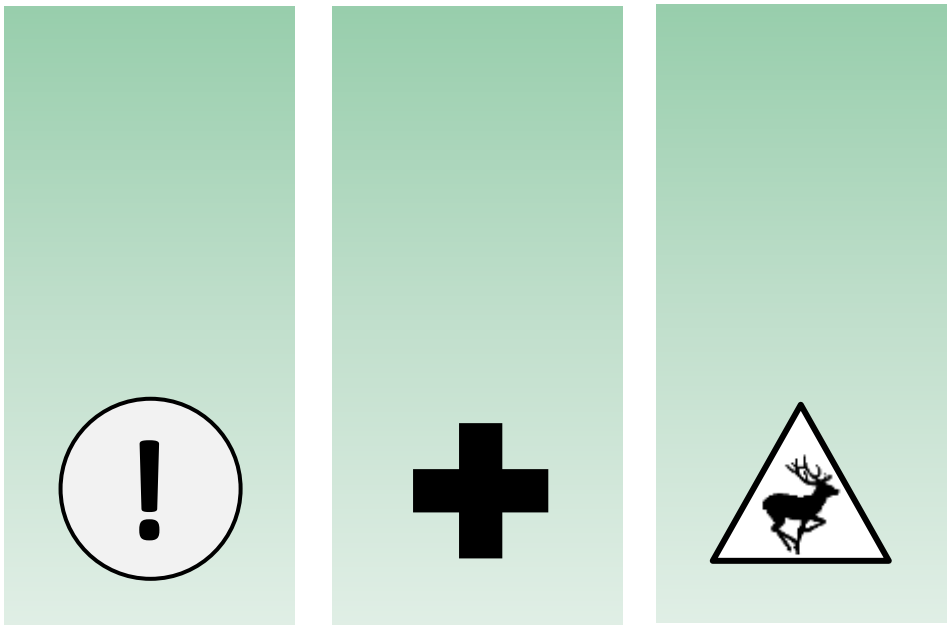
AIR QUALITY ASSESSMENT
LAND EAST OF DOWNEND ROAD, PORTCHESTER

ENSAFE PROJECT REFERENCE: AQ108773

PREPARED FOR: MILLER HOMES

DATE: JULY 2020



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EXECUTIVE SUMMARY

Ensafe Consultants were commissioned by Miller Homes to undertake an Air Quality Assessment in support of a planning application for a residential-led development at land east of Downend Road, Portchester.

The development proposals comprise of up to 350 residential units, with the application site located within close proximity to the M27, which is considered to be a significant source of road traffic emissions. As such, there is the potential for the development to introduce future site users to poor air quality as well as the potential for the site to cause adverse impacts to existing pollution levels at nearby sensitive receptors, both for human health and ecological. As such, an Air Quality Assessment has been undertaken to quantify pollutant levels across the site, consider its suitability for residential use and assess potential impacts as a result of the development.

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

Dispersion modelling was undertaken to quantify annual mean NO_2 and PM_{10}, 24 hour mean NO_x, annual mean NH_3, annual mean acid deposition and annual mean nitrogen deposition concentrations across the application Site and wider environs form impacts upon human health and ecological receptors. .

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

Predicted impacts to human health from changes to annual mean NO_2 and PM_{10} concentrations as a result of operational phase were predicted to be **negligible** at all sensitive receptor locations during the 2022 assessment scenario. The overall significance of potential impacts was determined to be **not significant** in accordance with the EPUK and IAQM guidance.

Impacts upon sensitive ecological designations as a result of emissions from the proposed development and were deemed insignificant at all designations for 24 hour mean NO, annual mean NH_3, annual mean acid deposition and annual mean nitrogen deposition.

Impacts upon sensitive ecological designations as a result of emissions from the proposed development could not be screened out as insignificant at one of sensitive receptor locations (including committed development) for annual mean NOx concentrations. The area in which PC exceeds 1% of the EQS is limited to the ecological designation closest to the roadside and does not extend past several meters from the roadside,a very small portion of the ecological site. Critically, predicted NO_2 concentrations were well below the relevant long term EQS at all sensitive receptor locations. Therefore, it is considered that impacts as a result of the development overall upon ecological receptors are considered to be **not significant.**

Based on the assessment results, air quality is not considered a constraint to planning consent.

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APPENDICIES

1. INTRODUCTION

1.1 Background

Ensafe Consultants (Ensafe) have been commissioned by Miller Homes to prepare an Air Quality Assessment in support of a development at Land East of Downend Road, Portchester to be referred to hereafter as the 'Proposed Development'.

This report has been prepared for Miller Homes and the contents should not be relied upon by others without the express written authority of Ensafe. If any unauthorised third party makes use of this report they do so at their own risk and Ensafe owe them no duty of care or skill.

1.2 Site Location and Context

The application Site is located on land adjacent to Land east of Downend Road, Portchester at approximate National Grid Reference (NGR): 460400, 106335. Reference should be made to Figure 1 within Appendix I for a location plan.

The Proposed Development comprises of up to 350 residential units alongside associated infrastructure and parking.

Due to the scale of the Proposed Development, there is potential for air quality impacts to arise at existing sensitive receptor locations during the construction and operational phases. Impacts may occur as a result of fugitive dust emissions associated with construction works, and additional road traffic exhaust emissions associated with the operational phase.

The application Site is also located in close proximity to the M27 which is considered a notable sources of road vehicle exhaust emissions, including nitrogen dioxide (NO_2) and particulate matter (PM_{10}). As such, this has the potential to cause elevated pollutant concentrations across the site which may result in exposure of future residents to poor air quality.

An Air Quality Assessment has therefore been undertaken to to quantify pollution levels across the application Site, and considerdied the potential impacts on sensitive human health and ecological receptors, in accordance with the requirements of the National Planning Policy Framework (NPPF). This is detailed in the following report.

1.3 Limitations

This report has been produced in accordance with Ensafe's standard terms of engagement. Ensafe 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.

2. LEGISLATION, GUIDANCE AND POLICY

The following legislation, guidance and policy has been considered 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 updated on 1st November 2019;*
- *Section 82 of the Environment Act (1995) (Part IV);*
- *The Air Quality Standards (Amendment) Regulations (2016).*
- *Department for Environment, Food and Rural Affairs (DEFRA) guidance Local Air Quality Management Technical Guidance (TG16), 2018;*
- *Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management (IAQM), v1.1, June 2016; and*
- *Land-Use Planning and Development Control: Planning for Air Quality, Environmental Protection United Kingdom (EPUK) and IAQM, January 2017.*
- *Air Quality Planning Guidance, Maidstone Borough Council (MBC), November 2017*

2.1 UK Legislation

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 Objective	
	Concentration (µg/m^3)	Averaging Period
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

[1] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA, 2007.

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

Table 2 Examples of Where the Air Quality Objectives Apply

Averaging Period	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 Policy – Fareham Borough Council

The Fareham Borough Council (FBC)[3] Local Plan consists of three parts (Core Strategy, Development Sites and Policies, and the Welborne Plan) and sets out the Planning Strategy for the Borough up to 2026..

A review of the Core Strategy, adopted on August 2011, indicated the following policies in relation to air quality that are relevant to this assessment:

- *CS4 17 - Green Infrastructure, Biodiversity and Geological Conservation*
- *CS7: Development in Fareham*
- *CS12: Daedalus Airfield Strategic Development Allocation*
- *CS16: Natural Resources and Renewable Energy*

[2] Local Air Quality Management Technical Guidance 2016 LAQM (TG16), DEFRA, 2016.
[3] Fareham Borough Local Plan, Fareham Borough Council, 2011

- *DSP2: Envrionmetnal Impact*
- *DSP56: Renwable Energy*
- *WEL6:General Design Principles*

This policy have been taken into account during the undertaking of this Air Quality Assessment by assessing the potential impacts of road vehicle exhaust emissions on existing pollution level and sensitive receptors in the vicinity of the Site.

2.3 Habitats Directive

The Council Directive 92/43/EEC[4] was adopted in 1992 on the conservation of natural habitats and of wild fauna and flora aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements.

The Directive establishes the EU wide network of protected areas to be safeguarded against potentially damaging developments.

Table 3 Critical Levels

Pollutant	Air Quality Limit Values	
	Concentration (µg/m^3)	Averaging Period
NO_x	30	Annual mean
	75	24-hour mean
NH_3	3	Annual mean for all higher plants
	1	Annual mean for sensitive lichen and bryophytes

[4] European Commission (1992), The Habitats Directive (92/43/EEC)

3. 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'[5].

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

- Earthworks;
- Construction; and
- Trackout.

The potential for dust emissions was assessed for each activity that has the potential 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.

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.
- 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).

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

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 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[5] suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix V.

3.2 Operational Phase Assessment

Detailed dispersion modelling has been undertaken to consider the following modelling scenarios:

- Baseline year for verification against latest ratified data (2018 traffic flows);
- Opening year do-minimum (DM) (anticipated traffic flows in 2022 should the proposals not proceed)
- Opening year do-something (DS) (predicted traffic flows in 2022 should the proposals be completed, with the addition of traffic generated by the Proposed Development).

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

It is noted that for the ecological receptors impacts assessment the DM and DS scenarios have included road from other committed developments, which are:

- Welborne, Fareham
- Trafalgar Wharf, Portsmouth

It should be noted that air quality is predicted to improve in the future. However, in order to provide a robust assessment, emission factors for 2018 have been used for all scenarions. The use of 2022 traffic data and 2018 emission factors is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

The sensitivity impact significance of each receptor was defined in accordance with the criteria shown in Table 4. These are based upon the guidance provided within the Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) guidance 'Land-Use Planning and Development Control: Planning for Air Quality[6].

[6] Land-Use Planning and Development Control: Planning for Air Quality, Environmental Protection UK and Institute of Air

Table 4 Operational Traffic Exhaust Emissions – Assessment of Impacts

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
110% or more of AQO	Moderate	Substantial	Substantial	Substantial

The criteria shown in Table 4 is adapted from the EPUK and IAQM guidance 'Land-Use Planning and Development Control: Planning for Air Quality'[6] 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.

Following the prediction of impacts at discrete receptor locations utilising the criteria in Table 4 the EPUK and IAQM[5] document 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.

3.3 Ecologial Impacts Assesment Methodology

3.3.1 Scoping

A desktop study is conducted to identify sensitive ecological receptors which fall within 200m of the

Quality Management, 2017.

road network which is likely to be used by traffic associated with the proposed development. If all ecological sites fall outside of the 200m buffer then no further action is required and the site should not be assessed further. Reference should be made to Figure 10 for geographical representative of roads with ecological sites within 200m.

If potential impacts of the site have not been screened out using the above criteria, the risk of impact should next be assessed based on AADT or air quality impacts. It is considered that traffic impacts can be screened out if predicted AADT traffic flows from cumulate developments are predicted to cause increases of less than 1000 AADT or 200 HDVs within 200m of ecological sites. It should be noted that where cumulative traffic counts are unavailable, potential impacts will not be screened out by this step even if the site results in increased traffic flows of less than 1000 AADT or 200 HDVs.

3.3.2 Quantification

Detailed dispersion modelling scenarios have considsidered NO_2 and NH_3 concentrations/depositions at ecological designations and presented as Process contribution (PC) - the change in pollutant concentration/deposition as a result of the proposal; and Predicted Environmental Concentration (PEC) - the addition of baseline / background concentrations/depositions to the PC including in-combination effects.

For each modelled habitat within each site, the PC is calculated as a percentage of the relevant critical load / level for the site alone and where possible in combination with cumulative developments. Impacts can be considered insignificant if the modelled PC is less than 1% of the EQS for relevant ecological habitat.

Should these criteria be exceeded then the PEC should be calculated and assessed against the standard for ecological habitat. If the predicted PC is greater than 1% and the PEC is less than 70% of the environmental standard, the emissions can be considered insignificant. Should the predicted PEC be greater than 70% of the EQS, detailed dispersion modelling should be produced and a specialist ecologist consulted to determine likely significance.

4. 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), FBC has undertaken Review and Assessment of air quality within their area of administration. This process has indicated that annual mean concentrations of NO_2 are above the AQO within the district. As such, two Air Quality Management Areas (AQMAs) has been declared which is described as:

> *"Portland Street AQMA - An area encompassing residential properties and the Sacred Heart Catholic Church on Portland Street."*

> *"Fareham AQMA - An area encompassing the junction of Gosport Road, Redlands Lane and Newgate Lane, and the surrounding area."*

The closest AQMA is Portland Street which is located approximately 2.4km south-west of the development boundary. Due to the distance between the two sites, potential impacts on NO_2 concentrations within the AQMA are not anticipated to be significant and therefore they have not been considered further in the context of this assessment.

FBC 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 FBC using continuous and periodic methods throughout their area of administration. There are currently two automatic analysers operated by FBC. Monitoring results for NO_2 from recent years are shown in Table 5. Monitoring results for NO_2 from the most recent, ratified and published data is presented in Table 5. Exceedances of the relevant AQO are highlighted in **bold.**

Table 5 Automatic Analyser Monitoring Results

Site Name	Type	NGR (m)		Annual Mean NO_2 Concentration (µg/m^3)		
		X	Y	2016	2017	2018
Gosport Road	Roadside	457594	105280	35.5	33.8	32.5
Portland Street	Roadside	457954	106027	34.9	34.6	**40.4**

The annual mean AQO for NO_2 was exceeded during 2018 at the Portland Street site. However, due to the distance from the proposed site, this source of data has not been considered further in the context of this assessment. FBC also monitor NO_2 concentrations across the borough using passive diffusion tubes. A review of the most recent, ratified and published data indicated several diffusion tubes located within 500m of the application site, presented in Table 6 and shown in Figure 2. Exceedances of the AQO are shown in **bold** which shows the annual mean AQO for NO_2 was not exceeded at the majority of the diffusion tube location in recent years.

Table 6 Diffusion Tube Monitoring Results

ID	Site Name	Type	NGR (m)		Distance from Site (m)	Annual Mean Concentration (µg/m^3)	
			X	Y		2017	2018
CM3	On Cams Hill, near Delme Arms	Roadside	458828	106243	1,584	27.40	27.30
CM2	Cams Mill Kerb side	Roadside	458775	106273	1,635	**68.00**	**57.70**
CM1	Cams Hill, Near the Bridge	Roadside	458775	106228	1,637	29.80	30.00
BL1	11 Bath Lane	Other	458376	106109	2,044	31.40	31.30
PS4/5/6	Co-located with Portland St Monitor	Roadside	457954	106027	2,473	34.40	34.80
PS1/1A/1B	1 Sentinel Cottages	Roadside	457939	106012	2,490	30.10	29.60
PS2	2 Sentinel Cottages	Roadside	457937	106021	2,491	33.30	33.80
PS3	38 Portland Street	Roadside	457935	106033	2,491	33.90	32.30
HR4	25 Hartlands Road	Roadside	457860	106077	2,561	24.80	25.00
WW1	Western Way	Roadside	457845	106008	2,583	23.90	26.70
HR2	17 Hartlands Road	Roadside	457822	106107	2,596	25.00	24.50
HR3A	7 Hartlands Road	Roadside	457787	106140	2,629	22.80	23.30
G1A	30 Old Gosport Road	Roadside	457732	105625	2,766	29.40	28.50
G12	Two Saints,101 Gosport Road	Roadside	457684	105630	2,811	34.00	30.80
G10	107 Gosport Road	Roadside	457675	105616	2,823	33.40	33.20
G11	2 Earls Road	Roadside	457668	105461	2,872	23.50	23.10
G14	Bottom of Beaconsfiel d Road	Other	457631	105494	2,898	26.30	26.40
G6	171 Gosport Road	Roadside	457599	105410	2,954	26.60	31.30
WW2	Western Way (Half way up Road)	Roadside	457443	106087	2,976	30.30	28.80
G7	193 Gosport Road	Roadside	457583	105354	2,986	34.50	37.40
E1/2/3	Co-located with Gosport	Roadside	457590	105281	3,004	32.40	29.80
G4	122 Gosport Road	Roadside	457598	105213	3,021	24.80	25.20

ID	Site Name	Type	NGR (m)		Distance from Site (m)	Annual Mean Concentration (µg/m^3)	
			X	Y		2017	2018
GR/RL	Corner of Gosport Rd and Redlands Lane	Roadside	457564	105300	3,022	21.40	23.20
G2A	138 Gosport Road	Other	457627	105138	3,022	27.70	25.80
G8Z	156 Gosport Road	Roadside	457656	105049	3,032	27.20	25.80
G3	202 Gosport Road	Roadside	457726	104869	3,050	24.40	23.70

As indicated in Table 5, in recent years there were exceedances of the annual mean AQO at tube CM2 in recent years. This is to be expected due to the tube's roadside location within an AQMA and proximity to the road. Reference should be made to Figure 2 within Appendix I for a graphical representation of the 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 Site is located across the following DEFRA NGRs:

- 459500, 106500
- 460500, 106500

Data for these locations were downloaded from the DEFRA website[7] summarised in Table 7 for the verification year (2018) and the predicted development opening year (2022).

Table 7 Predicted Background Pollutant Concentrations

Pollutant	Predicted Background Concentration (µg/m^3)	
	2018	2022
NO_x	30.32	25.26

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

Pollutant	Predicted Background Concentration (µg/m^3)	
	2018	2022
NO_2	20.45	17.52
PM_{10}	16.36	15.75
$PM_{2.5}$	10.64	10.13

As shown in Table 7, background pollutant concentrations at the Site are not predicted to exceed the relevant AQOs. The DEFRA background concentrations are deemed appropriate to represent pollutant concentrations (not included local emission sources) across the application site and have been used for the Baseline, DM and DS scenarios. Similar to emission factors, background concentrations for 2018 were utilised in preference to predicted background concentrations for the development opening year (2022). This provided a robust assessment and is likely to overestimate actual pollutant concentrations during the operation of the proposals.

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 are no nationally or European designated ecological receptors within 50m of the Site boundary, or within 50m from a route used by construction vehicles on the public highway (up to 500m from the Site entrance). Therefore, the risk of dust effects at a nationally or European designated ecological receptor site from construction impacts is not considered further in this assessment. Note that Ecololical receptors greater than 350m from the application Site are considered for the operational stage.

Human receptors sensitive to potential dust impacts during earthworks and construction were identified from a desk-top study of the area up to 350m from the development boundary. These are summarised in Table 8.

Table 8 Earthworks and Construction Dust Sensitive Receptors

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

Reference should be made to Figure 3 within Appendix I for a graphical representation of 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 9. 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 development via London Road to assess a worst-case scenario.

Table 9 Trackout Dust Sensitive Receptors

Distance from Site Access Route (m)	Approximate Number of Residential Receptors	Approximate Number of Ecological Receptors
Less than 20	More than 100	0
20 - 50	More than 100	0

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

There are ecological receptors within 50m of the site or trackout boundary. As such, ecological impacts have been assessed further within this report.

A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 10.

Table 10 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 and urban area. As such, historical dust generation may have occurred as a result of windblown emissions from commuting
The likelihood of concurrent dust generating activity on nearby sites.	A review of the FBC planning portal indicated there are several planning applications within 500m of the propsed development. As such, should both developments receive planning approval, there is a risk of concurrent dust generation if the construction phases overlap
Pre-existing screening between the source and the receptors	There is vegetation present along the western and northern boundaries. If retained, this could provide a natural protective screen to receptors in these directions
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. As such, properties to the north-east would be most affected by dust emissions

Guidance	Comment
Conclusions drawn from local topography	The topography of the area appears to be predominantly flat. As such, there are no constraints to dust dispersion
Duration of the potential impact, as a receptor may become more sensitive over time	Currently it is unclear as to the duration of the construction phase. However, it is likely to extend over more than one year
Any known specific receptor sensitivities which go beyond the classifications given in the document.	No specific receptor sensitivities identified during the baseline

4.4.2 Operational Phase - Human Health 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 in Table 11.

Table 11 Existing Sensitive Human Receptors

Receptor		NGR (m)	
		X	Y
R1	49 Wallington Shore Road	458785	106291
R2	2 Cams Hill	458835	106243
R3	1 Paradise Lane	458994	106198
R4	30 Cams Hill	459232	106121
R5	21 Condor Avenue	459786	105931
R6	10 Wagtail Way	459833	105943
R7	70 Porchester Road	460202	105907
R8	68 Porchester Road	460671	105717
R9	221 West Street	460802	105719
R10	204 West Street	460789	105666
R11	2 Kingsway	461088	105582
R12	14 West Road	461454	105559
R13	82 West Road	461511	105528
R14	17 Station Road	461819	105686
R15	24 Castle Road	461845.6	105602.7
R16	13 East Street	461896.5	105627.3
R17	26 Castle Street	461850	105582.3
R18	21 Castle Street	461862	105459.6

Receptor		NGR (m)	
		X	Y
R19	23 Station Road	461805.7	105714.3
R20	35 East Street	461995.7	105639.4
R21	90 Downend Road	459957	106574.5
R22	62 Eastern Way	458582.5	106280
R23	153 Hill Road	461411.4	106498.6
R24	15 Hill Road	461729.8	105934.6
R25	Residential Unit - Boarhunt Road	459001.8	107274
R26	12 Wallington Shore Road	458603.8	106539.7

The sensitive receptors identified in Table 11 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 Site 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.

4.4.3 Local Dust Sources

The proposed development is located in the vicinity of a wood storage facility. It is understood that there are no waste processing activities carried out on the site of the adjacent facility. The storage of waste wood is not considered as a dust generating activity and therefore it is not anticipated that any wind-blown dust from the adjacent facility would affect the site to any extent. As such the impacts of dust have not been considered further within this report.

4.4.4 Operational Phase - Ecological Sensitive Receptors

A desktop study has been carried out to identify sensitive ecological receptors which fall within 200m of the road network which is likely to be used by traffic associated with the proposed development. There is one ecological receptors locations in proximity to affected roads of the proposed development site; Portsmouth Harbour. This ecological designation has the potential to be impacted at the following four main locations as a result of the road traffic generated by the development and other committed developments:

- Delme Roundabout (A27 at Cams Hill);
- A27 by Paulsgrove Lake; and
- A32 Gosport Road.

These locations have been considered further within this assessment.

Through a combination of ecological boundaries accessed via MAGIC, accurate designated area has been assessed. Table 12 provides detail of the ecological receptors considered within this assessment.

Table 12 Ecological Receptors

s		Designation	Distance from Site (m)	NGR (m)	
				X	Y
E1	Portsmouth Harbour	Ramsar, SSSI and SPA	1,708	458,645	106,200
E2	Portsmouth Harbour	Ramsar, SSSI and SPA	1,669	458,684	106,227
E3	Portsmouth Harbour	Ramsar, SSSI and SPA	1,636	458,717	106,225
E4	Portsmouth Harbour	Ramsar, SSSI and SPA	1,581	458,772	106,210
E5	Portsmouth Harbour	Ramsar, SSSI and SPA	2,229	462,493	105,632
E6	Portsmouth Harbour	Ramsar, SSSI and SPA	2,252	462,521	105,646
E7	Portsmouth Harbour	Ramsar, SSSI and SPA	2,371	462,643	105,638
E8	Portsmouth Harbour	Ramsar, SSSI and SPA	2,528	462,806	105,640
E9	Portsmouth Harbour	Ramsar, SSSI and SPA	2,776	463,059	105,636
E10	Portsmouth Harbour	Ramsar, SSSI and SPA	2,935	463,215	105,605
E11	Portsmouth Harbour	Ramsar, SSSI and SPA	3,017	463,285	105,542
E12	Portsmouth Harbour	Ramsar, SSSI and SPA	2,539	457,863	105,756
E13	Portsmouth Harbour	Ramsar, SSSI and SPA	2,521	457,875	105,789
E14	Portsmouth Harbour	Ramsar, SSSI and SPA	2,458	457,929	105,838
E15	Portsmouth Harbour	Ramsar, SSSI and SPA	2,414	457,968	105,872
E16	Portsmouth Harbour	Ramsar, SSSI and SPA	2,383	457,993	105,914

Critical loads have been designated within the UK based on the sensitivity and relevant features of the receiving habitat. A review of the Air Pollution Information System (APIS) website[8] was undertaken in order to identify the relevant nitrogen critical load class and associated critical load for the designations considered within the model. The critical loads and background deposition rates for nitrogen deposition are detailed in Table 13.

Table 13 Nitrogen Critical Load

Ecological Receptor	Feature	Nitrogen Critical Load (kgN/ha/yr)		Nitrogen Deposition Rate	NH3 Critical Load (kgN/ha/yr)
		Min	Max		
E1	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3
E2	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3
E3	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3

[8] UK Air Pollution Information System, www.apis.ac.uk.

Ecological Receptor	Feature	Nitrogen Critical Load (kgN/ha/yr)		Nitrogen Deposition Rate	NH3 Critical Load (kgN/ha/yr)
		Min	Max		
E4	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3
E5	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3
E6	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3
E7	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3
E8	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3
E9	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3
E10	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3
E11	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3
E12	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3
E13	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3
E14	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3
E15	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3
E16	Pioneer, low-mid, mid-upper saltmarshes	20	30	14.8	3

It should be noted that the habitats shown in Table 13 are considered to be the most representative and sensitive within each designation for nitrogen deposition in that area.

Table 14 shows the relevant critical loads and background deposition rates for acid deposition.

Table 14 Acid Critical Load

Ecological Receptor	Feature	Acid Critical Load (kgN/ha/yr)			Acid deposition (kgN/ha/yr)	
		CLMaxs	CLMaxs	CLMaxs	N	S
E1	Calcareous grassland	4	0.856	4.856	1.07	0.23
E2	Calcareous grassland	4	0.856	4.856	1.07	0.23
E3	Calcareous grassland	4	0.856	4.856	1.07	0.23
E4	Calcareous grassland	4	0.856	4.856	1.07	0.23
E5	Calcareous grassland	4	0.856	4.856	1.07	0.23

Ecological Receptor	Feature	Acid Critical Load (kgN/ha/yr)			Acid deposition (kgN/ha/yr)	
		CLMaxs	CLMaxs	CLMaxs	N	S
E6	Calcareous grassland	4	0.856	4.856	1.07	0.23
E7	Calcareous grassland	4	0.856	4.856	1.07	0.23
E8	Calcareous grassland	4	0.856	4.856	1.07	0.23
E9	Calcareous grassland	4	0.856	4.856	1.07	0.23
E10	Calcareous grassland	4	0.856	4.856	1.07	0.23
E11	Calcareous grassland	4	0.856	4.856	1.07	0.23
E12	Calcareous grassland	4	0.856	4.856	1.07	0.23
E13	Calcareous grassland	4	0.856	4.856	1.07	0.23
E14	Calcareous grassland	4	0.856	4.856	1.07	0.23
E15	Calcareous grassland	4	0.856	4.856	1.07	0.23
E16	Calcareous grassland	4	0.856	4.856	1.07	0.23

5. ASSESSMENT

5.1 Construction Phase Assessment

5.1.1 Step 1

The undertaking of activities such as excavation, ground works, cutting, construction 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 highly sensitive receptors 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 15.

Earthworks

The Site is estimated to cover an approximate area of 200,000m^2. Based on this information the magnitude of potential dust emissions related to earthwork activities is considered ***large***.

Construction

The proposals comprise the construction of 350 residential units. Given the scale of the development, the total building volume is greater than 100,000m^2. The magnitude of potential dust emissions related to construction activities is therefore considered ***large.***

Trackout

Information on the number of HDV trips to be generated during the construction phase of the development was not available at the time of assessment. 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 ***large***.

Table 15 Dust Emission Magnitude

Magnitude of Activities		
Earthworks	**Construction**	**Trackout**
Large	Large	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 9, the desk top study indicated are approximately ***10-100*** sensitive receptors within 20m of the Site boundary and ***More than 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 17.95µg/m^3 as detailed in Table 7, combined with the receptor counts above, the area is considered to be of ***low*** sensitivity for earthworks, construction and ***medium*** for trackout activities.

Ecological

There are no ecological receptors, within the boundary of the site. Based on the assessment criteria detailed in Appendix III, the area is considered to be ***negligible*** 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 16

Table 16 Sensitivity of the Surrounding Area

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

5.1.4 Step 2C – Risk

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

It should be noted that the potential for impacts depends significantly on the distance between the dust generating activity and receptor location. Risk was predicted based on a worst-case scenario of works being undertaken at the site boundary closest to each sensitive area. Therefore, actual risk is likely to be lower than that predicted during the majority of the construction phase. A summary of the risk from each dust generating activity is provided in Table 17.

Table 17 Summary of Potential Unmitigated Dust Risks

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

5.1.5 Step 3 – Mitigation

The IAQM guidance[5] provides a number of potential mitigation measures to reduce impacts during the construction phase. These measures have been adapted for the development site as summarised in Table 18. The mitigation measures outlined in Table 18 can be reviewed prior to the commencement of construction works incorporated into the existing strategies as applicable.

Table 18 Fugitive Dust Mitigation Measures

Issue	Control Measure
Communications	• Display the name and contact details of person(s) account- able for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. • Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. • 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 if there are any 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	• 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 and Maintaining the Site	• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. • 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

Issue	Control Measure
	as described below.
Operating vehicle/machinery and sustainable travel	• Ensure all vehicles switch off engines when stationary - no idling vehicles. • Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable. • Impose and signpost a maximum-speed-limit of 8 mph on haul roads and work areas • 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 covered skips. • 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	• As bonfires and burning of waste materials is illegal on site, this will not be undertaken
Earthworks and Construction	• Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. • Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place. • Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery. • For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.
Trackout	• Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. • Avoid dry sweeping of large areas – any large areas will be water supressed • Ensure at risk 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 • Ensure there is an adequate area of hard surfaced road to the site exit, wherever site size and layout permits.

Issue	Control Measure
	• 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 18 are implemented, the residual effect from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance[5].

5.2 Operational Phase Assessment - Human Health

Additional vehicle movements associated with the operation of the Site will generate exhaust emissions, such as NO_2, PM_{10} and $PM_{2.5}$, on the local and regional road networks. An assessment was therefore undertaken using dispersion modelling in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the site. Reference should be made to Appendix II for full assessment input details.

5.2.1 Nitrogen Dioxide

Predicted Concentrations at the Application Site

Annual mean NO_2 concentrations were predicted across the development for the 2022 DS scenario at a height of 1.5m to represent exposure across the ground floor level, as shown in Figure 7 and 8 within Appendix I and presented in Table 19.

Table 19 Modelling Results - Annual Mean NO_2 Across Sensitive Uses

Floor Level	Predicted 2022 Annual Mean NO_2 Concentration Range (µg/m^3)
Ground (1.5m)	24.50 – 30.10

The predicted concentrations shown in Table 19 indicate that there were no exceedances of the annual mean AQO for NO_2 across the application Site.

Based on the results of the dispersion modelling assessment and worse case assumptions, 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.

Impacts at Sensitive Receptors

Annual mean NO_2 concentrations were predicted for 2022 DM and DS scenarios and are summarised in Table 20.

Table 20 Predicted Annual Mean NO_2 Concentrations

Sensitive Receptor		Predicted Annual Mean NO_2 Concentration (µg/m^3)		
		DM	DS	Change
R1	49 Wallington Shore Road	38.74	38.92	0.18

Sensitive Receptor		Predicted Annual Mean NO_2 Concentration (µg/m^3)		
		DM	DS	Change
R2	2 Cams Hill	33.46	33.61	0.15
R3	1 Paradise Lane	28.85	29.00	0.15
R4	30 Cams Hill	27.52	27.67	0.15
R5	21 Condor Avenue	23.81	23.91	0.10
R6	10 Wagtail Way	26.86	26.91	0.05
R7	70 Porchester Road	21.44	21.50	0.06
R8	68 Porchester Road	29.51	29.71	0.20
R9	221 West Street	24.38	24.53	0.15
R10	204 West Street	25.05	25.20	0.15
R11	2 Kingsway	21.81	21.88	0.07
R12	14 West Road	26.19	26.35	0.16
R13	82 West Road	29.89	30.14	0.25
R14	17 Station Road	25.79	25.89	0.10
R15	24 Castle Road	32.36	32.60	0.24
R16	13 East Street	27.11	27.21	0.10
R17	26 Castle Street	26.80	26.95	0.15
R18	21 Castle Street	22.78	22.83	0.05
R19	23 Station Road	24.45	24.50	0.05
R20	35 East Street	26.24	26.40	0.16
R21	90 Downend Road	29.10	29.40	0.30
R22	62 Eastern Way	33.51	33.65	0.14
R23	153 Hill Road	32.55	32.60	0.05
R24	15 Hill Road	21.58	21.60	0.02
R25	Residential Unit - Boarhunt Road	30.72	30.77	0.05
R26	12 Wallington Shore Road	25.44	25.47	0.03

As indicated in Table 20, annual mean NO_2 concentrations were below the relevant AQO at all sensitive receptor locations. Critically, no exceedances have been predicted in both the DM and DS scenarios.

Predicted impacts on annual mean NO_2 concentrations are summarised in Table 21.

Table 21 Predicted NO_2 Impacts

Sensitive Receptor		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	49 Wallington Shore Road	0.45	95-102% of the AQO	Negligible
R2	2 Cams Hill	0.37	76-94% of the AQO	Negligible
R3	1 Paradise Lane	0.37	75% or Less of the AQO	Negligible
R4	30 Cams Hill	0.38	75% or Less of the AQO	Negligible
R5	21 Condor Avenue	0.25	75% or Less of the AQO	Negligible
R6	10 Wagtail Way	0.13	75% or Less of the AQO	Negligible
R7	70 Porchester Road	0.15	75% or Less of the AQO	Negligible
R8	68 Porchester Road	0.50	75% or Less of the AQO	Negligible
R9	221 West Street	0.38	75% or Less of the AQO	Negligible
R10	204 West Street	0.37	75% or Less of the AQO	Negligible
R11	2 Kingsway	0.18	75% or Less of the AQO	Negligible
R12	14 West Road	0.40	75% or Less of the AQO	Negligible
R13	82 West Road	0.63	75% or Less of the AQO	Negligible
R14	17 Station Road	0.25	75% or Less of the AQO	Negligible
R15	24 Castle Road	0.60	76-94% of the AQO	Negligible
R16	13 East Street	0.25	75% or Less of the AQO	Negligible
R17	26 Castle Street	0.37	75% or Less of the AQO	Negligible
R18	21 Castle Street	0.12	75% or Less of the AQO	Negligible
R19	23 Station Road	0.13	75% or Less of the AQO	Negligible
R20	35 East Street	0.40	75% or Less of the AQO	Negligible
R21	90 Downend Road	0.75	75% or Less of the AQO	Negligible
R22	62 Eastern Way	0.35	76-94% of the AQO	Negligible
R23	153 Hill Road	0.13	76-94% of the AQO	Negligible
R24	15 Hill Road	0.05	75% or Less of the AQO	Negligible
R25	Residential Unit - Boarhunt Road	0.13	76-94% of the AQO	Negligible
R26	12 Wallington Shore Road	0.07	75% or Less of the AQO	Negligible

As indicated in Table 21, 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 sensitive

receptor locations.

It is therefore considered that the overall balance of impacts as a result of the Site are **not significant.** Further justifications are discussed in Section 5.2.5.

5.2.2 Particulate Matter (PM_{10})

Predicted Concentrations at the Application Site

Predicted annual mean PM_{10} concentrations across the development site during the DS scenario are summarised in Table 22.

Table 22 Modelling Results - Annual Mean PM_{10} Across Sensitive Uses

Floor Level	Predicted 2022 Annual Mean PM_{10} Concentration Range (µg/m^3)
Ground (1.5m)	16.77 – 17.41

The predicted concentrations shown in Table 22 indicate that there were no exceedances of the annual mean AQO for PM_{10} across the application site which is therefore considered to be suitable for residential use without the implementation of mitigation techniques to protect future site users from elevated PM_{10} concentrations.

Impacts at Sensitive Receptors

Annual mean PM_{10} concentrations were predicted for 2022 DM and DS scenarios and are summarised in Table 23.

Table 23 Predicted Annual Mean PM_{10} Concentrations

Sensitive Receptor		Predicted Annual Mean PM_{10} Concentration (µg/m^3)		
		DM	DS	Change
R1	49 Wallington Shore Road	18.48	18.52	0.04
R2	2 Cams Hill	17.37	17.39	0.02
R3	1 Paradise Lane	16.58	16.60	0.02
R4	30 Cams Hill	17.27	17.29	0.02
R5	21 Condor Avenue	15.44	15.45	0.01
R6	10 Wagtail Way	15.92	15.94	0.02
R7	70 Porchester Road	15.52	15.53	0.01
R8	68 Porchester Road	16.76	16.81	0.05
R9	221 West Street	15.87	15.89	0.02
R10	204 West Street	16.01	16.03	0.02

Sensitive Receptor		Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)		
		DM	DS	Change
R11	2 Kingsway	15.61	15.62	0.01
R12	14 West Road	16.25	16.27	0.02
R13	82 West Road	16.86	16.89	0.03
R14	17 Station Road	16.16	16.18	0.02
R15	24 Castle Road	17.27	17.30	0.03
R16	13 East Street	16.45	16.47	0.02
R17	26 Castle Street	16.35	16.37	0.02
R18	21 Castle Street	15.78	15.78	0.00
R19	23 Station Road	15.94	15.95	0.01
R20	35 East Street	16.34	16.36	0.02
R21	90 Downend Road	17.13	17.17	0.04
R22	62 Eastern Way	17.51	17.54	0.03
R23	153 Hill Road	17.49	17.49	0.00
R24	15 Hill Road	15.48	15.48	0.00
R25	Residential Unit - Boarhunt Road	17.57	17.58	0.01
R26	12 Wallington Shore Road	15.95	15.96	0.01

As indicated in Table 23, annual mean PM_{10} concentrations were below the relevant AQO at all sensitive receptor locations.

Predicted impacts on annual mean PM_{10} concentrations are summarised in Table 24.

Table 24 Predicted PM_{10} Impacts

Sensitive Receptor		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	49 Wallington Shore Road	0.10	75% or Less of the AQO	Negligible
R2	2 Cams Hill	0.05	75% or Less of the AQO	Negligible
R3	1 Paradise Lane	0.05	75% or Less of the AQO	Negligible
R4	30 Cams Hill	0.05	75% or Less of the AQO	Negligible
R5	21 Condor Avenue	0.02	75% or Less of the AQO	Negligible
R6	10 Wagtail Way	0.05	75% or Less of the AQO	Negligible

Sensitive Receptor		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R7	70 Porchester Road	0.02	75% or Less of the AQO	Negligible
R8	68 Porchester Road	0.12	75% or Less of the AQO	Negligible
R9	221 West Street	0.05	75% or Less of the AQO	Negligible
R10	204 West Street	0.05	75% or Less of the AQO	Negligible
R11	2 Kingsway	0.02	75% or Less of the AQO	Negligible
R12	14 West Road	0.05	75% or Less of the AQO	Negligible
R13	82 West Road	0.08	75% or Less of the AQO	Negligible
R14	17 Station Road	0.05	75% or Less of the AQO	Negligible
R15	24 Castle Road	0.08	75% or Less of the AQO	Negligible
R16	13 East Street	0.05	75% or Less of the AQO	Negligible
R17	26 Castle Street	0.05	75% or Less of the AQO	Negligible
R18	21 Castle Street	0.00	75% or Less of the AQO	Negligible
R19	23 Station Road	0.02	75% or Less of the AQO	Negligible
R20	35 East Street	0.05	75% or Less of the AQO	Negligible
R21	90 Downend Road	0.10	75% or Less of the AQO	Negligible
R22	62 Eastern Way	0.07	75% or Less of the AQO	Negligible
R23	153 Hill Road	0.00	75% or Less of the AQO	Negligible
R24	15 Hill Road	0.00	75% or Less of the AQO	Negligible
R25	Residential Unit - Boarhunt Road	0.02	75% or Less of the AQO	Negligible
R26	12 Wallington Shore Road	0.03	75% or Less of the AQO	Negligible

As indicated in Table 24, 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 5.2.5.

5.2.3 Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ has not been modelled within the assessment as the predicted concentrations relating to annual mean PM_{10} remain well below the AQO for $PM_{2.5}$ (25 µg/m^3) and associated impacts have been deemed not significant. Since PM_{10} contains all particulate matter with an aerodynamic diameter of less than 10µm, $PM_{2.5}$ is effectively accounted for within these predictions; and at worst could be considered that $PM_{2.5}$ concentrations would be equal to the predicted PM_{10} concentrations.

5.2.4 Dust Generation from Surrounding Area

Dust generation from the Veolia site at Downend Quarry has not been considered within this assessment as it is considered that activities at the site should not produce noticeable amounts of dust generation as this should be controlled via on-site mitigation measures as part of their permit conditions. This matter has been discussed with Richard Gustar at Fareham Council and confirmed via email.

5.2.5 Overal Impact Significance – Human Health

The overall significance of operational phase road traffic emission impacts for 2022 was determined as **not significant**. This was based on the predicted impacts at discrete receptor locations and the considerations outlined in Section 5.2. Further justifications are provided in Table 25.

Table 25 Overall Road Emissions Impact Significance to Human Health

Guidance	Comment
Number of properties affected by slight, moderate or substantial air quality impacts and a judgement on the overall balance	The NO_2 and PM_{10} concentrations were predicted to be **negligible** at all sensitive receptors The sensitive locations represent worst-case locations and therefore it is unlikely that any other receptors would be significantly affected by the Site It should be noted that associated impacts were based upon a robust approach which may lead to overestimations, and as such the overall balance can be judged as **not significant**
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 Site will not result in any new exposure to pollutant concentrations above the AQOs at sensitive locations across the application site
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: • 0.03% to 0.75% for NO_2; • 0.00% to 0.13% for PM_{10} Resultant impacts were subsequently predicted to be **not significant** at all receptor locations considered in accordance with the EPUK and IAQM significance matrix
Whether or not an exceedance of an objective is predicted to arise or be removed in the study area due to a substantial increase or decrease	There were no exceedances of the annual mean for NO_2, or PM_{10} at any location within the assessment 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 no exceedances of the annual mean AQO for NO_2, PM_{10} and $PM_{2.5}$ at any sensitive locations within the modelling extents at sensitive Furthermore, the magnitude of change at receptor locations was again considered **not significant**

It should also be noted that the combined use of 2022 traffic data and 2018 emission factors is considered to provide a worst-case scenario, which may lead to overestimations of actual pollutant concentrations during the operation of the proposals. As such, the overall significance of operational phase road traffic emission impacts on annual mean NO_2 and PM_{10} concentration was determined **not significant**.

5.3 Operational Phase Assessment - Ecological Receptors

Predicted concentrations and deposition rates of each pollutant at the ecological receptor locations identified and summarised in the following Sections based on IAQM guidance[9]. Tabultated results are presented in Appendix IV.

5.3.1 Annual Mean Oxides of Nitrogen

The PC proportion of the EQS is greater than 1% at one (E3) of the 16 receptor locations and as such, impacts on annual mean NO_x concentrations can be screened out at 15 of the receptor locations. At receptor E3, impacts cannot be screened as insignificant according to initial stage of EA screening criteria4.

During the secondary stage of assessment the PEC proportion of the EQS is predicted to be above 70% at sensitive receptor location E3, and as such, impacts on annual mean NOx concentrations at sensitive receptor location E3 cannot be screened out as insignificant.

However critically, predicted NOx concentrations were below the relevant long term EQS at sensitive receptor locations E3 for the PEC. In addition the area in which NOx PC exceeds 1% of the EQS is limited to the edges of the ecological designation close to the roadside and rail, and does not extend past several meters from the roadside. Using professional judgment, it is therefore considered that impacts as a result of the development will be not significant.

5.3.2 24-Hour Mean of Oxides of Nitrogen

The predicted 24-hour mean NOx PC proportion of the EQS is less than 10% at all receptor locations. As such, impacts on 24-Hour mean NOx concentrations are considered to be insignificant in accordance with the EA screening criteria and IAQM guidance.

5.3.3 Ammonia - NH3

The predicted annual mean NH_3 PC remains below 1% of the relevant long term EQS at all sensitive receptor locations, as such, impacts on annual mean NH_3 concentrations are considered to be insignificant in accordance with the EA screening criteria and IAQM guidance.

5.3.4 Nitrogen Deposition

The PC proportion of the EQS is less than 1% for receptor locations. As such, impacts on nitrogen deposition at these locations are considered to be insignificant in accordance with EA screening criteria and IAQM guidance.

5.3.5 Acid Deposistion

[9] IAQM A Guide to the Assessment of Air Quality impacts on Designated Nature Conservation Sites

The PC proportion of the EQS is less than 1% at all 16 receptor locations. As such, impacts on annual mean nitrogen deposition rates can be screened out as insignificant in accordance with the EA screening criteria and IAQM guidance at these locations. However the APIS site relevant critical load tool indicated that no receptors exceeded the CL function for acid deposition and as such impacts can be classified as not significant.

5.3.6 Overal Impact Significance – Ecological Receptors

Impacts upon sensitive ecological designations as a result of emissions from the proposed development could not be screened out as insignificant at one of sensitive receptor locations (including committed development) for annual mean NOx concentrations this area in which PC exceeds 1% of the EQS is limited to the ecological designation closest to the roadside and does not extend past several meters from the roadside,a very small portion of the ecological site.

Critically, predicted NO_x concentrations were well below the relevant long term EQS at all sensitive receptor locations. Therefore, it is considered that impacts as a result of the development will be **not significant.**

6. CONCLUSION

An air quality assessment of impacts to human health and ecological receptors has been undertaken for the Land east of Downend Road, Portchester.

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

Dispersion modelling was undertaken to quantify annual mean NO_2 and PM_{10}, 24 hour mean NO_x, annual mean NH_3, annual mean acid deposition and annual mean nitrogen deposition concentrations across the application Site and wider environs form impacts upon human health and ecological receptors. .

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

Predicted impacts to human health from changes to annual mean NO_2 and PM_{10} concentrations as a result of operational phase were predicted to be **negligible** at all sensitive receptor locations during the 2022 assessment scenario. The overall significance of potential impacts was determined to be **not significant** in accordance with the EPUK and IAQM guidance.

Impacts upon sensitive ecological designations as a result of emissions from the proposed development alone and were deemed insignificant at all designations for 24 hour mean NO_x, annual mean NH_3, annual mean acid deposition and annual mean nitrogen deposition.

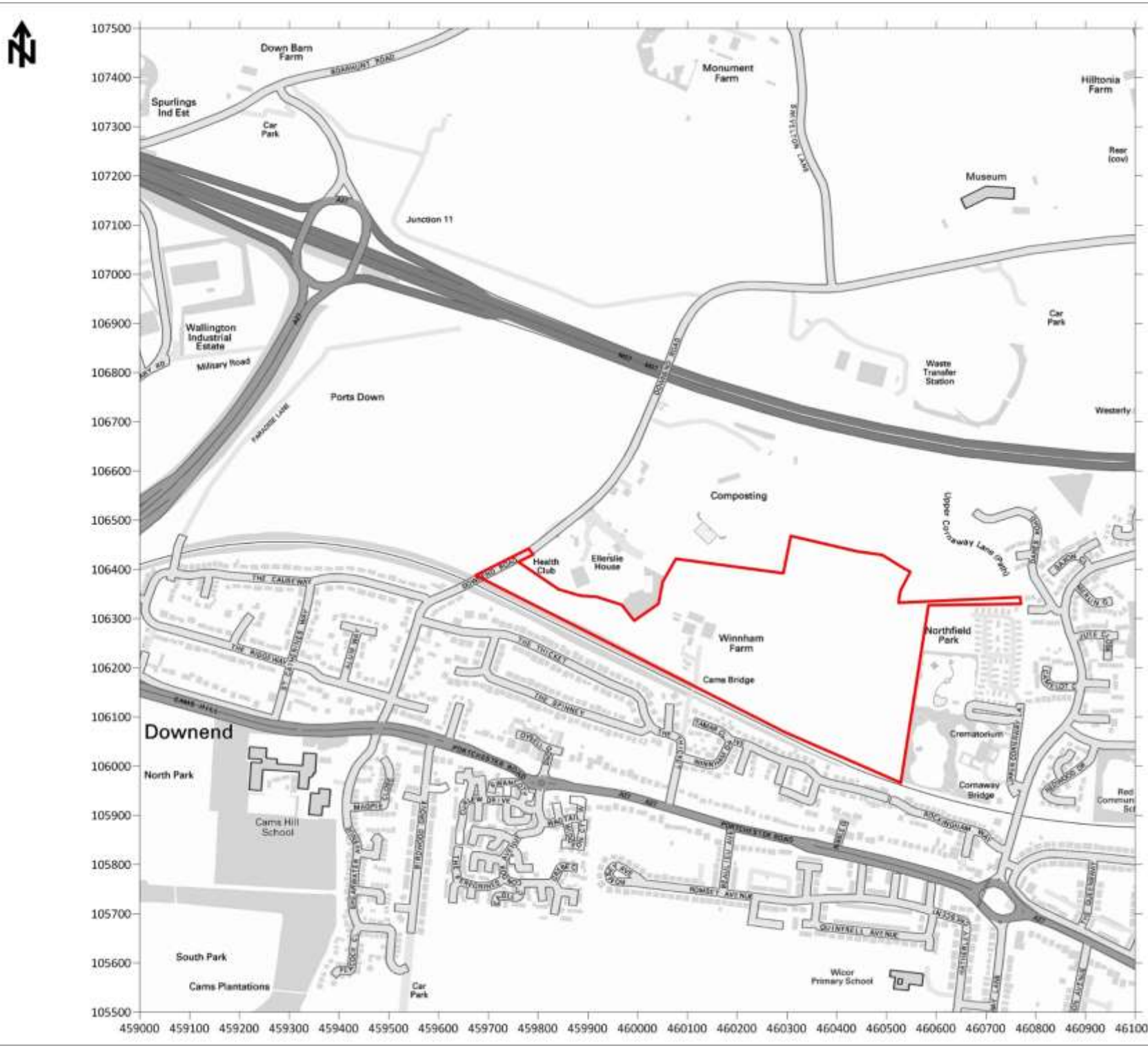
Impacts upon sensitive ecological designations as a result of emissions from the proposed development could not be screened out as insignificant at one of sensitive receptor locations (including committed development) for annual mean NO_x concentrations this area in which PC exceeds 1% of the EQS is limited to the ecological designation closest to the roadside and does not extend past several meters from the roadside,a very small portion of the ecological site. Critically, predicted NO_x concentrations were well below the relevant long term EQS at all sensitive receptor locations. Therefore, it is considered that impacts as a result of the development overall upon ecological receptors are considered to be **not significant.**

Based on the assessment results, air quality is not considered a constraint to planning consent.

7. ABBREVIATIONS

AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQAP	Air Quality Action Plan
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
DM	Do Minimum
DMRB	Design Manual for Roads and Bridges
DS	Do Something
EPUK	Environmental Protection UK
EU	European Union
FBC	Fareham Borough Council
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
NGR	National Grid Reference
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10µm
REC	Resource and Environmental Consultants
TEMPRO	Trip End Model Presentation Program
z_0	Roughness Length

APPENDIX I - FIGURES



Legend

Site Boundary

Title

Figure 1

Site Location

Project

Land East of Downend Road, Fareham

Project Number

AQ108773

Client

Miller Homes

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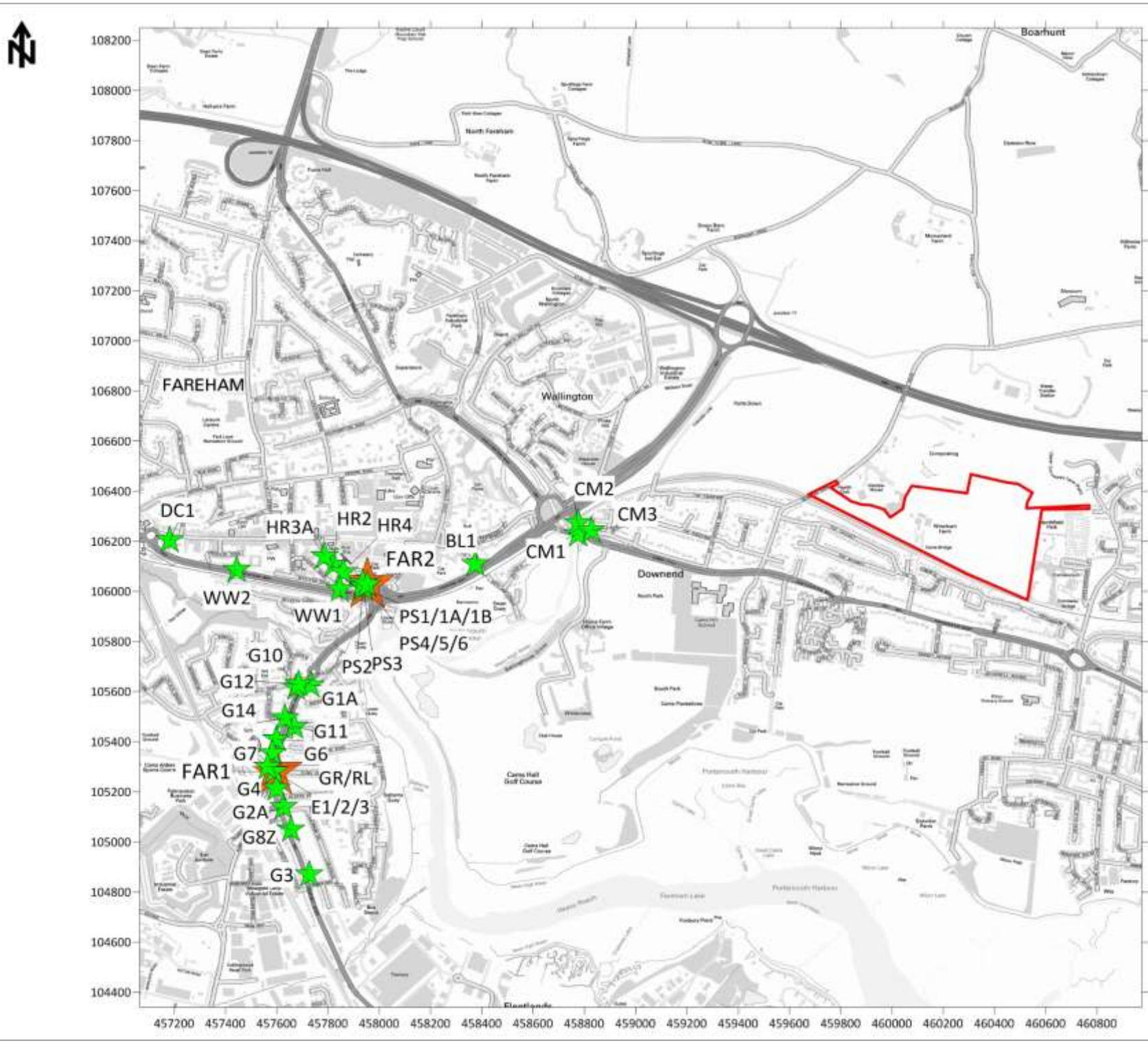

Legend

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

Title

Figure 2

Diffusion Tube Monitoring Locations

Project

Land East of Downend Road, Fareham

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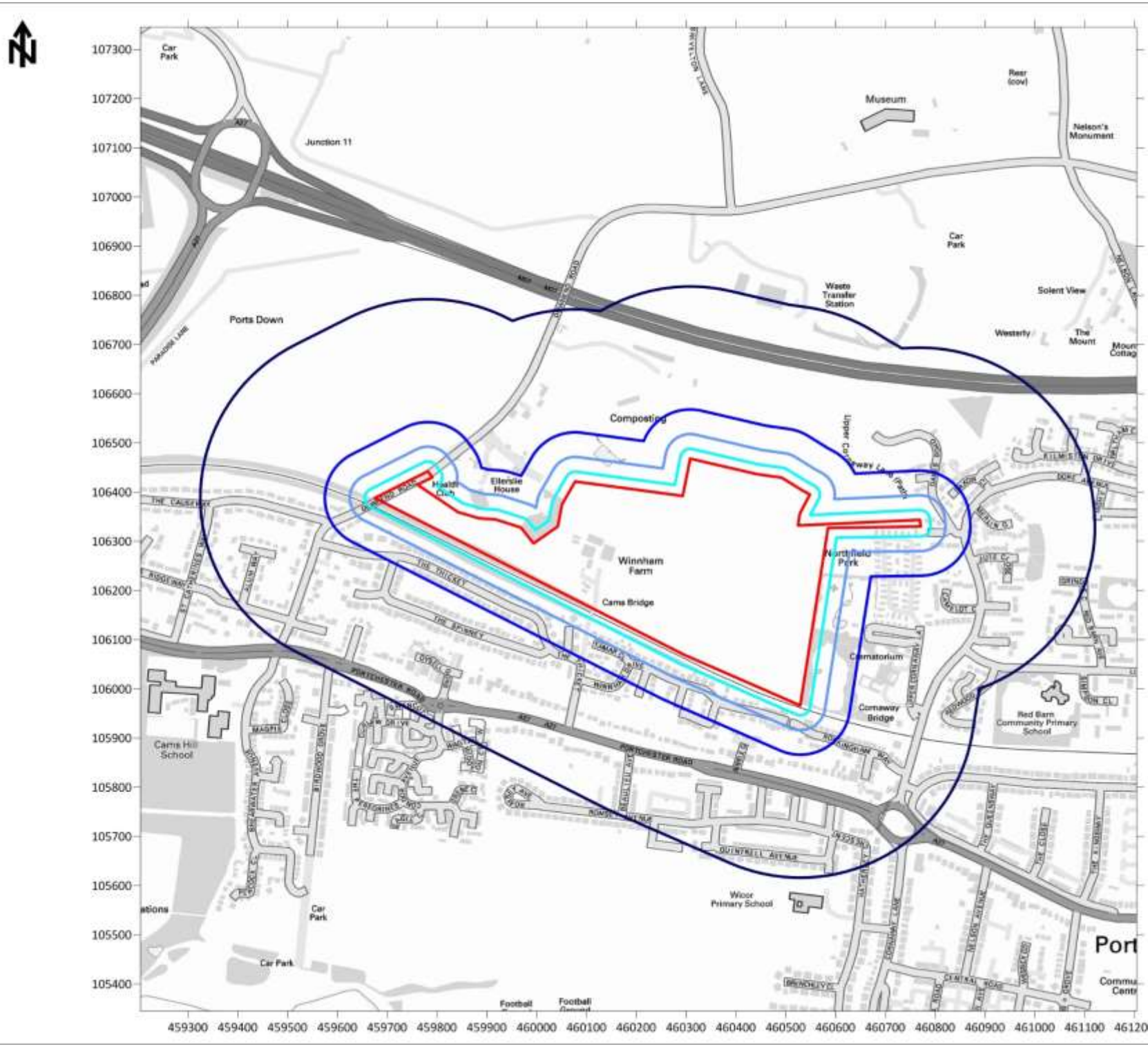

Legend

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

Title

Figure 3

Demolition, Earthworks and Construction Dust Buffer Zones

Project

Land East of Downend Road, Fareham

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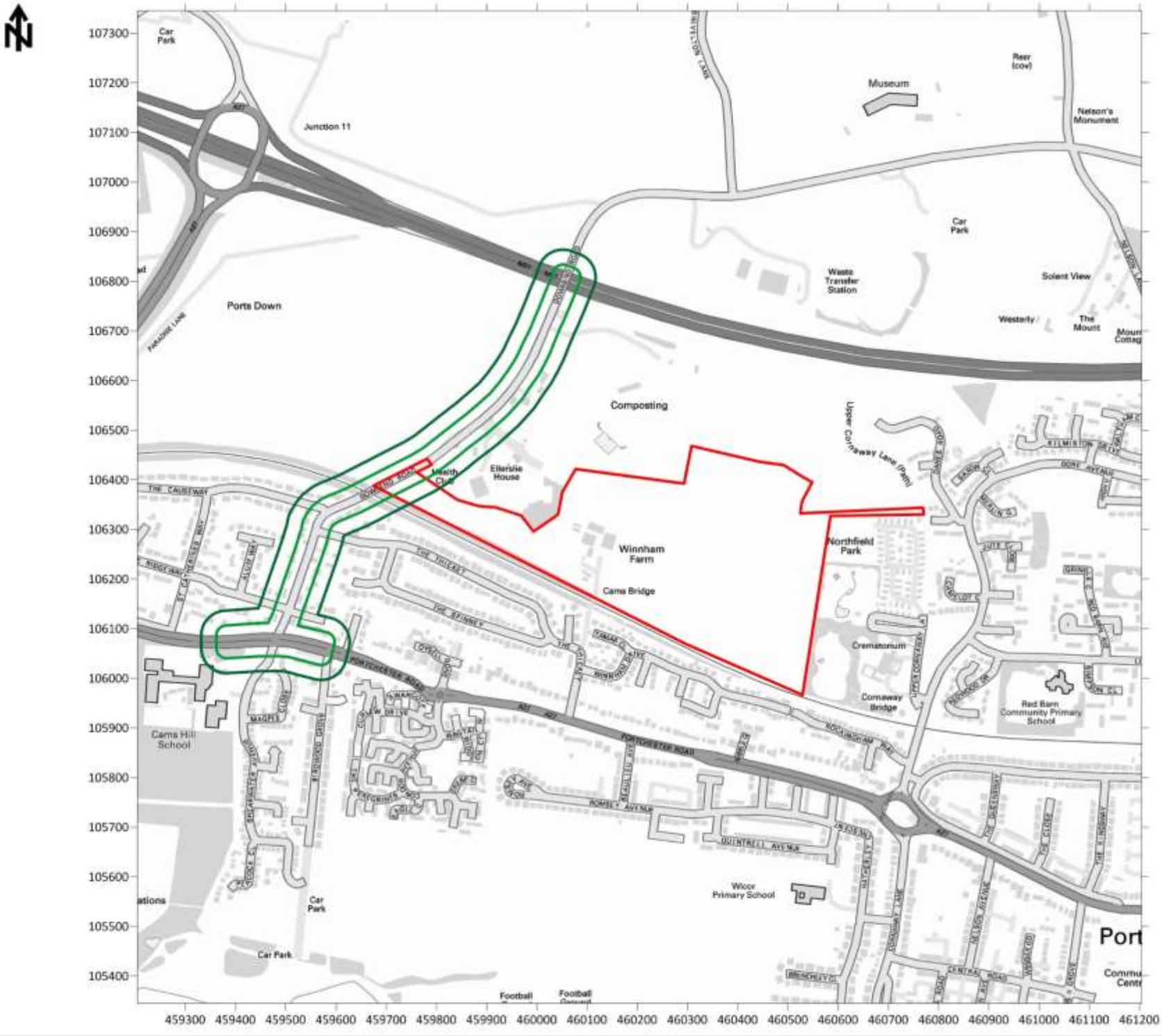

Legend

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

Title

Figure 4

Trackout Dust Buffer Zones

Project

Land East of Downend Road, Fareham

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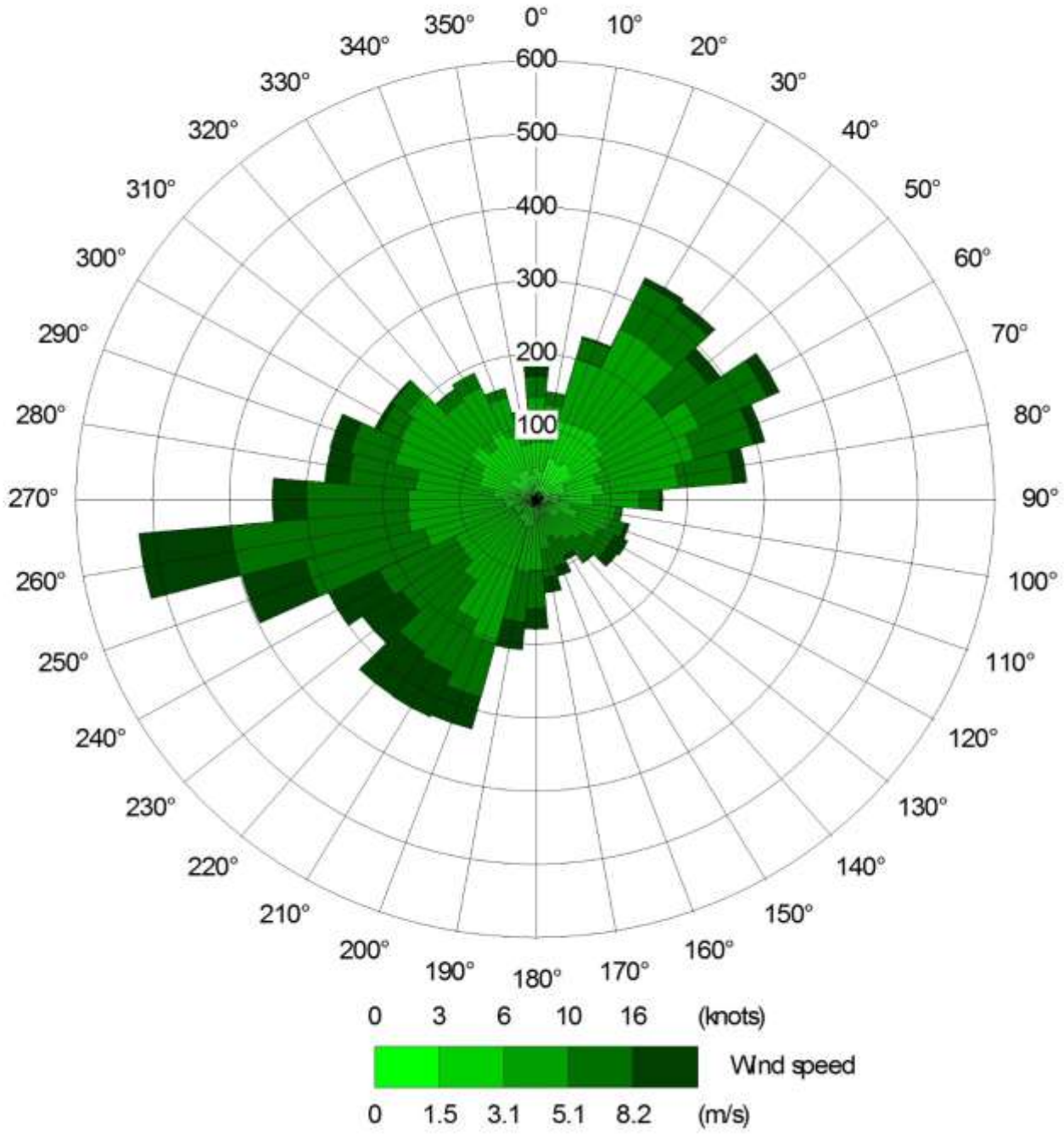

Title

Figure 5

Wind Rose Thorney Island 2018 Meteorological Station

Project

Land East of Downend Road, Fareham

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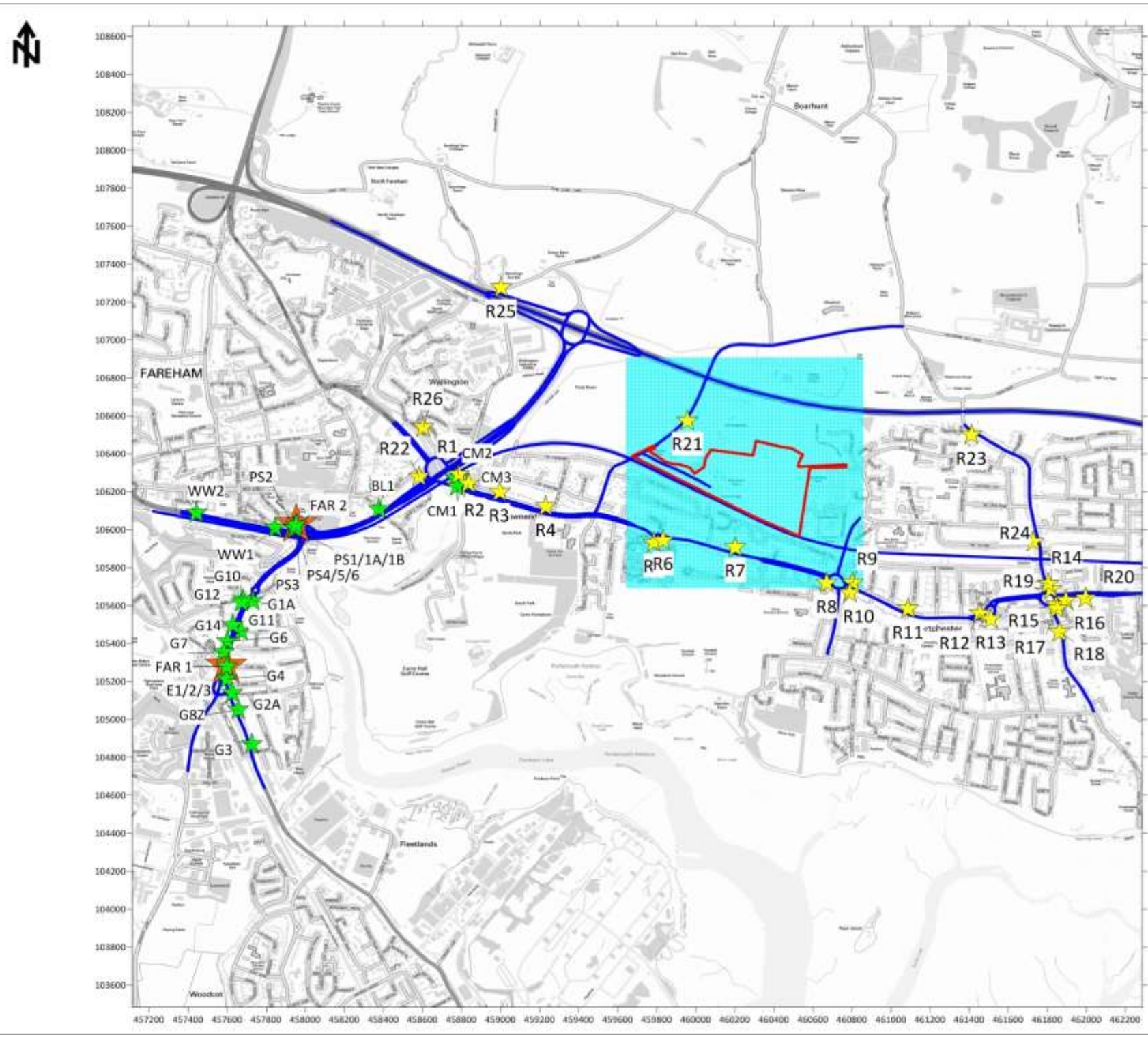

Legend

- Site Boundary
- Modelled Road Link
- Cartesian Grid
- Diffusion Tube Monitoring
- Automatic Analyser Location
- Sensitive Receptor Locations

Title

Figure 6

ADMS-Roads Input

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Land East of Downend Road, Fareham

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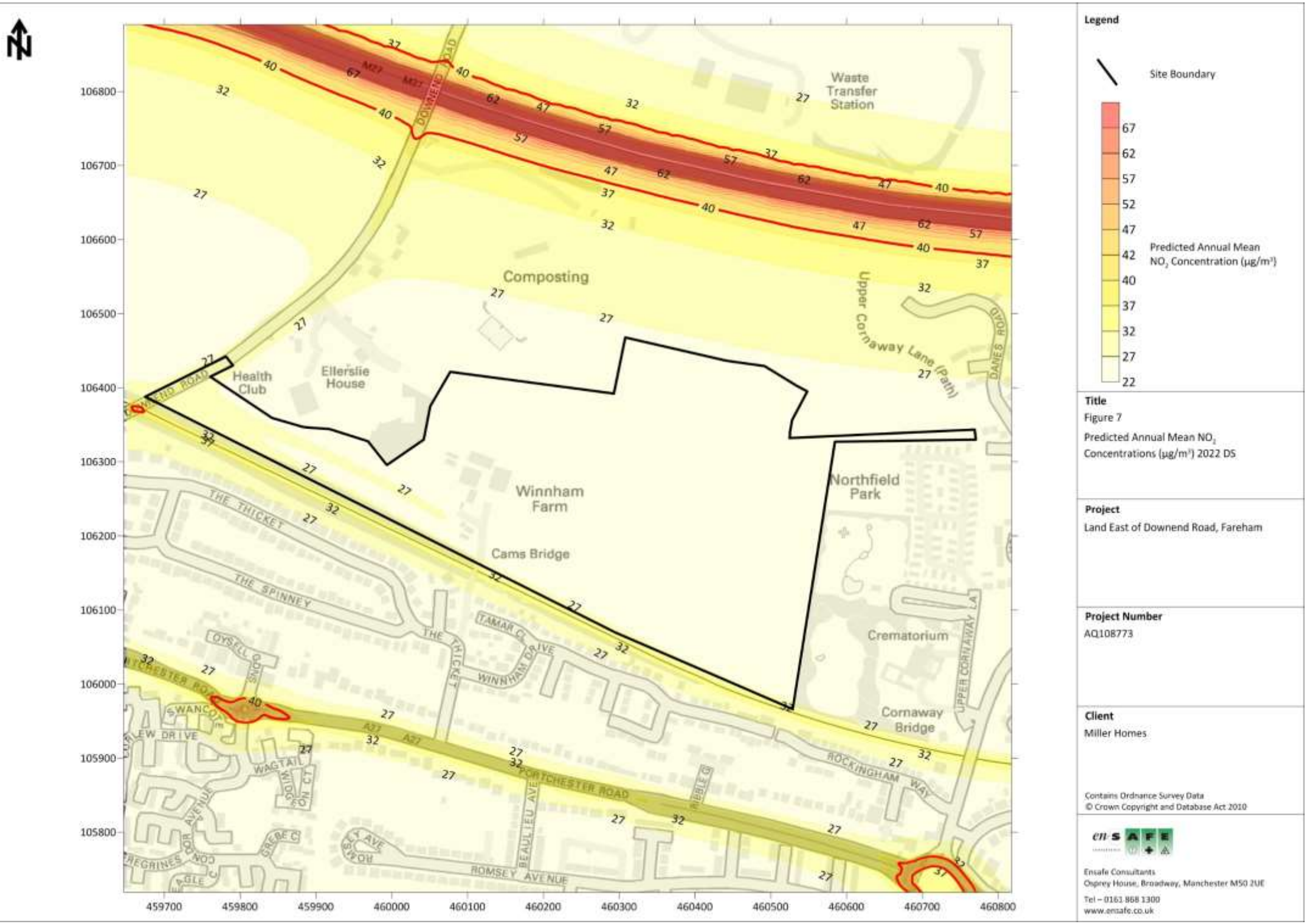

Legend

Site Boundary

67
62
57
52
47
42
40
37
32
27
22

Predicted Annual Mean NO_2 Concentration (µg/m³)

Title

Figure 7

Predicted Annual Mean NO_2 Concentrations (µg/m³) 2022 DS

Project

Land East of Downend Road, Fareham

Project Number

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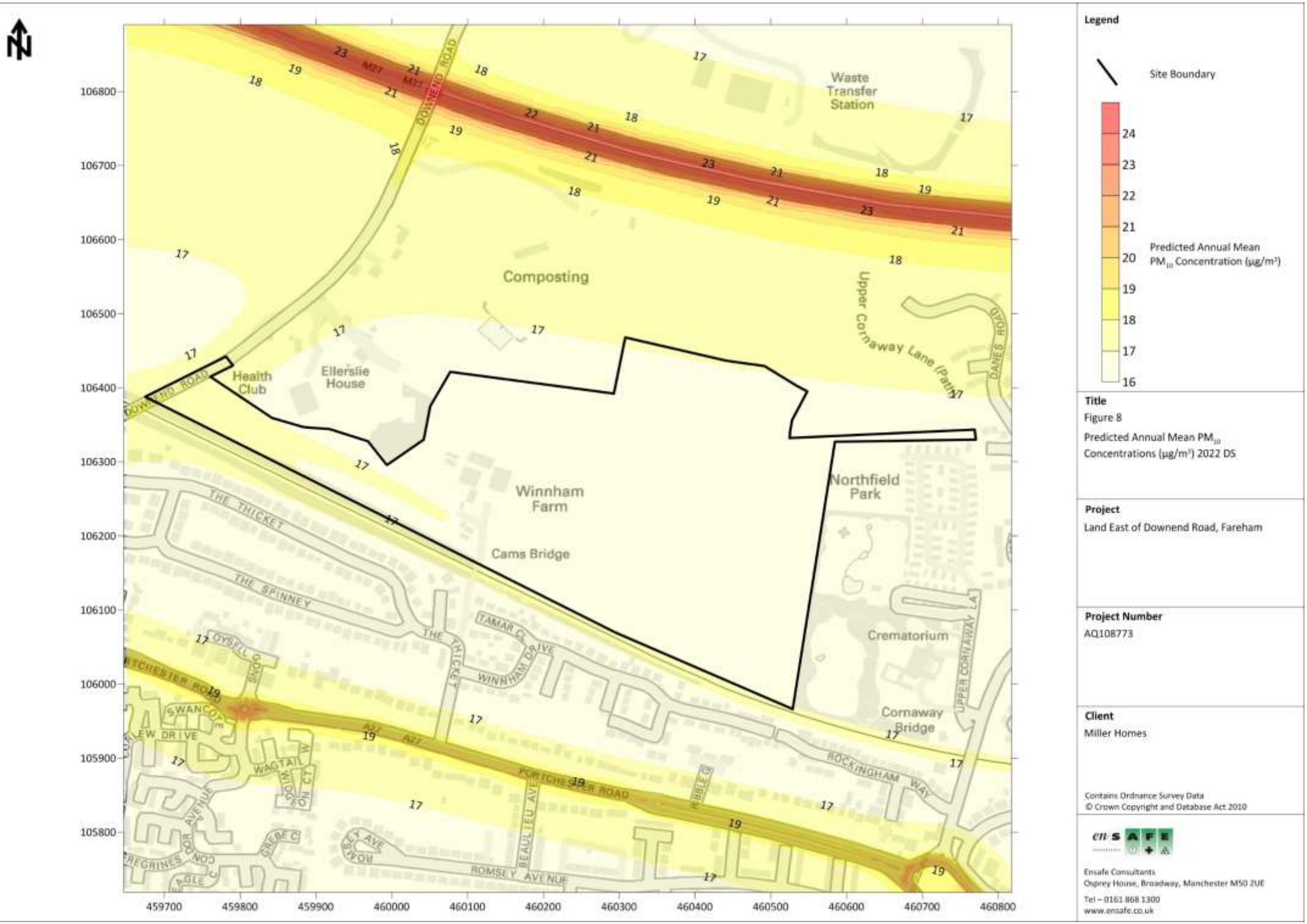

Legend

Site Boundary

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

24
23
22
21
20
19
18
17
16

Title

Figure 8

Predicted Annual Mean PM_{10} Concentrations (µg/m³) 2022 DS

Project

Land East of Downend Road, Fareham

Project Number

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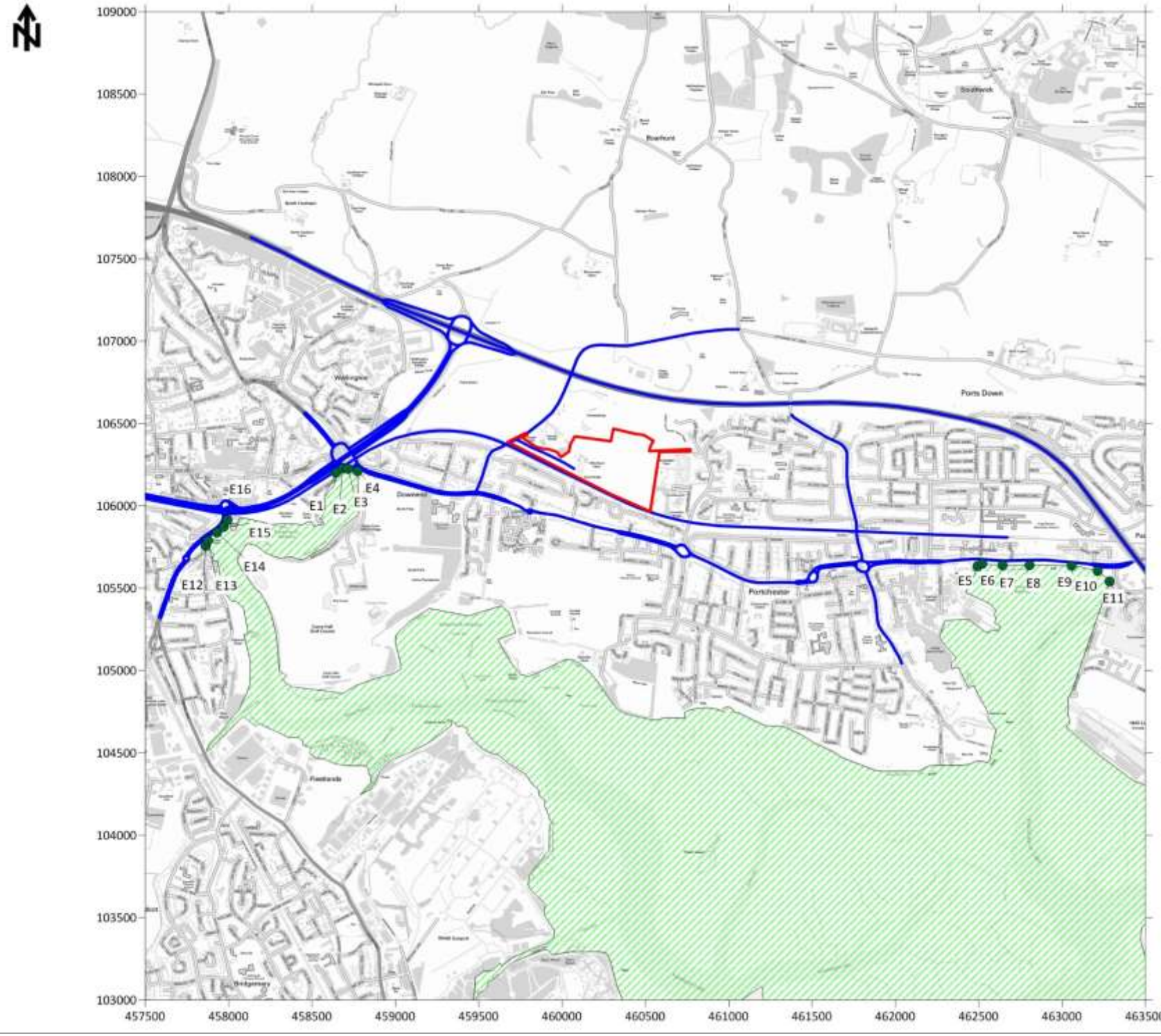

Legend

- Site Boundary
- Modelled Road Link
- Ecological Area
- Sensitive Receptor Location

Title

Figure 9

Ecological Receptors Site Context

Project

Land East of Downend Road, Fareham

Project Number

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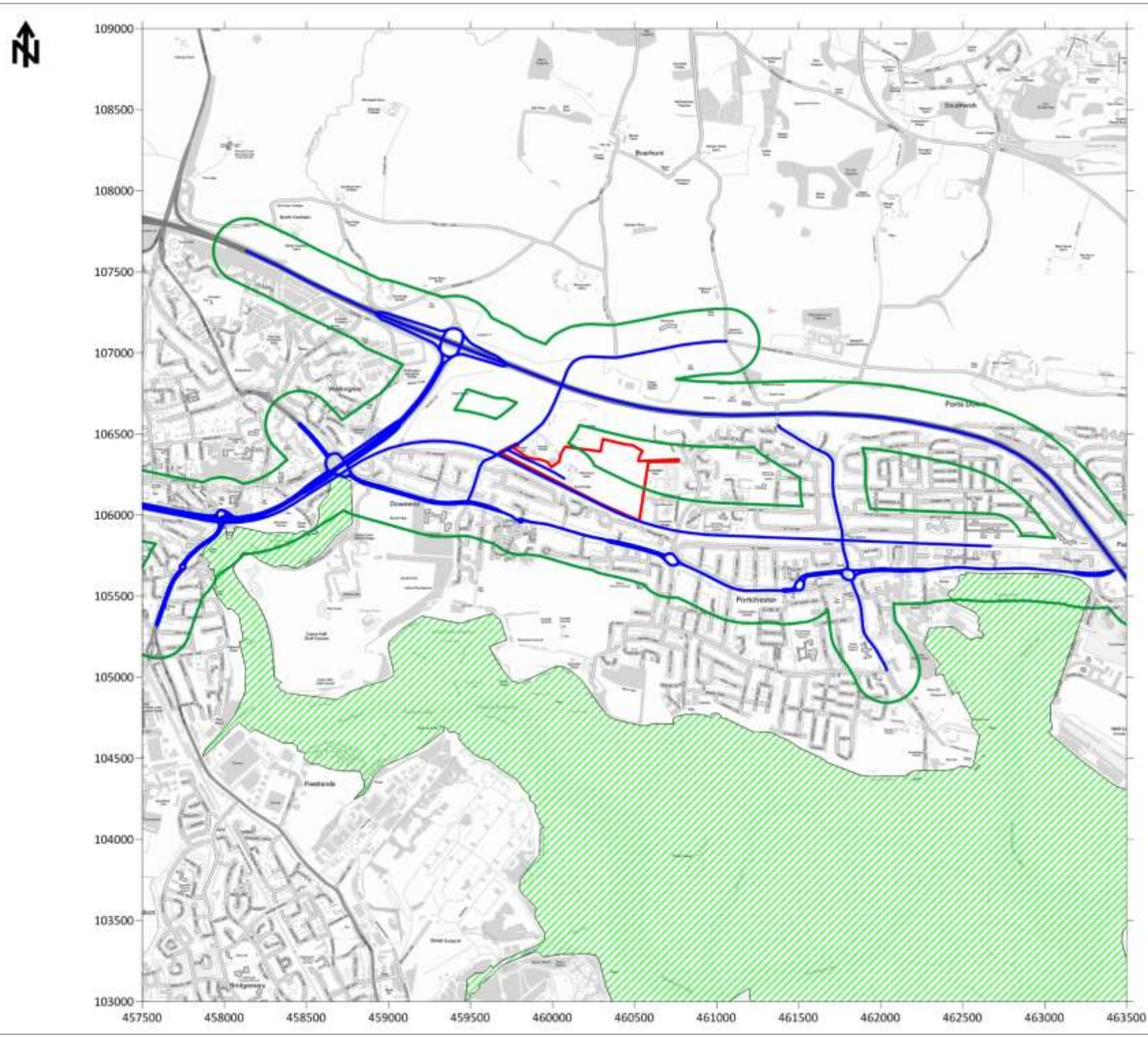

Legend

- Site Boundary
- 200m Road Buffer
- Modelled Road Link
- Ecological Area

Title

Figure 10

Road Impact Buffer

Project

Land East of Downend Road, Fareham

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APPENDIX II - ASSESSMENT INPUTS

Assessment Inputs

The Site has the potential to introduce future site users to poor air quality, as well as to cause impacts during the construction and operational phases of the development. Dispersion modelling using ADMS Roads was therefore undertaken to predict NO_2 and PM_{10} concentrations across the site and at sensitive locations both with and without the development in place, to consider potential impacts and assess site suitability for the proposed end-use.

The assessment was undertaken in accordance with the technical guidance contained within the DEFRA document LAQM (16)[2] and the Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) 'Land-Use Planning & Development Control: Planning for Air Quality (2018)[6].

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 4.0.1.0). ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

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 Site and surrounding highway network. One Cartesian grid was included in the model over the area at approximately NGR: 459650, 105700 to 460850, 106900 at height of 1.5m to represent the proposed ground floor level for the 2022 opening year scenario.

Results were subsequently used to produce contour plots within the Surfer software package. Reference should be made to Figure 6 within Appendix I for a graphical representation of the assessment grid extents.

Traffic Flow Data

Traffic data for use in the assessment, including development flows, was provided by I-Transport LLP, the appointed Transport Consultants for the project.

Traffic data for all other 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 2018. It should be noted that the DfT matrix is referenced in DEFRA guidance LAQM TG(16)[2] as being a suitable source of data for air quality assessments and is therefore considered to provide a reasonable representation of traffic flows in the vicinity of the site.

Growth factors provided by the Trip End Model Presentation Program (TEMPRO) software package were utilised to allow for conversion from the obtained 2018 traffic flow to 2022 which was used to represent the opening year scenario. Vehicle speeds were estimated based on the free flow potential of each link and local speed limits. Road widths were estimated from aerial photography and UK highway design standards.

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

Table AII.1 2018 Verification Traffic Data

Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)	Road Height (m) (Ecolgocial only)
L1	M27 - W of Junction 11	26.50	114,454	6.06	97	2
L2	M27 - W of Junction 11	26.00	103,009	5.05	89	2
L3	M27 - E of Junction 11	26.00	108,424	5.05	89	2
L4	M27 - E of Junction 11	29.50	120,471	6.06	97	2
L5	Slip to M27 W bound	6.00	11,445	6.06	64	2
L6	Slip from M27 E bound	6.00	11,445	5.05	64	2
L7	Slip to M27 E bound	7.50	12,047	5.05	64	2
L8	Slip from M27 W bound	7.00	12,047	4.60	64	2
L9	A27 Roundabout	10.00	35,630	3.86	32	2
L10	A27 - S of M27 S bound	11.00	29,952	3.86	97	2
L11	A27 - S of slip to Delme S bound	7.00	29,952	2.32	97	9
L12	A27 - S of Delme S bound	7.00	30,306	2.32	56	9
L13	A27 - S of slip to Delme S bound	7.00	30,306	3.86	56	2
L14	A27 - S of M27 N bound	10.50	29,952	3.86	40	2
L15	A27 - N of slip from Delme N bound	10.50	29,952	3.86	97	2
L16	A27 - S of slip from Delme N bound	6.50	29,952	2.32	97	9
L17	A27 - N of slip to Delme N bound	6.50	30,306	2.32	56	9
L18	A27 - S of slip to Delme N bound	6.50	30,306	2.77	56	2

Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)	Road Height (m) (Ecolgocial only)
L19	Delme Roundabout	8.50	22,497	3.86	32	2
L20	A27 Slip from A27 W bound	6.50	5,990	3.86	80	2
L21	A27 Slip to Delme Roundabout W bound	6.50	5,990	3.86	32	2
L22	A27 Slip from Delme Roundabout E bound	6.00	5,990	2.32	80	2
L23	A27 Slip to Delme Roundabout E bound	6.00	6,061	2.32	32	2
L24	A27 Slip from A27 E bound	6.00	6,061	2.32	80	2
L25	A27 Slip from Delme Roundabout W bound	6.00	6,061	3.06	80	2
L26	Wallington Way S bound	7.00	9,439	3.06	24	2
L27	Wallington Way S bound	7.00	9,439	3.06	56	2
L28	Wallington Way N bound	7.50	9,439	1.72	56	2
L29	Cams Hill - E of Delme E bound	7.50	9,181	1.72	32	2
L30	Cams Hill - W of Cams Hall E bound	10.00	9,181	1.72	24	2
L31	Cams Hill - E of Cams Hall E bound	7.00	9,181	1.72	56	2
L32	Cams Hill - W of Downend Road E bound	7.00	9,181	1.72	24	2
L33	Portchester Road - E of Downend Road E bound	7.00	9,181	1.72	56	2
L34	Cams Hill - E of Delme W bound	6.50	9,181	1.72	24	2
L35	Cams Hill - W of Cams Hall W bound	6.50	9,181	1.72	32	2
L36	Cams Hill - E of Cams Hall W bound	7.00	9,181	1.72	24	2
L37	Cams Hill - W of Downend Road W bound	7.00	9,181	1.72	56	2
L38	Portchester Road - E of Downend Road W bound	8.00	9,181	1.72	56	2
L39	Portchester Road - W of Portchester roundabout	13.00	18,362	1.72	56	2
L40	Portchester Road - W of Portchester roundabout	13.00	18,362	1.72	24	2
L41	Portchester Roundabout	7.50	18,362	1.72	24	2
L42	Portchester Road - E of Portchester roundabout	13.00	18,362	1.72	24	2

Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)	Road Height (m) (Ecolgocial only)
L43	Portchester Road - W of Beauliea Ave	13.00	18,362	1.72	56	2
L44	Portchester Road - E of Beauliea Ave	12.00	18,362	1.72	56	2
L45	Portchester Road - W of Cornaway Lane roundabout E bound	6.00	9,181	1.72	56	2
L46	Portchester Road - W of Cornaway Lane roundabout E bound	6.50	9,181	1.72	24	2
L47	Portchester Road - W of Cornaway Lane roundabout W bound	6.50	9,181	1.49	56	2
L48	Cornaway Lane Roundabout	6.00	10,594	1.72	24	2
L49	West street - E of Cornaway Lane Roundabout	11.00	18,362	1.72	24	2
L50	west street - W of Downsway	11.00	18,362	1.72	40	2
L51	West street - W of West Street Roundabout E bound	6.00	9,181	1.72	24	2
L52	West street - W of West Street Roundabout W bound	6.00	9,181	1.72	24	2
L53	West Street Roundabout	7.50	18,362	1.72	24	2
L54	West street - E of West street roundabout E bound	6.50	9,181	1.72	40	2
L55	West street - W of Castle Street roundabout E bound	6.50	9,181	1.72	24	2
L56	West street - E of West street roundabout W bound	6.50	9,181	1.72	24	2
L57	West street - W of Castle Street roundabout W bound	6.50	9,181	1.66	40	2
L58	Castle Street Roundabout	7.50	14,870	1.60	24	2
L59	East street - E of Castle street Roundabout E bound	6.50	12,075	1.60	40	2
L60	East Street - W of Murrills Estate E bound	6.50	12,075	1.60	24	2
L61	East Street - E of Murrills Estate E bound	8.00	12,075	1.60	24	2
L62	East street - E of Castle street Roundabout W bound	6.50	12,075	1.60	24	2

Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)	Road Height (m) (Ecolgocial only)
L63	East street - E of Castle street Roundabout W bound	6.50	12,075	1.60	40	2
L64	East Street - E of Murrills Estate W bound	6.00	12,075	2.14	24	2
L65	Station Road - N of Castle Street Roundabout	6.00	6,729	2.14	32	2
L66	Station Road - N of The Crossway	7.00	6,729	**1.14**	40	2
L67	Potsdown Hill Road - W of Nelson Lane	5.50	**10,239**	**1.33**	48	2
L68	Potsdown Hill Road - W of Swivelton Lane	7.50	**5,777**	**1.14**	48	2
L69	Downend Road - N of Site	8.00	**5,653**	**1.14**	48	2
L70	Downend Road - S of Site	7.00	**5,653**	**1.14**	32	2
L71	Downend Road - N of Cams Hill	6.00	**5,653**	**0.00**	16	2
L72	On site Access	4.00	**0**	2.14	16	2
L73	Castle Street Junction Approach	6.00	6,729	2.14	24	2
L74	Castle Street	6.00	6,729	0.00	40	2
L75	Trainline	5.00	0	0.00	72	2
L76	Trainline	5.00	0	0.00	72	2
L77	Trainline	5.00	0	0.00		10
L78	Trainline	5.00	0	2.08		2
L79	Cornaway Lane Slowdown	13.50	6,333	2.08	24	2
L80	Cornaway Lane North of Hatherly Crescent	6.20	6,333	2.08	32	2
L81	Cornaway Lane South of Hatherley Crescent	6.10	6,333	2.08	32	2
L82	Dore Avenue Slowdown	8.90	6,333	2.08	24	2
L83	Dore Avenue	6.70	6,333	2.32	40	2
L84	Eastern/Western Way bridge	4.20	20,002	2.32	56	2
L85	Eastern Way onto A32 South	10.40	20,002	2.32	24	2
L86	Eastern Way Exiting Roundabout	6.80	20,002	2.45	24	2
L87	Western Way Westbound	6.70	6,124	2.45	56	2
L88	Western Way Slowdown onto Roundabout	10.10	6,124	2.59	24	2

Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)	Road Height (m) (Ecolgocial only)
L89	A32 Approaching Juction to Left	4.10	13,138	2.45	24	2
L90	A27 Exiting Roundabout onto Western Way	4.60	3,674	2.59	24	2
L91	A32 Roundabout Approach	7.20	13,138	2.59	24	2
L92	Eastern Way onto A32 Southbound	3.60	13,138	2.32	24	2
L93	Roundabout Exit onto A27	7.50	9,092	1.42	24	2
L94	Gosport Road Junction	9.60	21,779	2.45	24	2
L95	Western Way- Westbound	7.00	6,124	2.59	56	2
L96	A32 Southbound	6.90	26,275	2.59	40	2
L97	Old Gosport Road Slowdown	5.20	26,275	2.59	24	2
L98	Gosport Road Exit	7.20	26,275	2.59	24	2
L99	Gosport Road Exit North of Old Gosport Road	7.80	26,275	2.59	24	2
L100	Gosport Road North of Old Gosport Road	6.80	26,275	2.59	40	2
L101	Old Gosport Road Roundabout Approach Northbound	6.80	26,275	2.48	24	2
L102	Old Gosport Road Roundabout	10.00	11,115	2.59	24	2
L103	Gosport Road South- Southbound	6.50	26,275	2.59	40	2
L104	Slowdown onto Newgate Lane Junction	7.30	23,648	2.59	24	2
L105	A32	8.60	23,648	2.59	24	2
L106	Gosport Road South- Northbound	7.30	26,275	2.59	40	2
L107	Newgate Lane -Merge- North	3.80	5,255	2.59	24	2
L108	Gosport Road	7.00	23,648	2.59	24	2
L109	Newgate Lane	6.50	5,255	3.20	40	2
L110	A32 onto Gosport Road Loop	6.40	13,646	3.20	24	2
L111	Gosport Road Traffic Lights	11.40	27,292	3.20	24	2
L112	A32/Gosport Road	7.20	27,292	2.05	40	2
L113	Southampton Road	11.50	24,323	2.05	32	2

Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)	Road Height (m) (Ecolgocial only)
L114	Southampton Road, Port Way Junction, East Bound	9.00	12,162	2.05	16	2
L115	Southampton Road, Port Way Junction, West Bound	9.00	12,162	6.06	16	2

The road width, height and mean vehicle speed shown in Table AII.1 remained the same for the 2022 scenarios. A summary of the 2022 traffic data is shown in Table AII.2.

Table AII.2 2022 Traffic Data

Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
L1	M27 - W of Junction 11	126,085	6.09	126,560	6.10
L2	M27 - W of Junction 11	113,476	6.09	113,904	6.10
L3	M27 - E of Junction 11	118,262	4.76	118,578	4.70
L4	M27 - E of Junction 11	131,403	4.76	131,753	4.70
L5	Slip to M27 W bound	12,608	6.09	12,656	6.10
L6	Slip from M27 E bound	12,608	6.09	12,656	6.10
L7	Slip to M27 E bound	13,140	4.76	13,175	4.70
L8	Slip from M27 W bound	13,140	4.76	13,175	4.70
L9	A27 Roundabout	58,289	2.37	58,764	2.30
L10	A27 - S of M27 S bound	29,144	2.37	29,382	2.30
L11	A27 - S of slip to Delme S bound	29,144	2.37	29,382	2.30
L12	A27 - S of Delme S bound	32,952	3.26	33,110	3.20
L13	A27 - S of slip to Delme S bound	32,952	3.26	33,110	3.20
L14	A27 - S of M27 N bound	29,144	2.37	29,382	2.30
L15	A27 - N of slip from Delme N bound	29,144	2.37	29,382	2.30
L16	A27 - S of slip from Delme N bound	32,952	3.26	33,110	3.20
L17	A27 - N of slip to Delme N bound	32,952	3.26	33,110	3.20
L18	A27 - S of slip to Delme N bound	32,952	3.26	33,110	3.20

Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
L19	Delme Roundabout	34,137	1.73	35,093	1.70
L20	A27 Slip from A27 W bound	5,829	2.37	5,876	2.30
L21	A27 Slip to Delme Roundabout W bound	5,829	2.37	5,876	2.30
L22	A27 Slip from Delme Roundabout E bound	5,829	2.37	5,876	2.30
L23	A27 Slip to Delme Roundabout E bound	6,590	3.26	6,622	3.20
L24	A27 Slip from A27 E bound	6,590	3.26	6,622	3.20
L25	A27 Slip from Delme Roundabout W bound	6,590	3.26	6,622	3.20
L26	Wallington Way S bound	10,486	3.75	10,563	3.70
L27	Wallington Way S bound	10,486	3.75	10,563	3.70
L28	Wallington Way N bound	10,486	3.75	10,563	3.70
L29	Cams Hill - E of Delme E bound	17,068	1.73	17,547	1.70
L30	Cams Hill - W of Cams Hall E bound	17,068	1.73	17,547	1.70
L31	Cams Hill - E of Cams Hall E bound	17,068	1.73	17,547	1.70
L32	Cams Hill - W of Downend Road E bound	15,611	1.92	16,089	1.90
L33	Portchester Road - E of Downend Road E bound	12,300	2.46	12,371	2.40
L34	Cams Hill - E of Delme W bound	17,068	1.73	17,547	1.70
L35	Cams Hill - W of Cams Hall W bound	17,068	1.73	17,547	1.70
L36	Cams Hill - E of Cams Hall W bound	15,611	1.92	16,089	1.90
L37	Cams Hill - W of Downend Road W bound	15,611	1.92	16,089	1.90
L38	Portchester Road - E of Downend Road W bound	12,300	2.46	12,371	2.40
L39	Portchester Road - W of Portchester roundabout	24,599	2.46	24,742	2.40
L40	Portchester Road - W of Portchester roundabout	24,599	2.46	24,742	2.40
L41	Portchester Roundabout	24,599	2.46	24,742	2.40
L42	Portchester Road - E of Portchester roundabout	24,773	2.47	24,916	2.50
L43	Portchester Road - W of Beauliea Ave	24,773	2.47	24,916	2.50
L44	Portchester Road - E of Beauliea Ave	24,773	2.47	24,916	2.50
L45	Portchester Road - W of Cornaway Lane roundabout E bound	12,441	2.52	12,722	2.50

Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
L46	Portchester Road - W of Cornaway Lane roundabout E bound	12,441	2.52	12,722	2.50
L47	Portchester Road - W of Cornaway Lane roundabout W bound	12,441	2.52	12,722	2.50
L48	Cornaway Lane Roundabout	24,881	2.52	25,445	2.50
L49	West street - E of Cornaway Lane Roundabout	17,925	1.99	18,424	1.90
L50	west street - W of Downsway	17,925	1.99	18,424	1.90
L51	West street - W of West Street Roundabout E bound	8,963	1.99	9,212	1.90
L52	West street - W of West Street Roundabout W bound	8,963	1.99	9,212	1.90
L53	West Street Roundabout	19,417	1.89	19,845	1.90
L54	West street - E of West street roundabout E bound	9,709	1.89	9,923	1.90
L55	West street - W of Castle Street roundabout E bound	9,709	1.89	9,923	1.90
L56	West street - E of West street roundabout W bound	9,709	1.89	9,923	1.90
L57	West street - W of Castle Street roundabout W bound	9,709	1.89	9,923	1.90
L58	Castle Street Roundabout	24,951	1.99	25,378	2.00
L59	East street - E of Castle street Roundabout E bound	12,475	1.99	12,689	2.00
L60	East Street - W of Murrills Estate E bound	12,475	1.99	12,689	2.00
L61	East Street - E of Murrills Estate E bound	12,475	1.99	12,689	2.00
L62	East street - E of Castle street Roundabout W bound	12,475	1.99	12,689	2.00
L63	East street - E of Castle street Roundabout W bound	12,475	1.99	12,689	2.00
L64	East Street - E of Murrills Estate W bound	12,475	1.99	12,689	2.00
L65	Station Road - N of Castle Street Roundabout	8,508	2.30	8,508	2.30
L66	Station Road - N of The Crossway	8,508	2.30	8,508	2.30
L67	Potsdown Hill Road - W of Nelson Lane	10,867	1.14	11,200	1.10
L68	Potsdown Hill Road - W of Swivelton Lane	6,129	1.33	6,825	1.20
L69	Downend Road - N of Site	5,999	1.14	6,693	1.00
L70	Downend Road - S of Site	5,999	1.14	7,619	0.90
L71	Downend Road - N of Cams Hill	5,999	1.14	7,619	0.90

Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
L72	On site Access	0	0.00	2,317	0.00
L73	Castle Street Junction Approach	7,400	2.33	7,400	2.30
L74	Castle Street	7,400	2.33	7,400	2.30
L75	Trainline	0	0.00	0	0.00
L76	Trainline	0	0.00	0	0.00
L77	Trainline	0	0.00	0	0.00
L78	Trainline	0	0.00	0	0.00
L79	Cornaway Lane Slowdown	6,661	2.08	6,661	2.08
L80	Cornaway Lane North of Hatherly Crescent	6,661	2.08	6,661	2.08
L81	Cornaway Lane South of Hatherley Crescent	6,661	2.08	6,661	2.08
L82	Dore Avenue Slowdown	6,661	2.08	6,661	2.08
L83	Dore Avenue	6,661	2.08	6,661	2.08
L84	Eastern/Western Way bridge	21,171	2.32	21,171	2.32
L85	Eastern Way onto A32 South	21,171	2.32	21,171	2.32
L86	Eastern Way Exiting Roundabout	21,171	2.32	21,171	2.32
L87	Western Way Westbound	6,495	2.52	6,495	2.52
L88	Western Way Slowdown onto Roundabout	6,495	2.52	6,495	2.52
L89	A32 Approaching Juction to Left	13,909	2.60	13,909	2.60
L90	A27 Exiting Roundabout onto Western Way	3,897	2.52	3,897	2.52
L91	A32 Roundabout Approach	13,909	2.60	13,909	2.60
L92	Eastern Way onto A32 Southbound	13,909	2.60	13,909	2.60
L93	Roundabout Exit onto A27	9,623	2.32	9,623	2.32
L94	Gosport Road Junction	22,876	2.58	22,876	2.58
L95	Western Way- Westbound	6,495	2.52	6,495	2.52
L96	A32 Southbound	27,818	2.60	27,818	2.60
L97	Old Gosport Road Slowdown	27,818	2.60	27,818	2.60
L98	Gosport Road Exit	27,818	2.60	27,818	2.60

Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
L99	Gosport Road Exit North of Old Gosport Road	27,818	2.60	27,818	2.60
L100	Gosport Road North of Old Gosport Road	27,818	2.60	27,818	2.60
L101	Old Gosport Road Roundabout Approach Northbound	27,818	2.60	27,818	2.60
L102	Old Gosport Road Roundabout	27,818	2.60	27,818	2.60
L103	Gosport Road South- Southbound	27,818	2.60	27,818	2.60
L104	Slowdown onto Newgate Lane Junction	25,036	2.60	25,036	2.60
L105	A32	25,036	2.60	25,036	2.60
L106	Gosport Road South- Northbound	27,818	2.60	27,818	2.60
L107	Newgate Lane -Merge- North	5,564	2.60	5,564	2.60
L108	Gosport Road	25,036	2.60	25,036	2.60
L109	Newgate Lane	5,564	2.60	5,564	2.60
L110	A32 onto Gosport Road Loop	14,436	3.21	14,436	3.21
L111	Gosport Road Traffic Lights	28,871	3.21	28,871	3.21
L112	A32/Gosport Road	28,871	3.21	28,871	3.21
L113	Southampton Road	24,647	2.02	25,378	1.96
L114	Southampton Road, Port Way Junction, East Bound	12,324	2.02	12,689	1.96
L115	Southampton Road, Port Way Junction, West Bound	12,324	2.02	12,689	1.96

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 9.0) released in May 2019, which incorporates updated COPERT 5 vehicle emissions factors for NO_x 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, 2018 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.

Meteorological Data

Meteorological data used in this assessment was taken from Thorney Island meteorological station over the period 1st January 2018 to 31st December 2018 (inclusive). Stansted meteorological station is located at approximate NGR: 476389, 102497 which is approximately 16.4km south-east of the

proposed development.

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

Roughness Length

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

Table AII.3 Utilised Roughness Lengths

Scenario	Roughness Length (m)	ADMS Description
Verification and Operational phase (DS scenarios)	0.5	Parkland, open suburbia
Meteorological Station	0.3	Agricultural Area (Max)

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 Stansted Airport meteorological station are summarised in Table AII.4.

Table AII.4 Utilised Monin-Obukhov Lengths

Scenario	Monin-Obukhov Length (m)	ADMS Description
Verification and Operational phase (DS scenarios) and Meteorological Station	10	Small Town >50, 000

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

Background Concentrations

The annual mean NO_2 concentrations detailed in Table 7, was used in the dispersion modelling assessment to represent annual mean pollutant levels at the Site and local monitoring sites.

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

Table AII.5 Predicted Background Pollutant Concentrations for Diffusion Tubes

Monitoring Location	DEFRA Grid Square	Pollutant	2018 Predicted Background Concentration (µg/m^3)
G3	457500,104500	NO_x	24.89
		NO_2	17.04
FAR1, G1A, G12, G12, G11,G14, G6, G7, E1/2/3, G4, Gr/RL, G2A, G8Z	457500, 105500	NO_x	25.14
		NO_2	17.31
PS4/5/6, PS1/1A/1B, PS2, WW1, FAR2	457500, 106500	NO_x	27.23
		NO_2	18.57
CM1, CM2,CM3, BL1	458500, 106500	NO_x	31.94
		NO_2	21.31

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

Table AII.6 Predicted Background Pollutant Concentrations for Receptors

Receptor Grid Square	Receptors	Pollutant	2018 Predicted Background Concentration (µg/m^3)
459500, 107500	R25	NO_x	27.50
		NO_2	18.82
		PM_{10}	16.21
459500, 105500	R5, R6, R22, R26	NO_x	20.74
		NO_2	14.63
		PM_{10}	14.10
458500, 106500	R1 – R3	NO_x	31.94
		NO_2	21.31
		PM_{10}	15.34
459500, 106500	R4, R21	NO_x	30.63
		NO_2	20.62
		PM_{10}	16.11
460500, 105500	R7 to R10	NO_x	22.46
		NO_2	15.71

Receptor Grid Square	Receptors	Pollutant	2018 Predicted Background Concentration (µg/m^3)
		PM_{10}	14.68
461500, 105500	R12 to R20	NO_x	23.65
		NO_2	16.43
		PM_{10}	14.84
461500, 106500	R23	NO_x	30.73
		NO_2	20.70
		PM_{10}	16.09

Similar to emission factors, background concentrations for 2018 were utilised in preference to predicted background concentrations for the development opening year (2022). This provided a robust assessment and is likely to overestimate actual pollutant concentrations during the operation of the proposals.

NO_x to NO_2 Conversion

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

Verification

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

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

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

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

FBC undertakes periodic monitoring of NO_2 concentrations at two roadside monitoring location within the assessment extents. The road contribution to total NO_x concentration was calculated from the monitored NO_2 result for use in the verification process. This was undertaken following the methodology contained within DEFRA guidance LAQM TG(16)[2]. The monitored annual mean NO_2 concentration and calculated road NO_x concentration are summarised in Table AII.7.

Table AII.7 Monitoring Results

Site ID	Monitored Road NO_x Concentration (µg/m³)	Modelled Road NO_x Concentration (µg/m³)	Change %
CM3	21.79	11.99	-81.69
CM2	52.20	85.41	38.88
CM1	35.01	17.64	-98.47
BL1	21.13	20.41	-3.54
PS4/5/6	31.38	33.78	7.10
PS1/1A/1B	23.57	22.35	-5.46
PS2	23.20	31.54	26.44
PS3	28.05	28.21	0.57
WW1	18.95	16.24	-16.67
G1A	29.28	22.55	-29.84
G12	18.11	27.50	34.14
G10	18.41	32.80	43.88
G11	18.14	11.36	-59.72
G14	22.99	18.12	-26.90
G6	23.98	28.59	16.12
WW2	12.04	20.65	41.67
G7	22.82	42.39	46.16
E1/2/3	28.25	25.33	-11.55
G4	24.66	15.64	-57.70
G2A	25.70	16.88	-52.22
G8Z	18.79	16.88	-11.33
G3	15.20	13.11	-15.95
FAR1	28.25	19.71	-43.35
FAR2	23.52	27.11	13.23

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 **1.0634** was required to be applied to all NO_x modelling results.

Showing the model overestimated rather than underestimated pollutant concentrations throughout the assessment extents.

Graph 1 Verification Adjustment Factor

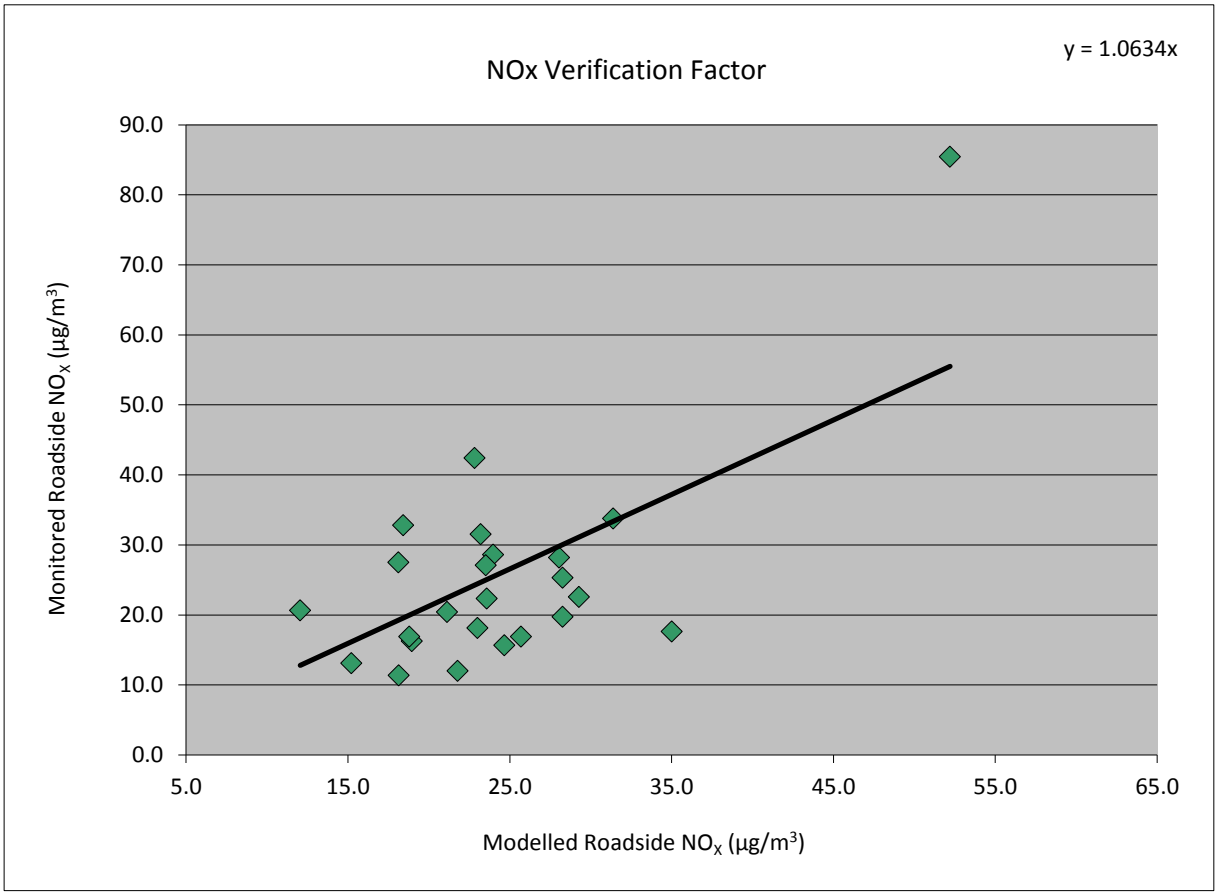

Table AII.8 presents the monitored annual mean NO_2 concentrations and the adjusted modelled total NO_2 concentration based on the above verification factor. Exceedances of the relevant AQO are highlighted in **bold.**

Table AII.8 Modelled Concentrations

Site ID	Monitored NO_2 Concentration ($\mu g/m^3$)	Adjusted Modelled Total NO_2 Concentration ($\mu g/m^3$)	Change (%)
CM3	27.30	32.58	-19.34
CM2	57.70	46.41	19.57
CM1	30.00	38.84	-29.46
BL1	31.30	32.26	-3.06
PS4/5/6	34.80	34.62	0.53
PS1/1A/1B	29.60	30.86	-4.24
PS2	33.80	30.68	9.24
PS3	32.30	33.04	-2.28%
WW1	26.70	28.57	-6.99
G1A	28.50	32.45	-13.87
G12	30.80	26.94	12.53
G10	33.20	27.09	18.40
G11	23.10	26.96	-16.72
G14	26.40	29.39	-11.33
G6	31.30	29.88	4.53
WW2	28.80	25.04	13.07
G7	37.40	29.31	21.63
E1/2/3	29.80	31.96	-7.26
G4	25.20	30.21	-19.89
G2A	25.80	30.72	-19.08
G8Z	25.80	27.29	-5.78
G3	23.70	25.19	-6.28
FAR1	26.90	31.71	-17.88
FAR2	31.80	30.84	3.03%

As demonstrated in Table AII.8, the percentage difference between modelled and monitored concentrations is deemed acceptable and is less than 20% in all cases. This reduces uncertainties in the model predictions and provide a robust representation of pollutant concentrations in accordance with the guidance suggested in LAQM (TG16)[2].

As PM monitoring is not undertaken within the assessment extents, the NO_x adjustment factor of **1.0634** was utilised to adjust model predictions of PM in accordance with the guidance provided within LAQM (TG16)[2].

APPENDIX III CONSTRUCTION PHASE ASSESSMENT CRITERIA

CONSTRUCTION PHASE METHODOLOGY

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction'[10].

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

- Earthworks;
- Construction; and
- Trackout.

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

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

The assessment steps are detailed below.

Step 1

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

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

Step 2

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

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

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

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

criteria are summarised in Table AIII.1.

Table AIII.1 Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	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	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	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	• Less than 10 HDV trips per day • Surface material with low potential for dust release • Unpaved road length less than 50m

Step 2B defines the sensitivity of the area around the development 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
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
		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

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
	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 outlines the risk category from earthworks and construction activities.

Table AIII.6 Dust Risk Category from Earthworks and Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

Table AIII.7 outlines the risk category from trackout.

Table AIII.7 Dust Risk Category from Trackout

Sensitivity of Area	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 – ECOLOGICAL RECEPTOR ASSESSMENT RESULTS

ECOLOGICAL ASSESSMENT RESULTS

Annual Mean Oxides of Nitrogen

Predicted annual mean NO_x concentrations for sensitive ecological receptors are summarised in Table AIV.1. It should be noted that the results presented in Table AIV.1 represent the maximum concentrations predicted across all meteorological datasets.

Table AIV.1 Predicted Annual Mean NO_x Concentrations

Receptor	Predicted Annual Mean NO_x Concentration (µg/m^3)	Proportion of EQS (%)	Predicted Annual Mean NO_x Concentration (µg/m^3)	Proportion of EQS (%)
	PC	PC	PEC	PEC
E1	0.24	1	26.94	89.79
E2	0.40	1	27.37	91.23
E3	0.47	**2**	27.44	91.47
E4	0.42	1	27.39	91.31
E5	0.19	1	27.16	90.53
E6	0.23	1	27.20	90.68
E7	0.23	1	27.20	90.67
E8	0.23	1	27.20	90.66
E9	0.27	1	27.24	90.79
E10	0.26	1	27.23	90.76
E11	0.13	0	27.10	90.33
E12	0.02	0	26.99	89.97
E13	0.02	0	26.99	89.97
E14	0.02	0	26.99	89.97
E15	0.02	0	26.99	89.98
E16	0.02	0	26.99	89.98

24-Hour Mean Oxides of Nitrogen

Predicted 24-hour mean NO_x concentrations for sensitive ecological receptors are summarised in Table AIV.2. It should be noted that the results presented in Table AIV.2 represent the maximum concentrations predicted across all meteorological datasets.

Table AIV.2 Predicted 24-hour Mean NO_x Concentrations

Receptor	Predicted 24-hour Mean NO_x Concentration ($\mu g/m^3$)	Proportion of EQS (%)
	PC	PC
E1	0.92	1
E2	1.17	**2**
E3	1.26	**2**
E4	1.36	**2**
E5	0.57	1
E6	0.66	1
E7	0.67	1
E8	0.65	1
E9	0.74	1
E10	0.79	1
E11	0.45	1
E12	0.13	0
E13	0.13	0
E14	0.14	0
E15	0.13	0
E16	0.13	0

Ammonia – NH3

Predicted annual mean HN_3 concentrations for sensitive ecological receptors are summarised in Table AIV.3. It should be noted that the results presented in Table AIV.3 represent the maximum concentrations predicted across all meteorological datasets.

Table AIV.3 Predicted Annual Mean NH_3 Concentrations

Receptor	Predicted Annual Mean NO_x Concentration ($\mu g/m^3$)	Proportion of EQS (%)
	PC	PC
E1	0.01	0
E2	0.02	1
E3	0.03	1

Receptor	Predicted Annual Mean NO_x Concentration ($\mu g/m^3$)	Proportion of EQS (%)
	PC	PC
E4	0.02	1
E5	0.01	0
E6	0.01	0
E7	0.01	0
E8	0.01	0
E9	0.01	0
E10	0.01	0
E11	0.01	0
E12	0.00	0
E13	0.00	0
E14	0.00	0
E15	0.00	0
E16	0.00	0

Nitrogen Deposition

Predicted annual mean nitrogen deposition rates are summarised in Table AIV.4. Reference should be made to Table AIV.4 for details of the site-specific Low and High EQSs.

Table AIV.4 Predicted Annual Mean Nitrogen Deposition Rates

Receptor	Predicted Annual Mean Nitrogen Deposition Rate (kgN/ha/yr)	Proportion of EQS (%)	
	PC	Low EQS	High EQS
		PC	PC
E1	0.11	1	0
E2	0.18	1	1
E3	0.20	1	1
E4	0.18	1	1
E5	0.08	1	0
E6	0.10	1	0

Receptor	Predicted Annual Mean Nitrogen Deposition Rate (kgN/ha/yr)	Proportion of EQS (%)	
	PC	Low EQS	High EQS
		PC	PC
E7	0.10	1	0
E8	0.10	1	0
E9	0.12	1	0
E10	0.10	1	0
E11	0.04	0	0
E12	0.01	0	0
E13	0.01	0	0
E14	0.01	0	0
E15	0.01	0	0
E16	0.01	0	0

Acid Deposition

Predicted acid deposition rates are summarised in Table AIV.5. It should be noted all results relate to the maximum predicted by any meteorological dataset. It should also be noted that the acid deposition rate for sulphur is the background deposition rate only, as sulphur is not emitted by the proposed installation.

Table AIV.5 Predicted Annual Mean Acid Deposition Rates

Receptor	Predicted Annual Mean Acid Deposition Rate (keq/ha/yr)		Proportion of EQS (%)		Exceedance of CL Function (keq/ha/yr)
	PC	PEC	PC	PEC	
E1	0.0076	1.31	0.16	26.93	None
E2	0.0126	1.31	0.26	27.03	None
E3	0.0145	1.31	0.30	27.07	None
E4	0.0129	1.31	0.27	27.04	None
E5	0.0060	1.31	0.12	26.90	None
E6	0.0072	1.31	0.15	26.92	None
E7	0.0072	1.31	0.15	26.92	None

Receptor	Predicted Annual Mean Acid Deposition Rate (keq/ha/yr)		Proportion of EQS (%)		Exceedance of CL Function (keq/ha/yr)
	PC	PEC	PC	PEC	
E8	0.0072	1.31	0.15	26.92	None
E9	0.0083	1.31	0.17	26.94	None
E10	0.0071	1.31	0.15	26.92	None
E11	0.0032	1.30	0.07	26.84	None
E12	0.0006	1.30	0.01	26.78	None
E13	0.0006	1.30	0.01	26.78	None
E14	0.0006	1.30	0.01	26.78	None
E15	0.0006	1.30	0.01	26.78	None
E16	0.0006	1.30	0.01	26.78	None

APPENDIX V - ASSESSOR'S CURRICULUM VITAE

RACHAEL HARRISON

Graduate Air Quality Consultant

BSc (Hons).

KEY EXPERIENCE:

Rachael is a Graduate Environmental Consultant with specialist experience in the air quality sector. Her 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 road vehicle exhaust emissions using the Design Manual for Roads and Bridges (DMRB) calculation spreadsheet.
- Assessment of dust impacts from construction sites to the Institute of Air Quality Management (IAQM) methodology.
- Production of air quality mitigation strategies for developments throughout the UK.
- Defining baseline air quality conditions and identification of sensitive areas.

QUALIFICATIONS:

- Bachelor of Science
- Odour Acuity Certified

SELECT PROJECTS SUMMARY:

Environmental Impact Assessment:

Warburton Lane, Trafford – EIA for a large scale residential development of 473 dwellings

Reading Metropolitan– EIA for a large scale mixed use development of 650 dwellings

C02 Central Dock - EIA for a large scale residential development of 650 dwellings

Residential Developments:

Minster Way, East Yorkshire AQA for a Large scale residential development comprising a two phase development of circa 400 residential units.

Cockerham Road, Garstang - AQA for a large scale residential development of 88 residential units.

Vaughan Way, Leicester - AQA in support of an extension to an existing building to provide 39 residential units across four additional floors.

Kearsley Social Club, **Bolton**– Exposure assessment for residential development assessing impacts from road traffic emissions.

Hailey Rod, Witney – Air Quality Screening Assessment for a residential development of 120 dwellings.

Meat Market, Glasgow – Exposure and impact assessment for residential units in Glasgow

Hailey Road, Witney - AQa is support of a large scale residential development forming part of wider strategic development area and new link road.

Hotel Developments:

Old Market Road, Bristol – AQA for the redevelopment of the site to provide a hotel located within an AQMA.

Hobson House, Cambridge - AQA for the redevelopment of the site to provide a hotel.

Mixed Use Developments:

The Bear Project - AQA for a mixed use development located within the Lewisham AQMA.

Radcliffe Park and Ride - Impacts and exposure assessment for additional Car Park deck at Park and Ride in Bury.

Rotherhithe Street, Southwark – AQA for the renovation of a Grade II listed building to provide a cinema, restaurant and two new apartment blocks

Commercial Developments:

Altrincham Retail Park - AQA for a retail unit, located within the Greater Manchester AQMA.

New Smithfield Market, Manchester – AQA for the development of a Cash and Carry warehouse.

Weston Hall Farm, Crewe AQA in support of the proposal comprising the change of use of current agricultural buildings to form a new commercial warehouses.

Odour Assessments:

Optimus Point, Leicester - Qualitative assessment in support of a warehouse development in close proximity to existing vape production.

Café Torelli, Kew - Kitchen odour risk assessment in support of a existing coffee shop and hot food takeaway.

Wright Street, Renfrew – Quantitative odour assessment for residential development adjacent waste water treatment works.

Monitoring Experience:

Co-ordination and management of NO_2 diffusion tube monitoring surveys in accordance with DEFRA guidance.

Odour Acuity certified, undertaken numerous site sniff tests

MATTHEW MITCHELL

Associate Director, Air Quality

MEnv, CEnv, MIAQM, MIEnvSc

KEY EXPERIENCE:

- Associate Director with specialist experience within the air quality sector. His key capabilities include:
- Management and delivery of project work on key, land development and urban regeneration projects.
- Preparation of factual and interpretative Air Quality Assessment reports and Air Quality Environmental Statement chapters in the vicinity of proposed schemes and developments in accordance with DEFRA, Environment Agency and Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) methodologies.
- Production of air quality mitigation strategies for developments throughout the UK.
- Green house gas and pollutant emissions inventories.
- Defining baseline air quality conditions and identification of sensitive areas.
- Representing clients at public inquiries and planning hearings.
- Detailed dispersion modelling of industrial power and oil and gas emissions using ADMS and AERMOD.
- Defining baseline air quality conditions and ambient Air Quality Monitoring.
- Road vehicle emissions using ADMS-Roads.

QUALIFICATIONS:

- Master of Environment in Environmental Science
- Chartered Environmentalist
- Member of the Institute of Air Quality Management

SELECT PROJECTS SUMMARY:

Mixed Use Developments

Plumstead College, Greenwich

Air Quality Assessment associated with the redevelopment London South East Colleges, Greenwich including the assessment of demolition of existing buildings and structures and construction of a 5-storey college, residential dwellings and flexible non-residential floorspace.

Lyle Park West, Newham

Air Quality Assessment for EIA scoping and ES chapter for a mixed-use development within the London Borough of Newham's Royal Docks & Beckton Riverside Opportunity Area consisting of road traffic, exposure and energy plant assessment of the development including air quality neutral assessment, including an assessment of nearby industrial land uses considering agent of change and safeguarding wharf polices and representation of the client at a planning hearing.

South Aylesford Retail Park, Kent

Air Quality Assessment in support of a proposed expansion of South Aylesford Retail Park, located on the edge of Tonbridge and Malling Air Quality Management Area. A number of air quality mitigation options were presented to off-set wider impacts associated with the Proposed Development, balancing efficacy against financial implications affecting scheme viability.

The Maltings, Rainham

Air Quality Assessment in support of a proposed residential of land north of Bramling Way, known as The Maltings, Rainham. The site was located in close proximity to an area designated by Medway Council as experiencing elevated pollutant concentrations resulting from road vehicle exhaust emission associated with the A2.

Brent House, Air Quality Mitigation Verification Report

Air Quality Validation Reports to support the discharge of planning conditions for a residential development requiring installation of appropriate ventilation and energy plan.

The Francis Crick Institute, London

Assessment in support of an energy centre located within the operational Francis Crick Institute to support an Environmental Permit (EP) application to the Environmental Agency (EA) for the operation of a mixture of combustion sources providing an overall rated thermal input of 66.15 Mega Watts (MW). Given the nature of the installation a Dispersion Modelling Assessment is required in support of a Part A Environmental Permit application.

The Earl's Court Project-

Matthew was the lead author for the air quality assessment and project Low Emissions Strategy for a 20 year, multi-phased development over a 23 Earl's Court site within the Central London. As well as managing the Air Quality Assessment of major road alterations, modelling of large-scale district heating plants undertaking baseline surveys Matthew compiled the project Low Emission Strategy using regional and national guidance creating a project specific low emissions solutions.

Battersea Power Station

EIA for this iconic mixed-use development on the landmark site of the former Battersea Power Station in London. As well as attending a series of meeting and site visits to determine suitable mitigation measures Matthew managed and carried out a monitoring programme including the set-up and operation of Beta-Attenuate Monitors (BAM1020) real time particulate monitors as well as dust deposition using standard Frisbee gauges, VOC/nitrogen dioxide passive diffusion tubes.

- Member of the Institute of Environmental Science