# Air Quality Assessment

## Heybeck Lane, Chidswell

Presented to **CC Projects**

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Delta-Simons Project No. 18-0864.02

deltasimons

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# Report Details

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|---|---|
| **Client** | CC Projects |
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| **Site Address** | Heybeck Lane, Chidswell |
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| **Delta-Simons Contact** | Simon Johnson |

# Quality Assurance

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# About us

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Specialising in Environment, Health & Safety and Sustainability, Delta-Simons provide support and advice within the property development, asset management, corporate and industrial markets. Operating from ten locations - Lincoln, Birmingham, Bristol, Dublin, Leeds, London, Manchester, Newcastle, Norwich and Nottingham - we employ over 100 environmental professionals, bringing experience from across the private consultancy and public sector markets.

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This report has been prepared by Redmore Environmental as term framework suppliers of Air Quality services to and on behalf of Delta-Simons.

# Executive Summary

| | |
|---|---|
| **Site and Report Context** | Delta-Simons was instructed by CC Projects to undertake the preparation of an Air Quality Assessment in support of the planning application for a residential development on land off Heybeck Lane, Chidswell.<br><br>The proposals comprise construction of 181 residential units and associated infrastructure.<br><br>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 Site during operation, as well as expose future residents to elevated pollution levels. As such, an Air Quality Assessment was required in order to determine baseline conditions, consider location suitability for the proposed end use and assess potential effects as a result of the scheme. |
| **Summary** | Potential construction phase air quality impacts from fugitive dust emissions were assessed as a result of earthworks, construction and trackout activities. It is considered that the use of good practice control measures would provide suitable mitigation for a development of this size and nature and reduce potential impacts to an acceptable level.<br><br>Potential operational phase impacts from vehicle exhaust emissions were assessed by predicting air quality conditions at sensitive locations both with and without the development in place. Results were subsequently verified using local monitoring data. Further to this, dispersion modelling was undertaken in order to predict pollutant concentrations across the proposed Site as a result of emissions from the highway network.<br><br>Review of the dispersion modelling results indicated that predicted air quality impacts as a result of traffic generated by the development were **not significant** at any sensitive location in the vicinity of the Site.<br><br>The results of the assessment also demonstrated that predicted pollution levels were below the relevant air quality standards across the development. As such, the Site is considered suitable for the proposed end use from an air quality perspective. |
| **Conclusions and Recommendations** | Based on the assessment results, air quality factors are not considered a constraint to planning consent for the proposal. |
| This is intended as a summary only. Further detail and limitations of the assessment is provided within the main body of the Report. | |

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## Appendices

# 1 Introduction

## 1.1 Appointment

Delta-Simons Environmental Consultants Limited ("Delta-Simons"), working with our approved technical specialist Redmore Environmental Ltd, was instructed by CC Projects (the "Client") to undertake the preparation of an Air Quality Assessment in support of the planning application for a residential development on land off Heybeck Lane, Chidswell (the "Site"). Reference should be made to Figure 1 for a map of the Site and surrounding area.

## 1.2 Context & Purpose

The proposals comprise construction of 181 residential dwellings and associated infrastructure 'the Proposed Development'.

The scheme has the potential to cause air quality impacts at sensitive locations. These may include fugitive dust emissions associated with construction works and road traffic exhaust emissions from vehicles travelling to and from the development during the operational phase. Future residents may also be exposed to any existing air quality issues at the Site. An Air Quality Assessment was therefore undertaken in order to determine baseline conditions and consider potential effects as a result of the proposals.

## 1.3 Scope of Works

The scope of works undertaken for this assessment was:

- Baseline assessment - determination of existing air quality conditions in the vicinity of the Site;
- Construction phase assessment - determination of potential impacts as a result of dust emissions during the construction of the proposed development;
- Dispersion modelling - prediction of ambient pollutant concentrations at sensitive locations through dispersion modelling of atmospheric emissions from the local road network;
- Operational phase road vehicle exhaust emission assessment - calculation of the change in pollutant concentrations as a result of road vehicle exhaust emissions associated with traffic generated by the development during the operational phase to determine the potential for significant air quality impacts; and,
- Operational phase exposure assessment - comparison of predicted concentrations with the relevant criteria to determine the suitability of the Site for residential use.

## 1.4 Limitations

The standard limitations associated with this assessment are presented in Appendix A.

# 2 Legislation and Policy

## 2.1 European Directives

European Union (EU) air quality legislation is provided within Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidated previous legislation which was designed to deal with specific pollutants in a consistent manner and provided new Air Quality Limit Values (AQLVs) for particulate matter with an aerodynamic diameter of less than 2.5µm. The consolidated Directives include:

- Directive 1999/30/EC - the First Air Quality "Daughter" Directive - sets ambient AQLVs for nitrogen dioxide ($NO_2$), oxides of nitrogen ($NO_x$), sulphur dioxide, lead and particulate matter with an aerodynamic diameter of less than 10µm ($PM_{10}$);
- Directive 2000/69/EC - the Second Air Quality "Daughter" Directive - sets ambient AQLVs for benzene and carbon monoxide; and,
- Directive 2002/3/EC - the Third Air Quality "Daughter" Directive - seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

The fourth daughter Directive was not included within the consolidation and is described as:

- Directive 2004/107/EC - sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

## 2.2 UK Legislation

The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and transpose EU Directive 2008/50/EC into UK law. AQLVs were published in these regulations for 7 pollutants, as well as Target Values for an additional 5 pollutants.

Part IV of the Environment Act (1995) requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by the Department for Environment, Food and Rural Affairs (DEFRA, July 2007[1]). The AQS sets out Air Quality Objectives (AQOs) that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

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

| Pollutant | Air Quality Objective | |
|---|---|---|
| | Concentration (µg/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 |

**Table 1: Air Quality Objectives**

[1] The AQS for England, Scotland, Wales and Northern Ireland, DEFRA, 2007.

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

| Averaging Period | Objective Should Apply At | Objective Should Not Apply At |
|---|---|---|
| Annual mean | All locations where members of the public might be regularly exposed<br>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<br>Hotels, unless people live there as their permanent residence<br>Gardens of residential properties<br>Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term |
| 24-hour Mean | All locations where the annual mean objectives would apply, together with hotels<br>Gardens of residential properties | Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term |
| 1-hour Mean | All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets)<br>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<br>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 |

**Table 2: Examples of Where Air Quality Objectives Apply**

## 2.3 Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (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 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. Reference should be made to section 3.2 for a review of the LAQM process to date in the vicinity of the Site.

[2] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

## 2.4 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 unclear 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). Enforcement can insist that there be no dust beyond the boundary of the works. 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 practice measures.

## 2.5 National Planning Policy

The revised National Planning Policy Framework[3] (NPPF) was published in June 2019 and 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 achievement 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 contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."*

Chapter 15 of the NPPF details objectives in relation to conserving and enhancing the natural environment. It states that:

*"Planning policies and decisions should contribute to and enhance the natural and local environment by:*

*[…]*

*e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality […]"*

The NPPF specifically recognises air quality as part of delivering sustainable development and states that:

*"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."*

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

[3] NPPF, Ministry of Housing, Communities and Local Government, 2019.

## 2.6 National Planning Practice Guidance

The National Planning Practice Guidance[4] (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 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 considerations be relevant to the 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.

## 2.7 Local Planning Policy

The Kirklees Local Plan (KLP)[5] was adopted by Kirklees Council (KC) on 27th February 2019. The KLP sets out the spatial vision and strategy for the development of Kirklees for the period up to 2031 and is used to guide decisions on planning, development and regeneration.

A review of the KLP indicated the following policies in relation to air quality that are relevant 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 unacceptably affect or cause a nuisance to the national or build 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 to unsafe levels must incorporate sustainable mitigation measures that reduce this impact to a safe level. If sustainable measures cannot be introduced the development will not be permitted.*

[4] http://planningguidance.planningportal.gov.uk.
[5] KLP, KC, 2019.

*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."*

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

# 3 Baseline

## 3.1 Introduction

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

## 3.2 Local Air Quality Management

As required by the Environment Act (1995), KC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual mean concentrations of $NO_2$ and 24-hour mean $PM_{10}$ concentrations are above the AQOs within the borough. As such, nine AQMAs have been declared. The closest to the Site is Kirklees AQMA 5, which was declared due to exceedances of the annual mean $NO_2$ AQO and is described as follows:

*"The designated area incorporates Leeds Road (A653), Dewsbury Ring Road (A638), Wakefield Road (A638), Highgate Road, Highgate Terrace, Bank Street and Old Bank Road, which is in close proximity to Dewsbury Town Centre."*

The development is located approximately 2.9km north-east of 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 within the AQS are currently below the relevant AQOs. As such, no further AQMAs have been designated.

## 3.3 Air Quality Monitoring

Monitoring of pollutant concentrations is undertaken by KC throughout their area of jurisdiction. Recent results recorded in the vicinity of the development are shown in Table 3. Exceedances of the relevant AQO are shown in **bold**.

| Monitoring Site | | Monitored $NO_2$ Concentration ($\mu g/m^3$) | | |
|---|---|---|---|---|
| | | 2016 | 2017 | 2018 |
| 4 | Princess Street, Batley | 32.68 | 25.20 | 28.47 |
| 20 | Rockley Street, Dewsbury | 36.20 | 35.69 | 33.96 |
| 39 | Bradford Road, Batley | 39.30 | 36.41 | 30.47 |
| 40 | Leeds Road, Dewsbury | **54.40** | **53.44** | **52.40** |
| 42 | Leeds Road, Dewsbury - 2 | **43.60** | **45.94** | 39.60 |
| 43 | John Street, Dewsbury | **43.00** | 38.59 | **42.93** |
| 44 | Calmswood Road, Eastborough | 32.20 | 34.44 | 35.07 |
| 54 | Wakefield Road, Dewsbury | 39.00 | 35.00 | 33.87 |

**Table 3: Monitoring Results - KC**

As shown in Table 3, annual mean $NO_2$ concentrations were above the AQO, as detailed within Table 1, at several sites between 2016 and 2018. As the monitors are positioned at roadside locations, exceedances would be expected.

The development Site is located approximately 120m south-east of Leeds City Council's (LCC's) administrative extents. LCC also undertake monitoring of pollutant concentrations in the vicinity of the development. Recent results are shown in Table 4.

| Monitoring Site | | Monitored $NO_2$ Concentration ($\mu g/m^3$) | | |
|---|---|---|---|---|
| | | 2016 | 2017 | 2018 |
| D151 | 2 Bradford Road | 30 | 32 | 28 |
| D153 | 3 Oban Terrace | 34 | 30 | 29 |
| D154 | The Brambles, Bradford Road | 36 | 31 | 28 |

**Table 4: Monitoring Results - LCC**

As shown in Table 4, annual mean $NO_2$ concentrations were below the AQO at all LCC monitoring sites during recent years.

KC and LCC do not undertake $PM_{10}$ monitoring within the vicinity of the Site.

Reference should be made to Figure 2 for a map of the survey positions.

## 3.4 Background Pollutant Concentrations

Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA. These maps cover the entire of the UK to assist LAs in their Review and Assessment of air quality. The Proposed Development is partially located in two grid squares. Data for these locations was downloaded from the DEFRA website[6] for the purpose of the project. This data is summarised in Table 5.

| NGR (m) | Predicted Background Pollutant Concentration ($\mu g/m^3$) | | | | | |
|---|---|---|---|---|---|---|
| | $NO_2$ | | | $PM_{10}$ | | |
| | 2018 | 2020 | 2030 | 2018 | 2020 | 2030 |
| 426500, 424500 | 14.82 | 13.64 | 10.69 | 14.07 | 13.88 | 13.49 |
| 427500, 424500 | 13.93 | 12.82 | 9.95 | 11.95 | 11.69 | 11.28 |

**Table 5: Predicted Background Pollutant Concentrations**

As shown in Table 5, predicted background $NO_2$ and $PM_{10}$ concentrations are below the relevant AQOs at the development Site.

[6] http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017.

# 4 Methodology

## 4.1 Introduction

The Proposed Development has the potential to cause the following impacts:

- Exposure of existing receptors to fugitive dust emissions as a result of construction phase activities;
- Increase pollution levels at sensitive receptors as a result of exhaust emissions associated with vehicle trips produced by future residents travelling to and from the Site; and,
- Exposure of future occupants to poor air quality should elevated pollution levels be experienced at the Site.

These issues were assessed in accordance with the following methodology, which was agreed with Andrew Jameson, Air Quality Officer at KC, on 29th August 2018.

## 4.2 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 V1.1'[7] .

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

- Earthworks;
- Construction; and,
- Trackout.

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

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

The assessment steps are detailed below.

### Step 1

Step 1 screens requirement for a more detailed assessment. Should human receptors be identified within 350m from the boundary or 50m from the construction vehicle route up to 500m 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 500m 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

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,

[7] Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

- The sensitivity of the are 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 defined the potential magnitude of dust emissions through the construction phase. The relevant criteria are summarised in Table 6.

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

**Table 6: Construction Dust - Magnitude of Emission**

Step 2B defines the sensitivity of the area around the development to potential dust impacts. The influencing factors are shown in Table 7.

| Receptor Sensitivity | Examples | |
|---|---|---|
| | Human Receptors | Ecological Receptors |
| High | Users expect high levels of amenity<br>High aesthetic or value property<br>People expected to be present continuously for extended periods of time<br>Locations where members of the public are exposed over a time period relevant to the AQO for $PM_{10}$ e.g. residential properties, hospitals 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<br>Aesthetics or value of their property could be diminished by soiling<br>People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work | Nationally designated site e.g. Sites of Special Scientific Interest |
| Low | Enjoyment of amenity would not reasonably be expected<br>Property would not be expected to be diminished in appearance<br>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 |

**Table 7: Construction Dust - Examples of Factors Defining Sensitivity of an Area**

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

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

These factors were considered in the undertaking of this assessment.

The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in Table 8.

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

**Table 8: Construction Dust - Sensitivity of the Area to Dust Soiling Effects on People and Property**

Table 9 outlines the criteria for determining the sensitivity of the area to human health impacts.

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

| Receptor Sensitivity | Background Annual Mean $PM_{10}$ Concentration | Number of Receptors | Distance from the Source (m) | | | | |
|---|---|---|---|---|---|---|---|
| | | | Less than 20 | Less than 50 | Less than 100 | Less than 200 | Less than 350 |
| | | 1 - 10 | Low | Low | Low | Low | Low |
| Low | - | 1 or more | Low | Low | Low | Low | Low |

**Table 9: Construction Dust - Sensitivity of the Area to Human Health Impacts**

Table 10 outlines the criteria for determining the sensitivity of the area to ecological impacts.

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

**Table 10: Construction Dust - Sensitivity of the Area to Ecological Impacts**

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

Table 11 outlines the risk category from earthworks and construction activities.

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

**Table 11: Construction Dust - Dust Risk Category from Earthworks and Construction Activities**

Table 12 outlines the risk category from trackout activities.

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

**Table 12: Construction Dust - Dust Risk Category from Trackout Activities**

### Step 3

Step 3 requires the identification of site specific mitigation measures within the IAQM guidance[8] 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.

[8] Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

### Step 4

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

The determination of significance relies on professional judgement and reasoning should be provided as far as practicable. The IAQM guidance suggests the provision of details of the assessor's qualifications and experience. These can be provided upon request.

## 4.3 Operational Phase Assessment

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

- 2018 - Verification;
- Opening year Do-Minimum (DM) (predicted traffic flows in 2030 should the proposals not proceed); and,
- Opening year Do-Something (DS) (predicted traffic flows in 2030 should the proposals be completed).

The dispersion modelling inputs are outlined in the following sections.

### Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 4.1.1.0). ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

#### Assessment Area

Ambient concentrations were predicted over the area NGR: 426645, 423930 to 427410, 424695. One Cartesian grid was used within the model to produce data suitable for contour plotting using the Surfer software package. Reference should be made to Figure 3 for a graphical representation of the assessment grid extents.

#### Traffic Flow Data

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

Traffic data was not available for the M62, M1 and the A638 Rishworth Road as they were outside the extents of the Transport Assessment. As such, flows for these links were obtained from the Department for Transport (DfT)[9]. 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 1999 to 2018. It should be noted that the DfT web tool is referenced in DEFRA guidance[10] as being a suitable source of data for air quality assessments and it is therefore in this context, considered to provide a reasonable estimate of traffic flows in the vicinity of the Site.

[9] https://roadtraffic.dft.gov.uk/#16/51.4518/-0.9760/basemap-countpoints.
[10] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

It should be noted that the DM and DS scenarios include vehicle movements produced from a proposed large scale mixed use scheme known as 'Land to the East of Leeds Road, Chidswell', situated immediately to the south of the Site, as well as traffic growth associated with committed developments and allocated sites throughout Kirklees. As such, the assessment provides a robust prediction of future year traffic flows.

Road widths and vehicle speeds were estimated from aerial photography and UK highway design standards. A summary of the traffic data used in the assessment is provided in Table 13.

| Link | | 24-hour AADT Flow | | | HDV Prop. of Fleet (%) | Mean Vehicle Speed (km/h) | Road Width (m) |
|---|---|---|---|---|---|---|---|
| | | 2018 | 2030 DM | 2030 DS | | | |
| L1 | A653 Dewsbury Road Northbound (NB), North of M62 J28 | 32,457 | 31,601 | 34,162 | 3.83 | 65 | 7.0 |
| L2 | A653 Dewsbury Road Southbound (SB), North of M62 J28 | 13,739 | 12,969 | 13,810 | 3.74 | 65 | 11.5 |
| L3 | M62, East of Roundabout | 133,421 | 156,148 | 157,700 | 14.31 | 95 | 32.5 |
| L4 | M62, Between on and off Slip Roads | 95,562 | 111,751 | 111,751 | 14.71 | 95 | 26.5 |
| L5 | M62, West of Roundabout | 121,412 | 142,029 | 144,635 | 15.15 | 95 | 27.5 |
| L6 | M62, Westbound (WB) off slip | 17,164 | 18,030 | 18,494 | 14.60 | 65 | 6.5 |
| L7 | M62, Eastbound (EB) on slip | 16,718 | 4,799 | 5,887 | 7.82 | 65 | 6.5 |
| L8 | M62, EB off slip | 9,767 | 7,878 | 8,601 | 5.20 | 65 | 6.9 |
| L9 | M62, WB on slip | 7,748 | 10,111 | 11,995 | 9.10 | 65 | 4.0 |
| L10 | A650 Braford Road, South of Tingley Hall Rise | 32,115 | 34,479 | 34,638 | 3.43 | 65 | 12.5 |
| L11 | A650 Braford Road, North of Tingley Hall Rise | 32,115 | 34,479 | 34,638 | 3.43 | 65 | 19.1 |
| L12 | A650 Braford Road, Slow Phase (SP) | 32,115 | 34,479 | 34,638 | 3.43 | 20 | 18.8 |
| L13 | A650 Braford Road, EB from roundabout | 6,777 | 5,658 | 5,658 | 3.69 | 20 | 3.5 |
| L14 | A650 Braford Road, WB | 19,164 | 19,886 | 19,944 | 3.26 | 20 | 10.5 |
| L15 | A650 Braford Road, EB from across roundabout | 6,174 | 8,935 | 9,036 | 3.69 | 45 | 7.5 |
| L16 | A650 Braford Road, EB from across roundabout, SP | 6,174 | 8,935 | 9,036 | 3.69 | 20 | 7.5 |
| L17 | A650 Tingley Common EB, SP | 16,157 | 16,443 | 16,443 | 6.41 | 20 | 13.7 |
| L18 | A650 Tingley Common EB | 16,157 | 16,443 | 16,443 | 6.41 | 65 | 6.8 |
| L19 | A650 Tingley Common WB | 17,972 | 20,677 | 20,677 | 6.07 | 65 | 6.5 |
| L20 | A650 Tingley Common | 34,128 | 37,120 | 37,120 | 6.23 | 65 | 10.9 |
| L21 | A653 Dewsbury Road NB, South of Roundabout, SP | 22,400 | 20,805 | 26,438 | 5.00 | 20 | 10.5 |
| L22 | A653 Dewsbury Road NB, South of Roundabout | 22,400 | 20,805 | 26,438 | 5.00 | 65 | 7.0 |

| Link | | 24-hour AADT Flow | | | HDV Prop. of Fleet (%) | Mean Vehicle Speed (km/h) | Road Width (m) |
|---|---|---|---|---|---|---|---|
| | | 2018 | 2030 DM | 2030 DS | | | |
| L23 | A653 Dewsbury Road SB, South of Roundabout | 10,545 | 14,230 | 16,315 | 3.84 | 65 | 7.0 |
| L24 | A653 Dewsbury Road SB, South of Roundabout, SP | 10,545 | 14,230 | 16,315 | 3.84 | 20 | 10.1 |
| L25 | A653 Dewsbury Road, South of Lowry Road, SP | 28,660 | 34,363 | 42,082 | 4.43 | 35 | 22.5 |
| L26 | A653 Dewsbury Road, Between Hesketh Lane and Rein Road | 28,660 | 34,363 | 42,082 | 4.43 | 55 | 14.8 |
| L27 | A653 Dewsbury Road, Between Hesketh Lane and Rein Road, SP | 28,660 | 34,363 | 42,082 | 4.43 | 20 | 15.5 |
| L28 | A653 Dewsbury Road, South of Rein Road, SP | 30,452 | 38,746 | 47,406 | 4.43 | 20 | 16.2 |
| L29 | A653 Dewsbury Road, South of Rein Road | 30,452 | 38,746 | 47,406 | 4.43 | 65 | 14.2 |
| L30 | A653 Dewsbury Road, North of Soothill Lane, SP | 30,452 | 38,746 | 47,406 | 4.43 | 20 | 18.2 |
| L31 | Syke Road | 8,393 | 9,719 | 9,719 | 3.25 | 45 | 7.1 |
| L32 | Syke Road. SP | 8,393 | 9,719 | 9,719 | 3.25 | 20 | 7.5 |
| L33 | A6029 Rein Road, SP | 12,412 | 14,359 | 15,300 | 2.20 | 20 | 7.5 |
| L34 | A6029 Rein Road | 12,412 | 14,359 | 15,300 | 2.20 | 35 | 6.5 |
| L35 | M62 Roundabout | 16,398 | 16,002 | 17,288 | 5.86 | 35 | 10.2 |
| L36 | Batley Road | 8,079 | 12,280 | 12,865 | 1.24 | 45 | 7.1 |
| L37 | Batley Road, East of Heybeck Lane Site Access | 8,079 | 12,280 | 12,865 | 1.24 | 45 | 7.7 |
| L38 | Batley Road, West of Heybeck Lane Site Access | 8,079 | 13,807 | 14,392 | 1.24 | 20 | 7.7 |
| L39 | Soothill Lane, SP | 11,424 | 12,575 | 14,981 | 3.42 | 20 | 8.3 |
| L40 | Soothill Lane | 11,424 | 12,575 | 14,981 | 3.42 | 45 | 8.5 |
| L41 | Soothill Lane, West of Manor Farm Drive | 11,424 | 12,575 | 14,981 | 3.42 | 45 | 8.2 |
| L42 | A653 Leeds Road NB, Between Soothill Lane and Site Access 1, SP | 14,615 | 20,237 | 26,063 | 3.07 | 25 | 9.3 |
| L43 | A653 Leeds Road NB, Between Soothill Lane and Site Access 1 | 14,615 | 20,237 | 26,063 | 3.07 | 45 | 7.0 |
| L44 | A653 Leeds Road NB, Between Site Access 2 and Site Access 2 | 14,293 | 18,747 | 24,396 | 2.97 | 45 | 7.0 |
| L45 | A653 Leeds Road NB, Between Chidswell Lane and Site Access 2 | 13,971 | 17,257 | 21,994 | 2.87 | 45 | 7.0 |

| Link | | 24-hour AADT Flow | | | HDV Prop. of Fleet (%) | Mean Vehicle Speed (km/h) | Road Width (m) |
|---|---|---|---|---|---|---|---|
| | | 2018 | 2030 DM | 2030 DS | | | |
| L46 | A653 Leeds Road NB, South of Chidswell Lane | 12,955 | 15,944 | 20,184 | 5.49 | 45 | 7.0 |
| L47 | A653 Leeds Road SB, Between Soothill Lane and Site Access 2, SP | 14,615 | 20,237 | 26,063 | 3.07 | 35 | 6.6 |
| L48 | A653 Leeds Road SB, Between Soothill Lane and Site Access 1 | 14,615 | 20,237 | 26,063 | 3.07 | 45 | 7.0 |
| L49 | A653 Leeds Road SB, Between Site Access 1 and Site Access 2 | 14,293 | 18,747 | 24,396 | 2.97 | 45 | 7.1 |
| L50 | A653 Leeds Road SB, Between Chidswell Lane and Site Access 2 | 13,971 | 17,257 | 21,994 | 2.87 | 45 | 7.1 |
| L51 | A653 Leeds Road SB, South of Chidswell Lane | 12,955 | 15,944 | 20,184 | 5.49 | 45 | 7.1 |
| L52 | A653 Leeds Road, East of Owl Lane | 25,911 | 31,889 | 40,368 | 5.49 | 45 | 15.3 |
| L53 | A653 Leeds Road, East of Owl Lane | 25,911 | 31,889 | 40,368 | 5.49 | 35 | 9.2 |
| L54 | A653 Leeds Road, East of Owl Lane, SP | 25,911 | 31,889 | 40,368 | 5.49 | 25 | 9.2 |
| L55 | A653 Leeds Road, East of B6128 | 18,341 | 22,954 | 29,121 | 4.67 | 25 | 12.4 |
| L56 | B6128 Rouse Mill Lane, East of Rouse Mill | 13,421 | 14,918 | 17,967 | 6.92 | 45 | 7.1 |
| L57 | B6128 Rouse Mill Lane, East of Rouse Mill, SP | 13,421 | 14,918 | 17,967 | 6.92 | 25 | 9.8 |
| L58 | Rouse Mill Lane/Grange Road Roundabout | 6,711 | 7,459 | 8,984 | 6.92 | 25 | 10.1 |
| L59 | B6128 Grange Road, SP | 13,421 | 14,918 | 17,967 | 6.92 | 25 | 13.7 |
| L60 | B6128 Grange Road | 13,421 | 14,918 | 17,967 | 6.92 | 45 | 7.7 |
| L61 | B6128 Grange Road, Approach to Forest Way, SP | 13,421 | 14,918 | 17,967 | 6.92 | 25 | 10.2 |
| L62 | B6128 Grange Road/Challenge Way/Mill Forest Way Roundabout | 6,711 | 7,459 | 8,984 | 6.92 | 25 | 7.4 |
| L63 | B6128 Challenge Way, East of Mill Forest Way, SP | 13,421 | 14,918 | 17,967 | 6.92 | 25 | 10.5 |
| L64 | B6128 Challenge Way, East of Mill Forest Way | 13,421 | 14,918 | 17,967 | 6.92 | 45 | 7.3 |
| L65 | B6128 Challenge Way, North of A653 Leeds Road, SP | 13,421 | 14,918 | 17,967 | 6.92 | 25 | 16.0 |
| L66 | B6128, South of A653 Leeds Road, SP | 17,797 | 19,894 | 23,011 | 5.85 | 25 | 11.6 |
| L67 | B6128, South of A653 Leeds Road | 17,797 | 19,894 | 23,011 | 5.85 | 45 | 10.7 |
| L68 | B6128 Owl Lane Roundabout | 16,873 | 19,278 | 22,726 | 5.74 | 25 | 7.9 |

| Link | | 24-hour AADT Flow | | | HDV Prop. of Fleet (%) | Mean Vehicle Speed (km/h) | Road Width (m) |
|---|---|---|---|---|---|---|---|
| | | 2018 | 2030 DM | 2030 DS | | | |
| L69 | Owl Lane, South of Leeds Road, SP | 8,061 | 9,589 | 11,901 | 7.44 | 25 | 9.1 |
| L70 | Owl Lane | 8,061 | 9,589 | 11,901 | 7.44 | 45 | 8.1 |
| L71 | Owl Lane, North of B6128, SP | 8,061 | 9,589 | 11,901 | 7.44 | 25 | 11.3 |
| L72 | B6128, Between Owl Lane and Windsor Drive, SP | 24,761 | 28,352 | 33,265 | 5.10 | 25 | 12.9 |
| L73 | B6128, Between Owl Lane and Windsor Drive | 24,761 | 28,352 | 33,265 | 5.10 | 45 | 7.0 |
| L74 | B6128, Between Windsor Drive and Dewsbury Rams | 26,972 | 30,751 | 36,925 | 1.53 | 45 | 7.7 |
| L75 | B6128, Between Dewsbury Rams and Amberwood Chase | 26,947 | 30,868 | 35,743 | 1.53 | 45 | 7.7 |
| L76 | B6128, Between Amberwood Chase and A638 Chancery Road | 26,549 | 30,403 | 35,279 | 4.55 | 45 | 10.5 |
| L77 | B6128, Between Amberwood Chase and A638 Chancery Road, SP | 28,778 | 29,448 | 34,323 | 1.60 | 35 | 10.7 |
| L78 | B6128/A638 Chancery Road Roundabout | 22,688 | 22,813 | 24,764 | 5.37 | 35 | 8.5 |
| L79 | A653 Leeds Road, West of B6128, SP | 16,353 | 19,093 | 24,955 | 4.24 | 25 | 12.8 |
| L80 | A653 Leeds Road, West of B6128 | 16,353 | 19,093 | 24,955 | 4.24 | 45 | 9.8 |
| L81 | A653 Leeds Road, West of B6128 | 16,353 | 19,093 | 24,955 | 4.24 | 45 | 9.8 |
| L82 | A653 Leeds Road, East of A638, SP 1 | 16,353 | 19,093 | 24,955 | 4.24 | 20 | 9.7 |
| L83 | A653 Leeds Road, East of A638, SP 2 | 16,353 | 19,093 | 24,955 | 4.24 | 15 | 10.5 |
| L84 | A653 Leeds Road, East of A638, SP 3 | 16,353 | 19,093 | 24,955 | 4.24 | 15 | 10.2 |
| L85 | A653 Leeds Road, to and from A638 | 8,176 | 9,546 | 12,664 | 4.24 | 15 | 12.8 |
| L86 | A653 Leeds Road, SB to A638 | 4,088 | 4,680 | 4,680 | 4.24 | 15 | 7.6 |
| L87 | A653 Leeds Road, EB from A638 | 4,088 | 4,867 | 7,984 | 4.24 | 25 | 5.5 |
| L88 | A638 Dewsbury Ring Road, East of Bradford Road | 21,713 | 23,927 | 30,162 | 1.58 | 35 | 21.2 |
| L89 | A638 Dewsbury Ring Road, North of Leeds Road | 21,713 | 23,927 | 30,162 | 1.58 | 35 | 15.6 |
| L90 | A638 Dewsbury Ring Road, North of Leeds Road | 21,713 | 23,740 | 26,858 | 1.58 | 25 | 17.3 |
| L91 | A638 Dewsbury Ring Road, South of Leeds Road | 24,757 | 25,665 | 25,665 | 2.89 | 25 | 17.8 |

| Link | | 24-hour AADT Flow | | | HDV Prop. of Fleet (%) | Mean Vehicle Speed (km/h) | Road Width (m) |
|---|---|---|---|---|---|---|---|
| | | 2018 | 2030 DM | 2030 DS | | | |
| L92 | A638 Dewsbury Road, South of Leeds Road | 24,757 | 25,665 | 25,665 | 2.89 | 25 | 20.6 |
| L93 | A638 Rishworth Road | 14,427 | 16,871 | 17,046 | 4.90 | 35 | 17.1 |
| L94 | A638 Wakefield Road, East of Rishworth Road, SP | 25,553 | 26,528 | 26,702 | 8.04 | 25 | 16.8 |
| L95 | A638 Wakefield Road, East of Rishworth Road | 25,553 | 26,528 | 26,702 | 8.04 | 45 | 9.5 |
| L96 | A638 Chancery Road, West of B6128, Junction | 25,553 | 26,528 | 26,702 | 8.04 | 25 | 8.8 |
| L97 | A638 Chancery Road, West of B6128 | 25,553 | 26,528 | 26,702 | 8.04 | 60 | 9.2 |
| L98 | A638 Chancery Road, West of B6128, SP | 25,553 | 26,528 | 26,702 | 8.04 | 25 | 19.1 |
| L99 | A638 EB, East of B6128, SP | 19,418 | 21,591 | 23,538 | 8.03 | 25 | 7.8 |
| L100 | A638 EB, East of B6128 | 19,418 | 21,591 | 23,538 | 8.03 | 80 | 7.2 |
| L101 | A638 WB, East of B6128 | 19,418 | 21,591 | 23,538 | 8.03 | 80 | 7.2 |
| L102 | A638 WB, East of B6128 | 19,418 | 21,591 | 23,538 | 8.03 | 80 | 7.2 |
| L103 | A638 EB, East of M1 | 21,907 | 20,617 | 21,400 | 7.97 | 30 | 7.0 |
| L104 | A638 EB, West of Queens Drive | 21,907 | 20,617 | 21,400 | 7.97 | 30 | 12.6 |
| L105 | A638 EB, East of Queens Drive, SP | 43,814 | 41,234 | 42,800 | 7.97 | 30 | 17.1 |
| L106 | A638 EB, East of Queens Drive | 43,814 | 41,234 | 42,800 | 7.97 | 30 | 12.1 |
| L107 | A638 WB, East of M1 | 21,907 | 20,617 | 21,400 | 7.97 | 30 | 7.0 |
| L108 | M1, South of Junction | 107,610 | 125,924 | 127,397 | 10.00 | 95 | 40.8 |
| L109 | M1, Between Slip Roads | 89,272 | 104,394 | 104,394 | 9.75 | 95 | 32.7 |
| L110 | M1, North of Junction | 130,448 | 152,546 | 153,402 | 9.55 | 95 | 32.8 |
| L111 | M1 NB on slip | 23,688 | 22,668 | 23,313 | 11.90 | 65 | 6.7 |
| L112 | M1 SB off slip | 18,630 | 20,996 | 21,207 | 13.50 | 65 | 9.5 |
| L113 | M1 NB off slip | 11,647 | 13,293 | 13,732 | 11.30 | 65 | 6.3 |
| L114 | M1 SB on slip | 13,006 | 14,472 | 15,507 | 6.60 | 65 | 6.3 |
| L115 | M1 Roundabout | 18,703 | 19,481 | 20,454 | 9.43 | 35 | 9.2 |
| L116 | Chidswell Lane, Between A653 Leeds Road and Site Access 3, SP | 3,525 | 4,537 | 14,295 | 0.33 | 25 | 7.8 |
| L117 | Chidswell Lane, Between A653 Leeds Road and Site Access 3 | 3,525 | 4,537 | 14,295 | 0.33 | 35 | 7.5 |
| L118 | Chidswell Lane, Between Site Access 4 and Windsor Drive | 3,030 | 7,251 | 10,482 | 0.33 | 35 | 7.1 |

| Link | | 24-hour AADT Flow | | | HDV Prop. of Fleet (%) | Mean Vehicle Speed (km/h) | Road Width (m) |
|---|---|---|---|---|---|---|---|
| | | 2018 | 2030 DM | 2030 DS | | | |
| L119 | Chidswell Lane, Between Windsor Drive and Site Access 4 | 437 | 569 | 2,539 | 6.32 | 35 | 4.5 |
| L120 | Chidswell Lane, South of Site Access 4 | 437 | 569 | 2,539 | 6.32 | 35 | 3.5 |
| L121 | Cross Street | 437 | 569 | 2,539 | 6.32 | 35 | 6.5 |
| L122 | Windsor Road | 2,715 | 6,814 | 8,075 | 3.10 | 40 | 7.2 |
| L123 | Windsor Road, SP | 2,715 | 6,814 | 8,075 | 3.10 | 20 | 7.2 |
| L124 | B6128, South of A638 Chancery Road | 17,004 | 13,687 | 14,493 | 4.71 | 30 | 10.4 |
| L125 | B6128, South of Roundabout, SP | 17,004 | 13,687 | 14,493 | 4.71 | 20 | 11.7 |
| L126 | B6128, South of Roundabout | 17,004 | 13,687 | 14,493 | 4.71 | 45 | 10.5 |
| L127 | B6128 Roundabout | 8,502 | 6,844 | 7,246 | 4.71 | 35 | 7.4 |

**Table 13: Traffic Data**

Reference should be made to Figure 3 for a graphical representation of the road link locations.

### Emission Factors

In 2016, Air Quality Consultants Ltd (AQC) produced a spreadsheet entitled 'Calculator Using Realistic Emissions for Diesels' (CURED, versions V1A and V2A). This provided an alternative emissions calculator which took account of the large amount of evidence from real-world emissions tests showing that the European Environment Agency's COPERT and DEFRA's Emissions Factor Toolkit (EFT) were incorrect[11].

DEFRA released EFT (v8.0.1) in December 2017. This included COPERT 5 vehicle emission factors and fleet information, which now better reflect the predictions made by CURED V1A and V2A. However, AQC noted there remained some uncertainty regarding how well the future vehicle fleet will perform in the real world. As such, in January 2018 AQC released CURED V3A[12]. This has been formulated to simulate failure of Euro 6d to provide any benefits over and above those of Euro6c, providing a more pessimistic view of the performance of post-2019 diesel cars and vans.

In May 2019, DEFRA released EFT (v9.0). Whilst a new version of CURED has not yet been developed, AQC have released a technical note[13] providing a comparison of the new EFT (v9.0) with EFT (8.0.1) and CURED V3A. This concluded that the most recent version of CURED provides more pessimistic emission factors than both versions of the EFT. As such, CURED V3A was utilised in the dispersion modelling in order to provide a robust representation of future year $NO_x$ emission factors.

As $PM_{10}$ emission factors do not require adjustment, factors were calculated for the relevant traffic flows using the EFT (version 9.0) produced by DEFRA.

### Meteorological Data

Meteorological data used in the assessment was taken from Leeds Bradford International Airport meteorological station over the period 1st January 2018 to 31st December 2018 (inclusive). Leeds Bradford International Airport meteorological station is located at NGR: 422676, 441150, which is approximately 17.4km north-west of the

[11] Emissions of Nitrogen Oxides from Modern Diesel Vehicles, AQC, 2016.
[12] Emissions of Nitrogen Oxides from Modern Diesel Vehicles, AQC, 2016.
[13] Emissions of Nitrogen Oxides from Modern Diesel Vehicles, AQC, 2016.

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 4 for a wind rose of the utilised meteorological data.

### Roughness Length

The roughness length ($z_0$) 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 of $z_0$ is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'parkland, open suburbia'.

A $z_0$ of 0.3m was used to describe the meteorological site. This value of $z_0$ 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 the modelling extents and 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'.

### $NO_x$ to $NO_2$ Conversion

Predicted annual mean $NO_x$ concentrations were converted to $NO_2$ concentrations using the spreadsheet (version 7.1) provided by DEFRA, which is the method detailed within DEFRA guidance[14].

### 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 2018 using traffic data, meteorological data and monitoring results from this year.

Due to the large modelling extents and associated variation in local land uses and topography, two verification factors were produced for use in the assessment. These are described as follows:

- Verification Factor 1 - Calculated using the model inputs described previously, relevant background pollutant data obtained from the DEFRA maps and monitoring results from sites situated in LCC's administrative extents; and,

[14] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

- Verification Factor 2 - Calculated using the model inputs described previously, relevant background pollutant data obtained from the DEFRA maps and monitoring results from sites situated in KC's administrative extents.

The above factors were subsequently utilised to adjust road $NO_x$ concentrations at receptors most represented of the local land uses and topography surrounding the monitoring sites.

The background pollutant concentrations and monitoring results used to calculate the verification factors are provided in the following Sections.

Verification Factor 1

Background annual mean $NO_2$ and $PM_{10}$ concentrations were obtained from the DEFRA mapping study for the grid square containing diffusion tube D153 - 3 Oban Terrace, 427500, 426500.

Background levels of $NO_x$ and $NO_2$ were adjusted in accordance with the approach provided by AQC[15], which is to be adopted when using the CURED V3A emissions spreadsheet. This method uplifts the background concentrations predicted by DEFRA. The $NO_x$ and $NO_2$ concentrations before and after adjustment are outlined in Table 18. It should be noted that the motorway-in proportion of the background concentration was removed to avoid double-counting of these emissions.

| Pollutant | Predicted Background Pollutant Concentration (µg/m$^3$) | |
|---|---|---|
| | 2018 | 2030 |
| $NO_x$ - Unadjusted | - | 16.97 |
| $NO_x$ - Adjusted | - | 19.75 |
| $NO_2$ - Unadjusted | 18.02 | 12.28 |
| $NO_2$ - Adjusted | 18.90 | 14.76 |

**Table 14: Background $NO_2$ and $NO_x$ Concentrations - Verification Factor 1**

Adjustment of $PM_{10}$ concentrations is not required. As such, background levels were obtained from the DEFRA mapping study. These are shown in Table 20.

| Pollutant | Predicted Background Pollutant Concentration (µg/m$^3$) | |
|---|---|---|
| | 2018 | 2030 |
| $PM_{10}$ | 14.74 | 14.07 |

**Table 15: Background $PM_{10}$ Concentrations - Verification Factor 1**

LCC undertook monitoring of $NO_2$ concentrations at three locations along roads included in the model during 2018. Results were obtained and the road contributions to total $NO_x$ concentrations calculated following the methodology contained within DEFRA guidance[16]. The monitored annual mean $NO_2$ concentrations and calculated road $NO_x$ concentrations are summarised in Table 20.

| Monitoring Site | | Monitored $NO_2$ Concentration (µg/m$^3$) | Calculated Road $NO_x$ Concentration (µg/m$^3$) |
|---|---|---|---|
| D151 | 2 Bradford Road | 27.9 | 17.91 |
| D153 | 3 Oban Terrace | 28.9 | 19.99 |
| D154 | The Brambles, Bradford Road | 27.5 | 17.08 |

**Table 16: Verification Factor 1 - Monitoring Results**

[15] Adjusting Background $NO_2$ Maps for CURED, AQC, 2016.
[16] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

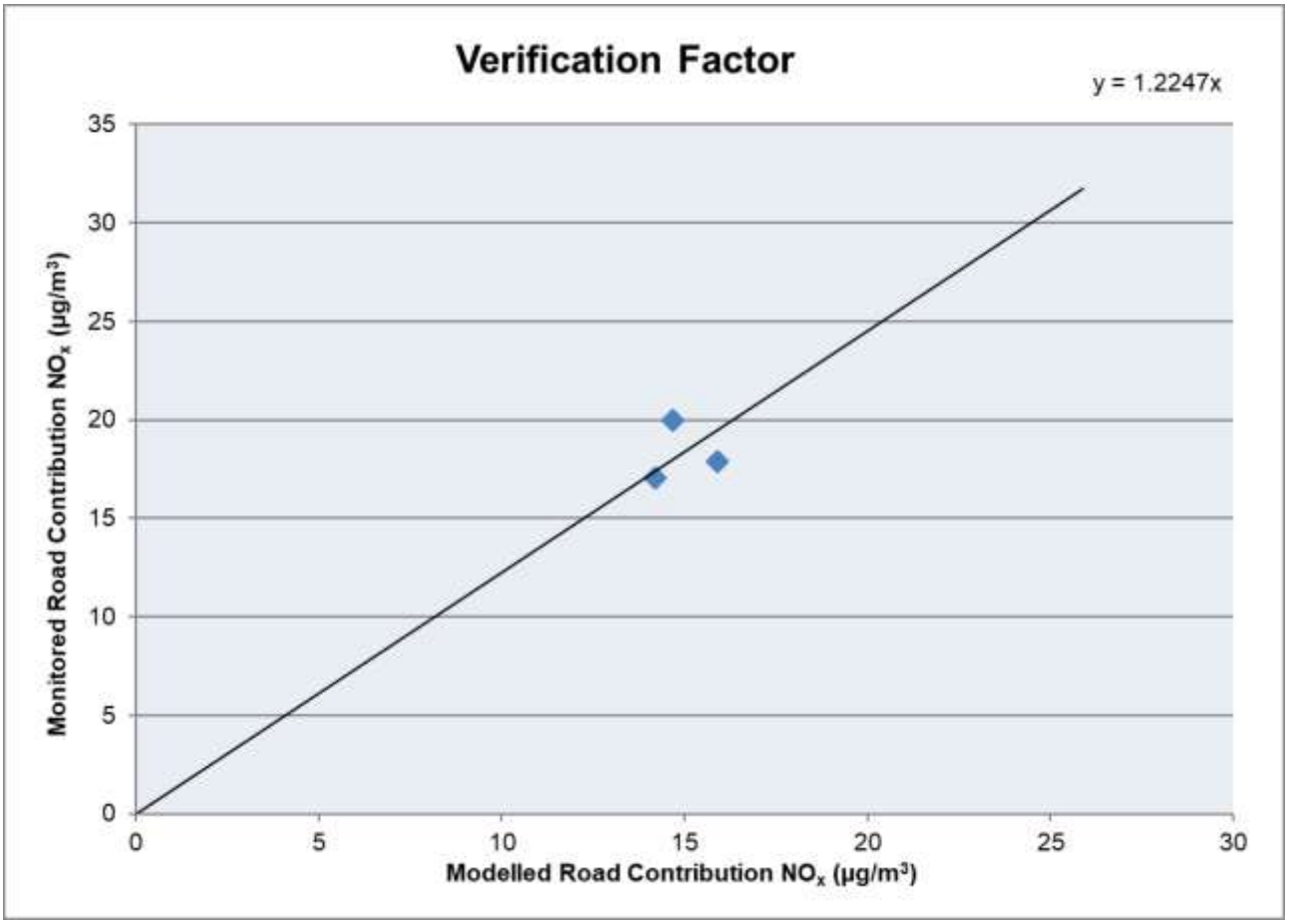
The annual mean road $NO_x$ concentrations predicted from the dispersion model and the road $NO_x$ concentrations calculated from the 2018 $NO_2$ monitoring results are summarised in Table 21.

| Monitoring Site | | Calculated Road $NO_x$ Concentration ($\mu g/m^3$) | Modelled Road $NO_x$ Concentration ($\mu g/m^3$) |
|---|---|---|---|
| D151 | 2 Bradford Road | 17.91 | 15.91 |
| D153 | 3 Oban Terrace | 19.99 | 14.68 |
| D154 | The Brambles, Bradford Road | 17.08 | 14.21 |

**Table 17: Verification Factor 1 - Modelling Results**

The monitored and modelled road $NO_x$ concentrations were graphed and the equation of the trendline based on linear progression though zero calculated. This indicated that a verification factor of 1.2247 was required to be applied to the road $NO_x$ model output, as shown in Graph 1.

**Graph 1 - $NO_x$ Verification Factor 1**




Monitoring of $PM_{10}$ concentrations is not undertaken within the assessment extents. The $NO_x$ verification factor was therefore used to adjust $PM_{10}$ model predictions in lieu of more accurate data in accordance with DEFRA guidance[17].

[17] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

Verification Factor 2

Background annual mean $NO_2$ and $PM_{10}$ concentrations were obtained from the DEFRA mapping study for the grid square containing diffusion tube 40 - Leeds Road, Dewsbury, 424500, 421500.

Background levels of $NO_x$ and $NO_2$ were adjusted in accordance with the approach provided by AQC[18], as outlined previously. The values before and after adjustment are outlined in Table 18.

| Pollutant | Predicted Background Pollutant Concentration (µg/m³) | |
|---|---|---|
| | 2018 | 2030 |
| $NO_x$ - Unadjusted | - | 26.75 |
| $NO_x$ - Adjusted | - | |
| $NO_2$ - Unadjusted | 23.11 | 17.95 |
| $NO_2$ - Adjusted | 24.24 | 20.29 |

**Table 18: Background $NO_2$ and $NO_x$ Concentrations - Verification Factor 2**

Adjustment of $PM_{10}$ concentrations is not required. As such, background levels were obtained from the DEFRA mapping study. These are shown in Table 19.

| Pollutant | Predicted Background Pollutant Concentration (µg/m³) | |
|---|---|---|
| | 2018 | 2030 |
| $PM_{10}$ | 12.25 | 11.60 |

**Table 19: Background $PM_{10}$ Concentrations - Verification Factor 2**

KC undertook monitoring of $NO_2$ concentrations at six locations along roads included in the model during 2018. Results were obtained and the road contributions to total $NO_x$ concentrations calculated following the methodology contained within DEFRA guidance[19]. The monitored annual mean $NO_2$ concentrations and calculated road $NO_x$ concentrations are summarised in Table 20.

| Monitoring Site | | Monitored $NO_2$ Concentration (µg/m³) | Calculated Road $NO_x$ Concentration (µg/m³) |
|---|---|---|---|
| 20 | Rockley Street, Dewsbury | 33.96 | 19.92 |
| 40 | Leeds Road, Dewsbury | 52.4 | 63.44 |
| 42 | Leeds Road, Dewsbury - 2 | 39.6 | 32.38 |
| 43 | John Street, Dewsbury | 42.93 | 40.08 |
| 44 | Calmswood Road, Eastborough | 35.07 | 22.31 |
| 54 | Wakefield Road, Dewsbury | 33.87 | 19.72 |

**Table 20: Verification Factor 2 - Monitoring Results**

The annual mean road $NO_x$ concentrations predicted from the dispersion model and the road $NO_x$ concentrations calculated from the 2018 $NO_2$ monitoring results are summarised in Table 21.

| Monitoring Site | | Calculated Road $NO_x$ Concentration (µg/m³) | Modelled Road $NO_x$ Concentration (µg/m³) |
|---|---|---|---|
| 20 | Rockley Street, Dewsbury | 19.92 | 16.02 |

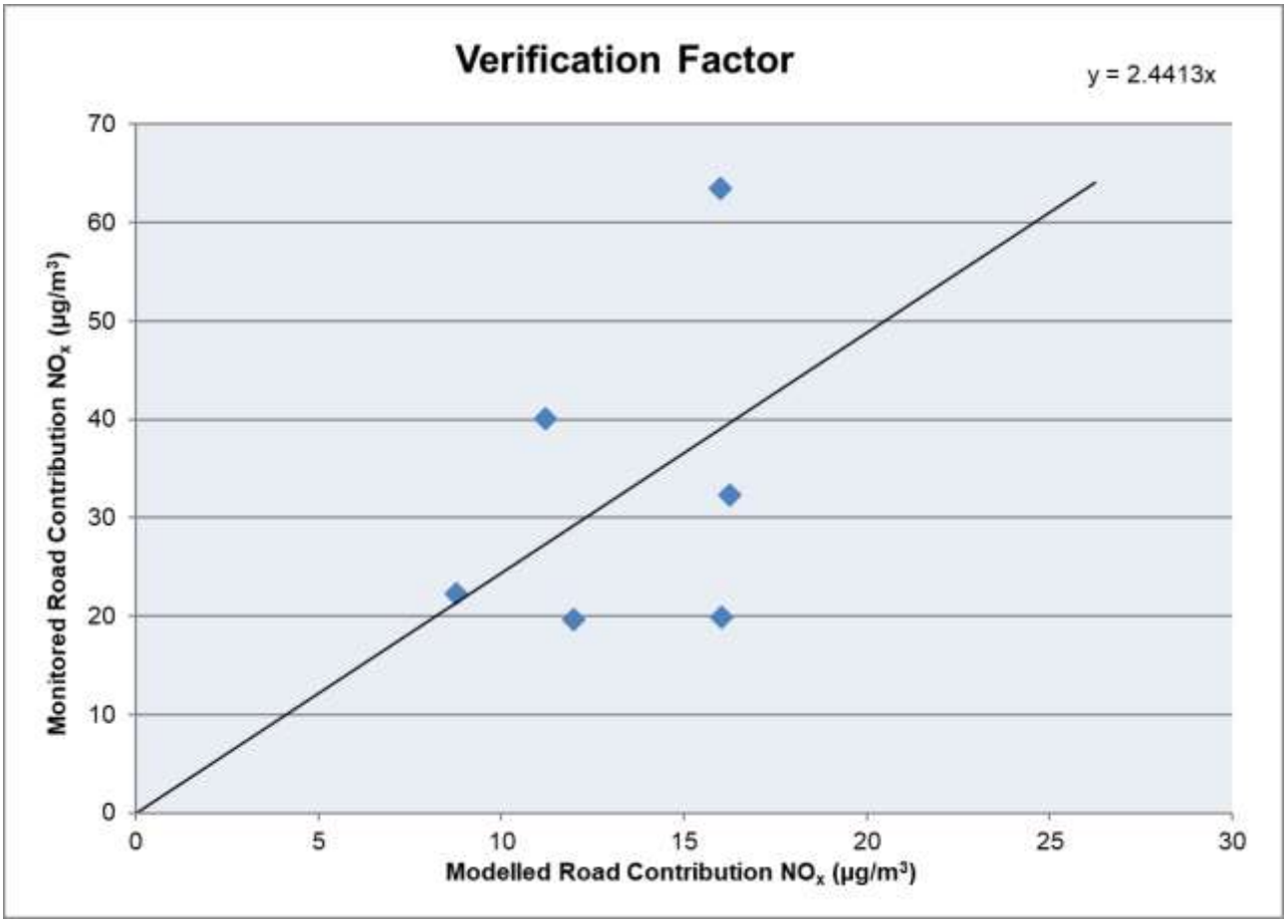
[18] Adjusting Background $NO_2$ Maps for CURED, AQC, 2016.
[19] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

| Monitoring Site | | Calculated Road $NO_x$ Concentration ($\mu g/m^3$) | Modelled Road $NO_x$ Concentration ($\mu g/m^3$) |
|---|---|---|---|
| 40 | Leeds Road, Dewsbury | 63.44 | 16.00 |
| 42 | Leeds Road, Dewsbury - 2 | 32.38 | 16.26 |
| 43 | John Street, Dewsbury | 40.08 | 11.22 |
| 44 | Calmswood Road, Eastborough | 22.31 | 8.78 |
| 54 | Wakefield Road, Dewsbury | 19.72 | 11.98 |
| 20 | Rockley Street, Dewsbury | 19.92 | 16.02 |

**Table 21: Verification Factor 2 - Modelling Results**

The monitored and modelled road $NO_x$ concentrations were graphed and the equation of the trendline based on linear progression though zero calculated. This indicated that a verification factor of 2.4413 was required to be applied to the road $NO_x$ model output, as shown in Graph 2.

**Graph 2 - $NO_x$ Verification Factor 2**




Monitoring of $PM_{10}$ concentrations is not undertaken within the modelling extents. The $NO_x$ verification factor was therefore used to adjust $PM_{10}$ model predictions in lieu of more accurate data in accordance with DEFRA guidance[20].

[20] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

### Road Vehicle Exhaust Emission Impacts

The development has the potential to impact on existing air quality as a result of road traffic exhaust emissions associated with vehicles travelling to and from the Site. Locations sensitive to potential changes in pollutant concentrations were identified within 200m of the highway network in accordance with the guidance provided within the Design Manual for Roads and Bridges (DMRB)[21] on the likely limits of pollutant dispersion from road sources. The criteria provided within DEFRA guidance[22] 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'[23]. 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 22.

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

**Table 22: Road Vehicle Exhaust Emissions - Significance of Impact**

The matrix shown in Table 22 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[24] 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. It should be noted that this is a binary judgement of either it is **significant** or it is **not significant**.

### Future Exposure

The Proposed Development has the potential to expose future residents to poor air quality. Pollutant concentrations were therefore quantified across the Site using dispersion modelling as detailed previously. The results were subsequently compared with the relevant AQOs to determine the potential for any exceedance.

[21] DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.
[22] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.
[23] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.
[24] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

# 5 Assessment

## 5.1 Introduction

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

## 5.2 Construction Phase Assessment

### Step 1

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

The 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 350m of the Site boundary. These are summarised in Table 23.

| Distance from Site Boundary (m) | Approximate Number of Human Receptors | Approximate Number of Ecological Receptors |
|---|---|---|
| Up to 20 | 10 - 100 | 0 |
| Up to 50 | 10 - 100 | 1 |
| Up to 100 | More than 100 | - |
| Up to 350 | More than 100 | - |

**Table 23: Earthworks and Construction Dust Sensitive Receptors**

The ecological receptor identified in Table 23 is the Dum Wood Local Wildlife Site (LWS) and Site of Wildlife Significance (SWS) which lies approximately 30m to the east of the Site. Reference should be made to Figure 5 for a map of the designation extents.

Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 500m of the Site access. These are summarised in Table 24.

| Distance from Site Access Route (m) | Approximate Number of Human Receptors | Approximate Number of Ecological Receptors |
|---|---|---|
| Up to 20 | More than 100 | 0 |
| Up to 50 | More than 100 | 0 |

**Table 24: Trackout Dust Sensitive Receptors**

A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 25.

| Guidance | Comment |
|---|---|
| Whether there is any history of dust generating activities in the area | The desk top study did not indicate any dust generating activities in the local area |

| Guidance | Comment |
|---|---|
| The likelihood of concurrent dust generating activities on nearby sites | The Site is situated adjacent to a proposed large scale mixed use development known as 'Land to the East of Leeds Road, Chidswell'. It is therefore possible that there will be concurrent dust generation in the area should the construction phases of the two schemes overlap |
| Pre-existing screening between the source and the receptors | There is no significant screening around the Site boundary |
| Conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which works will take place | As shown in Figure 4, the predominant wind bearing at the Site is from the west. As such, receptors to the east are most likely to be affected by dust releases |
| Conclusions drawn from local topography | There are no significant topographical constraints to dust dispersion |
| Duration of the potential impact, as a receptor may become more sensitive over time | Currently it is unclear as to the duration of the construction phase. However, it is likely that it will extend over one year |
| Any known specific receptor sensitivities which go beyond the classification given in the document | No specific receptor sensitivities identified during the baseline assessment |

**Table 25: Additional Area Sensitivity Factors**

Based on the criteria shown in Table 5, the sensitivity of the receiving environment to potential dust impacts was determined as **high**. This was because the identified receptors included residential properties.

Bases on the criteria shown in Table 10, sensitivity of receptors to ecological impacts was determined as **low**. This was because the sensitive receptor identified in Table 23 is a locally designated site.

The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria shown in Section 3.2, is shown in Table 26.

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

**Table 26: Sensitivity of the Surrounding Area**

It should be noted that only earthworks and construction activities will take place within 50m of the ecological receptor. As such, impacts as a result of the trackout activities on this designation have not been considered.

The potential risk of dust impacts at the identified receptors is considered in the following sections.

### Step 2

Earthworks

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. The Site covers an area greater than 10,000m$^2$. In accordance with the criteria outlined in Table 6, the magnitude of potential dust emission from earthworks is therefore **large**.

Table 26 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 11, the development is considered to be a **high** risk site for dust soiling as a result of earthworks.

Table 26 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 11, the development is considered to be a **low** risk site for human health impacts as a result of earthworks.

Table 26 indicates the sensitivity of the area to ecological impacts is **low**. In accordance with the criteria outlined in Table 11, the development is considered to be a **low** risk site for ecological impacts as a result of earthworks.

Construction

Due to the nature of the development, the total building volume is likely to be greater than 100,000m$^3$. In accordance with the criteria outlined in Table 6, the magnitude of potential dust emissions from construction is therefore **large**.

Table 26 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 11, the development is considered to be a **high** risk site for dust soiling as a result of construction activities.

Table 26 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 11, the development is considered to be a **low** risk site for human health impacts as a result of construction activities.

Table 26 indicates the sensitivity of the area to ecological impacts is **low**. In accordance with the criteria outlined in Table 11, the development is considered to be a **low** risk site for ecological impacts as a result of construction activities

Trackout

Based on the Site area, it is anticipated that the unpaved road length is likely to be greater than 100m. In accordance with the criteria outlined in Table 6, the magnitude of potential dust emissions from trackout is therefore **large**.

Table 26 indicates the sensitivity of the area to dust soiling effects to people and property is **high**. In accordance with the criteria outlined in Table 12, the development is considered to be a **high** risk site for dust soiling as a result of trackout activities.

Table 26 indicates the sensitivity of the area to human health impacts is **medium**. In accordance with the criteria outlined in Table 12, the development is considered to be a **medium** risk site for human health impacts as a result of trackout activities.

Summary of the Risk of Dust Effects

A summary of the risk from each dust generating activity is provided in Table 27.

| Potential Impact | Risk | | |
|---|---|---|---|
| | Earthworks | Construction | Trackout |
| Dust Soiling | High | High | High |

| | | | |
|---|---|---|---|
| Human Health | Low | Low | Medium |
| Ecological | Low | Low | - |

**Table 27: Summary of Potential Unmitigated Dust Risks during Construction**

As indicated in Table 27, the potential risk of dust soiling is **high** from earthworks, construction and trackout. The potential risk for human health effects is **medium** from trackout and **low** from earthworks and construction. The potential risk of ecological effects is **low** from earthworks and construction.

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

The IAQM guidance[25] 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 28. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan if required by the Local Authority.

| Issue | Control Measure |
|---|---|
| Communications | Develop and implement a stakeholder communications plan that includes community engagement before work commences on-site<br>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<br>Display the head or regional office contact information<br>Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the LA |
| 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<br>Make the complaints log available to the LA upon request<br>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<br>Hold regular liaison meetings with any other high risk construction sites within 500m of the boundary, to ensure plans are co-ordinated and dust and emissions are minimised |
| Monitoring | Undertake daily on-site and off-site inspection to monitor dust, record inspection results, and make the log available to the LA upon request<br>Carry out regular Site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the LA upon request<br>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<br>Fully enclose specific operations where there is a high potential for dust production and they are active for an extensive period |

[25] Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

| Issue | Control Measure |
|---|---|
| | Avoid Site runoff of water or mud<br>Keep Site fencing, barriers and scaffolding clean using wet methods<br>Remove materials that have a potential to produce dust from Site as soon as possible, unless being re-used<br>Cover, seed or fence stockpiles to prevent wind whipping |
| Operating vehicle/machinery and sustainable travel | Ensure all vehicles switch off engines when stationary - no idling vehicles<br>Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable<br>Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas<br>Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials |
| Operations | Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques<br>Ensure an adequate water supply on the Site for effective dust suppression, using non-potable water where possible and appropriate<br>Use enclosed chutes and conveyors and covered skips<br>Minimise drop heights and use fine water sprays wherever appropriate<br>Ensure equipment is available to clean any dry spillages, and clean up spillages as soon as reasonably practicable using wet cleaning methods |
| Waste management | Avoid bonfires and burning of waste materials |
| Earthworks | Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable<br>Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil as soon as practicable |
| Construction | Avoid scabbling (roughening of concrete surfaces) if possible<br>Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out<br>Ensure bulk cement and other fine powder materials are delivered in enclosed tankers |
| Trackout | Use water-assisted dust sweeper on access and local roads<br>Avoid dry sweeping of large areas<br>Ensure vehicles entering and leaving Site are covered to prevent escape of materials<br>Implement a wheel washing system<br>Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the Site exit |

**Table 28: Fugitive Dust Emissions Mitigation Measures**

### Step 4

Assuming the relevant mitigation measures outlined in Table 28 are implemented, the residual impacts from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance[26].

[26] Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

## 5.3 Operational Phase Assessment

Vehicle movements associated with the operation of the proposal will generate exhaust emissions on the local and regional road networks. 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, as well as consider potential exposure of future occupants to AQO exceedances.

The assessment considered the following scenarios:

- 2018 - Verification;
- 2030 - Do-Minimum (DM); and,
- 2030 - Do-Something (DS).

The DM scenario (i.e. without development) included anticipated baseline traffic data, inclusive of anticipated growth and committed developments for the relevant assessment year. The DS scenario (i.e. with development) included anticipated 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.

### Road Vehicle Exhaust Emission Impacts

#### Receptors

Locations sensitive to potential operational phase road vehicle exhaust emission impacts were identified from a desk-top study and are summarised in Table 29.

| Receptor | | NGR (m) | |
|---|---|---|---|
| | | X | Y |
| R1 | Residential - Oban Close | 427907.9 | 426244.7 |
| R2 | Residential - Tingley Hall Rise | 428081.2 | 426212.0 |
| R3 | Residential - Bradford Road | 428202.8 | 426158.2 |
| R4 | Residential - Station Hall Farm | 428286.2 | 426511.2 |
| R5 | Residential - Tingley Avenue | 428231.3 | 426245.9 |
| R6 | Residential - Bradford Road | 428416.5 | 426113.0 |
| R7 | Education Facility - Bradford Road | 428730.0 | 425969.2 |
| R8 | Residential - Aspen Court | 427230.4 | 426233.5 |
| R9 | Residential - Dewsbury Road | 427798.9 | 425878.5 |
| R10 | Residential - Dewsbury Road | 427525.3 | 425509.0 |
| R11 | Residential - Dewsbury Road | 427520.6 | 425558.2 |
| R12 | Education Facility - Rein Road | 427349.3 | 425973.8 |
| R13 | Residential - Rein Road | 427309.0 | 425893.0 |
| R14 | Residential - Dewsbury Road | 427080.4 | 424948.5 |
| R15 | Residential - Leeds Road | 426911.1 | 424429.4 |
| R16 | Residential - Leeds Road | 426933.0 | 424515.4 |
| R17 | Residential - Heybeck Lane | 426958.7 | 424461.8 |
| R18 | Residential - Leeds Road | 426825.9 | 424213.6 |

| Receptor | | NGR (m) | |
|---|---|---|---|
| | | X | Y |
| R19 | Residential - Leeds Road | 426539.7 | 423364.2 |
| R20 | Residential - Leeds Road | 426695.0 | 423769.2 |
| R21 | Residential - Leeds Road | 426379.2 | 423194.0 |
| R22 | Residential - Leeds Road | 426264.3 | 423097.6 |
| R23 | Residential - Leeds Road | 426212.5 | 423094.5 |
| R24 | Residential - Leeds Road | 426103.4 | 423016.3 |
| R25 | Residential - Leeds Road | 425836.5 | 422793.2 |
| R26 | Residential - Leeds Road | 425457.3 | 422393.2 |
| R27 | Residential - Leeds Road | 425084.7 | 422014.8 |
| R28 | Residential - Leeds Road | 424983.9 | 422015.4 |
| R29 | Residential - Leeds Road | 424921.0 | 421978.3 |
| R30 | Residential - Leeds Road | 424864.7 | 421922.8 |
| R31 | Education Facility - Leeds Road | 424834.4 | 421903.6 |
| R32 | Residential - Highgate Road | 424856.2 | 421830.7 |
| R33 | Residential - Highgate Road | 424895.1 | 421778.2 |
| R34 | Residential - Soothill Lane | 426235.3 | 424361.1 |
| R35 | Residential - Soothill Lane | 425652.9 | 424244.5 |
| R36 | Residential - Grange Road | 425420.5 | 423707.8 |
| R37 | Education Facility- Soothill Lane | 425908.2 | 424167.8 |
| R38 | Residential - Heybeck Lane | 427092.5 | 424408.5 |
| R39 | Residential - Heybeck Lane | 427237.1 | 424477.2 |
| R40 | Education Facility - Heybeck Lane | 428016.8 | 424506.5 |
| R41 | Residential - Chidswell Lane | 426656.5 | 422999.9 |
| R42 | Residential - Windsor Drive | 426400.2 | 422827.6 |
| R43 | Residential - Owl Lane | 426540.6 | 422534.7 |
| R44 | Residential - Owl Lane | 426938.3 | 422099.4 |
| R45 | Residential - Chidswell Lane | 426777.9 | 422730.7 |
| R46 | Residential - Kingsway | 427114.7 | 421851.0 |
| R47 | Residential - Kingsway | 427210.8 | 421709.2 |
| R48 | Education Facility - Leeds Road | 427149.1 | 422033.2 |
| R49 | Residential - Lodge Hill Road | 427767.9 | 421856.3 |
| R50 | Residential - Cross Keys | 429391.9 | 420986.1 |
| R51 | Residential - Wakefield Road | 429763.4 | 420720.4 |
| R52 | Residential - Batley Road | 429537.1 | 422953.5 |

**Table 29: Operational Phase Road Vehicle Exhaust Emission Sensitive Receptors**

Reference should be made to Figure 6 for a graphical representation of the road vehicle exhaust emission sensitive receptor locations.

It should be noted that the modelling results for positions R1 to R25 and R34 to R52 have been adjusted using Verification Factor 1. This was because the receptors are situated in a similar context to LCC's monitors, adjacent to roads within a suburban location.

The modelling results for positions R26 to R33 have been adjusted using Verification Factor 2. This was because the receptors are situated in a similar context to KC's monitors, adjacent to roads situated within an urban location and close to Dewsbury Town Centre.

### Predicted Concentrations

Annual mean $NO_2$ concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 30.

| Receptor | | Predicted Annual Mean $NO_2$ Concentration ($\mu g/m^3$) | | |
|---|---|---|---|---|
| | | DM | DS | Change |
| R1 | Residential - Oban Close | 20.97 | 20.98 | 0.01 |
| R2 | Residential - Tingley Hall Rise | 19.76 | 19.79 | 0.03 |
| R3 | Residential - Bradford Road | 18.17 | 18.18 | 0.01 |
| R4 | Residential - Station Hall Farm | 19.39 | 19.40 | 0.01 |
| R5 | Residential - Tingley Avenue | 19.11 | 19.12 | 0.01 |
| R6 | Residential - Bradford Road | 21.44 | 21.45 | 0.01 |
| R7 | Education Facility - Bradford Road | 17.02 | 17.02 | 0.00 |
| R8 | Residential - Aspen Court | 20.80 | 20.80 | 0.00 |
| R9 | Residential - Dewsbury Road | 20.46 | 20.53 | 0.07 |
| R10 | Residential - Dewsbury Road | 24.82 | 24.93 | 0.11 |
| R11 | Residential - Dewsbury Road | 21.58 | 21.66 | 0.08 |
| R12 | Education Facility - Rein Road | 17.37 | 17.38 | 0.01 |
| R13 | Residential - Rein Road | 17.68 | 17.69 | 0.01 |
| R14 | Residential - Dewsbury Road | 19.95 | 20.02 | 0.07 |
| R15 | Residential - Leeds Road | 23.19 | 23.34 | 0.15 |
| R16 | Residential - Leeds Road | 19.78 | 19.87 | 0.09 |
| R17 | Residential - Heybeck Lane | 24.36 | 24.62 | 0.26 |
| R18 | Residential - Leeds Road | 20.00 | 20.06 | 0.06 |
| R19 | Residential - Leeds Road | 20.15 | 20.20 | 0.05 |
| R20 | Residential - Leeds Road | 21.13 | 21.21 | 0.08 |
| R21 | Residential - Leeds Road | 20.96 | 21.04 | 0.08 |
| R22 | Residential - Leeds Road | 23.32 | 23.42 | 0.10 |
| R23 | Residential - Leeds Road | 21.59 | 21.66 | 0.07 |
| R24 | Residential - Leeds Road | 21.00 | 21.00 | 0.00 |

| Receptor | | Predicted Annual Mean $NO_2$ Concentration ($\mu g/m^3$) | | |
|---|---|---|---|---|
| | | DM | DS | Change |
| R25 | Residential - Leeds Road | 19.31 | 19.31 | 0.00 |
| R26 | Residential - Leeds Road | 28.64 | 28.64 | 0.00 |
| R27 | Residential - Leeds Road | 27.09 | 27.10 | 0.01 |
| R28 | Residential - Leeds Road | 29.63 | 29.64 | 0.01 |
| R29 | Residential - Leeds Road | 31.39 | 31.40 | 0.01 |
| R30 | Residential - Leeds Road | 31.39 | 31.42 | 0.03 |
| R31 | Education Facility - Leeds Road | 28.93 | 28.98 | 0.05 |
| R32 | Residential - Highgate Road | 28.16 | 28.17 | 0.01 |
| R33 | Residential - Highgate Road | 27.40 | 27.41 | 0.01 |
| R34 | Residential - Soothill Lane | 17.07 | 17.12 | 0.05 |
| R35 | Residential - Soothill Lane | 17.28 | 17.34 | 0.06 |
| R36 | Residential - Grange Road | 18.00 | 18.01 | 0.01 |
| R37 | Education Facility- Soothill Lane | 15.42 | 15.43 | 0.01 |
| R38 | Residential - Heybeck Lane | 17.77 | 17.99 | 0.22 |
| R39 | Residential - Heybeck Lane | 17.19 | 17.24 | 0.05 |
| R40 | Education Facility - Heybeck Lane | 15.71 | 15.72 | 0.01 |
| R41 | Residential - Chidswell Lane | 17.38 | 17.38 | 0.00 |
| R42 | Residential - Windsor Drive | 18.04 | 18.05 | 0.01 |
| R43 | Residential - Owl Lane | 17.10 | 17.11 | 0.01 |
| R44 | Residential - Owl Lane | 19.78 | 19.80 | 0.02 |
| R45 | Residential - Chidswell Lane | 15.84 | 15.84 | 0.00 |
| R46 | Residential - Kingsway | 18.57 | 18.58 | 0.01 |
| R47 | Residential - Kingsway | 17.65 | 17.66 | 0.01 |
| R48 | Education Facility - Leeds Road | 17.65 | 17.65 | 0.00 |
| R49 | Residential - Lodge Hill Road | 17.60 | 17.61 | 0.01 |
| R50 | Residential - Cross Keys | 21.06 | 21.06 | 0.00 |
| R51 | Residential - Wakefield Road | 18.57 | 18.57 | 0.00 |
| R52 | Residential - Batley Road | 24.61 | 24.62 | 0.01 |

**Table 30: Predicted Annual Mean $NO_2$ Concentrations**

As indicated in Table 30, predicted annual mean $NO_2$ concentrations were below the relevant AQO at all sensitive receptors in both scenarios.

Annual mean $PM_{10}$ concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 31.

| Receptor | | Predicted Annual Mean $PM_{10}$ Concentration ($\mu g/m^3$) | | |
|---|---|---|---|---|
| | | DM | DS | Change |
| R1 | Residential - Oban Close | 15.93 | 15.93 | 0.00 |
| R2 | Residential - Tingley Hall Rise | 15.44 | 15.45 | 0.01 |
| R3 | Residential - Bradford Road | 15.04 | 15.04 | 0.00 |
| R4 | Residential - Station Hall Farm | 15.19 | 15.19 | 0.00 |
| R5 | Residential - Tingley Avenue | 15.26 | 15.26 | 0.00 |
| R6 | Residential - Bradford Road | 16.22 | 16.22 | 0.00 |
| R7 | Education Facility - Bradford Road | 14.72 | 14.72 | 0.00 |
| R8 | Residential - Aspen Court | 15.39 | 15.39 | 0.00 |
| R9 | Residential - Dewsbury Road | 15.78 | 15.80 | 0.02 |
| R10 | Residential - Dewsbury Road | 16.63 | 16.66 | 0.03 |
| R11 | Residential - Dewsbury Road | 15.81 | 15.83 | 0.02 |
| R12 | Education Facility - Rein Road | 14.70 | 14.70 | 0.00 |
| R13 | Residential - Rein Road | 14.80 | 14.81 | 0.00 |
| R14 | Residential - Dewsbury Road | 15.84 | 15.87 | 0.03 |
| R15 | Residential - Leeds Road | 16.34 | 16.38 | 0.04 |
| R16 | Residential - Leeds Road | 15.47 | 15.50 | 0.03 |
| R17 | Residential - Heybeck Lane | 16.56 | 16.63 | 0.07 |
| R18 | Residential - Leeds Road | 15.67 | 15.70 | 0.02 |
| R19 | Residential - Leeds Road | 15.67 | 15.68 | 0.02 |
| R20 | Residential - Leeds Road | 16.04 | 16.07 | 0.03 |
| R21 | Residential - Leeds Road | 16.05 | 16.07 | 0.03 |
| R22 | Residential - Leeds Road | 16.42 | 16.45 | 0.03 |
| R23 | Residential - Leeds Road | 15.91 | 15.93 | 0.02 |
| R24 | Residential - Leeds Road | 15.83 | 15.83 | 0.00 |
| R25 | Residential - Leeds Road | 15.50 | 15.50 | 0.00 |
| R26 | Residential - Leeds Road | 14.37 | 14.37 | 0.00 |
| R27 | Residential - Leeds Road | 13.69 | 13.69 | 0.00 |
| R28 | Residential - Leeds Road | 13.96 | 13.97 | 0.00 |
| R29 | Residential - Leeds Road | 14.25 | 14.26 | 0.00 |
| R30 | Residential - Leeds Road | 14.30 | 14.31 | 0.01 |
| R31 | Education Facility - Leeds Road | 13.80 | 13.82 | 0.01 |
| R32 | Residential - Highgate Road | 13.68 | 13.69 | 0.00 |
| R33 | Residential - Highgate Road | 13.61 | 13.61 | 0.00 |
| R34 | Residential - Soothill Lane | 14.76 | 14.78 | 0.02 |

| Receptor | | Predicted Annual Mean $PM_{10}$ Concentration ($\mu g/m^3$) | | |
|---|---|---|---|---|
| | | DM | DS | Change |
| R35 | Residential - Soothill Lane | 14.83 | 14.85 | 0.02 |
| R36 | Residential - Grange Road | 15.12 | 15.12 | 0.00 |
| R37 | Education Facility- Soothill Lane | 14.25 | 14.25 | 0.00 |
| R38 | Residential - Heybeck Lane | 14.83 | 14.88 | 0.05 |
| R39 | Residential - Heybeck Lane | 14.75 | 14.76 | 0.01 |
| R40 | Education Facility - Heybeck Lane | 14.32 | 14.32 | 0.00 |
| R41 | Residential - Chidswell Lane | 14.80 | 14.80 | 0.00 |
| R42 | Residential - Windsor Drive | 15.03 | 15.03 | 0.00 |
| R43 | Residential - Owl Lane | 14.78 | 14.79 | 0.00 |
| R44 | Residential - Owl Lane | 15.52 | 15.52 | 0.01 |
| R45 | Residential - Chidswell Lane | 14.38 | 14.38 | 0.00 |
| R46 | Residential - Kingsway | 15.18 | 15.19 | 0.00 |
| R47 | Residential - Kingsway | 14.84 | 14.84 | 0.00 |
| R48 | Education Facility - Leeds Road | 15.04 | 15.04 | 0.00 |
| R49 | Residential - Lodge Hill Road | 15.09 | 15.10 | 0.00 |
| R50 | Residential - Cross Keys | 15.78 | 15.78 | 0.00 |
| R51 | Residential - Wakefield Road | 15.03 | 15.03 | 0.00 |
| R52 | Residential - Batley Road | 15.88 | 15.89 | 0.00 |

**Table 31: Predicted Annual Mean $PM_{10}$ Concentrations**

As indicated in Table 31, predicted annual mean $PM_{10}$ concentrations were below the relevant AQO at all sensitive receptors in both scenarios.

### Predicted Impacts

Predicted impacts on annual mean $NO_2$ concentrations at the sensitive receptor locations are summarised in Table 32.

| Receptor | | Predicted Annual Mean $NO_2$ Concentration | Predicted Concentration Change as Proportion of AQO (%) | Impact Significance |
|---|---|---|---|---|
| R1 | Residential - Oban Close | Below 75% of AQO | 0 | Negligible |
| R2 | Residential - Tingley Hall Rise | Below 75% of AQO | 0 | Negligible |
| R3 | Residential - Bradford Road | Below 75% of AQO | 0 | Negligible |
| R4 | Residential - Station Hall Farm | Below 75% of AQO | 0 | Negligible |
| R5 | Residential - Tingley Avenue | Below 75% of AQO | 0 | Negligible |
| R6 | Residential - Bradford Road | Below 75% of AQO | 0 | Negligible |
| R7 | Education Facility - Bradford Road | Below 75% of AQO | 0 | Negligible |

| Receptor | | Predicted Annual Mean $NO_2$ Concentration | Predicted Concentration Change as Proportion of AQO (%) | Impact Significance |
|---|---|---|---|---|
| R8 | Residential - Aspen Court | Below 75% of AQO | 0 | Negligible |
| R9 | Residential - Dewsbury Road | Below 75% of AQO | 0 | Negligible |
| R10 | Residential - Dewsbury Road | Below 75% of AQO | 0 | Negligible |
| R11 | Residential - Dewsbury Road | Below 75% of AQO | 0 | Negligible |
| R12 | Education Facility - Rein Road | Below 75% of AQO | 0 | Negligible |
| R13 | Residential - Rein Road | Below 75% of AQO | 0 | Negligible |
| R14 | Residential - Dewsbury Road | Below 75% of AQO | 0 | Negligible |
| R15 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R16 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R17 | Residential - Heybeck Lane | Below 75% of AQO | 1 | Negligible |
| R18 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R19 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R20 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R21 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R22 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R23 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R24 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R25 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R26 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R27 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R28 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R29 | Residential - Leeds Road | 76 - 94% of AQO | 0 | Negligible |
| R30 | Residential - Leeds Road | 76 - 94% of AQO | 0 | Negligible |
| R31 | Education Facility - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R32 | Residential - Highgate Road | Below 75% of AQO | 0 | Negligible |
| R33 | Residential - Highgate Road | Below 75% of AQO | 0 | Negligible |
| R34 | Residential - Soothill Lane | Below 75% of AQO | 0 | Negligible |
| R35 | Residential - Soothill Lane | Below 75% of AQO | 0 | Negligible |
| R36 | Residential - Grange Road | Below 75% of AQO | 0 | Negligible |
| R37 | Education Facility- Soothill Lane | Below 75% of AQO | 0 | Negligible |
| R38 | Residential - Heybeck Lane | Below 75% of AQO | 1 | Negligible |
| R39 | Residential - Heybeck Lane | Below 75% of AQO | 0 | Negligible |
| R40 | Education Facility - Heybeck Lane | Below 75% of AQO | 0 | Negligible |

| Receptor | | Predicted Annual Mean $NO_2$ Concentration | Predicted Concentration Change as Proportion of AQO (%) | Impact Significance |
|---|---|---|---|---|
| R41 | Residential - Chidswell Lane | Below 75% of AQO | 0 | Negligible |
| R42 | Residential - Windsor Drive | Below 75% of AQO | 0 | Negligible |
| R43 | Residential - Owl Lane | Below 75% of AQO | 0 | Negligible |
| R44 | Residential - Owl Lane | Below 75% of AQO | 0 | Negligible |
| R45 | Residential - Chidswell Lane | Below 75% of AQO | 0 | Negligible |
| R46 | Residential - Kingsway | Below 75% of AQO | 0 | Negligible |
| R47 | Residential - Kingsway | Below 75% of AQO | 0 | Negligible |
| R48 | Education Facility - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R49 | Residential - Lodge Hill Road | Below 75% of AQO | 0 | Negligible |
| R50 | Residential - Cross Keys | Below 75% of AQO | 0 | Negligible |
| R51 | Residential - Wakefield Road | Below 75% of AQO | 0 | Negligible |
| R52 | Residential - Batley Road | Below 75% of AQO | 0 | Negligible |

**Table 32: Predicted Impacts - $NO_2$**

As indicated in Table 32, impacts on annual mean $NO_2$ concentrations as a result of the Proposed Development were predicted to be **negligible** at all receptors.

Predicted impacts on annual mean $PM_{10}$ concentrations at the sensitive receptor locations are summarised in Table 33.

| Receptor | | Predicted Annual Mean $PM_{10}$ Concentration | Predicted Concentration Change as Proportion of AQO (%) | Impact Significance |
|---|---|---|---|---|
| R1 | Residential - Oban Close | Below 75% of AQO | 0 | Negligible |
| R2 | Residential - Tingley Hall Rise | Below 75% of AQO | 0 | Negligible |
| R3 | Residential - Bradford Road | Below 75% of AQO | 0 | Negligible |
| R4 | Residential - Station Hall Farm | Below 75% of AQO | 0 | Negligible |
| R5 | Residential - Tingley Avenue | Below 75% of AQO | 0 | Negligible |
| R6 | Residential - Bradford Road | Below 75% of AQO | 0 | Negligible |
| R7 | Education Facility - Bradford Road | Below 75% of AQO | 0 | Negligible |
| R8 | Residential - Aspen Court | Below 75% of AQO | 0 | Negligible |
| R9 | Residential - Dewsbury Road | Below 75% of AQO | 0 | Negligible |
| R10 | Residential - Dewsbury Road | Below 75% of AQO | 0 | Negligible |
| R11 | Residential - Dewsbury Road | Below 75% of AQO | 0 | Negligible |
| R12 | Education Facility - Rein Road | Below 75% of AQO | 0 | Negligible |

| Receptor | | Predicted Annual Mean $PM_{10}$ Concentration | Predicted Concentration Change as Proportion of AQO (%) | Impact Significance |
|---|---|---|---|---|
| R13 | Residential - Rein Road | Below 75% of AQO | 0 | Negligible |
| R14 | Residential - Dewsbury Road | Below 75% of AQO | 0 | Negligible |
| R15 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R16 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R17 | Residential - Heybeck Lane | Below 75% of AQO | 0 | Negligible |
| R18 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R19 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R20 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R21 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R22 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R23 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R24 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R25 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R26 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R27 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R28 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R29 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R30 | Residential - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R31 | Education Facility - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R32 | Residential - Highgate Road | Below 75% of AQO | 0 | Negligible |
| R33 | Residential - Highgate Road | Below 75% of AQO | 0 | Negligible |
| R34 | Residential - Soothill Lane | Below 75% of AQO | 0 | Negligible |
| R35 | Residential - Soothill Lane | Below 75% of AQO | 0 | Negligible |
| R36 | Residential - Grange Road | Below 75% of AQO | 0 | Negligible |
| R37 | Education Facility- Soothill Lane | Below 75% of AQO | 0 | Negligible |
| R38 | Residential - Heybeck Lane | Below 75% of AQO | 0 | Negligible |
| R39 | Residential - Heybeck Lane | Below 75% of AQO | 0 | Negligible |
| R40 | Education Facility - Heybeck Lane | Below 75% of AQO | 0 | Negligible |
| R41 | Residential - Chidswell Lane | Below 75% of AQO | 0 | Negligible |
| R42 | Residential - Windsor Drive | Below 75% of AQO | 0 | Negligible |
| R43 | Residential - Owl Lane | Below 75% of AQO | 0 | Negligible |
| R44 | Residential - Owl Lane | Below 75% of AQO | 0 | Negligible |
| R45 | Residential - Chidswell Lane | Below 75% of AQO | 0 | Negligible |

| Receptor | | Predicted Annual Mean $PM_{10}$ Concentration | Predicted Concentration Change as Proportion of AQO (%) | Impact Significance |
|---|---|---|---|---|
| R46 | Residential - Kingsway | Below 75% of AQO | 0 | Negligible |
| R47 | Residential - Kingsway | Below 75% of AQO | 0 | Negligible |
| R48 | Education Facility - Leeds Road | Below 75% of AQO | 0 | Negligible |
| R49 | Residential - Lodge Hill Road | Below 75% of AQO | 0 | Negligible |
| R50 | Residential - Cross Keys | Below 75% of AQO | 0 | Negligible |
| R51 | Residential - Wakefield Road | Below 75% of AQO | 0 | Negligible |
| R52 | Residential - Batley Road | Below 75% of AQO | 0 | Negligible |

**Table 33: Predicted Impacts - $PM_{10}$**

As indicated in Table 33, impacts on annual mean $PM_{10}$ concentrations as a result of the Proposed Development were predicted to be **negligible** at all receptors.

### Future Exposure

The Proposed Development has the potential to cause exposure of future residents to elevated air pollutant levels. Dispersion modelling was therefore undertaken with the inputs described in Section 4.3 to quantify air quality conditions at the Site. This included consideration of vehicle exhaust emissions on the local road network, as well as other background sources. Reference should be made to Figures 7 and 8 for graphical representations of the results for $NO_2$ and $PM_{10}$ concentrations, respectively.

It should be noted that all presented results have been adjusted in accordance with the methodology outlined within Section 4.3.

As shown in Figure 7, annual mean $NO_2$ concentrations were predicted to be below the AQO of 40µg/m$^3$ at all locations across the Site. The maximum level at the boundary was 20.02µg/m$^3$. As such, future residents are not predicted to be exposed to $NO_2$ concentrations above the AQO.

As shown in Figure 8, annual mean $PM_{10}$ concentrations were predicted to be below the AQO of 40µg/m$^3$ at all locations across the Site. The maximum level at the boundary was 15.59µg/m$^3$. As such, future residents are not predicted to be exposed to $PM_{10}$ concentrations above the AQO.

Based on the assessment results, the Site is considered suitable for residential development.

### West Yorkshire Technical Planning Guidance

The West Yorkshire LAs have produced air quality technical guidance[27] as part of an overarching Low Emissions Strategy 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 and relevant Local Plan policies.

The guidance provides a methodology for determining the scale of a development as minor, medium or major and the required air quality mitigation for the relevant banding. Review of the relevant criteria indicated the proposals were classified as **medium** as they include over 50 dwellings but are not predicted to result in an increase in the existing traffic flow on roads of more than 10,000 AADT by 5% or more.

[27] Air Quality and Emissions: Technical Planning Guidance, West Yorkshire Low Emissions Group, 2014.

The guidance[28] provides a number of mitigation options that should be considered for inclusion within developments. Those relevant to the proposals include the following:

- Provision of 1 electric vehicle (EV) charging point per residential unit; and,
- Production of a full Travel Plan to encourage the use of non-transport modes and assist with the reduction of development transport related emissions.

It is recommended that the above measures are incorporated into the scheme in response to the assessment. This will assist with minimising air quality effects as a result of vehicle exhaust emissions.

It should be noted that the outline planning application is supplied by a Framework Travel Plan, the details of which will be explored further as part of a detailed Travel Plan to be prepared as part of any subsequent reserved matters or discharge of condition submission, should outlined permission be granted. Likewise, it is anticipated that the details relating to the EV charging points will be submitted to the LA as part of any future reserved matters or discharge of condition submission.

### Overall Impact Significance

The overall significance of operational phase impacts was determined as **negligible**. This was based on the overall predicted impacts at discrete receptor locations, predicted concentrations at the Site and the considerations outlined previously. Further justification is provided in Table 34.

| Guidance | Comment |
|---|---|
| The existing and future air quality in the absence of the development | Predicted annual mean $NO_2$ and $PM_{10}$ concentrations were below the relevant AQOs at all sensitive receptors in the DM scenario. It is considered unlikely that future air quality conditions will change significantly in the absence of the development given the relatively 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 |
| The influence and validity of any assumptions adopted when undertaking the prediction of impacts | The assessment assumed that vehicle exhaust emission rates and background pollutant levels reduce in accordance with pessimistic estimates of future conditions, rather than DEFRA predictions. This ensured a robust analysis of the opening year scenarios<br>Due to the adopted assumptions it is considered the presented results are sufficiently robust for an assessment of this nature |

**Table 34: Operational Phase Overall Impact Significance**

The IAQM guidance[29] 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.

[28] Air Quality and Emissions: Technical Planning Guidance, West Yorkshire Low Emissions Group, 2014.
[29] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

# 6 Summary and Conclusions

Delta-Simons, working with our approved technical specialist Redmore Environmental, has been appointed to prepare this Air Quality Assessment in support of the planning application for a residential development on land off Heybeck Lane, Chidswell.

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 Site during operation, as well as expose future residents to any existing air quality issues. As such, an Air Quality Assessment was required in order to determine baseline conditions and assess 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 trackout activities was predicted to be **not significant**.

The Proposed Development has the potential to expose future users to elevated pollution levels and impact existing air quality in the vicinity of the Site during operation. Dispersion modelling was therefore undertaken using ADMS-Roads in order to predict pollutant concentrations as a result of emissions from the local highway network. Results were subsequently verified using local monitoring data.

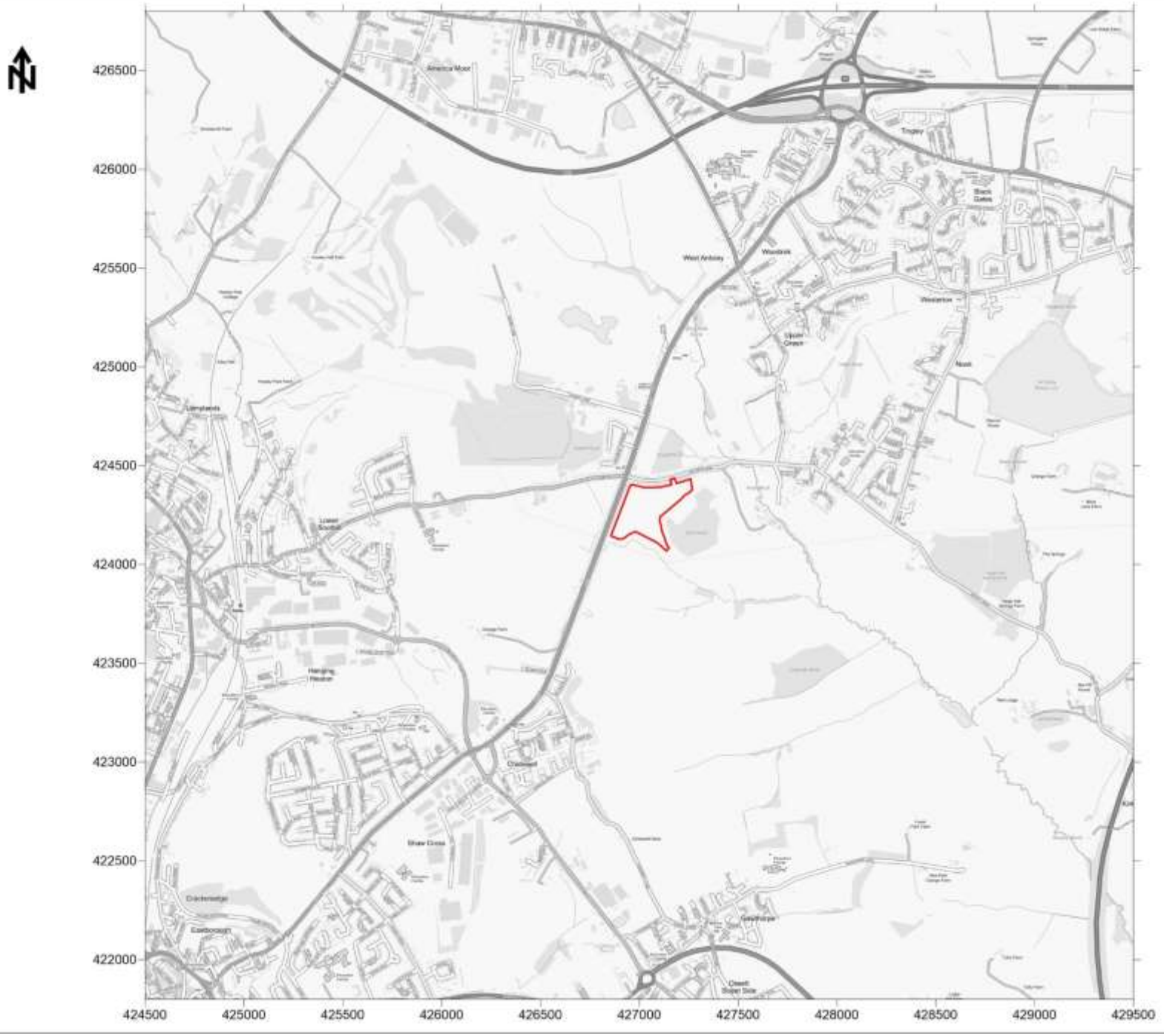
Impacts on $NO_2$ and $PM_{10}$ concentrations as a result of operational phase road vehicle exhaust emissions were predicted to be **negligible** at all sensitive receptor locations.

The dispersion modelling results indicated than annual mean $NO_2$ and $PM_{10}$ concentrations were predicted to be below the relevant AQOs at all locations across the Site. The location is therefore considered suitable for residential use.

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

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

# Figures




**Legend**

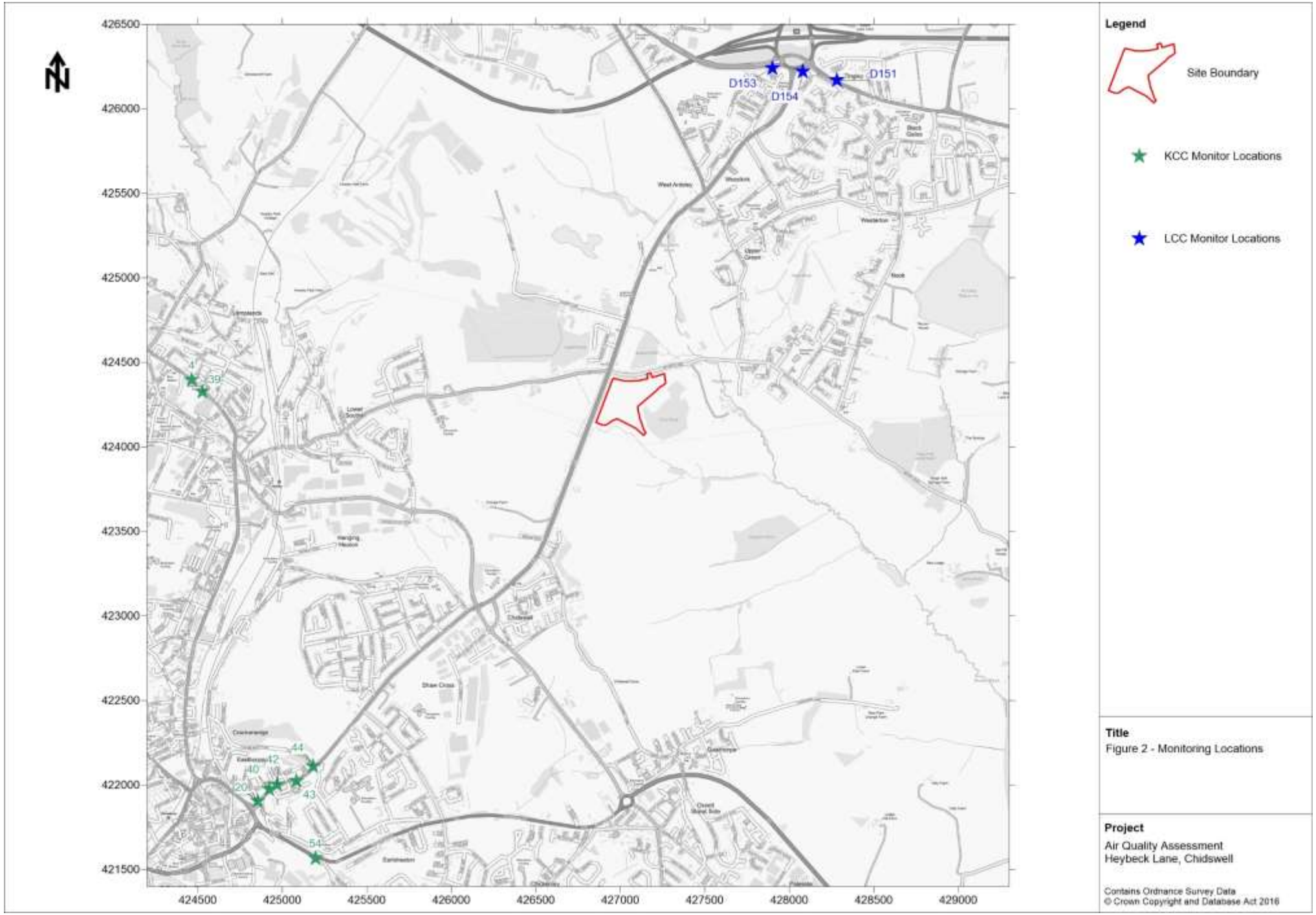
Site Boundary

**Title**

Figure 1 - Site Location Plan

**Project**

Air Quality Assessment
Heybeck Lane, Chidswell




**Legend**

Site Boundary

KCC Monitor Locations

LCC Monitor Locations

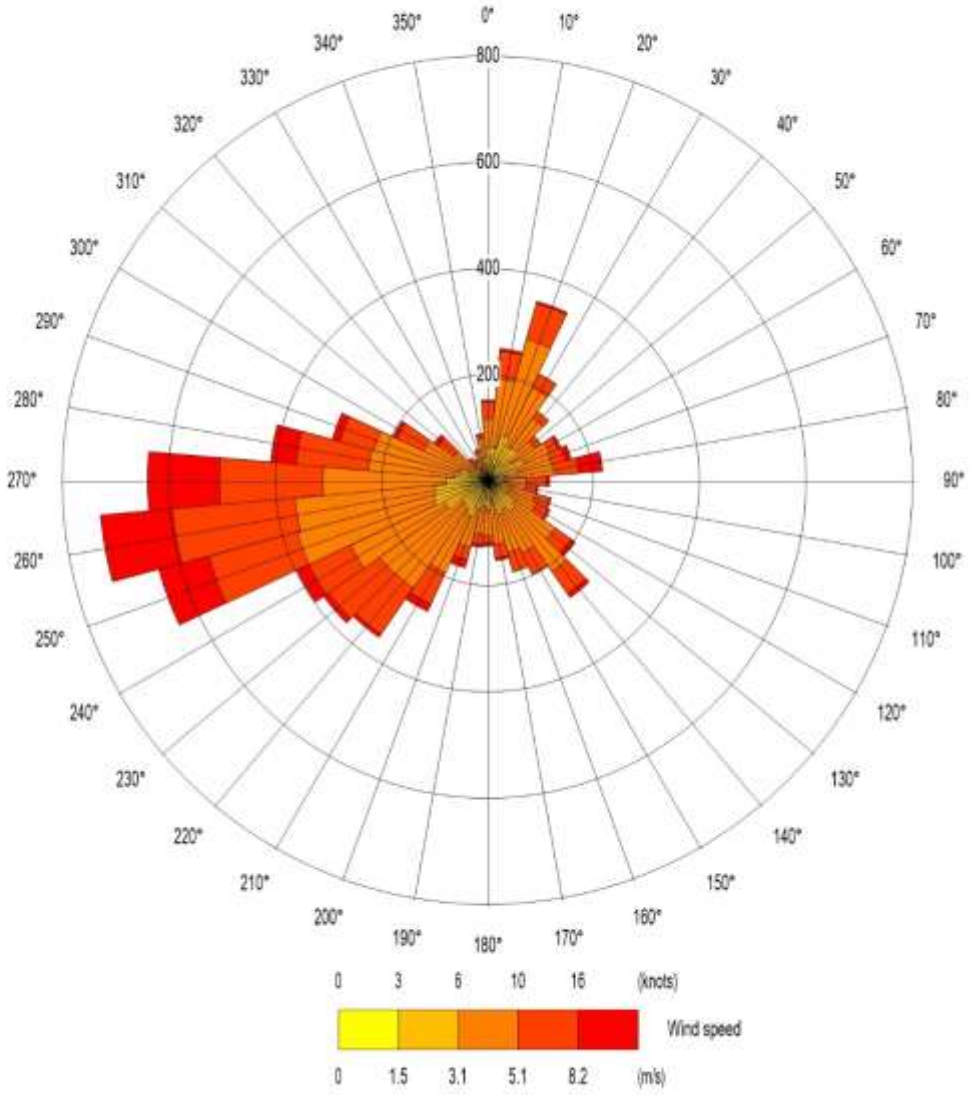
**Title**

Figure 2 - Monitoring Locations

**Project**

Air Quality Assessment
Heybeck Lane, Chidswell


427000
426500
426000
425500
425000
424500
424000
423500
423000
422500
422000
421500
421000
420500
424000
424500
425000
425500
426000
426500
427000
427500
428000
428500
429000
429500
430000
430500
Legend
Site Boundary
Road Link
Output Grid
Title
Figure 3 - ADMS-Roads Inputs
Project
Air Quality Assessment
Heybeck Lane, Chidswell
Contains Ordnance Survey Data
© Crown Copyright and Database Act 2016




**Legend**

**Title**

Figure 4 - Wind Rose of 2018 Leeds Bradford International Airport Meteorological Data

**Project**

Air Quality Assessment
Heybeck Lane, Chidswell


**Legend**

Site Boundary

Ecological Receptor

**Title**

Figure 5 - Construction Phase Dust Emissions - Ecological Receptor Extents

**Project**

Air Quality Assessment
Heybeck Lane, Chidswell


**Legend**

Site Boundary

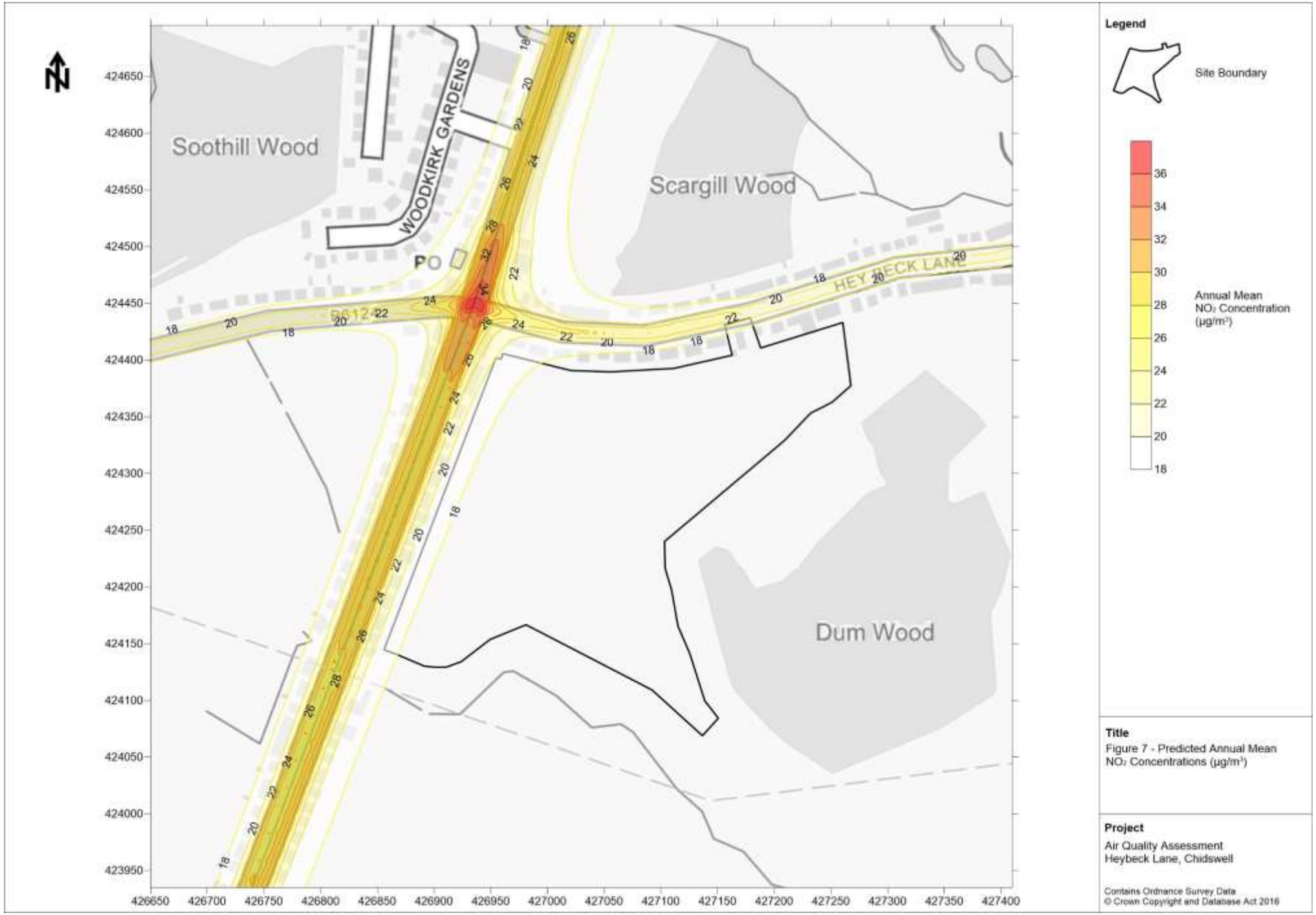
Sensitive Receptor

**Title**

Figure 6 - Road Vehicle Exhaust Emissions Sensitive Receptors

**Project**

Air Quality Assessment
Heybeck Lane, Chidswell




**Legend**

Site Boundary

Annual Mean $NO_2$ Concentration ($\mu g/m^3$)

36
34
32
30
28
26
24
22
20
18

**Title**

Figure 7 - Predicted Annual Mean $NO_2$ Concentrations ($\mu g/m^3$)

**Project**

Air Quality Assessment
Heybeck Lane, Chidswell


**Legend**

Site Boundary

Annual Mean $PM_{10}$ Concentration ($\mu g/m^3$)

20
19
18
17
16
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**Title**

Figure 8 - Predicted Annual Mean $PM_{10}$ Concentrations ($\mu g/m^3$)

**Project**

Air Quality Assessment
Heybeck Lane, Chidswell

# Appendix A - Limitations

# Limitations

The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

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