Llantrisant Health Park

Air Quality Assessment

For *Cwm Taf Morgannwg University Health Board*

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1. Introduction

Hydrock have been commissioned by Cwm Taf Morgannwg University Health Board to prepare an Air Quality Assessment (AQA) to support the planning application for a health park (the 'Proposed Development') at the former British Airways Avionics Engineering site on Ely Meadow, Talbot Green, Pontyclun, CF72 8XL (The 'Site'). The Site is located within the administrative boundary of Rhondda Cynon Taf County Borough Council (RCTCBC).

The Site is centred on the National Grid Reference (NGR); x303640, y183585 and is shown below Figure 1. The Site is situated approximately 1km west of Llantrisant and 600m north of Talbot Green. Ely Meadow runs parallel to the eastern / northern Site boundary, with the river Ely running adjacent to the western boundary. The Royal Glamorgan Hospital lies approximately 200m north of the Site.

Figure 1: Site Location

1.1 Proposed Development

The proposals seek planning permission for a health park comprising diagnostic and treatment facilities, including Day Case Surgery, Endoscopy, Arthroplasty and a Skills Hub Academy. The main building will be split into 3 zones, with zones 2 and 3 composed of 3 storeys and zone 1 composed of 4 storeys. Access will be via the existing entrance and road network.

1.2 Purpose of Air Quality Assessment

The assessment describes the scope, relevant legislation, assessment methodology and the baseline conditions currently existing in the area. It then presents an assessment of potential impacts during the construction and operational phases of the Proposed Development, and an evaluation of the significance of these effects with respect to air quality.

2. Relevant Legislation and Guidance

2.1 Air Quality Regulations and Objectives

There are two sets of air quality legislation which include ambient air quality thresholds for the protection of public health that apply in Wales, these include legally binding limit values originally set by the European Union (EU) Directive 2008/50/EC[1] on ambient air quality and cleaner air for Europe; and regulations implementing national air quality objectives as set out in the Air Quality Strategy (AQS) for Scotland, Wales and Northern Ireland (AQS)[2] which local authorities are required to work towards achieving.

The EU (Withdrawal Agreement) Act 2020 sets out arrangement for implementing air quality limit values that are included in the EU Directive on ambient air quality and cleaner air for Europe (2008/50/EC) included in the following:

- Air Quality Regulations (SI 2010 No.1001)[3] and amended (SI 2016 No.1184)[4] ;
- The Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 (SI 2019 74)[5] ;
- The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 (SI 2020 1313)[6] amend the Air Quality Regulations (SI 2010 No.1001) to account for EU withdrawal; and
- The AQS objectives are implemented in the Air Quality Standards (Wales) Regulations 2010[7].

The AQS 2007 Volume 1[2] sets out the government's policies and framework for improving air quality in the UK with the aim of meeting the requirements of above legislation. The AQS also outlines the Limit Values, Target Values, Standards, Objectives, Critical Levels and Exposure Reduction Targets for the protection of human health and the environment (collectively termed Air Quality Assessment Levels (AQALs) throughout this report). Those relevant to this assessment is provided below, in Table 1:

Table 1: National Air Quality Objectives

Pollutant	Averaging Period	AQALs	
NO_2	1 Hour Mean	200 µg/m^3	Not to be exceeded more than 18 times in 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 in a year.

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

[2] Defra. "The Air Quality Strategy for England, Scotland, Wales and Northern Ireland". Available at: https://www.gov.uk/government/publications/2010-to-2015-government-policy-environmental-quality/2010-to-2015-government-policy-environmental-quality#appendix-5-international-european-and-national-standards-for-air-quality

[3] The National Archives. "The Air Quality Standards Regulations 2010". Available at: http://www.legislation.gov.uk/uksi/2010/1001/contents/made

[4] The National Archives (2016). "The Air Quality Standards (Amendment) Regulations 2016". Available at: https://www.legislation.gov.uk/uksi/2016/1184/contents/made

[5] The Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 (legislation.gov.uk). Available at: https://www.legislation.gov.uk/uksi/2019/74/contents/made

[6] The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 (legislation.gov.uk). Available at: https://www.legislation.gov.uk/uksi/2020/1313/contents/made

[7] The National Archives. "The Air Quality Standards (Wales) Regulations 2010". Available at: https://www.legislation.gov.uk/wsi/2010/1433/schedule/1/made

Pollutant	Averaging Period	AQALs
	Annual Mean	40 µg/m^3
$PM_{2.5}$	Annual Mean	25 µg/m^3

Defra's Local Air Quality Management Technical Guidance 2022 (LAQM.TG(22))[8] provides guidance on where the above AQAL's should apply. This is summarised below, in Table 2.

Table 2: Summary of where AQALs should apply

Averaging Period	Objectives should apply at:	Objectives should generally NOT apply at:
Annual Mean	All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, care homes etc.	Building facades 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 other locations at the building façade) or any other location where public exposure is expected to be short term.
24 Hour Mean and 8 Hour Mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties	Kerbside sites (as opposed to other locations at the building façade) or any other location where public exposure is expected to be short term.
1 Hour Mean	All locations where the annual Mean and: 24 and 8-hour mean objectives apply. Kerbside site (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railways stations etc. which are not fully enclosed, where members of the public might be expected to spend one hour or more. Any outdoor locations where members of the public might	Kerbside sites where the public would not be expected to have regular access.

[8] Defra, "LAQM Technical Guidance (TG22)" (Department for Food, Environment and Rural Affairs (Defra), August 2022), https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf

Averaging Period	Objectives should apply at:	Objectives should generally NOT apply at:
	reasonably expect to spend one hour or longer.	
15 Minute Mean	All locations where member of the public might reasonably be exposed for a period of 15 minutes	

2.2 Clean Air Plan for Wales

The Clean Air Plan for Wales[9] sets out Wales's commitment and long-term ambition to improve air quality and reduce the impacts of air pollution on human health, biodiversity, the natural environment and the economy. The 10-year pathway has been structured around four core themes; people, environment, prosperity and place. Furthermore, amongst numerous air quality actions, the document outlines the implementation of a Clean Air Act and how it will be developed and what it is likely to include.

The Environment (Air Quality and Soundscapes) (Wales) Act 2024 became law in Wales 14 February 2024[10]. The Clean Air Act (Wales) requires the Welsh Government to:

- provide a framework for setting national air quality targets and consider who guidelines,
- amend existing legislation relating to the national air quality strategy;
- local air quality management; smoke control; clean air zones/low emission zones and vehicle idling; and
- place a duty on Welsh Ministers to promote awareness of air pollution.

2.3 Local Air Quality Management

Obligations under the Environment Act 2021[11] (which provides an amendment to the Environment Act 1995[12]) requires local authorities to review and assess air quality in their administrative boundaries. Where AQALs are predicted to be exceeded, the local authority must declare an Air Quality Management Area (AQMA) at sensitive receptor locations and formulate an Air Quality Action Plan (AQAP) to reduce pollution concentrations to values below AQALs.

The Welsh Government published the Local Air Quality Management in Wales Policy Guidance[13] in 2017 in order to integrate the Well-being of Future Generations (Wales) Act 2015[14] into the Local Air Quality Management (LAQM) system in Wales. This directed local authorities to integrate the five ways of working from this act into LAQM, including the principles of long-term, prevention-focused, integration, collaboration and involvement.

9 Welsh Government, The Clean Air Plan for Wales, Healthy Air, Healthy Wales, 2020

10 Welsh Government, The Environment (Air Quality and Soundscapes) (Wales), https://business.senedd.wales/mgIssueHistoryHome.aspx?IId=40984

11 https://bills.parliament.uk/bills/2593/publications

12 Environment Agency, "Environment Act 1995" (The Environment Agency, 2002), http://www.legislation.gov.uk/ukpga/1995/25/contents.

13 Welsh Government, "Local Air Quality Management in Wales Policy Guidance," June 2017, https://gov.wales/sites/default/files/publications/2019-04/local-air-quality-management-in-wales.pdf.

14 Welsh Government, "Well-Being of Future Generations (Wales) Act 2015," 2015, https://www.legislation.gov.uk/anaw/2015/2/contents/enacted.

2.4 Well-being of Future Generations Act

The Well-being of Future Generations Act[15] requires public bodies in Wales to consider the long-term impact of their decisions, to collaborate with people, communities and each other, and to prevent persistent problems such as poverty, health inequalities and climate change. Under the Well-being of Future Generations Act, the Welsh government has established average population exposure to NO_2 as an indicator to measure progress towards well-being goals in Wales. Regulations made under the Act require public services boards to consider air quality when carrying out their statutory assessments of local well-being.

2.5 Planning Policy Wales

Planning Policy Wales[16] sets out the national policy and guidance for making planning decisions in Wales. Section 6.7 relates to air quality, stating that *"the planning system should maximise its contribution to achieving the well-being goals, and in particular a healthier Wales, by aiming to reduce average population exposure to air and noise pollution alongside action to tackle high pollution hotspots*".

For new development, planning authorities and developers must address any implication arising as a result of its association with, or location within, air quality management areas or areas where there are sensitive receptors, not create areas of poor air quality, and seek to incorporate measures which reduce overall exposure to air pollution. It also states the need for consideration of airborne pollution during the construction phase of development.

2.6 Future Wales: the National Plan 2040

Future Wales: the national plan 2040[17] was published in February 2021 by the Welsh government. This document forms part of the national development framework for Wales and promotes development that enhances wellbeing and quality of life. The document should be read in conjunction with Planning Policy Wales and planning applications will need comply with the plan. Air quality and clean air is referenced throughout the document, in particular developing infrastructure responsibly.

2.7 Local Planning Policy

Adopted on the 2nd March 2011, the Local Development Plan (LDP) for Rhondda Cynon Taf County Borough[18] is the overarching planning policy document providing statutory framework for the development and use of land within RCTCBC administrative area over the period 2006-2021.

RCTCBC are preparing a Revised LDP for the period 2022 - 2037, which began in April 2022. However, until the Revised LDP is adopted, the current LDP remains in force.

The current LDP contains policy AW 8 - Protection And Enhancement Of The Natural Environment, which states:

> *"Rhondda Cynon Taf's distinctive natural heritage will be preserved and enhanced by protecting it from inappropriate development. Development proposals will only be permitted where:*
>
> *[...]*

[15] Welsh Government, Well-being of Future Generations (Wales) Act 2015 2015 anaw 2

16 Welsh Government, "Planning Policy Wales: Edition 10," , https://gov.wales/sites/default/files/publications/2019-02/planning-policy-wales-edition-10.pdf.

17 Welsh Government, FUTURE WALES The National Plan 2040, February 2021

[18] Rhondda Cynon Taf Local Development Plan up to 2021, Adopted March 2011

> *There would be no unacceptable impact upon features of importance to landscape or nature conservation, including ecological networks, the quality of natural resources such as air, water and soil, and the natural drainage of surface water."*

Policy AW 10 - Environmental Protection and Public Health is also contained within the LDP and states:

> *"Development proposals will not be permitted where they would cause or result in a risk of unacceptable harm to health and / or local amenity because of:-*
>
> *1. Air pollution;*
>
> *[…]*
>
> *unless it can be demonstrated that measures can be taken to overcome any significant adverse risk to public health, the environment and / or impact upon local amenity."*

3. Methodology

3.1 Consultation

Full details of the AQA approach were sent via email to RCTCBC's in July 2024 with a request for further comment / guidance. The following response was received on 12/07/2024:

> *" I would advise as follows.*
>
> *We would require that you use 2023 AQ data for your assessment and verification including weather data. The council's 2023 AQ report is due to be published in September, however, provisional aq data for RCT is available at https://www.airquality.gov.wales/maps-data/data-selector/index.*
>
> *The impact of the development on the councils AQMA's shall be assessed as part of the assessment"*

The above comments have been taken into consideration and the approved methodology is outlined below.

3.2 Guidance

The following guidance has been used to undertake this AQA:

- Defra's LAQM.TG(22)[8];
- EPUK & IAQM Land-use Planning & Development Control: Planning for Air Quality[19];
- The IAQM's guidance on assessing impacts from construction[20]; and
- Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites[21].

3.3 Baseline Air Quality

The baseline air quality conditions in the vicinity of the Site have been established through the compilation and review of the following sources. The Baseline assessment can be found in Section 4.

- Data from the National Atmospheric Emissions Inventory (NAEI)[22] and Defra's Pollutant Release and Transfer Register (PRTR) data[23];
- Defra's modelled background concentrations of AQS pollutants (UK-AIR)[24]. These estimates are produced using detailed modelling tools and are available as concentrations at central 1km^2 National Grid square locations across the UK. Mapped background concentrations have been obtained based upon the 2021 base year Defra update;

[19] EPUK & IAQM, "Land-Use Planning & Development Control: Planning for Air Quality" (Institute for Air Quality Management (IAQM), January 2017), http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf.

[20] IAQM, "Guidance on the Assessment of Dust from Demolition and Construction" (Institute of Air Quality Management (IAQM)), February 2014), http://www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf.

[21] IAQM, "A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites" (Institute for Air Quality Management (IAQM), June 2019), https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2019.pdf.

[22] National Atmospheric Emissions Inventory, UK Emissions Interactive Map (beis.gov.uk).

[23] UK Pollutant Release and Transfer Register (PRTR) https://prtr.defra.gov.uk/map-search

[24] UK-AIR, "Background Mapping Data for Local Authorities - 2021," n.d., https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2021.

- Defra's predicted roadside concentrations of NO_2 produced from their pollution climate model (PCM)[25];
- Multi Agency Geographic Information for the Countryside (MAGIC)[26], and;
- RCTCBC's latest available air quality monitoring data, derived from the latest available air quality annual progress report (ASR) published in 2023[27].

3.4 Construction Phase Assessment

3.4.1 Dust Risk Assessment

The construction dust risk assessment is provided in Section 5 and has been undertaken in line with IAQM guidance. This considers the risk of impacts during the construction phase in terms of nuisance dust, human health (PM_{10} exposure) and ecological impacts.

With regard to ecological receptors, risk assessment should be taken where high-sensitivity receptors are located within 50m of a Site boundary. The Multi Agency Geographic Information for the Countryside (MAGIC) website, which incorporates Natural Resources Wales interactive maps[26], has been reviewed to identify whether any statutory ecological sensitive receptors are situated within 50m of the Site boundary or within 50m of any routes used by construction vehicles on the public highway, up to 250m from the Site entrance. *No receptors were identified within 50m of the Site boundary or Trackout route and therefore no further consideration of ecological receptors is required*.

Sensitive receptors were identified within 250m of the Site boundary. Based on the IAQM guidance residential dwellings, museums, car parks and car show room are indicative examples of high sensitivity receptors in relation to both dust soiling and health effects of PM_{10}. Indicative examples of medium sensitivity receptors include places of work, such as offices.

The IAQM guidance states that the potential dust emission magnitude from Demolition, Earthworks, Construction and Trackout should all be assessed individually. In addition, the sensitivity of the area to adverse dust impacts should also be defined.

The overall significance of the risk of adverse impacts during the construction phase can then be defined using the 'risk of impacts matrix' for each stage of the construction phase described above.

3.4.2 Construction Traffic Emissions

The IAQM guidance states that from experience of assessing exhaust emissions from site traffic, it is unlikely that any significant adverse impacts on local air quality would be caused and in the vast majority of cases, quantitative assessment is not needed. As such, short term effects of construction traffic emissions have not been assessed, as they are also likely to be well below the EPUK & IAQM[19] traffic criteria outlined in Table 3.

3.5 Operational Phase Assessment

3.5.1 Scope

The scope of assessment has been determined against the EPUK & IAQM's two stage checklist criteria[19]. The Proposed Development meets the Stage 1 Criteria for requiring an AQA and accordingly, has been considered against the relevant Stage 2 checklist criteria shown in Table 3 which identifies whether a detailed assessment of potential air quality impacts is required.

[25] https://uk-air.defra.gov.uk/data/gis-mapping/

[26] https://magic.defra.gov.uk/MagicMap.aspx

[27] Rhondaa Cyon Taff Council Borough Council, 2023 Annual Air Quality Progress Report, September 2023.

Stage 2 includes some criteria which are not directly relevant to the Proposed Development, such as those related to the realignment of roads within an AQMA, introduction of a new bus station, new road junctions and underground car parks. These have been excluded from this assessment and only relevant screening criteria have been included.

Table 3: EPUK & IAQM Assessment Criteria

Criteria	The Development Will:	Indicative Criteria to Proceed to a Detailed AQA:
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 (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	Have one of 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 NOx emission rate is less than 5mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent 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 situation where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emissions rates. Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.

As the Site is not located within an AQMA the less stringent criteria apply. The transport Consultants on the scheme, Hydrock, now Stantec, have confirmed the Proposed Development is anticipated to generate vehicle trips above 500 Annual Average Daily Traffic (AADT).

In line with the Welsh Government commitment to Net Zero Carbon, the aim of Llantrisant Health Park will be to have no fossil fuels burnt to heat the building. Due to this, alternative for heating will be provided via electricity and Air Source Heat Pumps (ASHPs).

Healthcare premises are dependent on electrical power supplies and therefore an interruption to this power supply can greatly disrupt the delivery of healthcare, with serious consequences to staff and patients. As such, there is a requirement to implement a resilience plan that can withstand the impact of failure to the incoming electrical supply. The emergency back-up system will comprise 4no. 1.5MVA low voltage prime rated diesel generators. Final details of the generators and associated plant are unknown at

this stage. However, recommendations are provided in section 7.2.2 to minimise air quality impacts from emissions as much as reasonably practicable.

Based on the above, a detailed assessment of air quality impacts from scheme-generated traffic has been undertaken, in accordance with EPUK & IAQM guidance, according to the methodology outlined below.

3.5.2 ADMS-Urban Dispersion Model

A detailed AQA has been undertaken using the air dispersion model ADMS-Urban v5.0.1 to establish the current and future air quality conditions in the area. The software is commercially available, has been validated for this type of assessment by Defra and is used extensively for AQA's.

ADMS-Urban is able to provide an estimate of air quality both before and after development, considering important input data such as background pollutant concentrations, variable emissions, meteorological data, and traffic flows.

3.5.3 Assessment Scenarios

The following scenarios have been modelled:

- Baseline/verification 2023;
- Do Minimum (DM) – Opening year 2027 (baseline traffic flows for the opening year of Proposed Development); and
- Do Something (DS) - DM traffic flows plus operational traffic flows associated with the Proposed Development.

3.5.4 Model Inputs

3.5.4.1 Traffic Data

The traffic data was provided by Hydrock now Stantec. Traffic data has been supplemented with traffic flows from the Department of Transport (DfT). A TEMPro factor was applied to the data to obtain opening year traffic flows, which accounts for local growth. The modelled road links are shown in Figure 2 below, with full details provided in Appendix A.

For each road link, vehicle speeds were based on road signage and OS data[28]. Vehicle speeds were reduced within 50m of junctions relative to the speed limit to account for queuing and congestion in the average speed profile, in accordance with LAQM.TG(22). Google typical traffic was used to assist with determining appropriate slow down speeds across the study area.

[28] https://www.openstreetbrowser.org/#map=16/51.5050/-0.0888&basemap=osm-mapnik

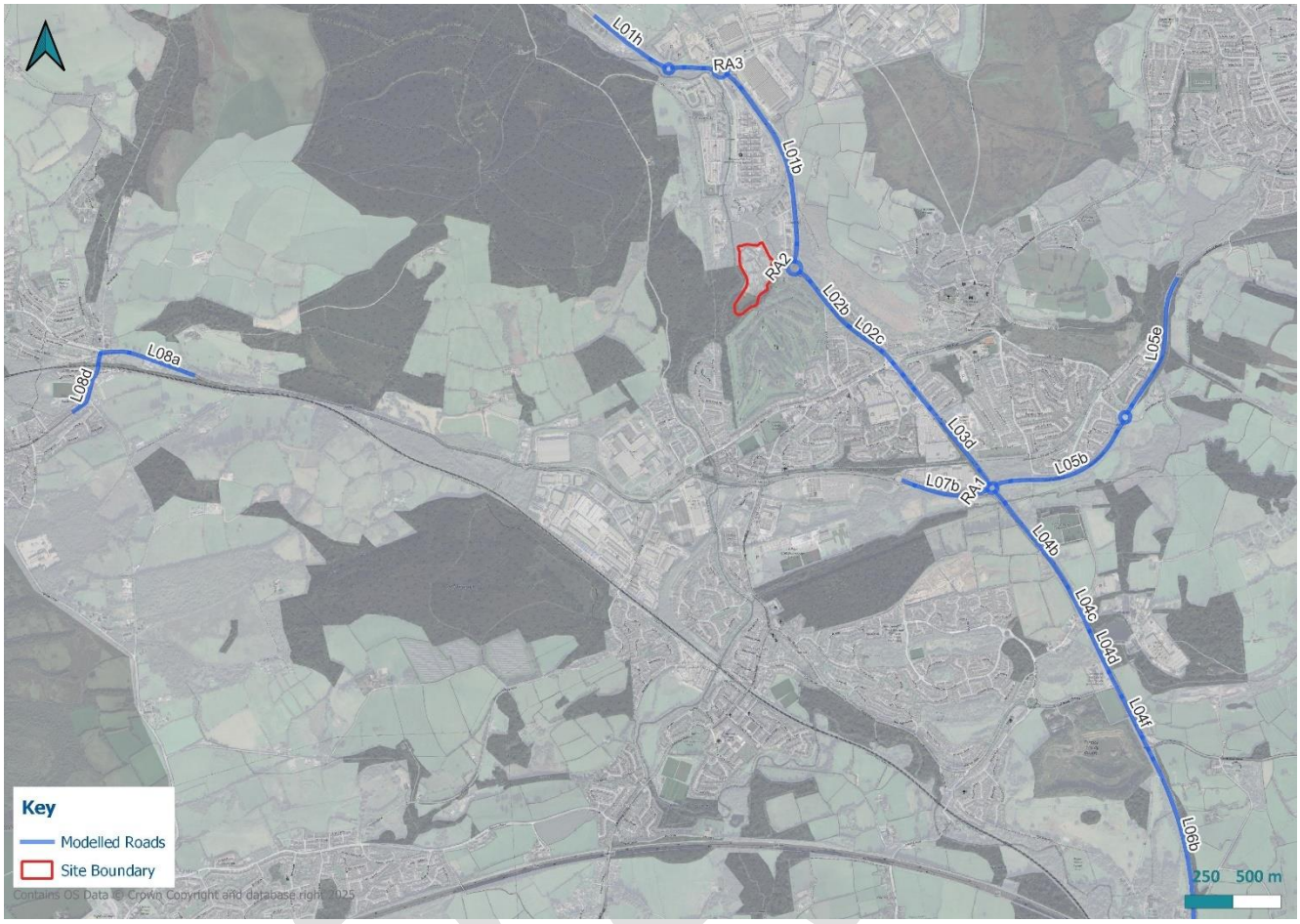

Figure 2: Modelled Roads

3.5.4.2 Street Canyons

To account for the street canyon characteristics in the area (Llanharan and Mwyndy), the advanced street canyon input has been utilised within the dispersion model.

The advanced street canyon module in ADMS-Urban modifies the dispersion of pollutants from a road source and can account for the presence and properties of canyon walls on either one or both sides of the road and can take account of canyon asymmetry.

3.5.4.3 Emission Factors

Emission rates for NO_x, PM_{10} and $PM_{2.5}$ used for the dispersion modelling assessment were calculated from the latest Emissions Factor Toolkit (EFT)(v.12.1).

Most modern vehicles on the road in the UK meet a particular Euro emissions standard from 1 – 6, with 6 being the newest. Different parts of the country have newer or older vehicles than others. This is defined as the "fleet". The EFT estimates this primarily based on whether the location is within or outside London or in England, Wales or Scotland. In the case of this model the vehicle fleet used was "Wales (urban and rural)".

When predicting future year emissions, the toolkit includes forecasts such as anticipated advances in vehicle technology and changes in vehicle fleet composition, which assumes that vehicle emissions will reduce over time.

3.5.4.4 Temporal Variation (Diurnal Traffic Profile)

Temporal variation in traffic flows along roads have been included in the dispersion model to account for the realistic differences that would occur between weekdays and weekends. Accordingly, a time varying profile was included in the model.

The diurnal profile used in the model has been calculated based on DfT Road traffic statistics (TRA) dataset. TRA0307 provides 'Motor vehicle traffic distribution by time of day and day of the week on all roads, Great Britain: 2023'[29], which shows the average hourly traffic flow in each combination of weekday and hour, relative to the average hour across the whole year for main roads in Great Britain. Figure 3 shows the diurnal traffic profile included in the model.

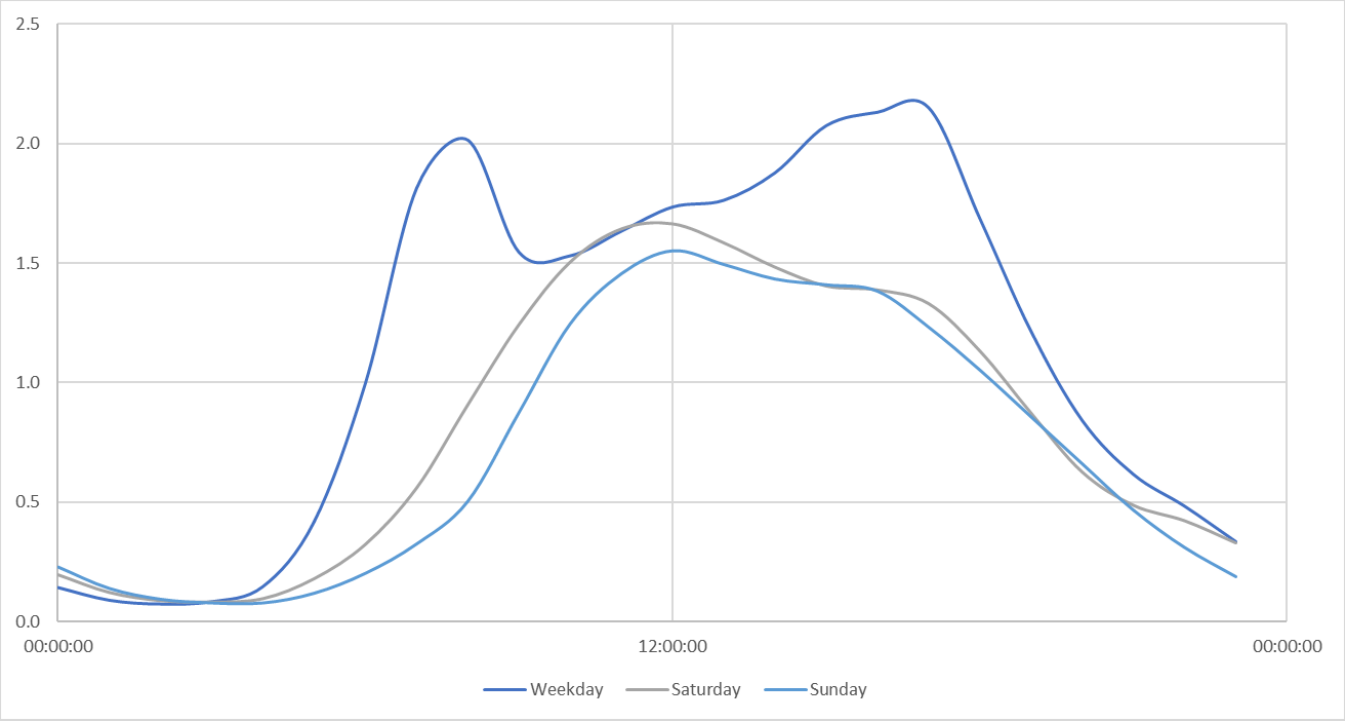

Figure 3: Diurnal Traffic Profile Included in the Dispersion Model

3.5.4.5 Meteorological Parameters

To calculate pollutant concentrations at identified sensitive receptor locations the dispersion model uses hourly sequential meteorological data, including wind direction, wind speed, temperature, cloud cover and stability, which exert significant influence over atmospheric dispersion.

The dispersion modelling has been undertaken using 2023 data from Cardiff Airport. This meteorological site is located approximately 16km south of the Proposed Development. It is also the closest and most relevant meteorological station that records all of the parameters necessary for dispersion modelling. Due to low cloud cover data capture (below 85%), data were infilled with data from Pembry Sands meteorological station. The modelled wind rose is presented in Appendix B.

3.5.4.6 Surface Characteristics

The following surface roughness parameters have been applied in the model:

29 DfT, "Average Annual Daily Flow and Temporal Traffic Distributions (TRA03) - Statistical Data Sets - GOV.UK," 2023, https://www.gov.uk/government/statistical-data-sets/tra03-motor-vehicle-flow.

- Dispersion site surface roughness = 0.5m (ADMS pre-set 'parkland open suburbia');
- Met site surface roughness = 0.02m (ADMS pre-set 'open grassland');

The following Minimum Monin-Obukhov (MO) lengths were applied:

- Dispersion site = 10m;
- Met site = 10m.

3.5.5 Receptors Included in the Dispersion Model

3.5.5.1 Human Receptors

Sensitive receptor locations included in the dispersion model are shown below in Figure 4 and Table 4. These are conservative locations of relevant exposure within the Site locale based upon their proximity to the modelled road network.

Table 4: Receptor Locations

Receptor ID	Location	NGR		Z (m)	Sensitivity & Relevant AQALS
		X	Y		
R01	Penrhys, Ely Valley Road, Llantrisant	304034	183335	1.5	High, LT & ST
R02	37 Dan Y Graig Heights, Llantrisant	304080	183365	1.5	High, LT & ST
R03	12 Danygraig Drive, Llantrisant	304252	183151	1.5	High, LT & ST
R04	10 Talbot Close, Llantrisant	304309	183158	1.5	High, LT & ST
R05	26 Clos Leland, Llantrisant	304601	182827	1.5	High, LT & ST
R06	13 Grafton Drive, Llantrisant	305441	182639	1.5	High, LT & ST
R07	1 Mwyndy Terrace, Llantrisant	305326	181831	1.5	High, LT & ST
R08	2 Mwyndy Cottages, Llantrisant	305440	181582	1.5	High, LT & ST
R09	High Corner House, Llanharan	300342	183132	1.5	High, LT & ST
R10	1a Bridgend Road, Llanharan	300253	183103	4.5	High, LT & ST
R11	2 Bridgend Road, Llanharan	300226	182977	1.5	High, LT & ST
R12	Royal Glamorgan Hospital, Llantrisant	303655	184321	1.5	High, LT & ST
R13	2 Ynysmaerdy Terrace, Llantrisant	303401	184553	1.5	High, LT & ST
PR01	Proposed Development	303744	183544	1.5	High, LT & ST

Figure 4: Receptor Locations

3.5.5.2 Ecological Receptors

The area surrounding the Site was reviewed for the designations listed below using the MAGIC website[26]:

- Special Protection Areas (SPAs);
- Special Areas of Conservation (SACs);
- Ramsar sites (protected wetlands);
- Sites of Special Scientific Interest (SSSIs); and,
- Local nature sites (ancient woods, local wildlife sites and national and local nature reserves).

No designated ecological sites lie within 200m of the affected road network. As such, potential impacts of vehicle emissions on ecological sites have not been considered further[30].

3.5.6 Model Verification

A verification study has been undertaken in accordance with LAQM.TG(22) using RCTCBC monitoring data. An adjustment factor of **2.599** has been applied to modelled road NO_x concentrations;

30 Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (NEA001)

Due to insufficient PM monitoring in the study area, the modelled road-PM_{10} and road-$PM_{2.5}$ components have been adjusted by the NO_x verification factor obtained before adding to the appropriate background concentration, in accordance with LAQM.TG(22). This approach is considered likely to provide a conservative estimate of the contribution of modelled roads to ambient PM_{10} and $PM_{2.5}$ concentrations.

Root Mean Square Error (RMSE) is used to define the average error or uncertainty of the model. LAQM.TG(22) states that the RMSE is acceptable where it is within 25%. The model verification process calculated post-adjusted RMSE of **2.2µg/m³** which equates to **5.5%** of the annual mean AQAL for NO_2 respectively. The adjustment factors are therefore considered to be acceptable.

Full details of the model verification procedure are included in Appendix C.

3.5.7 Background Concentrations

The background concentrations used in the dispersion model have been obtained from Defra. Further details are provided in Section 4.3 and Appendix D.

3.5.8 Conversion Factors

3.5.8.1 NO_x to NO_2 Conversion

Ambient NO_x concentrations have been predicted through dispersion modelling. Annual NO_x concentrations have been converted using Defra's NO_x to NO_2 conversion tool[31] version 9.1.

3.5.8.2 1-hour mean NO_2

To determine short term (1-hour mean) concentrations, reference was made to LAQM.TG(22)[8], which states if annual mean concentrations of NO_2 do not exceed 60µg/m³, it is unlikely hourly mean concentrations would exceed the relevant AQAL, which allows for 18 exceedances of the hourly standard (200µg/m³) in a calendar year.

3.5.8.3 Annual Mean Particulate Matter

To determine total annual mean concentrations of PM_{10} and $PM_{2.5}$, the adjusted modelled road contribution was added to the background concentration to give the total concentration for comparison with the AQALs.

3.5.8.4 24-hour mean PM_{10}

Annual mean PM_{10} concentrations were used to derive the potential number of exceedances of the 24-hour mean PM_{10} AQAL, of which 35 are allowed per year. The method described in LAQM.TG(22) was applied, which is based on the relationship between the number of 24-hour exceedances of 50µg/m³ and the annual mean concentration. This relationship is described in Equation 1 below:

Equation 1 - Calculation of PM_{10} 24-hour Mean Exceedances:

$$\textbf{Number of exceedances of 24-hour mean of 50µg/m}^3 = -18.5 + 0.00145 * a^3 + (206/a)$$

where 'a' = total annual mean PM_{10} concentration.

3.6 Assessment of Significance

The long-term annual average concentrations for NO_2, PM_{10} and $PM_{2.5}$ have been compared against the applicable AQALs and the magnitude of impacts has been determined against the following threshold criteria, from the EPUK & IAQM guidance.

[31] Defra, "NOx to NO2 Calculator" (Defra, 2024), https://laqm.defra.gov.uk/air-quality/air-quality-assessment/nox-to-no2-calculator/

Table 5: Impact Significance Criteria

Long term average concentration at receptor in assessment year	% Change in concentration relative to AQAL			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76 - 94% of AQAL	Negligible	Slight	Moderate	Moderate
95 - 102% of AQAL	Slight	Moderate	Moderate	Substantial
103 - 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Notes:

In accordance with EPUK & IAQM planning guidance any change less than 0.5% will be considered as Negligible. 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 user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.

Additional factors are also included in the assessment of significance, including the spatial extent of adverse impacts, in accordance with IAQM guidance, which states:

> *"An individual property exposed to a moderately adverse impact might not be considered a significant, but many hundreds of properties exposed to a slight adverse impact could be."*

The EPUK & IAQM guidance provides a number of factors for determining the significance of predicted air quality impacts. Such factors include:

- the existing and future air quality in the absence of the Proposed Development;
- the extent of current and future population exposure to the impacts;
- the worst-case assumptions adopted when undertaking the prediction of impacts; and
- the extent to which the Proposed Development has adopted best practice to eliminate and minimise emissions.

For the purposes of this assessment, these factors were taken into consideration when determining overall significance of impacts.

With regard to the exposure assessment, professional judgement has been applied to determine whether exposure to air pollution is significant or not, based on the following criteria:

- Annual mean concentrations within 10% below or exceeding relevant AQAL = significant exposure; and
- Annual mean concentrations more than 10% below relevant AQAL = not significant.

The 10% threshold around an AQAL is generally considered to be the range at which a 'risk of exceedance' is present, according to LAQM.TG (22).

3.7 Model Limitations

There are inherent uncertainties associated with the model (ADMS-Urban) used in this assessment, including uncertainties associated with the input data such as predicted traffic flows. The model itself simplifies

complex physical systems into a range of algorithms. In addition, local micro-climatic conditions may affect the concentrations of pollutants that the ADMS model will not take into account.

To account for uncertainty in future emission factors and pollutant concentrations, the precautionary principle has been adopted in the main assessment, whereby background pollutant concentrations held at 2023 (no future improvements assumed).

4. Baseline Air Quality Conditions

4.1 AQMAs

At the time of writing, RCTCBC have declared 16 AQMAs across the administrative area, which have all been declared due to exceedances of the annual mean NO2 AQAL (40ug/m^3), with the exception of Cymmer AQMA which is also declared due to exceedances of the 1-hour NO_2 mean. The closest AQMA to the Site is the Mwyndy AQMA, situated 2.5km south east.

4.2 Local Emission Sources

The main source of air pollution in the surrounding Site locale are vehicles using the local road network, predominantly Ely Valley Road (A4119) to the east of the Site.

A review of the NAEI[22] and Defra's PRTR[23] data indicates that there are no major industrial pollution sources in the immediate vicinity of the Site that will influence local air quality.

4.3 Defra Mapped Concentrations

4.3.1 Background Concentrations

Mapped background concentrations of NO_2, PM_{10} and $PM_{2.5}$ were downloaded for the grid squares containing the Site. Background pollutant concentrations for 2023 (the base year), 2025 (the assessment year), and 2027 (the earliest opening year of the Proposed Development) are displayed in Table 6.

Table 6: Defra Mapped Background Concentrations

Grid Square (x,y)	Pollutant	AQAL (µg/m^3)	Annual Mean Concentration (µg/m^3)		
			2023	2025	2027
303500, 183500	NO_2	40	7.4	6.9	6.5
	PM_{10}	40	10.7	10.5	10.3
	$PM_{2.5}$	25	6.5	6.3	6.2

The data show that annual mean background concentrations of NO_2, PM_{10} and $PM_{2.5}$ at the grid squares within which the Site is located are below the AQALs in all years.

Concentrations of all pollutants are predicted to decline incrementally each year. These reductions are principally due to the forecast effect of the roll out of cleaner vehicles and strategies to reduce emissions across all sectors.

Defra UK-AIR modelled background concentrations from 2023 for relevant grid squares were considered to be the appropriate source of background concentrations in the dispersion model for the assessment of human health receptors. NO_2, PM_{10} and $PM_{2.5}$ backgrounds were derived from this data shown above.

Background concentrations for each modelled receptor location are shown in Appendix D.

4.3.2 Pollution Climate Mapping

Defra's PCM model provides estimates of roadside concentrations of annual mean NO_2, PM_{10} and $PM_{2.5}$ which are used in reporting compliance with limit values.

The road closest to the Site, i.e., Ely Valley Road, is included within the model and predicts 2023 annual mean roadside concentrations of NO_2, PM_{10} and $PM_{2.5}$ at 19 µg/m^3, 12 µg/m^3 and 6.7µg/m^3 respectively.

These predicted concentrations are below the relevant AQALs. The model also predicts that roadside concentrations will decline incrementally year on year.

4.4 Air Quality Monitoring Data

4.4.1 Automatic Monitoring

The closest automatic analyser to the Site is the Mountain Ash Roadside monitor located approximately 11km to the south east. Given the distance and monitor locale, air quality measurements at these analysers are unlikely to be representative of the Site and therefore monitoring results have not been presented.

4.4.2 Passive Monitoring

Passive NO_2 diffusion tube monitoring is currently undertaken by RCTCBC at numerous locations throughout the Council's area as part of their commitment to LAQM. The closest tubes to the Site are shown in Figure 5 and the data presented in Table 7.

Figure 5: Local Authority Air Quality Monitoring

Table 7: Passive Diffusion Tube Monitoring Concentrations

Site ID and Name	Site Type	X (m)	Y (m)	Distance from Site (km)	Annual Mean NO_2 Concentration (µg/m^3)					
					2018	2019	2020	2021	2022	2023
37 Lakeside Court, A4119	R	305442	181579	2.6 – SE	37.1	32.3	22.7	27.8	28.0	26.5
110 Cowbridge Rd	R	303533	181287	2.0 - S	29.0	30.5	18.6	23.2	23.2	23.4
111 Bridgend Rd, Llanharan	R	300259	183082	3.3 - W	36.5	33.1	26.9	32.4	27.3	27.3
132 Cowbridge Rd, Talygarn	R	302880	180517	2.9 - S	29.5	31.0	19.6	24.4	22.8	22.4

Notes: R = Roadside

The data in Table 7 shows there have been no exceedances of the NO_2 annual mean AQAL during the period 2018 to 2023. Moreover, concentrations have remained well below 60 µg/m^3 and therefore, in accordance with LAQM.TG(22), exceedance of the hourly NO_2 AQAL is considered unlikely.

Measured 2018 concentrations at 37 – Lakeside Court and 111- Bridgend Road were within 10% of the AQAL and therefore indicates a risk of exceedance at this location. However, concentrations have since reduced and 2023 concentrations are more than 10% below the AQAL. Overall, concentrations illustrate a downward trend since 2018 to 2023. Measurements in 2020 and 2021 should be treated with caution due to the potential effects of the Covid 19 pandemic and reduced traffic flows during this time period.

5. Construction Phase Assessment

5.1 Overview

The construction phase of the Proposed Development will involve a number of activities that will release polluting emissions to air. Predominantly, these will be emissions of dust. As such, a qualitative construction dust risk assessment has been carried out in accordance with IAQM guidance. Information used in the assessment of Potential Dust Emission Magnitude was provided by the client. Additional application of professional judgement was required to ensure a robust assessment.

Construction activities will typically include:

- material export and import;
- temporary stockpiling of materials;
- groundwork for foundations and services;
- construction of buildings;
- landscaping works; and
- vehicle movements (with the potential to track-out material from site).

5.2 Potential Dust Emission Magnitude

5.2.1 Demolition

The majority of existing buildings will be demolished as part of the development proposals. The total volume of buildings / infrastructure to be demolished is >75,000 m^3. Demolition activities will take place up to 12m above ground level.

Based on the above, the potential dust emission magnitude for earthworks is considered to be **'Large'.**

5.2.2 Earthworks

Earthworks will primarily involve excavating material, haulage, Site clearance, tipping and stockpiling. This may also involve levelling the site and landscaping.

The total area of the Site is approximately 44,000m^2, which is within the IAQM's 'Medium' criteria (18,000m^2 – 110,000m^2). The underlying soil texture is loamy and clayey[32] which have a medium to high potential for dust release when due to the presence of smaller particles.

It is expected that there will be up to 10 heavy earth moving vehicles on site at any one time.

Based on the above, the potential dust emission magnitude for earthworks is considered to be '**Medium'**.

5.2.3 Construction

The key issues when determining the potential dust emission magnitude during the construction phase include the size of the building(s)/infrastructure, method of construction, construction materials, and duration of build.

An estimation of the total volume of the Proposed Development has been estimated on the quantum of development, and it is considered that the total volume of the buildings proposed is >75,000m^3.

32 Cranfield University, "Cranfield Soil and Agrifood Institute," n.d., http://www.landis.org.uk/soilscapes/.

Construction materials are likely to comprise concrete, steel and glass. It has been assumed that concrete batching and sandblasting will not be undertaken onsite.

Based on the above, the potential dust emission magnitude for construction is considered to be '**Large'**.

5.2.4 Trackout

The risk of impacts occurring during Trackout is predominantly dependent on the number of vehicles accessing the Site on a daily basis. However, vehicle size, speed and the duration of activities are also factors which are used to determine the risk of impacts.

Vehicles will route via the existing road network therefore no unpaved surfaces over 50m would be required. HDV outward movements are estimated to be <50 per day.

Based on the above, the potential dust emission magnitude during Trackout is considered to be '**Medium'**.

5.2.5 Summary

Table 8 below shows a summary of the potential dust emission magnitudes from each activity.

Table 8: Dust Emission Magnitude Summary

Activity	Dust Emission Magnitude
Demolition	Large
Earthworks	Medium
Construction	Large
Trackout	Medium

5.3 Sensitivity of Area

The prevailing wind direction for the closest regionally representative meteorological measurement station to the Site, at Cardiff Airport, is shown in Appendix B. The wind rose shows that the prevailing winds are from the west.

Figure 6 shows the construction phase distance buffers (20m, 50m, 100m and 250m) around the Site boundary, as well as identified high and medium sensitivity receptor locations within these buffers.

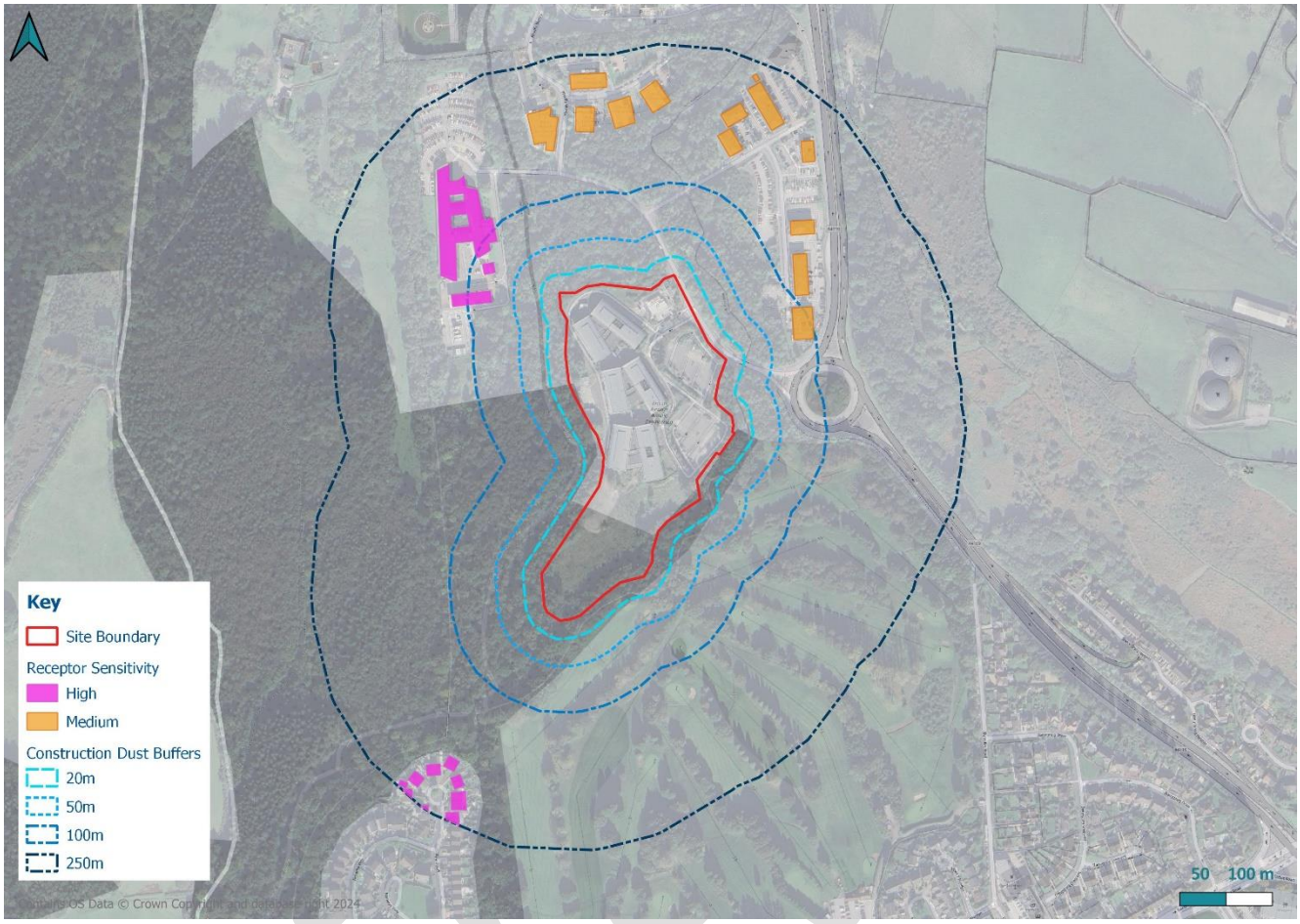

Figure 6: Construction Phase Receptors

5.3.1 Dust Soiling Impacts

Figure 6 illustrates there are <100 high sensitivity human receptors within 100m of the Site boundary. As such, the overall sensitivity of the surrounding area to nuisance dust soiling effects during Demolition, Earthworks and Construction, according to IAQM guidance, is defined as '**Low'**.

With regard to Trackout, the sensitivity is assessed where receptors are located within 50m from Trackout routes up to 250m from the Site. There are less than 10 high-sensitivity receptors within 20m of potential Trackout routes from the Site, the sensitivity to dust soiling impacts from Trackout is defined as '**Low'**.

5.3.2 Human Health Impacts

Defra mapped background predictions (Table 6) show that annual mean concentrations of PM_{10} are not likely to exceed <24µg/m^3 in the vicinity of the Site, based on 2023 estimates. According to IAQM guidance, where PM_{10} concentrations are <24µg/m^3 and there are less than 100 high sensitivity receptors within 20m of construction works, the overall sensitivity of the surrounding area to human health impacts is defined as **'Low'** for Demolition, Earthworks, Construction and Trackout.

5.4 Risk of Impacts

Using the methodology prescribed in the IAQM guidance, the overall risk of impacts can be defined by combining the sensitivity of the area with the potential dust emission magnitude of each stage of the construction phase as described above.

Table 9 provides a summary of the construction dust risk assessment. Overall, the development is considered to be **Medium Risk** for nuisance dust soiling effects and a **Medium Risk** for PM_{10} health effects in the absence of mitigation.

Table 9: Risk of Adverse Impacts During Construction Phase

Potential Impact	Sensitivity of Surrounding Area	Dust Impact Risk			
		Demolition	Earthworks	Construction	Trackout
Dust Soiling	Low	Medium Risk	Low Risk	Low Risk	Low Risk
Human Health	Low	Medium Risk	Low Risk	Low Risk	Low Risk

6. Operational Phase Assessment

6.1 Impact Assessment

6.1.1 Annual Mean NO_2

Predicted annual mean NO_2 concentrations were assessed against the AQAL of 40µg/m^3 as presented in Table 10.

Table 10: Modelled Annual Mean NO_2 Concentrations

Receptor	DM 2027 (µg/m^3)	DS 2027 (µg/m^3)	Concentration Change (µg/m^3)	DS % of AQAL	% Change Relative to AQAL	EPUK & IAQM Impact Descriptor
R01	11.9	12.1	0.3	30.3%	1	Negligible
R02	12.4	12.7	0.3	31.7%	1	Negligible
R03	11.0	11.2	0.2	27.9%	0	Negligible
R04	14.8	15.3	0.4	38.2%	1	Negligible
R05	12.7	12.9	0.2	32.2%	0	Negligible
R06	15.6	15.7	0.1	39.3%	0	Negligible
R07	21.7	21.9	0.2	54.6%	0	Negligible
R08	15.3	15.4	0.1	38.5%	0	Negligible
R09	9.2	9.3	0.1	23.2%	0	Negligible
R10	19.7	20.1	0.4	50.1%	1	Negligible
R11	15.8	16.0	0.2	40.1%	0	Negligible
R12	11.5	11.6	0.1	28.9%	0	Negligible
R13	13.3	13.4	0.1	33.5%	0	Negligible

% Change rounded to nearest whole number as per EPUK & IAQM guidance

Bold denotes an exceedance of the annual mean AQAL

Table 10 shows no predicted exceedances of the annual mean NO_2 AQAL at any receptor in either the DM or DS scenarios associated with the 2027 opening year (using 2023 backgrounds and 2027 emission factors). The maximum increase in annual mean NO_2 concentrations is 0.4µg/m^3 at a residential property adjacent to the A4119 (R04 - 10 Talbot Close).

The predicted changes in annual mean NO_2 at all existing receptors are 1% or less of the relevant AQAL. As such, in accordance with the EPUK & IAQM guidance, the impact associated with the Proposed Development on annual mean NO_2 concentrations is considered to be negligible at all receptor locations.

6.1.2 1 Hour Mean NO_2

With regard to the 1-hour NO_2 objective, Defra's LAQM.TG(22) states where the annual means are below 60µg/m^3, it is unlikely that exceedances of the 1-hour mean will occur. All modelled results are below this threshold, and therefore it is considered unlikely that the 1-hour NO_2 AQAL will be exceeded at any of the receptor locations modelled. The impact of the Proposed Development on short term NO_2 concentrations is considered to be negligible.

6.1.3 Annual Mean PM_{10}

Predicted annual mean PM_{10} concentrations were assessed against the AQAL of 40µg/m^3 as presented in Table 11.

Table 11: Modelled PM_{10} Concentrations

Receptor	DM 2027 (µg/m^3)	DS 2027 (µg/m^3)	Concentration Change (µg/m^3)	DS % of AQAL	% Change Relative to AQAL	EPUK & IAQM Impact Descriptor
R01	11.9	11.9	0.1	29.8%	0	Negligible
R02	12.0	12.0	0.1	30.1%	0	Negligible
R03	12.3	12.4	0.1	31.0%	0	Negligible
R04	13.8	14.0	0.2	35.0%	0	Negligible
R05	13.4	13.5	0.1	33.6%	0	Negligible
R06	14.9	15.0	0.1	37.5%	0	Negligible
R07	18.8	18.9	0.1	47.2%	0	Negligible
R08	16.7	16.8	<0.1	41.9%	0	Negligible
R09	11.6	11.6	<0.1	29.0%	0	Negligible
R10	15.5	15.7	0.2	39.3%	0	Negligible
R11	14.9	15.0	0.1	37.6%	0	Negligible
R12	12.0	12.0	<0.1	30.0%	0	Negligible
R13	12.6	12.6	<0.1	31.5%	0	Negligible

% Change rounded to nearest whole number as per EPUK & IAQM guidance

Bold denotes an exceedance of the annual mean AQAL

Table 11 shows that there are no predicted exceedances of the annual mean PM_{10} AQAL at any receptor in either the DM or DM scenarios associated with the 2027 opening year. The maximum increase in annual mean PM_{10} concentrations is 0.2µg/m^3 at R10.

The predicted changes in annual mean PM_{10} concentrations are all 0% of the relevant AQAL when rounded to the nearest whole number. Based on the EPUK & IAQM criteria, the impact of the Proposed Development on annual mean PM_{10} concentrations is considered to be negligible.

6.1.4 24-hour Mean PM_{10}

There were no predicted exceedances of the 24-hour mean AQAL at any of the receptors included in the dispersion model; therefore, in accordance with the guidance there is no predicted risk of exceedances of the 24-hour mean PM_{10} AQAL as a result of increased traffic generation associated with Proposed Development.

6.1.5 Annual Mean $PM_{2.5}$

Predicted annual mean $PM_{2.5}$ concentrations were assessed against the AQAL of 25µg/m³ as presented in Table 12.

Table 12: Modelled Annual Mean $PM_{2.5}$ Concentrations

Receptor	DM 2027 (µg/m³)	DS 2027 (µg/m³)	Concentration Change (µg/m³)	DS % of AQAL	% Change Relative to AQAL	EPUK & IAQM Impact Descriptor
R01	7.4	7.5	<0.1	29.8%	0	Negligible
R02	7.5	7.5	<0.1	30.1%	0	Negligible
R03	7.6	7.7	<0.1	30.6%	0	Negligible
R04	8.4	8.5	0.1	34.0%	0	Negligible
R05	8.0	8.0	<0.1	32.1%	0	Negligible
R06	8.6	8.7	<0.1	34.7%	0	Negligible
R07	9.5	9.5	<0.1	38.2%	0	Negligible
R08	8.5	8.5	<0.1	33.9%	0	Negligible
R09	7.0	7.1	<0.1	28.2%	0	Negligible
R10	9.1	9.2	0.1	36.7%	0	Negligible
R11	8.7	8.8	0.1	35.1%	0	Negligible
R12	7.1	7.1	<0.1	28.3%	0	Negligible
R13	7.4	7.4	<0.1	29.5%	0	Negligible

% Change rounded to nearest whole number as per EPUK & IAQM guidance

Bold denotes an exceedance of the annual mean AQAL

Table 12 shows that there are no predicted exceedances of the annual mean $PM_{2.5}$ AQAL at any receptor in either the 2024 DM or DS scenarios associated with the opening year.

Predicted annual mean concentrations of $PM_{2.5}$ are all below the AQAL of 25µg/m³ in all modelled scenarios.

The predicted changes in annual mean $PM_{2.5}$ concentrations are all 0% of the relevant AQAL, with total concentrations below 75% of the objective. Based on the EPUK & IAQM criteria, the impact of the Proposed Development on annual mean $PM_{2.5}$ concentrations is considered to be negligible.

6.2 Occupant Exposure

The maximum modelled annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations at the Site are shown in Table 13.

Table 13: Predicted Annual Mean Concentrations at the Site Boundary

NO_2 ($\mu g/m^3$)	% of AQAL	PM_{10} ($\mu g/m^3$)	% of AQAL	$PM_{2.5}$ ($\mu g/m^3$)	% of AQAL
9.4	23.4	11.4	28.4	6.9	27.5

Table 13 indicates modelled concentrations of NO_2, PM_{10} and $PM_{2.5}$ are below the relevant AQALs at the Site. Therefore, exposure to poor air quality from road traffic emissions should not be a constraint for planning at the Site.

6.3 Significance of Air Quality Impacts

The unmitigated impact associated with the scheme has been predicted in accordance with the stated assessment methodology. The following factors have been taken into account:

- there are no predicted exceedances of the annual mean NO_2, PM_{10} or $PM_{2.5}$ AQALs as a result of the Proposed Development;
- a negligible impact on annual mean NO_2, PM_{10} or $PM_{2.5}$ concentrations has been predicted at all considered sensitive receptor locations;
- the Proposed Development will not introduce new receptors into an area of exceedance of any relevant AQAL;
- exceedances of the 1-hour mean NO_2 and 24-hour mean PM_{10} AQALs are considered unlikely, based upon the marginal change in concentrations and absolute concentrations predicted through the dispersion modelling study; and
- all modelled concentrations have been verified against RCTCBC monitoring data.

On the basis of the above, the overall effect on air quality as a result of the additional development trips on sensitive receptors is considered to be 'not significant'.

7. Mitigation Measures

7.1 Construction Phase

The qualitative construction dust risk assessment shows that the works are **Medium Risk** for adverse impacts during construction, in the absence of mitigation.

To effectively reduce the risk of impacts to Negligible, appropriate mitigation measures should be adopted. The IAQM's highly recommended mitigation measures for Medium-Risk sites are provided at Appendix E of this report. Implementing these measures, such as within a Construction Environment Management Plan (CEMP) secured through condition, should effectively reduce the risk of impacts to negligible during the construction phase.

7.2 Operational Phase

7.2.1 Traffic Emissions

7.2.1.1 Electric Vehicle Charging Infrastructure

Electric vehicle charging points for should be provided in line with the UK Government's Approved Document Part S (Adopted 2022)[33]. Part S states Where a new building which is not a residential building or a mixed-use building has more than 10 parking spaces—

> (a) one of those parking spaces must have access to one electric vehicle charge point; and
>
> (b) cable routes for electric vehicle charge points must be installed in a minimum of one fifth of the total number of remaining parking spaces.

7.2.1.2 Travel Plan Measures

As detailed in the Travel Plan (TP)[34] prepared by Hydrock, now Stantec, the Site is well located to make use of the existing public transport links and pedestrian / cycle routes. Furthermore, the measures outlined in the TP will seek to encourage sustainable modes of transport and discourage the use of car travel, such as;

- Travel notice board to provide information on public transport, walking and cycling routes, car sharing;
- Welcome Packs with the above information;
- Initiatives to promote walking and cycling;
- Initiatives to promote public transport; and
- Initiatives to promote car sharing;

These measures provide an opportunity to promote and establish sustainable modes of transport which will help to reduce potential air quality impacts.

7.2.2 Plant Emissions

As noted in section 3.5.1, 4.no emergency back-up diesel generators will be installed as part of the Proposed Development's resilience plan. To minimise both emissions and impacts associated with these generators, consideration of the following measures are strongly recommended:

[33] HM Government, "Approved Document S, 2021 edition", https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1057375/AD_S.pdf
[34] 29762-HYD-XX-XX-RP-TP-6001-P01.01

- Only operate the generator for testing and during emergency conditions
- Where feasible, do not test more than one engine at a time. Stagger the tests to minimise emissions and short-term impacts;
- Keep testing times and frequency to the minimum – just enough to demonstrate reliability at the appropriate load;
- Avoid testing engines when the air quality is poor. Only test when low ambient nitrogen oxides (NOx) backgrounds are expected, such as not during peak traffic periods;
- Avoid testing engines when there is a strong prevailing wind in the direction of nearby sensitive receptors;
- Where possible, Use the electricity generated from the test on the site;
- Install backup generators away from sensitive receptors (not below windows or venting onto car parks) and terminate the exhaust flues vertically, making sure there are no obstructions such as caps or cowls.
- Combined stack – Aggregating separate discharge points such as stacks, can improve dispersion. The MCPD guidance[35] states that; Operators of in scope plant must not avoid aggregation:
  - by separating discharge points; and/or
  - to minimise costs.
- If using diesel, use low-sulphur fuel;
- Consider the use of alternatives fuels where possible, such as Green D+, which is a high performance HVO (Hydrogenated Vegetable Oil) fuel with lower emissions of particulates and NOx compared to diesel;
- Consider measures to reduce emissions such as:
  - Installation of selective catalytic reduction (SCR) abatement to exhaust to significantly reduce emissions of NO_x;
  - Comply with the medium combustion plant emission limit value (ELV)[36] (190mg/m^3 for Gas Oil engines); and
  - Provision of Diesel Particulate Filters (DPF).

35 https://www.gov.uk/guidance/medium-combustion-plant-when-you-need-a-permit
36 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32015L2193#d1e32-15-1

8. Discussion and Conclusion

Hydrock were commissioned by Cwm Taf Morgannwg University Health Board to prepare an AQA for the proposed Llantrisant health park diagnostic and treatment facility.

A qualitative construction dust risk assessment has been undertaken in line with IAQM guidance. Through good practice and implementation of appropriate mitigation measures outlined at Appendix E of this report, it is expected that the release of dust would be effectively controlled and mitigated, with resulting effects considered to be 'not significant'. All dust impacts are considered to be temporary and short-term in nature.

In line with EPUK & IAQM guidance detailed dispersion modelling, using ADMS-Urban, has been performed to assess the significance of potential impacts of the Proposed Development traffic on local air quality. The modelling assessment has shown that the impact of the Proposed Development on local air quality is Negligible for NO_2, PM_{10} and $PM_{2.5}$. No exceedances of the relevant AQALs were identified. Additionally, future receptors at the Proposed Development will not be introduced to an area of poor air quality from road traffic emissions, as no exceedances of the AQALs were identified at the Site. As such, the overall effect arising from change in operational phase trips is considered to be 'not significant'.

The predominant source within the heating strategy for the health park will be ASHPs. This is beneficial in terms of air quality as it does not introduce any new combustion sources. Due to the nature of the Proposed Development and the necessity for continued power supply, back-up generators will comprise part of the energy strategy. The generators will operate during an emergency and testing only. Measures outlined in Section 7.2.2 should be adopted where possible to minimise emissions.

From the evidence presented, and by following the guidance provided herein, the Proposed Development will comply with all relevant air quality policy. As such, air quality should not pose any significant obstacles to the planning process.

Appendix A Traffic Data

The traffic data, supplied by Hydrock, now Stantec is shown in below in Table 14.

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Table 14: Traffic Data

Link ID	Road Link	Speeds (kph)	Model Verification		2027 DM		2027 DS	
			AADT	% HDV	AADT	% HDV	AADT	% HDV
L01	A4119 N/O Site (Ely Valley Road) (DfT 10654)	64 - 80	24809	2.5	26149	2.5	26871	2.6
L02	A4119 S/O Site (DfT 10654)	64 - 112	24809	2.5	26149	2.5	27794	2.7
L03	A4119 S/O Lanelay Road (DfT 78486)	48 - 64	27538	2.5	29025	2.5	30176	2.6
L04	A4119 S/O A473 (Mwyndy) (DfT 40650)	64	36290	4.7	38250	4.7	38837	4.7
L05	A473 East (Cross Inn) (DfT 90327)	64	27636	2.1	29128	2.1	29692	2.2
L06	A4119 S/O Llantrisant Road (DfT 99581)	64	36379	3.8	38343	3.8	38930	3.8
L07	A473 West (DfT 99226)	64	20989	3.6	22122	3.6	22122	3.6
L08	A473 Llanharan (DfT 571)	48 - 96	10261	2.9	10815	2.9	11095	2.9

Appendix B Windrose

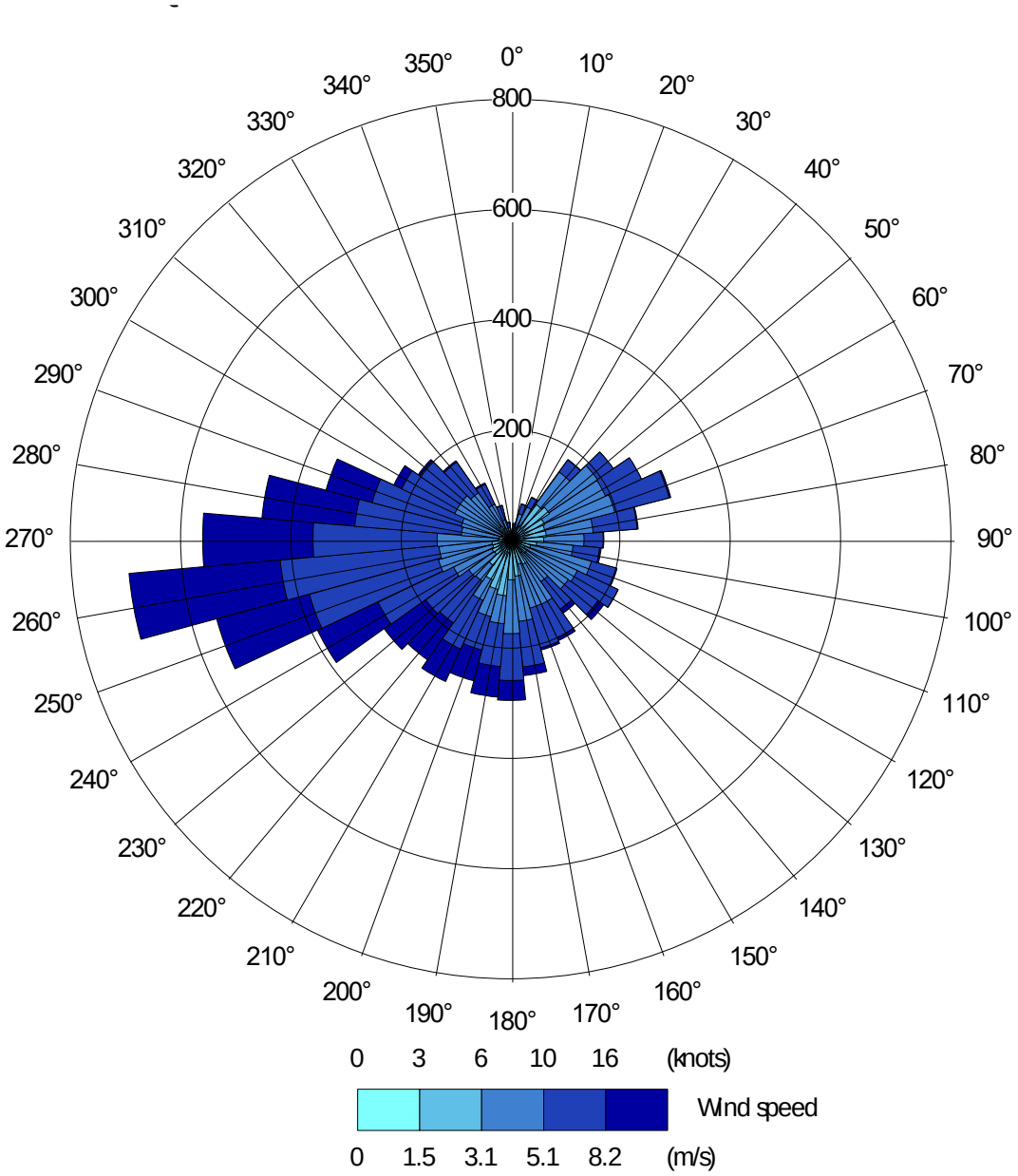

Figure 7: Wind rose Cardiff Airport (Infilled with Pembry Sands) (2023)

- * Data capture for wind speed: 99.7%
- Data capture for wind direction: 99.7%
- Data capture for temperature: 99.7%
- Data capture for cloud cover: 99.9%.

Appendix C Model Verification

An important stage in the modelling process is model verification, which involves comparing the model output with measured concentrations in order to increase confidence in modelled predictions.

According to LAQM.TG (22), the difference between modelled results and monitored concentrations is acceptable where it is within 25%.

Monitoring Locations used for Verification

The following monitoring locations were selected for model verification due to being representative of the study area and having more than 75% data collection for 2023:

- 37 - Lakeside Court, A4119; and
- 111 – Bridgend Rd, Llanharan

There were no other suitable tubes in the vicinity of the Site.

Model Verification

It is most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides (NO_x = NO + NO_2). 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 NO_2 concentrations using the NOx from NO_2 calculator (Version 9.1) available on the Defra LAQM Support website[31].

A comparison of modelled and monitored concentrations prior to adjustment are given in Table 15.

Table 15: Modelled and Monitored Concentrations Before Adjustment

Monitoring ID	Modelled Road NO_x (µg/m^3)	Monitored Road NO_x (µg/m^3)	Ratio Monitored/ Modelled	Modelled Total NO_2 (µg/m^3)	Monitored Total NO_2 (µg/m^3)	Difference (%)
37	13.6	42.5	3.1	14.8	27	-44
111	21.3	50.7	2.4	15.8	27	-42

As shown, the model was underpredicting at all diffusion tubes. As such, an adjustment factor of **2.599** has been determined, as the equation of the slope of the best-fit line between the 'measured' road contribution and the model derived road contribution of NO_x, as shown below:

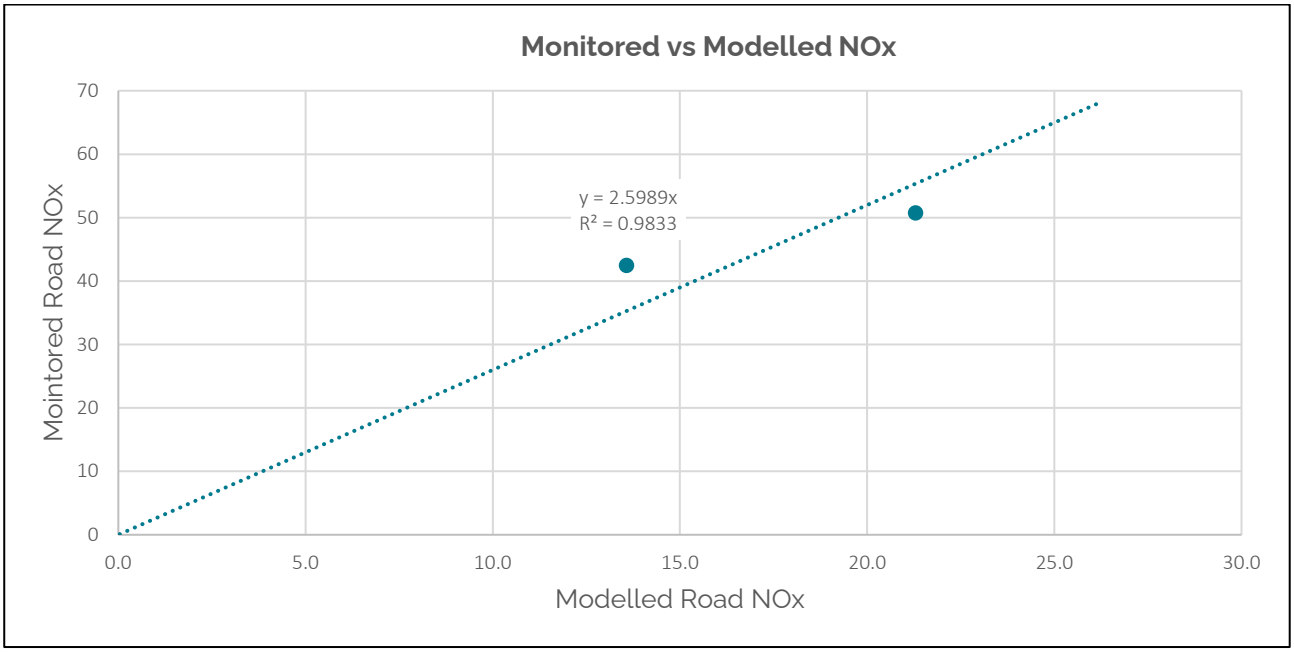

Figure 8: Model Adjustment Factor

Table 16 shows total monitored versus modelled NO_2 following the adjustment of the road contribution of NO_x by this factor. The total NO_2 concentration was determined by adding the calculated background NO_2 concentration to the modelled road contribution.

Table 16: Post-adjusted Modelled and monitored results

Monitoring ID	Adjusted Modelled NO_2 (µg/m³)	Monitored NO_2 (µg/m³)	Difference (%)
37	23.8	26.5	-10%
111	28.9	27.3	6%

The post adjusted NO_2 concentration were with 25% and within the ideal 10%. Therefore, adjustment is acceptable for use.

In addition, the overall post-adjusted uncertainty (RMSE) for annual mean NO_2 was 5.5%, which is well within ideal 10% range of uncertainty. As such, the factor was considered to be acceptable.

Appendix D Background Concentrations

The background concentrations used in the modelling assessment are shown below. For future years as a conservative assumption 2023 concentrations were applied.

Table 17: Background Concentrations

Receptor	Year	X	Y	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)
37	2023	305500	181500	8.4	13.7	6.9
111	2023	300500	183500	5.9	10.1	6.3
R01	2023	304500	183500	7.6	11.0	6.9
R02	2023	304500	183500	7.6	11.0	6.9
R03	2023	304500	183500	7.6	11.0	6.9
R04	2023	304500	183500	7.6	11.0	6.9
R05	2023	304500	182500	8.2	11.5	7.0
R06	2023	305500	182500	7.8	11.6	6.9
R07	2023	305500	181500	8.4	13.7	6.9
R08	2023	305500	181500	8.4	13.7	6.9
R09	2023	300500	183500	5.9	10.1	6.3
R10	2023	300500	183500	5.9	10.1	6.3
R11	2023	300500	182500	6.0	10.2	6.3
R12	2023	300500	181500	9.3	11.1	6.6
R13	2023	300500	180500	9.3	11.1	6.6
PR01	2023	300500	179500	7.4	10.7	6.5

Appendix E Construction Dust Mitigation

In order to mitigate the worst-case dust impacts the following general mitigation measures are highly recommended by the IAQM for Medium Risk construction sites. Highly recommended mitigation measures applicable specifically to Demolition, Earthworks, Construction and Trackout are provided based on the respective risk of adverse impact.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the 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 the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM10 continuous monitoring and/or visual inspections.

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- 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.

Monitoring

- 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, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. 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.

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose 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.

Operating Vehicle / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.

Operations

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

Waste Management

- No bonfires and burning of waste materials.

Measures Specific to Demolition

- Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

Measures Specific to Construction (desirable)

- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.

Measures Specific to Trackout (desirable)

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