



# Highmoor Lane, Cleckheaton

## Air Quality Assessment

*For Thirteen Group*

---

Date      *20 May 2025*

Doc ref    *29177-HYD-XX-ZZ-RP-Y-2001\_P05*

# Document control sheet

Issued by	Hydrock Consultants Limited Merchants House North Wapping Road Bristol BS1 4RW United Kingdom	T +44 (0)117 9459225 E bristolcentral@hydrock.com hydrock.com
Client	Thirteen Group	
Project name	Highmoor Lane, Cleckheaton	
Title	Air Quality Assessment	
Doc ref	29177-HYD-XX-ZZ-RP-Y-2001_P05	
Project number	29177	
Status	S4	
Date	20/05/2025	

Document production record		
Issue number	P05	Name
Prepared by	SM / LM	
Checked by	LM	
Approved by	LM	

Document revision record			
Issue number	Status	Date	Revision details
P01	S3	21/08/2024	Draft Issue for Comment
P02	S3	27/08/2024	Draft Issue for Comment
P03	S4	10/01/2025	Final – updated Masterplan only
P04	S4	16/04/2025	Final – updated Masterplan only
P05	S4	20/05/2025	Final – updated Masterplan only

Hydrock Consultants Limited has prepared this report in accordance with the instructions of the above named client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

# Contents

<b>1.</b>	<b>Introduction.....</b>	<b>1</b>
1.1	<i>Proposed Development.....</i>	1
1.2	<i>Purpose of Air Quality Assessment.....</i>	2
<b>2.</b>	<b>Relevant Legislation.....</b>	<b>3</b>
2.1	<i>Air Quality Regulations and Objectives.....</i>	3
2.2	<i>Local Air Quality Management.....</i>	5
2.3	<i>National Planning Policy Framework.....</i>	5
2.4	<i>Planning Practice Guidance.....</i>	6
2.5	<i>Local Planning Policy.....</i>	6
<b>3.</b>	<b>Methodology.....</b>	<b>8</b>
3.1	<i>Consultation.....</i>	8
3.2	<i>Guidance.....</i>	8
3.3	<i>Development Classification.....</i>	8
3.4	<i>Baseline Air Quality.....</i>	10
3.5	<i>Construction Phase Assessment.....</i>	11
3.6	<i>Operational Phase Assessment.....</i>	11
3.7	<i>Comparison with AQALs.....</i>	18
3.8	<i>Assessment of Significance.....</i>	18
3.9	<i>Model Limitations.....</i>	18
<b>4.</b>	<b>Baseline Air Quality Conditions.....</b>	<b>20</b>
4.1	<i>Local Air Quality Management.....</i>	20
4.2	<i>Local Emission Sources.....</i>	20
4.3	<i>Defra Mapped Concentrations.....</i>	20
4.4	<i>Air Quality Monitoring Data.....</i>	21
<b>5.</b>	<b>Construction Phase Assessment.....</b>	<b>24</b>
5.1	<i>Overview.....</i>	24
5.2	<i>Potential Dust Emission Magnitude.....</i>	24
5.3	<i>Sensitivity of Area.....</i>	25
5.4	<i>Risk of Impacts.....</i>	27
<b>6.</b>	<b>Operational Phase Assessment.....</b>	<b>28</b>
6.1	<i>Exposure Assessment.....</i>	28
6.2	<i>Significance of Air Quality Exposure.....</i>	30
<b>7.</b>	<b>Mitigation Measures.....</b>	<b>31</b>
7.1	<i>Construction Phase.....</i>	31
7.2	<i>Operational Phase.....</i>	31

## 8. Discussion and Conclusion ..... 32

### Tables

Table 1: National Air Quality Objectives .....	3
Table 2: Summary of where AQALs should apply.....	4
Table 3: WYLES Criteria for Medium Development.....	9
Table 4: EPUK & IAQM Assessment Criteria.....	11
Table 5: Receptor Locations.....	16
Table 6: Defra Mapped Background Concentrations.....	20
Table 7: Passive Diffusion Tube Monitoring Concentrations.....	22
Table 8: Dust Emission Magnitude Summary.....	25
Table 9: Sensitivity of Local Area.....	27
Table 10: Risk of Adverse Impacts During Construction Phase.....	27
Table 11: Modelled Annual Mean NO <sub>2</sub> Concentrations.....	28
Table 12: Modelled PM <sub>10</sub> Concentrations.....	29
Table 13: Modelled Annual Mean PM <sub>2.5</sub> Concentrations.....	30
Table 14: Traffic Data.....	33
Table 15: 2022 Modelled and Monitored Concentrations Before Adjustment.....	35
Table 16: Post-adjusted 2022 Modelled and monitored results.....	36
Table 17: 2022 Background Concentrations.....	38

### Figures

Figure 1: Site Location .....	1
Figure 2: Proposed Site Layout.....	2
Figure 3: WYLES Air Quality Assessment Process (Source: WYLES guidance).....	9
Figure 4: Links Modelled.....	14
Figure 5: Diurnal traffic profile included in the dispersion model.....	15
Figure 6: Receptor Locations.....	17
Figure 7: Defra Modelled PCM Roadside NO <sub>2</sub> Concentrations(2022).....	21
Figure 8: Local Authority Monitoring.....	22
Figure 9: Construction Phase Receptors.....	26
Figure 10: Annual Mean NO <sub>2</sub> Concentrations.....	29
Figure 11: Wind rose Bingley No.2 Meteorological Station (2022).....	34
Figure 12: Model Adjustment Factor.....	36
Figure 13: Post-adjusted Monitored vs Modelled NO <sub>2</sub> .....	37

### Appendices

<i>Appendix A</i>	<i>Traffic Data</i>
<i>Appendix B</i>	<i>Windrose</i>
<i>Appendix C</i>	<i>Model Verification</i>
<i>Appendix D</i>	<i>Background Concentrations</i>
<i>Appendix E</i>	<i>Construction Dust Mitigation</i>

## 1. Introduction

Hydrock have been commissioned by Thirteen Group to prepare an Air Quality Assessment (AQA) to support the planning application for proposed residential development and associated infrastructure (the 'Proposed Development'), on land at Highmoor Lane, Cleckheaton (The 'Site'). The Site is located south of Highmoor Lane and east of the M62 and is approximately 2km south west of Cleckheaton town centre, within the administrative boundary of Kirklees Council (KC).

The Site is centred on the National Grid Reference (NGR); x417075, y424652 and shown below in Figure 1.



Figure 1: Site Location

### 1.1 Proposed Development

The proposals seek planning permission for a residential development comprising 40 No. dwellings. The Proposed Site Layout<sup>1</sup> is shown below in Figure 2:

<sup>1</sup> IDP Architecture Masterplanning Urban Design, "Proposed Site Layout", Project No: N81:3165 drawing number 1002, revision P2, dated 27/3/2024



## 2. Relevant Legislation

### 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 England, these include legally binding limit values originally set by the European Union (EU) Directive 2008/50/EC<sup>2</sup> on ambient air quality and cleaner air for Europe; and regulations implementing national air quality objectives as set out in the revised 2023 Air Quality Strategy for England (AQS)<sup>3</sup> which local authorities are required to work towards achieving. In Northern Ireland and Scotland, the AQS (Volume 1)<sup>4</sup> remains in force.

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)<sup>5</sup> and amended (SI 2016 No.1184)<sup>6</sup> ;
- » The Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 (SI 2019 74)<sup>7</sup> ;
- » The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 (SI 2020 1313)<sup>8</sup> amend the Air Quality Regulations (SI 2010 No.1001) to account for EU withdrawal; and
- » The AQS objectives are implemented in the Air Quality (England) Regulations 2000 (SI 2000/928)<sup>9</sup> and Air Quality (England) (Amendment) Regulations 2002 (SI 2002/3043)<sup>10</sup>.

The 2023 AQS sets out the government's policies and framework for improving air quality in England with the aim of meeting the requirements of above legislation. The Air Quality Strategy 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). The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023<sup>11</sup> also brought forward a new target level for PM<sub>2.5</sub>. Those relevant to this assessment is provided below, in Table 1.

Table 1: National Air Quality Objectives

Pollutant	Averaging Period	AQALs	
NO <sub>2</sub>	1 Hour Mean	200µg/m <sup>3</sup>	Not to be exceeded more than 18 times in a year.
	Annual Mean	40µg/m <sup>3</sup>	

<sup>2</sup> Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe Available at: <https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A32008L0050>

<sup>3</sup> Defra. "The Air Quality Strategy for England, Scotland, Wales and Northern Ireland". Available at: <https://www.gov.uk/government/publications/the-air-quality-strategy-for-england>

<sup>4</sup> The air quality strategy for England, Scotland, Wales and Northern Ireland: Volume 1, Available at:

<https://www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-1>

<sup>5</sup> The National Archives. "The Air Quality Standards Regulations 2010". Available at:

<http://www.legislation.gov.uk/uksi/2010/1001/contents/made>

<sup>6</sup> The National Archives (2016). "The Air Quality Standards (Amendment) Regulations 2016". Available at:

<https://www.legislation.gov.uk/uksi/2016/1184/contents/made>

<sup>7</sup> 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>

<sup>8</sup> The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 (legislation.gov.uk). Available at:

<https://www.legislation.gov.uk/uksi/2020/1313/contents/made>

<sup>9</sup> The National Archives. "The Air Quality (England) Regulations 2000". Available at:

<http://www.legislation.gov.uk/uksi/2000/928/contents/made>

<sup>10</sup> The National Archives. "The Air Quality (England) (Amended) Regulations 2002". Available at:

<http://www.legislation.gov.uk/uksi/2002/3043/contents>

<sup>11</sup> <https://www.legislation.gov.uk/uksi/2023/96/contents/made>

Pollutant	Averaging Period	AQALs	
PM <sub>10</sub>	24 Hour Mean	50µg/m <sup>3</sup>	Not to be exceeded more than 35 times in a year.
	Annual Mean	40µg/m <sup>3</sup>	
PM <sub>2.5</sub>	Annual Mean	20µg/m <sup>3</sup>	
	Annual Mean Concentration Target (AMCT)	10µg/m <sup>3</sup>	To be met across England by 2040
	-	Population Exposure Reduction Target (PERT)	35% reduction in population exposure by 2040 (compared to a base year of 2018).

It should be noted that, based on latest guidance from the Defra policy team, the PM<sub>2.5</sub> AMCT of 10µg/m<sup>3</sup> is not currently applicable at sensitive receptors, and is not yet integrated into the planning system. Therefore, this assessment compares against the AQAL of 20 µg/m<sup>3</sup> for PM<sub>2.5</sub>.

Defra's Local Air Quality Management Technical Guidance 2022 (LAQM.TG(22))<sup>12</sup> 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.	<ul style="list-style-type: none"> <li>Building facades of offices or other places of work where members of the public do not have regular access.</li> <li>Hotels, unless people live there as their permanent residence.</li> <li>Gardens of residential properties.</li> <li>Kerbside sites (as opposed to other locations at the building façade) or any other location where public exposure is expected to be short term.</li> </ul>
24 Hour Mean and 8 Hour Mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties	<ul style="list-style-type: none"> <li>Kerbside sites (as opposed to other locations at the building façade) or any other location where public exposure is expected to be short term.</li> </ul>

<sup>12</sup> 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:
<p><b>1 Hour Mean</b></p>	<p>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.</p> <p>Any outdoor locations where members of the public might reasonably expect to spend one hour or longer.</p>	<p>Kerbside sites where the public would not be expected to have regular access.</p>
<p><b>15 Minute Mean</b></p>	<p>All locations where member of the public might reasonably be exposed for a period of 15 minutes</p>	

## 2.2 Local Air Quality Management

Obligations under the Environment Act 2021<sup>13</sup> (which provides an amendment to the Environment Act 1995<sup>14</sup>) 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.

KC's declared AQMAs are discussed in Section 4.1. KC prepared an AQAP<sup>15</sup> in September 2019 which provides measures to reduce air pollution in key locations. The measures include those relating to congestion and accessibility, promoting active and health lifestyles and building great neighbourhoods.

## 2.3 National Planning Policy Framework

The National Planning Policy Framework (NPPF)<sup>16</sup> sets out the Government's planning policy for England. It requires planning decisions for any new development to prevent new and existing development from contributing to, or being put at risk from, unacceptable levels of air pollution (paragraph 180). It also states that planning decisions should sustain and contribute towards compliance with relevant limit values or national objectives for air pollutants, taking into account the presence of (AQMAs and Clean Air Zones (CAZ)'s (paragraph 192), and the cumulative impacts from other sites (paragraph 191).

<sup>13</sup> <https://bills.parliament.uk/bills/2593/publications>

<sup>14</sup> Environment Agency, "Environment Act 1995" (The Environment Agency, 2002), <http://www.legislation.gov.uk/ukpga/1995/25/contents>.

<sup>15</sup> <https://www.kirklees.gov.uk/beta/crime-and-safety/pdf/air-quality-action-plan.pdf>

<sup>16</sup> Department for Levelling Up, Housing & Communities. National Planning Policy Framework (December, 2023). [online] Available: [https://assets.publishing.service.gov.uk/media/65829e99fc07f3000d8d4529/NPPF\\_December\\_2023.pdf](https://assets.publishing.service.gov.uk/media/65829e99fc07f3000d8d4529/NPPF_December_2023.pdf)

Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. Furthermore, planning decisions should ensure that any new development in AQMAs and CAZs is consistent with the local air quality action plan.

Also, to help reduce congestion and emissions, to improve air quality and public health, significant development should be focused on locations which are / can be made sustainable through limiting the need to travel (paragraph 109).

## 2.4 Planning Practice Guidance

Reference ID 32 (Air Quality) of the National Planning Practice Guidance (NPPG)<sup>17</sup>, which was updated in November 2019, provides guiding principles on how planning can take account of the impact of new development on air quality. The NPPG summarises the importance of air quality in planning and the key legislation relating to it.

## 2.5 Local Planning Policy

The Kirklees Local Plan was adopted on 27 February 2019. It comprises the strategy and policies document<sup>18</sup>, and the allocations and designations document<sup>19</sup>. These have been reviewed for relevant policies, which are given below.

Air Quality is mainly dealt with through Policy LP51, which states:

*"Policy LP51 Protection and improvement of local air quality*

- 1. Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air pollution which would have an unacceptable impact on the natural and built environment or to people.*
- 2. Proposals that have the potential to increase local air pollution either individually or cumulatively must be accompanied by evidence to show that the impact of the development has been assessed in accordance with the relevant guidance. Development which has the potential to cause levels of local air pollution to increase must incorporate sustainable mitigation measures that reduce the level of this impact. If sustainable measures cannot be introduced the development will not be permitted.*
- 3. Where the development introduces new receptors into Air Quality Management Areas or Areas of Concern or near other areas of relatively poor air quality, for example near roads or junctions, the development must incorporate sustainable mitigation measures that protect the new receptors from unacceptable levels of air pollution. Where sustainable mitigation measures cannot be introduced which prevent receptors from being exposed to unsafe levels of air pollution, development will not be permitted."*

Other policies that have reference to air quality include:

*"Policy LP15 Residential use in town centres*

*Proposals for residential uses (including student accommodation) within the defined town centres as set out on the Policies Map will be supported subject to:*

<sup>17</sup> Ministry of Housing, Communities & Local Government, "Reference ID (32) Air Quality" (Ministry of Housing, Communities & Local Government, 2019), <https://www.gov.uk/guidance/air-quality--3>.

<sup>18</sup> <https://www.kirklees.gov.uk/beta/planning-policy/pdf/local-plan-strategy-and-policies.pdf>

<sup>19</sup> <https://www.kirklees.gov.uk/beta/planning-policy/pdf/local-plan-allocations-and-designations.pdf>

[...]

*the protection of the amenity of existing residents and future occupiers of the proposed residential use in accordance with amenity and design policies within the plan, and will in particular consider matters such as privacy, noise and air quality;"*

*"Policy LP20 Sustainable travel*

[...]

*The council will support demand management measures which discourage single occupancy car travel within new development and encourage the use of low emission vehicles to improve areas with low levels of air quality."*

*"Policy LP21 Highways and access*

*All proposals shall:*

[...]

*c. be accompanied by a supporting Transport Assessment or Transport Statement where the development would generate significant trip generation, providing detail as to the impact on highway safety, air quality, noise and light restrictions;"*

*"Policy LP47 Healthy, active and safe lifestyles*

[...]

*Healthy, active and safe lifestyles will be enabled by:*

[...]

*g. ensuring that the current air quality in the district is monitored and maintained and, where required, appropriate mitigation measures included as part of new development proposals; h. creating high-quality and inclusive environments incorporating active design and the creation of safe, accessible and green environments which minimise and mitigate against potential harm from risks such as pollution and other environmental hazards;"*

The Site also falls within part of Allocation Site HS102 within the KC allocations and designations document. This states that "Odour source near site - nearby industry" is a constant and that an AQA is a required planning report.

### 3. Methodology

#### 3.1 Consultation

Full details of the AQA approach were sent via email to KC Environmental Health team in July 2024 with a request for further comment / guidance. The following response was received on 5<sup>th</sup> July 2024:

*"Thank you for your enquiry.*

*I've reviewed your e-mail and agree with the methodology and approach for the impending Air Quality Assessment for the above development.*

*Our concern is that future residents are not exposed to poor air quality due to the adjacent M62 motorway, and the cumulative impact of other committed developments in the area.*

*Please contact me if you require any further information."*

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 Air Quality Assessment:

- » Defra's LAQM.TG(22)<sup>12</sup>;
- » EPUK & IAQM Land-use Planning & Development Control: Planning for Air Quality<sup>20</sup>;
- » The IAQM's guidance on assessing impacts from construction<sup>21</sup>; and
- » Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites<sup>22</sup>.

The West Yorkshire Low Emissions Strategy (WYLES) has been developed through collaboration between the West Yorkshire local authorities. Part of this WYLES is the Air Quality and Emission Technical Planning Guidance<sup>23</sup> ("the WYLES Guidance"), which has been followed in undertaking this AQA.

#### 3.3 Development Classification

The WYLES guidance provides guidance on the Development Proposal Air Quality Assessment process. The three-step process of 'Development Classification', 'Impacts Assessment' and 'Mitigation and Compensation' is shown in Figure 3 below.

---

<sup>20</sup> 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>.

<sup>21</sup> 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>.

<sup>22</sup> 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>.

<sup>23</sup> <https://www.kirklees.gov.uk/beta/crime-and-safety/pdf/WYLES-air-quality-and-emissions-planning-technical-guide.pdf>

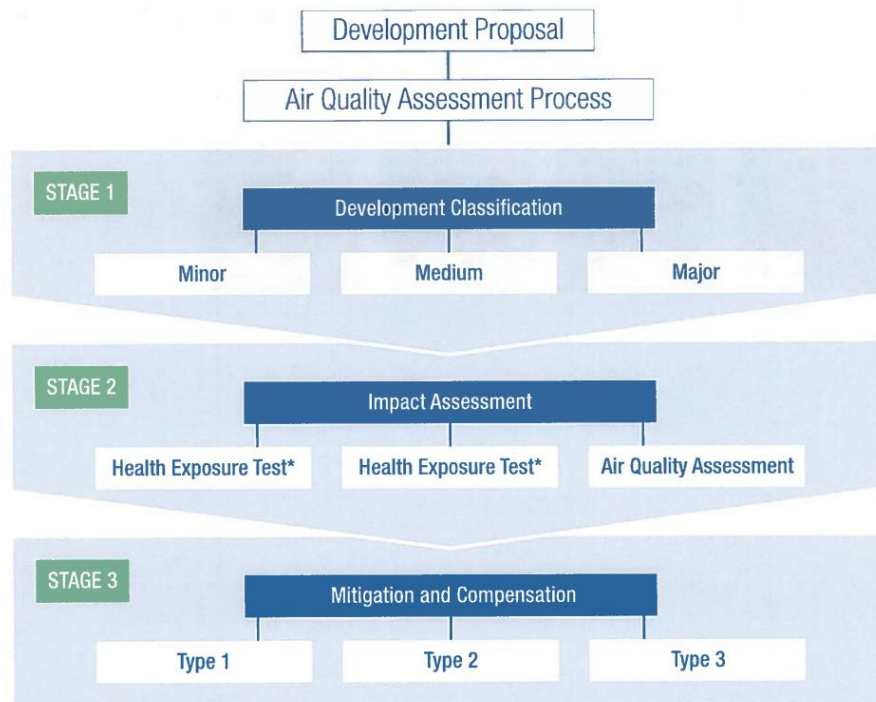


Figure 3: WYLES Air Quality Assessment Process (Source: WYLES guidance)

The WYLES guidance provides detailed criteria for development classification as either 'Small', 'Medium' or 'Major'. The relevant criteria for classifying the Proposed Development have been extracted from the WYLES guidance and are shown below for reference.

Table 3: WYLES Criteria for Medium Development

Land Use	Description	Criteria
<b>Dwelling Houses (C3)</b>	Dwellings for individuals, families or not more than six people in a single household.	>50 units

Other:

1. Any development generating 30 or more two-way vehicle movements in any hour
2. Any developments generating 100 or more two-way vehicle movements per day
3. Any development proposing 100 or more parking spaces
4. Any relevant development proposed in a location where the local transport infrastructure is inadequate
5. Any relevant development proposed in a location adjacent to an Air Quality Management Area (AQMA)

There are also additional WYLES trigger criteria to determine a 'Major' development, which are:

- » Where the Proposed Development falls within the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011 and includes air quality and/or transport as a specific likely impact;
- » Proposals located within an AQMA;
- » Proposals that could increase the existing traffic flow on roads of > 10,000 Annual Average Daily Traffic (AADT) by 5% or more;
- » Proposals that increase traffic 5% on road canyons with >5,000 AADT;

- » Proposals that could introduce or significantly alter congestion and includes the introduction of substantial road infrastructure changes;
- » Proposals that reduce average speeds by more than 10kph;
- » Proposals that include additional HGV movements by more than 10% of total trips; and,
- » Where significant demolition and construction works are proposed.

The proposed number of dwellings is less than the WYLES criteria for a medium development. However, the anticipated traffic generation from the Proposed Development, provided by Hydrock (the appointed transport consultants), is 201 Annual Average Daily Traffic (AADT). This is above the criteria in Table 3 of:

*"Any developments generating 100 or more two-way vehicle movements per day."*

Therefore, the Proposed Development has been classified as a 'Medium Development' in line with the WYLES guidance. This classification has been agreed with KC Environmental Health team<sup>24</sup>.

Therefore, an assessment of impacts is not required, however, the Proposed Development has also been scoped against EPUK & IAQM guidance in Section 3.6.1.

As the Site is adjacent to the M62, and as agreed with KC Environmental Health, an exposure assessment using ADMS-Urban, has been undertaken. Details of this are provided in Section 3.6.

### 3.4 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)<sup>25</sup>, Environment Agency (EA)<sup>26</sup> and Defra's Pollutant Release and Transfer Register (PRTR) data<sup>27</sup>;
- » Defra's modelled background concentrations of AQS pollutants (UK-AIR)<sup>28</sup>. These estimates are produced using detailed modelling tools and are available as concentrations at central 1km<sup>2</sup> National Grid square locations across the UK. Mapped background concentrations have been obtained based upon the 2018 base year Defra update (August 2020 publication);
- » Defra's predicted roadside concentrations of NO<sub>2</sub> produced from their pollution climate model (PCM)<sup>29</sup>;
- » Multi Agency Geographic Information for the Countryside (MAGIC)<sup>30</sup>, which incorporates Natural England's interactive maps and;
- » KC's latest available air quality monitoring data, derived from the latest available air quality annual status report published in 2023<sup>31</sup>.

<sup>24</sup> It was agreed that the Proposed Development would be 'Medium' as a worst-case, as traffic generation was not available during consultation.

<sup>25</sup> National Atmospheric Emissions Inventory, UK Emissions Interactive Map (beis.gov.uk).

<sup>26</sup> <https://data.gov.uk/dataset/cfd94301-a2f2-48a2-9915-e477ca6d8b7e/pollution-inventory>

<sup>27</sup> UK Pollutant Release and Transfer Register (PRTR) <https://prtr.defra.gov.uk/map-search>

<sup>28</sup> UK-AIR, "Background Mapping Data for Local Authorities - 2018," n.d., <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>.

<sup>29</sup> [https://uk-air.defra.gov.uk/data/modelled-data?base\\_year=2022](https://uk-air.defra.gov.uk/data/modelled-data?base_year=2022)

<sup>30</sup> <https://magic.defra.gov.uk/MagicMap.aspx>

<sup>31</sup> Kirklees Council, "2023 Air Quality Annual Status Report", June 2023, <https://www.kirklees.gov.uk/beta/crime-and-safety/pdf/kirklees-annual-status-report-2023.pdf>

## 3.5 Construction Phase Assessment

### 3.5.1 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<sub>10</sub> 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, or within 50m of any routes used by construction vehicles on the public highway, up to 500m from the Site entrance. MAGIC website<sup>30</sup> has been reviewed to identify whether any statutory ecological sensitive receptors present in the area. No receptors were identified within 50m of the Site boundary or expected 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<sub>10</sub>. 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.

### 3.5.2 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 traffic criteria outlined in Table 4.

## 3.6 Operational Phase Assessment

### 3.6.1 Scope of Impact Assessment

The Proposed Development is classified as 'Medium' in line with the WYLES guidance. However, to be robust, scoping has also been undertaken against the EPUK & IAQM guidance below.

The scope of assessment has been determined against the EPUK and IAQM's two stage checklist criteria<sup>20</sup>. 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 4 which identifies whether a detailed assessment of potential air quality impacts is required.

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. The relevant checklist criteria shown in Table 4 identifies whether a detailed assessment of potential air quality impacts is required.

Table 4: 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	A change of LDV flows of:

Criteria	The Development Will:	Indicative Criteria to Proceed to a Detailed AQA:
	with relevant receptors. (LDV - cars and small vans <3.5t gross vehicle weight)	<ul style="list-style-type: none"> <li>» more than 100 AADT within or adjacent to an AQMA</li> <li>» more than 500 AADT elsewhere</li> </ul>
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).	<p>A change of HDV flows of:</p> <ul style="list-style-type: none"> <li>» more than 25 AADT within or adjacent to an AQMA</li> <li>» more than 100 AADT elsewhere.</li> </ul>
3	<p>Have one of more substantial combustion processes, where there is a risk of impacts at relevant receptors.</p> <p>NB. This includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.</p>	<p>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.</p> <p>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.</p> <p>Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.</p>

As the Site is located outside of an AQMA, with the closest AQMA more than 2km away (see Section 4.1 for more details) the less stringent criteria apply. The transport consultants on the scheme, Hydrock, have confirmed the Proposed Development is anticipated to generate vehicle trips of 201 AADT at the Site access. This is below the thresholds for outside of an AQMA in Table 4. Hydrock (The transport consultants) have also advised the traffic generated (of 201 AADT) would disperse onto the local road network at the four-arm signalised junction to the immediate east of the Site as described below:

- » A649 Halifax Road (Northwest): 97 two-way trips;
- » A643 Moorside: 38 two-way trips; and,
- » A649 Halifax Road (Southeast): 65 two-way trips.

Therefore, the traffic generation would also not trigger the more stringent thresholds in of inside an AQMA in Table 4.

There are no substantial combustions sources associated with the Proposed Development or situated within the locale, as such impacts from these sources are not discussed further. Emissions criteria to avoid significant impacts for any proposed gas boilers are detailed in Section 7.2.1.

Based on the above, a detailed assessment of air quality impacts from scheme-generated traffic has been scoped out, in accordance with EPUK & IAQM guidance. According to the methodology outlined below is for assessing the exposure of future receptors at the Site only.

### 3.6.2 ADMS-Urban Dispersion Model

A detailed AQA has been undertaken using the air dispersion model ADMS-Urban v5.1 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.

### 3.6.3 Assessment Scenarios

The following scenarios have been modelled:

- » Baseline/verification 2022; and,
- » 2028 Do Something (2028 DS) – 2028 traffic flows + Proposed Development traffic.

Whilst Proposed Development generated traffic is minimal and does not require direct assessment, it has been added to the 2028 DS scenario to ensure a conservative assessment. Further details are in Appendix A.

### 3.6.4 Model Inputs

#### 3.6.4.1 Traffic Data

The traffic data comprises of AADT flows for 2022. These have been sourced from the DfT's matrix data, also known as the DfT Road Traffic Statistics website<sup>32</sup>. A TEMPro factor of 1.0404 was applied to the 2022 data, which accounts for local growth up to the anticipated opening year of 2028. By applying TEMPro growth factors, the opening year analysis includes an allowance for potential future growth in baseline traffic levels to take account of the likely effects of nearby committed developments, as confirmed by the Transport consultants, Hydrock. The modelled road links are shown in Figure 4 below, with full details provided in Appendix A.

---

<sup>32</sup> <https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints>



Figure 4: Links Modelled

For each road link, vehicle speeds were obtained from the speed limit for each road derived from the OpenStreet Browser v4.10<sup>33</sup>, which has been used as a proxy for average speeds on the network. 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 also used to assist with determining appropriate slow down speeds across the study area.

#### 3.6.4.2 Emission Factors

Emission rates for NO<sub>x</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> used for the dispersion modelling assessment were calculated from the Emissions Factor Toolkit (EFT)(v.12).

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 “England (rural)” and “England (motorway)”.

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. However, there is some uncertainty over the accuracy of the future predictions.

<sup>33</sup> [https://www.openstreetbrowser.org/#map=15/53.7033/-1.2698&categories=car\\_maxspeed](https://www.openstreetbrowser.org/#map=15/53.7033/-1.2698&categories=car_maxspeed)

### 3.6.4.3 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: 2022<sup>34</sup>, 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 England. Figure 5 shows the diurnal traffic profile included in the model.

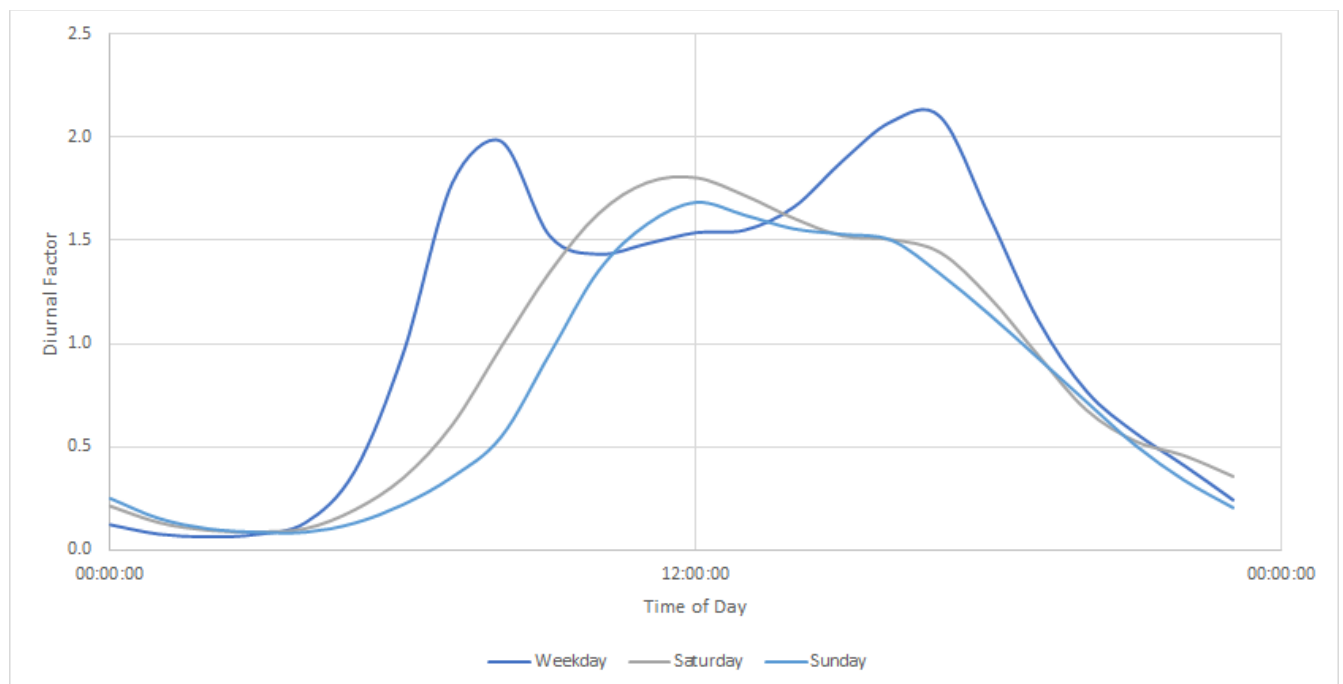


Figure 5: Diurnal traffic profile included in the dispersion model

### 3.6.4.4 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 2022 data from Bingley No.2 meteorological station. This site is located approximately 13km north-west of the Proposed Development. It is also the closest and most relevant meteorological station that records all of the parameters necessary for dispersion modelling. Missing data from the 2022 data was infilled from Emley Moor No.2 Meteorological station to improve data capture. A wind rose is presented in Appendix B.

### 3.6.4.5 Surface Characteristics

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

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

<sup>34</sup> DfT, "Average Annual Daily Flow and Temporal Traffic Distributions (TRA03) - Statistical Data Sets - GOV.UK," 2015, <https://www.gov.uk/government/statistical-data-sets/tra03-motor-vehicle-flow>.

- » Met site surface roughness = 0.1m (ADMS pre-set 'root crop');

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

- » Dispersion site = 30m (ADMS pre-set 'cities and large towns');
- » Met site = 10m (small towns <10,000).

### 3.6.5 Receptors Included in the Dispersion Model

#### 3.6.5.1 Human Receptors

Sensitive receptor locations included in the dispersion model are shown below in Figure 6 and Table 5. These are worst-case locations within the Site based upon their proximity to the local road network.

Table 5: Receptor Locations

Receptor ID	Location	NGR		Z (m)
		X	Y	
R1	Site boundary	417015	424706	1.5
R2	Site boundary	416997	424668	1.5
R3	Site boundary	416987	424626	1.5
R4	Site boundary	416977	424586	1.5
R5	Site boundary	417080	424684	1.5

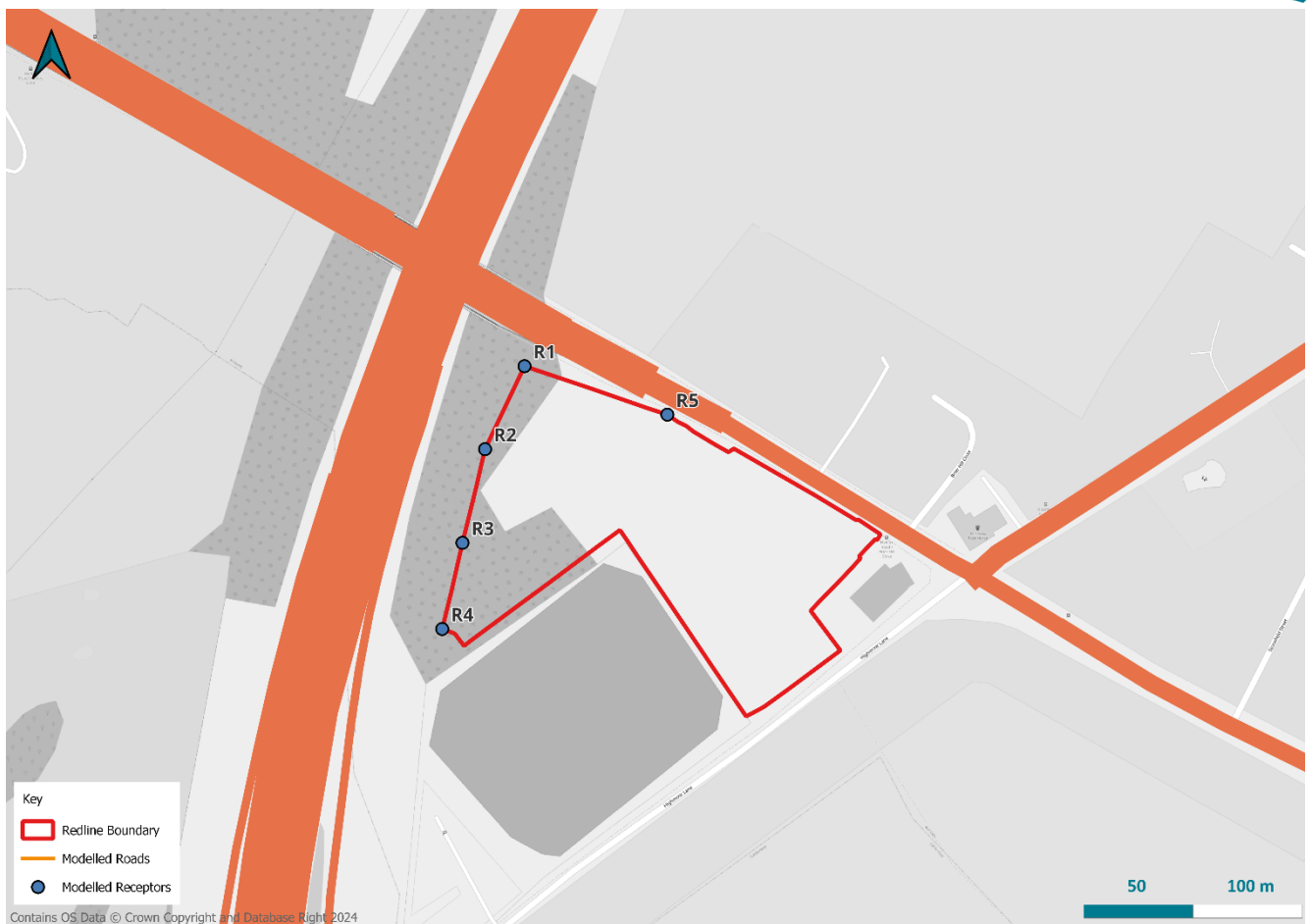


Figure 6: Receptor Locations

In addition to the above, to capture the dispersion of pollutants across the Site, a grid of receptors has been modelled at 1.5m height across the Site. The grid consists of 36 by 36 receptors originating at co-ordinates x416921, y424448 with a spacing of approximately 10m between grid points.

### 3.6.6 Model Verification

A verification study has been undertaken in accordance with LAQM.TG(22) using Calderdale Metropolitan Borough Council (CMBC) monitoring data. An adjustment factor of **3.19** was applied to modelled road NO<sub>x</sub> concentrations.

Due to insufficient PM monitoring in the study area, the modelled road-PM<sub>10</sub> and road-PM<sub>2.5</sub> components have been adjusted by the NO<sub>x</sub> 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<sub>10</sub> and PM<sub>2.5</sub> 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 a post-adjusted RMSE of **2.8µg/m<sup>3</sup>**, which equates to **7.0%** of the annual mean AQAL for NO<sub>2</sub> and is therefore considered to be acceptable.

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

### 3.6.7 NO<sub>x</sub> to NO<sub>2</sub> Conversion

Ambient NO<sub>x</sub> concentrations have been predicted through dispersion modelling. Annual NO<sub>x</sub> concentrations have been converted using Defra's NO<sub>x</sub> to NO<sub>2</sub> conversion tool<sup>35</sup> version 8.1.

## 3.7 Comparison with AQALs

### 3.7.1 Nitrogen Dioxide

Annual mean road NO<sub>x</sub> predicted by the model was converted to annual mean NO<sub>2</sub> using the Defra NO<sub>x</sub> to NO<sub>2</sub> calculator<sup>35</sup>. To determine short term (1 hour mean) concentrations, reference was made to LAQM.TG(22)<sup>32</sup>, which states if annual mean concentrations of NO<sub>2</sub> do not exceed 60µg/m<sup>3</sup>, it is unlikely hourly mean concentrations would exceed the relevant AQAL, which allows for 18 exceedances of the hourly standard (200µg/m<sup>3</sup>) in a calendar year.

### 3.7.2 Particulate Matter

To determine total annual mean concentrations of PM<sub>10</sub> and PM<sub>2.5</sub>, the modelled road contribution was added to the background concentration to give the total concentration for comparison with the AQALs.

Annual mean PM<sub>10</sub> concentrations were used to derive the potential number of exceedances of the 24-hour mean PM<sub>10</sub> 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/m<sup>3</sup> and the annual mean concentration. This relationship is described in Equation 1 below:

Equation 1 - Calculation of PM<sub>10</sub> 24-hour Mean Exceedances

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

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

## 3.8 Assessment of Significance

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;
- » 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).

## 3.9 Model Limitations

There are inherent uncertainties associated with the model (ADMS Urban) used in this assessment, including the 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, a precautionary principle has been undertaken in the assessment, whereby background pollutant concentrations held at 2022 (no future improvements assumed from the model verification year). Note that the IAQM's position statement on Dealing with Uncertainty in Vehicle NO<sub>x</sub> Emissions within Air Quality Assessments<sup>36</sup> states that "*an exclusively*

<sup>35</sup> Defra, "NO<sub>x</sub> to NO<sub>2</sub> Calculator" (Defra, 2019), <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOXNO2calc>.

<sup>36</sup> IAQM, "Dealing with Uncertainty in Vehicle NO<sub>x</sub> Emissions within Air Quality Assessments- WITHDRAWN", July 2018.

*vehicle emissions-based sensitivity test is no longer necessary".* Based on this, the 2028 EFT year has been used and is considered appropriate.

The above assumptions ensure a conservative approach has been considered in the assessment.

## 4. Baseline Air Quality Conditions

### 4.1 Local Air Quality Management

KC have 10 declared AQMAs. The closest of these AQMAs is Kirklees AQMA declared in 2008 for exceedances of the NO<sub>2</sub> annual mean AQAL, located approximately 6km to the south of the Site. However, the closest AQMA to the Site is the Calderdale AQMA No.6 (Brighouse) located approximately 2.5km to the south west within the administrative area of Calderdale Council (CC).

Based on the distance of the Site from declared AQMAs, they are not considered further in this assessment.

### 4.2 Local Emission Sources

The main source of air pollution in the surrounding Site locale are vehicles using the local road network, predominantly the M62 located approximately 30m to the west of the Site, and the A649 (Halifax Road) located to the north of the Site.

A review of the NAEI<sup>25</sup>, EA<sup>26</sup> and Defra's PRTR<sup>27</sup> 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<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> were downloaded for the grid squares containing the Site.

Background pollutant concentrations for 2019 (the pre-covid base year), 2022 (the post covid base year), 2024 (the assessment year), and 2028 (the anticipated opening year of the Proposed Development) are displayed in Table 6.

Table 6: Defra Mapped Background Concentrations

Pollutant	AQAL (µg/m <sup>3</sup> )	Annual Mean Concentration (µg/m <sup>3</sup> )			
		2019	2022	2024	2028
NO <sub>2</sub>	40	17.5	15.1	13.4	12.0
PM <sub>10</sub>	40	13.3	12.8	12.6	12.4
PM <sub>2.5</sub>	20	8.8	8.4	8.2	8.1

The data show that annual mean background concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> 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 2022 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<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> backgrounds were derived from this data shown above. Noting that this is a conservative background to choose.

To avoid double counting of potential source contributions already contained within the ADMS-Roads dispersion model, 'Motorways in', 'Primary A Road in' and 'Trunk Road in' was removed from each grid square.

As the relationship between NO<sub>2</sub> and NO<sub>x</sub> is not linear, the NO<sub>2</sub> Adjustment for NO<sub>x</sub> Sector Removal Tool<sup>37</sup> has been used – in accordance with LAQM.TG(22).

Adjusted 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<sub>2</sub>, which are used in reporting national compliance with limit values. The modelling data has been reviewed from the 2022 compliance assessment.

The 2022 roadside annual mean NO<sub>2</sub> concentrations are projected to be 15.1-18.1µg/m<sup>3</sup> on the roads nearest to the Site that have been modelled (Halifax Road and Moorside Road) and are therefore below the annual mean AQAL. Roadside concentrations are predicted to decline incrementally year on year.



Figure 7: Defra Modelled PCM Roadside NO<sub>2</sub> Concentrations(2022)

## 4.4 Air Quality Monitoring Data

### 4.4.1 Automatic Monitoring

The UK Automatic Urban and Rural Network (AURN) is a countrywide network of air quality monitoring stations operated on behalf of the Defra. Monitoring data for AURN sites is available from the UK Air website<sup>38</sup>.

<sup>37</sup> Defra NO<sub>2</sub> Adjustment for NO<sub>x</sub> Sector Removal Tool version 7.0 (2018), available at <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxsector>.

<sup>38</sup> Automatic Urban and Rural Network (AURN) - Defra, UK

There are not AURN stations within 5km of the Site, and therefore data from this source is not considered further in this assessment.

KC undertakes continuous air quality monitoring at locations within the Council's area. The closest of these continuous air quality monitors to the Site is over 3km south of the Site, and therefore data from these automatic monitoring stations is not considered further in this assessment.

#### 4.4.2 Passive Monitoring

Passive NO<sub>2</sub> diffusion tube monitoring is currently undertaken by KC at numerous locations throughout the Council's area as part of their commitment to LAQM. The closest tubes to the Site, within approximately 2.5km, are shown in Figure 8 and the data presented in Table 7.

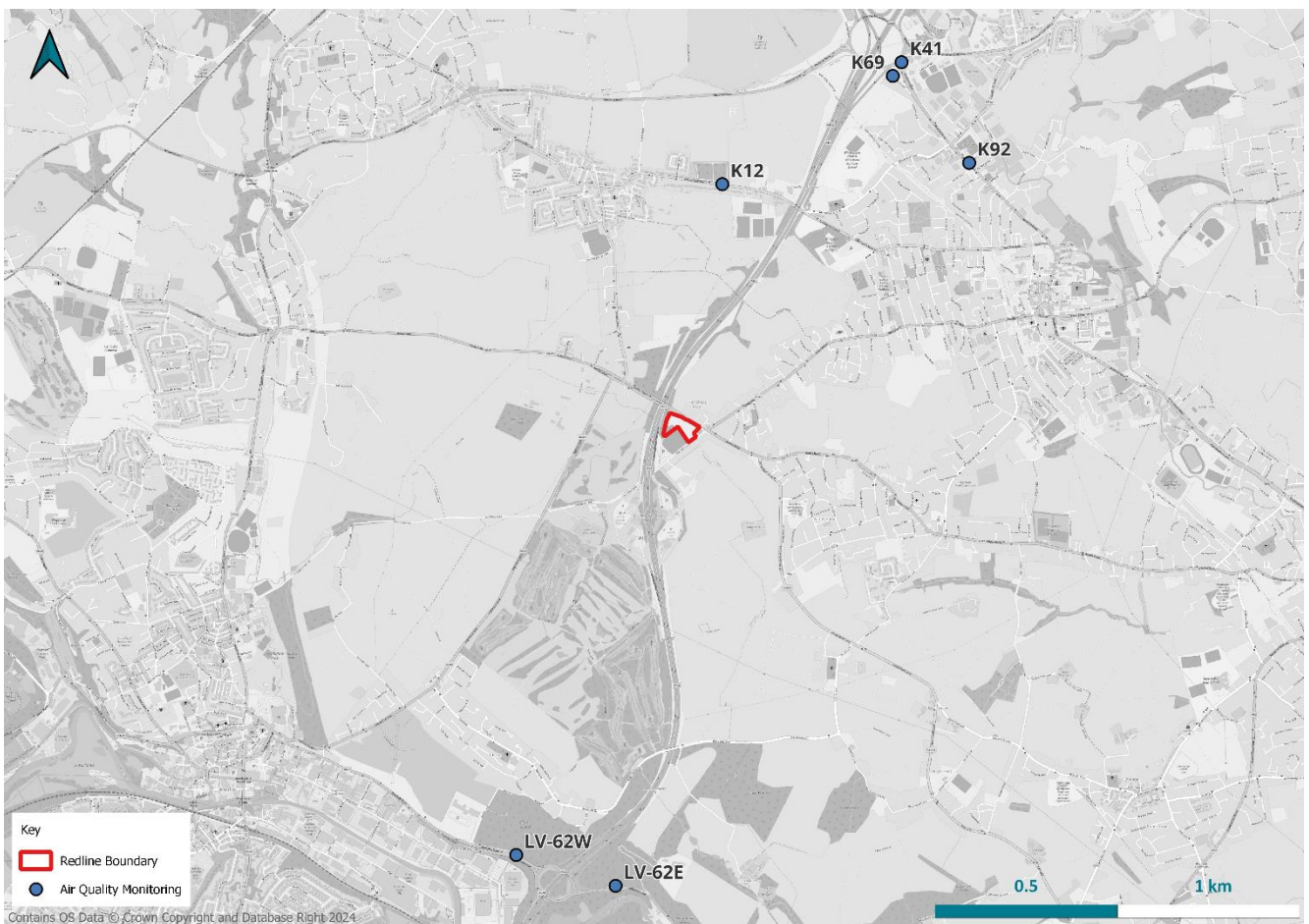


Figure 8: Local Authority Monitoring

Table 7: Passive Diffusion Tube Monitoring Concentrations

Site ID	Council	Site Type	X (m)	Y (m)	Distance from Site (km)	Annual Mean NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )				
						2018	2019	2020	2021	2022
K12	KC	Kerbside	417302	425961	1.3	-	-	-	-	16.4
K41	KC	Roadside	418285	426630	2.3	36.4	34.0	26.7	32.0	28.8
K69	KC	Roadside	418237	426555	2.2	35.3	28.4	21.1	24.6	24.3
K92	KC	Roadside	418656	426078	2.1	-	-	-	21.1	24.0
LV-62E	CMBC	Roadside	416717	422113	2.5	38.0	36.0	32.2	31.8	30.2

Site ID	Council	Site Type	X (m)	Y (m)	Distance from Site (km)	Annual Mean NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )				
						2018	2019	2020	2021	2022
<b>LV-62W</b>	CMBC	Roadside	416172	422282	2.5	<b>40.0</b>	37.0	30.4	39.2	30.0

Notes: **Bold** values denote exceedance of the NO<sub>2</sub> annual mean AQAL.

The data in Table 7 shows there has been one exceedance of the NO<sub>2</sub> annual mean AQAL at monitoring site LV-62W in 2018. No other exceedances were recorded at the reported monitoring sites. However, several sites have recorded annual mean NO<sub>2</sub> concentration within 10% of the AQAL in recent years which indicates a risk of exceedance in line with Defra's LAQM.TG(22).

The overall trend in the monitoring data is a decreasing annual mean concentration from 2018 to 2022 (where the data is over these years).

The 2020 and 2021 measured concentrations should be treated with caution due to uncertainty associated with atypical vehicle traffic flows during government lockdown restrictions in the COVID-19 pandemic.

## 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. Where detailed information was unknown, the dust emission magnitude has been estimated based on professional judgement.

Construction activities will 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).

The risks of impact and the significance of each stage of the construction phase is classified as Negligible, Low, Medium or High, determined against a matrix which considers the distance from source, receptor sensitivity, background pollution concentrations and the potential dust emission magnitude of the works.

### 5.2 Potential Dust Emission Magnitude

#### 5.2.1 Demolition

No demolition activities are required as part of the Proposed Development and therefore demolition is not considered further.

#### 5.2.2 Earthworks

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling the site and landscaping. The total area of the Site is within the IAQM's 'Medium' criteria (18,000m<sup>2</sup> – 110,000m<sup>2</sup>). The underlying soil texture is loamy and clayey<sup>39</sup> which has a medium to high potential for dust release when due to the presence of smaller sized particles.

It is anticipated there would be 2 heavy earth moving vehicles active at any one time, with anticipated heights of formed bund to be 2m.

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 buildings to be constructed (i.e., extensions) has been estimated based on the masterplan of the Proposed Development.

The total volume of buildings to be constructed was estimated to be between 12,000m<sup>3</sup> and 75,000m<sup>3</sup>, with construction materials comprising brick and block timber frame. It has been confirmed 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 **'Medium'**.

---

<sup>39</sup> Cranfield University, "Cranfield Soil and Agrifood Institute," n.d., <http://www.landis.org.uk/soilscapes/>.

### 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.

It is expected that there would be <20 HDVs outwards movements from the Site each day (anticipated number of movements is 5 based on information from client). No unpaved surfaces over 50m would be utilised as site traffic would be routed along the existing road network.

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

### 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
Earthworks	Medium
Construction	Medium
Trackout	Small

## 5.3 Sensitivity of Area

The prevailing wind direction for the closest regionally representative meteorological measurement station to the Site, at Bingley No.2 Meteorological Station, is shown below for 2022 in Appendix B. The wind rose shows that the prevailing winds are from the west.

Figure 9 shows the construction phase distance buffers (20m, 50m, 100m and 250m) around the Site boundary, as well as identified high sensitivity receptor locations within these buffers.

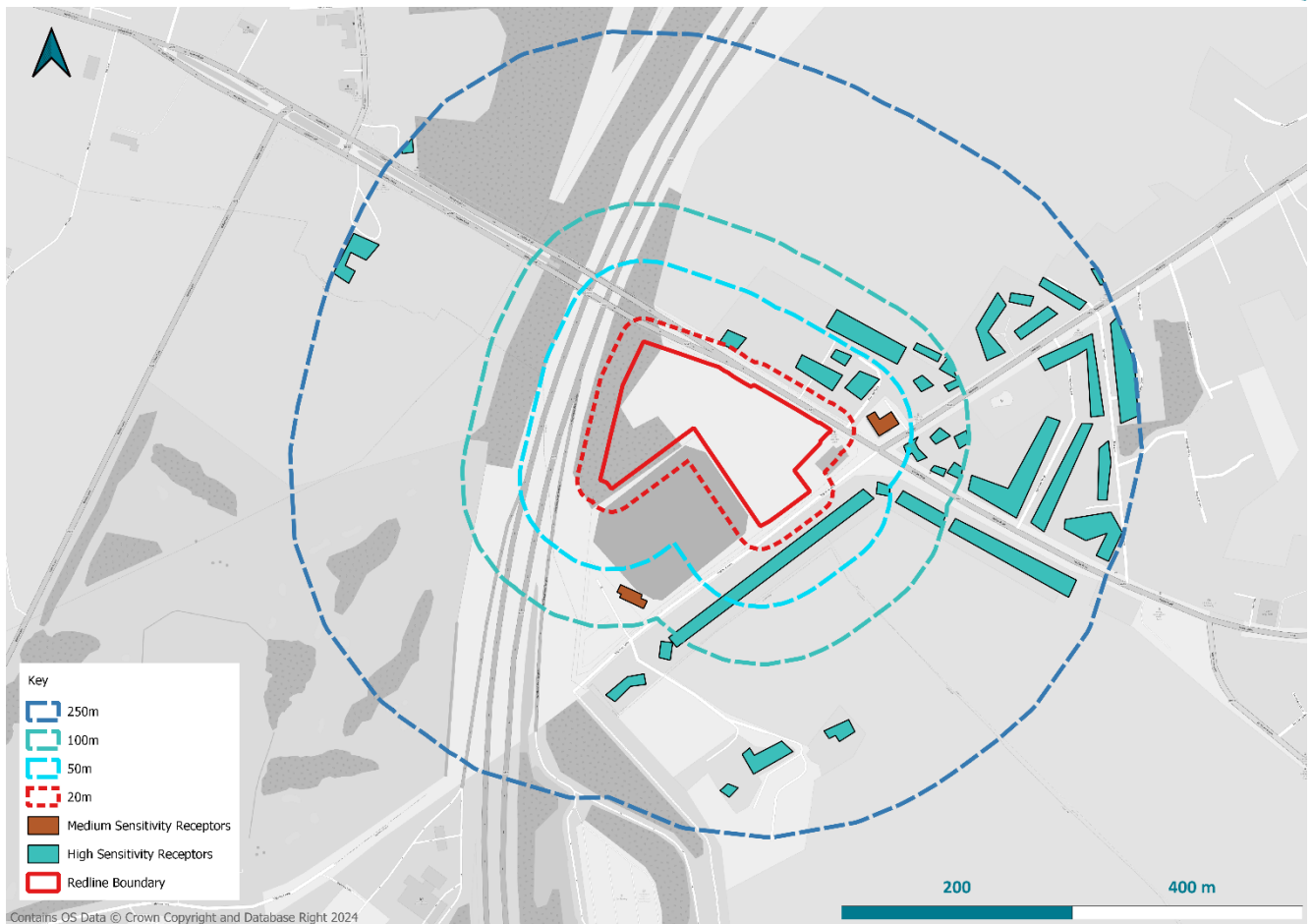


Figure 9: Construction Phase Receptors

### 5.3.1 Dust Soiling Impacts

Figure 9 illustrates there are between 1-10 high sensitivity human receptors within 20m of the Site boundary. As such, the overall sensitivity of the surrounding area to nuisance dust soiling effects during Earthworks and Construction, according to IAQM guidance, is defined as **'Medium'**.

With regard to Trackout, the sensitivity for Small size sites is assessed where receptors are located within 50m from Trackout routes up to 250m from the Site. As there are more 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 **'High'**.

### 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  $24\mu g/m^3$  in the vicinity of the Site<sup>40</sup>, based on 2024 estimates. According to IAQM guidance, where  $PM_{10}$  concentrations are  $<24\mu g/m^3$  and there are not more 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 Earthworks, Construction and Trackout.

<sup>40</sup> the concentration at which exceedance of the 24-hour AQAL is likely

### 5.3.3 Summary of Area Sensitivity

The sensitivity of the surrounding area for the potential impacts discussed above is summarised in Table 9 below.

Table 9: Sensitivity of Local Area

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

### 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 10 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 **Low Risk** for PM<sub>10</sub> health effects, in the absence of mitigation.

Table 10: Risk of Adverse Impacts During Construction Phase

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

## 6. Operational Phase Assessment

### 6.1 Exposure Assessment

#### 6.1.1 Annual Mean NO<sub>2</sub>

Predicted annual mean NO<sub>2</sub> concentrations were assessed against the AQAL of 40µg/m<sup>3</sup> as presented in Table 11.

Table 11: Modelled Annual Mean NO<sub>2</sub> Concentrations

Receptor	DS 2028 (µg/m <sup>3</sup> )	DS % of AQAL	Exposure Significant
R1	30.8	77	Not Significant
R2	31.9	80	Not Significant
R3	30.5	76	Not Significant
R4	29.0	73	Not Significant
R5	23.8	60	Not Significant

Table 11 shows no predicted exceedances of the annual mean NO<sub>2</sub> AQAL at any receptor as modelled at worst-case location on Site in the DS 2028 scenario (using 2022 backgrounds). The highest concentration modelled was 31.9µg/m<sup>3</sup> at R2, which is 80% of the AQAL.

As no concentration modelled was within 10% of the AQAL, the potential future exposure of the modelled receptors to poor air quality is considered to be 'Not Significant'.

Figure 10 below shows the annual mean NO<sub>2</sub> concentrations across the Site. This shows that although exceedances of the annual mean AQAL for NO<sub>2</sub> of 40µg/m<sup>3</sup> are present on the M62, concentrations decrease with distance from the road, and there are no exceedances present on Site.

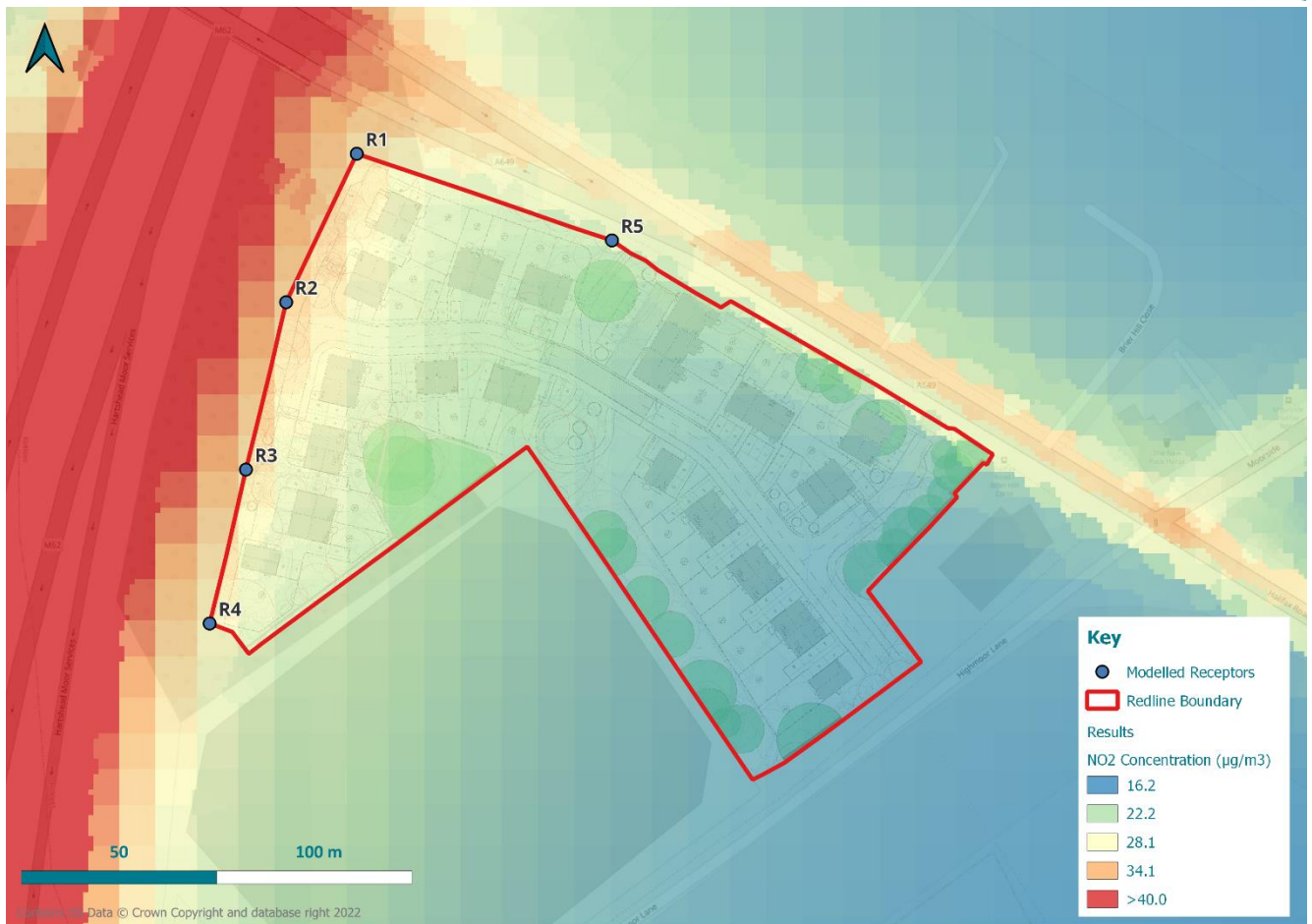


Figure 10: Annual Mean NO<sub>2</sub> Concentrations

### 6.1.2 1 Hour Mean NO<sub>2</sub>

With regard to the 1-hour NO<sub>2</sub> objective, Defra's LAQM.TG(22) states where the annual means are below 60µg/m<sup>3</sup>, it is unlikely that exceedances of the 1-hour mean will occur. All modelled results at modelled receptors were below this threshold, and therefore it is considered unlikely that the 1-hour NO<sub>2</sub> AQAL will be exceeded at the Site.

### 6.1.3 Annual Mean PM<sub>10</sub>

Predicted annual mean PM<sub>10</sub> concentrations were assessed against the AQAL of 40µg/m<sup>3</sup> as presented in Table 12.

Table 12: Modelled PM<sub>10</sub> Concentrations

Receptor	DS 2028 (µg/m <sup>3</sup> )	DS % of AQAL	Exposure Significant
R1	19.1	48	Not Significant
R2	20.6	51	Not Significant
R3	20.3	51	Not Significant
R4	19.9	50	Not Significant
R5	17.0	42	Not Significant

Table 12 shows no predicted exceedances of the annual mean PM<sub>10</sub> AQAL at any receptor as modelled at worst-case location on Site in the DS 2028 scenario (using 2022 backgrounds). The highest concentration modelled was 20.6µg/m<sup>3</sup> at R2, which is 51% of the AQAL.

As no concentrations modelled was within 10% of the AQAL, the potential future exposure of the modelled receptors to poor air quality is considered to be 'Not Significant'.

### 6.1.4 24-hour Mean PM<sub>10</sub>

The AQAL for 24-hour mean PM<sub>10</sub> concentrations is 50µg/m<sup>3</sup> not be exceeded more than 35 times a year. There were no predicted exceedances of the 24-hour mean AQAL at any of the receptors included in the dispersion model.

### 6.1.5 Annual Mean PM<sub>2.5</sub>

Predicted annual mean PM<sub>2.5</sub> concentrations were assessed against the AQAL of 20µg/m<sup>3</sup> as presented in Table 13.

Table 13: Modelled Annual Mean PM<sub>2.5</sub> Concentrations

Receptor	DS 2028 (µg/m <sup>3</sup> )	DS % of AQAL	Exposure Significant
R1	12.1	60	Not Significant
R2	12.7	64	Not Significant
R3	12.5	63	Not Significant
R4	12.3	61	Not Significant
R5	10.8	54	Not Significant

Table 13 shows no predicted exceedances of the annual mean PM<sub>2.5</sub> AQAL at any receptor as modelled at worst-case location on Site in the DS 2028 scenario (using 2022 backgrounds). The highest concentration modelled was 12.7µg/m<sup>3</sup> at R2, which is 64% of the AQAL.

As no concentrations modelled was within 10% of the AQAL, the potential future exposure of the modelled receptors to poor air quality is considered to be 'Not Significant'.

## 6.2 Significance of Air Quality Exposure

The judgement on the overall significance of exposure to poor air quality at the Site is based on the following:

- » there are no predicted exceedances of the annual mean NO<sub>2</sub>, PM<sub>10</sub> or PM<sub>2.5</sub> AQALs at the Site, and all modelled concentration are greater than 10% below the relevant AQALs;
- » exceedances of the 1-hour mean NO<sub>2</sub> and 24-hour mean PM<sub>10</sub> AQALs are considered unlikely, based upon the modelled concentrations;
- » the assessment has used worst-case assumptions when undertaking the prediction of exposure to poor air quality including placing receptors right at the Site boundary, and using background concentrations from 2022; and
- » all modelled concentrations have been verified against CC monitoring data.

On the basis of the above, the overall judgement on the potential for exposure to poor air quality at the Site is 'not significant', and the Site is therefore suitable for future residential development.

## 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), should effectively reduce the risk of impacts to negligible during the construction phase.

### 7.2 Operational Phase

#### 7.2.1 Gas Boilers

Should gas boilers be proposed, these should meet a NO<sub>x</sub> emission rate of less than 5 mg/sec and have release emissions from a vent or stack in a location and at a height that provides adequate dispersion to ensure significant air quality impacts are avoided. As a guide, a NO<sub>x</sub> emission rate of less than 5 mg/sec equates to a 450 kW ultra-low NO<sub>x</sub> gas boiler. Most modern gas boiler should meet this.

#### 7.2.2 Electric Vehicle Charging Infrastructure

Electric vehicle charging points for residential dwellings should be provided in line with the UK Government's Approved Document Part S (Adopted 2022)<sup>41</sup>. Part S states that each dwelling should have access to an electric vehicle charging point.

#### 7.2.3 Travel Plan Measures

The air quality impacts from the Proposed Development generated traffic will be negligible as discussed in this report. However, Hydrock have prepared a Residential Travel Plan (RTP)<sup>42</sup>, and the measures outlined in the RTP will seek to encourage sustainable modes of transport and discourage the use of car travel, such as;

- » Measures to communicate the RTP;
- » Measures to promote walking and cycling;
- » Measures to encourage and promote public transport use;
- » Measures to manage car use; and
- » Appointment of a Travel Plan Co-ordinator.

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

---

<sup>41</sup> HM Government, "Approved Document S, 2021 edition",

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1057375/AD\\_S.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1057375/AD_S.pdf)

<sup>42</sup> Hydrock, "Highmoor Lane, Cleckheaton Residential Travel Plan", doc ref: 31236

## 8. Discussion and Conclusion

Hydrock have been commissioned by Thirteen Group to prepare an AQA to support the planning application for a proposed residential development and associated infrastructure on land at Highmoor Lane, Cleckheaton.

A qualitative construction dust risk assessment has been undertaken in line with IAQM guidance<sup>21</sup>. Through good practice and implementation of appropriate mitigation measures outlined at Appendix E, 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.

The transport consultants on the scheme, Hydrock, have confirmed the Proposed Development is anticipated to generate vehicle trips of 201 AADT at the Site access. This is below the thresholds for detailed assessment of potential air quality impacts outside of an AQMA in Table 4. Hydrock (The transport consultants) have also advised the traffic generated (of 201 AADT) would disperse onto the local road network at the four-arm signalised junction to the immediate east of the site, and, therefore, the traffic generation would also not trigger the more stringent thresholds in of inside an AQMA in Table 4. The air quality impacts are therefore negligible in line with EPUK & IAQM guidance.

However, to address concerns with emissions from existing traffic on the M62, detailed dispersion modelling, using ADMS-Urban, has been performed to assess the significance of exposure of future residential receptors at the Site to poor air quality. The modelling assessment has shown that the annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentration do not exceed the relevant AQALs at the Site, and are also more than 10% below these AQALs. As such, the exposure is 'not significant', and the Site is considered suitable for the proposed use.

Should gas boilers be proposed, these should meet a NO<sub>x</sub> emission rate of less than 5 mg/sec and have release emissions from a vent or stack in a location and at a height that provides adequate dispersion to ensure significant air quality impacts are avoided. As a guide, a NO<sub>x</sub> emission rate of less than 5 mg/sec equates to a 450 kW ultra-low NO<sub>x</sub> gas boiler. Most modern gas boiler should meet this.

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, is shown in below in Table 14. Data was utilised for the following scenarios:

- » Baseline/verification 2022; and,
- » 2028 Do Something (2028 DS) – 2028 traffic flows + Proposed Development traffic.

The 2022 Data has been factored to the 2028 opening year by applying a TEMPro factor of 1.0404 which has been supplied by the Transport Consultant (Hydrock). By applying TEMPro growth factors, the opening year analysis includes an allowance for potential future growth in baseline traffic levels to take account of the likely effects of nearby committed developments.

The full generated traffic from the Proposed Development, before distribution, has been added to the modelled road links immediately local to the Site (L01 and L02) as a worst-case.

Table 14: Traffic Data

Link ID	Road Link	Speed (kph)	Verification 2022		2028 DS	
			AADT	% HDV	AADT	% HDV
L01	Halifax Road (A649)	48.3	12,994	2.2	13,719	2.2
L02	Moorside (A643)	48.3	6,837	2.0	7,313	2.0
L03	M62 (north of J25)	112.7	123,317	14.9	128,299	14.9
L04	M62 (J25 intermediate & slips roads)	112.7	123,317	14.9	128,299	14.9
L05	M62 (south of J25)	112.7	100,908	15.9	104,985	15.9
L06	Wakefield Rd (A644) (east of M62)	80.5	22,227	8.0	23,125	8.0
L07	Wakefield Rd (A644) (west of M62)	80.5	11,345	8.2	11,803	8.2
RB1	J25 roundabout	80.5	64,449	14.4	67,053	14.4

## Appendix B Windrose

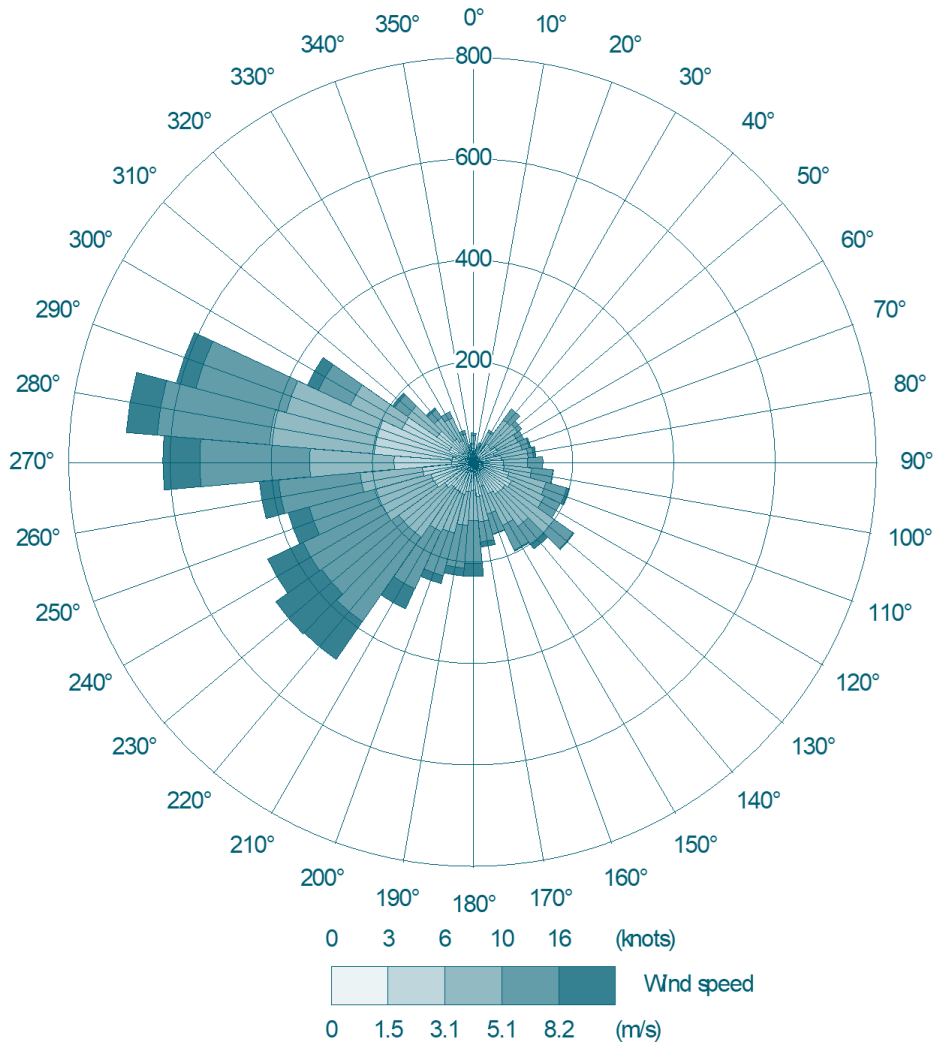


Figure 11: Wind rose Bingley No.2 Meteorological Station (2022)

Data capture of essential variables for modelling:

- » Data capture for wind speed: 99.1%;
- » Data capture for wind direction: 97.5%;
- » Data capture for temperature: 99.1%; and,
- » Data capture for cloud cover: 98.3%.

## 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 2022:

- » LV-62W; and
- » LV-62E

### Model Verification

It is most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides ( $\text{NO}_x = \text{NO} + \text{NO}_2$ ). The model output of road- $\text{NO}_x$  (i.e., the component of total  $\text{NO}_x$  coming from road traffic) has been compared with the 'measured' road- $\text{NO}_x$ . Measured road- $\text{NO}_x$  has been calculated from the measured  $\text{NO}_2$  concentrations using the  $\text{NO}_x$  from  $\text{NO}_2$  calculator (Version 8.1) available on the Defra LAQM Support website<sup>35</sup>.

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

Table 15: 2022 Modelled and Monitored Concentrations Before Adjustment

Monitoring ID	Modelled Road $\text{NO}_x$ ( $\mu\text{g}/\text{m}^3$ )	Monitored Road $\text{NO}_x$ ( $\mu\text{g}/\text{m}^3$ )	Ratio Monitored/Modelled	Modelled Total $\text{NO}_2$ ( $\mu\text{g}/\text{m}^3$ )	Monitored Total $\text{NO}_2$ ( $\mu\text{g}/\text{m}^3$ )	Difference (%)
LV-62W	8.2	34.7	4.2	16.6	30	-45
LV-62E	12.7	35.2	2.8	19.0	30	-37

As shown, the model was underpredicting at all diffusion tubes. As such, an adjustment factor of **3.19** 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  $\text{NO}_x$ , as shown below:

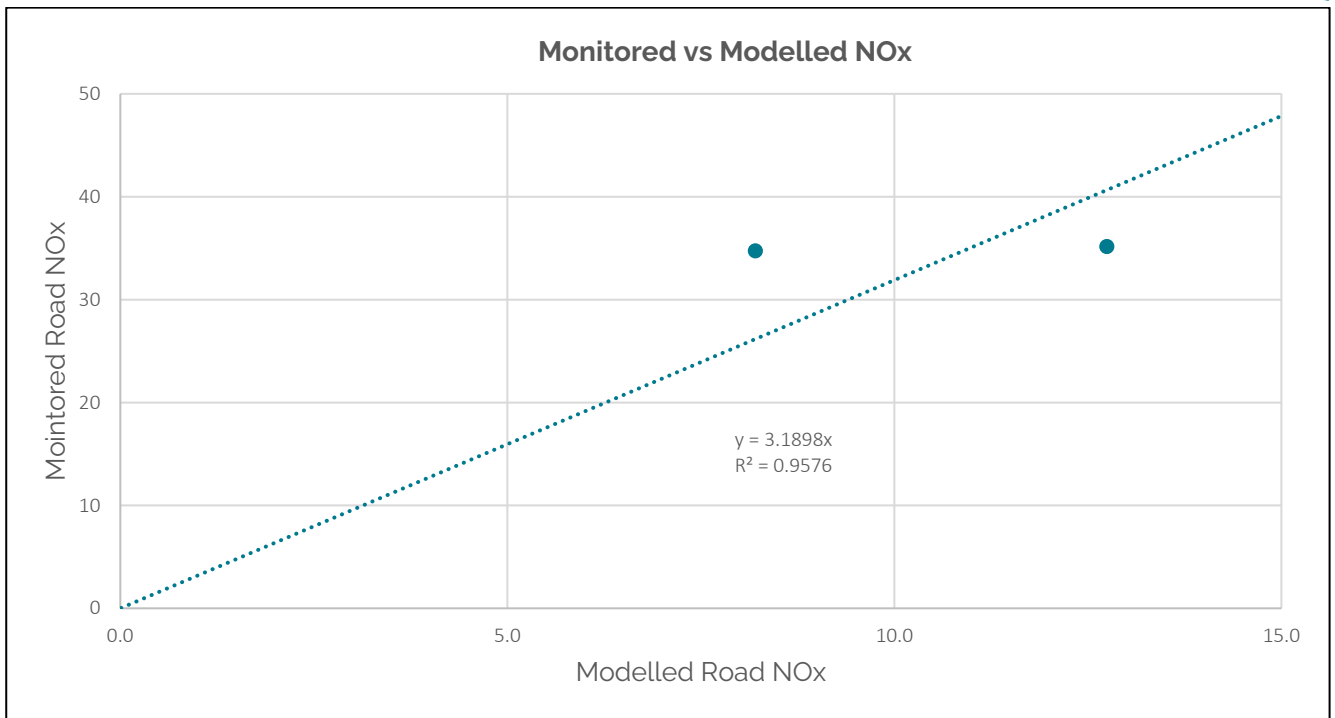


Figure 12: Model Adjustment Factor

Table 16 shows total monitored versus modelled NO<sub>2</sub> following the adjustment of the road contribution of NO<sub>x</sub> by this factor. The total NO<sub>2</sub> concentration was determined by adding the calculated background NO<sub>2</sub> concentration to the modelled road contribution.

Table 16: Post-adjusted 2022 Modelled and monitored results

Monitoring ID	Adjusted Modelled NO <sub>2</sub> (µg/m <sup>3</sup> )	Monitored NO <sub>2</sub> (µg/m <sup>3</sup> )	Difference (%)
LV-62W	25.9	30.0	-14%
LV-62E	32.8	30.2	9%

Following adjustment of NO<sub>x</sub> by a factor of **3.19**, modelled concentrations of NO<sub>2</sub> were within the accepted +/-25% range of monitored concentrations:

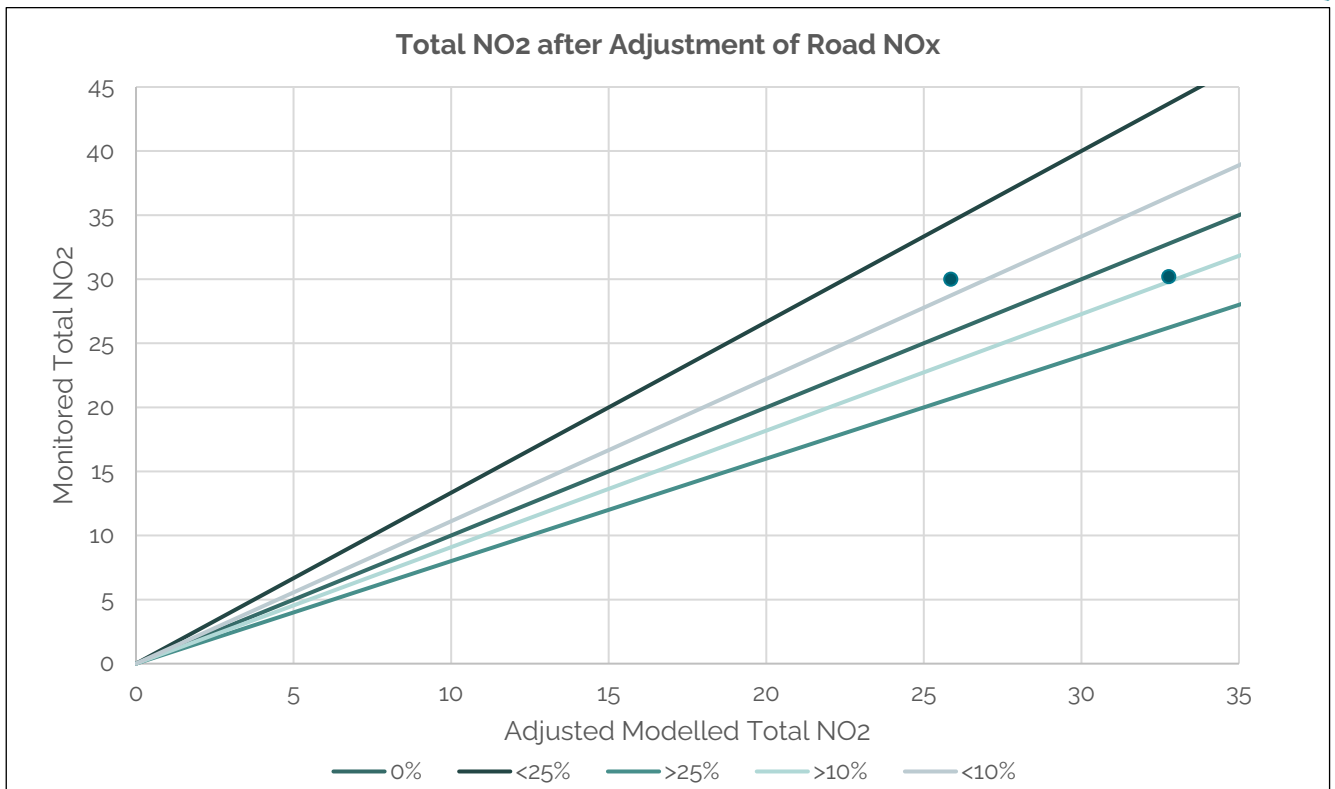


Figure 13: Post-adjusted Monitored vs Modelled NO<sub>2</sub>

In addition, the overall post-adjusted uncertainty (RMSE) for annual mean NO<sub>2</sub> was 7.0%, which is well within ideal 10% range of uncertainty. As such, the factor was considered to be acceptable.

As there is insufficient PM<sub>10</sub> or PM<sub>2.5</sub> monitoring data in the study area, it was not possible to perform model verification for these pollutants. As such, the NO<sub>2</sub> adjustment factor has also been applied to PM<sub>10</sub> and PM<sub>2.5</sub> model results, in accordance with LAQM.TG(22).

## Appendix D Background Concentrations

The background concentrations used in the modelling assessment are shown below. For future years as a conservative assumption 2022 concentrations were applied.

Table 17: 2022 Background Concentrations

Receptor	X	Y	NO <sub>2</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )
R1	417015	424706	13.0	12.7	8.4
R2	416997	424668	11.6	12.9	8.4
R3	416987	424626	11.6	12.9	8.4
R4	416977	424586	11.6	12.9	8.4
R5	417080	424684	13.0	12.7	8.4

## 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 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 PM<sub>10</sub> 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<sub>10</sub> 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 active 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 on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable
- » 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 Earthworks (Desirable Only)

- » 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.

#### Measures Specific to Construction

- » Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

#### Measures Specific to Trackout (Desirable Only)

- » 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.
- » Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).