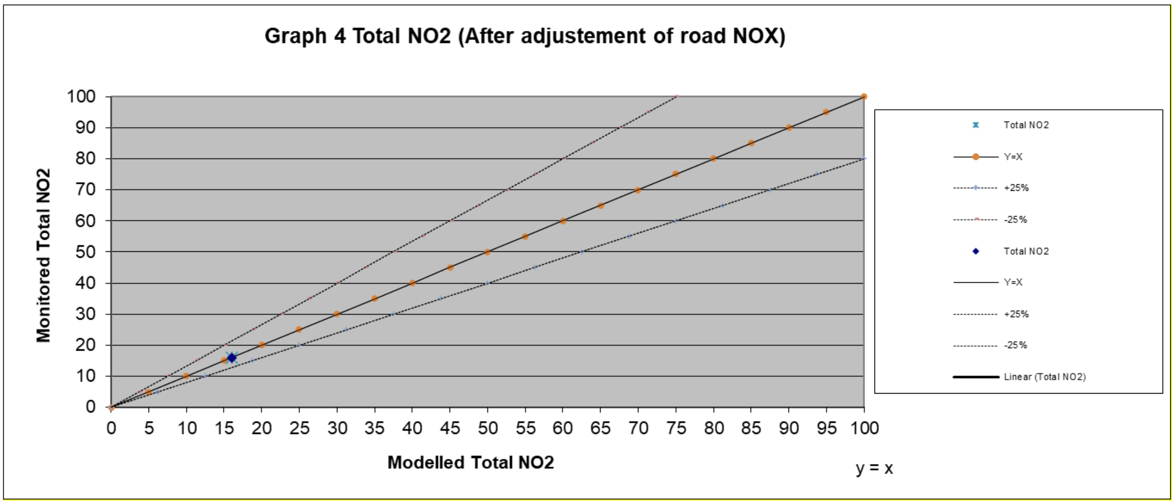

Figure D.2: Adjusted Model NO_2 Results

Summary

Following the model verification, it is considered that the model is performing acceptably with all modelled concentrations with + or – 10 % of monitored concentrations.

In accordance with Defra guidance, the road contributed NO_x adjustment factor was also applied to the road contributed PM concentration. The total PM_{10} and $PM_{2.5}$ concentrations are derived by adding the adjusted road contribution value to the Defra background concentrations.

An adjustment factor of 6.197 has been applied across the study area for NO_2, PM_{10} and $PM_{2.5}$.