AIR QUALITY ASSESSMENT

AT

GASHOLDER SITE, CRAMPTON'S ROAD
SEVENOAKS

AQ109220

8/3/2021

Prepared For

Whitby Wood
91-94 Lower Marsh
London
SE1 7AB

Prepared By

Emma Cowell
Ensafe Consultants
Osprey House,
Pacific Quay, Broadway,
Manchester,
M50 2UE

TABLE OF CONTENTS

DISTRIBUTION LIST

Issued To	Title / Company / Location
James Lord	Senior Engineer / Whitby Wood
Patrick Little	Interim Head of Environmental Planning & Assessment / CBRE Ltd

QUALITY ASSURANCE

Issue / Revision	Issue 1	Revision 1	Revision 2
Remarks	First submission	Update following client comments	
Date	03/03/2021	08/03/2021	
Prepared By	Emma Cowell	Emma Cowell	
Job Title	Graduate Consultant	Graduate Consultant	
Signature	[redacted]	[redacted]	
Checked By	Josh Jones	Josh Jones	
Job Title	Air Quality Consultant	Air Quality Consultant	
Signature	[redacted]	[redacted]	
Authorised By	Joshua Davies	Joshua Davies	
Job Title	Principal Air Quality Consultant	Principal Air Quality Consultant	
Signature	[redacted]	[redacted]	
Project Number	AQ109220	AQ109220r1	

EXECUTIVE SUMMARY

Ensafe Consultants were commissioned by Whitby Wood to undertake an Air Quality Assessment in support of a proposed residential development at Cramptons Road, Sevenoaks.

The proposed development comprises 136 residential units over three residential types alongside associated parking areas and infrastructure.

The site is located within the vicinity of the A225 and A25, as well as within the vicinity of an area designated by Sevenoaks District Council as experiencing elevated pollutant concentrations resulting from road vehicle exhaust emissions. As such, an Air Quality Assessment was required to quantify pollution levels across the site, consider its suitability for the proposed end-use and assess potential impacts as a result of the development.

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

Dispersion modelling was undertaken in order to predict annual mean pollutant concentrations across the application site as a result of existing road vehicle exhaust emissions associated with the A225 and A25. Additionally, modelling was undertaken to quantify impacts as a result of additional road vehicle exhaust emissions generated by the proposed development. Results were subsequently verified using local monitoring results provided by Sevenoaks District Council.

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

Additionally, the assessment concluded that impacts on pollutant levels as a result of operational phase pollutant emissions were predicted to be **not significant** at all sensitive locations in the vicinity of the site, as a result of **negligible impacts** 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, air quality issues are not considered a constraint to planning consent for the proposed development.

1.0 INTRODUCTION

1.1 Background

Ensafe Consultants has been commissioned by Whitby Wood, hereafter referred to as "the Client" to undertake an Air Quality Assessment in support of a proposed development, comprising of the development of 136 residential units alongside associated parking and infrastructure, herein after referred to as the "Proposed Development".

1.2 Site Location and Context

The application site is located at Cramptons Road, Sevenoaks at approximate National Grid Reference (NGR) 552858, 157179, and within the vicinity of the A225 and A25 which are considered notable sources of road traffic emissions including nitrogen dioxide (NO_2) and particulate matter (PM). The site is also located 400m north of the Sevenoaks District Council (SDC) Air Quality Management Area (AQMA) No. 13.

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

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

Reference should be made to Figure 1 within Appendix I for a location plan.

1.3 Limitations

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

2.0 LEGISLATION, GUIDANCE AND POLICY

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

- European Union (EU) Directive 2008/50/EC;
- The National Planning Policy Framework (NPPF), updated on 19th February 2019);
- The National Planning Practice Guidance (NPPG), relevant chapters produced on 1st 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.(TG16), DEFRA, 2018[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/m³)	Averaging Periods
NO_2	40	Annual mean
	200	1-hour mean; not to be exceeded more than 18 times a year
PM_{10}	40	Annual mean
	50	24-hour mean; not to be exceeded more than 35 times a year
$PM_{2.5}$	25	Annual mean

Table 2 summarises the advice provided in DEFRA guidance LAQM (TG16)[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 Sevenoaks District Council Core Strategy

The SDC Core Strategy[5] draws together the objectives of a wide range of plans, programmes and strategies and provides the overarching principles that will deliver the essential development needs of the District up to 2026.

A review of the Strategy Document indicated the following policy in relation to air quality that is relevant to this assessment:

- Policy SP 2: Sustainable Development

2.2.2 Sevenoaks District Council Allocations and Management Plan

SDC's Allocations and Management Plan[6] currently forms part of the Local Plan for the Sevenoaks District alongside the Core Strategy.

A review of plan indicated the following policy in relation to air quality that is relevant to this assessment:

- Policy EN2 – Amenity Protection

[5] Sevenoaks District Council Core Strategy, adopted February 2011.
[6] Sevenoaks District Council - Allocations and Development Management Plan, 2015.

2.2.3 Kent Environment Strategy: Implementation Plan

The Kent Environment Strategy Implementation Plan[7] outlines a range of actions that enable the county of Kent to manage current and future risks and opportunities for our environment and the services it provides.

The implementation plan outlines several key priorities that will be a focus within the strategy. The following activities have been identified as relating to air quality and therefore relevant for this assessment:

- Develop a low emissions strategy
- Raise awareness of the health impacts of air pollution, and actions that can be taken to reduce emissions and personal exposure.

These policies and plans have been considered throughout this report by assessing potential air quality exposure and impacts as a result of the Proposed Development.

[7] Kent Environment Strategy - Implementation Plan 2017

3.0 METHODOLOGY

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

3.1 Construction Phase Assessment

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

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

- Demolition
- 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

3.2.1 Road Vehicle Exhaust Impact Assessment

The Proposed Development is located 400m north of the SDC AQMA No. 13, which has been designated due to exceedances of the annual mean AQO for NO_2 associated with the A25 and A225, respectively. Subsequently the proposals have the potential to cause impacts upon existing pollution levels at nearby sensitive receptors within and adjacent to the AQMA.

Detailed dispersion modelling was therefore undertaken to quantify annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations at existing sensitive use to quantify impacts caused by the operation of the Proposed Development. The following modelling scenarios were utilised during the assessment:

- 2019 as baseline year for verification against latest ratified data;
- Opening year do-minimum (DM) (predicted traffic flows in 2023 should the proposals not proceed); and
- 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).

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 2019 were utilised within the dispersion model. The use of 2023 traffic data and 2019 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.

3.2.2 EPUK and IAQM Impact Significant Criteria

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: Operational Impact Descriptor

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.

3.2.3 Future Exposure

The Proposed Development is located within close proximity to A225. 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), SDC, 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 this area. As such, nine AQMAs have been declared, the closest being described as:

- *AQMA No. 13 (A25): The entire length of the A25 from the border with Tonbridge and Malling in the East to the border with Tandridge on the West.*

The application site is located 400m north of the AQMA. As such there is potential for the Proposed Development to cause air quality impacts during the construction and operational phases.

SDC 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 SDC using continuous and passive methods throughout their areas of administration. A review of SDC's most recent Air Quality Monitoring Data[8] indicated that there is one automatic analyser currently operational within the vicinity of the Proposed Development. The results are presented in Table 4.

Table 4: Automatic Monitoring Results

Site Name	Type	NGR (m)		Dist' to Site (m)	Annual Mean Concentration (µg/m³)			
		X	Y		Pollutant	2017	2018	2019
CM2	Roadside	553044	156690	518	NO_2	28	25	-
					PM_{10}	20	21	20

As indicated in Table 4, there were no exceedances of the annual mean AQOs for NO_2 or PM at the automatic analyser in recent years.

SDC monitor NO_2 concentrations across the borough using passive diffusion tubes. A review of the most recent air quality monitoring data indicated 5 diffusion tubes located within the vicinity of the application site, presented in Table 5. Exceedances of the annual mean AQO are highlighted in **bold**.

Table 5: Diffusion Tube Monitoring Results

ID	Site Name	Type	NGR (m)		Dist' to Site (m)	Annual Mean Concentration (µg/m³)		
			X	Y		2017	2018	2019
DT31	Bat & Ball 3	Roadside	553165	156685	574	**51**	**51**	**44**
DT23	Bat & Ball 1	Roadside	553059	156624	585	34	39	33
DT88	Bradbourne Vale Road	Roadside	552963	156583	603	29	30	28
DT32	Bat & Ball 4	Roadside	553151	156558	680	**48**	**52**	**41**

[8] Sevenoaks 2020 Air Quality Monitoring Data

ID	Site Name	Type	NGR (m)		Dist' to Site (m)	Annual Mean Concentration (µg/m³)		
			X	Y		2017	2018	2019
DT35	Seal Hollow Road/A25	Roadside	554093	156798	1,278	33	34	30

As indicated in Table 5, there were some exceedances of the annual mean AQO for NO_2 at diffusion tube locations DT31 and DT32 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:

- NGR: 552500, 157500

Data for this location was downloaded from the DEFRA website[9]. For the purpose of this assessment, background concentrations are summarised in Table 6 for the verification year (2019) and the predicted development opening year (2023).

Table 6: Predicted Background Pollutant Concentrations

Pollutant	Predicated Background Concentration (µg/m³)	
	2019	2023
NO_x	15.92	13.36
NO_2	11.94	10.17
PM_{10}	14.69	13.88
$PM_{2.5}$	9.83	9.20

4.4 Sensitive Receptors

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

4.4.1 Construction Phase Sensitive Receptors

There is one ecological receptor, Sevenoaks Gravel Pits SSSI, located within 20 to 50m of the trackout routes and within 50m from the proposed development site. Based on the assessment criteria detailed in Appendix III, the area is considered to be sensitive to potential impacts as a result of the construction phase. Therefore, the risk of dust effects at a nationally or European designated ecological receptor site from construction impacts have been considered in this assessment.

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

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 7.

Table 7: Demolition, Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors	Number of Ecological Receptors
Less than 20	10 - 100	1
20 – 50	10 - 100	1
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 8. The exact construction vehicle access routes were not available for the purpose of this assessment as they will depend on sourcing of materials. This is likely to be decided by the contractor. However, it was assumed that construction traffic would access the Proposed Development via the A225 (Orford Road), to ensure a worst case trackout assessment is undertaken.

Table 8: Trackout Dust Sensitive Receptors

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

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 9.

Table 9: Additional Area Sensitivity Factors

Guidance	Comment
Whether there is any history of dust generating activities in the area	The site is located within a predominantly residential area. As such, historical dust generation may have occurred as a result of windblown emissions from road vehicle emissions, regeneration and farming processes.
The likelihood of concurrent dust generating activity on nearby sites.	A review of the SDC indicated that there are no large-scale planning applications within 500m of the site. There is therefore no potential for concurrent dust generation as a result of construction of the site.

Guidance	Comment
Pre-existing screening between the source and the receptors	There is vegetation present along the west boundary of the site. If retained this would offer limited protection from dust soiling activities.
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 site 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 the construction phase is unknown but considering the 2023 opening year it is likely to extend over 2 years.
Any known specific receptor sensitivities which go beyond the classifications given in the document.	No further specific receptor sensitivities were identified during the baseline.

4.4.2 Operational Phase Sensitive Receptors

A desk-top study was undertaken in order to identify any sensitive receptor locations in the vicinity of the site that require specific consideration during the assessment and are summarised Table 10.

Table 10: Existing Sensitive Human Receptors

Potential Impact		NGR (m)		Height (m)
		X	Y	
R1	152 Otford Road	552860	157330	1.5
R2	2 Otford Road	552836	157391	1.5
R3	27 Berwick Way	552816	157029	1.5
R4	29 Otford Road	552997	156702	1.5
R5	99 St John's Hill	553117	156579	1.5
R6	32 Bradbourne Vale Road	552886	156581	1.5
R7	71 St Johns Road	552902	156546	1.5
R8	68 Seal Road	553289	156672	1.5
R9	Crown Crest Court	553311	156658	1.5
R10	8 Seal Road	553074	156667	1.5
R11	20 Seal Road	553129	156686	1.5
R12	St Johns Medical Practice	553173	156267	1.5
R13	30 St Johns Hill	553174	156046	1.5
R14	1 Lambarde Road	552119	156357	1.5
R15	The Mill	552210	156366	1.5
R16	Croiselles	554477	156791	1.5
R17	190 Seal Road	553868	156772	1.5

The sensitive receptors identified in Table 10 represent worst-case locations. However, this is not an exhaustive list and there may be other locations within the vicinity of the site that may experience air quality impacts as a result of the proposed development that have not been individually identified above.

Reference should be made to Figure 6 within Appendix I for a graphical representation of operational phase emission sensitive human receptor locations.

5.0 ASSESSMENT

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

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

5.1 Construction Phase Assessment

5.1.1 Step 1 – Screening

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

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

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

5.1.2 Step 2A – Magnitude

The scale and nature of the works was determined to assess the magnitude of dust arising from each construction phase activity. The determination of magnitude was based upon the criteria detailed in Appendix III, with the outcome of Step 2A is summarised below in Table 11.

Demolition

The proposed development will involve demolition of some of the existing buildings on the site. The volume of buildings to be demolished is therefore likely to be approximately 1,000m^3. With this considered the magnitude of potential dust emissions related to demolition activities is considered small.

Earthworks

The Proposed Development site is estimated to cover an area of approximately 2500m^2 to 10,000m^2. The magnitude of potential dust emissions related to earthwork activities is therefore considered medium.

Construction

The proposals comprise the construction of 136 residential units, given the scale of the Proposed Development the total building and infrastructure volume is 24,000m^3. The magnitude of potential dust emissions related to construction activities is therefore considered small.

Trackout

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

Table 11: Dust Emission Magnitude

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

5.1.3 Step 2B – Sensitivity

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

Dust Soiling

As shown in Section 4.4.1 and Table 8, the desk top study indicated are approximately **more than 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 **high** for all construction phase activities. This is because the site is situated in a predominantly residential area and the people or property would reasonably be expected to be present here for extended periods of time.

Human Health

The annual mean concentration of PM_{10} is **14.69µg/m^3** 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 12.

Table 12: Sensitivity of the Surrounding Area

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

5.1.4 Step 2C – Risk

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

It should be noted that the potential for impacts depends significantly on the distance between the dust generating activity and receptor location. Risk was predicted based on a worst-case scenario of works being undertaken at the site boundary closest to each sensitive area. Therefore, actual risk is likely to be lower than that predicted during the majority of the construction phase. A summary of the risk from each dust generating activity is provided in Table 13.

Table 13: Summary of Potential Unmitigated Dust Risks

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

5.1.5 Step 3 – Mitigation

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 14. For the general activities, the highest risk category outlined within Table 13 (**High**) has been applied to determine the mitigation measures. For demolition, earthworks, construction and trackout activities, mitigation measures have been based on their respective risks as specified within Table 13.

The mitigation measures outlined in Table 14 can be reviewed prior to the commencement of construction works incorporated into the existing strategies as applicable.

Table 14: 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 log book. • 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 window sills 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 make an inspection log available to the local authority when asked

Issue	Control Measure
	• 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 • Avoid the use of diesel- or petrol-powered 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

Issue	Control Measure
	• 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. • Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). • Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground. • Avoid explosive blasting, using appropriate manual or mechanical alternatives. • Bag and remove any biological debris or damp down such material before demolition
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 log book. • 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.

5.1.6 Step 4 – Residual Impacts

Assuming the relevant mitigation measures outlined in Table 14 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].

5.2 Operational Phase Assessment

The application site is located adjacent to the A25, A225 and nearby to the SDC AQMA No. 13 and as such, there is potential to expose future site users to elevated pollution levels. Additionally, vehicle movements associated with the operation of the Proposed Development will generate exhaust emissions, such as NO_2 and PM on the local and regional road networks.

An assessment was therefore undertaken using dispersion modelling in order to quantify NO_2 and PM concentrations across the application site and to assess potential changes in pollutant concentrations at sensitive locations in the vicinity of the site.

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.

5.2.1 Future Exposure - Predicted Concentrations at the Development Site

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

Predicted annual mean NO_2 concentrations across the Proposed Development site during the DS scenario are summarised in Table 15. Exceedance of the AQO are highlighted in **bold**.

Table 15: Modelling Results - Annual Mean NO_2 Across Sensitive Uses

Floor Level	Predicted 2023 Annual Mean NO_2 Concentration ($\mu g/m^3$)
Ground (1.5m)	14 – 30

The predicted concentrations shown in Table 15 indicate that there were no exceedances of the AQO at sensitive locations across ground floor areas of the proposed development. As such, it is considered that annual mean NO_2 levels at the Proposed Development site should not be viewed as a constraint to development.

Predictions of 1-hour NO_2 concentrations were not produced as part of the dispersion modelling assessment. LAQM.(TG16)[2] states if annual mean NO_2 concentrations are below $60\mu g/m^3$ then it is unlikely that the 1-hour AQO will be exceeded. As such, based on the results in Table 15, it is not predicted that on-site concentrations will exceed the 1-hour mean AQO for NO_2.

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

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

Predicted annual mean PM concentrations across the Proposed Development site during the DS scenario are summarised in Table 16.

Table 16: Modelling Results - Annual Mean PM Across Sensitive Uses

Floor Level	Predicted 2023 Annual Mean Concentration ($\mu g/m^3$)	
	PM_{10}	$PM_{2.5}$
Ground (1.5m)	14.8 - 16	9.9 – 10.6

The predicted concentrations shown in Table 16 indicate that there were no exceedances of the annual mean AQOs for PM_{10} or $PM_{2.5}$ throughout the modelling area. As such, it is considered that annual mean PM levels at the Proposed Development site should not be viewed as a constraint to development.

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

5.2.2 Impact Assessment - Predicted Concentrations at Sensitive Receptors

Nitrogen Dioxide

Annual mean NO_2 concentrations were predicted for 2023 DM and DS scenarios and are summarised in Table 17. Reference should be made to Figure 6 for a graphical representation of these locations. Exceedances of the annual mean AQO are highlighted in **bold.**

Table 17: 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	152 Otford Road	21.33	21.43	0.10
R2	2 Otford Road	25.20	25.34	0.14
R3	27 Berwick Way	25.40	25.50	0.10
R4	29 Otford Road	23.35	23.45	0.10
R5	99 St John's Hill	**48.56**	**48.71**	0.15
R6	32 Bradbourne Vale Road	22.70	22.76	0.06
R7	71 St Johns Road	21.16	21.21	0.05
R8	68 Seal Road	29.01	29.08	0.07
R9	Crown Crest Court	24.47	24.52	0.05
R10	8 Seal Road	**45.48**	**45.63**	0.15
R11	20 Seal Road	**40.53**	**40.63**	0.10
R12	St Johns Medical Practice	18.17	18.20	0.03
R13	30 St Johns Hill	25.92	25.99	0.07
R14	1 Lambarde Road	19.41	19.45	0.04
R15	The Mill	26.93	27.00	0.07
R16	Croiselles	20.27	20.31	0.04
R17	190 Seal Road	21.35	21.39	0.04

As indicated in Table 17, annual mean NO_2 concentrations were above the relevant AQO at Receptors 5, 10 and 11 in both scenarios. Critically, no new exceedances have been predicted as a result of the development

Predicted impacts on annual mean NO_2 concentrations are summarised in Table 18.

Table 18: Predicted NO_2 Impacts at Sensitive Receptors

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	152 Otford Road	0.25	75% or Less of the AQO	Negligible
R2	2 Otford Road	0.35	75% or Less of the AQO	Negligible
R3	27 Berwick Way	0.25	75% or Less of the AQO	Negligible
R4	29 Otford Road	0.25	75% or Less of the AQO	Negligible
R5	99 St John's Hill	0.37	110+% of the AQO	Negligible
R6	32 Bradbourne Vale Road	0.15	75% or Less of the AQO	Negligible
R7	71 St Johns Road	0.13	75% or Less of the AQO	Negligible
R8	68 Seal Road	0.17	76-94% of the AQO	Negligible
R9	Crown Crest Court	0.13	75% or Less of the AQO	Negligible
R10	8 Seal Road	0.38	110+% of the AQO	Negligible
R11	20 Seal Road	0.25	103-109% of the AQO	Negligible
R12	St Johns Medical Practice	0.07	75% or Less of the AQO	Negligible
R13	30 St Johns Hill	0.17	75% or Less of the AQO	Negligible
R14	1 Lambarde Road	0.10	75% or Less of the AQO	Negligible
R15	The Mill	0.18	75% or Less of the AQO	Negligible
R16	Croiselles	0.10	75% or Less of the AQO	Negligible
R17	190 Seal Road	0.10	75% or Less of the AQO	Negligible

As indicated in Table 18 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 5.2.3.

Particulate Matter (PM_{10})

Annual mean PM_{10} concentrations were predicted for 2023 DM and DS scenarios and are summarised Table 19.

Table 19: 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	152 Otford Road	14.99	14.99	0.00
R2	2 Otford Road	15.12	15.13	0.01
R3	27 Berwick Way	15.13	15.13	0.00
R4	29 Otford Road	15.16	15.16	0.00
R5	99 St John's Hill	16.45	16.46	0.01
R6	32 Bradbourne Vale Road	15.20	15.21	0.01
R7	71 St Johns Road	15.16	15.16	0.00

Potential Impact		Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)		
		DM	DS	Change
R8	68 Seal Road	15.89	15.89	0.00
R9	Crown Crest Court	15.73	15.73	0.00
R10	8 Seal Road	16.07	16.07	0.00
R11	20 Seal Road	16.53	16.54	0.01
R12	St Johns Medical Practice	15.52	15.52	0.00
R13	30 St Johns Hill	15.77	15.77	0.00
R14	1 Lambarde Road	15.11	15.12	0.01
R15	The Mill	15.81	15.81	0.00
R16	Croiselles	14.44	14.44	0.00
R17	190 Seal Road	15.64	15.64	0.00

As indicated in Table 19 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 20.

Table 20: Predicted PM_{10} Impacts at Sensitive Receptors

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	152 Otford Road	0.00	75% or Less of the AQO	Negligible
R2	2 Otford Road	0.03	75% or Less of the AQO	Negligible
R3	27 Berwick Way	0.00	75% or Less of the AQO	Negligible
R4	29 Otford Road	0.00	75% or Less of the AQO	Negligible
R5	99 St John's Hill	0.03	75% or Less of the AQO	Negligible
R6	32 Bradbourne Vale Road	0.03	75% or Less of the AQO	Negligible
R7	71 St Johns Road	0.00	75% or Less of the AQO	Negligible
R8	68 Seal Road	0.00	75% or Less of the AQO	Negligible
R9	Crown Crest Court	0.00	75% or Less of the AQO	Negligible
R10	8 Seal Road	0.00	75% or Less of the AQO	Negligible
R11	20 Seal Road	0.02	75% or Less of the AQO	Negligible
R12	St Johns Medical Practice	0.00	75% or Less of the AQO	Negligible
R13	30 St Johns Hill	0.00	75% or Less of the AQO	Negligible
R14	1 Lambarde Road	0.02	75% or Less of the AQO	Negligible
R15	The Mill	0.00	75% or Less of the AQO	Negligible
R16	Croiselles	0.00	75% or Less of the AQO	Negligible
R17	190 Seal Road	0.00	75% or Less of the AQO	Negligible

As indicated in Table 20 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 5.2.3.

Particulate matter ($PM_{2.5}$)

Annual mean $PM_{2.5}$ concentrations were predicted for 2023 DM and DS scenarios and are summarised Table 19. Exceedances of the AQO are shown in bold.

Table 21: 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	152 Otford Road	10.00	10.00	0.00
R2	2 Otford Road	10.08	10.08	0.00
R3	27 Berwick Way	10.08	10.09	0.01
R4	29 Otford Road	10.26	10.26	0.00
R5	99 St John's Hill	11.16	11.16	0.00
R6	32 Bradbourne Vale Road	10.28	10.28	0.00
R7	71 St Johns Road	10.25	10.25	0.00
R8	68 Seal Road	10.81	10.81	0.00
R9	Crown Crest Court	10.72	10.72	0.00
R10	8 Seal Road	10.94	10.94	0.00
R11	20 Seal Road	11.22	11.23	0.01
R12	St Johns Medical Practice	10.60	10.60	0.00
R13	30 St Johns Hill	10.74	10.74	0.00
R14	1 Lambarde Road	10.23	10.23	0.00
R15	The Mill	10.63	10.63	0.00
R16	Croiselles	9.81	9.81	0.00
R17	190 Seal Road	10.67	10.67	0.00

As indicated in Table 19 annual mean $PM_{2.5}$ concentrations were below the relevant AQO at all receptor locations considered.

Predicted impacts on annual mean $PM_{2.5}$ concentrations are summarised in Table 20.

Table 22: Predicted $PM_{2.5}$ Impacts at Sensitive Receptors

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	152 Otford Road	0.00	75% or Less of the AQO	Negligible
R2	2 Otford Road	0.00	75% or Less of the AQO	Negligible
R3	27 Berwick Way	0.04	75% or Less of the AQO	Negligible
R4	29 Otford Road	0.00	75% or Less of the AQO	Negligible
R5	99 St John's Hill	0.00	75% or Less of the AQO	Negligible
R6	32 Bradbourne Vale Road	0.00	75% or Less of the AQO	Negligible

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R7	71 St Johns Road	0.00	75% or Less of the AQO	Negligible
R8	68 Seal Road	0.00	75% or Less of the AQO	Negligible
R9	Crown Crest Court	0.00	75% or Less of the AQO	Negligible
R10	8 Seal Road	0.00	75% or Less of the AQO	Negligible
R11	20 Seal Road	0.04	75% or Less of the AQO	Negligible
R12	St Johns Medical Practice	0.00	75% or Less of the AQO	Negligible
R13	30 St Johns Hill	0.00	75% or Less of the AQO	Negligible
R14	1 Lambarde Road	0.00	75% or Less of the AQO	Negligible
R15	The Mill	0.00	75% or Less of the AQO	Negligible
R16	Croiselles	0.00	75% or Less of the AQO	Negligible
R17	190 Seal Road	0.00	75% or Less of the AQO	Negligible

As indicated in Table 20 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 5.2.3.

5.2.3 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 23.

Table 23: 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 17 sensitive receptors considered. The sensitive receptors 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 above the AQOs at sensitive locations on the application 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: • 0.08% to 0.4% for NO_2; • 0.00% to 0.03% for PM_{10}; and • 0.00% to 0.04% for $PM_{2.5}$ Resultant impacts were subsequently predicted to be **negligible** at all 17 receptor locations considered.

Guidance	Comment
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 exceedances of the annual mean AQO for NO_2 across the local road networks within the modelling extents, and at 3 sensitive receptor locations. No new exceedances were predicted as a result of the Proposed Development as exceedances are observed in both DM and DS future scenarios. Furthermore, locations subject to exceedances experienced increases less than 0.5% of the AQO, as detailed below: • R5 – 0.37%; • R10– 0.38%; and • R11 – 0.25% The remaining 14 receptors locations were predicted to experience annual mean NO_2 concentrations below the AQO. There were no exceedances of annual mean PM concentrations at any location within the modelling extents
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 exceedances of the annual mean AQO NO_2 at 3 sensitive locations. All exceedances of the annual mean AQO for NO_2 were predicted during both the DM and DS scenarios. Therefore, resultant impacts cannot be directly accounted to the operation of the proposed development. The predicted exceedances were above 45µg/m^3 at 1 location (R5) and above 41µg/m^3 at 1 sensitive location (R10) in both scenarios. It is again critical to note that the Proposed Development results in negligible impacts at these locations. 14 receptor locations are predicted to experience NO_2 below the relevant annual AQOs. It should also be noted that all impacts were predicted to be **negligible** at all locations. Therefore, the overall magnitude of predicted impacts is judged to be **not significant** in the context of this assessment.

The combined use of 2023 traffic data and 2019 emission factors is considered to provide a worst-case scenario, which will lead to overestimations of 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.**

6.0 CONCLUSION

Ensafe Consultants were commissioned by the client to undertake an Air Quality Assessment in support of a proposed residential development at Cramptons Road, Sevenoaks.

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

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

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

Predicted impacts on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of operational phase exhaust emissions were predicted to be **negligible** at all 17 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, air quality is not considered a constraint to planning consent and the Proposed Development is considered suitable for residential use.

7.0 ABBREVIATIONS

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

END OF REPORT

APPENDIX I - FIGURES

Legend

Site Boundary

Air Quality Management Area

Title

Figure 1

Site Location

Project

Air Quality Assessment
Gasholder Site, Crampton's Road
Sevenoaks

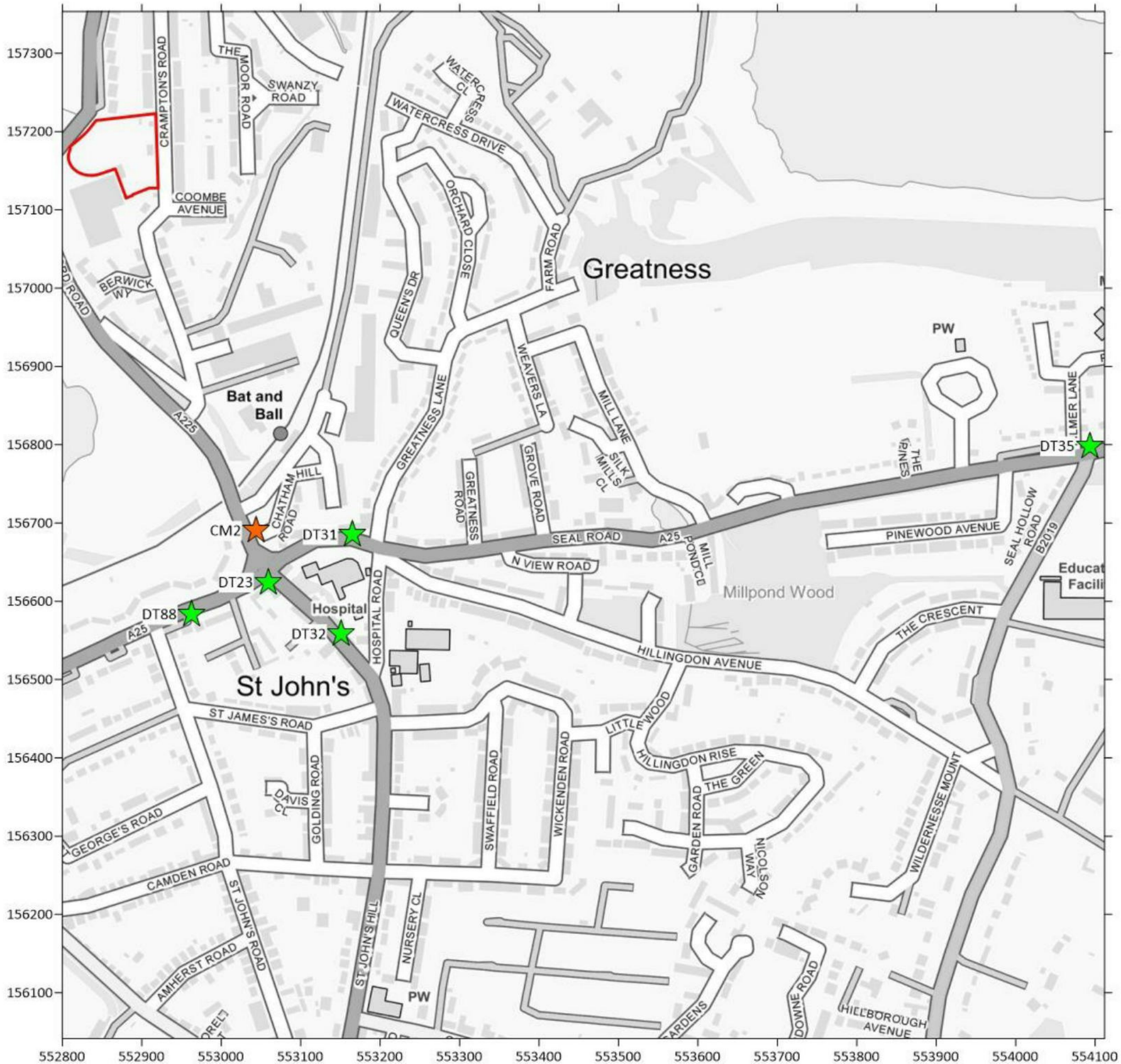
Project Number

AQ109220

Client

Whitby Wood

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



Legend

- Site Boundary
- Diffusion Tube Monitoring Locations
- Automatic Analyser Monitoring Location

Title

Figure 2

Diffusion Tube Monitoring Locations

Project

Air Quality Assessment
Gasholder Site, Cramptons Road
Sevenoaks

Project Number

AQ109220

Client

Whitby Wood

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

Legend

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

Title

Figure 3

Demolition, Earthworks and Construction Dust Buffer Zones

Project

Air Quality Assessment
Gasholder Site, Cramptons Road
Sevenoaks

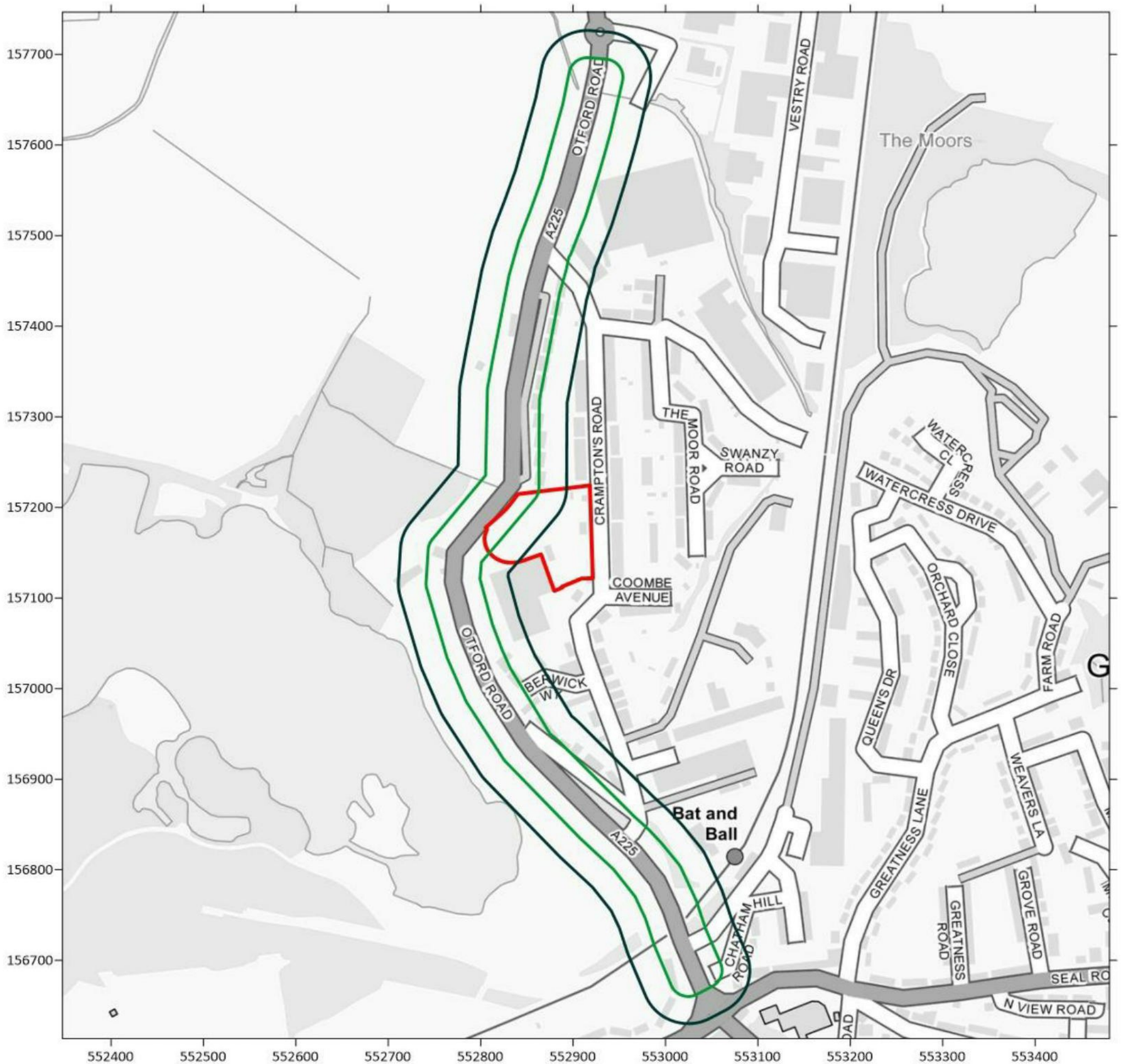
Project Number

AQ109220

Client

Whitby Wood

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



Legend

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

Title

Figure 4

Trackout Dust Buffer Zones

Project

Air Quality Assessment
Gasholder Site, Cramptons Road
Sevenoaks

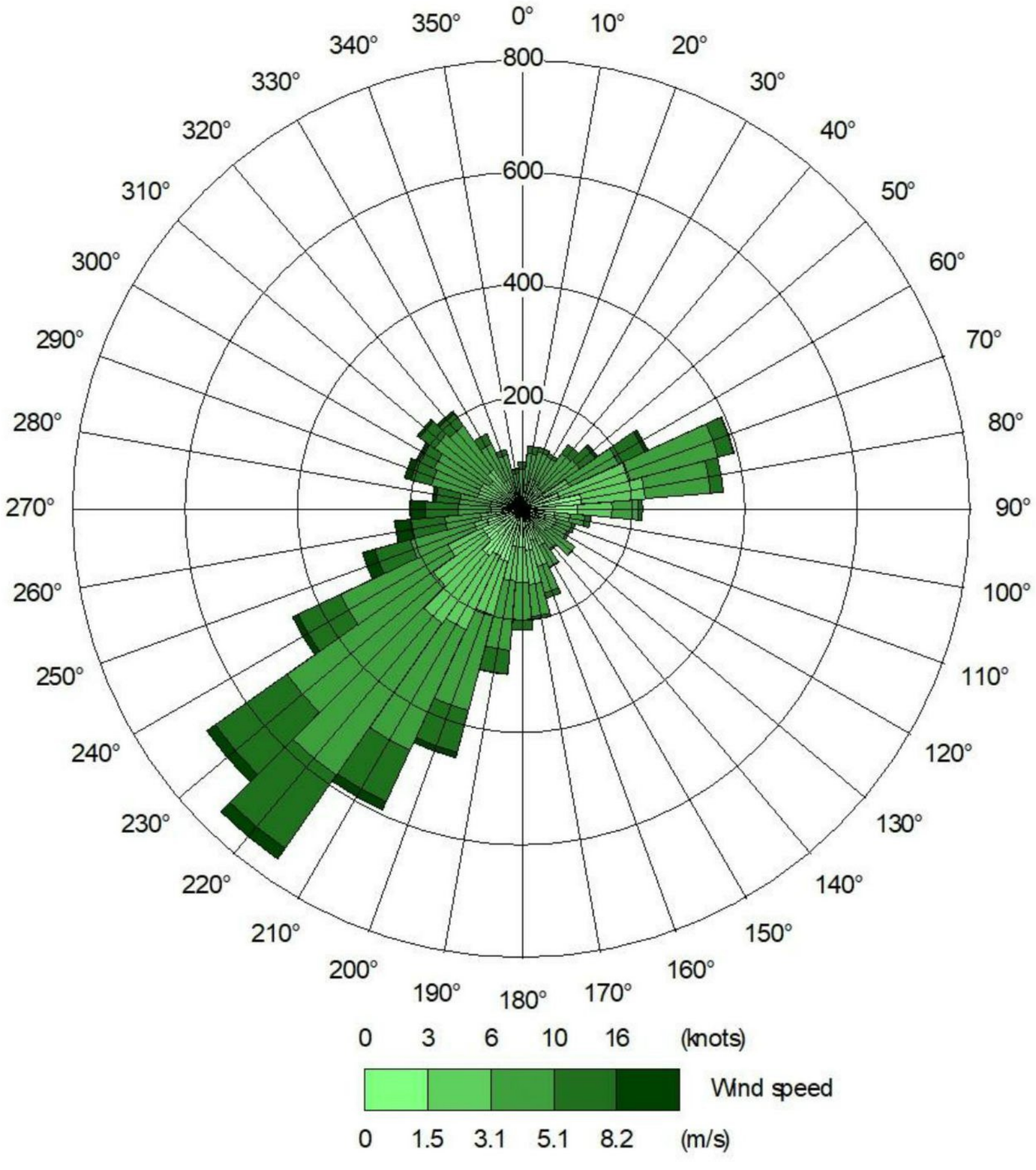
Project Number

AQ109220

Client

Whitby Wood

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



Legend

Title

Figure 5

Wind Rose
Gatwick Airport Meteorological Station

Project

Air Quality Assessment
Gasholder Site, Crampton's Road
Sevenoaks

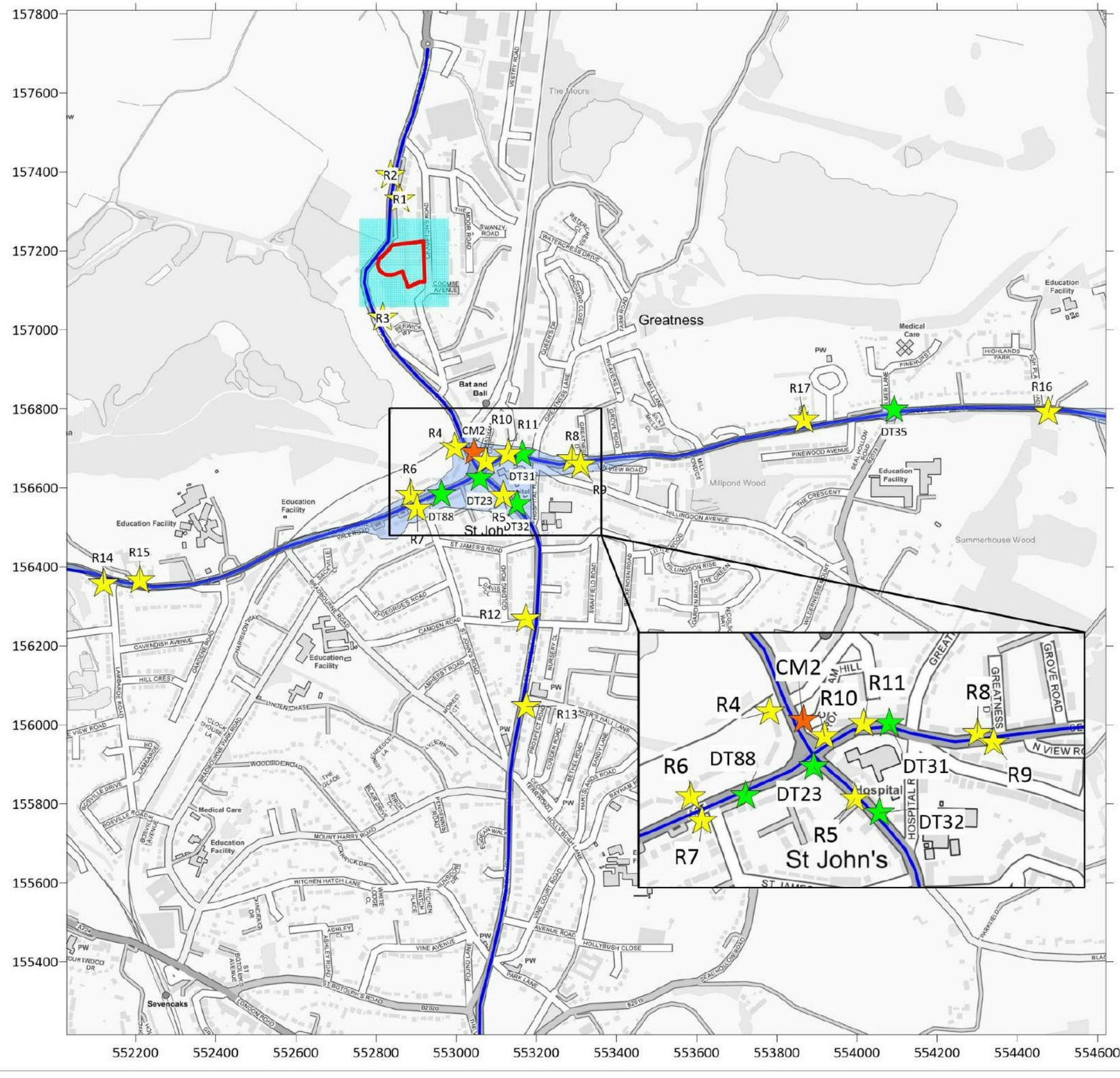
Project Number

AQ109220

Client

Whitby Wood

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



Legend

- Site Boundary
- Modelled Road Link
- Cartesian Grid
- Diffusion Tube Monitoring Locations
- Automatic Analyser Monitoring Locations
- Sensitive Receptor Locations
- Air Quality Management Area

Title

Figure 6

ADMS-Roads Input

Project

Air Quality Assessment
Gasholder Site, Cramptons Road
Sevenoaks

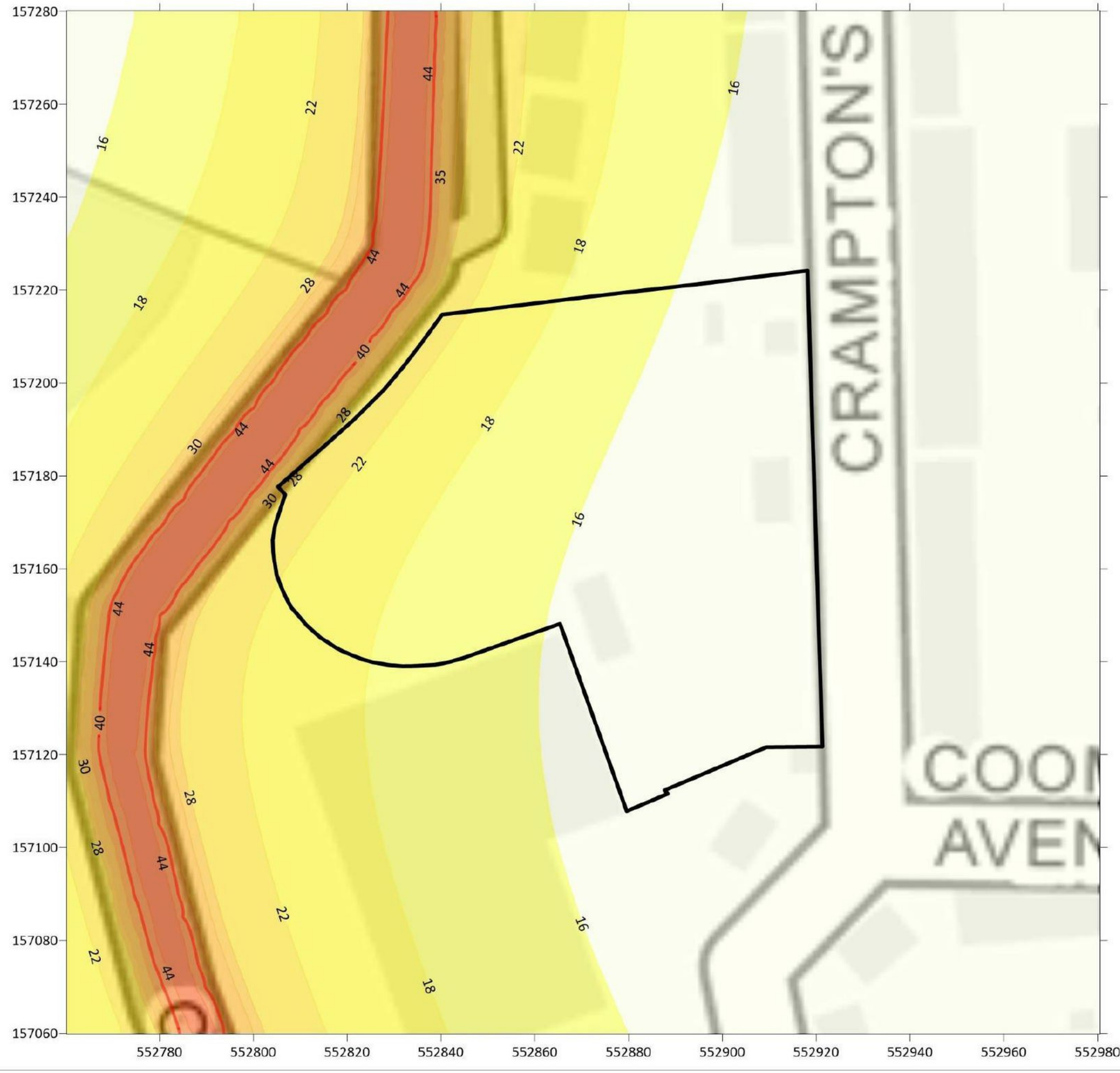
Project Number

AQ109220

Client

Whitby Wood

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



Legend

Site Boundary

54
44
40
35
30
28
22
18
16
14

Predicted Annual Mean NO_2 Concentration (µg/m³)

Title

Figure 7

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

Project

Air Quality Assessment
Gasholder Site, Cramptons Road
Sevenoaks

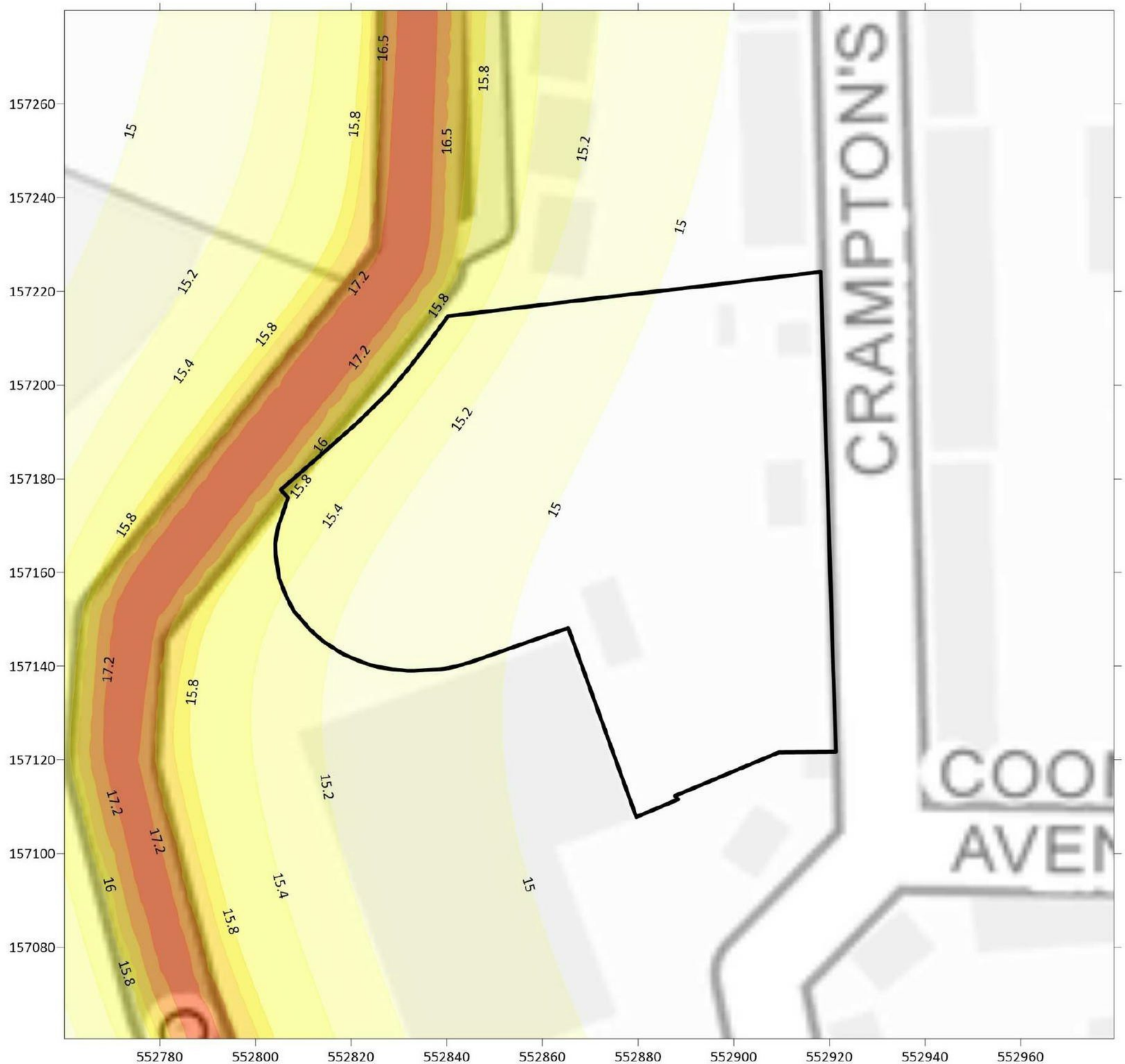
Project Number

AQ109220

Client

Whitby Wood

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



Legend

Site Boundary

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

18.2
17.2
16.5
16
15.8
15.4
15.2
15
14.8

Title

Figure 8

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

Project

Air Quality Assessment
Gasholder Site, Cramptons Road
Sevenoaks

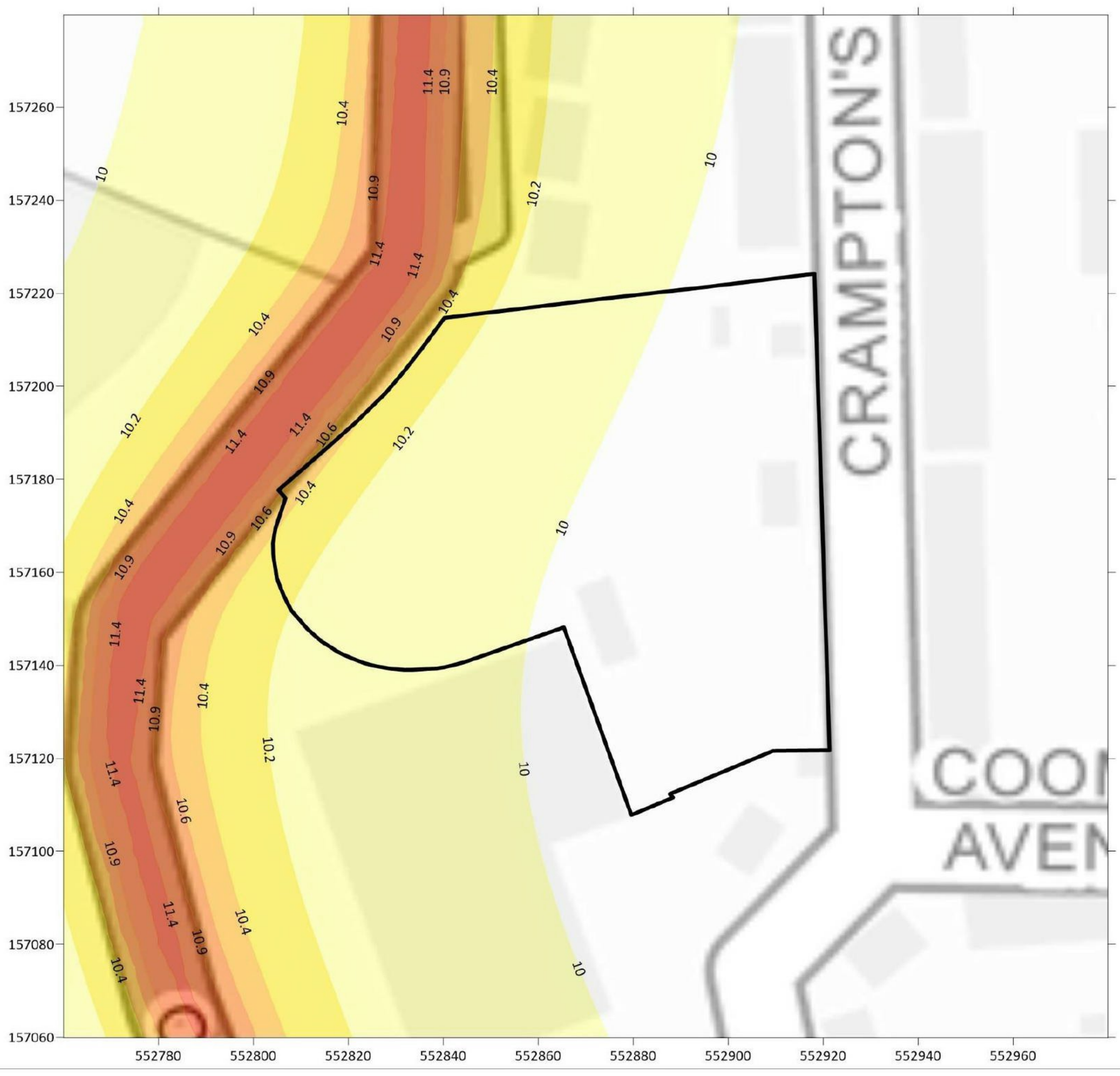
Project Number

AQ109220

Client

Whitby Wood

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



Legend

Site Boundary

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

11.9
11.4
10.9
10.6
10.4
10.2
10
9.9

Title

Figure 9

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

Project

Air Quality Assessment
Gasholder Site, Cramptons Road
Sevenoaks

Project Number

AQ109220

Client

Whitby Wood

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

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 (TG16)[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: 552760, 157060 and 552980, 157280 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 and its network distribution was provided by Vectos, the appointed Transport Consultants for the scheme, and indicated that a total flow generation of 476 AADT is anticipated as a result of the Purposed Development.

Baseline traffic data for all road links used in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition, was obtained from the Department for Transport (DfT). The Dft Matrix web tool enables the user to view and download traffic flows on every link of the A-road and motorway network in Great Britain for the years 1999 to 2019. 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 2019 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: 2019 Verification Traffic Data

Road Link		Road Width (m)	Canyon Height	24 Hour AADT Flow	HDV Pop (%)	Mean Vehicle Speed (km/hr)
L1	A225 near site, above Cramptons Road junction	9.5	-	19612	1.8	40
L2	A225 near site, below Cramptons Road junction	10.3	-	19612	1.8	40
L3	A225/A25 junction	17.4	-	19612	1.8	10
L4	Otford Road/Bradbourne Vale Road	10.9	-	16394	2.1	40
L5	Otford Road/ Seal Road Junction	11.45	-	16394	2.1	40
L6	Bradbourne Road	13.3	-	16394	2.1	10
L7	Bradbourne Road approaching Seal Road	9.4		12913	3.2	10
L8	Seal Road Gradient	7.2	-	12913	3.2	15
L9	Seal Road	8.7	-	12913	3.2	40
L10	St John's Hill approaching Otford Road	9.1	-	14671	1.7	10
L11	St John's Hill canyon section	9	5	14671	1.7	25
L12	St John's Hill slow down section	8.8	-	14671	1.7	25
L13	St John's Hill	10	-	14671	1.7	32
L14	A225 - north	9.0	-	19612	1.8	40

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

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

Table AII 2: 2023 Traffic Data

Road Link		Do Minimum (DM)		Do Something (DS)		Additional Development Flow
		24 Hr AADT Flow	HDV Prop (%)	24 Hr AADT Flow	HDV Prop (%)	
L1	A225 near site, above Cramptons Road junction	19,902	1.8	20,060	1.8	158
L2	A225 near site, below Cramptons Road junction	19,902	1.8	20,140	1.7	238
L3	A225/A25 junction	19,902	1.8	20,140	1.7	238
L4	Otford Road/Bradbourne Vale Road	16,637	2.1	16,737	2.1	100
L5	Otford Road/ Seal Road Junction	16,637	2.1	16,737	2.1	100
L6	Bradbourne Road	16,637	2.1	16,737	2.1	100
L7	Bradbourne Road approaching Seal Road	13,104	3.2	13,165	3.2	61
L8	Seal Road Gradient	13,104	3.2	13,165	3.2	61

Road Link		Do Minimum (DM)		Do Something (DS)		Additional Development Flow
		24 Hr AADT Flow	HDV Prop (%)	24 Hr AADT Flow	HDV Prop (%)	
L9	Seal Road	13,104	3.2	13,165	3.2	61
L10	St John's Hill approaching Otford Road	14,888	1.7	14,965	1.7	77
L11	St John's Hill canyon section	14,888	1.7	14,965	1.7	77
L12	St John's Hill slow down section	14,888	1.7	14,965	1.7	77
L13	St John's Hill	14,888	1.7	14,965	1.7	77
L14	A225 - north	19,902	1.8	20,140	1.7	238

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, 2019 emission factors have been utilised for the prediction of pollution levels for all scenarios in preference to the development opening year in order to provide a robust assessment.

NO_x to NO_2 Conversion

Predicted annual mean NO_x concentrations from the dispersion model were converted to NO_2 concentrations using the NO_x to NO_2 Calculator (v.8.1) provided by DEFRA, which is the method detailed within LAQM (TG16)[2].

Meteorological Data

Meteorological data used in this assessment was taken from Gatwick meteorological station over the period 1st January 2019 to 31st December 2019 (inclusive). Gatwick Met Station meteorological station is located at approximate NGR: 526820, 140260 which is 31km south west of the Proposed Development. Although there is a large distance between the application site and Gatwick Met Station, the use of this data is considered to provide a reasonable representation of conditions at the development site.

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

Roughness Length

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

Table AII 3: Utilised Roughness Lengths

Scenario	Roughness Length (m)	ADMS Description
Verification, Operational Phases (DM and DS scenarios)	0.5	Parkland, open suburbia

Scenario	Roughness Length (m)	ADMS Description
Meteorological Station	0.5	Parkland, open suburbia

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 Gatwick meteorological station are summarised in Table AII 4

Table AII 4: Utilised Monin-Obukhov Lengths

Scenario	Monin-Obukhov Length (m)	ADMS Description
Verification, Operational Phases (DM and DS scenarios)	30	Cities and large towns
Meteorological Station	30	Mixed urban/industrial

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 6, 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	2019 Predicted Background Concentration (µg/m³)
DT88, DT35, DT32, DT23, DT31, CM2	552500, 156500	NO_x	16.34
		NO_2	12.21

Similar to emission factors, background concentrations for 2019 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 2019, using traffic data, meteorological data and monitoring results from this year.

SDC undertakes periodic monitoring of NO_2 concentrations at 5 roadside monitoring locations within the assessment extents. It should be noted that the automatic analyser (CM2) was not used for NO_x verification purposes as the NO_2 monitoring concentration was not available for 2019.

The road contribution to total NO_x concentration was calculated from the monitored NO_2 result for use in the verification process. This was undertaken following the methodology contained within DEFRA guidance LAQM (TG16)[2]. The monitored annual mean NO_2 concentration and calculated road NO_x concentration are summarised in Table AII 6.

Table AII 6: Monitoring Results

Site ID	Monitored Road NO_x Concentration ($\mu g/m^3$)	Modelled Road NO_x Concentration ($\mu g/m^3$)	% Difference ((Monitored Modelled)/Monitored)) * 100
DT88	20.64	10.24	50
DT31	64.72	16.74	74
DT32	57.87	23.71	59
DT23	40.55	15.96	61
DT35	36.88	8.96	76

The monitored and modelled NO_x road contribution concentrations were graphed and the equation of the trend line based on the linear progression through zero was calculated, as shown in Graph 1. This indicated that a verification factor of **2.8422** was required to be applied to all NO_x modelling results, showing the model overestimated pollutant concentrations throughout the assessment extents.

Graph 1 - Verification Adjustment Factor

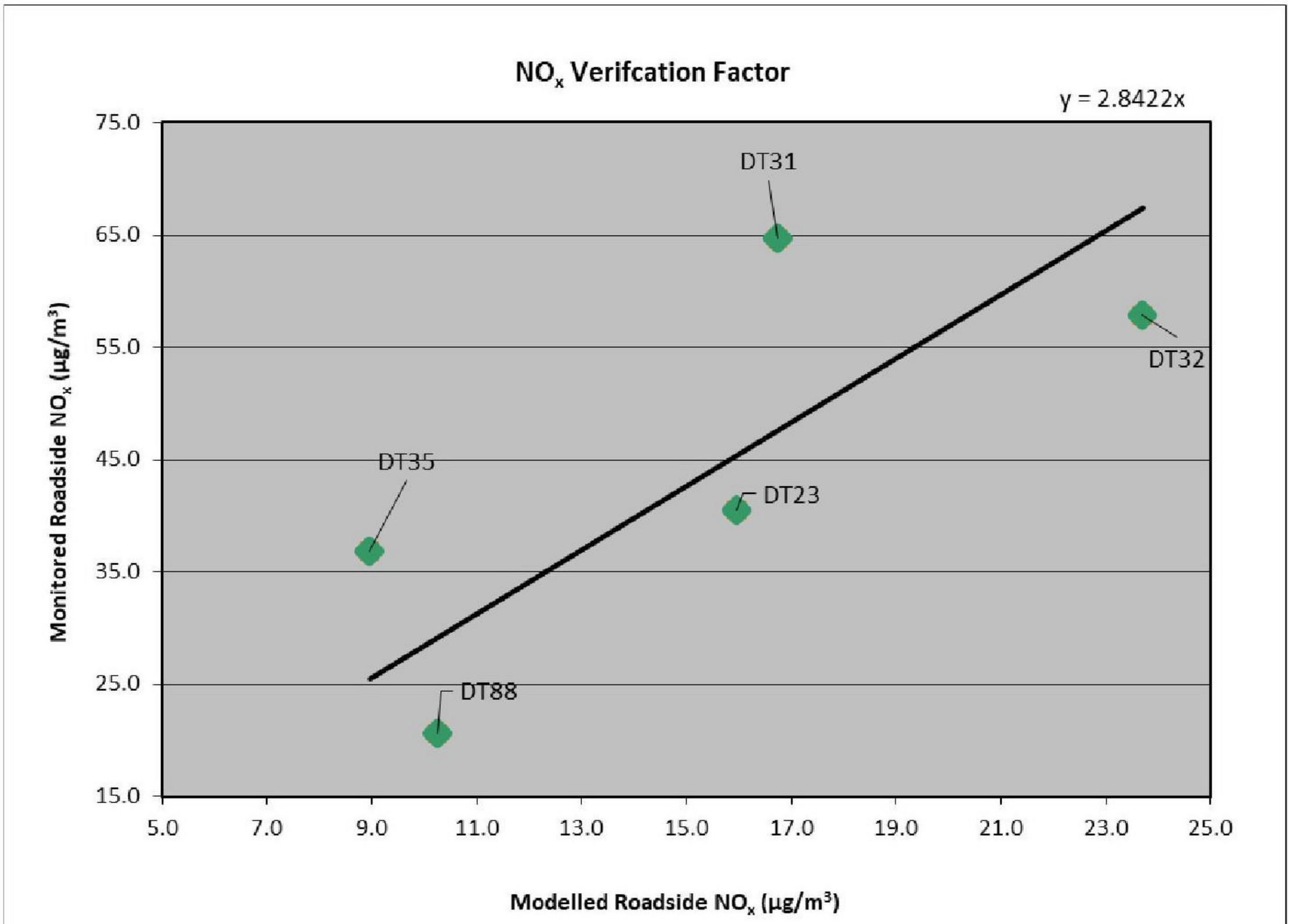


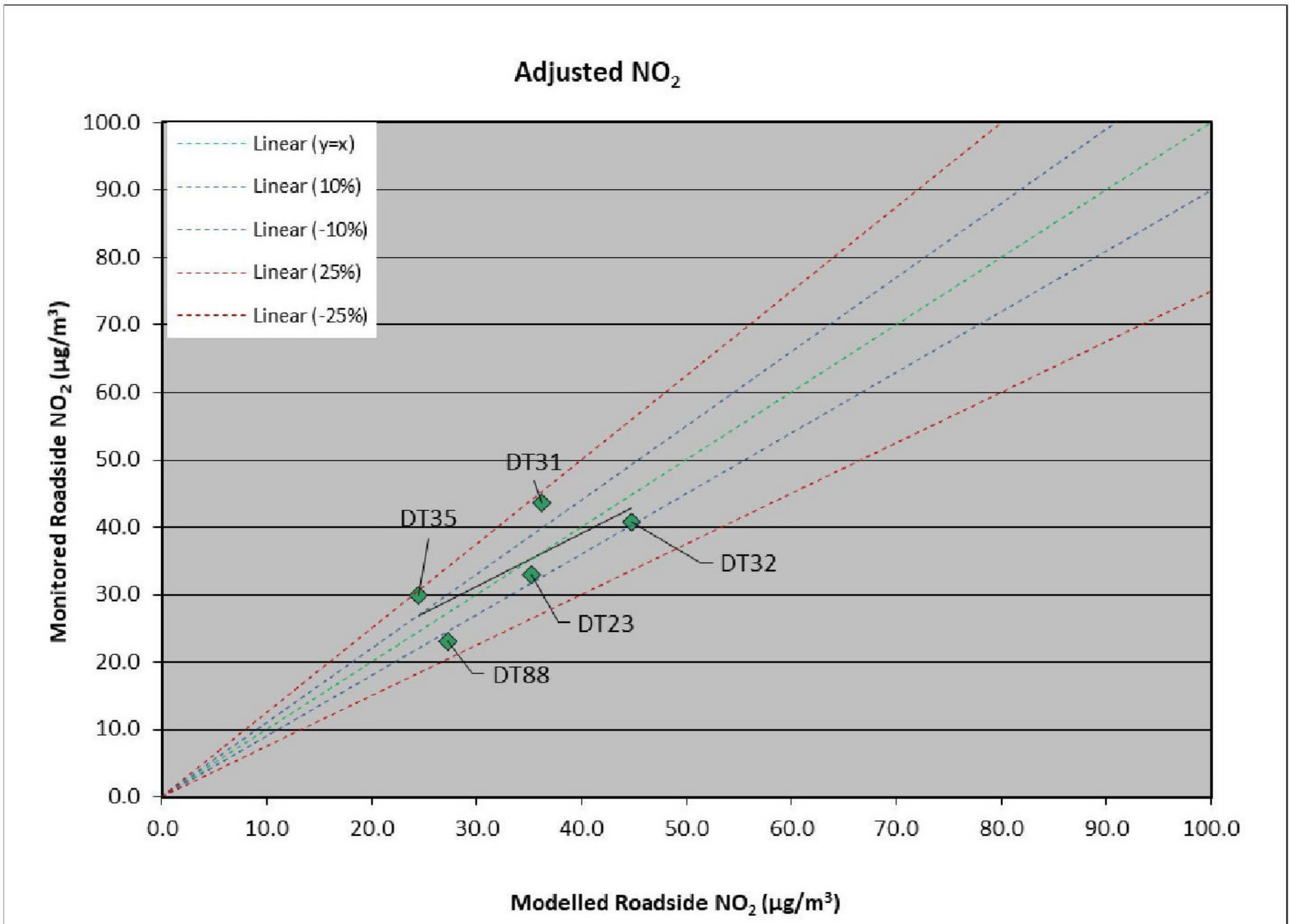
Table AII 7 presents the monitored annual mean NO_2 concentrations and the adjusted modelled total NO_2 concentration based on the above verification factor. Exceedances are shown in **bold.**

Table AII 7: Modelled Concentrations

Site ID	Monitored Road NO_2 Concentration (µg/m³)	Adjusted Modelled Road NO_2 Concentration (µg/m³)	% Difference ((Monitored Modelled)/Monitored)) * 100
DT88	23.10	27.28	-18
DT31	**43.60**	36.19	17
DT32	**40.70**	**44.71**	-10
DT23	33.00	35.20	-7
DT35	29.90	24.38	18

As indicated in Table AII 7, all adjusted NO_2 concentrations are within the 25% difference as specified within LAQM (TG16)[2]. A graphical representation of the adjusted NO_2 concentrations is provided within Graph 2.

Graph 2 – Adjusted NO_2 Concentrations



SDC also undertakes monitoring of annual mean PM_{10} concentrations at one monitoring location (CM2) within the assessment extents, it was therefore possible to provide a separate PM_{10} verification factor. The dispersion model was run with the traffic input data previously detailed for 2019 to predict the 2019 concentration at the monitoring locations. The results are shown in Table AII 8.

Table AII 8: PM_{10} Verification Results

Site ID	Modelled Road PM_{10} Contribution	Background PM_{10}	Modelled Total PM_{10}	Monitored PM_{10}	Adjustment Factor
CM2	1.17[a]	15.36[b]	16.53[c]	20.00[d]	1.2099[e]

Where:

[a] *Raw modelled road contribution from ADMS model file (.plt)*
[b] *DEFRA background concentration*
[c] *Sum of modelled road PM_{10} contribution and background PM_{10}*
[d] *Monitored annual average PM_{10} concentration; and*
[e] *Adjustment Factor applied to modelled total PM_{10} results [Monitored PM_{10}/Modelled Total PM_{10}]*

The monitored and modelled PM_{10} road contribution concentrations were compared. This indicated that a verification factor of **1.2099** was required to be applied to all PM_{10} modelling results, showing the model has a tendency to underestimate pollutant concentrations throughout the assessment extents. As $PM_{2.5}$ monitoring is not undertaken within the assessment

extents, a PM_{10} adjustment factor of **1.2099** was utilised to adjust model predictions of $PM_{2.5}$ 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'[10].

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

- Demolition
- 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

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

Magnitude	Activity	Criteria
		• Demolition activities greater than 20m above ground level
	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