AIR QUALITY ASSESSMENT

AT

LAND OFF Y GARNEDD, LLANFAIRPWLL, ANGLESEY

AQ109517

18/12/2020

Prepared For

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EXECUTIVE SUMMARY

Ensafe Consultants were commissioned by Du Construction Ltd to undertake an Air Quality Assessment in support of a proposed residential development at Land off Y Garnedd, Llanfairpwll, Anglesey.

The proposal consists of the development of 27 dwellings alongside associated infrastructure and parking.

The site is located within the vicinity of the A55, which is considered a notable source of road traffic emissions. As such, an Air Quality Assessment was required to quantify pollution levels across the site, consider its suitability for the proposed end-use and assess potential impacts as a result of the development.

Potential construction phase air quality impacts from fugitive dust emissions were assessed as a result of earthworks, construction and trackout activities. It is considered that the use of good practice control measures would provide suitable mitigation for a development of this size and nature and reduce potential impacts to an acceptable level.

Dispersion modelling was undertaken in order to predict annual mean pollutant concentrations across the application site as a result of existing road vehicle exhaust emissions associated with the A55, during peak periods. Results were subsequently verified using local monitoring results provided by Isle of Anglesey County Council.

The dispersion modelling results indicated that annual mean pollutant levels across the application site were below the relevant air quality objectives. The location is therefore considered suitable for the proposed end-use without the implementation of protective mitigation techniques.

Additionally, based on the level of anticipated traffic generation from the site the assessment concluded that impacts on pollutant levels as a result of operational phase pollutant emissions were predicted to be **not significant** in accordance with relevant screening criteria. The use of robust assumptions, where necessary, was considered to provide sufficient results confidence for an assessment of this nature.

Based on the assessment results, air quality issues are not considered a constraint to planning consent for the proposed development.

1.0 INTRODUCTION

1.1 Background

Ensafe Consultants has been commissioned by Du Construction Ltd, hereafter referred to as "the Client" to undertake an Air Quality Assessment in support of a proposed development, comprising of the development of 27 residential units, herein after referred to as the "Proposed Development".

1.2 Site Location and Context

The application site is located at Land off Y Garnedd, Llanfairpwll, Anglesey at approximate National Grid Reference (NGR) 252870, 372180, and within the vicinity of the A55 which is considered a notable source of road traffic emissions including nitrogen dioxide (NO_2) and particulate matter (PM).

Subsequently, the Proposed Development has the potential to introduce future residential occupants into an area of elevated pollution levels, as well as to cause impacts at sensitive receptor locations during the construction and operational phases.

An Air Quality Assessment has therefore been requested to quantify annual mean NO_2 and PM_{10} concentrations across the site to consider suitability for the proposed end-use, and to assess potential impacts as a result of the development. This is detailed in the following report. Reference should be made to Figure 1 within Appendix I for a location plan.

1.3 Limitations

This report has been produced in accordance with Ensafe Group's standard terms of engagement. Ensafe Group has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Ensafe Group; a charge may be levied against such approval.

2.0 LEGISLATION, GUIDANCE AND POLICY

The following legislation, guidance and policy will be considered and adhered to during the preparation of the Air Quality Assessment:

- European Union (EU) Directive 2008/50/EC;
- Planning Policy Wales (PPW), Edition 10, December 2018[1]
- Section 82 of the Environment Act (1995) (Part IV);
- The Air Quality Standards (Amendment) Regulations (2016)[2];
- Local Air Quality Management Technical Guidance 2016 LAQM.(TG16), DEFRA, 2018[3];
- Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management (IAQM), v1.1, June 2016[4]; and
- Land-Use Planning and Development Control: Planning for Air Quality, Environmental Protection UK and IAQM, January 2017[5].

2.1 Background

The Air Quality Standards (Amendment) Regulations (2016) came into force on 31st December 2016. These Regulations amend the Air Quality Standards Regulations 2010 and transpose the EU Directive 2008/50/EC into UK law. AQLVs were published in these regulations for 7 pollutants, as well as Target Values for an additional 6 pollutants.

Part IV of the Environment Act (1995) requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published in July 2007[2]. The AQS sets out AQOs that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale. These are generally in line with the AQLVs, although the requirements for compliance vary slightly.

Table 1 presents the AQOs for pollutants considered within this assessment.

Table 1: Air Quality Objectives

Pollutant	Air Quality Objectives	
	Concentration (µg/m³)	Averaging Periods
NO_2	40	Annual mean
	200	1-hour mean; not to be exceeded more than 18 times a year
PM_{10}	40	Annual mean
	50	24-hour mean; not to be exceeded more than 35 times a year
$PM_{2.5}$	25	Annual mean

Table 2 summarises the advice provided in DEFRA guidance LAQM (TG16)[3] on where the AQOs for pollutants considered within this report apply.

1 Planning Policies Wales (Edition 10), Welsh Government, 2018
2 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA, 2007
3 Local Air Quality Management Technical Guidance 2016 LAQM (TG16), DEFRA, February 2018.
4 Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, 2016.
5 Land-Use Planning and Development Control: Planning for Air Quality, EPUK and IAQM, January 2017.

Table 2: Examples of Where the Air Quality Objectives Apply

Averaging Periods	Objectives Should Apply At	Objectives Should Not Apply At
Annual mean	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 mean	All locations where the annual mean objective would apply, together with hotels. 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
1-hour mean	All locations where the annual mean and 24-hour mean objectives apply. 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 be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

2.2 Planning Policy Wales

The Planning Policy Wales (PPW) Edition 10 was published December 2018[1] and sets out the Welsh Government's core planning policies and principles with respect to land use planning, including air quality. The document includes the following considerations which are relevant to this assessment:

> *"Good design can help to ensure high environmental quality. Landscape and green infrastructure considerations are an integral part of the design process. Integrating green infrastructure is not limited to focusing on landscape and ecology, rather, consideration should be given to all features of the natural environment and how these function together to contribute toward the quality of places. This embraces the principles of 'ecosystems services' and sustainable management of natural resources where multiple benefits solution become an integral part of good design. In a similar manner, addressing environmental risks can make a positive contribution to environmental protection and improvement, addressing land contamination, instability and flood risk and providing for biodiversity, climate protection, improved air quality, soundscape and water resources benefits."*

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

"The Welsh Government is committed to reducing reliance on the private car and supporting a modal shift to walking, cycling and public transport. Delivering this objective will make an important contribution to decarbonisation, improving air quality, increasing physical activity, improving the health of the nation and realising the goals of the Well-being of Future Generations Act."

"When considering a scheme of enabling development, planning permission should be granted only where all of the following can be applied:

[…]

- *the enabling development does not give rise to significant risks, for example residential development in the floodplain or significantly impact on air quality or soundscape."*

"In proposing new development, planning authorities and developers must, therefore:

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

"To assist decision making it will be important that the most appropriate level of information is provided and it may be necessary for a technical air quality and noise assessment to be undertaken by a suitably qualified and competent person on behalf of the developer."

"Good design, for example setting back buildings from roads to avoid canyon effects and using best practice in terms of acoustic design to ensure the appropriate and intended acoustic environment of completed developments should be incorporated at an early consideration in the design and planning process. Other mitigation measures must be capable of being effectively implemented for their intended purpose, and could include those related to:

- *traffic management and road safety;*
- *ensuring progress towards a shift to low or zero emissions means of road transport, such as electrical charging points;*
- *supporting low or zero emissions public transport;*
- *providing active travel infrastructure; and*
- *incorporating green infrastructure, where it can improve air quality by removing air pollution and aiding its dispersal, reduce real or perceived noise levels by absorbing and scattering noise and introducing natural sounds to soften man-made noise, provide areas of relative tranquillity, and reduce exposure by putting a buffer between sources of pollution and receptors."*

"Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission."

Relevant considerations in making planning decisions for potentially polluting development are likely to include:

[…]

- *impact on health and amenity;*

[…]

- *the risk and impact of potential pollution from the development, insofar as this might lead to the creation of, or worsen the situation in, an air quality management area, a noise action planning priority area or an area where there are sensitive receptors"*

The implications of the PPW have been considered throughout this assessment.

2.3 Local Planning Policy

2.3.1 Isle of Anglesey County Council Joint local Development Plan[6]

The Anglesey and Gwynedd Joint Local Development was formally adopted on 31 July 2017 sets out the planning policies up to 2026. The majority of decisions on planning applications in the two Planning Authority areas will be based on the contents of the Plan.

A review of the Joint Local Development Plan indicated the following policies in relation to air quality that are relevant to this assessment:

- ***Strategic Policy PS 5: Sustainable Development***
- ***Policy PCYFF 2: Development Criteria***
- ***Policy PCYFF 3: Design and Place Shaping***
- ***Policy GWA 2: Waste Management and Allocated Sites***

This policy has been considered throughout this report by assessing potential air quality impacts as a result of the proposed development.

[6] Anglesey and Gwynedd Joint Local Development Plan 2011 – 2026, July 2017

3.0 METHODOLOGY

There is the potential for the Proposed Development to expose future site users to elevated pollution concentrations and to cause impacts at sensitive locations during the construction and operational phases. These have been assessed in accordance with the following methodology.

3.1 Construction Phase Assessment

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the IAQM document 'Guidance on the Assessment of Dust from Demolition and Construction'[4].

Activities on the proposed construction site have been divided into three types to reflect their different potential impacts. These are:

- Earthworks
- Construction
- Trackout

The potential for dust emissions was assessed for each activity that is likely to take place and considered three separate dust effects:

- Annoyance due to dust soiling
- Harm to ecological receptors
- The risk of health effects due to a significant increase in exposure to PM_{10} and $PM_{2.5}$

The assessment steps are detailed below.

3.1.1 Step 1

Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 350m from the site boundary or 50m from the construction vehicle route up to 500m from the site entrance, then the assessment should proceed to Step 2. Additionally, should ecological receptors be identified within 50m of the boundary site or 50m from the construction vehicle route up to 500m from the site entrance, then the assessment should also proceed to Step 2.

Should sensitive receptors not be present within the relevant distances then **negligible** impacts would be expected and further assessment is not necessary.

3.1.2 Step 2

Step 2 assesses the risk of potential dust impacts. A site is allocated to a risk category based on two factors:

- The scale and nature of the works, which determines the magnitude of dust arising as: small, medium or large (Step 2A); and
- The sensitivity of the area to dust impacts, which can be defined as low, medium or high sensitivity (Step 2B).

The two factors are combined in Step 2C to determine the risk of dust impacts without the application of best practice mitigation measures.

3.1.3 Step 3

Step 3 requires the identification of site-specific mitigation measures within the IAQM guidance[4] to reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with **negligible** risk, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

3.1.4 Step 4

Once the risk of dust impacts has been determined and the appropriate mitigation measures identified, the final step is to determine the significance of any residual impacts. For almost all construction activity, the aim should be to control effects through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be **'not significant'**.

The determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts. The IAQM guidance[4] suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix IV.

3.2 Operational Phase Assessment

3.2.1 Future Exposure

The Proposed Development is located adjacent the A55. As such, the proposals have the potential to introduce new receptors into an area of existing poor air quality.

Detailed dispersion modelling was therefore undertaken to quantify pollutant exposure across the site and determine suitability for the proposed use. The following modelling scenarios were utilised during the assessment:

- 2018 as baseline year for verification against latest ratified data;
- Opening year do-something (DS) (predicted traffic flows in 2023 should the proposals be completed)

It should be noted that air quality is predicted to improve in the future. However, in order to provide a robust assessment, emission factors for 2018 were utilised within the dispersion model. The use of 2023 traffic data and 2018 emission factors is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

Full details of data used for the modelling assessment are presented in Appendix II of this report.

3.2.2 Road Traffic Exhaust Emission Impacts

The Proposed Development has the potential to impact on existing air quality as a result of road traffic exhaust emissions, such as NO_2, PM_{10} and $PM_{2.5}$ associated with vehicles travelling to and from the site. A screening assessment was therefore undertaken using the criteria contained within the EPUK and IAQM guidance[5] documents to determine the potential for trips generated by the Proposed Development to affect local air quality.

The EPUK and IAQM guidance[5] document states the following criteria to help establish when an air quality assessment is likely to be considered necessary:

- Proposals that will cause a change in Light Duty Vehicle (LDV) flows of more than 100 AADT within or adjacent to an AQMA or more than 500 elsewhere;
- Proposals that will cause a change in Heavy Duty Vehicle (HDV) flows of more than 25 AADT within or adjacent to an AQMA or more than 100 elsewhere;

Should the above criteria not be met, the EPUK and IAQM guidance[5] document considers air quality impacts associated with the scheme to be not significant and no further assessment is required. Conversely, should the criterion be exceeded it may be deemed necessary that further assessment is required.

4.0 BASELINE

Existing air quality conditions in the vicinity of the application site were identified in order to provide a baseline for assessment. These are detailed in the following sections.

4.1 Local Air Quality Management

As required by the Environment Act (1995), IoACC, has undertaken Review and Assessment of air quality within their area of administration. This process has indicated that that there are not designated AQMA's within the borough.

4.2 Air Quality Monitoring

Monitoring of pollutant concentrations is undertaken by IoACC using continuous and passive methods throughout their areas of administration. A review of the North Wales Authorities Collaborative Project includes IoACC's most recent Air Quality Monitoring Data ASR 2019[7] indicated that there is one automatic analyser currently operated by IoACC , CM1 - Llynfaes (Creigiau), located at NGR: 239692, 379774, monitoring PM_{10} and $PM_{2.5}$. This is approximately 10.1km south-east of the site. Due to the distance between the sites and contrasting environments, similar pollutant concentrations are not anticipated at the application site and the automatic analyser data is not considered further.

IoACC monitor NO_2 concentrations across the borough using passive diffusion tubes. A review of the most recent air quality monitoring data indicated 4 diffusion tubes located within the vicinity of the application site, presented in Table 3.

Table 3: Diffusion Tube Monitoring Results

ID	Site Name	Type	NGR (m)		Dist' to Site (m)	Annual Mean Concentration (µg/m³)		
			X	Y		2016	2017	2018
IACC-018 (DT1)	Llanfair P.G	Kerbside	252567	372057	441	39.7	37.8	35.3
IACC-046 (DT4)	Llanfair P.G	Roadside	253265	372372	441	-	**44.8**	37.9
IACC-073 (A15)	A15 Llanfair	Roadside	252567	372057	325	-	37.1	36.7[a]
IACC-076 (A18)	A18 Llanfair	Roadside	253788	371936	952	-	14.8	21.1[a]

[a] Site had less than 3 months worth of data and could not be annualised. Mean presented is for the period of monitoring rather than for the whole year.

As indicated in Table 3, there were exceedances of annual mean AQO for NO_2 at diffusion tube location IACC-046 (DT4) in recent years. Reference should be made to Figure 2 within Appendix I for a graphical representation of the passive monitoring locations.

4.3 Background Pollutant Concentrations

The total concentration of a pollutant is comprised of explicit local emission sources (such as roads and industrial sources) and the background component. The background component consists of indeterminate sources which are transported into an area from further away by meteorological conditions. Background pollutant concentrations are therefore the ambient level of pollution that is not affected by local sources of pollution.

In reality, it is not usually practical to obtain a true representation of background levels in urban areas due to corruption by local sources; background levels used in assessments may contain a mixture of both sources.

Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The Proposed Development site is located across grid square:

[7] North Wales Authorities Collaborative Project, 2019 Air Quality Progress Report

- NGR: 252500, 372500

Data for this location was downloaded from the DEFRA website[8]. For the purpose of this assessment, background concentrations are summarised in Table 4 for the verification year (2018) and the predicted development opening year (2023).

Table 4: Predicted Background Pollutant Concentrations

Pollutant	Predicated Background Concentration (µg/m³)	
	2018	2023
NO_x	6.77	5.37
NO_2	5.40	4.32
PM_{10}	9.27	8.58
$PM_{2.5}$	6.08	5.51

4.4 Sensitive Receptors

A sensitive receptor is defined as any location which may be affected by changes in air quality as a result of a development. These have been defined for construction dust impacts in the following Sections.

4.4.1 Construction Phase Sensitive Receptors

There are no nationally or European designated ecological receptors within 50m of the Site boundary, or within 50m from a route used by construction vehicles on the public highway (up to 500m from the Site entrance). Therefore, the risk of dust effects at a nationally or European designated ecological receptor site from construction impacts have not been considered further in this assessment.

Human receptors sensitive to potential dust impacts during, earthworks and construction were identified from a desk-top study of the area up to 350m from the Proposed Development boundary. These are summarised in Table 5.

Table 5: Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors
Less than 20	10 - 100
20 – 50	10 - 100
50 – 100	More than 100
100 – 350	More than 100

Reference should be made to Figure 3 within Appendix I for a graphical representation of earthworks and construction dust buffer zones.

Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 500m of the site access route. These are summarised in Table 6. The exact construction vehicle access routes were not available for the purpose of this assessment as they will depend on sourcing of materials. This is likely to be decided by the contractor. However, it was assumed that construction traffic would access the Proposed Development via Y Garnedd, to ensure a worst case trackout assessment is undertaken.

8 http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html.

Table 6: Trackout Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors
Less than 20	More than 100
20 – 50	More than 100

Reference should be made to Figure 4 within Appendix I for a graphical representation of trackout dust buffer zones.

A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 7.

Table 7: Additional Area Sensitivity Factors

Guidance	Comment
Whether there is any history of dust generating activities in the area	The site is located within an urban area. As such, historical dust generation may have occurred as a result of windblown emissions from commuting and regeneration
The likelihood of concurrent dust generating activity on nearby sites.	A review of the IoACC Planning Portal indicated there are no proposed large scale developments within the vicinity of the site: As such there is no risk of concurrent dust generation.
Pre-existing screening between the source and the receptors	There is no vegetation present along all boundaries. As such, there will be no pre-existing screening to receptors in all directions.
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	The wind direction is predominantly from the south and south-west of the development, as shown in Figure 5 within Appendix I. As such, properties to the north and north-east would be most affected by dust emissions
Conclusions drawn from local topography	The topography of the area appears to be predominantly flat. As such, there are no constraints to dust dispersion
Duration of the potential impact, as a receptor may become more sensitive over time	Currently it is unclear as to the duration of the construction phase. However, given the 2023 opening year it is likely to extend over one year. Receptors may therefore become more sensitive over time
Any known specific receptor sensitivities which go beyond the classifications given in the document.	No specific receptor sensitivities identified during the baseline

4.4.2 Operational Phase Sensitive Receptors

A desk top study was undertaken to identify the closest receptor locations to the application site. This indicated residential locations within close proximity to all development boundaries. There are no educational or medical facility in immediate vicinity of the application site or the affected road networks, with the nearest education facility (Ysgol Gynradd Llanfair-pwllgwyngyll) and medical facility (Llanfairpwll Health Centre) located approximately 530m and 545m south of the site.

5.0 ASSESSMENT

There is the potential for air quality impacts as a result of the construction and operation of the Proposed Development in addition to the exposure of future site users to elevated pollution levels. These are assessed in the following Sections.

Reference should be made to Appendix II for full assessment input details.

5.1 Construction Phase Assessment

5.1.1 Step 1 – Screening

The undertaking of activities such as excavation, ground works, cutting, construction, concrete batching and storage of materials has the potential to result in fugitive dust emissions throughout the construction phase. Vehicle movements both on-site and on the local road network also have the potential to result in the re-suspension of dust from haul road and highway surfaces.

The desk-study detailed in Section 4.4.1 identified a number of receptors with a high classification of sensitivity within 350m of the site boundary, and within 50m of the anticipated trackout routes. As such, a detailed assessment of potential dust impacts was required, and summarised in the below sections.

Reference should be made to Appendix III for details of the relevant IAQM construction phase assessment criteria, which were utilised in conjunction with site specific information.

5.1.2 Step 2A – Magnitude

The scale and nature of the works was determined to assess the magnitude of dust arising from each construction phase activity. The determination of magnitude was based upon the criteria detailed in Appendix III, with the outcome of Step 2A is summarised below in Table 8.

Demolition

No demolition is proposed as part of the application. As such this aspect has not been considered further within the assessment.

Earthworks

The Proposed Development site is estimated to cover an area of approximately 9,100m^2. The magnitude of potential dust emissions related to earthwork activities is therefore considered medium.

Construction

The proposals comprise the construction of 27 residential units, given the scale of the Proposed Development the total building and infrastructure volume is likely to be less than 25,000m^3. The magnitude of potential dust emissions related to construction activities is therefore considered small.

Trackout

Information on the number of HDV trips to be generated during the construction phase of the Proposed Development was not available at the time of assessment. Similarly, the surface material and unpaved road length was not known at this stage of the project. Based on the site area, it is anticipated that the unpaved road length is likely to be more than 100m. The magnitude of potential dust emissions from trackout is therefore considered large.

Table 8: Dust Emission Magnitude

Magnitude of Activities		
Earthworks	**Construction**	**Trackout**
Medium	Small	Large

5.1.3 Step 2B – Sensitivity

The next step (Step 2B) is to determine the sensitivity of the surrounding area, based on general principles such as amenity and aesthetics, as well as human exposure sensitivity.

Dust Soiling

As shown in Section 4.4.1 and Table 6, the desk top study indicated are approximately 10 - 100 sensitive receptors within 20m of the Proposed Development boundary and more than 100 within 20m of the anticipated trackout routes.

Based on the assessment criteria detailed in Appendix III, the sensitivity of the receiving environment to potential dust soiling impacts was considered to be high for all construction phase activities. This is because the site is situated in a predominantly residential area and the people or property would reasonably be expected to be present here for extended periods of time.

Human Health

The annual mean concentration of PM_{10} is 9.08µg/m^3 as detailed in Section 4, based on the receptor counts provided above, the area is considered to be of low sensitivity for earthworks and construction phase activities and medium sensitivity for trackout activities.

The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria detailed in Appendix III is summarised in Table 9.

Table 9: Sensitivity of the Surrounding Area

Potential Impact	Sensitivity of the Surrounding Area		
	Earthworks	**Construction**	**Trackout**
Dust Soiling	High	High	High
Human Health	Low	Low	Medium

5.1.4 Step 2C – Risk

Both the magnitude and sensitivity factors are combined in Step 2C to determine the risk of dust impacts without the application of best practice mitigation measures.

It should be noted that the potential for impacts depends significantly on the distance between the dust generating activity and receptor location. Risk was predicted based on a worst-case scenario of works being undertaken at the site boundary closest to each sensitive area. Therefore, actual risk is likely to be lower than that predicted during the majority of the construction phase. A summary of the risk from each dust generating activity is provided in Table 10.

Table 10: Summary of Potential Unmitigated Dust Risks

Potential Impact	Risk		
	Earthworks	**Construction**	**Trackout**
Dust Soiling	Medium	Low	High
Human Health	Low	Negligible	Medium

5.1.5 Step 3 – Mitigation

The IAQM guidance[4] provides a number of potential mitigation measures to reduce impacts during the construction phase. These measures have been adapted for the Proposed Development site as summarised in Table 11. The mitigation measures outlined in Table 11 can be reviewed prior to the commencement of construction works incorporated into the existing strategies as applicable.

Table 11: Fugitive Dust Mitigation Measures

Issue	Control Measure
Communications	• Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary • Develop and implement a stakeholder communications plan that includes community engagement • 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 LA
Site Management	• Record all dusty and air quality complaints • Record any exceptional incidents that cause dust/or air emissions, and the action taken to resolve the situation • Make complaints log available to LA when asked • Hold regular liaison meetings with other high-risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/ deliveries which might be using the same strategic road network routes.
Monitoring	• Undertake daily on-site and off-site inspection, where receptors are nearby, to monitor dust, record inspection results, and make the log available to the LA when asked • Carry out regular site inspections to monitor compliance with the DMP • Increase frequency of site inspections when activities with a high potential to produce dust are being carried out
Preparing & Maintaining Site	• Plan site layout so that machinery and dust causing activities are located away from receptors • Fully enclose site or specific operations where there is a high potential for dust production and the site as actives for an extensive period • Avoid site runoff of water or mud • Use water as dust suppressant where applicable • 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 • Cover, seed or fence stockpiles to prevent wind whipping

Issue	Control Measure
Operating Vehicle/Machinery & Sustainable Travel	• Avoid the use of diesel- or petrol-powered powered generators and use mains electricity or battery powered equipment where practicable. • All vehicles to switch off engines - no idling vehicles • Avoid the use of diesel or petrol powered generators where practicable • Impose a signpost a maximum-speed limit of 15mph on surfaced and 10mph on un-surfaced haul roads and work areas • Produce a Construction Logistics Plan to manage sustainable deliveries
Operations	• Cutting equipment to use water as dust suppressant or suitable local extract ventilation • Ensure adequate water supply on the site for effective dust/particulate matter suppression/mitigation • Use enclosed chutes and covered skips • Minimise drop heights • Ensure equipment is readily available on site to clean any spillages
Waste Management	• Avoid bonfires and burning of waste materials
Earthworks & Construction	• Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable • Only remove the cover in small areas during work and not all at once • Avoid scabbling • Ensure sand and other aggregates are stored and not able to dry out, unless it is required for a specific process
Trackout	• Use water-assisted dust sweeper on the access and local roads • Avoid dry sweeping of large areas • Ensure vehicles entering and leaving sites are covered to prevent escape of materials • Record all inspections of haul routes and any subsequent action in a site log book • Implement a wheel washing system at a suitable location near site exit • 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

5.1.6 Step 4 – Residual Impacts

Assuming the relevant mitigation measures outlined in Table 11 are implemented, the residual effect from all dust generating activities is predicted to be negligible and therefore **not significant** in accordance with the IAQM guidance[4].

5.2 Operational Phase Assessment

5.2.1 Road Vehicle Exhaust Impacts

Any additional vehicle movements associated with the Proposed Development will generate exhaust emissions, such as NO_2, PM_{10} and $PM_{2.5}$ on the local and regional road networks.

Based on data from the appointed traffic consultant, SCP Transport, it is expected that there will be 135 AADT trips from the proposed development. It is therefore not anticipated that the operational phase of the site would result in a change of AADT flows of more than 500, produce 100 HDV movements per day or significantly affect average speeds on the local road network.

Subsequently, potential air quality impacts associated with operational phase road vehicle exhaust emissions are predicted to be **not significant** in accordance the EPUK and IAQM[5] screening criteria shown in Section 3.2.2.

5.2.2 Future Exposure

Annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations were predicted across the Proposed Development for the 2023 DS scenario at a height of 1.5m to represent exposure across the ground floor level, as shown in Figures 7 to 9 within Appendix I.

Background NO_2 and PM_{10} levels are likely to be lower at elevated heights due to increased distance from emission sources, such as roads. Therefore, predicted concentrations at heights above ground floor level are considered acceptable in regards to future exposure and have not been assessed further.

Nitrogen Dioxide

Predicted annual mean NO_2 concentrations across the Proposed Development site during the DS scenario are summarised in Table 12.

Table 12: Modelling Results - Annual Mean NO_2 Across Sensitive Uses

Floor Level	Predicted 2023 Annual Mean NO_2 Concentration (µg/m³)
Ground (1.5m)	9.92 – 21.67

The predicted concentrations shown in Table 12 indicate that there were no exceedances of the AQO at sensitive locations across ground floor areas of the proposed development. As such, it is considered that annual mean NO_2 levels at the Proposed Development site should not be viewed as a constraint to development.

Furthermore, predictions of 1-hour NO_2 concentrations were not produced as part of the dispersion modelling assessment. However, as stated in LAQM (TG16)[3] if annual mean NO_2 concentrations are below 60µg/m³ then it is unlikely that the 1-hour AQO will be exceeded. As such based on the results in Table 12, it is not predicted that on-site concentrations will exceed the 1-hour mean AQO for NO_2.

Based on the results of the dispersion modelling assessment, the site is considered to be suitable for residential use without the implementation of mitigation techniques to protect future site users from elevated NO_2 concentrations.

Particulate Matter (PM_{10} & $PM_{2.5}$)

Predicted annual mean PM concentrations across the Proposed Development site during the DS scenario are summarised in Table 13.

Table 13: Modelling Results - Annual Mean PM Across Sensitive Uses

Floor Level	Predicted 2023 Annual Mean Concentration (µg/m³)	
	PM_{10}	$PM_{2.5}$
Ground (1.5m)	10.06 – 12.31	6.56 – 7.86

The predicted concentrations shown in Table 13 indicate that there were no exceedances of the annual mean AQOs for PM_{10} or $PM_{2.5}$ throughout the modelling area. As such, it is considered that annual mean PM levels at the Proposed Development site should not be viewed as a constraint to development.

Based on the results of the dispersion modelling assessment, the site is considered to be suitable for residential use without the implementation of mitigation techniques to protect future site users from elevated PM concentrations.

6.0 CONCLUSION

Ensafe Consultants were commissioned by the client to undertake an Air Quality Assessment in support of a proposed residential development at Land off Y Garnedd, Llanfairpwll, Anglesey.

During the construction phase of the Proposed Development there is the potential for air quality impacts as a result of fugitive dust emissions from the site. These were assessed in accordance with the IAQM methodology. Assuming good practice dust control measures are implemented, the residual potential air quality impacts from dust generated by construction, earthworks and trackout activities was predicted to be **not significant**.

Dispersion modelling was undertaken to quantify annual mean NO_2 and PM_{10} concentrations across the application and subsequently verified using IoACC local monitoring data.

The dispersion modelling results indicated that annual mean NO_2 and PM_{10} concentrations across the application site were below the relevant AQOs. The location is therefore considered suitable for the proposed end-use without the implementation of protective mitigation techniques.

Potential impacts during the operational phase of the Proposed Development may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. An assessment was therefore undertaken using the EPUK and IAQM screening criteria to determine the potential for vehicle trips generated by the Proposed Development to affect local air quality. The traffic data provided by SCP Transport, indicated that operational traffic flows are below the relevant thresholds. Based on this information associated impacts are likely to be **not significant** throughout the operational phase.

Based on the assessment results, air quality is not considered a constraint to planning consent and the Proposed Development is considered suitable for residential use.

7.0 ABBREVIATIONS

AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Strategy
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DS	Do Something
DMP	Dust Management Plan
EPUK	Environmental Protection UK
EU	European Union
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
IoACC	Isle of Anglesey County Council
LAQM	Local Air Quality Management
LA	Local Authority
LDV	Light Duty Vehicle
NGR	National Grid Reference
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5µm
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10µm
TEMPRO	Trip End Model Presentation Program
z_0	Roughness Length

END OF REPORT

APPENDIX I - FIGURES

Legend

Site Boundary

Title

Figure 1

Site Location

Project

Land off Y Garnedd, Llanfairpwll, Anglesey

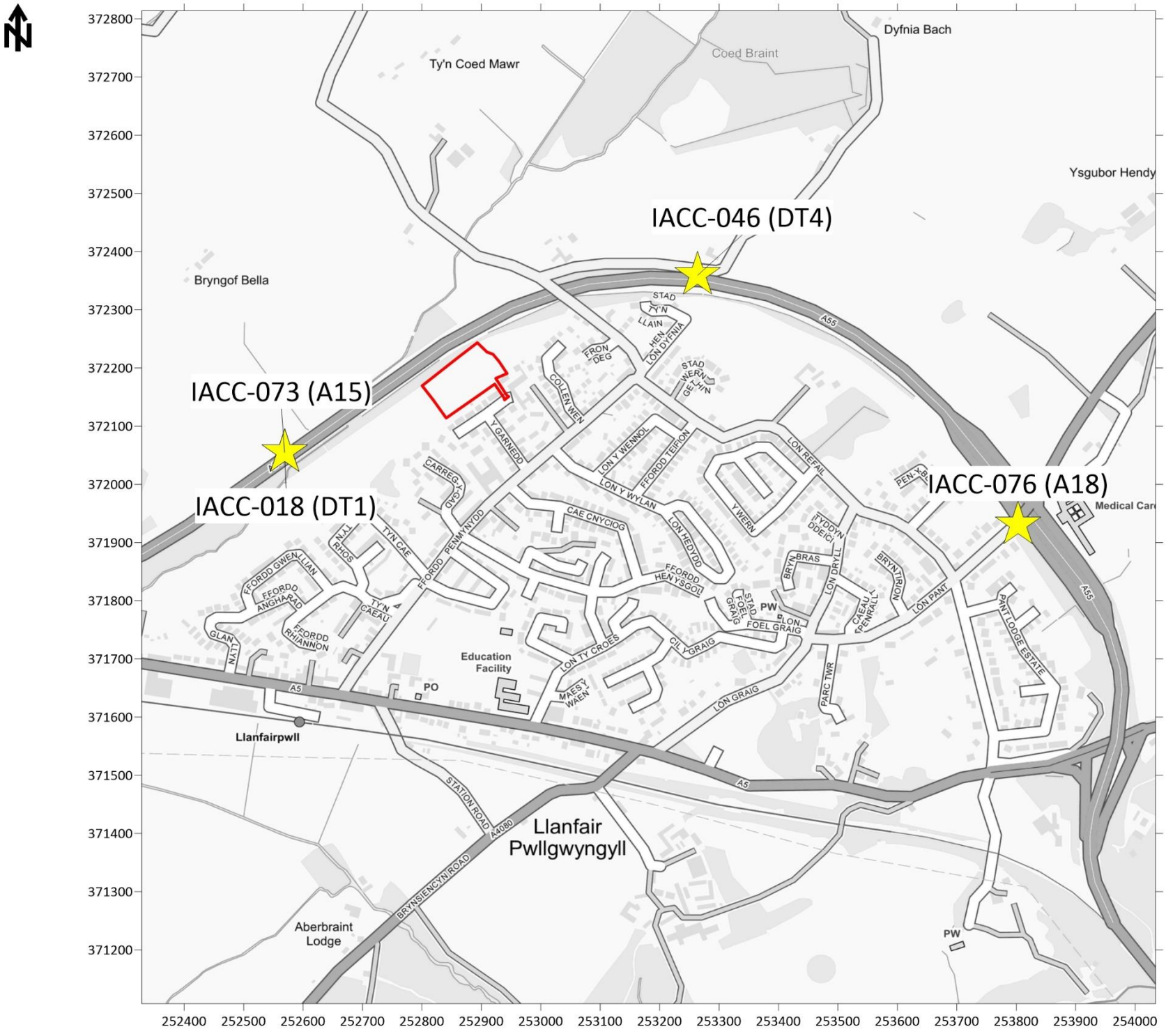
Project Number

AQ109517

Client

Du Construction Ltd

Ensafe Consultants
Osprey House, Broadway, Manchester M50 2UE
Tel – 0161 868 1300
www.ensafe.co.uk



Legend

Site Boundary

Diffusion Tube Monitoring Locations

Title

Figure 2

Diffusion Tube Monitoring Locations

Project

Land off Y Garnedd, Llanfairpwll, Anglesey

Project Number

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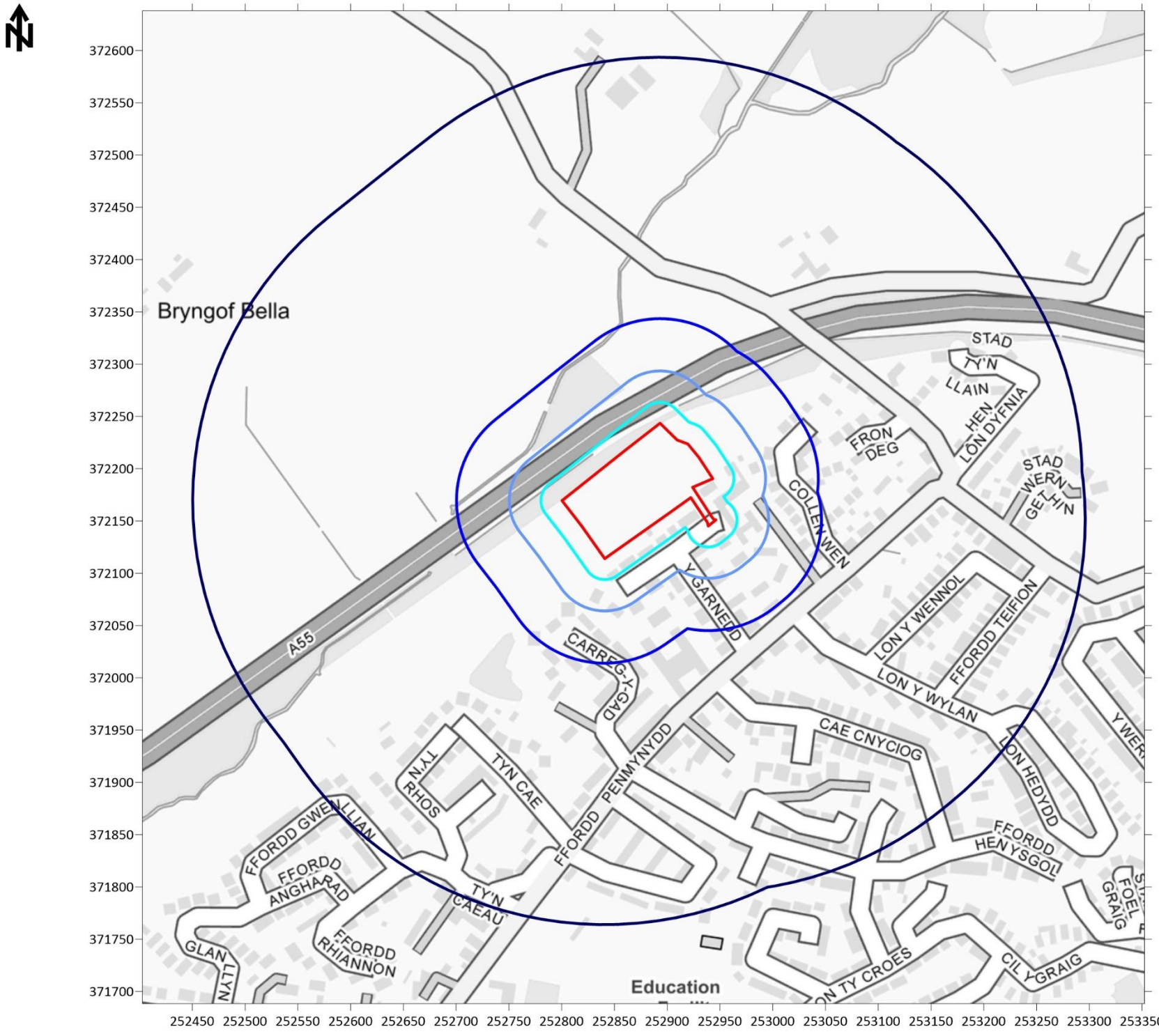

Legend

- Site Boundary
- 20m from Site Boundary
- 50m from Site Boundary
- 100m from Site Boundary
- 350m from Site Boundary

Title

Figure 3

Earthworks and Construction
Dust Buffer Zones

Project

Land off Y Garnedd, Llanfairpwll, Anglesey

Project Number

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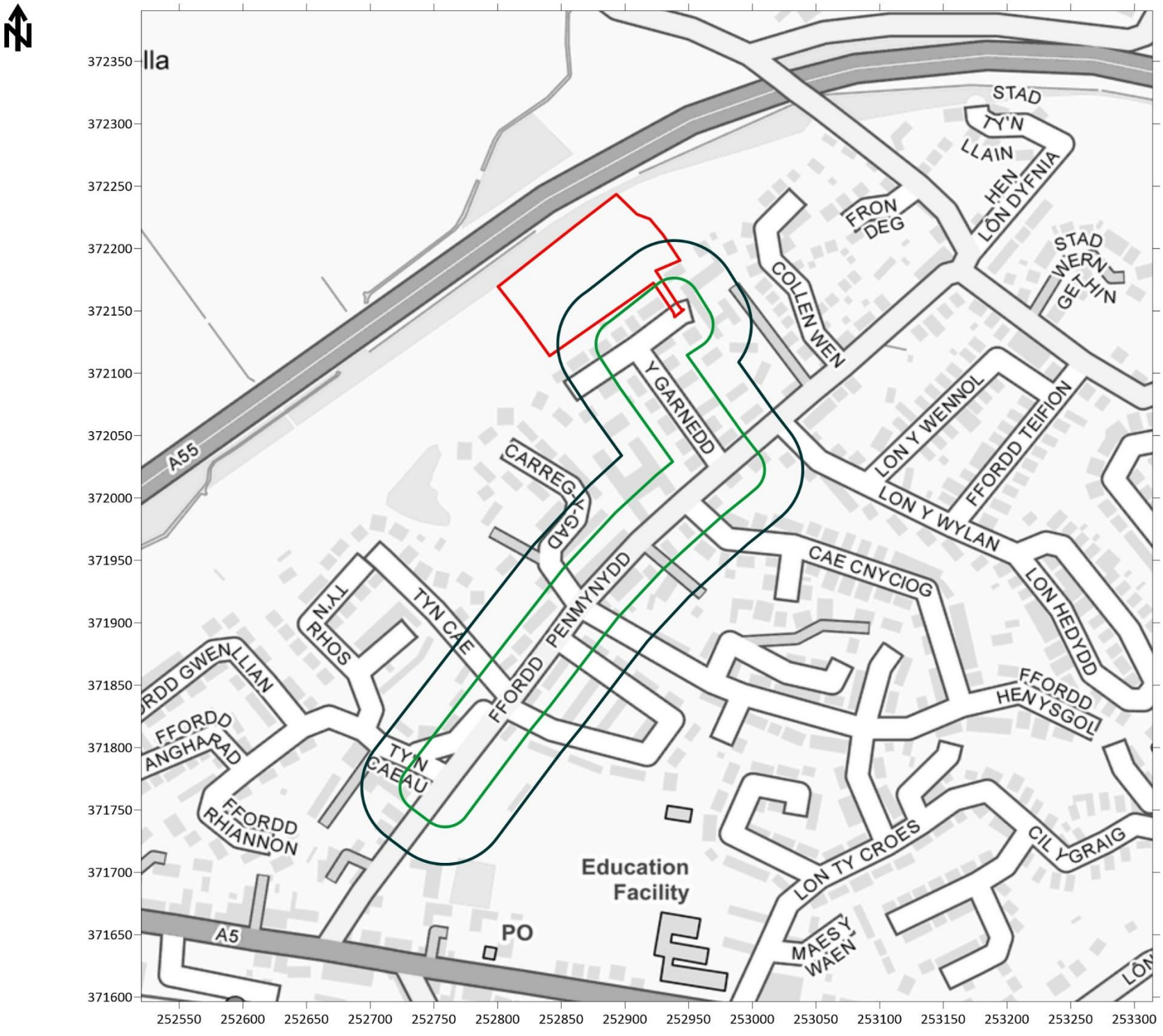

Legend

- Site Boundary
- 20m from Site Access Route
- 50m from Site Access Route

Title

Figure 4

Trackout Dust Buffer Zones

Project

Land off Y Garnedd, Llanfairpwll, Anglesey

Project Number

AQ109517

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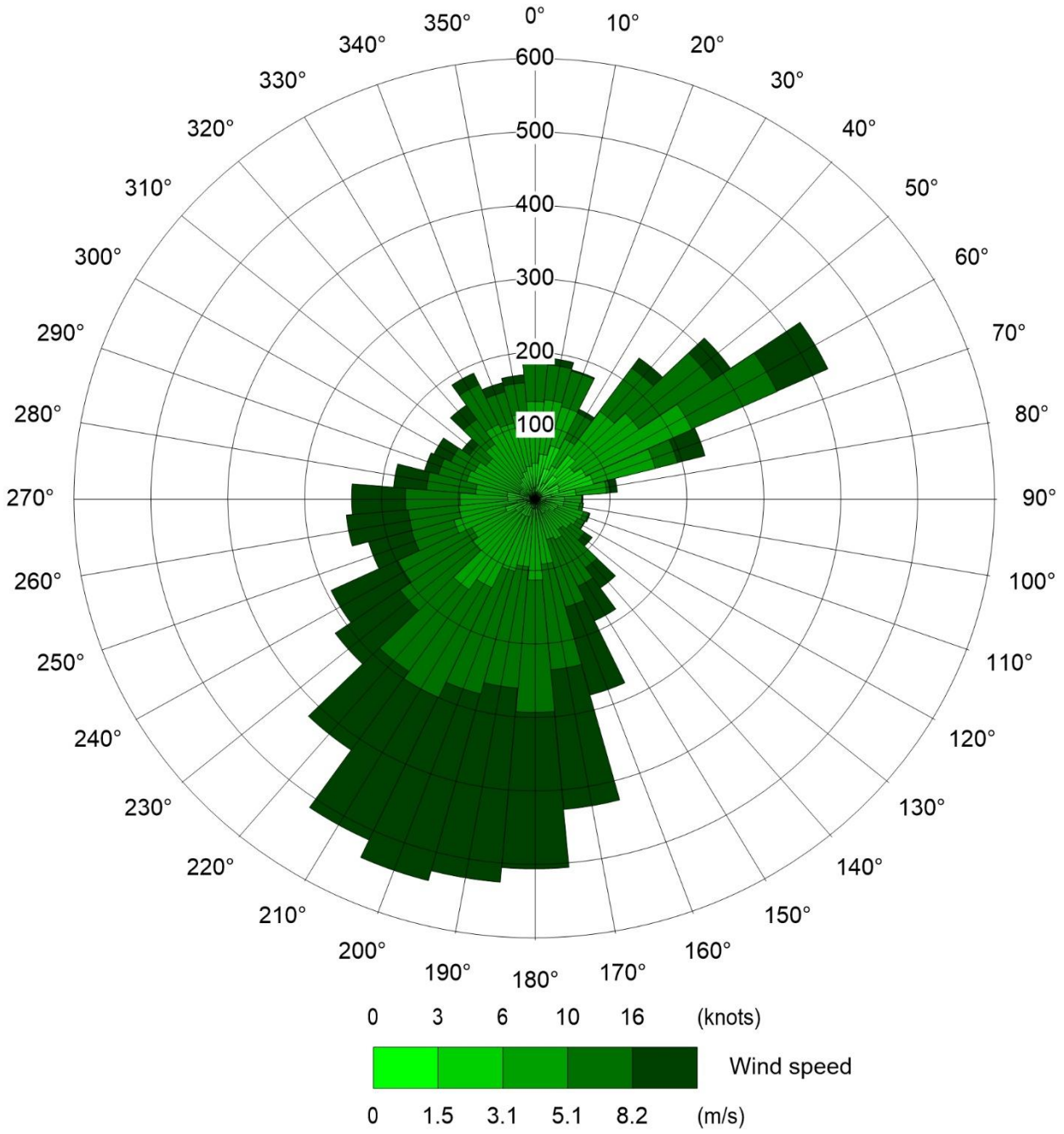

Title

Figure 5

Wind Rose RAF Valley
Meteorological Station 2018

Project

Land off Y Garnedd, Llanfairpwll, Anglesey

Project Number

AQ109517

Client

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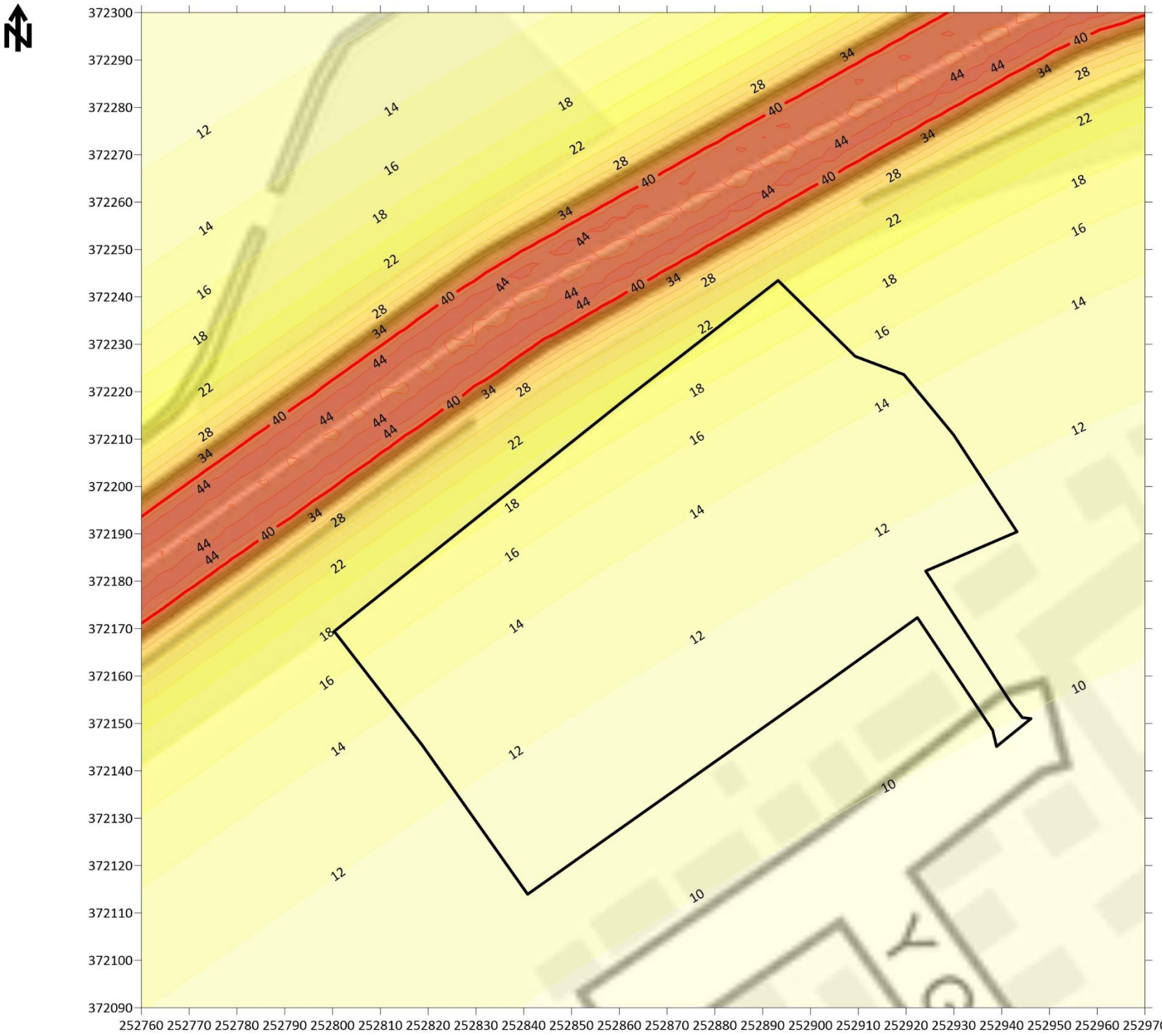

Legend

Site Boundary

48
46
44
42
40
38
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8

Predicted Annual Mean NO_2 Concentration (µg/m^3)

Title

Figure 6

Predicted Annual Mean NO_2 Concentrations (µg/m^3) 2023 DS

Project

Land off Y Garnedd, Llanfairpwll, Anglesey

Project Number

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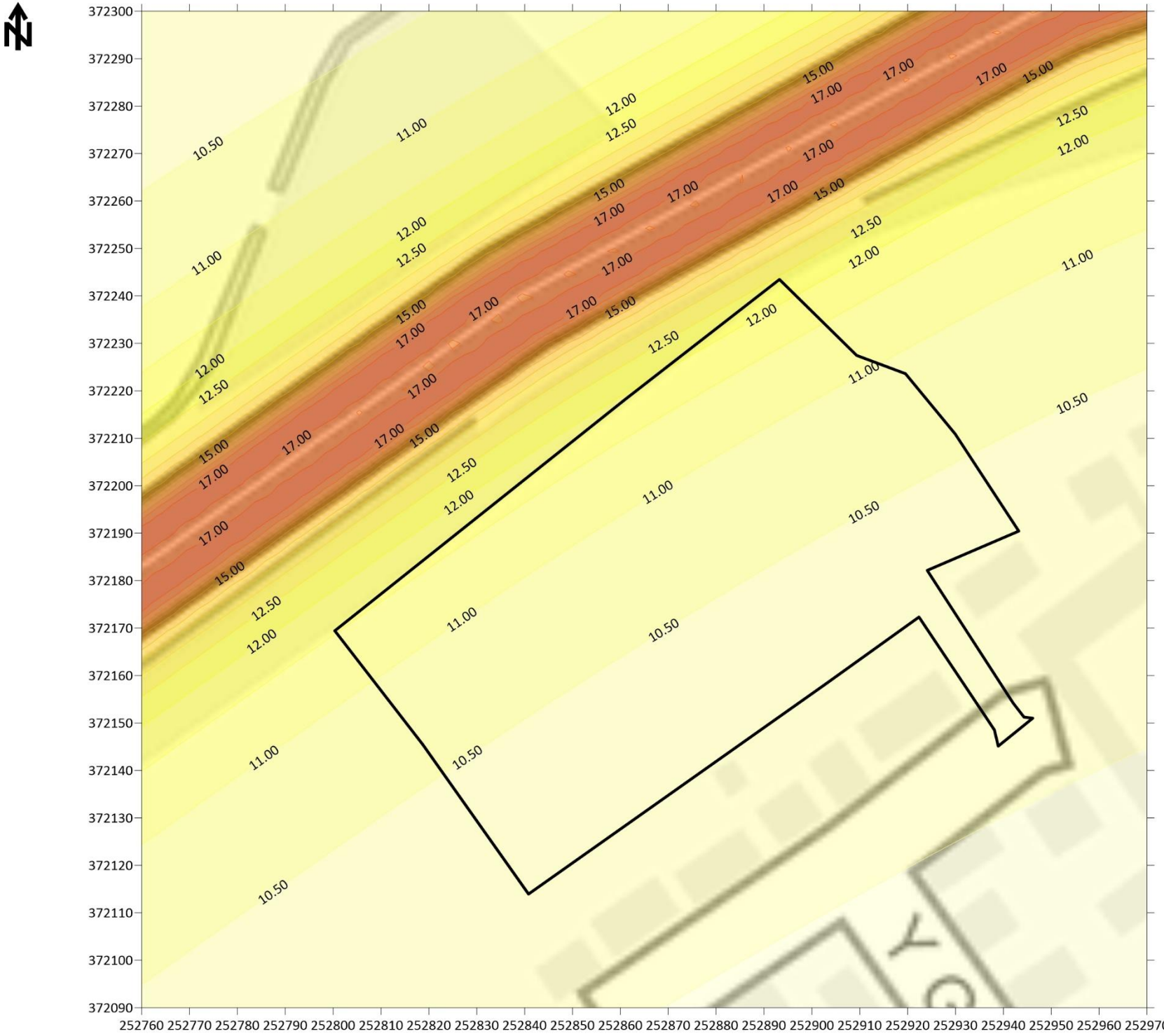

Title

Figure 7

Predicted Annual Mean PM_{10} Concentrations (µg/m³) 2023 DS

Project

Land off Y Garnedd, Llanfairpwll, Anglesey

Project Number

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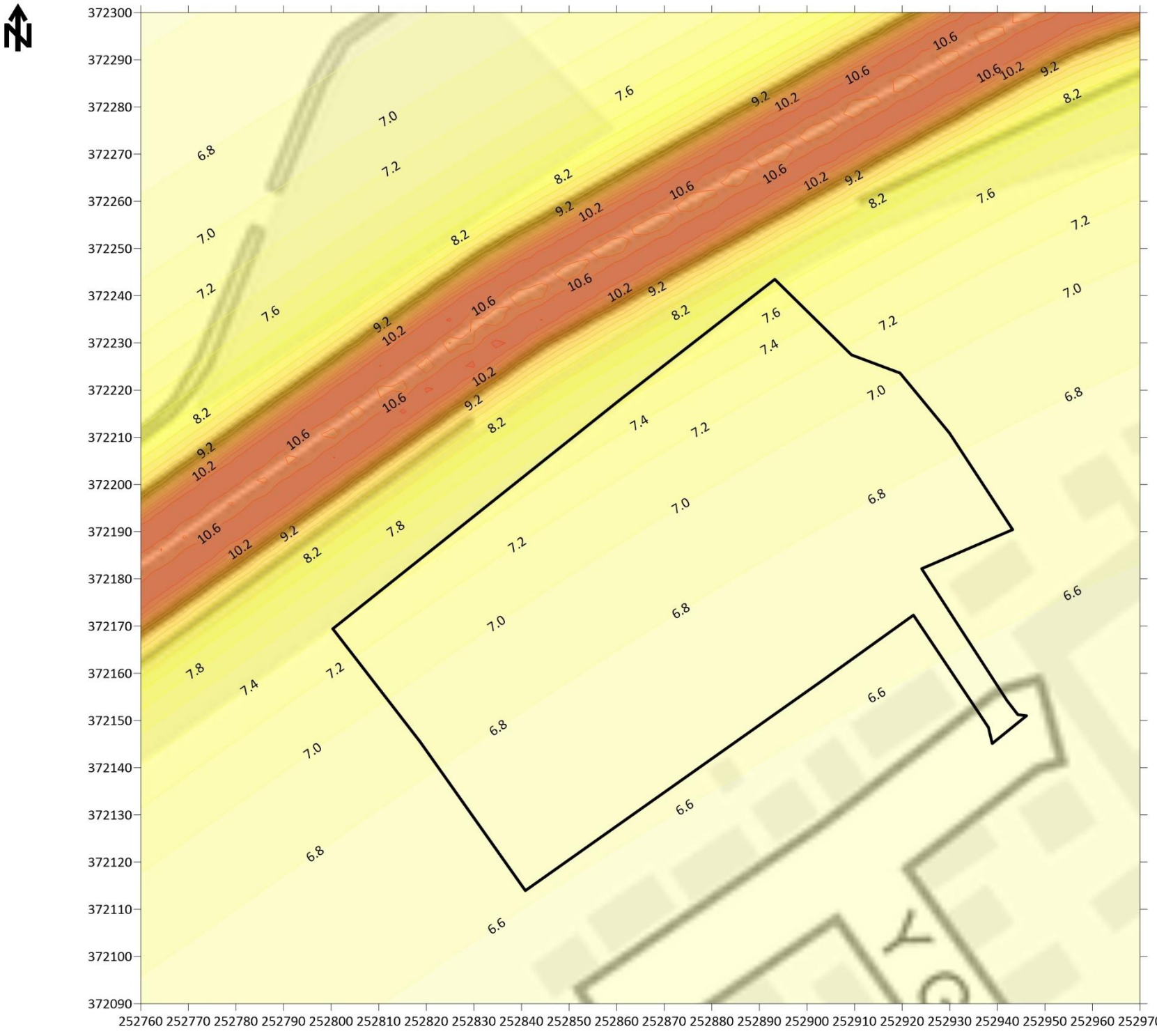

Legend

Site Boundary

11.4
11.0
10.6
10.2
9.8
9.4
9.0
8.6
8.2
7.8
7.4
7.0
6.6
6.2

Predicted Annual Mean $PM_{2.5}$ Concentration (µg/m³)

Title

Figure 8

Predicted Annual Mean $PM_{2.5}$ Concentrations (µg/m³) 2023 DS

Project

Land off Y Garnedd, Llanfairpwll, Anglesey

Project Number

AQ109517

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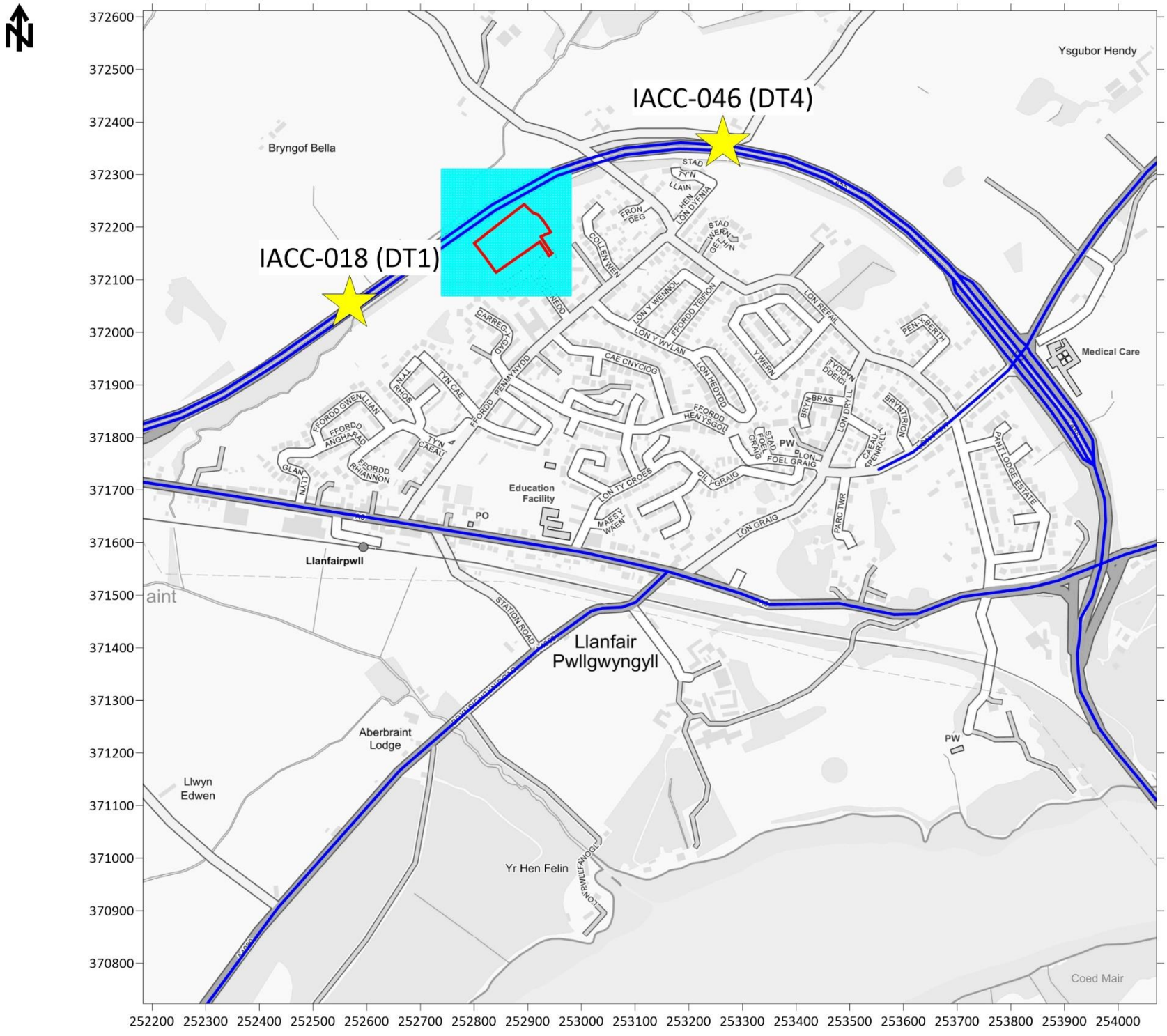

Legend

- Site Boundary
- Modelled Road Link
- Cartesian Grid
- Diffusion Tube Monitoring

Title

Figure 9

ADMS-Roads Input

Project

Land off Y Garnedd, Llanfairpwll, Anglesey

Project Number

AQ109517

Client

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APPENDIX II – ASSESSMENT INPUTS

8.0 ASSESSMENT INPUTS

The Proposed Development has the potential to introduce future site users to poor air quality. Dispersion modelling using ADMS Roads was therefore undertaken to predict NO_2 and PM_{10} concentrations across the site to consider site suitability for the proposed end-use.

The assessment was undertaken in accordance with the guidance contained within the DEFRA document LAQM (TG16)[3] and the EPUK and IAQM guidance[5].

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 5.0). ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

The model requires input data that details the following parameters:

- Assessment area;
- Traffic flow data;
- Vehicle emission factors;
- Spatial co-ordinates of emissions;
- Street width;
- Meteorological data;
- Roughness length; and
- Monin-Obukhov length.

Assessment Area

Ambient concentrations were predicted over the Proposed Development site and surrounding highway network. One Cartesian grid was included in the model over the area at approximately NGR: 252740, 372070 at height of 1.5m to represent the proposed ground floor level for the 2023 opening year scenario.

Results were subsequently used to produce contour plots within the Surfer software package. Reference should be made to Figure 9 within Appendix I for a graphical representation of the verification inputs and operation phase DS extents, respectively.

Traffic Flow Data

Development flows traffic data and its network distribution was provided by SCP Transport, the appointed Transport Consultants for the scheme, and indicated that a total flow generation of 135 AADT is anticipated as a result of the Purposed Development.

Baseline traffic data for all road links used in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition, was obtained from the Department for Transport (DfT). The Dft Matrix web tool enables the user to view and download traffic flows on every link of the A-road and motorway network in Great Britain for the years 1999 to 2018.

It should be noted that the DfT matrix is referenced in DEFRA guidance LAQM (TG16)[3] as being a suitable source of data for air quality assessments and is therefore considered to provide a reasonable representation of traffic flows in the vicinity of the site.

Growth factors provided by the Trip End Model Presentation Program (TEMPRO) software package were utilised to allow for conversion from the obtained 2018 traffic flow to 2023 which was used to represent the opening year scenario.

Vehicle speeds were estimated based on the peak period flow of each link and local speed limits. Sections of the A55 are prone to slow speeds during peak periods of the day. For the purpose of this assessment the A55 were modelled at a speed of 56kph (30mph) to represent the periods of slower peak traffic.

Road widths were estimated from aerial photography and UK highway design standards.

A summary of the traffic data used in the verification scenario is provided in Table AII 1.

Table AII 1: 2018 Verification Traffic Data

Road Link		Road Width (m)	24 Hour AADT Flow	HDV Pop (%)	Mean Vehicle Speed (km/hr)
L1	A55 (South of A5025)	18.0	29,306	7.1	56
L2	A55 Westbound (South of A5025 bridge)	9.0	14,653	7.1	56
L3	A55 Eastbound (North of A5025 bridge)	9.0	14,653	7.1	56
L4	A55 Westbound (North of A5025)	7.2	11,855	7.7	56
L5	A55 Eastbound (North of A5025)	7.4	11,855	7.7	56
L6	A55 Southbound slip on	5.3	2,931	7.1	30
L7	A55 Southbound slip on Speed up	5.8	2,931	7.1	20
L8	A55 Northbound slip off	4.9	2,931	7.1	30
L9	A55 Northbound slip off Slow down	7.4	2,931	7.1	20
L10	A55 Northbound slip on	6.2	2,371	7.7	30
L11	A55 Northbound slip on Speed up	8.8	2,371	7.7	20
L12	A55 Southbound Slip off	4.3	2,371	7.7	30
L13	A55 Southbound slip off Slow down	5.3	2,371	7.7	20
L14	Lon Pant	6.7	9,712	3.4	20
L15	A5025/Lon Pant Bridge	8.0	9,712	3.4	20
L16	A5025	7.3	9,712	3.4	20
L17	A5025	8.0	9,712	3.4	20
L18	A55 (South of A5)	10.1	37,954	6.3	56
L19	A55 Port Britannia Bridge	12.0	37,954	6.3	56
L20	A5	7.0	5,161	2.8	56
L21	A4080	7.0	1,736	4.1	30

Reference should be made to Figure 6 within Appendix I for a graphical representation of the road link locations used within the verification assessment. The road width, canyon height and mean vehicle speed shown in Table AII.1 remained the same for the 2023 scenarios.

In order to consider a robust assessment, a TEMPRO traffic growth factor was applied to the baseline traffic data to obtain traffic flows for the development future opening year, and development traffic added to each relevant road link. A summary of the 2023 traffic data is shown in **Table AII 2**.

Table AII 2: 2023Traffic Data

Road Link		Development Opening Year	
		24 Hr AADT Flow	HDV Prop (%)
L1	A55 (South of A5025)	29,508	7.1
L2	A55 Westbound (South of A5025 bridge)	14,754	7.1
L3	A55 Eastbound (North of A5025 bridge)	14,754	7.1
L4	A55 Westbound (North of A5025)	11,937	7.7
L5	A55 Eastbound (North of A5025)	11,937	7.7
L6	A55 Southbound slip on	2,951	7.1
L7	A55 Southbound slip on Speed up	2,951	7.1
L8	A55 Northbound slip off	2,951	7.1
L9	A55 Northbound slip off Slow down	2,951	7.1
L10	A55 Northbound slip on	2,387	7.7
L11	A55 Northbound slip on Speed up	2,387	7.7
L12	A55 Southbound Slip off	2,387	7.7
L13	A55 Southbound slip off Slow down	2,387	7.7
L14	Lon Pant	9,779	3.4
L15	A5025/Lon Pant Bridge	9,779	3.4
L16	A5025	9,779	3.4
L17	A5025	9,779	3.4
L18	A55 (South of A5)	38,216	6.3
L19	A55 Port Britannia Bridge	38,216	6.3
L20	A5	5,197	2.8
L21	A4080	1,748	4.1

Reference should be made to Figure 6 within Appendix I for a graphical representation of the road link locations used within the operation phase assessment.

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 10.1) released in August 2020, which incorporates updated COPERT 5.3 vehicle emissions factors for NOx and PM and EURO 6 vehicle fleet sub-categories.

There is current uncertainty over NO_2 concentrations within the UK, with roadside levels not reducing as previously expected due to the implementation of new vehicle emission standards. Therefore, 2018 emission factors have been utilised for the prediction of pollution levels for all scenarios in preference to the development opening year in order to provide a robust assessment.

NO_x to NO_2 Conversion

Predicted annual mean NO_x concentrations from the dispersion model were converted to NO_2 concentrations using the NO_x to NO_2 Calculator (v.8.1) provided by DEFRA, which is the method detailed within LAQM (TG16)[3].

Meteorological Data

Meteorological data used in this assessment was taken from RAF Valley meteorological station over the period 1st January 2018 to 31st December 2018 (inclusive). RAF Valley meteorological station is located at approximate NGR: 230500, 375500 which is approximately 22.4km north-west of the Proposed Development. Although there is a relatively large distance between the application site and RAF Valley the use of this data has prior approval from the Environmental Health Department at IoACC and is therefore considered to provide a reasonable representation of conditions at the development site.

All meteorological records used in the assessment were provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 5 within Appendix I for a wind rose of utilised meteorological data.

Roughness Length

The specific roughness length (z_0) values used to represent conditions during the verification process, DS scenario, as well as conditions at the RAF Valley meteorological station are summarised in Table AII 3.

Table AII 3: Utilised Roughness Lengths

Scenario	Roughness Length (m)	ADMS Description
Verification, DS Scenario and RAF Valley Meteorological station	0.3	Agricultural areas (max)

These values of z_0 are considered appropriate for the morphology of the assessment area.

Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the stability of the atmosphere within certain urban or rural contexts. The specific length values used to represent conditions during the verification process, DS scenario, as well as conditions at the Manchester Ringway meteorological station are summarised in Table AII 4

Table AII 4: Utilised Monin-Obukhov Lengths

Scenario	Monin-Obukhov Length (m)	ADMS Description
Verification, DS Scenario and RAF valley Meteorological station	10	Small towns < 50,000

This Monin-Obukhov value is considered appropriate for the morphology of the assessment area.

Background Concentrations

The annual mean NO_2 concentrations detailed in Table 4, was used in the dispersion modelling assessment to represent annual mean pollutant levels at the Proposed Development site and local monitoring sites.

Table AII 5 displays the specific background concentrations as predicted by DEFRA, utilised to represent the condition at the monitoring locations used within the verification process.

Table AII 5: Predicted Background Pollutant Concentrations for Diffusion Tubes

Monitoring Location	DEFRA Grid Square	Pollutant	2018 Predicted Background Concentration (µg/m³)
IACC-018 (DT1)	252500, 372500	NOx	6.77
		NO_2	5.40
IACC-046 (DT4)	253500,372500	NOx	7.89
		NO2	6.26

Similar to emission factors, background concentrations for 2018 were utilised in preference to predicted background concentrations for the development opening year (2023). This provided a robust assessment and is likely to overestimate actual pollutant concentrations during the operation of the proposals.

Verification

The predicted results from a dispersion model may differ from measured concentrations for a large number of reasons, including:

- Estimates of background concentrations;
- Uncertainties in source activity data such as traffic flows and emission factors;
- Variations in meteorological conditions;
- Overall model limitations; and
- Uncertainties associated with monitoring data, including locations.

Model verification is the process by which these and other uncertainties are investigated and where possible minimised. In reality, the differences between modelled and monitored results are likely to be a combination of all of these aspects.

For the purpose of this assessment model verification was undertaken for 2018, using traffic data, meteorological data and monitoring results from this year.

IoACC undertakes periodic monitoring of NO_2 concentrations at 2 roadside monitoring location within the assessment extents suitable for verification purposes. These locations were considered to be most representative of air quality conditions at the development site.

The road contribution to total NO_x concentration was calculated from the monitored NO_2 result for use in the verification process. This was undertaken following the methodology contained within DEFRA guidance LAQM (TG16)[3]. The monitored annual mean NO_2 concentration and calculated road NO_x concentration are summarised in Table AII 6.

Table AII 6: Monitoring Results

Site ID	Monitored Road NO_x Concentration (µg/m³)	Modelled Road NO_x Concentration (µg/m³)	% Difference ((Monitored Modelled)/Monitored)) * 100
IACC-018 (DT1)	59.56	16.66	72
IACC-046 (DT4)	63.78	12.09	81

The monitored and modelled NO_x road contribution concentrations were graphed and the equation of the trend line based on the linear progression through zero was calculated, as shown in Graph 1. This indicated that a verification factor of **4.1621** was required to be applied to all NO_x modelling results, showing the model overestimated pollutant concentrations throughout the assessment extents.

Graph 1 - Verification Adjustment Factor

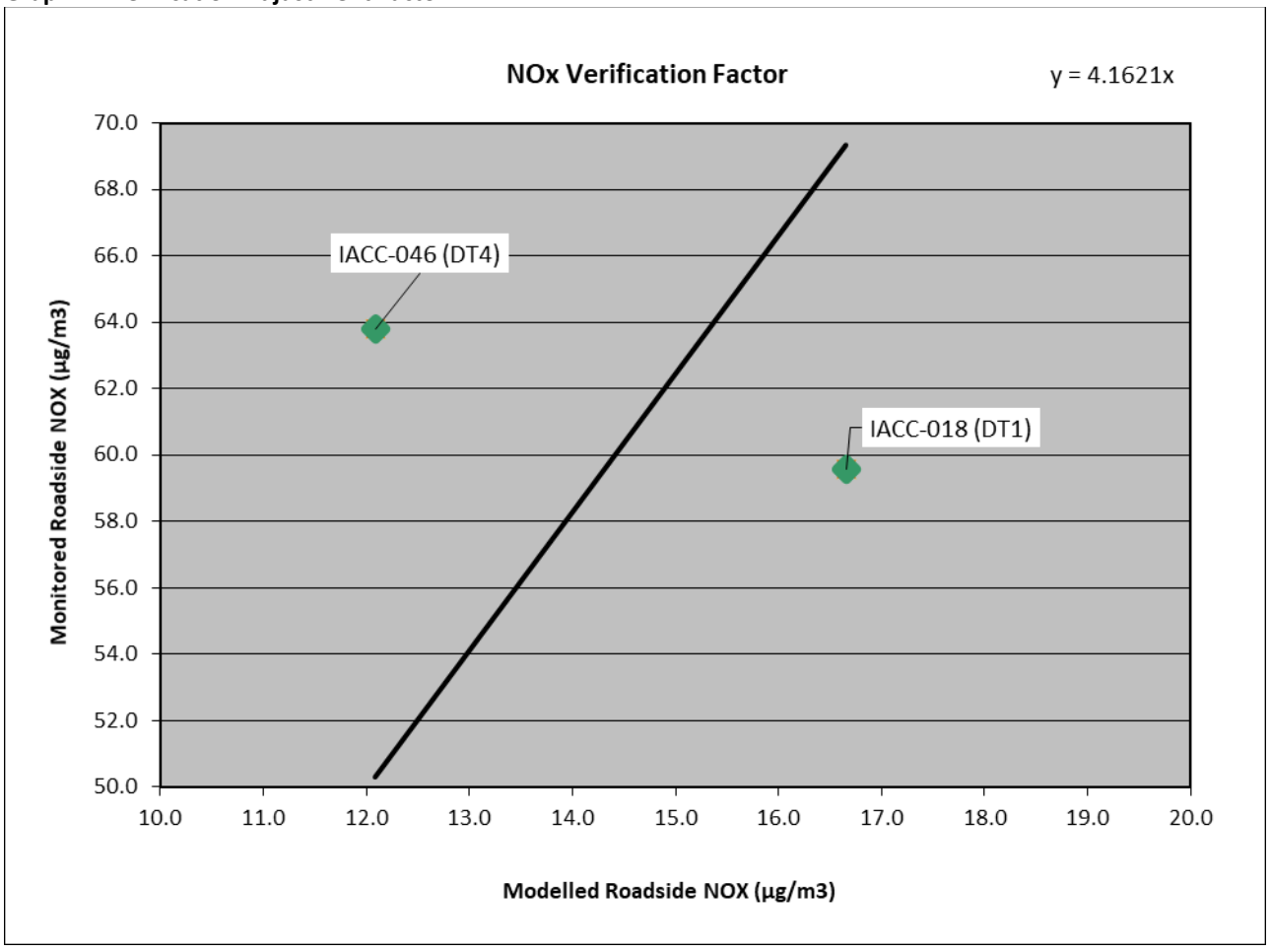

Table AII 7 presents the monitored annual mean NO_2 concentrations and the adjusted modelled total NO_2 concentration based on the above verification factor.

Table AII 7: Modelled Concentrations

Site ID	Monitored Road NO_2 Concentration (µg/m³)	Adjusted Modelled Road NO_2 Concentration (µg/m³)	% Difference ((Monitored Modelled)/Monitored)) * 100
IACC-018 (DT1)	35.30	39.53	-12
IACC-046 (DT4)	37.90	31.92	16

As PM monitoring is not undertaken within the assessment extents, the NO_x adjustment factor of **4.1621** was utilised to adjust model predictions of PM in accordance with the guidance provided within LAQM (TG16)[2].

APPENDIX III – CONSTRUCTION PHASE ASSESSMENT CRITERIA

CONSTRUCTION PHASE METHODOLOGY

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction'[9].

Activities on the proposed construction site have been divided into three types to reflect their different potential impacts. These are:

- Earthworks;
- Construction; and
- Trackout.

The potential for dust emissions was assessed for each activity that is likely to take place and considered three separate dust effects:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to a significant increase in exposure to PM_{10} and $PM_{2.5}$.

The assessment steps are detailed below.

Step 1

Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 350m from the site boundary or 50m from the construction vehicle route up to 500m from the site entrance, then the assessment should proceed to Step 2. Additionally, should ecological receptors be identified within 50m of the boundary site or 50m from the construction vehicle route up to 500m from the site entrance, then the assessment should also proceed to Step 2.

Should sensitive receptors not be present within the relevant distances then negligible impacts would be expected and further assessment is not necessary.

Step 2

Step 2 assesses the risk of potential dust impacts. A site is allocated to a risk category based on two factors:

- The scale and nature of the works, which determines the magnitude of dust arising as: small, medium or large (Step 2A); and
- The sensitivity of the area to dust impacts, which can be defined as low, medium or high sensitivity (Step 2B).

The two factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied.
Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table AIII.1.

9 Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, 2016.

Table AIII.1: Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	Earthworks	• Total site area greater than 10,000m^2 • Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • More than 10 heavy earth moving vehicles active at any one time • Formation of bunds greater than 8m in height • More than 100,000 tonnes of material moved
	Construction	• Total building volume greater than 100,000m^3 • On site concrete batching • Sandblasting
	Trackout	• More than 50 Heavy Duty Vehicle (HDV) trips per day • Potentially dusty surface material (e.g. high clay content) • Unpaved road length greater than 100m
Medium	Earthworks	• Total site area 2,500m^2 to 10,000m^2 • Moderately dusty soil type (e.g. silt) • 5 to 10 heavy earth moving vehicles active at any one time • Formation of bunds 4m to 8m in height • Total material moved 20,000 tonnes to 100,000 tonnes
	Construction	• Total building volume 25,000m^3 to 100,000m^3 • Potentially dusty construction material (e.g. concrete) • On site concrete batching
	Trackout	• 10 to 50 HDV trips per day • Moderately dusty surface material (e.g. high clay content) • Unpaved road length 50m to 100m
Small	Earthworks	• Total site area less than 2,500m^2 • Soil type with large grain size (e.g. sand) • Less than 5 heavy earth moving vehicles active at any one time • Formation of bunds less than 4m in height • Total material moved less than 20,000 tonnes • Earthworks during wetter months
	Construction	• Total building volume less than 25,000m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	• <10 HDV (3.5t) outward movements in any one day • Surface material with low potential for dust release • Unpaved road length <50m

Step 2B defines the sensitivity of the area around the development site for construction, earthworks and trackout. The factors influencing the sensitivity of the area are shown in Table AIII.2.

Table AIII.2: Examples of Factors Defining Sensitivity of an Area

Sensitivity	Examples	
	Human Receptors	**Ecological Receptors**
High	• Users expect of high levels of amenity • High aesthetic or value property • People expected to be present continuously for extended periods of time • Locations where members of the public are exposed over a time period relevant to the AQO for PM_{10} e.g. residential properties, hospitals, schools and residential care homes	• Internationally or nationally designated site e.g. Special Area of Conservation
Medium	• Users would expect to enjoy a reasonable level of amenity • Aesthetics or value of their property could be diminished by soiling • People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work	• Nationally designated site e.g. Sites of Special Scientific Interest
Low	• Enjoyment of amenity would not reasonably be expected • Property would not be expected to be diminished in appearance • Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, playing fields, farmland, footpaths, short term car park and roads	• Locally designated site e.g. Local Nature Reserve

The guidance also provides the following factors to consider when determining the sensitivity of an area to potential dust impacts during the construction phase:

- Any history of dust generating activities in the area;
- The likelihood of concurrent dust generating activity on nearby sites;
- Any pre-existing screening between the source and the receptors;
- Any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which works will take place;
    - Any conclusions drawn from local topography;
    - Duration of the potential impact, as a receptor may become more sensitive over time; and
    - Any known specific receptor sensitivities which go beyond the classifications given in the document.

These factors were considered in the undertaking of this assessment.

The sensitivity of the area to dust soiling effects on people and property is shown in Table AIII.3.

Table AIII.3: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	**Less than 50**	**Less than 100**	**Less than 350**
High	More than 100	High	High	Medium	Low
	10 - 100	High	Medium	Low	Low
	1 - 10	Medium	Low	Low	Low

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 350
Medium	More than 1	Medium	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

Table AIII.4 outlines the sensitivity of the area to human health impacts.

Table AIII.4: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the Source (m)				
			Less than 20	Less than 50	Less than 100	Less than 200	Less than 350
High	Greater than 32µg/m^3	More than 100	High	High	High	Medium	Low
		10 - 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28 - 32µg/m^3	More than 100	High	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 - 28µg/m^3	More than 100	High	Medium	Low	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	Less than 24µg/m^3	More than 100	Medium	Low	Low	Low	Low
		10 - 100	Low	Low	Low	Low	Low
	Less than 24µg/m^3	More than 100	Medium	Low	Low	Low	Low
		10 - 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	Greater than 32µg/m^3	More than 10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	28 - 32µg/m^3	More than 10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	24 - 28µg/m^3	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	Less than 24µg/m^3	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	-	More than 1	Low	Low	Low	Low	Low

Table AIII.5 outlines the sensitivity of the area to ecological impacts.

Table AIII.5: Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	Less than 20	Less than 50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Step 2C combines the dust emission magnitude with the sensitivity of the area to determine the risk of unmitigated impacts.

Table AIII.6 outlines the risk category from earthworks and construction activities.

Table AIII.6: Dust Risk Category from Earthworks and Construction

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

Table AIII.8 outlines the risk category from trackout.

Table AIII.7: Dust Risk Category from Trackout

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Low	Negligible
Low	Low	Low	Negligible

Step 3

Step 3 requires the identification of site-specific mitigation measures within the IAQM guidance to reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with negligible risk mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

Step 4

Once the risk of dust impacts has been determined and the appropriate mitigation measures identified, the final step is to determine the significance of any residual impacts. For almost all construction activity, the aim should be to control effects through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'.

APPENDIX IV – ASSESSOR' S CURRICULUM VITAE

CONAL KEARNEY
Head of Noise and Air Quality
BEng(Hons), MSc, MIAQM, MIEnvSc

KEY EXPERIENCE

Conal is Head of Noise and Air with specialist experience in the air quality and odour sector. His key capabilities include:

- Representing clients at public inquiries and planning hearings as an expert witness.
- Advanced atmospheric air dispersion modelling of road vehicle and industrial emissions using ADMS and AIRVIRO.
- Preparation of factual and interpretative Air Quality Assessments and Environmental Statement chapters for proposed developments in accordance with UK Government, Environment Agency and Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) methodologies.
- Management and delivery of project work on key, land development and urban regeneration projects.
- Assessment of dust impacts from construction sites to the Institute of Air Quality Management (IAQM) methodology.
- Dust and Odour impact assessments from minerals and waste sites
- Management of Environmental Permit Applications primarily for the Medium Combustion Plant Directive (MCDP)

SELECT PROJECTS SUMMARY

Industrial Developments

- Land at Mossdown Road, Oldham – energy from waste incinerator. Industrial and road impacts on air quality dust and odour.
- Messingham Quarry, North Lincolnshire - AQA and dust impacts for proposed new sand extraction site.
- Arden Quarry, Derbyshire - AQA for proposed mineral extraction and site restoration
- Granta Park, Oxfordshire. Assessment of VOC fume emissions.
- University of Birmingham. Permit application for CHP scheme.
- Arbroath Road, Carnoustie. Odour and AQA for biogas CHP scheme.
- Brenda Road, Hartlepool – Dispersion modelling to inform stack design for biogas AD facility environmental permit.

Highways Developments

- Alderley Edge Bypass, Cheshire - AQA for major new road scheme.
- South Heywood – EIA for new link road and mixed use joint development

Residential and Mixed-Use Developments

- Orchard Close, Knaresborough. AQA and public inquiry evidence.
- Friars School, Southwark, London. School development for mixed use education and residential building in AQMA.
- Fairoaks Garden Village – ES chapter and input for major mixed use development
- Westcraig, Edinburgh - EIA chapter and input for major residential development
- Manor Place, London. Road and energy generation dispersion emissions assessment
- Craven Park, London. Mitigation statement and planning hearing expert opinion

Public Sector

- Technical advisor on Manchester Airport Consultative Committee - advise members on environmental technical matters in relation to the airport's operations.
- Cheshire County Council - compile AQ chapters for Local Transport Plan
- Cheshire East Council - specialist AQ advice on highways, minerals and waste projects

Local Air Quality Management

- Broughton Gyratory, Chester - dispersion model for City Centre detailed assessment report
- Congleton town centre - dispersion modelling assessment for detailed and further assessment reports.
- Disley - dispersion modelling assessment for detailed and further assessments
- Holmes Chapel - dispersion modelling assessment for detailed and further assessment reports for road and rail sources.
- Crewe - town centre dispersion modelling for detailed and further assessment reports.

Expert Witness

- Abacus School, Hamstead – air quality expert witness at planning public inquiry
- North Street, Stilton – air quality and noise expert witness for residential development at planning hearing.
- Nesscliffe Crematorium– air quality and noise expert witness for residential development at planning hearing.
- Queensway, Lytham St Annes. Dust and odour assessment for development. Public Inquiry expert witness
- Paxton Academy, Croydon – Planning hearing air quality expert witness for proposed new school

QUALIFICATIONS

- Bachelor of Engineering
- Master of Science
- Odour Acuity Certified Master of Science
- Member of the Institute of Air Quality Management
- Member of the Institute of Environmental Science