



Dice
Environmental
Air Quality

University of Huddersfield multistorey car park

Air Quality Assessment

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Executive Summary

Dice Environmental were commissioned by DLP Planning to undertake an Air Quality Assessment to support a planning application for the development of an multistorey car park at the University of Huddersfield, Old Leeds Road, Huddersfield, HD1 1TW.

An Air Quality Assessment was undertaken to:

- Assess potential impacts associated with fugitive dust emissions during the construction phase of the proposed development;
- Assess potential impacts associated with road transport emissions during the operational phase of the proposed development; and,
- Identify any requirement for relevant mitigation measures.

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 the identified site-specific control measures would provide suitable mitigation for a development of this size and nature and reduce potential impacts to an acceptable level.

Potential impacts during the operational phase of the proposals may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the development. Dispersion modelling was therefore undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the highway network both with and without the development in place. Results were subsequently verified using local monitoring data.

Review of the dispersion modelling results indicated that air quality impacts as a result of traffic generated by the development were not predicted to be significant at any sensitive location in the vicinity of the site.

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

1. Introduction

1.1. Instruction

Dice Environmental were commissioned by DLP Planning to undertake an Air Quality Assessment to support a planning application for the development of a multistorey car park at the University of Huddersfield, Old Leeds Road, Huddersfield, HD1 1TW.

1.2. Site Location and Proposed Development

The site is located on land off Old Leeds Road, at approximate National Grid Reference (NGR): 414770, 416900. The relevant Local Authority (LA) is Kirklees Council (KC). Reference should be made to Figure 1 for a site location plan.

The development comprises the provision of approximately 534 car parking spaces (including accessible and Electric Vehicle (EV) spaces), as well as cycle parking, within a multi storey car park covering eight levels, an external service yard, and associated works. The scheme is part of the wider campus masterplan for the University of Huddersfield.

1.3. Assessment Scope

The proposals have the potential to cause air quality impacts at sensitive locations. As such, an Air Quality Assessment was undertaken to:

- Assess potential impacts associated with fugitive dust emissions during the construction phase of the development;
- Assess potential impacts associated with road transport emissions during the operational phase of the development; and,
- Identify any requirement for relevant mitigation measures.

This is detailed in the following report.

1.4. Limitations

All limitations of this report are presented in Appendix I.

1.5. Confidentiality

Dice Environmental 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 Dice Environmental; a charge may be levied against such approval.

2. Legislation and Policy

2.1. Legislation

The Air Quality Standards Regulations (2010) [1] and subsequent amendments include Air Quality Limit Values (AQLVs) for the following pollutants:

- Nitrogen dioxide (NO₂)
- Sulphur dioxide;
- Lead;
- Particulate matter with an aerodynamic diameter of less than 10µm (PM₁₀)
- Particulate matter with an aerodynamic diameter of less than 2.5µm (PM_{2.5})
- Benzene; and,
- Carbon monoxide.

Air Quality Target Values were also provided for several additional pollutants. It should be noted that the AQLV for PM_{2.5} stated in the Air Quality Standards Regulations (2010) was amended in the Environment (Miscellaneous Amendments) (EU Exit) Regulations (2020) [2].

The Air Quality Strategy (AQS) was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published on 28th April 2023 [3]. The document contains standards, objectives and measures for improving ambient air quality, including a number of Air Quality Objectives (AQOs). These 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 the determination of compliance vary.

The Environmental Improvement Plan 2025 [4] was published in December 2025, providing long term and Interim Targets in order to reduce population exposure to PM_{2.5}. The Concentration Target for 2040 was adopted in the Environmental Targets (Fine Particulate Matter) (England) Regulations (2023).

Table 1 presents the AQOs, Interim Target and Concentration Target for pollutants considered within this assessment.

Table 1: Air Quality Objectives/ Interim Target/ Concentration Target

Pollutant	Air Quality Objective/ Interim Target/ Concentration Target	
	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Period
NO ₂	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM ₁₀	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum
PM _{2.5}	10	Annual mean Interim Target to be achieved by 2030
	10	Annual mean Concentration Target to be achieved by 2040

Table 2 summarises the advice provided in DEFRA guidance [5] on where AQOs for pollutants considered within this report apply.

Table 2: Examples of Where the Air Quality Objectives Apply

Averaging Period	Objectives Should Apply At	Objective 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
24h 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
1h mean	• All locations where the annual mean and 24 and 8-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. Local Air Quality Management

LAs are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure, as summarised in Table 2, are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.3. Dust

The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments, such as construction sites, is that provided in Section 79 of Part III of the Environmental Protection Act (1990). The Act defines nuisance as:

*any dust, steam, smell or other effluvia arising on industrial, trade or business premises
and being prejudicial to health or a nuisance.*

Enforcement of the Act, in regard to nuisance, is currently under the jurisdiction of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the LA is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Environmental Protection Act (1990). The only defence is to show that the process to which the nuisance has been attributed and its operation are being controlled according to best practicable means.

2.4. National Planning Policy Framework

The National Planning Policy Framework [6] (NPPF) was published in August 2026. The document sets out the Government's planning policies for England and how these are expected to be applied. The purpose of the planning system is to contribute to the achievements of sustainable development. In order to ensure this, the NPPF recognises three overarching objectives including the following of relevance to air quality:

c) an environmental objective - to support efforts to mitigate and adapt to climate change, including moving to a low carbon economy; and protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently and minimising waste and pollution.

The NPPF provides the following policies of relevance to air quality:

- P1: Planning for clean and safe places, paragraph 1b; and,
- P3: Living conditions and pollution, paragraph 1 and 2.

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

2.5. National Planning Practice Guidance

The National Planning Practice Guidance [7] (NPPG) web-based resource was launched by the Department for Communities and Local Government to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. What air quality considerations does planning need to address?
2. What is the role of plan-making with regard to air quality?
3. Are air quality concerns relevant to neighbourhood planning?
4. What information is available about air quality?
5. When could air quality be relevant to the planning development management process?
6. What specific issues may need to be considered when assessing air quality impacts?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?

These were reviewed and the relevant guidance considered as necessary throughout the undertaking of this assessment.

2.6. Local Planning Policy

The Kirklees Local Plan [8] was adopted by KC on 27th February 2019. Review of the document identified the following policies of relevance to this assessment:

Policy LP47 - Healthy, active and safe lifestyles

The council will, with its partners, create an environment which supports healthy, active and safe communities and reduces inequality.

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;

[...].

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 or 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 11potential 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 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.

The above policies were taken into consideration throughout the undertaking of the assessment.

2.7. West Yorkshire Technical Planning Guidance

The West Yorkshire LAs have produced the Air Quality and Emissions: Technical Planning Guidance [9] as part of an overarching Low Emissions Strategy (LES) to reduce road transport emissions in the county. It is aimed at helping LAs deliver AQO compliance through cost effective service planning brought about by the joint working group and relevant Local Plan policies and was taken into consideration throughout the undertaking of this assessment.

3. Methodology

3.1. Introduction

The proposed development has the potential to cause air quality impacts during the construction and operational phases. These were assessed in accordance with the following methodology.

3.2. 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 Institute of Air Quality Management (IAQM) document *Guidance on the Assessment of Dust from Demolition and Construction V2.2* [10].

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

- Earthworks;
- Construction; and,
- Track-out.

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 PM₁₀.

The assessment steps are detailed below.

Step 1 – Screen the Need for an Assessment

Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 250m from the boundary or 50m from the construction vehicle route up to 250m from the site entrance, then the assessment proceeds to Step 2. Additionally, should ecological receptors be identified within 50m of the site or the construction vehicle route up to 250m from the site entrance, then the assessment also proceeds 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 – Assess the Risk of Dust Impacts

Step 2 assesses the risk of potential dust impacts. A site is allocated 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 3.

Table 3: Construction dust – Magnitude of Emission

Magnitude	Activity	Criteria
Large	Earthworks	• Total site area >110,000m² • Potentially dusty soil type (e.g., clay, which will be prone to suspension when dry due to small particle size) • >10 heavy earth moving vehicles active at any one time • Formation of bunds >6m in height
	Construction	• Total building volume >75,000m³ • On site concrete batching • Sandblasting
	Track-out	• >50 Heavy Duty Vehicle (HDV) trips per day • Potentially dusty surface material (e.g., high clay content) • Unpaved road length >100m
Medium	Earthworks	• Total site area 18,000-110,000m² • Moderately dusty soil type (e.g., silt) • 5-10 heavy earth moving vehicles active at any one time • Formation of bunds 3-6m in height
	Construction	• Total building volume 12,000-75,000m³ • Potentially dusty construction material (e.g., concrete) • On site concrete batching
	Track-out	• 20-50 HDV trips per day • Moderately dusty surface material (e.g., high clay content) • Unpaved road length 50-100m
Small	Earthworks	• Total site area <18,000m² • Soil type with large grain size (e.g., sand) • <5 heavy earth moving vehicles active at any one time • Formation of bunds <3m in height
	Construction	• Total building volume <12,000m³ • Construction material with low potential for dust release (e.g., metal cladding or timber)

Magnitude	Activity	Criteria
	Track-out	• <20 HDV trips per day • Surface material with low potential for dust release • Unpaved road length less than 50m

Step 2B defines the sensitivity of the area around the development to potential dust impacts. The influencing factors are shown in Table 4.

Table 4: Construction Dust – Sensitivities of Human and Ecological Receptors

Receptor Sensitivity	Examples	
	Human Receptors	Ecological Receptors
Large	• Users expect 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 PM₁₀ 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
Small	• 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, farmland, short term car parks and roads	• Locally designated site e.g., Local Nature Reserve

The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in Table 5.

Table 5: Construction Dust – Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<250
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 6 outlines the criteria for determining the sensitivity of the area to human health impacts.

Table 6: Construction Dust – Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Background Annual Mean PM ₁₀ Concentration	No. of Receptors	Distance from the Source (m)			
			<20	<50	<100	<250
High	>32 µg/m ³	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28-32µg/m ³	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24-28 µg/m ³	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24 µg/m ³	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32 µg/m ³	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28-32µg/m ³	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24-28 µg/m ³	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24 µg/m ³	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low

Table 7 outlines the criteria for determining the sensitivity of the area to ecological impacts.

Table 7: Construction Dust – Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	<20	<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 8 outlines the risk category earthworks, construction and track-out activities.

Table 8: Construction Dust – Dust Risk Category from Earthworks, Construction and Track-out activities

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

Step 3 – Site Specific Mitigation

Step 3 requires the identification of site-specific mitigation measures within the IAQM guidance [10] 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 – Determine Significant Effects

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**.

3.3. Operational Phase Assessment

The development has the potential to affect air quality as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site. Potential impacts have therefore been defined by predicting pollutant concentrations at sensitive locations using dispersion modelling for the following scenarios:

- 2024 - Verification;
- Opening year Do-Minimum (DM) (predicted traffic flows in 2031 should the proposals not proceed); and,
- Opening year Do-Something (DS) (predicted traffic flows in 2031 should the proposals be completed).

Reference should be made to Appendix 1 for assessment input data and details of the verification process.

Locations sensitive to potential changes in off-site pollutant concentrations were identified within 200m of the highway network in accordance with the guidance provided by National Highways [11] on the likely limits of pollutant dispersion from road sources. The criteria provided within DEFRA guidance [5] on where the AQOs apply, as summarised in Table 2, was utilised to determine worst-case receptor positions in the vicinity of links likely to be affected by changes in traffic flows as a result of the development.

The significance of predicted air quality impacts was determined in accordance with the guidance provided within the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality' [12]. Using this methodology impacts were defined based on the interaction between the predicted pollutant concentration from the DS scenario and the magnitude of change between the DM and DS scenarios, as outlined in Table 9.

Table 9: Significance of Operational Phase Road Vehicle Exhaust Emissions Impacts

Concentration at Receptor in Assessment Year	Predicted Concentration Change as Proportion of AQO/ Concentration Target (%)			
	1	2-5	6-10	>10
<75% of AQO/ Concentration Target	Negligible	Negligible	Slight	Moderate
76-94% of AQO/ Concentration Target	Negligible	Slight	Moderate	Moderate
95-102% of AQO/ Concentration Target	Slight	Moderate	Moderate	Substantial
103-109% of AQO/ Concentration Target	Moderate	Moderate	Substantial	Substantial
>110% of AQO/ Concentration Target	Moderate	Substantial	Substantial	Substantial

The matrix shown in Table 9 is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which makes it clearer which cell the impact falls within. It should be noted that changes of 0%, i.e. less than 0.5%, are described as **negligible**.

Following the prediction of impacts at discrete receptor locations, the IAQM document provides guidance on determining the overall air quality impact significance of the operation of a development. The following factors are identified for consideration by the assessor:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and,
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

The IAQM guidance states that an assessment must reach a conclusion on the likely significance of the predicted impact. Where the overall effect is **moderate** or **substantial**, the effect is likely to be considered **significant**, whilst if the impact is **slight** or **negligible**, the impact is likely to be considered **not significant**. It should be noted that this is a binary judgement of either **significant** or **not significant**.

4. Baseline

4.1. Introduction

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

4.2. Local Air Quality Management

As required by the Environment Act (1995), as amended by the Environment Act (2021), KC has undertaken review and assessment of air quality within its area of jurisdiction. This process has indicated that annual mean concentrations of NO₂ are above the relevant AQOs within the district. As such, seven AQMAs have been declared. The closest of these to the site is described as follows:

AQMA No.9 Huddersfield Town Centre - The designated area incorporates roads bordering and within the Huddersfield Ring Road.

The development is partially located within the AQMA. As such, there is the potential for vehicles travelling to and from the site to increase pollution levels in this sensitive area. This has been considered throughout the assessment.

KC has concluded that concentrations of all other pollutants considered in the AQS are below the relevant AQOs. As such, no further AQMAs have been declared.

4.3. Air Quality Monitoring

Monitoring of pollutant concentrations is undertaken by KC throughout its area of jurisdiction. Recent annual mean NO₂ concentrations recorded in the vicinity of the site, as provided in KC's '2025 Air Quality Annual Status Report (ASR) [13], are shown in Table 10. Exceedances of the AQO are shown in **bold**.

Table 10: Monitoring Results - Annual Mean NO₂

Monitoring Site		Monitored Annual Mean NO ₂ Concentration (µg/m ³)		
ID	Site Name	2022	2023	2024
28	Southgate (Ring Road), Huddersfield - Lamp Post 019 - near Oldgate Car Park	41.0	38.1	38.1
56	New Wharf Inn PH opposite Riverbank Court, Wakefield Road, Aspley - Planning 1 Tube	36.1	34.8	48.6
143	Outside 33 Queensgate at Zetland Street	-(a)	-(a)	28.9
144	Outside the Jules Verne PH, Westgate, LC003	-(a)	-(a)	53.1
148	Triplicate 1-5 Southgate, Huddersfield, LC005	-(a)	-(a)	29.9
161	22 Westgate, Junction Station	-(a)	-(a)	32.0

Note: (a) Monitor commissioned in 2024.

As shown in Table 10, annual mean NO₂ concentrations were above the AQO of 40µg/m³ at monitor 28 in 2022 and at monitors 56 and 144 in 2024. Annual mean NO₂ concentrations were below the AQO of 40µg/m³ at the 143, 148 and 161 monitoring locations in recent years. Reference should be made to Figure 2 for a map of the survey positions.

KC do not undertake PM₁₀ or PM_{2.5} monitoring in the vicinity of the site.

4.4. Background Pollutant Concentrations

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 in grid square NGR: 414500, 416500. Data for this location was downloaded from the DEFRA website [14] for the purpose of the assessment and is summarised in Table 11.

Table 11: Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration (µg/m ³)		
	2024	2026	2031
NO _x	15.61	14.75	12.58
PM ₁₀	11.85	11.72	11.43
PM _{2.5}	6.98	6.86	6.58

As shown in Table 11, predicted background NO₂, PM₁₀ and PM_{2.5} concentrations are below the relevant AQOs and Concentration Target at the site.

4.5. 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 dust and road vehicle exhaust emission impacts in the following Sections.

Construction Phase Sensitive Receptors

Receptors sensitive to potential dust impacts during earthworks and construction were identified from a desk-top study of the area up to 250m from the development boundary. These are summarised in Table 12.

Table 12: Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors			Approximate Number of Ecological Receptors
	Low Sensitivity	Medium Sensitivity	High Sensitivity	
<20	>1	>10	>100	0
<50	>1	>10	>100	0
<100	>1	>10	>100	-
<250	>1	>10	>100	-

Receptors sensitive to potential dust impacts from track-out were identified from a desk-top study of the area up to 50m from the road network within 250m of the site access. These are summarised in Table 13.

Table 13: Trackout Dust Sensitive Receptors

Distance from Site Access Route (m)	Approximate Number of Human Receptors			Approximate Number of Ecological Receptors
	Low Sensitivity	Medium Sensitivity	High Sensitivity	
<20	>1	>10	0	0
<50	>1	>10	0	0

There are no ecological receptors within 50m of the development boundary or the access route within 250m of the site entrance. As such, ecological impacts have not been assessed further within this report.

Operational Phase Sensitive Receptors

Locations sensitive to potential operational phase road vehicle exhaust emission impacts were identified from a desk-top study and are summarised in Table 14.

Table 14: Operational Phase Road Vehicle Exhaust Emissions Sensitive Receptors

Receptor		NGR (m)	
		X	Y
R1	The University of Huddersfield - Daphne Steele Building	414685.0	416975.0
R2	Southgate Community Diagnostic Centre - Emily Siddon Building	414777.0	417056.0
R3	Residential - Union Street	414671.0	417030.0
R4	Residential - Southgate	414723.0	416899.0
R5	Residential - Southgate	414662.5	416936.0
R6	Residential - Southgate	414743.0	416814.0
R7	Hello Student - Oldgate House	414737.0	416737.0
R8	Hello Student - Oldgate House	414783.5	416645.0
R9	The University of Huddersfield - Queensgate Campus	414828.0	416521.5
R10	The University of Huddersfield - Queensgate Campus	414736.0	416428.0
R11	The University of Huddersfield - Queensgate Campus	414932.0	416465.0

Reference should be made to Figure 3 for a graphical representation of road vehicle exhaust emission sensitive receptor locations.

5. Assessment

5.1. Introduction

There is the potential for air quality impacts as a result of the construction and operation of the proposed development. These are assessed in the following Sections.

5.2. Construction Phase Assessment

Step 1 – Screen the Need for an Assessment

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 on the local road network also have the potential to result in the re-suspension of dust from highway surfaces.

The potential for impacts at sensitive locations depends significantly on local meteorology during the undertaking of dust generating activities, with the most significant effects likely to occur during dry and windy conditions.

The desk-study undertaken to inform the baseline identified a number of sensitive receptors within 250m of the site boundary. As such, a detailed assessment of potential dust impacts was required.

Step 2a – Define the Potential Dust Emission Magnitude

Earthworks

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. The area of the proposed development site is less than 18,000m². In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from earthworks is therefore **small**.

Construction

Due to the nature of the development, the total building volume will be less than 12,000m³. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from construction is therefore **small**.

Track-out

Based on the site area, it is anticipated that the unpaved road length will be less than 50m. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from track-out is therefore **small**.

Step 2b – Define the Sensitivity of the Area

Dust Soiling

The sensitivity of the area with respect to dust soiling from earthworks and construction was defined based on the number of receptors shown in Table 12 using the criteria summarised in Table 5. This indicated a sensitivity classification of **high**.

The sensitivity of the area with respect to dust soiling from trackout was defined based on the number of receptors shown in Table 13 using the criteria summarised in Table 5. This indicated a sensitivity classification of **medium**.

Human Health

As shown in Table 11, the 2026 annual mean PM₁₀ background concentration at the site is 11.23µg/m³. Using the criteria shown in Table 6 and the number of receptors shown in Table 12, the sensitivity of the area with respect to human health from earthworks and construction was classified as **medium**.

Using the criteria in Table 6 and the number of receptors shown in Table 13, the sensitivity of the area with respect to human health from trackout was classified as **low**.

Step 2c - Define the Risk of Dust Impacts

The derived dust emission magnitude for each activity has been combined with the sensitivity of the area to determine the risk of unmitigated impacts in line with the methodology set out in Table 8. A summary of the risk from each dust generating activity is provided in Table 15.

Table 15: Summary of Potential Unmitigated Dust Risks During Construction

Potential Impact	Activity	Step 2A - Dust Emission Magnitude	Step 2B - Sensitivity of the Area	Step 2C - Risk
Dust Soiling	Earthworks	Small	High	Low
	Construction	Small	High	Low
	Track-out	Small	Medium	Low
Human Health	Earthworks	Small	Medium	Low
	Construction	Small	Medium	Low
	Track-out	Small	Low	Negligible

As indicated in Table 15, the potential risk of dust soiling is **low** from all activities. The potential risk of human health impacts is **low** from earthworks and construction and **negligible** from track-out.

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.

Step 3 – Site Specific Mitigation

The IAQM guidance [10] provides potential mitigation measures to reduce impacts as a result of fugitive dust emissions during the construction phase. These have been adapted for the development site as summarised in Table 16. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan (CEMP) or similar if required by the LA.

Table 16: Fugitive Dust Emission 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. This may be the environment manager/engineer or the site manager • Display the head or regional office contact information
Site Management	• Record all dust and air quality complaints and make the complaints log available to the local authority when asked • Make the complaints log available to the LA upon request • Record any exceptional incidents that cause dust or air emissions either on or off site
Monitoring	• Carry out regular site inspections, record inspection results, and make an inspection log available to the LA upon request • Increase the frequency of site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions
Site Preparation	• 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 • Avoid site runoff of water or mud
Operating vehicle/machinery and sustainable travel	• Ensure all vehicles switch off engines when stationary – no idling vehicles • Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable
Operations	• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques • Ensure an adequate water supply on the site for effective dust suppression, using non-potable water where possible and appropriate • Use enclosed chutes and conveyors and covered skips • Minimise drop heights and use fine water sprays wherever appropriate
Waste management	• Avoid bonfires and burning of waste materials

Step 4 – Determine Significant Effects

Assuming the relevant mitigation measures outlined in Table 16 are implemented, the residual impact from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance [10].

5.3. Operational Phase Assessment

Introduction

The development has the potential to increase concentrations of NO₂, PM₁₀ and PM_{2.5} as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site during the operational phase. An assessment was therefore undertaken using dispersion modelling in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the site.

The assessment considered the following scenarios:

- 2024 - Verification;
- 2031 - DM; and,
- 2031 - DS.

The DM scenario (i.e. without development) included baseline traffic data, inclusive of anticipated growth and committed developments for the relevant assessment year. The DS scenario (i.e. with development) included baseline traffic data, inclusive of anticipated growth and committed developments for the relevant assessment year, in addition to predicted vehicle trips associated with the operation of the proposals.

For the purpose of the assessment traffic data for 2031 was utilised as the development opening year. Air quality is predicted to improve in the future. However, in order to provide a robust assessment, emissions factors for 2024 were utilised within the dispersion model. The use of 2031 traffic data and 2024 emission factors is considered to provide a robust scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

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

Potential Development Impacts

Predicted Concentrations

Annual mean NO₂ concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 17.

Table 17: Predicted Annual Mean NO₂ Concentrations

Receptor		Predicted Annual Mean NO ₂ Concentration (µg/m ³)		
		DM	DS	Change
R1	The University of Huddersfield - Daphne Steele Building	19.29	19.47	0.18
R2	Southgate Community Diagnostic Centre - Emily Siddon Building	15.12	15.33	0.21

Receptor		Predicted Annual Mean NO ₂ Concentration (µg/m ³)		
		DM	DS	Change
R3	Residential - Union Street	16.00	16.12	0.12
R4	Residential - Southgate	17.18	17.28	0.10
R5	Residential - Southgate	17.63	17.74	0.11
R6	Residential - Southgate	18.83	18.95	0.12
R7	Hello Student - Oldgate House	17.82	17.92	0.10
R8	Hello Student - Oldgate House	18.68	18.78	0.10
R9	The University of Huddersfield - Queensgate Campus	22.53	22.61	0.08
R10	The University of Huddersfield - Queensgate Campus	17.59	17.63	0.04
R11	The University of Huddersfield - Queensgate Campus	16.95	16.98	0.03

As indicated in Table 17, predicted annual mean NO₂ concentrations were below the AQO of 40µg/m³ at all receptor locations in both scenarios.

Reference should be made to Figures 4 and 5 for graphical representations of annual mean NO₂ concentrations across the assessment area for the DM and DS scenarios, respectively.

Annual mean PM₁₀ concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 18.

Table 18: Predicted Annual Mean PM₁₀ Concentrations

Receptor		Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)		
		DM	DS	Change
R1	The University of Huddersfield - Daphne Steele Building	15.44	15.56	0.12
R2	Southgate Community Diagnostic Centre - Emily Siddon Building	13.19	13.34	0.15
R3	Residential - Union Street	13.63	13.71	0.09
R4	Residential - Southgate	14.09	14.15	0.06
R5	Residential - Southgate	14.37	14.45	0.07
R6	Residential - Southgate	15.09	15.17	0.08
R7	Hello Student - Oldgate House	14.61	14.67	0.06
R8	Hello Student - Oldgate House	15.02	15.08	0.06
R9	The University of Huddersfield - Queensgate Campus	17.99	18.04	0.05
R10	The University of Huddersfield - Queensgate Campus	14.80	14.82	0.03
R11	The University of Huddersfield - Queensgate Campus	14.51	14.52	0.02

As indicated in Table 18, predicted annual mean PM₁₀ concentrations were below the AQO of 40µg/m³ at all receptor locations in both scenarios.

Reference should be made to Figures 6 and 7 for graphical representations of annual mean PM₁₀ concentrations across the assessment area for the DM and DS scenarios, respectively.

Annual mean PM_{2.5} concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 19.

Table 19: Predicted Annual Mean PM_{2.5} Concentrations

Receptor		Predicted Annual Mean PM _{2.5} Concentration (µg/m ³)		
		DM	DS	Change
R1	The University of Huddersfield - Daphne Steele Building	9.16	9.23	0.07
R2	Southgate Community Diagnostic Centre - Emily Siddon Building	7.71	7.80	0.09
R3	Residential - Union Street	7.99	8.04	0.05
R4	Residential - Southgate	8.29	8.33	0.04
R5	Residential - Southgate	8.47	8.51	0.04
R6	Residential - Southgate	8.93	8.98	0.05
R7	Hello Student - Oldgate House	8.62	8.66	0.04
R8	Hello Student - Oldgate House	8.89	8.92	0.04
R9	The University of Huddersfield - Queensgate Campus	10.79	10.82	0.03
R10	The University of Huddersfield - Queensgate Campus	8.73	8.75	0.02
R11	The University of Huddersfield - Queensgate Campus	8.55	8.56	0.01

As indicated in Table 19, predicted annual mean PM_{2.5} concentrations were above the Concentration Target of 10µg/m³ at one receptor and below the Concentration Target at all remaining locations in both the DM and DS scenarios. It should be noted that there were no new exceedances in the DS scenario when compared to the DM.

Reference should be made to Figures 8 and 9 for graphical representations of annual mean PM_{2.5} concentrations across the assessment area for the DM and DS scenarios, respectively.

Predicted Impacts

Predicted impacts on annual mean NO₂ concentrations at the sensitive receptor locations are summarised in Table 20.

Table 20: Predicted Impacts – NO₂

Receptor		Predicted Annual Mean NO ₂ Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	The University of Huddersfield - Daphne Steele Building	<75% of AQO	0	Negligible
R2	Southgate Community Diagnostic Centre - Emily Siddon Building	<75% of AQO	1	Negligible
R3	Residential - Union Street	<75% of AQO	0	Negligible
R4	Residential - Southgate	<75% of AQO	0	Negligible
R5	Residential - Southgate	<75% of AQO	0	Negligible

Receptor		Predicted Annual Mean NO ₂ Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R6	Residential - Southgate	<75% of AQO	0	Negligible
R7	Hello Student - Oldgate House	<75% of AQO	0	Negligible
R8	Hello Student - Oldgate House	<75% of AQO	0	Negligible
R9	The University of Huddersfield - Queensgate Campus	<75% of AQO	0	Negligible
R10	The University of Huddersfield - Queensgate Campus	<75% of AQO	0	Negligible
R11	The University of Huddersfield - Queensgate Campus	<75% of AQO	0	Negligible

As indicated in Table 20, impacts on annual mean NO₂ concentrations as a result of the proposed development were predicted to be **negligible** at all receptors.

Predicted impacts on annual mean PM₁₀ concentrations at the sensitive receptor locations are summarised in Table 21.

Table 21: Predicted Impacts - PM₁₀

Receptor		Predicted Annual Mean PM ₁₀ Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	The University of Huddersfield - Daphne Steele Building	<75% of AQO	0	Negligible
R2	Southgate Community Diagnostic Centre - Emily Siddon Building	<75% of AQO	0	Negligible
R3	Residential - Union Street	<75% of AQO	0	Negligible
R4	Residential - Southgate	<75% of AQO	0	Negligible
R5	Residential - Southgate	<75% of AQO	0	Negligible
R6	Residential - Southgate	<75% of AQO	0	Negligible
R7	Hello Student - Oldgate House	<75% of AQO	0	Negligible
R8	Hello Student - Oldgate House	<75% of AQO	0	Negligible
R9	The University of Huddersfield - Queensgate Campus	<75% of AQO	0	Negligible
R10	The University of Huddersfield - Queensgate Campus	<75% of AQO	0	Negligible
R11	The University of Huddersfield - Queensgate Campus	<75% of AQO	0	Negligible

As indicated in Table 21, impacts on annual mean PM₁₀ concentrations as a result of the proposed development were predicted to be **negligible** at all receptors.

Predicted impacts on annual mean PM_{2.5} concentrations at the sensitive receptor locations are summarised in Table 22.

Table 22: Predicted Impacts - PM_{2.5}

Receptor		Predicted Annual Mean PM _{2.5} Concentration	Predicted Concentration Change as Proportion of Conc. Target (%)	Impact Significance
R1	The University of Huddersfield - Daphne Steele Building	76-94% of Concentration Target	1	Negligible
R2	Southgate Community Diagnostic Centre - Emily Siddon Building	76-94% of Concentration Target	1	Negligible
R3	Residential - Union Street	76-94% of Concentration Target	1	Negligible
R4	Residential - Southgate	76-94% of Concentration Target	0	Negligible
R5	Residential - Southgate	76-94% of Concentration Target	0	Negligible
R6	Residential - Southgate	76-94% of Concentration Target	0	Negligible
R7	Hello Student - Oldgate House	76-94% of Concentration Target	0	Negligible
R8	Hello Student - Oldgate House	76-94% of Concentration Target	0	Negligible
R9	The University of Huddersfield - Queensgate Campus	103-109% of Concentration Target	0	Negligible
R10	The University of Huddersfield - Queensgate Campus	76-94% of Concentration Target	0	Negligible
R11	The University of Huddersfield - Queensgate Campus	76-94% of Concentration Target	0	Negligible

As indicated in Table 22, impacts on annual mean PM_{2.5} concentrations as a result of the proposed development were predicted to be **negligible** at all receptors.

Overall Impact Significance

The overall significance of operational phase road traffic emission impacts was determined as **negligible**. This was based on the worst-case predicted impact at any discrete receptor location and the considerations outlined previously. Further justification is provided in Table 23.

Table 23: Overall Impact Significance

Guidance	Comment
The existing and future air quality in the absence of the development	Predicted annual mean NO₂ and PM₁₀ concentrations were below the relevant AQOs at all locations in the DM scenario. Predicted annual mean PM_{2.5} concentrations were above the Concentration Target at one sensitive receptor in the DM scenario. The predicted concentrations are considered unlikely to change significantly in the absence of the proposals given the established nature of the area.
The extent of current and future population exposure to the impacts	The development is not predicted to affect the population exposed to exceedances of the AQOs and Concentration Target.
The influence and validity of any assumptions adopted when undertaking the prediction of impacts	It was assumed that vehicle exhaust emission rates will not reduce in future years. This provides robust results when compared with DEFRA and National Highways methodologies Due to the adopted assumptions it is considered the presented results are sufficiently robust for an assessment of this nature.

The IAQM guidance [12] states that only if the impact is greater than **slight**, the effect is considered **significant**. As impacts were predicted to be **negligible**, overall effects are considered **not significant**, in accordance with the stated methodology.

Interim Planning Guidance

Interim Planning Guidance [15] on the consideration of the PM_{2.5} targets identified in the Environment Act (2021) in planning decisions has been produced by DEFRA. This requires evidence that the key sources of air pollution within a development have been identified and appropriate action to minimise emissions of PM_{2.5} and its precursors as far as is reasonably practicable be provided in support of planning applications. To assist the process, two questions and associated considerations are provided. These are summarised in Table 24, along with the development response.

Table 24: Interim Planning Guidance

Question	Response
How has exposure to PM_{2.5} been considered when selecting the development site? Factors to consider include: • Site proximity to people (particularly large populations and/or vulnerable groups, e.g. schools, hospitals, care homes, areas of deprivation) and the impact of the development on these • Site proximity to pollution sources and the impact of these on users of the development • Exposure and emissions during both construction and in-use	The proposed development is located within the University of Huddersfield campus in the vicinity of residential, educational and commercial land uses. These have been considered within the assessment and air quality impacts associated with the development are predicted to be not significant The scheme comprises a car park, which is not considered sensitive to long-term pollutant exposure As outlined in Table 16, a number of mitigation measures will be used throughout the construction phase in order to reduce fugitive dust emissions as far as practicable. This will control potential exposure at off-site locations
What actions and/or mitigations have been considered to reduce PM_{2.5} exposure for development users and nearby receptors and to reduce emissions of PM_{2.5} and its precursors? Factors to consider include: • Site layout • The development's design • Technology used in the construction or installed for use in the development • Construction and future use of the development	In order to reduce emissions of PM_{2.5} with associated impacts at nearby receptors and on-site, the following measures have been included in the proposals: • Provision of secure cycle storage • Provision of Electric Vehicle charging • Implementation of a Travel Plan Further to the above, in order to reduce emissions during the construction phase, a number of mitigation measures will be used to minimise dust generation from associated activities

Based on the responses provided in the table above and the results of the assessment, it is considered that the development has identified key sources of air pollution and taken appropriate action to minimise emissions of PM_{2.5}.

6. Conclusion

Dice Environmental were commissioned by DLP Planning to undertake an Air Quality Assessment to support a planning application for the development of an ITH at the University of Huddersfield, Old Leeds Road, Huddersfield, HD1 1TW.

The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road traffic exhaust emissions associated with vehicles travelling to and from the development during operation. As such, an Air Quality Assessment was undertaken to determine baseline conditions and consider potential effects as a result of the scheme.

During the construction phase of the 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 significance of potential air quality impacts from dust generated by earthworks, construction and track-out activities was predicted to be **not significant**.

Potential impacts during the operational phase of the proposals may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. Dispersion modelling was therefore undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the highway network both with and without the development in place. Results were subsequently verified using local monitoring data.

Review of the dispersion modelling results indicated that impacts on annual mean NO₂, PM₁₀ and PM_{2.5} concentrations as a result of traffic generated by the development were predicted to be **negligible** at all receptor locations.

Following consideration of the relevant issues, impacts as a result of the operation of the development were considered to be **not significant**, in accordance with the IAQM guidance.

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

Appendix 1 – Limitations

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between Dice Environmental and the Client as indicated in Section 1.2.
2. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
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Appendix II – Glossary of Abbreviations

Table A1: Acronyms

Acronym	Definition
AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
ASR	Annual Status Report
CEMP	Construction Environmental Management Plan
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DM	Do-Minimum
DS	Do-Something
EB	Eastbound
EFT	Emission Factor Toolkit
EV	Electric Vehicle
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
ITH	Integrated Travel Hub
KC	Kirklees Council
LA	Local Authority
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle
NB	Northbound
NGR	National Grid Reference
NO ₂	Nitrogen dioxide
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10µm
PM _{2.5}	Particulate matter with an aerodynamic diameter of less than 2.5µm
SB	Southbound
SP	Slow Phase
WB	Westbound
Z ₀	Roughness Length

Appendix III - Assessment Input Data

Introduction

The proposed development has the potential to cause air quality impacts as a result of emissions associated with vehicles travelling to and from the site. In order to assess changes in NO₂, PM₁₀ and PM_{2.5} concentrations at sensitive locations, detailed dispersion modelling was undertaken in accordance with the following methodology.

Modelling was undertaken for 2024 to allow verification against recent monitoring results and 2031 to represent likely conditions in the opening year of the scheme.

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 5.1.0.2). 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 (z_0); and,
- Monin-Obukhov length.

The relevant inputs are detailed in the following Sections.

Assessment Area

Ambient concentrations were predicted over the area NGR: 414420, 416400 to 415140, 417120. One Cartesian grid was used within the model to produce data suitable for contour plotting using the Surfer software package. Receptors potentially sensitive to changes in pollutant concentrations were included in the assessment as outlined in the main report text.

Reference should be made to Figure 10 for a graphical representation of the assessment grid extents.

Traffic Flow Data

Traffic data for use in the assessment, including 24-hour Average Annual Daily Traffic (AADT) flows and fleet composition as HDV proportion, were obtained from the Transport Consultants for the project.

Traffic data was not available from the Transport Consultants for a number of road links. Additional flows were therefore taken from the Department for Transport (DfT) [16]. The DfT web tool enables the user to view and download traffic flows on every link of the 'A' road and motorway network, as well as selected minor roads, in Great Britain for the years 2000 to 2025. It should be noted that the DfT web tool is referenced in DEFRA guidance as being a suitable source of data for air quality assessments and it is therefore considered to provide a reasonable estimate of traffic flows in the vicinity of the site.

The baseline traffic data obtained from the DfT was converted to the opening year of the development utilising a factor obtained from TEMPro (version 8.0). This software package has been developed by the DfT to calculate future traffic growth throughout the UK.

Road parameters for input into the model were based on the following:

- Road widths were estimated from aerial photography and UK highway design standards;
- Vehicle speeds were estimated as an average for the relevant road link over the course of a 24-hour period;
- Vehicle speeds were determined following review of speed limits within the study extents, as well as congestion data available from GoogleMaps;
- Vehicle speeds specific to slow phases were determined using the methodology outlined in the DEFRA guidance [5];
- Necessary adjustments to slow phase vehicle speeds were based upon congestion data available from GoogleMaps; and,
- The length for slow phases were derived using the approaching distance of 25m outlined in the DEFRA guidance [5], and adjusted accordingly based on aerial photography and congestion data available from GoogleMaps.

A summary of the traffic flow data used in the assessment is provided in Table A1.1.

Table A1.1: Traffic Data

Link		24-hour AADT Flow			HDV Proportion of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		Verif.	2031 DM	2031 DS			
L1	Old Leeds Road, south of Pine Street	1,401	1,677	3,229	3.07	6.8	30

Link		24-hour AADT Flow			HDV Proportion of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		Verif.	2031 DM	2031 DS			
L2	Old Leeds Road, north of Pine Street	2,206	2,626	4,178	3.17	7.5	30
L3	Old Leeds Road, Slow Phase (SP)	2,206	2,626	4,178	3.17	10.4	20
L4	A62 Leeds Road, Southbound (SB), south of Old Leeds Road	5,292	5,692	6,083	3.06	7.3	45
L5	A62 Leeds Road, SB, SP	5,292	5,692	6,083	3.06	10.4	20
L6	A62 Leeds Road, Northbound (NB), south of Old Leeds Road	3,016	3,253	3,638	3.08	5.1	45
L7	A62 Southgate, SB, north of A62 Leeds Road	9,296	9,923	10,116	3.07	7.6	45
L8	A62 Southgate, SB, north of A62 Leeds Road, SP	9,296	9,923	10,116	3.07	19.4	20
L9	A62 Leeds Road, SB, north of Old Leeds Road	5,026	5,397	5,782	3.06	7.3	45
L10	A62 Leeds Road, NB, north of Old Leeds Road	2,982	3,220	3,611	3.09	5.1	45
L11	A62 Southgate, SB, north of St Peter's Street, SP	13,882	14,812	15,008	3.07	9.6	20
L12	A62 Southgate, SB, north of Kirkgate, SP	13,882	14,812	15,008	3.07	17.4	20
L13	A62 Southgate, SB, south of Kirkgate	13,882	14,812	15,008	3.07	9.0	30
L14	A62 Southgate, SB, south of Kirkgate, SP	13,882	14,812	15,008	3.07	19.2	20
L15	A62 Southgate, NB, south of Sainbury's petrol station, SP	8,245	8,804	8,997	3.07	8.8	20
L16	A62 Southgate, NB, north of Sainbury's petrol station, SP	8,245	8,804	8,997	3.07	8.8	20
L17	A62 Southgate, NB, south of Kirkgate, SP	8,245	8,804	8,997	3.07	9.5	20
L18	A62 Southgate, NB, north of Kirkgate, SP	8,245	8,804	8,997	3.07	6.7	20
L19	A62 Southgate, NB, south of Northumberland Street, SP	8,245	8,804	8,997	3.07	10.2	20
L20	A62 Southgate, NB, north of Northumberland Street	7,867	8,407	8,603	3.06	10.9	45
L21	A629 Wakefield Road, Eastbound (EB), west of B6432 St Andrews Road	17,124	17,994	18,092	3.50	10.5	45
L22	A629 Wakefield Road, EB, west of B6432 St Andrews Road, SP	17,124	17,994	18,092	3.50	8.6	20

Link		24-hour AADT Flow			HDV Proportion of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		Verif.	2031 DM	2031 DS			
L23	A629 Wakefield Road, EB, east of B6432 St Andrews Road	17,124	17,994	18,092	3.50	9.4	45
L24	A629 Wakefield Road, Westbound (WB), west of B6432	17,242	18,118	18,214	2.97	10.4	45
L25	A629 Wakefield Road, WB, SP	17,242	18,118	18,214	2.97	10.4	20
L26	A62 Queensgate, SB, north of Zetland Street	10,454	10,985	11,083	2.33	7.6	45
L27	A62 Queensgate, SB, north of Zetland Street, SP	10,454	10,985	11,083	2.33	7.5	20
L28	A62 Queensgate, SB, south of Zetland Street	10,454	10,985	11,083	2.33	7.6	45
L29	A62 Queensgate, NB, south of Zetland Street	15,592	16,384	16,481	1.82	7.2	45
L30	A62 Queensgate, NB, south of Zetland Street, SP	15,592	16,384	16,481	1.82	6.7	20
L31	A62 Queensgate, NB, north of Zetland Street	15,592	16,384	16,481	1.82	7.6	45
L32	A62 Queensgate, NB, north of Zetland Street, SP	15,592	16,384	16,481	1.82	11.9	20
R1	A62 Roundabout	27,513	29,032	29,292	3.50	10.6	20
L33	A629 Wakefield Road, WB, east of B6432, SP	17,242	18,118	18,214	2.97	10.4	20

Reference should be made to Figure 10 for a graphical representation of the road link locations.

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (EFT) (version 14.2). This has been produced by DEFRA and incorporates COPERT 5.8 vehicle emission factors and fleet information.

Meteorological Data

Meteorological data used in the assessment was taken from Leeds Bradford Airport meteorological station over the period 1st January 2024 to 31st December 2024 (inclusive). Leeds Bradford Airport is located at NGR: 422676, 441150, which is approximately 25.5km north-east of the development. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

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 9 for a wind rose of utilised meteorological data.

Roughness Length

The z_0 is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 0.5m was used to describe the modelling extents. This value is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'parklands, open suburbia'.

A z_0 of 0.3m was used to describe the meteorological site. This value is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'agricultural areas (max)'.

Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used to describe both the modelling extents and the meteorological site. This value is considered appropriate for the nature of both areas and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

Background Concentrations

Annual mean NO_2 , PM_{10} and $\text{PM}_{2.5}$ background concentrations for the opening year of 2031 were obtained from the DEFRA mapping study for the grid square containing the site, NGR: 414500, 416500, as shown in Table 11. These were used to represent baseline conditions without the contribution from road vehicle exhaust emissions.

NO_x to NO_2 Conversion

Predicted annual mean NO_x concentrations were converted to NO_2 concentrations using the spreadsheet (version 9.1) provided by DEFRA, which is the method detailed within DEFRA guidance [5].

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 the assessment, model verification was undertaken for 2024 using traffic data, meteorological data and monitoring results from this year.

Monitoring of NO₂ concentrations was undertaken at three locations within the vicinity of roads included within the model during 2024. The results for the monitors were obtained and the road contributions to total NO_x concentrations calculated following the methodology contained within DEFRA guidance [5]. The monitored annual mean NO₂ concentrations and calculated road NO_x concentrations are summarised in Table A1.2.

Table A1.2: NO_x Verification - Monitoring Results

Monitoring Location		Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
28	Southgate (Ring Road), Huddersfield – Lamp Post 019 - Near Oldgate Car Park	38.10	58.71
143	outside 33 Queensgate at Zetland Street	28.90	31.63
148	Triplicate 1 - 5 Southgate, Huddersfield, LC005	29.90	34.34

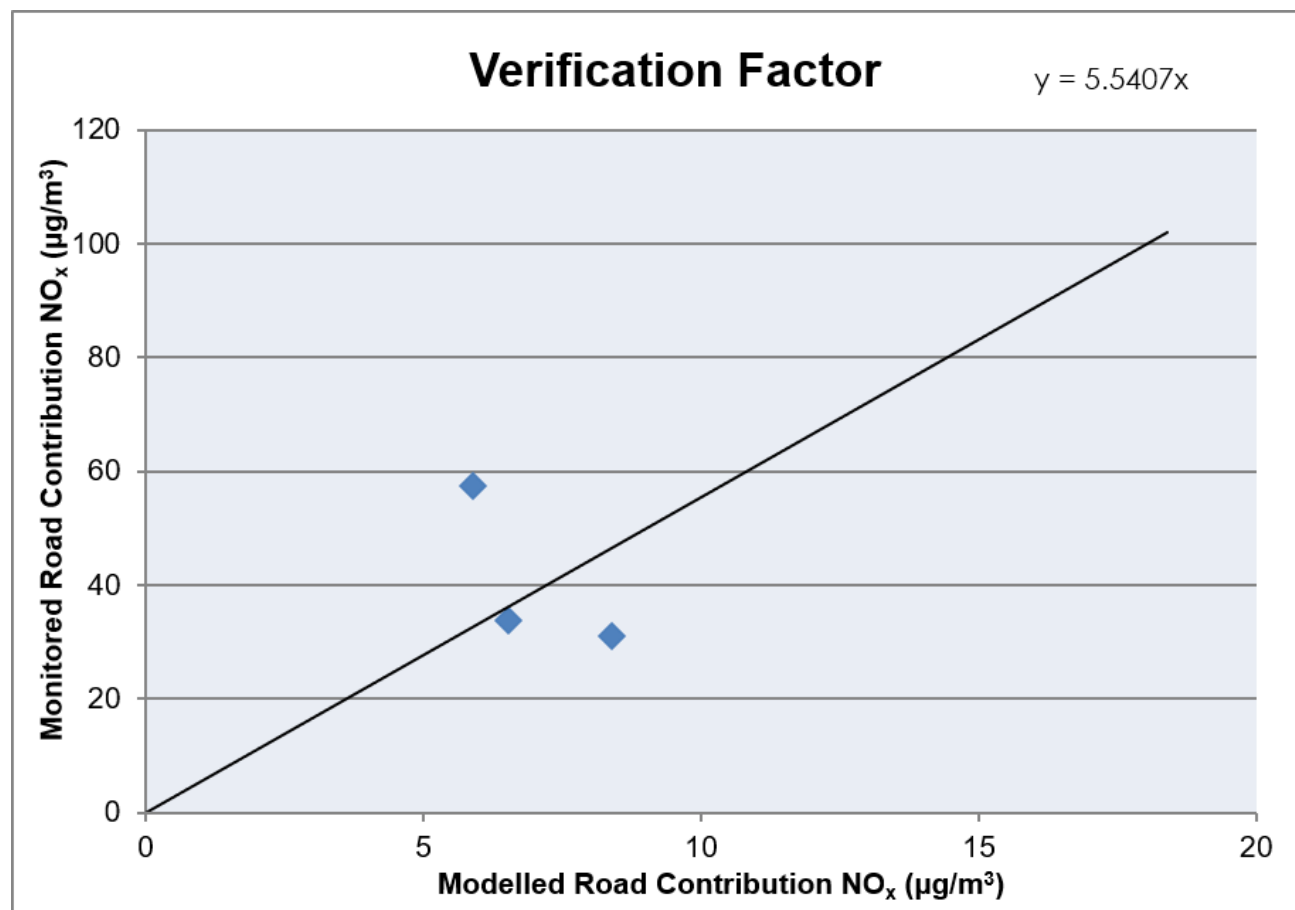
The annual mean road NO_x concentrations predicted from the dispersion model and the 2024 road NO_x concentrations calculated from the monitoring results are summarised in Table A1.3.

Table A1.3: NO_x Verification - Modelling Results

Monitoring Location		Calculated Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)
28	Southgate (Ring Road), Huddersfield – Lamp Post 019 - Near Oldgate Car Park	58.71	5.88
143	outside 33 Queensgate at Zetland Street	31.63	8.41
148	Triplicate 1 - 5 Southgate, Huddersfield, LC005	34.34	6.52

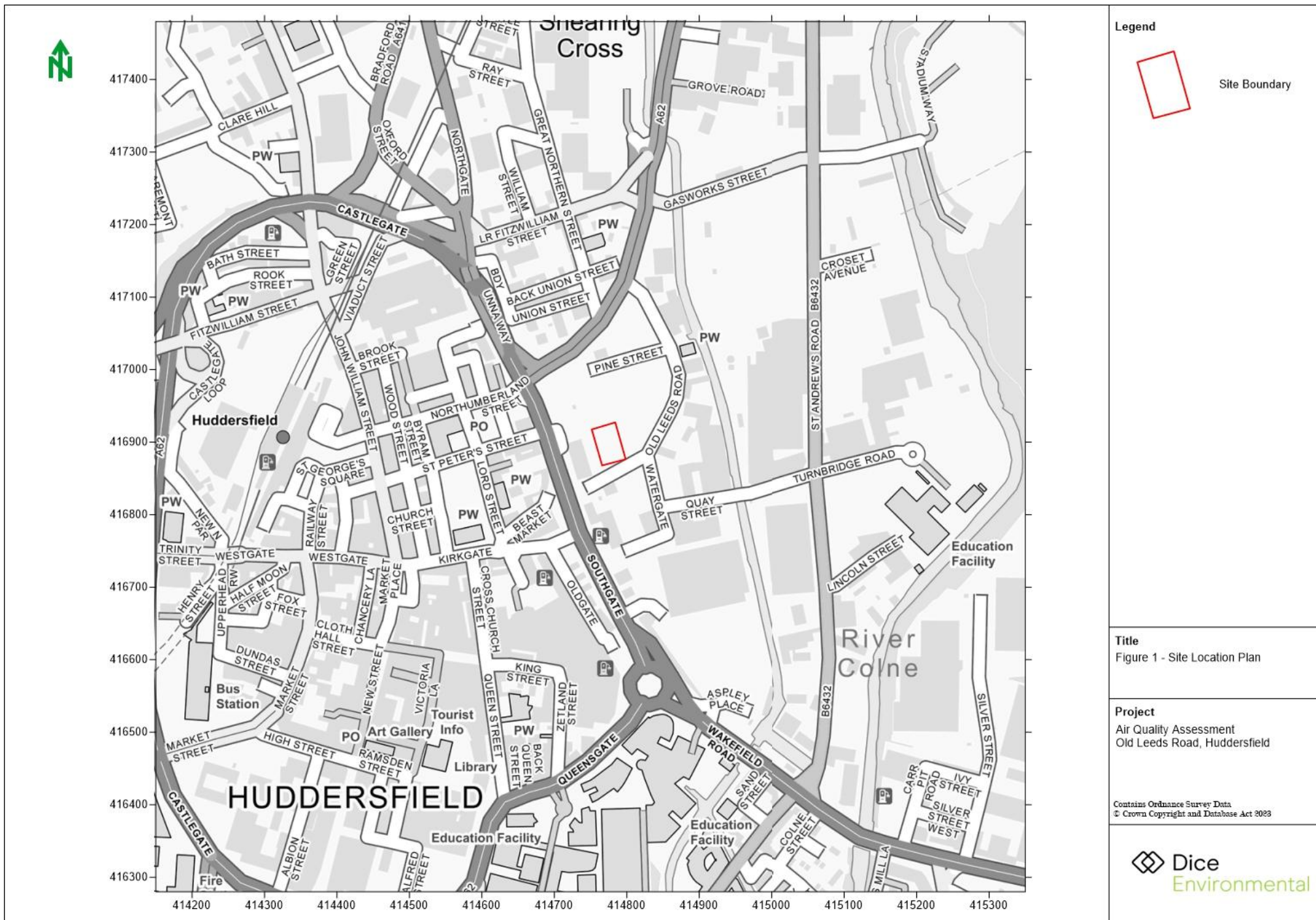
The monitored and modelled road NO_x concentrations were graphed and the equation of the trendline based on linear progression through zero calculated. This indicated that a verification factor of 5.6498 was required to be applied to all modelling results, as shown in Graph 1.

Graph 1: NO_x Verification Factor



Monitoring of PM₁₀ and PM_{2.5} concentrations is not undertaken within the assessment extents. The NO_x verification factor was therefore used to adjust model predictions of these species in lieu of more accurate data in accordance with DEFRA guidance.

Appendix IV – Figures

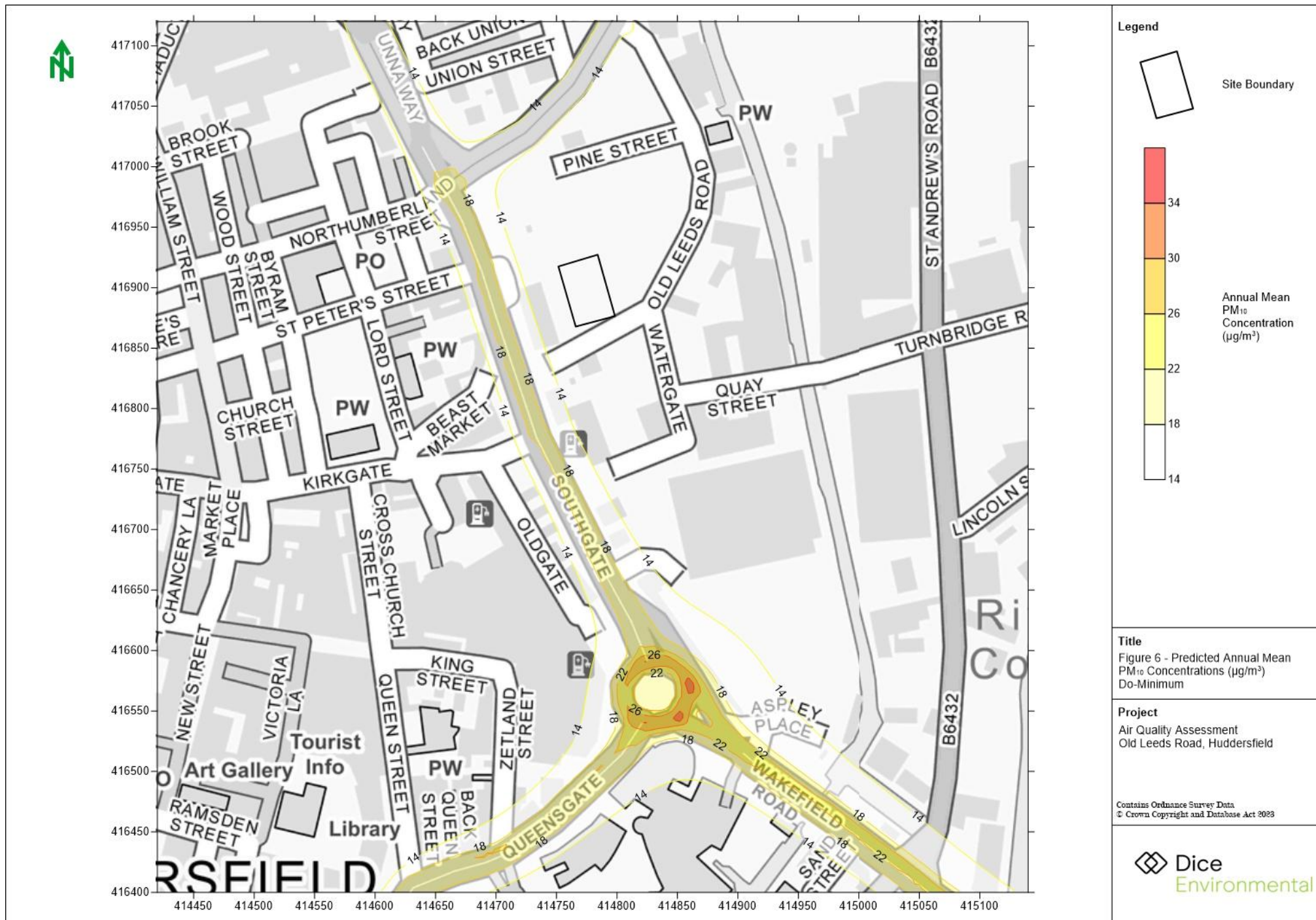








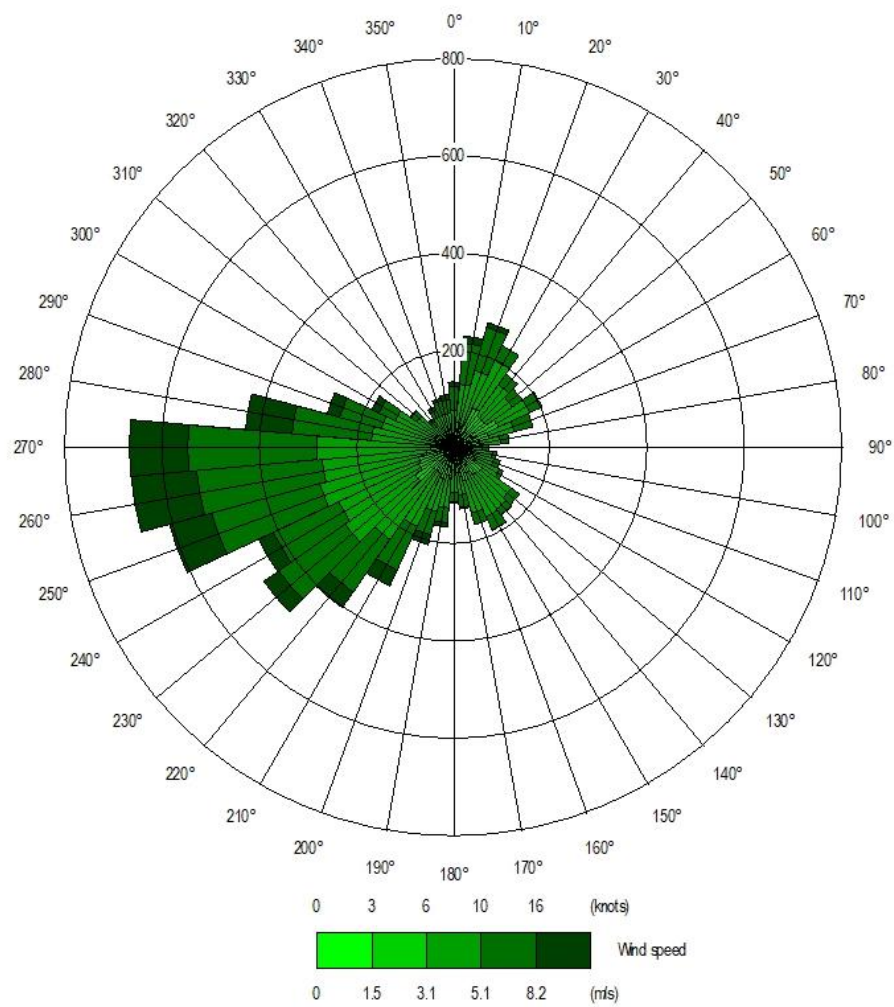












Legend

Title

Figure 11 - Wind Rose of Leeds
Bradford Airport 2024 Meteorological
Data

Project

Air Quality Assessment
Old Leeds Road, Huddersfield

Appendix V – Bibliography

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