AIR QUALITY ASSESSMENT

AT

WEST LUND LANE, KIRKBYMOORSIDE

AQ108932R1

15TH FEBRUARY 2021

Prepared For

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EXECUTIVE SUMMARY

Ensafe Consultants were commissioned by Mulgrave Developments Ltd and Crossco (1377) (Sylatech) to undertake an Air Quality Assessment in support of an application for a residential and commercial development at West Lund Lane, Kirkbymoorside.

It is understood the proposals comprise full planning permission for the construction of a commercial building for the immediate expansion of Sylatech (phase1), together with outline permission for the extension of the first phase building (phase 2) and further commercial development to the east of West Lund Lane (phase 3) as well as full planning permission for the construction of 67 dwellings and associated works.

Due to the scale and nature of the development, there is potential for the proposals to cause impacts at sensitive receptors during the construction and operational phases. Additionally, given the proximity to the A170 there is potential to expose future site users to elevated pollutant concentrations. An Air Quality Assessment is therefore required in order to determine baseline conditions at the site, assess site suitability for the proposed end-use and assess the potential impacts as a result of the Proposed Development.

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

Dispersion modelling was undertaken in order to predict annual mean pollutant concentrations across the application site as a result of the A170 and to predicted impacts as a result of additional road vehicle exhaust emissions associated with the proposed development. Results were subsequently verified using local monitoring results provided by Ryedale District Council.

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

Additionally, the assessment concluded that impacts on pollutant levels as a result of operational phase pollutant emissions from thesite, were predicted to be negligible at all sensitive locations in the vicinity of the site, as a result of not significant at discrete sensitive receptor locations. The use of robust assumptions, where necessary, was considered to provide sufficient results confidence for an assessment of this nature.

Based on the assessment results the site is considered suitable for the proposed end use and complies with the Ryedale District Council Local Plan and National Planning Policy Framework.

1.0 INTRODUCTION

1.1 Background

Ensafe Consultants has been commissioned by Mulgrave Developments Ltd and Crossco (1377) (Sylatech), hereafter referred to as "the Client" to undertake an Air Quality Assessment in support of the proposed development, comprising the constriction of an additional industrial unit and the construction of 67 residential units, herein after referred to as the "Proposed Development".

It is understood the proposals comprise full planning permission for the construction of a commercial building for the immediate expansion of Sylatech (phase1), together with outline permission for the extension of the first phase building (phase 2) and further commercial development to the east of West Lund Lane (phase 3) as well as full planning permission for the construction of 67 dwellings and associated works. Reference should be made to Figure 1 within Appendix I for a location plan of the outline application and Figure 2 for the full application.

1.2 Site Location and Context

The application site is located Mulgrave Developments Ltd & Crossco (1377) (Sylatech) at approximate National Grid Reference (NGR) 469550, 485900.

Due to the scale of the Proposed Development, there is potential to cause impacts upon existing nitrogen dioxide (NO_2) and Particulate Matter (PM_{10} and $PM_{2.5}$) concentrations as a result of additional road vehicle exhaust emission generated during operation, as well as fugitive dust emission generated during construction. There is also potential for the proposals to expose future site users to elevated pollution levels, given the proximity to the A170 which is considered a notable source of road traffic emissions.

An Air Quality Assessment has therefore been requested to assess potential impacts as a result of the Proposed Development and quantify annual mean NO_2 and PM_{10} concentrations across the site in order to consider suitability for the proposed end-uses. This is detailed in the following report.

1.3 Limitations

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

2.0 LEGISLATION, GUIDANCE AND POLICY

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

- European Union (EU) Directive 2008/50/EC;
- The National Planning Policy Framework (NPPF), updated on 19th February 2019);
- The National Planning Practice Guidance (NPPG), relevant chapters produced on 1th November 2019;
- Section 82 of the Environment Act (1995) (Part IV);
- The Air Quality Standards (Amendment) Regulations (2016)[1];
- Local Air Quality Management Technical Guidance 2016 LAQM.TG (16), DEFRA, 2016[2];
- Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management (IAQM), v1.1, June 2016[3]; and
- Land-Use Planning and Development Control: Planning for Air Quality, Environmental Protection UK and IAQM, January 2017[4].

2.1 Background

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

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

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

Table 1: Air Quality Objectives

Pollutant	Air Quality Objectives	
	Concentration (µg/m^3)	Averaging Periods
NO_2	40	Annual mean
	200	1-hour mean; not to be exceeded more than 18 times a year
PM_{10}	40	Annual mean
	50	24-hour mean; not to be exceeded more than 35 times a year
$PM_{2.5}$	25	Annual Mean

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

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

Table 2: Examples of Where the Air Quality Objectives Apply

Averaging Periods	Objectives Should Apply At	Objectives Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

2.2 Local Planning Policy

2.2.1 Ryedale District Council (RDC) Local Plan

The Ryedale Local Plan was adopted in September 2013 and sets out the planning framework for the area for the coming years. A review of the local plan indicated the following policies regarding air quality which are relevant to our planning applications:

- **Policy SP17 – Managing Air Quality, Land and Water Resources**

  "Air Quality will be protected and improved by

  - *Locating and managing development to reduce traffic congestion and air pollution and promote the use of alternative forms of travel to the private car*
  - *Supporting measures to encourage non-car based means of travel or the use of low emission vehicles*
  - *Reducing air quality emissions from buildings through renewable energy provision and sustainable building standards in line with Policy SP18*
  - *Requiring development proposals within or adjoining the Malton Air Quality Management Area to demonstrate how effects on air quality will be mitigated and further human exposure to poor air quality reduced. All development proposals within or near to the Air Quality Management Area which are likely to impact upon air quality; which are sensitive to poor air quality or which would conflict with any Air Quality Action Plan will be accompanied by an Air Quality Assessment*
  - *Only permitting development if the individual or cumulative impact on air quality is acceptable and appropriate mitigation measures are secured"*

Reference has been made to this policy during the undertaking of this Air Quality Assessment by assessing the impacts of road vehicle exhaust emissions on future site users and on nearby existing sensitive locations.

3.0 METHODOLOGY

3.1 Construction Phase Assessment

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the IAQM document 'Guidance on the Assessment of Dust from Demolition and Construction'[3].

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

- Earthworks
- Construction
- Trackout

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

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

The assessment steps are detailed below.

3.1.1 Step 1

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

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

3.1.2 Step 2

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

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

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

3.1.3 Step 3

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

3.1.4 Step 4

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

The determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts. The IAQM guidance[3] suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix IV.

3.2 Operational Phase Assessment

The Proposed Development is located within the vicinity of A170, which is a notable source of road vehicle emissions. As such, the proposals have the potential to introduce new receptors into an area of existing poor air quality, as well as to cause impacts upon existing pollution levels at nearby sensitive receptors.

Potential impacts have been defined by predicting pollutant concentrations at sensitive locations using dispersion modelling for the following scenarios.

- 2018 as baseline year for verification against latest ratified data;
- Opening year do-minimum (DM) (predicted traffic flows in 2023 should the proposal not proceed); and
- Opening year do-something (DS) (predicted traffic flows in 2023 should the proposal be completed, with the addition of traffic generated by the Proposed Development).

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

3.2.5 Road Traffic Exhaust Emission Impacts

Receptors potentially sensitive to changes in pollutant concentrations were identified within the assessment extents. LAQM (TG16)[2] provides the following examples of where annual mean AQOs should apply:

- Residential properties;
- Schools;
- Hospitals; and
- Care homes.

The sensitivity impact significance of each receptor was defined in accordance with the criteria shown in Table 3. These are based upon the guidance provided within the EPUK and IAQM guidance[4].

Table 3: Predicted Background Pollutant Concentrations

Long Term Average Concentration	% Change in Concentration Relative to 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

The criteria shown in Table 3 is adapted from the EPUK and IAQM guidance[4] with sensitivity descriptors included to allow comparisons of various air quality impacts. It should be noted that changes of 0%, i.e. less than 0.5%, will be described as negligible in accordance with the EPUK and IAQM guidance[4].

Following the prediction of impacts at discrete receptor locations utilising the criteria in Table 3 the EPUK and IAQM guidance[4] states that this framework is to be used as a starting point to make a judgement on significance of effect but other influences might need to be accounted for. Whilst impacts might be determined as 'slight', 'moderate' or 'substantial' at individual receptors, overall effect might not necessarily be deemed as significant in some circumstances. The following factors may provide some assistance in determining the overall significance of a development:

- • Number of properties affected by significant air quality impacts and a judgement on the overall balance;
- • Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective will be relevant;
- • The percentage change in concentration relative to the objective and the descriptions of the impacts at the receptors;
- • Whether or not an exceedance of an objective is predicted to arise or be removed in the study area due to a substantial increase or decrease; and
- • The extent to which an objective is exceeded e.g. an annual mean NO_2 concentration of 41µg/m^3 should attract less significance than an annual mean of 51µg/m^3.

These factors were considered and an overall significance determined for the impact of operational phase road traffic emissions. It should be noted that the determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts.

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

3.2.6 Future Exposure

The Proposed Development is located within close proximity to A170. Subsequently, the proposals have potential to introduce new receptors into an area of elevated NO_2, PM_{10} and $PM_{2.5}$ concentrations.

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

- Opening year do-something (DS) (predicted traffic flows in 2023 should the proposals be completed with the addition of traffic generated by the Proposed Development

The results of the dispersion modelling assessment will also be compared against the relevant AQOs detailed in Table 1 to determine significance. Full details of data used for the modelling assessment are presented in Appendix II of this report.

4.0 BASELINE

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

4.1 Local Air Quality Management

As required by the Environment Act (1995), RDC, has undertaken Review and Assessment of air quality within their area of administration. This process has indicated that concentrations of NO_2 are above the AQO within their administration. As such, one AQMA has been declared, the closest being described as:

- ***Malton AQMA (RDC)**: An area in the centre of Malton encompassing properties along the B1248 (Castlegate and Yorkersgate, between Sheepfoot Hill and Market Street), and the B1257 (Wheelgate and Old Maltongate, between Finkle Street and 20m east of the junction with East Mount.*

The application site is located 16 km north of the AQMA. As such it is very unlikely that Proposed Development will result in air quality impacts within the AQMA during construction or operation.

RDC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs and as such no further AQMAs have been designated.

4.2 Air Quality Monitoring

Monitoring of pollutant concentrations is undertaken by RDC using passive methods throughout their areas of administration. A review of most recent Air Quality Monitoring Data[5] indicated no monitoring locations in the vicinity of the site. Following a further review of the wider Ryedale area one diffusion tube was located and deemed representative of conditions surrounding the Proposed Development. Recent results are presented in Table 4.

Table 4: Diffusion Tube Monitoring Results

ID	Site Name	Type	NGR (m)		Dist' to Site (m)	Annual Mean Concentration (µg/m³)		
			X	Y		2016	2017	2018
14	Pickering	Roadside	479943	483823	10,500	26	23	23

As indicated in Table 4, there were no exceedances of annual mean AQO for NO_2 at Location 14 in recent years. Reference should be made to Figure 2 within Appendix I for a graphical representation of the passive monitoring locations.

4.3 Background Pollutant Concentrations

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

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

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

[5] Ryedale District Council Air Quality Status Report, June 2019.

- NGR: 469500, 485500
- NGR: 469500, 486500

Data for these locations were downloaded from the DEFRA website[6]. For the purpose of this assessment, the maximum background concentrations are summarised in Table 5 for the verification year (2018) and the predicted development opening year (2023).

Table 5: Predicted Background Pollutant Concentrations

Pollutant	Predicated Background Concentration (µg/m³)	
	2018	2023
NO_x	8.59	7.22
NO_2	6.74	5.71
PM_{10}	11.22	10.43
$PM_{2.5}$	7.19	6.55

4.4 Sensitive Receptors

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

4.4.1 Industrial Development Outline Application - Construction Phase Sensitive Receptors

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

Human receptors sensitive to potential dust impacts during, earthworks and construction were identified from a desk-top study of the area up to 350m from the Proposed Development boundary. These are summarised in Table 6.

Table 6: Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors
Less than 20	1 - 10
20 – 50	10 - 100
50 – 100	10 - 100
100 – 350	More than 100

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

Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 500m of the site access route. These are summarised in Table 7. , It has been confirmed that construction traffic will access the Proposed Development via West Lund Lane.

6 https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

Table 7: Trackout Dust Sensitive Receptors

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

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

A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 8.

Table 8: Additional Area Sensitivity Factors

Guidance	Comment
Whether there is any history of dust generating activities in the area	The Proposed Development is in a residential and industrial area. As such, there is likely to have been a history of dust generating activities due to regeneration and commuting activities in the locality, as well as dust generated as a result of industrial processes from adjacent industrial units.
The likelihood of concurrent dust generating activity on nearby sites.	A review of the Ryedale planning applications database indicated that there are no major planning applications within 500m of the Proposed Development. As such, there is limited potential for concurrent dust generation.
Pre-existing screening between the source and the receptors	There is some vegetation alongside the northern boundary which can provide some protective screening to receptors.
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	The wind direction is predominantly from the south-west of the development, as shown in Figure 5 within Appendix I. As such, properties to the north-east of the proposed development would be most affected by dust emissions
Conclusions drawn from local topography	The topography of the area appears to be predominantly flat. As such, there are no constraints to dust dispersion.
Duration of the potential impact, as a receptor may become more sensitive over time	The full application is proposed to take approximately one year with the full application likely to last longer over one year..
Any known specific receptor sensitivities which go beyond the classifications given in the document.	No specific receptor sensitivities identified during the baseline

4.4.2 Residential Development Full Application - Construction Phase Sensitive Receptors

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

Human receptors sensitive to potential dust impacts during, demolition, earthworks and construction were identified from a desk-top study of the area up to 350m from the Proposed Development boundary. These are summarised in Table 6.

Table 9: Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors
Less than 20	1 - 10
20 – 50	10 - 100
50 – 100	10 - 100
100 – 350	More than 100

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

Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 500m of the site access route. These are summarised in Table 7. The exact construction vehicle access routes were not available for the purpose of this assessment as they will depend on sourcing of materials. This is likely to be decided by the contractor. It has been confirmed that construction traffic would access the Proposed Development via West Lund Lane and Ings Lane, to ensure a worst case trackout assessment is undertaken.

Table 10: Trackout Dust Sensitive Receptors

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

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

A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 8.

Table 11: Additional Area Sensitivity Factors

Guidance	Comment
Whether there is any history of dust generating activities in the area	The Proposed Development is in a residential and industrial area. As such, there is likely to have been a history of dust generating activities due to regeneration and commuting activities in the locality, as well as dust generated as a result of industrial processes from adjacent industrial units.
The likelihood of concurrent dust generating activity on nearby sites.	A review of the Ryedale planning applications database indicated that there are no major planning applications within 500m of the Proposed Development. As such, there is limited potential for concurrent dust generation.
Pre-existing screening between the source and the receptors	There is no existing screening present along the boundary of the site. As such, there is limited screening to receptors.

Guidance	Comment
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	The wind direction is predominantly from the south-west of the development, as shown in Figure 5 within Appendix I. As such, properties to the north-east of the proposed development would be most affected by dust emissions
Conclusions drawn from local topography	The topography of the area appears to be predominantly flat. As such, there are no constraints to dust dispersion.
Duration of the potential impact, as a receptor may become more sensitive over time	Currently it is unclear as to the duration of the construction phase. However, given the 2023 opening year, the development is likely to extend over one year.
Any known specific receptor sensitivities which go beyond the classifications given in the document.	No specific receptor sensitivities identified during the baseline

4.4.3 Operational Phase Sensitive Receptors

A desk top study was undertaken to identify the closest receptor locations to the application site. This indicated residential locations within close proximity to all development boundaries, summarised in Table 12.

Table 12: Existing Sensitive Human Receptors

Receptor		NGR (m)		Height (m)	In AQMA?
		X	Y		
R1	29 West Lund Lane	469464	486073	1.5	No
R2	Brooklands, West Lund Lane	469396	486178	1.5	No
R3	19 West Lund Lane	469449	486248	1.5	No
R4	2 Duncombe Terrace	469674	486199	1.5	No
R5	11 Weighbridge Close	469880	486116	1.5	No
R6	1 Queens Way	469984	486129	1.5	No
R7	3 Hills View	470061	486083	1.5	No
R8	10 Hills View	470192	486037	1.5	No
R9	42 Ings Lane	469748	485882	1.5	No
R10	48 Ings Lane	469739	485963	1.5	No

Receptors were modelled at 1.5m to represent the average UK "breathing height above ground floor. Reference should be made to Figure 9 within Appendix I for a graphical representation of operational phase emission sensitive human receptor locations.

5.0 ASSESSMENT

5.1 Construction Phase Assessment

5.1.1 Step 1 – Screening

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

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

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

5.1.2 Step 2A – Magnitude

The scale and nature of the works was determined to assess the magnitude of dust arising from each construction phase activity. The determination of magnitude was based upon the criteria detailed in Appendix III, with the outcome of Step 2A is summarised below in Table 13.

Earthworks

The Proposed Development site is estimated to cover an area of approximately 58,000m^2. However, It is not anticipated that large volumes of material will be excavated and exported from the site to prepare for construction. The magnitude of potential dust emissions related to earthwork activities is therefore considered **medium**.

Construction

Given the scale of the Proposed Development the total building and infrastructure volume is likely to be between 25,000 and 100,000m^3. The magnitude of potential dust emissions related to construction activities is therefore considered **medium**.

Trackout

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

Table 13: Dust Emission Magnitude

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

5.1.3 Step 2B – Sensitivity

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

Dust Soiling

As shown in Section 4.4.1 and Table 7, the desk top study indicated are approximately **10 - 100** sensitive receptors within 50m of the Proposed Development boundary and **10 - 100** within 20m of the anticipated trackout routes.

Based on the assessment criteria detailed in Appendix **III**, the sensitivity of the receiving environment to potential dust soiling impacts was considered to be **medium** for earthworks, and construction activities and **high** for trackout activities.

Human Health

The annual mean concentration of PM_{10} is **11.22µg/m³** as detailed in Section 4, based on the receptor counts provided above, the area is considered to be of **low** sensitivity for all construction phase activities.

The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria detailed in Appendix **III** is summarised in Table 14.

Table 14: Sensitivity of the Surrounding Area

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

5.1.4 Step 2C – Risk

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

It should be noted that the potential for impacts depends significantly on the distance between the dust generating activity and receptor location. Risk was predicted based on a worst-case scenario of works being undertaken at the site boundary closest to each sensitive area. Therefore, actual risk is likely to be lower than that predicted during the majority of the construction phase. A summary of the risk from each dust generating activity is provided in Table 15.

Table 15: Summary of Potential Unmitigated Dust Risks

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

5.2 Construction Phase Assessment Mitigation

5.2.5 Step 3 – Mitigation

Following the above construction phase assessments for each of the application, the IAQM guidance[3] provides a number of potential mitigation measures to reduce impacts during the construction phase. These measures have been adapted for the Proposed Development site as summarised in Table 16. The mitigation measures outlined in Table 16 can be reviewed prior to the commencement of construction works incorporated into the existing strategies as applicable.

Table 16: Fugitive Dust Mitigation Measures

Issue	Control Measure
Communications	• Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. • Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. • Display the head or regional office contact information • Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority.
Site Management	• Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. • Make the complaints log available to the local authority when asked • Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the logbook. • Hold regular liaison meetings with other high-risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/ deliveries which might be using the same strategic road network routes.
Monitoring	• Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary. • Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and inspection log available to the local authority when asked • Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Preparing & Maintaining Site	• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. • Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site. • Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive time period • Avoid site runoff of water or mud • Keep site fencing, barriers and scaffolding clean using wet methods • Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below. • Cover, seed, or fence stockpiles to prevent wind whipping
Operating Vehicle/Machinery & Sustainable Travel	• Ensure all vehicles switch off engines when stationary - no idling vehicles

Issue	Control Measure
	• Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable. • Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un- surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate) • Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials • Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)
Operations	• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems. • Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. • Use enclosed chutes and conveyors and covered skips. • Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate. • Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Waste Management	• Avoid bonfires and burning of waste materials
Earthworks & Construction	• Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable • Only remove the cover in small areas during work and not all at once. • Avoid scabbling (roughening of concrete surfaces) if possible • Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place. • Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery. • For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.
Trackout	• Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use. • Avoid dry sweeping of large areas. • Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. • Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable. • Record all inspections of haul routes and any subsequent action in a site logbook.

Issue	Control Measure
	• Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned. • Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). • Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits. • Access gates to be located at least 10 m from receptors where possible

5.2.6 Step 4 – Residual Impacts

Assuming the relevant mitigation measures outlined above are implemented, the residual effect from all dust generating activities is predicted to be **negligible** and therefore **not significant** in accordance with the IAQM guidance[3].

5.3 Operational Phase Assessment

The assessment was undertaken in accordance with the methodology detailed in Section 3.2. Reference should be made to Appendix II for full assessment input details. To ensure a robust assessments, traffic generated by the development has been considered within the DS Scenario.

5.3.1 Future Exposure

Annual mean NO_2 and PM_{10} concentrations were predicted across the Proposed Development for the 2023 DS scenario at a height of 1.5m to represent exposure across the ground floor level, as shown in Figures 7 and 8 within Appendix I.

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

Nitrogen Dioxide (NO_2)

Predicted annual mean NO_2 concentrations across the Proposed Development during the DS scenario are summarised in Table 17.

Table 17: Modelling Results - Annual Mean NO_2 across the Proposed Development

Floor Level	Predicted 2023 Annual Mean NO_2 Concentration (µg/m^3)
Ground (1.5m)	7.20 – 8.00

The predicted concentrations shown in Table 17 indicate that there were no exceedances of the AQO at sensitive locations across ground floor areas of the proposed development. As such, it is considered that annual mean NO_2 levels at the Proposed Development should not be viewed as a constraint to development.

Furthermore, predictions of 1-hour NO_2 concentrations were not produced as part of the dispersion modelling assessment. However, as stated in LAQM (TG16)[2] if annual mean NO_2 concentrations are below 60µg/m^3 then it is unlikely that the 1-hour AQO will be exceeded. As such based on the results in Table 17, it is not predicted that on-site concentrations will exceed the 1-hour mean AQO for NO_2.

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

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

Predicted annual mean PM concentrations across the Proposed Development during the DS scenario are summarised in Table 18.

Table 18: Modelling Results - Annual Mean PM across the Proposed Development

Floor Level	Predicted 2023 Annual Mean Concentration (µg/m^3)	
	PM_{10}	$PM_{2.5}$
Ground (1.5m)	11.30 – 11.40	7.23 – 7.30

The predicted concentrations shown in Table 18 indicate that there were no exceedances of the annual mean AQOs for PM_{10} or $PM_{2.5}$ throughout the modelling area. As such, it is considered that annual mean PM levels at the Proposed Development should not be viewed as a constraint to development.

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

5.3.2 Impact Assessment - Predicted Concentrations at Sensitive Receptors

Any additional vehicle movements associated with the Proposed Development will generate exhaust emissions, such as NO_2, PM_{10} and $PM_{2.5}$ on the local and regional road networks. Based on data from the appointed traffic consultant, Local Transport Projects, it is expected that there will be an additional 757 vehicle trips from the Proposed Development. As such, a detailed impact assessment was undertaken.

An assessment was therefore undertaken in accordance with the methodology detailed in Section 3.2 in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the site.

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

Nitrogen Dioxide (NO_2)

Annual mean NO_2 concentrations were predicted for 2023 DM and DS scenarios and are summarised in Table 19.

Table 19: Predicted Annual Mean NO_2 Concentrations at Sensitive Receptors

Potential Impact		Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)		
		DM	DS	Change
R1	29 West Lund Lane	7.57	7.92	0.35
R2	Brooklands, West Lund Lane	8.42	8.63	0.21
R3	19 West Lund Lane	13.83	14.14	0.31
R4	2 Duncombe Terrace	13.75	13.99	0.24
R5	11 Weighbridge Close	11.98	12.18	0.20
R6	1 Queens Way	13.20	13.45	0.25
R7	3 Hills View	9.75	9.90	0.15
R8	10 Hills View	10.07	10.23	0.16
R9	42 Ings Lane	6.97	7.06	0.09
R10	48 Ings Lane	7.09	7.16	0.07

As indicated in Table 19, predicted annual mean NO_2 concentrations were below the relevant AQO at all receptor locations considered. Predicted impacts on annual mean NO_2 concentrations are summarised in Table 20.

Table 20: Predicted NO_2 Impacts at Sensitive Receptors

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	29 West Lund Lane	0.87	75% or Less of AQO	Negligible
R2	Brooklands, West Lund Lane	0.53	75% or Less of AQO	Negligible
R3	19 West Lund Lane	0.78	75% or Less of AQO	Negligible
R4	2 Duncombe Terrace	0.60	75% or Less of AQO	Negligible

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R5	11 Weighbridge Close	0.50	75% or Less of AQO	Negligible
R6	1 Queens Way	0.63	75% or Less of AQO	Negligible
R7	3 Hills View	0.38	75% or Less of AQO	Negligible
R8	10 Hills View	0.40	75% or Less of AQO	Negligible
R9	42 Ings Lane	0.23	75% or Less of AQO	Negligible
R10	48 Ings Lane	0.18	75% or Less of AQO	Negligible

As indicated in Table 20, impacts on annual mean NO_2 concentrations as a result of road vehicle exhaust emissions associated with the development were predicted to be **negligible** at all receptor locations. It is therefore considered that the overall impacts as a result of the proposed development are **not significant.** Further justifications are discussed in Section 5.2.1

Particulate Matter (PM_{10})

Annual mean PM_{10} concentrations were predicted for 2023 DM and DS scenarios and are summarised Table 21.

Table 21: Predicted Annual Mean PM_{10} Concentrations at Sensitive Receptors

Potential Impact		Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)		
		DM	DS	Change
R1	29 West Lund Lane	0.14	0.21	0.07
R2	Brooklands, West Lund Lane	0.29	0.32	0.03
R3	19 West Lund Lane	1.19	1.25	0.06
R4	2 Duncombe Terrace	1.01	1.05	0.04
R5	11 Weighbridge Close	0.85	0.88	0.03
R6	1 Queens Way	1.09	1.13	0.04
R7	3 Hills View	0.62	0.65	0.03
R8	10 Hills View	0.75	0.78	0.03
R9	42 Ings Lane	0.16	0.17	0.01
R10	48 Ings Lane	0.17	0.18	0.01

As indicated in Table 21 annual mean PM_{10} concentrations were below the relevant AQO at all receptor locations considered. Predicted impacts on annual mean PM_{10} concentrations are summarised in Table 22.

Table 22: Predicted PM_{10} Impacts at Sensitive Receptors

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	29 West Lund Lane	0.18	75% or Less of AQO	Negligible
R2	Brooklands, West Lund Lane	0.08	75% or Less of AQO	Negligible
R3	19 West Lund Lane	0.15	75% or Less of AQO	Negligible

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R4	2 Duncombe Terrace	0.10	75% or Less of AQO	Negligible
R5	11 Weighbridge Close	0.08	75% or Less of AQO	Negligible
R6	1 Queens Way	0.10	75% or Less of AQO	Negligible
R7	3 Hills View	0.08	75% or Less of AQO	Negligible
R8	10 Hills View	0.08	75% or Less of AQO	Negligible
R9	42 Ings Lane	0.03	75% or Less of AQO	Negligible
R10	48 Ings Lane	0.03	75% or Less of AQO	Negligible

As indicated in Table 22, impacts on annual mean PM_{10} concentrations as a result of road vehicle exhaust emissions associated with the development were predicted to be **negligible** at all receptor locations. It is therefore considered that the overall impacts as a result of the proposed development are **not significant.** Further justifications are discussed in Section 5.2.1.

Particulate matter (PM2.5)

Annual mean $PM_{2.5}$ concentrations were predicted for 2023 DM and DS scenarios and are summarised Table **23**.

Table 23: Predicted Annual Mean $PM_{2.5}$ Concentrations at Sensitive Receptors

Potential Impact		Predicted Annual Mean $PM_{2.5}$ Concentration ($\mu g/m^3$)		
		DM	DS	Change
R1	29 West Lund Lane	0.08	0.12	0.04
R2	Brooklands, West Lund Lane	0.17	0.19	0.02
R3	19 West Lund Lane	0.70	0.74	0.04
R4	2 Duncombe Terrace	0.61	0.63	0.02
R5	11 Weighbridge Close	0.50	0.52	0.02
R6	1 Queens Way	0.64	0.67	0.03
R7	3 Hills View	0.37	0.38	0.01
R8	10 Hills View	0.44	0.46	0.02
R9	42 Ings Lane	0.09	0.10	0.01
R10	48 Ings Lane	0.10	0.11	0.01

As indicated in Table 23 annual mean $PM_{2.5}$ concentrations were below the relevant AQO at all receptor locations in considered.

Predicted impacts on annual mean $PM_{2.5}$ concentrations are summarised in Table 24.

Table 24: Predicted $PM_{2.5}$ Impacts at Sensitive Receptors

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	29 West Lund Lane	0.16	75% or Less of AQO	Negligible

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R2	Brooklands, West Lund Lane	0.08	75% or Less of AQO	Negligible
R3	19 West Lund Lane	0.16	75% or Less of AQO	Negligible
R4	2 Duncombe Terrace	0.08	75% or Less of AQO	Negligible
R5	11 Weighbridge Close	0.08	75% or Less of AQO	Negligible
R6	1 Queens Way	0.12	75% or Less of AQO	Negligible
R7	3 Hills View	0.04	75% or Less of AQO	Negligible
R8	10 Hills View	0.08	75% or Less of AQO	Negligible
R9	42 Ings Lane	0.04	75% or Less of AQO	Negligible
R10	48 Ings Lane	0.04	75% or Less of AQO	Negligible

As indicated in Table 24, impacts on annual mean $PM_{2.5}$ concentrations as a result of road vehicle exhaust emissions associated with the development were predicted to be **negligible** at all receptor locations. It is therefore considered that the overall impacts as a result of the proposed development are **not significant.** Further justifications are discussed in Section 5.2.1.

5.2.1. Impact Significance

The overall significance of operational phase road traffic emission impacts for 2023 was determined as **not significant**. This was based on the predicted impacts at discrete receptor locations and the considerations outlined in Section 5.2. Further justifications are provided in Table 25.

Table 25: Overall Road Emissions Impact Significance

Guidance	Comment
Number of properties affected by slight, moderate or substantial air quality impacts and a judgement on the overall balance	Impacts on annual mean NO_2 and PM concentrations were predicted to be **negligible** at all 10 sensitive receptors locations considered The sensitive locations represent worst-case locations and therefore it is unlikely that any other receptors would be significantly affected by the proposed development
Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant	The Proposed Development will not result in any new exposure to pollutant concentrations on the development site and as such no new exposure has been introduced
The percentage change in concentration relative to the objective and the descriptions of the impacts at the receptors	The change in concentration relative to the AQO was predicted to range from: • 0.00% to 0.087% for NO_2, • 0.00% to 0.018% for PM_{10}; and • 0.00% to 0.016% for $PM_{2.5}$ Resultant impacts were subsequently predicted to be **negligible** at all receptor locations considered.
Whether or not an exceedance of an objective is predicted to arise or be removed in the study area due to a substantial increase or decrease	There were no exceedances of the annual mean AQOs for NO_2, PM_{10} and $PM_{2.5}$ at any location within the modelling extent.

Guidance	Comment
The extent to which an objective is exceeded e.g. an annual mean NO_2 concentration of 41µg/m^3 should attract less significance than an annual mean of 51µg/m^3	As stated above, there were no exceedances of the annual mean AQOs for NO_2, PM_{10} and $PM_{2.5}$ at any sensitive receptor location within the modelling extent.

It should also be noted that the combined use of 2023 traffic data and 2018 emission factors is considered to provide a worst-case scenario, which may lead to overestimations of actual pollutant concentrations during the operation of the proposals. As such, the overall significance of operational phase road traffic emission impacts on annual mean NO_2 and PM concentrations was determined not significant with a high level of confidence

6.0 CONCLUSION

Ensafe Consultants were commissioned by the client to undertake an Air Quality Assessment in support of a proposed development at West Lund Lane, Kirkbymoorside.

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

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

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

Predicted impacts on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of operational phase exhaust emissions from the site were predicted to be **negligible** at all 10 sensitive receptor locations within the vicinity of the site.

The overall significance of potential impacts was determined to be **not significant** in accordance with the EPUK and IAQM guidance. The use of robust assumptions, in the form of worse-case road vehicle emission factors, was considered to provide sufficient results confidence for an assessment of this nature.

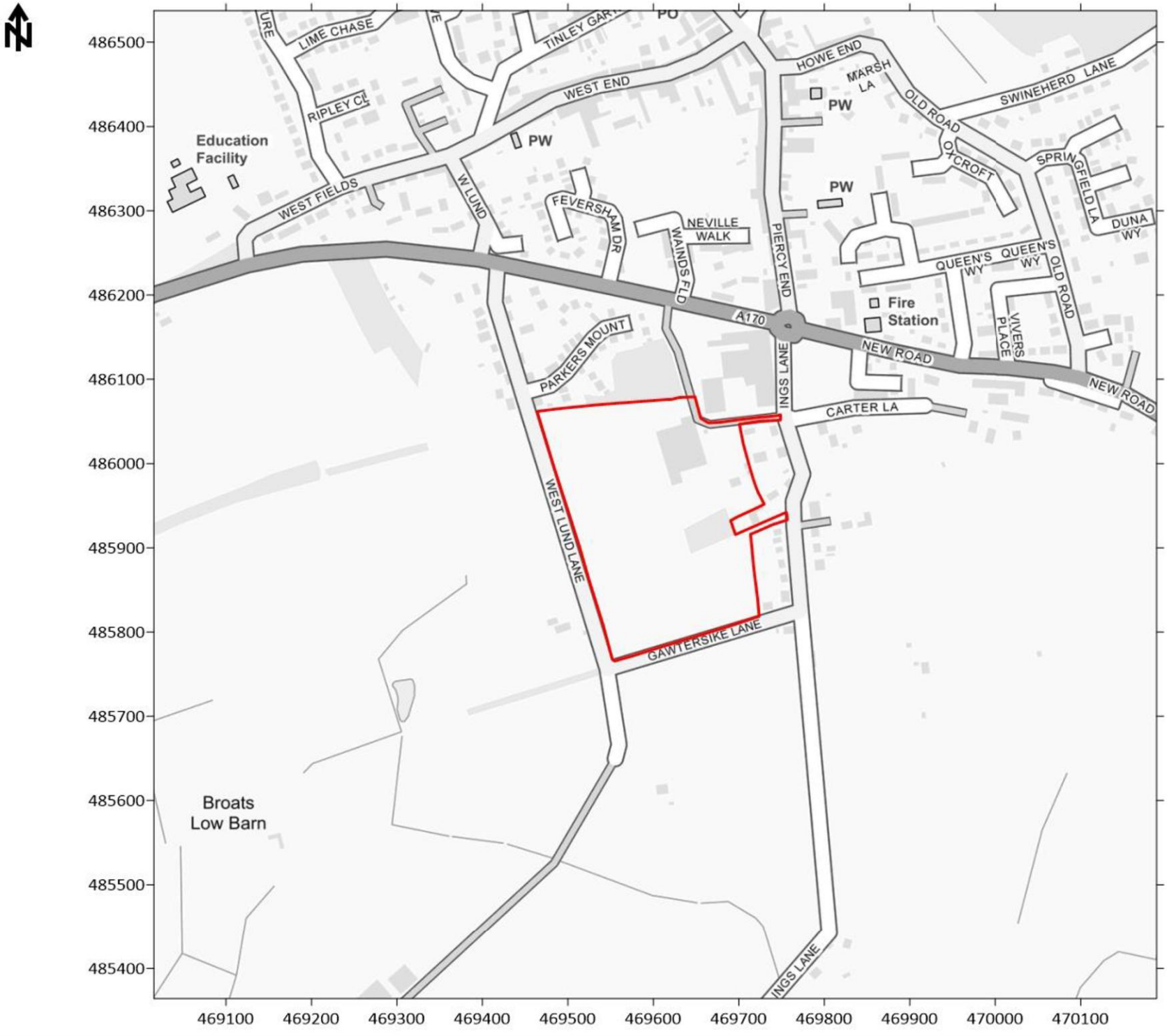
Based on the assessment results the site is considered suitable for the proposed end use and comply with the RDC Local Plan and NPPF.

7.0 ABBREVIATIONS

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

END OF REPORT

APPENDIX I - FIGURES



Legend

Site Boundary

Title

Figure 1

Site Location

Project

West Lund Lane, Kirkbymoorside

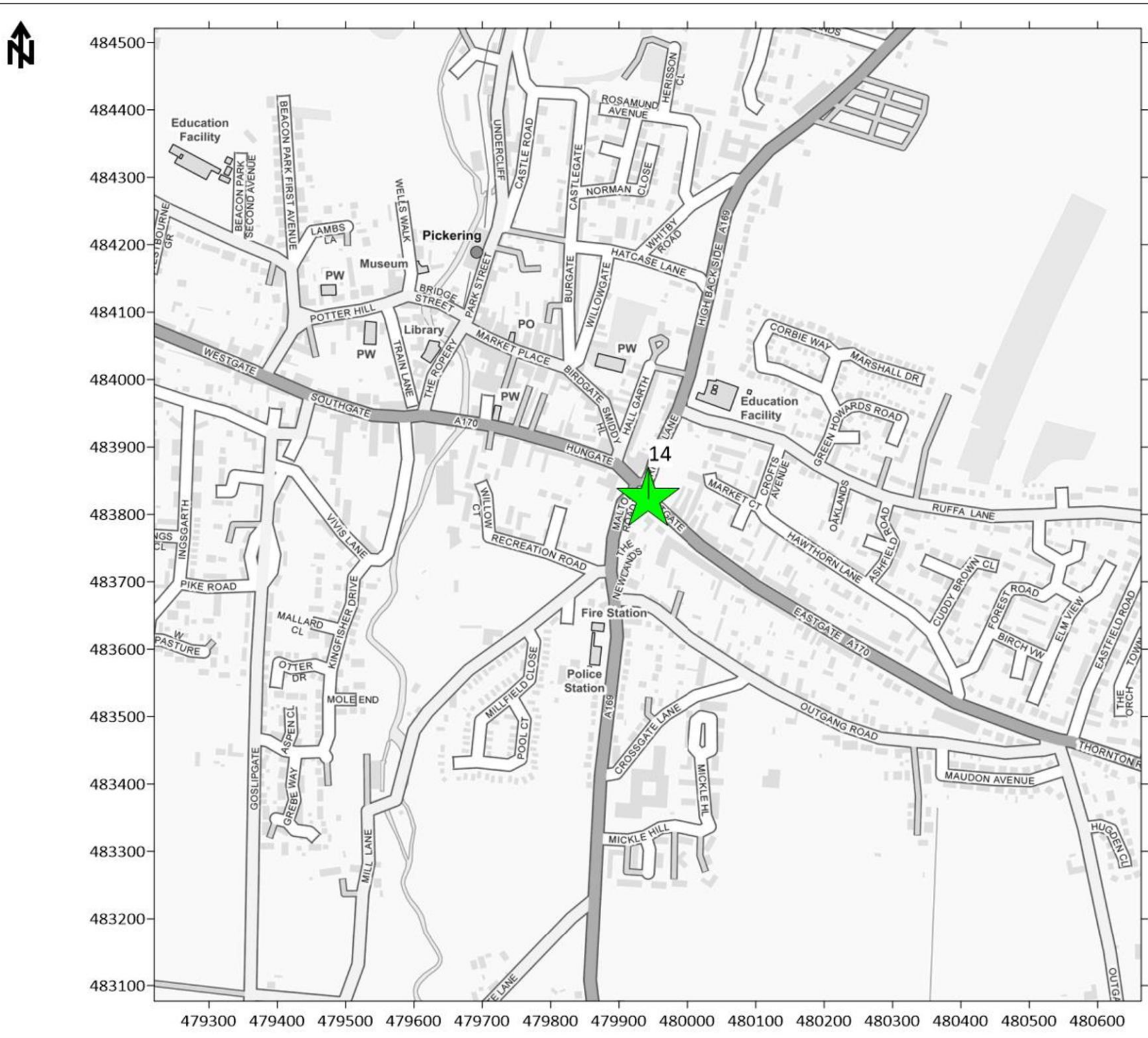
Project Number

AQ108932

Client

Mulgrave Developments Ltd and Crossco (1377) (Sylatech)

Ensafe Consultants
Osprey House, Broadway, Manchester M50 2UE
Tel – 0161 868 1300 Fax – 0161 868 1301
www.ensafe.co.uk



Legend

Diffusion Tube Monitoring Locations

Title

Figure 2

Diffusion Tube Monitoring Locations

Project

West Lund Lane, Kirkbymoorside

Project Number

AQ108932

Client

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Legend

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

Title

Figure 3

Earthworks and Construction
Dust Buffer Zones

Project

West Lund Lane, Kirkbymoorside

Project Number

AQ108932

Client

Mulgrave Developments Ltd and
Crossco (1377) (Sylatech)

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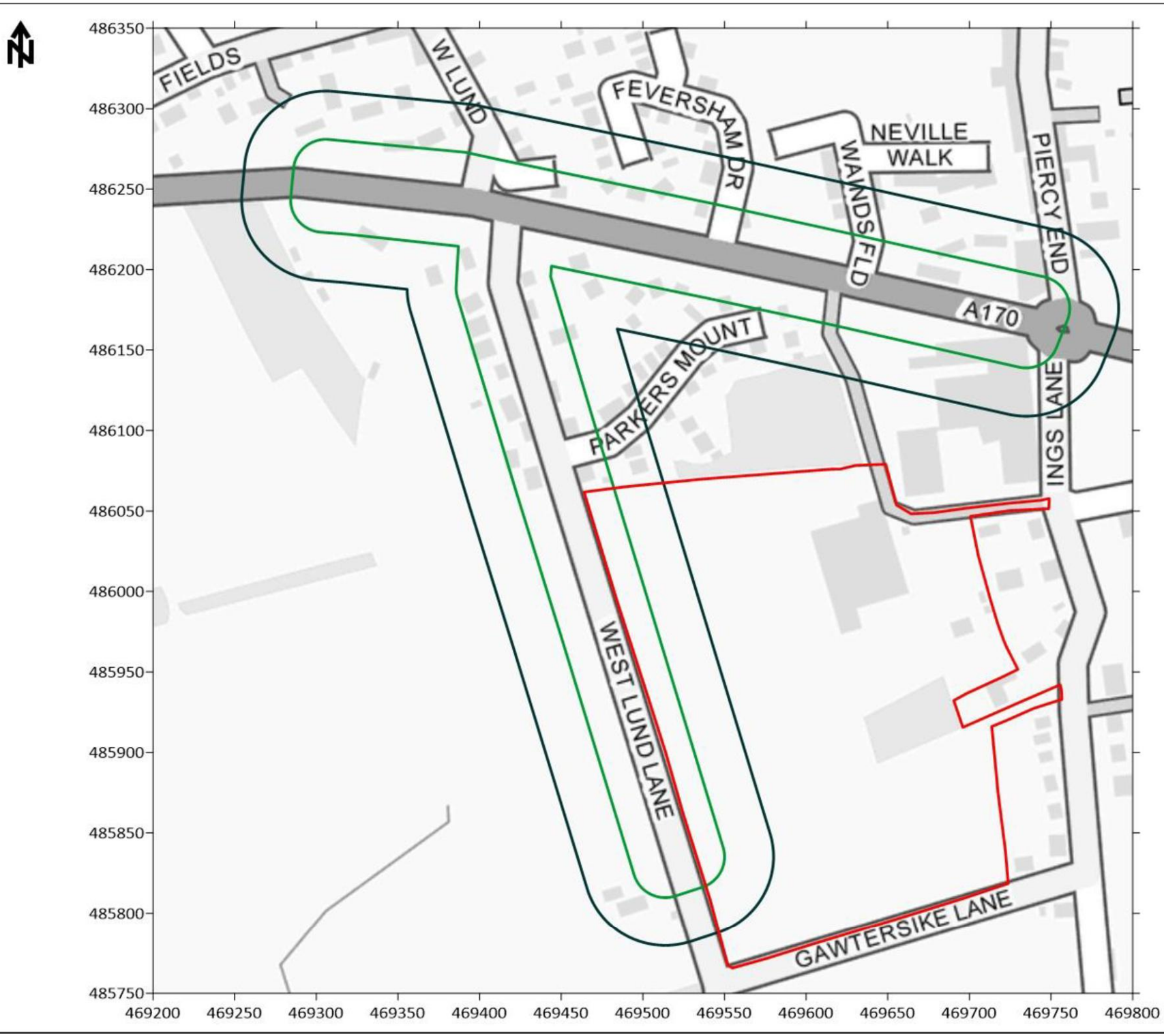

Legend

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

Title

Figure 4

Trackout Dust Buffer Zones

Project

West Lund Lane, Kirkbymoorside

Project Number

AQ108932

Client

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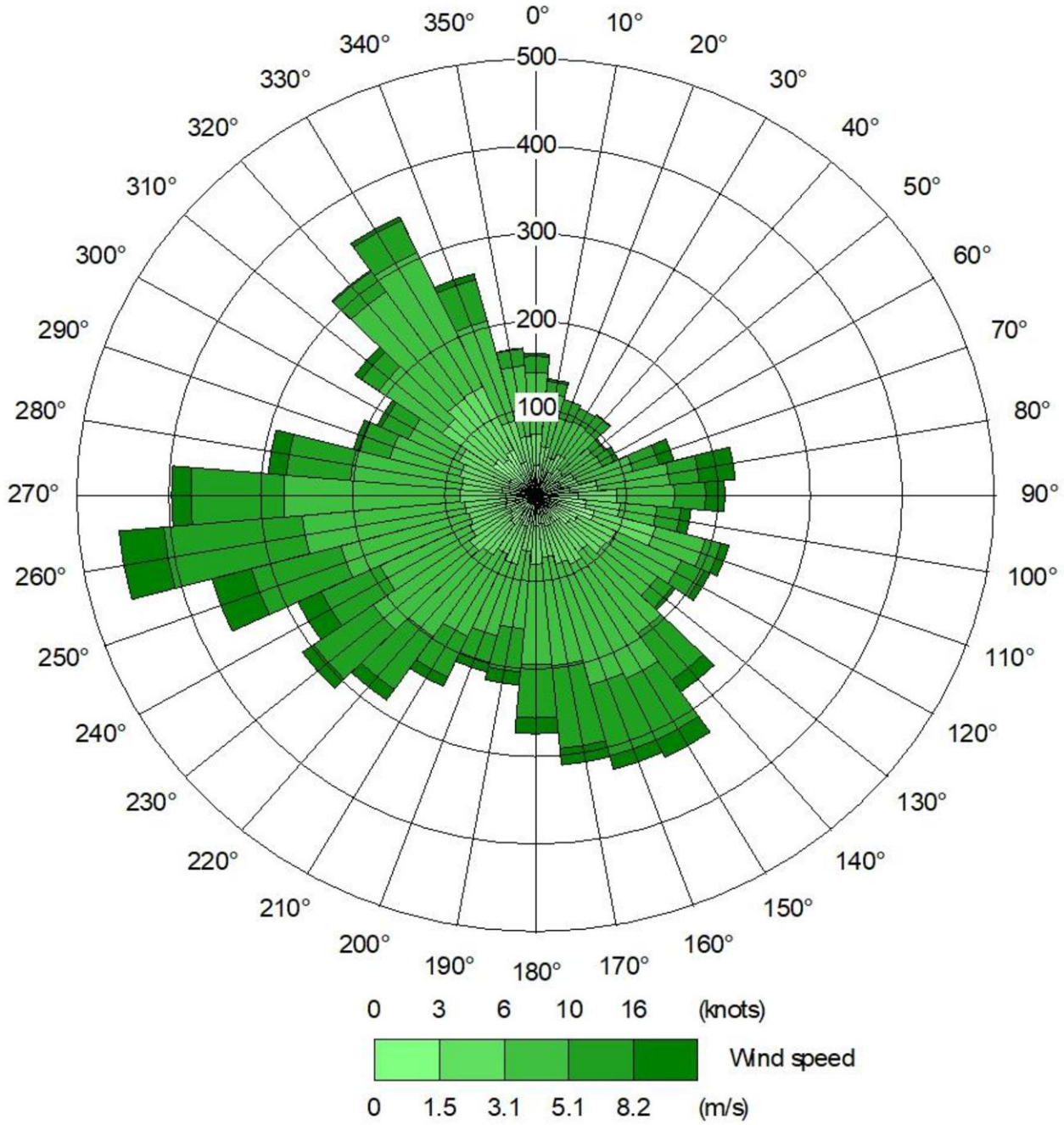

Title

Figure 5

Wind Rose Linton-On-Ouse 2018 Meteorological Station

Project

West Lund Lane, Kirkbymoorside

Project Number

AQ108932

Client

Mulgrave Developments Ltd and Crossco (1377) (Sylatech)

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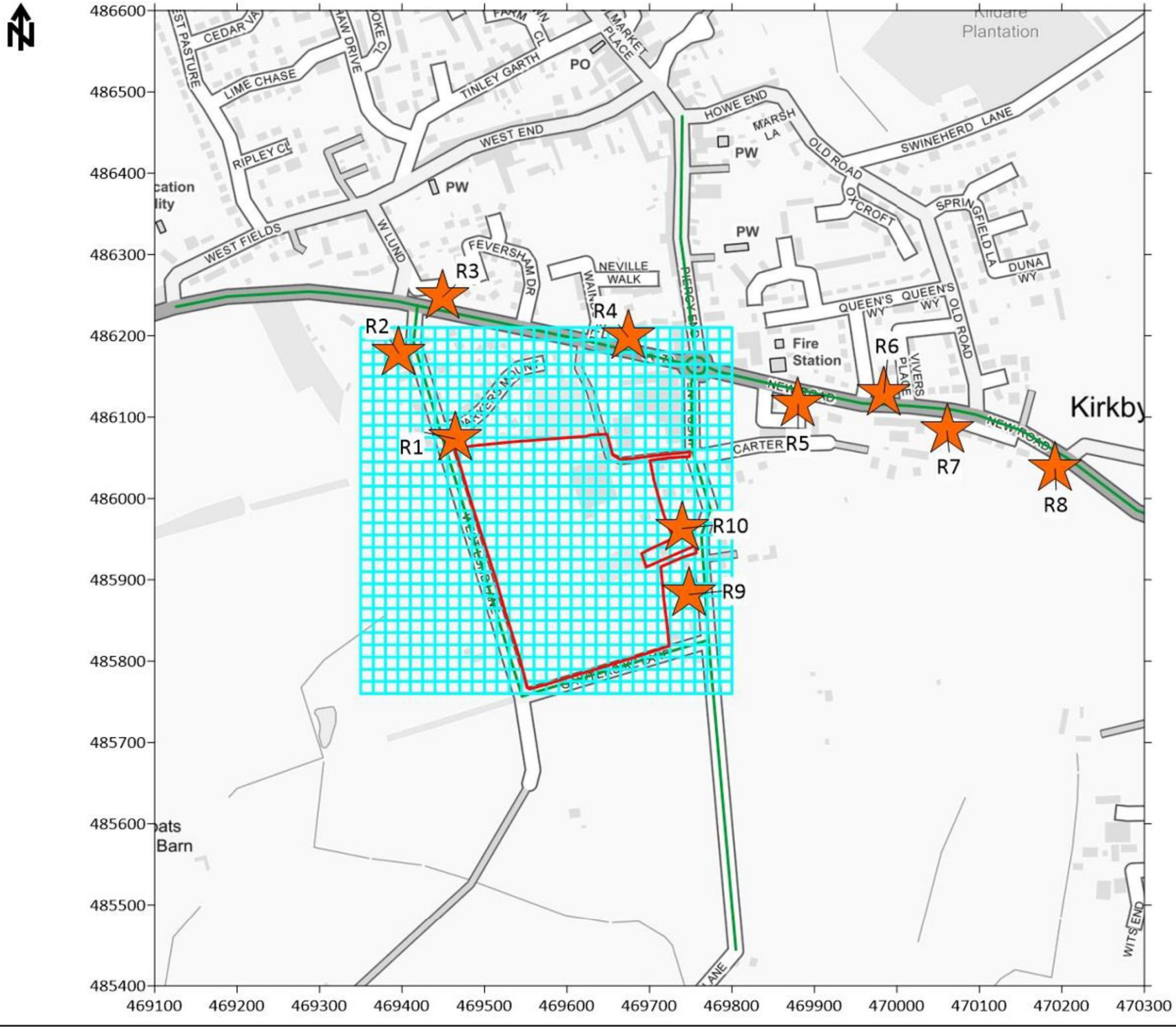

Legend

- Site Boundary
- Modelled Road Link
- Cartesian Grid
- Sensitive Receptor Locations

Title

Figure 6

ADMS-Roads Input

Project

West Lund Lane, Kirkbymoorside

Project Number

AQ108932

Client

Mulgrave Developments Ltd and Crossco (1377) (Sylatech)

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Legend

Modelled Road Link

Diffusion Tube Monitoring

Title

Figure 7

ADMS-Roads Input

Project

West Lund Lane, Kirkbymoorside

Project Number

AQ108932

Client

Mulgrave Developments Ltd and Crossco (1377) (Sylatech)

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Legend

Site Boundary

Predicted Annual Mean NO_2 Concentration (µg/m³)

34
32
30
28
26
24
22
20
18
16
14
12
10
8
6

Title

Figure 8

Predicted Annual Mean NO_2 Concentrations (µg/m³) 2023 DS

Project

West Lund Lane, Kirkbymoorside

Project Number

AQ108932

Client

Mulgrave Developments Ltd and Crossco (1377) (Sylatech)

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www.ensafe.co.uk

Legend

Site Boundary

Predicted Annual Mean PM_{10} Concentration (µg/m³)

15.4
15.2
15
14.8
14.6
14.4
14.2
14
13.8
13.6
13.4
13.2
13
12.8
12.6
12.4
12.2
12
11.8
11.6
11.4
11.2

Title

Figure 9

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

Project

West Lund Lane, Kirkbymoorside

Project Number

AQ108932

Client

Mulgrave Developments Ltd and Crossco (1377) (Sylatech)

Ensafe Consultants
Osprey House, Broadway, Manchester M50 2UE
Tel – 0161 868 1300 Fax – 0161 868 1301
www.ensafe.co.uk

Legend

Site Boundary

9.7
9.6
9.5
9.4
9.3
9.2
9.1
9
8.9
8.8
8.7
8.6
8.5
8.4
8.3
8.2
8.1
8
7.9
7.8
7.7
7.6
7.5
7.4
7.3
7.2

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

Title

Figure 10

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

Project

West Lund Lane, Kirkbymoorside

Project Number

AQ108932

Client

Mulgrave Developments Ltd and Crossco (1377) (Sylatech)

Ensafe Consultants
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APPENDIX II – ASSESSMENT INPUTS

8.0 ASSESSMENT INPUTS

The Proposed Development has the potential to introduce future site users to poor air quality as well as to cause impacts as existing receptor locations. Dispersion modelling using ADMS Roads was therefore undertaken to predict NO_2 and PM concentrations across the site and at existing receptor locations to consider site suitability for the proposed end-use, and assess potential development impacts.

The assessment was undertaken in accordance with the guidance contained within the DEFRA document LAQM TG(16)[2] and the EPUK and IAQM guidance[4].

Dispersion Model

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

The model requires input data that details the following parameters:

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

Assessment Area

Ambient concentrations were predicted over the Proposed Development site and surrounding highway network. One Cartesian grid was included in the model over the area at approximately NGR: 469350, 469800 and 485760, 486210 at height of 1.5m to represent the proposed ground floor level for the 2023 opening year scenario.

Results were subsequently used to produce contour plots within the Surfer software package. Reference should be made to Figure 7 and 8 within Appendix I for a graphical representation of the verification inputs and operation phase DS extents, respectively.

Traffic Flow Data

Development flows traffic data was provided by Local Transport Projects, the appointed Transport Consultants for the scheme, and indicated that a two-way flow of 757 AADT is anticipated as a result of the Purposed Development.

The Dft Matrix web tool enables the user to view and download traffic flows on every link of the A-road and motorway network in Great Britain for the years 1999 to 2018. The DfT matrix is referenced in DEFRA guidance LAQM (TG16)[2] as being a suitable source of data for air quality assessments and is therefore considered to provide a reasonable representation of traffic flows in the vicinity of the site.

Growth factors provided by the Trip End Model Presentation Program (TEMPRO) software package were utilised to allow for conversion from the obtained 2018 traffic flow to 2023 which was used to represent the opening year scenario.
Vehicle speeds were estimated based on the free flow potential of each link and local speed limits. Road widths were estimated from aerial photography and UK highway design standards.

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

Table AII 1: 2018 Verification Traffic Data

Road Link		Road Width (m)	24 Hour AADT Flow	HDV Pop (%)	Mean Vehicle Speed (km/hr)	Data Source
L1	A170	7.0	10714	3	64	TC
L2	A170	7.0	10714	3	40	TC
L3	A170	7.5	10705	3	39	TC
L4	A170	7.2	10775	3	24	TC
L5	A170 Roundabout	6.0	7349	3	16	TC
L6	A170	7.0	11246	4	24	TC
L7	A170	7.2	11246	4	40	TC
L8	A170	7.2	11246	4	72	TC
L9	Ings Lane	6.0	1880	2	24	TC
L10	Ings Lane	5.0	1880	2	40	TC
L11	Ings Lane	5.0	1880	2	72	TC
L12	Piercy End	7.0	5494	2	24	TC
L13	Piercy End	7.0	5494	2	32	TC
L14	West Lund Lane	5.5	238	0	40	TC
L15	West Lund Lane	4.0	238	0	72	TC
L16	Southgate A170	8.0	11246	4	40	TC
L17	Southgate A170	6.5	11246	4	40	TC
L18	Southgate A170	6.5	11246	4	40	TC
L19	Hungate A170 Traffic Split	4.5	5623	4	40	TC
L20	Hungate A170 Roundabout	11.0	10286	4	24	TC
L21	Eastgate A170	12.0	11246	4	32	TC
L22	Eastgate A170	9.0	11246	4	40	TC
L23	Eastgate A170	7.0	11246	4	40	TC
L24	Eastgate A170	8.0	11246	4	40	TC
L25	Kirkham Lane Traffic Split	3.5	3195	4	32	DFT
L26	Kirkham Lane Traffic Split	3.5	3195	4	32	DFT
L27	Malton Road	11.0	12262	5	32	DFT
L28	Malton Road	8.5	12262	5	40	DFT
L29	Hungate A170 Traffic Split	4.5	5623	4	24	TC

Reference should be made to Figure 9 and 10 within Appendix I for a graphical representation of the road link locations used within the verification assessment. Due to the large proximity of road links 16-29 used in the verification, these links were not used in future year modelling. The road width, canyon height and mean vehicle speed shown in Table AII.1 remained the same for the 2023 scenarios.

In order to consider a robust assessment, the baseline traffic data was factored up to the development opening year, using TEMPRO, and 598 AADT added to each link. A summary of the 2023 traffic data is shown in **Table AII 2**.

Table AII 2: 2023Traffic Data

Road Link		DM		DS	
		24 Hr AADT Flow	HDV Prop (%)	24 Hr AADT Flow	HDV Prop (%)
L1	A170	12,540	3.1	12,952.8	3.0
L2	A170	12,540	3.1	12,952.8	3.0
L3	A170	12,597	3.1	13,164.0	2.9
L4	A170	12,661	3.0	13,195.6	2.8
L5	A170 Roundabout	8,686	2.8	9,033.3	2.7
L6	A170	13,303	3.2	13,942.9	3.0
L7	A170	13,303	3.2	13,942.9	3.0
L8	A170	13,303	3.2	13,942.9	3.0
L9	Ings Lane	1,971	1.9	2,130.3	1.8
L10	Ings Lane	1,971	1.9	2,130.3	1.8
L11	Ings Lane	1,971	1.9	2,130.3	1.8
L12	Piercy End	6,810	2.0	6,864.4	1.9
L13	Piercy End	6,810	2.0	6,864.4	1.9
L14	West Lund Lane	248	-	846.0	-
L15	West Lund Lane	248	-	846.0	-

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

Emission Factors

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

There is current uncertainty over NO_2 concentrations within the UK, with roadside levels not reducing as previously expected due to the implementation of new vehicle emission standards. Therefore, 20XX emission factors have been utilised for the prediction of pollution levels for all scenarios in preference to the development opening year in order to provide a robust assessment.

NO_x to NO_2 Conversion

Predicted annual mean NO_x concentrations from the dispersion model were converted to NO_2 concentrations using the NO_x to NO_2 Calculator (v.8.1) provided by DEFRA, which is the method detailed within LAQM TG(16)[2].

Meteorological Data

Meteorological data used in this assessment was taken from Linton-On-Ouse meteorological station over the period 1st January 2018 to 31st December 2018 (inclusive). Linton-On-Ouse meteorological station is located at approximate NGR: 448917, 461785 which is approximately 31.5km North East of the Proposed Development.

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

Roughness Length

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

Table AII 3: Utilised Roughness Lengths

Scenario	Roughness Length (m)	ADMS Description
Verification, DM and DS Scenarios	0.5	Parklands, open suburbia
Linton-On-Ouse	0.2	Agricultural areas (min)

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

Monin-Obukhov Length

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

Table AII 4: Utilised Monin-Obukhov Lengths

Scenario	Monin-Obukhov Length (m)	ADMS Description
Verification, DM and DS Scenarios	10	Small towns < 50,000
Linton-On-Ouse	10	Small towns < 50,000

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

Background Concentrations

The annual mean NO_2 concentrations detailed in Table 5, was used in the dispersion modelling assessment to represent annual mean pollutant levels at the Proposed Development site and local monitoring sites.

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

Table AII 5: Predicted Background Pollutant Concentrations for Diffusion Tubes

Monitoring Location	DEFRA Grid Square	Pollutant	2018 Predicted Background Concentration (µg/m^3)
14	479500, 483500	NO_X	8.84
		NO_2	6.93

Table AII 6 displays the predicted background concentrations by DEFRA used in the operational phase assessment for the sensitive receptor locations.

Table AII 6: Predicted Background Pollutant Concentrations at Sensitive Receptors

Monitoring Location	DEFRA Grid Square	Pollutant	2018 Predicted Background Concentration (µg/m³)
R1 – R6	469500, 486500	NO_X	8.59
		NO_2	6.74
		PM_{10}	11.22
		$PM_{2.5}$	7.19
R7 – R8	470500, 486500	NO_X	7.65
		NO_2	6.03
		PM_{10}	11.90
		$PM_{2.5}$	7.19
R9 – R10	469500, 485500	NO_X	7.65
		NO_2	6.03
		PM_{10}	11.37
		$PM_{2.5}$	7.05

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

Verification

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

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

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

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

RDC does not undertake periodic monitoring of NO_2 concentrations in close proximity to the proposed development, however there is one roadside monitoring location which is considered to be representative of the proposed development located 10km south-east of the site. This site was therefore utilised for the purpose of verification

An additional modelling extent was therefore defined for the purpose of verification. It is considered the calculated verification factor is likely to be representative of conditions throughout each borough and is therefore suitable for an assessment of this nature. Reference should be made to Figure 10 for a plan of the verification area

The road contribution to total NO_x concentration was calculated from the monitored NO_2 result for use in the verification process. This was undertaken following the methodology contained within DEFRA guidance LAQM TG(16)[2]. The monitored annual mean NO_2 concentration and calculated road NO_x concentration are summarised in Table AII 7.

Table AII 7: Monitoring Results

Site ID	Monitored Road NO_x Concentration ($\mu g/m^3$)	Modelled Road NO_x Concentration ($\mu g/m^3$)	% Difference ((Monitored Modelled)/Monitored)) * 100
14	30.39	26.85	11.66

The monitored and modelled NO_x road contribution concentrations were calculated. This indicated that a verification factor of **1.1320** was required to be applied to all NO_x modelling results, showing the model overestimated pollutant concentrations throughout the assessment extents.

Table AII 8: Modelled Concentrations

Site ID	Monitored Road NO_2 Concentration ($\mu g/m^3$)	Adjusted Modelled Road NO_2 Concentration ($\mu g/m^3$)	% Difference ((Monitored Modelled)/Monitored)) * 100
14	23.00	23.00	0.01

As PM monitoring is not undertaken within the assessment extents, the NO_x adjustment factor of **1.1320** was utilised to adjust model predictions of PM in accordance with the guidance provided within LAQM (TG16)[2].

APPENDIX III – CONSTRUCTION PHASE ASSESSMENT CRITERIA

CONSTRUCTION PHASE METHODOLOGY

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction'[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} and $PM_{2.5}$.

The assessment steps are detailed below.

Step 1

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

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

Step 2

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

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

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

Table AIII.1: Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	Demolition	• Total building volume greater than 50,000m3 • Potentially dusty construction material (e.g. concrete) • On-site crushing and screening • Demolition activities greater than 20m above ground level

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

Magnitude	Activity	Criteria
	Earthworks	• Total site area greater than 10,000m^2 • Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • More than 10 heavy earth moving vehicles active at any one time • Formation of bunds greater than 8m in height • More than 100,000 tonnes of material moved
	Construction	• Total building volume greater than 100,000m^3 • On site concrete batching • Sandblasting
	Trackout	• More than 50 Heavy Duty Vehicle (HDV) trips per day • Potentially dusty surface material (e.g. high clay content) • Unpaved road length greater than 100m
Medium	Demolition	• Total building volume 20,000m3 to 50,000m3 • Potentially dusty construction material • Demolition activities 10m to 20m above ground level
	Earthworks	• Total site area 2,500m^2 to 10,000m^2 • Moderately dusty soil type (e.g. silt) • 5 to 10 heavy earth moving vehicles active at any one time • Formation of bunds 4m to 8m in height • Total material moved 20,000 tonnes to 100,000 tonnes
	Construction	• Total building volume 25,000m^3 to 100,000m^3 • Potentially dusty construction material (e.g. concrete) • On site concrete batching
	Trackout	• 10 to 50 HDV trips per day • Moderately dusty surface material (e.g. high clay content) • Unpaved road length 50m to 100m
Small	Demolition	• Total building volume under 20,000m3 • Construction material with low potential for dust release (e.g. metal cladding or timber) • Demolition activities less than 10m above ground level • Demolition during wetter months
	Earthworks	• Total site area less than 2,500m^2 • Soil type with large grain size (e.g. sand) • Less than 5 heavy earth moving vehicles active at any one time • Formation of bunds less than 4m in height • Total material moved less than 20,000 tonnes • Earthworks during wetter months
	Construction	• Total building volume less than 25,000m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	• <10 HDV (3.5t) outward movements in any one day • Surface material with low potential for dust release • Unpaved road length <50m

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

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

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

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

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

These factors were considered in the undertaking of this assessment.

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

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

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

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

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

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

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

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

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

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

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

Table AIII.6: Dust Risk Category from Demolition

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

Table AIII.7 outlines the risk category from earthworks and construction activities.

Table AIII.7: Dust Risk Category from Earthworks and Construction

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

Table AIII.8 outlines the risk category from trackout.

Table AIII.8: Dust Risk Category from Trackout

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

Step 3

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

Step 4

Once the risk of dust impacts has been determined and the appropriate mitigation measures identified, the final step is to determine the significance of any residual impacts. For almost all construction activity, the aim should be to control effects

through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'.

APPENDIX IV – ASSESSOR' S CURRICULUM VITAE

JOSHUA DAVIES

Senior Air Quality Consultant

BSc (Hons) AMIEnvSci

KEY EXPERIENCE

Josh is an Environmental Consultant with specialist experience in the air quality sector. HIs key capabilities include:

- Production of Air Quality Assessments to the Department for Environment, Food and Rural Affairs (DEFRA), Environment Agency and Environmental Protection UK (EPUK) methodologies for clients from the residential, retail and commercial sectors.
- Detailed dispersion modelling of road vehicle emissions using ADMS-Roads. Studies have included impact assessment of pollutant concentrations at various floor levels and assessment of suitability of development sites for proposed end-use.
- Assessment of dust impacts from construction sites to the Institute of Air Quality Management (IAQM) methodology.
- Assessment of Odour Impact from commercial and industrial processes in line with Environment Agency (EA) and IAQM methodologies and guidance
- Quantification of Ecological Impacts associated with Nitrogen and Acid Deposition from industrial processes
- Production of air quality mitigation strategies for developments throughout the UK.
- Management of Environmental Permit Applications primarily for the Medium Combustion Plant Directive (MCDP)

SELECT PROJECTS SUMMARY

- Back Lane, Congleton - for a residential development of 140 dwellings.
- Imperial War Museum, Duxford – Air Quality screening assessment associated with dust and odour as a result of proposed restoration activities
- London South Bank University -AQA for redevelopment of the campus, with associated energy centre
- Scunthorpe United Football Stadium - AQA for new sports stadium and commercial and retail park
- Heineken UK, Manchester – Production of various AQAs for the expansion of the Manchester Brewery site.
- Cricklewood Freight Terminal – AQA for an aggregate freight terminal in Brent. Dust and HGV impact assessment and mitigation strategy
- Llay Wrexham – AQ associated with a Short-Term Reserve Operation site in line with the Medium Combustion Plant Directive (MCPD)

ES Chapters

- Great Jackson Street Framework - Production of a number of ES chapters for large-scale mixed use multi storey buildings
- Keele University – Road and Energy Assessment for the proposed re-development of the student campus
- Newton Farm, Perth - EIA for a medium scale residential development in close vicinity to the A9.

Odour Assessments

- Clipsone House Farm – Quantitative odour and ammonia assessment in support of a proposed extension to a large-scale poultry farm.
- Chatteris AD Plant - Quantitative odour modelling and sniff tests to discharge condition on an existing anaerobic digestion plant
- Jennychem, Snodland - Risk Assessment and Best Practice Statement in support of the proposed car repairs facility spray booth

London Borough of Southwark Experience

- Camberwell Road, Southwark - Exposure assessment for a proposed gym within an AQMA, 24 hour and 1 hour mean AQOs assessed.
- Pelier Street- AQA for a residential development located within the Southwark AQMA
- Haddonfield Estate - AQA for a residential development located within the Southwark AQMA
- Lavington Street - AQA for mixed use scheme in AQMA in Southwark, including an AQN assessment.
- Daniels Road - AQA for a residential development within the Southwark AQMA

Educational Developments

- Brinsworth Comprehensive School, Rotherham - Baseline and Construction phase assessment for the proposed extension and new Sports Hall. Site suitability due to the Schools close proximity to the M1 Motorway.
- Ashton House, Waterloo Street, Bolton – Exposure and impact assessment related to a proposed expansion of the existing site located within the Greater Manchester AQMA
- St Marys and Johns CE School, Barnet AQA for the refurbishment of the existing school and the construction of a 3-storey classroom block, within the borough wide Barnet AQMA.
- St Peters Catholic School, Guildford - AQA for the redevelopment of the existing site, and the construction of a two-storey classroom block.

Monitoring & Surveying Experience

- Co-ordination and management of NO2 diffusion tube monitoring surveys in accordance with DEFRA guidance.
- Odour Acuity certified, undertaken numerous site sniff tests

QUALIFICATIONS

- Bachelor of Science
- Member of the Institute of Environmental Science (IES)
- Odour Acuity Certified Master of Science
- Member of the Institute of Air Quality Management
- Member of the Institute of Environmental Science