



AIR QUALITY ASSESSMENT OAKDENE, WINDMILL LANE, BURSLEDON

REC REFERENCE: AQ105125R4

REPORT PREPARED FOR: TRACEY BUCKLAND

DATE: JUNE 2018



National Consultancy, Locally Delivered

A CONCEPT LIFE SCIENCES COMPANY





Issue/revisi on	Issue 1	Revision 1	Revision 2	Revision 3	Revision 4
Remarks	Draft	Minor Revision	Draft	Minor text change	
Date	23/03/2018	04/04/2018	13/06/2018	21/06/2018	
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Project Number	AQ105125r1	AQ105125r2	AQ105125r3	AQ105125r4	





EXECUTIVE SUMMARY

Resource and Environmental Consultants Ltd was commissioned by Tracey Buckland to undertake an Air Quality Assessment in support of a planning application for a proposed six mobile units at Oakdene, Windmill Lane, Bursledon.

It is understood that the proposal comprises the extension of the existing site to provide 6 further mobile homes, alongside associated infrastructure.

The site is located in the vicinity of the M27, which is considered a significant source of road vehicle emission and, as such, there are concerns that the development will introduce future site users to an area experiencing elevated pollutant concentrations. Additionally, there is potential for the proposed development to cause air quality impacts at nearby sensitive receptors during the construction phase. As such, an Air Quality Assessment was required to quantify pollutant levels across the site, assess potential construction phase impacts and consider site suitability for the proposed end-use.

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

Dispersion modelling was undertaken in order to quantify existing pollutant concentrations at the site and assess potential exposure of future users as a result of road vehicle exhaust emissions. Pollutant concentrations were predicted across the ground floor level and were subsequently verified using local monitoring results.

The dispersion modelling results indicated that pollutant levels at the portion of the site closest to the M27 exceeded the relevant air quality standards. In order to protect future residents from poor air quality, a number of mitigation measures have been recommended for units in these locations.

Based on the assessment results and the implementation of appropriate mitigation techniques, air quality issues are not considered a constraint to planning consent for the proposed development.





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1.0 INTRODUCTION

1.1 Background

Resource and Environmental Consultants Ltd was commissioned by Tracey Buckland to undertake an Air Quality Assessment in support of a planning application for a proposed residential site at Oakdene, Windmill Lane, Bursledon.

1.2 Site Location and Context

The site is located at Oakdene, Windmill Lane, Bursledon, at approximate National Grid Reference (NGR): 448487, 110980. Reference should be made to Figure 1 within Appendix I for a location plan.

The site is located in the vicinity of the M27, which is considered a significant source of road vehicle emission and, as such, there are concerns that the development will introduce future site users to an area experiencing elevated pollutant concentrations. Additionally, the development has the potential to cause air quality impacts at sensitive receptor locations as a result of fugitive dust emissions associated with the construction phase. An Air Quality Assessment was therefore required to determine baseline conditions, consider potential exposure as a result of the development and provide consideration of potential effects as a result of the construction phases of the proposals. This is detailed in the following report.

1.3 Limitations

This report has been produced in accordance with REC's standard terms of engagement. REC 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 REC; a charge may be levied against such approval.





2.0 LEGISLATION AND POLICY

2.1 European Legislation

European Union (EU) air quality legislation is provided within Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidated previous legislation which was designed to deal with specific pollutants in a consistent manner and provided new air quality objectives for particulate matter with an aerodynamic diameter of less than $2.5\mu\text{m}$ ($\text{PM}_{2.5}$). The consolidated Directives include:

- ▶ Directive 99/30/EC - the First Air Quality "Daughter" Directive - sets ambient Air Quality Limit Values (AQLVs) for NO_2 , oxides of nitrogen (NO_x), sulphur dioxide, lead and PM_{10} ;
- ▶ Directive 2000/69/EC - the Second Air Quality "Daughter" Directive - sets ambient AQLVs for benzene and carbon monoxide; and
- ▶ Directive 2002/3/EC - the Third Air Quality "Daughter" Directive - seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

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

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

2.2 UK Legislation

The Air Quality Standards (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 2007¹. 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.

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





Table 1 Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration ($\mu\text{g}/\text{m}^3$)	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

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 Local Air Quality Management Technical Guidance 2016 LAQM (TG16), DEFRA, 2016





2.3 Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves considering present and likely future air quality against the AQOs. If it is predicted that levels at sensitive locations where members of the public are regularly present for the relevant averaging period are likely to be exceeded, the LA is required to declare an AQMA. For each AQMA the LA is required to produce an Air Quality Action Plan (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.4 Dust

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

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

Enforcement of the Act, in regard to nuisance, is currently under the administration of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the LA is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Environmental Protection Act (1990). Enforcement can insist that there be no dust beyond the boundary of the works. The only defence is to show that the process to which the nuisance has been attributed and its operation are being controlled according to best practice measures.

2.5 National Planning Policy

2.5.1 National Planning Policy Framework

The National Planning Policy Framework³ (NPPF) was published on 27th March 2012 and sets out the Government's core policies and principles with respect to land use planning, including air quality. The document includes the following considerations which are relevant to this assessment:

"The planning system should contribute to and enhance the natural and local environment by:

[...]

Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability

Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning

³ National Planning Policy Framework, Department for Communities and Local Government, 2012.





decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."

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

2.5.2 National Planning Practice Guidance

The National Planning Practice Guidance⁴ (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 to support the NPPF and make it more accessible. The relevant air quality sections are highlighted below:

Paragraph 001 states that: "Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values" and "It is important that the potential impact of new development on air quality is taken into account, where the national assessment indicates that relevant limits have been exceeded or are near the limit". The role of Local Authorities under LAQM are stated and that Air Quality Action Plans should "identify measures that will be introduced in pursuit of the objectives"

Paragraph 005 states that "Whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation"

Paragraph 007 states that "Assessments should be proportional to the nature and scale of development proposed and the level of concern about air quality". In terms of mitigation, it states that "Mitigation options where necessary will be location specific, will depend on the proposed development and should be proportionate to the likely impact"

Paragraph 009 shows a flow chart highlighting how the assessment of air quality impacts should fit into the development management process. It makes it clear that air quality impact risks, AQLVs and AQOs should be considered in the decision-making process.

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

2.6 Eastleigh Borough Council Local Planning Policy

As part of the Local Development Framework, Eastleigh Borough Council (EBC) submitted a draft Local Plan⁵ in February 2014. This sets out the spatial vision, objectives, development strategy and a series of over-arching strategic policies that will guide the scale, location and type of development in the borough until 2029. In November of 2014 the government's planning inspector concluded that the plan was not sound and as such work was started on a new local plan.

A review of the adopted local plan saved policies indicated the following in relation to air quality that are relevant to this assessment:

⁴ <http://planningguidance.planningportal.gov.uk/>.

⁵ Eastleigh Borough Local Plan Revised Pre-Submission, Eastleigh Borough Council, 2014.





"Policy 32.ES

Proposals for uses which may generate air, land or water pollution, will only be permitted if the Borough Council is satisfied that they have been designed to control their impact to an acceptable level.

And

Policy 33.ES

Where new development appears likely to have a significant impact on air quality in the locality, or future occupiers of the development may be subject to unacceptable air quality, the Council will require a suitable air quality assessment to be carried out prior to consideration of the application."

The Emerging Eastleigh Local Plan⁶ will form the statutory development plan for the area, and sets out the Council's future planning framework for the district from 2016 to 2036. The Emerging Plan is currently at pre-submission stage and as such there are no adopted Policies at the time of undertaking this assessment. Although the Local Plan is still under consultation, consideration has been taken to review future policies. A review of the document indicated the following policies which are relevant to this assessment in relation to air quality

"Policy BU2 - Land Lying south east of Windmill lane

An area of 3.8 hectares on the southeast side of Windmill Lane is allocated for residential development of approximately 50 dwellings. Planning permission will be granted provided that detailed proposals accord with the development plan and meet the following specific development requirements:

- i. noise and air quality assessments are undertaken to confirm that the site can be developed satisfactorily for residential purposes given the proximity to the M27"

"Policy E1 - Land at the Civic Offices and former Magistrates' Court, Leigh Road, Eastleigh

An area of approximately 1.9 hectares south of Leigh Road, Eastleigh as defined on the policies map is allocated for re-development. It is suitable for a range of uses including office (B1a) development or other uses providing employment, education/ training and/ or meeting facilities, emergency or community uses and some residential development. Development will be subject to the approval by the Borough Council of a development brief and a masterplan which address the following requirements:

[...]

- v. the design and layout of development takes account of the noise and air quality issues adjoining the site"

⁶ Eastleigh Borough Local Plan 2011 – 2029 Revised Pre-submission, February 2014





“Policy AL2 - Land west of Allbrook Way

Approximately 4.2 hectares of land west of Allbrook Way and north of Knowle Hill, as defined on the policies map is allocated for approximately 45 dwellings. Planning permission will be granted provided that detailed proposals accord with the development plan and meet the following specific development requirements:

[...]

xi. . Implementation of appropriate measures to mitigate any adverse air quality and/or noise impacts arising from the proximity of the M27 Motorway to the west and/or Allbrook Way to the east”

“Policy HE3 - Land at Home Farm, St John’s Road, Hedge End

An area of approximately 0.6ha to the west of Hedge End, as defined on the policies map, is allocated for development to include approximately 16 dwellings. Planning permission will be granted provided that the detailed proposals comply with the development plan, and comply with an approved masterplan for the whole site which addresses the following specific requirements:

[...]

ix. Implementation of appropriate measures to mitigate any adverse air quality impacts arising from the proximity of the M27 Motorway to the west”

Reference has been made to these policies during the undertaking of this Air Quality Assessment by assessing pollutant concentrations across the development and determining potential air quality impacts from the proposals.





3.0 METHODOLOGY

The proposed development has the potential to expose future site users to elevated pollution levels as well as causing air quality impacts during the construction phases. These issues have been assessed in accordance with the following methodology.

3.1 Construction Phase Assessment

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction'⁷

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

- ▶ Earthworks; 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 PM₁₀.

The assessment steps are detailed below.

3.1.1 Step 1

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

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

⁷ Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, 2014.





3.1.2 Step 2

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

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

The two factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied.

Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table 3.

Table 3 Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	Earthworks	• Total site area greater than 10,000m² • 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
	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 2,500m² to 10,000m² • 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
	Trackout	• 10 to 50 HDV trips per day • Moderately dusty surface material (e.g. high clay content) • Unpaved road length 50m to 100m
	Earthworks	• Total site area less than 2,500m² • 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





Magnitude	Activity	Criteria
	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 earthworks and trackout. The factors influencing the sensitivity of the area are shown in Table 4.

Table 4 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 PM₁₀ e.g. residential properties, hospitals, schools and residential care homes	• Internationally or nationally designated site e.g. Special Area of Conservation
Medium	• Users would expect to enjoy a reasonable level of amenity • Aesthetics or value of their property could be diminished by soiling • People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work	• Nationally designated site e.g. Sites of Special Scientific Interest
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 5.

Table 5 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 6 outlines the sensitivity of the area to human health impacts.

Table 6 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
		More than 100	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
	Less than 24µg/m ³	10 - 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	-	More than 10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
Low	-	1 - 10	Low	Low	Low	Low	Low

Table 7 outlines the sensitivity of the area to ecological impacts.

Table 7 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 8 outlines the risk category from earthworks and construction activities.

Table 8 Dust Risk Category from Earthworks

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

Table 9 outlines the risk category from trackout.





Table 9 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

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 IAQM² guidance suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix III

3.2 Operational Phase Impact Assessment

3.2.1 Future Exposure

The proposed development includes sensitive land use and is located adjacent to the M27 which is considered to be a significant source of road vehicle exhaust emission. As such, the proposals have the potential to introduce new receptors into an area of existing poor air quality. Detailed dispersion modelling was therefore undertaken to quantify NO₂ and PM₁₀ concentrations across the site and determine suitability for the proposed use. Reference should be made to Appendix II for details of the assessment inputs.

3.2.2 Road Vehicle Exhaust Emissions

The development has the potential to impact on existing air quality as a result of road traffic exhaust emissions, such as NO₂ and PM₁₀, associated with vehicles travelling to and from the site. A screening assessment was therefore undertaken using the criteria contained within the Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) 'Land-Use Planning &





Development Control: Planning for Air Quality (2017)⁸ guidance documents to determine the potential for trips generated by the development to affect local air quality.

The EPUK and IAQM guidance⁸ document states the following criteria to help establish when an air quality assessment is likely to be considered necessary:

- ▶ Proposals that will cause a change in Light Duty Vehicle (LDV) flows of more than 100 AADT within or adjacent to an AQMA or more than 500 elsewhere;
- ▶ Proposals that will cause a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 elsewhere;
- ▶ Proposals that would realign roads within an AQMA by more than 5m;
- ▶ Proposals that will introduce new junctions or remove existing junctions near relevant receptors;
- ▶ Proposals that will introduce or change a bus station or change flows of buses by more than 25 AADT within an AQMA or more than 100 AADT elsewhere;
- ▶ Proposals which will include an underground car park with extraction system which will be within 20m of a relevant receptor and have more than 100 movements per day;
- ▶ Proposals which include either a centralised plant using biofuel, a combustion plant with single or thermal input >300KWh or a standby emergency generator associated with a centralised energy centre; and
- ▶ Proposals which include combustion processes of any size.

Should these criteria not be met, then the EPUK and IAQM guidance⁸ documents consider air quality impacts associated with a scheme to be **negligible** and no further assessment is required.

Should screening of the traffic data indicate that any of the above criteria are met, then potential impacts at sensitive receptor locations can be assessed by calculating the predicted change in NO₂ and PM₁₀ concentrations as a result of the proposed development. The significance of predicted impacts can then be determined in accordance with the methodology outlined in the EPUK and IAQM guidance⁸.

⁸ Land-Use Planning & Development Control: Planning for Air Quality, EPUK and IAQM, January 2017 Update.





4.0 BASELINE

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

4.1 Local Air Quality Management

As required by the Environment Act (1995), EBC has undertaken Review and Assessment of air quality within their area of administration. This process concluded that annual mean concentrations of NO₂ are above the AQO within the area. As such, four Air Quality Management Areas (AQMA) have been declared, the closest of which to the proposed site is:

"An area encompassing a number of properties along Hamble Lane, Bursledon between the Junctions with Jurd Way and Portsmouth Road."

The proposed site is located approximately 1.2km south-west of the Eastleigh AQMA No.3. Due to the distance between the two sites there is a low potential for the proposed development to expose future users to elevated pollutant concentrations associated with the AQMA. Although, proximity to the M27 may have the potential to introduce future site users to elevated pollutant concentrations.

Following declaration of the AQMA an action plan has been produced by EBC. This proposes measures with the aim of reducing annual mean NO₂ concentrations to levels below the AQO. EBC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs and as such no further AQMA's have been designated.

4.2 Air Quality Monitoring

EBC monitors pollutant concentrations using continuous methods throughout their area of administration. The closest continuous monitor to the proposed site is Southampton Road at NGR: 445490, 118230. This is approximately 4.5km north-west of the development boundary at a roadside location within an AQMA. Due to the distance from the proposed development site, similar pollutant concentrations would not be expected and as such this source of data has not been considered further in the context of this assessment.

EBC also utilises passive diffusion tubes to monitor NO₂ concentrations throughout the council. There are two suitable diffusion tubes located in the vicinity of the proposed development and monitoring results from recent years are summarised in Table 10.

Recent results are shown in Table 10 and in exceedances of the NO₂ AQO are highlighted in **bold**.

Table 10 Diffusion Tube Monitoring Results

Site Location		Type	NGR (m)		Annual Mean NO ₂ Concentration (µg/m ³)		
			X	Y	2014	2015	2016
HL	Hamble Lane	Roadside	447717	110347	36.65	31.97	36.91
HL2	Hamble Lane 2	Roadside	447745	110478	37.65	30.45	40.01





As indicated in Table 10 the annual mean AQO for NO₂ was exceeded at one location in recent years. This is due to their locations within an AQMA in Eastleigh Borough Council.

Reference should be made to Figure 2 within Appendix I for a graphical representation of the diffusion tube monitoring locations.

4.3 Background Pollutant Concentrations

Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The proposed development site is located in grid square NGR: 448500, 110500. Data for this location was downloaded from the DEFRA website⁹ for the purpose of this assessment and is summarised in Table 11 for the verification year (2016) and the predicted development opening year (2019).

Table 11 Predicted Background Concentrations

Pollutant	Predicted Background Concentration (µg/m ³)	
	2016	2019
NO _x	31.00	28.43
NO ₂	21.32	19.81
PM ₁₀	16.28	15.96

As shown in Table 11 background concentrations of NO₂ do not exceed the relevant AQO. Comparison with the monitoring results indicates the impact that vehicle exhaust emissions from the highway network have on pollutant concentrations at roadside locations

4.4 Construction Phase Sensitive Receptors

Receptors sensitive to potential dust impacts during earthworks were identified from a desk-top study of the area up to 350m from the development boundary. These are summarised in Table 12.

Table 12 Earthworks Dust Sensitive Receptors

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

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

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





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 13. 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 construction traffic would access the site from Windmill Lane off Providence Road (A27) to ensure the maximum potential trackout distance was considered.

Table 13 Trackout Dust Sensitive Receptors

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

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

There are no ecological receptors within 50m of the site or trackout boundary. As such, ecological impacts have not 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 14.

Table 14 Additional Area Sensitivity Factors

Guidance	Comment
Whether there is any history of dust generating activities in the area	The site is located in a predominantly residential location. There is likely to have been a history of dust generating activities due to development in the locality
The likelihood of concurrent dust generating activity on nearby sites	A review of the Eastleigh Development portal indicated that there are no upcoming planning applications within 500m of the site. As such, there is limited risk of concurrent dust generating activity
Pre-existing screening between the source and the receptors	There is currently vegetation present on the western boundary, flanking the M27. If retained this could provide limited natural protective screening to future users
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	The wind direction is predominantly from the south-west of the development, as shown in Figure 5 within Appendix I. As such, properties to the north-east of the proposed development would be most affected by dust emissions





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	The development is scheduled for completion in 2019 therefore the construction phase is likely to complete within 1 year as such receptors may become more sensitive over time
Any known specific receptor sensitivities which go beyond the classifications given in the document.	No specific receptor sensitivities identified during the baseline

Based on the criteria shown in Table 4, the sensitivity of the receiving environment to potential dust impacts was considered to be **high**. This was because users would expect to be present continuously for extended period of times or value of their property could be diminished by soiling and people would be expected to be present for extended periods of time e.g. residential properties.

The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria shown in Section 3.1.2 is shown in Table 15.

Table 15 Sensitivity of the Surrounding Area

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





5.0 ASSESSMENT

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

5.1 Construction Phase Assessment

5.1.1 Step 1

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

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

The desk-study undertaken to inform the baseline identified a number of sensitive receptors within 350m of the site boundary. As such, a detailed assessment of potential dust impacts was required.

5.1.2 Step 2

Earthworks

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. Information on soil type was not available for the purpose of this assessment. As such, the soil type was considered to be potentially dusty in order to provide a worst-case scenario.

The proposed development site is estimated to cover a total area of less than 2,500m². In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from earthworks is therefore **small**.

Table 15 indicates the sensitivity of the area to dust soiling effects on people and property is **medium**. In accordance with the criteria outlined in Table 8 the development is considered to be a **low** risk site for dust soiling as a result of earthworks activities.

Table 15 indicates the sensitivity of the area to human health is **low**. In accordance with the criteria outlined in Table 8, the development is considered to be a **negligible** risk site for human health as a result of earthwork activities.

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. Similarly, the surface material and unpaved road length was not known at this stage of the project.





Based on the site area, it is anticipated that the unpaved road length is likely to be below 50m. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from trackout is therefore **small**.

Table 15 indicates the sensitivity of the area to dust soiling effects to people and property is **high**. In accordance with the criteria outlined in Table 9, the development is considered to be a **low** risk site for dust soiling as a result of trackout activities.

Table 15 indicates the sensitivity of the area to human health is **medium**. In accordance within the criteria outlined in Table 9, the development is considered to be a **negligible** risk site for human health as a result of trackout activities.

Summary of the Risk of Dust Effects

A summary of the risk from each dust generating activity is provided in Table 16.

Table 16 Summary of Potential Unmitigated Dust Risks

Potential Impact	Risk	
	Earthworks	Trackout
Dust Soiling	Low	Low
Human Health	Negligible	Negligible

As indicated in Table 16 , the potential risk of dust soiling is **low** for earthworks. The potential risk of human health impacts is **negligible** for earthwork, and trackout activities

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.

5.1.3 Step 3

The IAQM guidance 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 17. The mitigation measures outlined in Table 17 can be reviewed prior to the commencement of construction works incorporated into the existing the strategies as applicable.

Table 17 Fugitive Dust Mitigation Measures





Issue	Control Measure
Communications	• Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary • Display the head or regional office contact information • Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the LA
Site Management	• Record all dusty and air quality complaints • Make the complaints log available to the LA when asked • Record any exceptional incidents that cause dust/or air emissions, and the action taken to resolve the situation
Monitoring	• Undertake daily on-site and off-site inspection where receptors are nearby to monitor dust • Carry out regular site inspections to monitor compliance with the DMP • Increase frequency of site inspections when activities with a high potential to produce dust are being carried out
Preparing and Maintaining the Site	• Plan site layout so that machinery and dust causing activities are located away from receptors • Fully enclose site or specific operations where there is a high potential for dust production and the site as active for an extensive period • Avoid site runoff of water or mud • Keep site fencing, barriers and scaffolding clean using wet methods • Cover, seed or fence stockpiles to prevent wind whipping Use water as dust suppressant where applicable
Operating Vehicle/ Machinery and Sustainable Travel	• All vehicles to switch off engines - no idling vehicles • Avoid the use of diesel or petrol powered generators where practicable • Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph in unsurfaced haul roads
Operations	• Cutting equipment to use water as dust suppressant or suitable local extract ventilation • Ensure adequate water supply on the site for effective dust/particulate matter suppression/mitigation • Use enclosed chutes and covered skips • Minimise drop heights • Ensure equipment is readily available on site to clean any spillages
Waste Management	• No bonfires
Earthworks	• Only remove the cover in small areas during work and not all at once • Avoid scabbling • Ensure sand and other aggregates are stored and not able to dry out, unless it is required for a specific process





Issue	Control Measure
Trackout	• Use water-assisted dust sweeper on the access and local roads • Avoid dry sweeping of large areas • Ensure vehicles entering and leaving sites are covered to prevent escape of materials • Inspect on-site routes for integrity, instigate necessary repairs and record in site log book • Implement a wheel washing system at a suitable location near site exit

5.1.4 Step 4

Assuming the relevant mitigation measures outlined in Table 17 are implemented, the residual effect from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance⁷.

5.2 Operational Phase Assessment

5.2.1 Future Exposure

The proposed development has the potential to expose future users to elevated pollution levels. This was assessed through dispersion modelling, with the results presented in the following Sections.

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

5.3 Nitrogen Dioxide - Annual Mean

Figure 6 within Appendix I displays the contour plot for the predicted annual mean NO₂ concentrations at 1.5m which is representative of exposure across the ground floor level of the development for the proposed opening year (2019).

Predicted annual mean NO₂ concentrations across the development site are summarised in Table 18.

Table 18 Predicted Annual Mean NO₂ Concentrations at the Development Site

Elevation	Predicted 2019 Annual Mean NO ₂ Concentration Range (µg/m ³)
Ground (1.5m)	31.88 – 45.16

The predicted concentrations shown in Table 18 indicate that there are exceedances of the AQO at areas adjacent to the M27. As shown in Figure 6 it should be noted that these exceedances within the site extents are restricted to the western boundary, immediately adjacent to the M27. It is recommended that residential units located within this area of exceedance, require the implementation of mitigation measures to protect future site users from elevated NO₂ concentrations. This is discussed in Section 6.0.

Based on the results of the dispersion modelling assessment, the site is considered suitable for the proposed end use subject to the implementation of mitigation measures.





5.4 PM₁₀ - Annual Mean

Figure 7 within Appendix I displays the contour plot for the predicted annual mean PM₁₀ concentrations at 1.5m which is representative of exposure across the ground floor level of the development for the proposed opening year (2019).

Predicted annual mean PM₁₀ concentrations across the development site are summarised in Table 19.

Table 19 Predicted Annual Mean PM₁₀ Concentrations at the Development Site

Elevation	Predicted 2019 Annual Mean PM ₁₀ Concentration Range (µg/m ³)
Ground (1.5m)	17.50 - 19.06

The predicted concentrations shown in Table 19 indicate that there were no exceedances of the AQO throughout the modelling area. As such, there is predicted to be no risk of exceedance of the annual mean AQO for PM₁₀ at proposed residential receptors.

Based on the results of the dispersion modelling assessment, the site is considered to be suitable for residential use without the implementation of mitigation techniques to protect future residents from elevated annual mean PM₁₀ concentrations.

5.5 Road Traffic Exhaust Emission

Any additional vehicle movements associated with the proposed development will generate exhaust emissions, such as NO₂ and PM₁₀ on the local and regional road networks.

Although there was no Transport Consultant appointed to this scheme, the anticipated vehicle generation was based upon the number of proposed units. It is anticipated that the 6 proposed residential units, will not result in a change of AADT flows of more than 500, produce over 100 HDV movements per day or significantly affect average speeds on the local road network. Additionally, it is unlikely that the proposed development will generate or increase traffic congestion, increase vehicle speed, significantly alter the traffic composition on local roads or include significant new car parking.

As such, potential air quality impacts associated with operational phase road vehicle exhaust emissions are predicted to be **not significant**, in accordance with the EPUK and IAQM⁸ screening criteria shown in Section 3.2.2.





6.0 MITIGATION

There are a number of air quality mitigation options available to reduce potential exposure of future site users to elevated pollutant concentrations. However, all techniques have financial implications and may therefore affect scheme viability.

6.1 Construction Phase

The IAQM guidance⁸ provides a number of potential mitigation measures to reduce potential impacts from the construction phase. As a low risk of dust impacts as a result of earthworks was identified, mitigation measures are required. These have been adapted for the development site as summarised in Table 17. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan if required by EBC.

6.2 Operational Phase

Detailed dispersion modelling indicated that annual mean NO₂ concentrations were categorised as exceeding the AQO at Unit 6 of the proposed residential unit on the ground floor of the development adjacent to the western boundary of M27. As such, the inclusion of appropriate mitigation measures is therefore required in order to reduce the potential for exposure of site users to elevated pollutant concentrations. These could include:

- ▶ Room layout orientation to locate sensitive areas such as living rooms and bedrooms away from poor air quality; and
- ▶ The omitting of openings such as doors and openable windows in areas of poor air quality with the use of mechanical ventilation to provide clean air to rooms to these areas.

The air inlet to any mechanical ventilation for unit 6 should be located to the rear of this unit within the proposed ventilation location area (as shown in Figure 6). This should ensure a supply of clean air for residents.

As an alternative to sealed windows, a high specification of air tightness on the windows and doors could be incorporated within the area experiencing exceedances of the AQO. Therefore, when these are closed, the units would be ventilated by clean air from the mechanical system. This provides freedom of choice over whether natural ventilation is preferable during certain periods. The key to reducing exposure using this method is to ensure occupants are informed over the potential impacts associated with prolonged exposure to elevated pollution levels. As such, it may also be possible to provide development users with a welcome pack containing air quality information which will allow them to follow appropriate advice on protection against high concentrations during certain periods.

PM₁₀ concentrations are considered to be acceptable and do not require any further mitigating measures.

These proposed mitigation options are considered a suitable solution for a development of this size and nature.





7.0 CONCLUSION

Resource and Environmental Consultants Ltd was commissioned by Tracey Buckland to undertake an Air Quality Assessment in support of a planning application for a proposed residential site at Oakdene, Windmill Lane, Bursledon.

It is understood that the proposal comprises the extension of the existing site to provide 6 further mobile homes, alongside associated infrastructure.

The site is located in the vicinity of the M27, which is considered a significant source of road vehicle emission and, as such, there are concerns that the development will introduce future site users to an area experiencing elevated pollutant concentrations. Additionally, there is potential for the proposed development to cause air quality impacts at nearby sensitive receptors during the construction phase. As such, an Air Quality Assessment was required to quantify pollutant levels across the site, assess potential construction phase impacts and consider site suitability for the proposed end-use.

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 air quality impacts from dust generated by earthwork and trackout activities was predicted to be **not significant**.

For the operational phase of the development, potential impacts may occur as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site. An assessment was therefore undertaken using the EPUK and IAQM⁸ screening criteria to determine the potential for vehicles generated by the development to affect local air quality. This indicated that impacts associated with vehicles travelling to and from the site were predicted to be **not significant**.

Dispersion modelling was also undertaken in order to quantify pollutant concentrations across the site and to assess potential exposure of future users. Results were subsequently verified using local monitoring results obtained from EBC.

The dispersion modelling results indicated that NO₂ levels exceeded the AQOs at residential unit 6 on the ground floor level adjacent to the western boundary of the M27. In order to protect residents from the poor air quality, mechanical ventilation should be included for the rear habitable rooms at unit 6 (as referred to in Figure 6) as detailed in section 6.2. Mitigation of this type is considered suitable for a development of this size and nature. The annual mean AQO for PM₁₀ was not exceeded at any location across the site.

Based on the assessment results, air quality is not considered a constraint to planning consent for the proposed development, subject to the inclusion of relevant mitigation measures.





8.0 ABBREVIATIONS

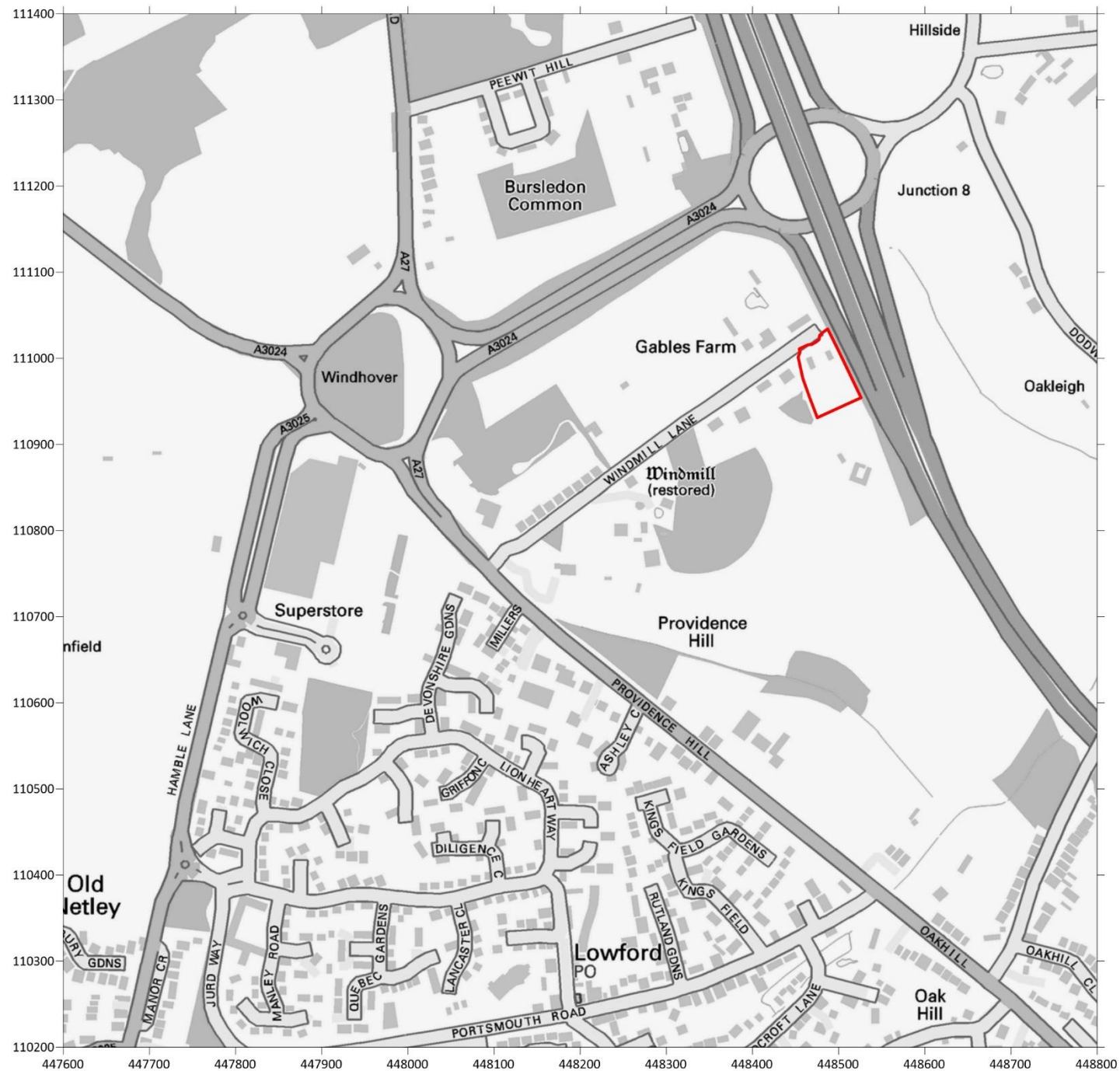
AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQAP	Air Quality Action Plan
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Strategy
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EBC	Eastleigh Borough Council
EPUK	Environmental Protection UK
EU	European Union
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
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 _{2.5}	Particulate matter with an aerodynamic diameter of less than 2.5µm
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10µm
REC	Resource and Environmental Consultants
RPG	Russell Giles Partnership Limited
TEB	Transport Emission Benchmark
TEMPRO	Trip End Model Presentation Program
Z ₀	Roughness Length





APPENDIX I FIGURES





Legend



Site Boundary

Title

Figure 1
Site Location

Project

Oakdene, Windmill Lane, Bursledon

Project Number

AQ105125

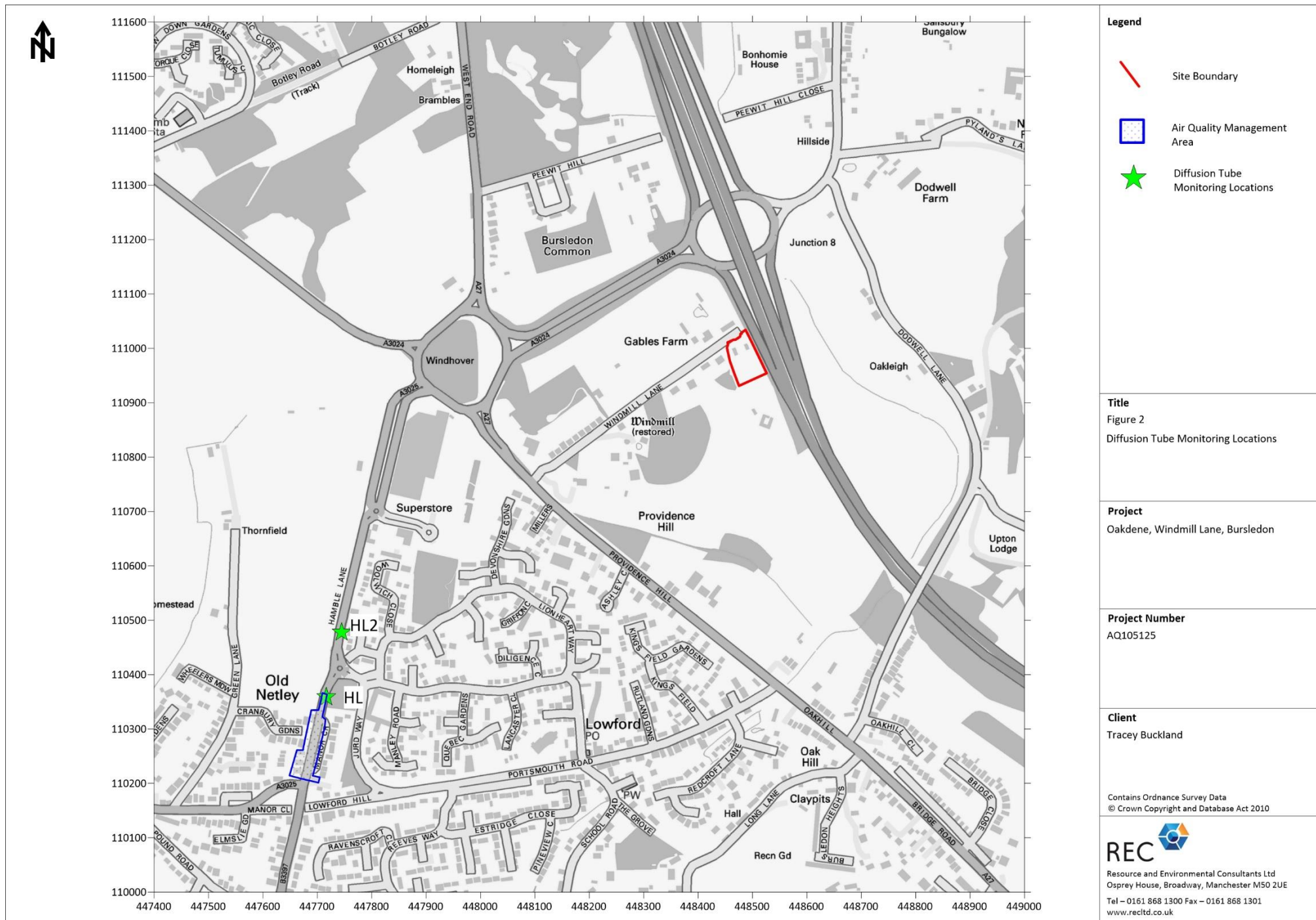
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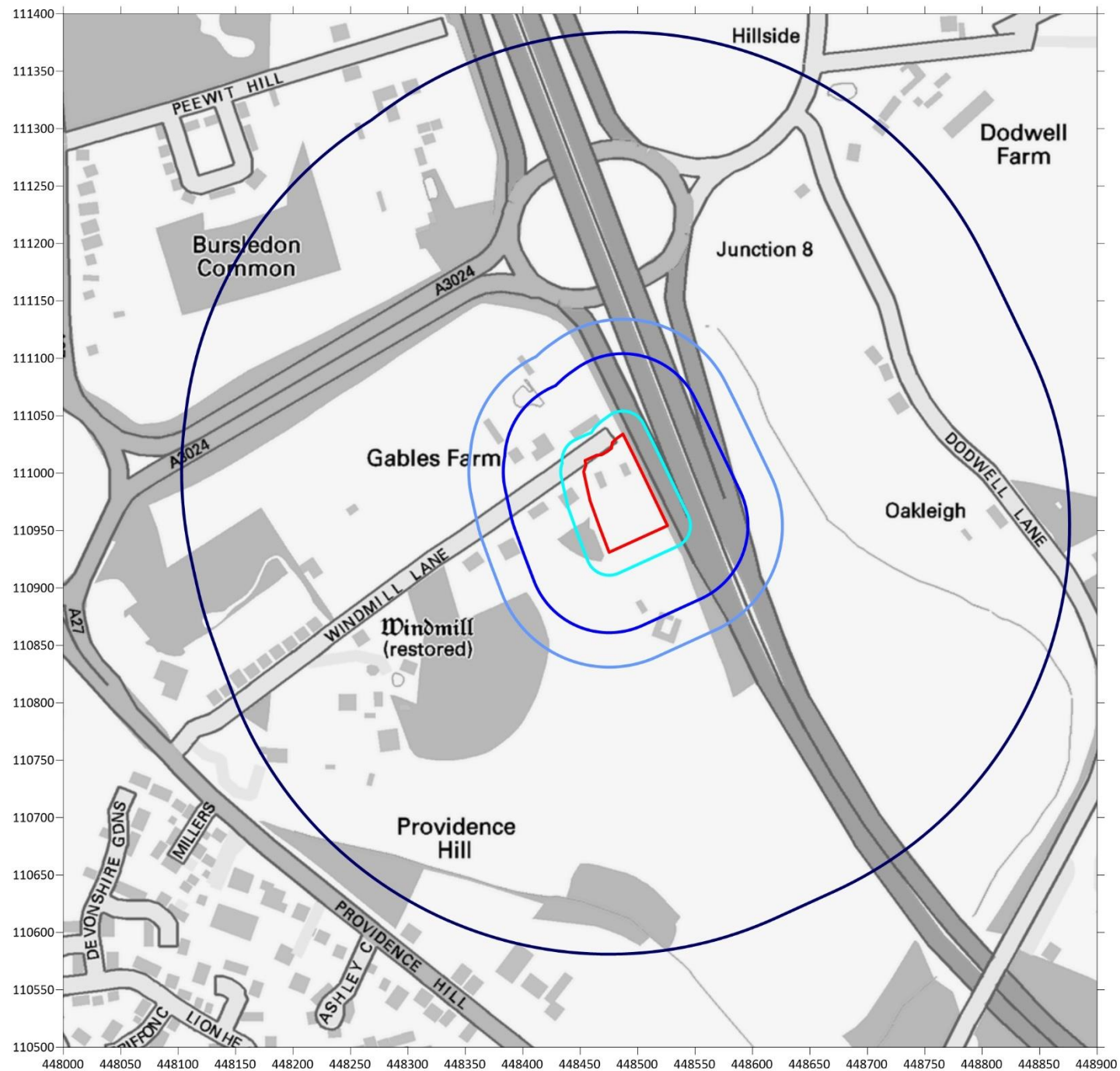
Tracey Buckland

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Legend

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

Title

Figure 3
Earthworks
Dust Buffer Zones

Project

Oakdene, Windmill Lane, Bursledon

Project Number

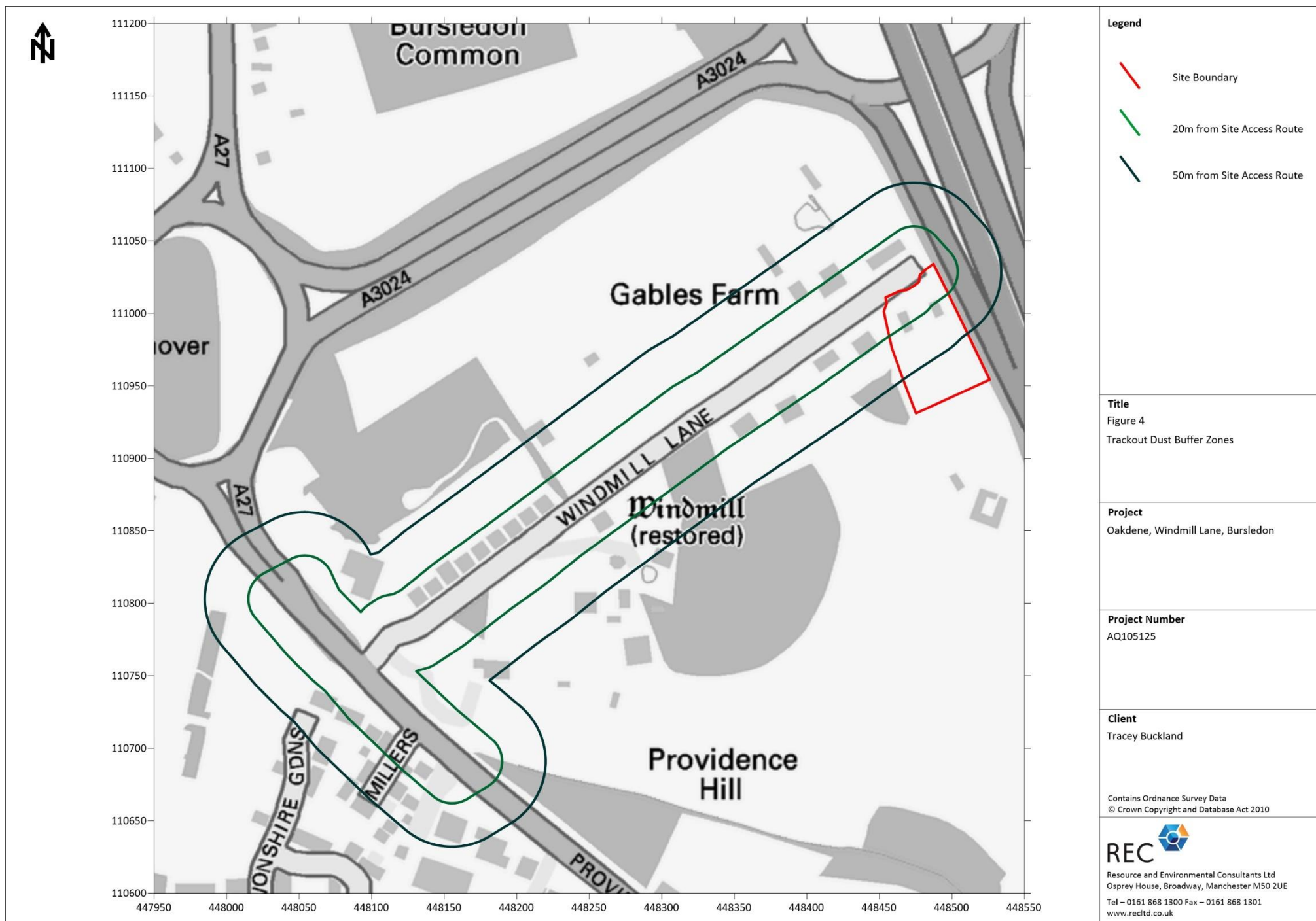
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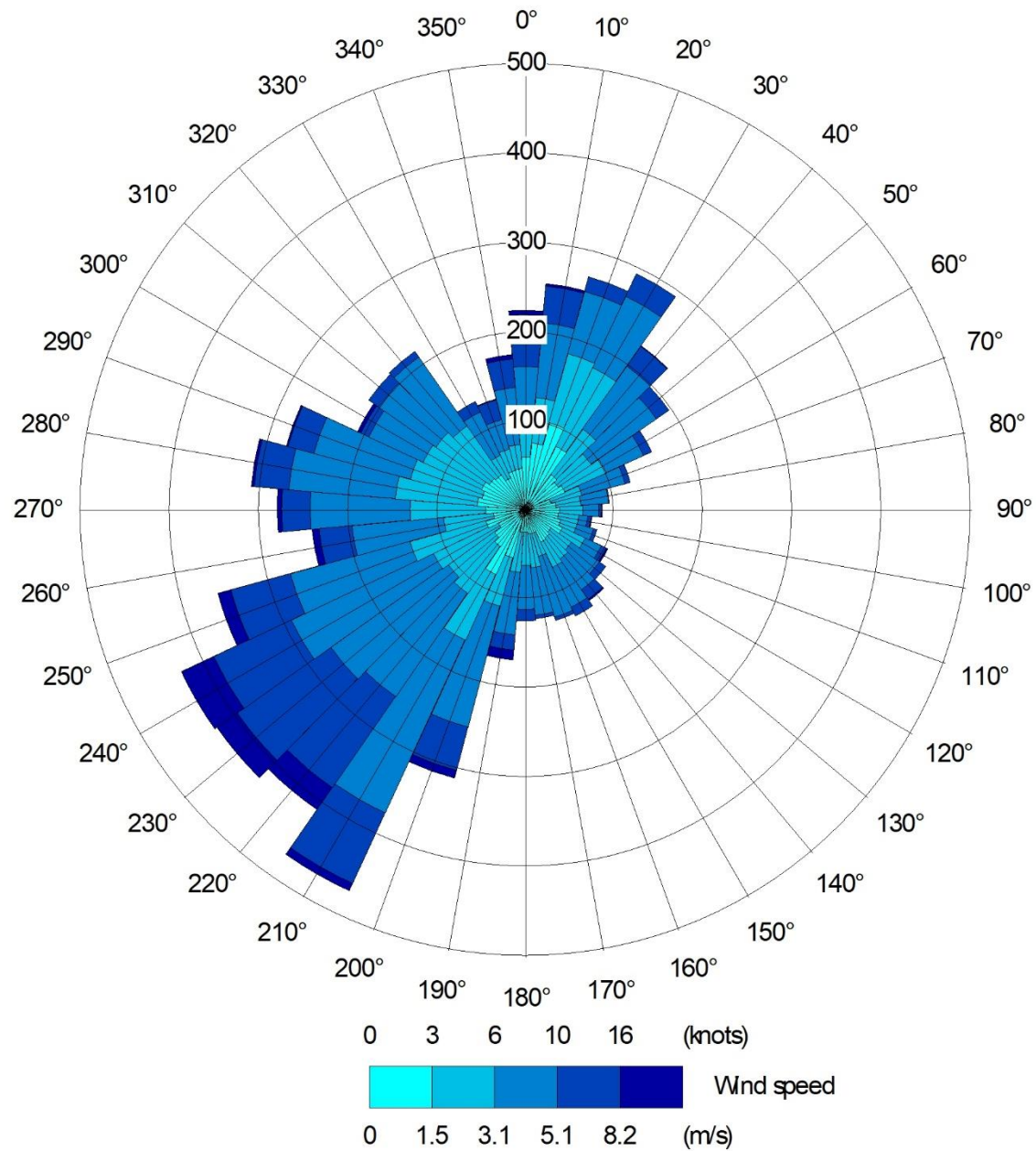
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Legend

Title

Figure 5
Wind Rose
Southampton Airport 2016
Meteorological Station

Project

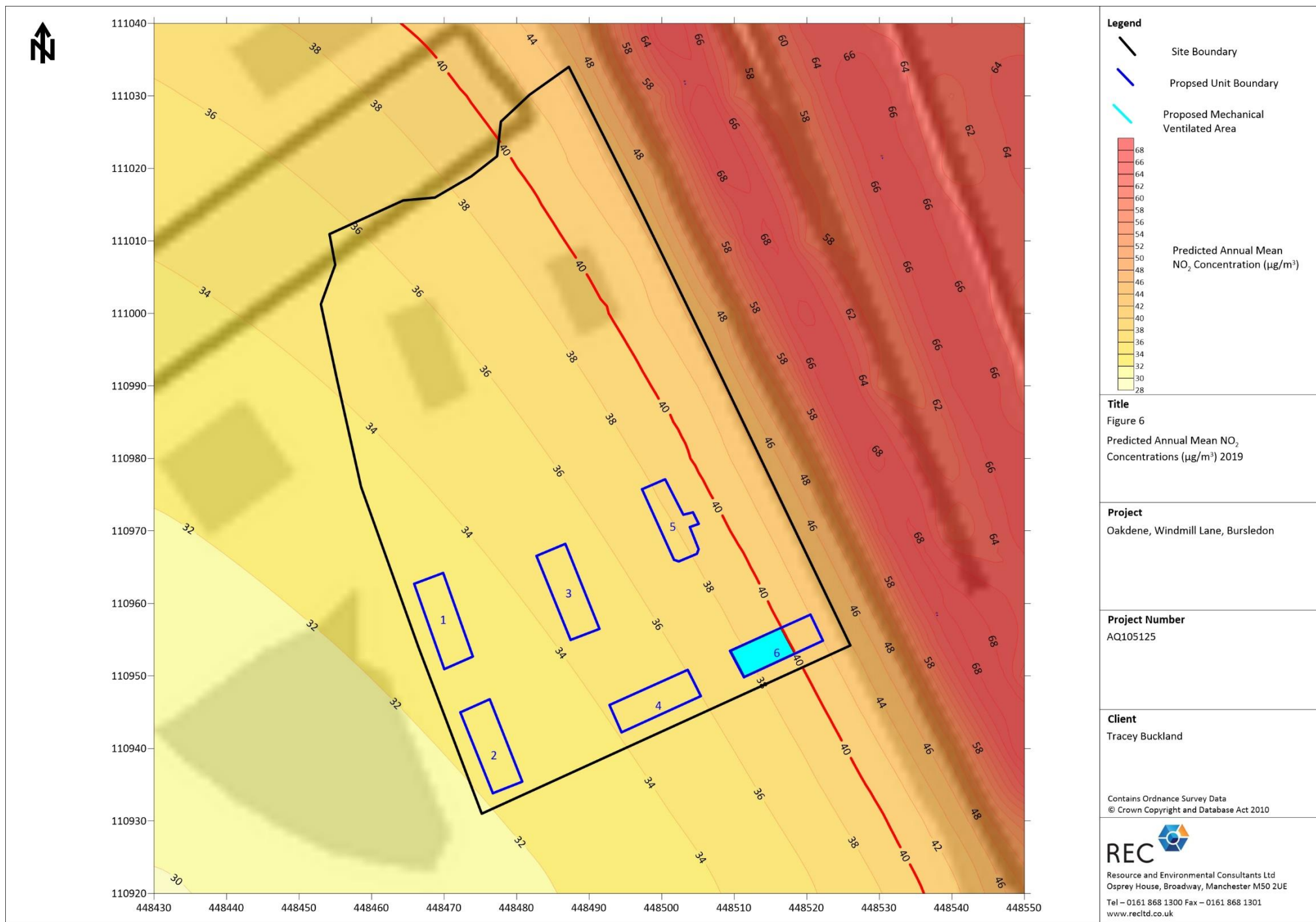
Oakdene, Windmill Lane, Bursledon

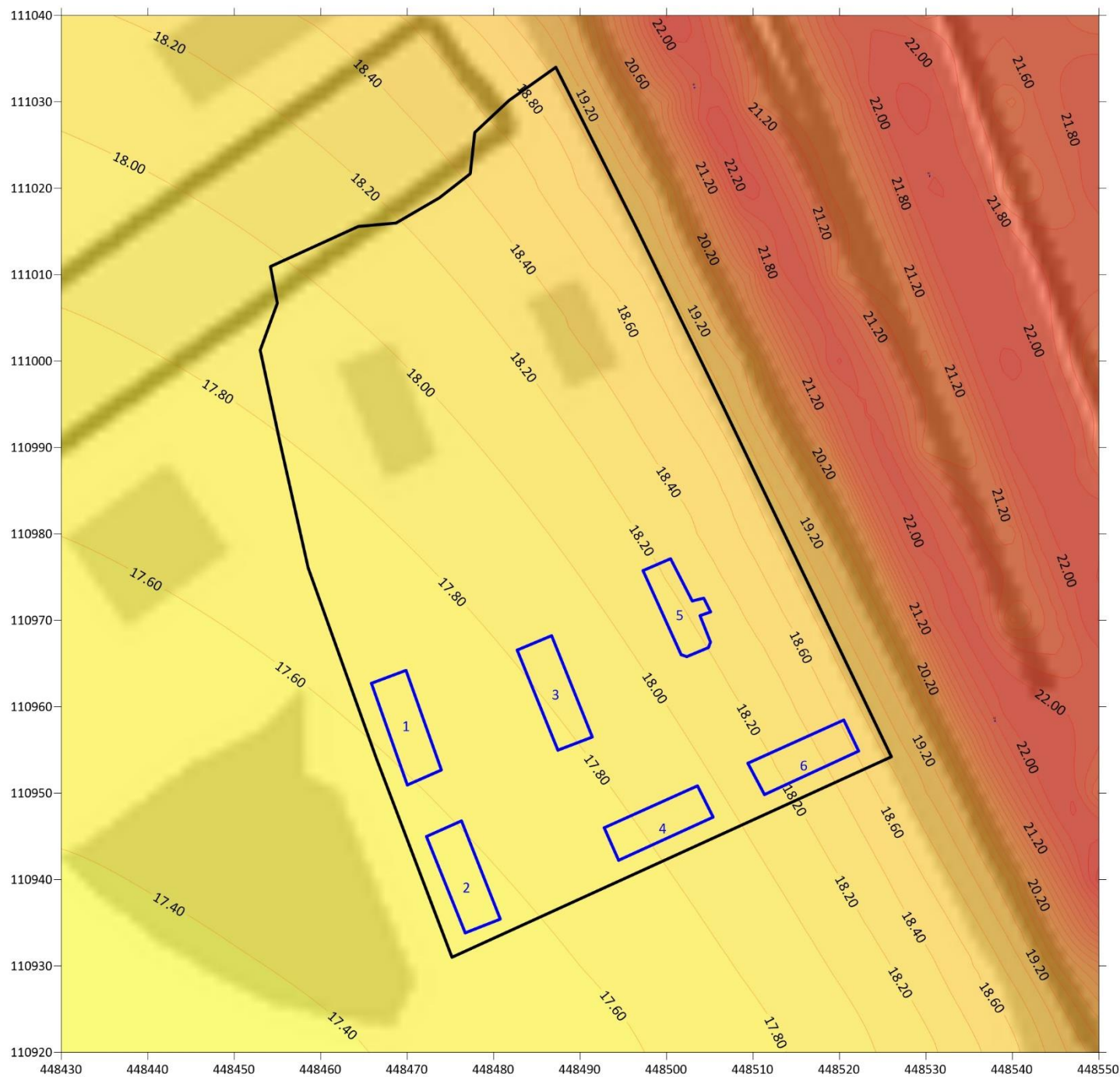
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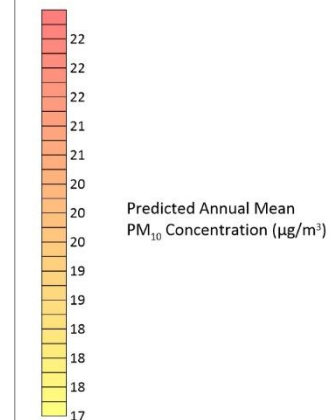
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Legend

- Site Boundary
- Proposed Unit Boundary



Title

Figure 7
Predicted Annual Mean PM_{10}
Concentrations ($\mu g/m^3$) 2019

Project

Oakdene, Windmill Lane, Bursledon

Project Number

AQ105125

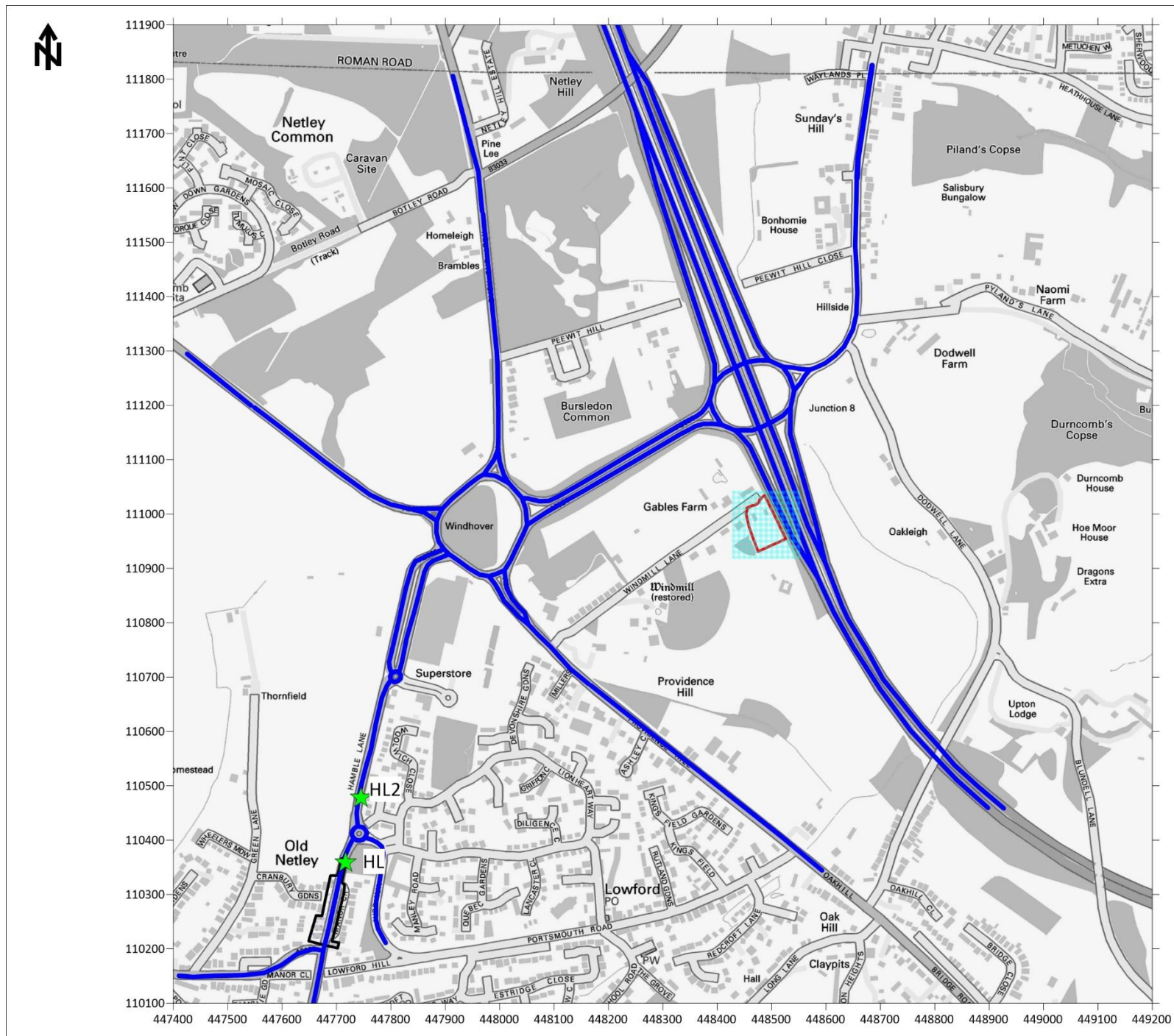
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Air Quality Assessment
Oakdene, Windmill Lane,
Bursledon
June 2018
AQ105125r4

APPENDIX II ASSESSMENT INPUT DATA





ADMS-ROADS ASSESSMENT INPUTS

The proposed development has the potential to expose future site users to elevated pollutant levels. In order to assess NO₂ and PM₁₀ concentrations across the site, detailed dispersion modelling was undertaken in accordance with the following methodology.

The dispersion 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 inputs are described in the following subsections.

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.

Assessment Area

Ambient concentrations were predicted over the area NGR: 448430, 110920 to 448550, and 111040. One Cartesian grid with a resolution of 10m was used to model concentrations at the 1.5m height.

Reference should be made to Figure 8 within Appendix I for a graphical representation of the assessment grid extents and ADMS-Road inputs for the operational year.

Traffic Flow Data

24-hour flows and fleet composition were downloaded from the Department for Transport (DfT) Matrix. 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 2016. It should be noted that the DfT matrix is referenced in DEFRA guidance LAQM (TG16)² as being a suitable source of data for air quality assessments and is therefore considered to provide a reasonable representation of traffic flows in the vicinity of the site.

Growth factors provided by the Trip End Model Presentation Program (TEMPRO v7.2) software package were utilised to allow for conversion from the obtained 2015 traffic flow year to 2016, for model verification, and to 2019 which was used to represent the operational year of the proposed development.





Some of the traffic data used in the assessment was provided by the Transport Consultant assigned for one of the previous Air Quality Assessments undertaken by REC. (AQ102155r1).

Road widths were estimated from aerial photography and UK highway design standards. Reference should be made to Figure 8 within Appendix I for a graphical representation of the road link locations. Vehicle speeds were estimated based on the free flow potential of each link and local speed limits.

A summary of the traffic data used in the assessment is provided in Table All.1 and Table All.2.

Table All.1 2016 Traffic Data

Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)
1A	Portsmouth Road	5.5	10,975	3.78	30
1B	Portsmouth Road Junction	7	10,975	3.78	20
2A	Hamble Lane near Tesco	5.8	35,025	2.24	30
2B	Hamble Lane Tesco Mini Roundabout	8.1	35,025	2.24	20
2C	Hamble Lane Northbound Split	5.4	17,512	2.24	30
2D	Hamble Lane Southbound Split	5.4	17,512	2.24	20
3C	Jurd Way Junction	12.4	7,971	2.44	20
4A	Hamble Lane South of Jurd Way	6.4	35,025	2.44	30
4B	Hamble Lane South of Jurd Way Junction	11.5	35,025	2.44	15
R1	Roundabout at Hamble Lane and Jurd Way	7.3	39,010	1.63	15
R2	A27 Roundabout	11.2	80,538	2.11	20
5Ai	Providence Hill - Northbound	6.9	8,911	2.69	15
5Aii	Providence Hill - Southbound	6.4	8,911	2.69	15
5B	Providence Hill - South of Windmill Lane	10.2	17,822	2.69	40
6B	West End Road North	8.5	16,780	1.89	40
6Ci	West End Road South - Southbound	6.3	8,390	1.89	15
6Cii	West End Road South - Northbound	7	8,390	1.89	15
7	Bursledon Road - South of Heathhouse Lane	7.6	18,892	2.00	30
7A	Dodwell Lane South	8.4	18,892	2.00	20
7b	Dodwell Lane Junction Approach	9.4	9,446	2.00	15
7c	Dodwell Lane Junction Depart	6.5	9,446	2.00	15





Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)
7D	A3024 Junction Depart West	7	45,725	4.04	15
7E	A3024 West	7.5	45,725	4.04	40
7F	A3024 Junction Approach East	7.8	45,725	4.04	15
7G	A3024 East	7.8	45,725	4.04	40
8	M27 North Eastbound	14.5	63,345	6.82	90
9	M27 Junction 8 Eastbound	11	49,126	5.42	90
9A	M27 South Eastbound	10.8	54,585	5.78	90
9B	M27 South Westbound	14.5	77,421	5.42	90
9C	M27 Junction 8 Westbound	11	60,710	5.42	90
9D	M27 South Westbound	10.5	66,714	5.78	90
9E	M27 Off-slip Westbound	6	6,671	5.78	45
9F	M27 On-slip Westbound	7	6,671	5.42	50
9G	M27 Off-slip Eastbound	6.9	5,458	5.42	45
9H	M27 On-slip Eastbound	6	5,458	5.78	50
R3	M27 Junction 8 Roundabout	9.1	111,021	5.07	20
10a	Burlesdon Road Northbound - R2 Exit	8.2	9,700	5.78	15
10b	Burlesdon Road Southbound - R2 Approach	9.9	9,700	5.78	15
10C	Burlesdon Road - North of R2	6.3	19,401	5.78	50

The road width and mean vehicle speeds shown in Table AII.1 remained the same for the 2019 scenario. A summary of the 2019 traffic data is shown in Table AII.2.

Table AII.2 2019 Traffic Data

Road Link		24-hour AADT Flow	HDV Prop. (%)
1A	Portsmouth Road	11,372	3.78
1B	Portsmouth Road Junction	11,372	3.78
2A	Hamble Lane near Tesco	36,292	2.24
2B	Hamble Lane Tesco Mini Roundabout	36,292	2.24





Road Link		24-hour AADT Flow	HDV Prop. (%)
2C	Hamble Lane Northbound Split	18,146	2.24
2D	Hamble Lane Southbound Split	18,146	2.24
3C	Jurd Way Junction	8,260	2.44
4A	Hamble Lane South of Jurd Way	36,292	2.44
4B	Hamble Lane South of Jurd Way Junction	36,292	2.44
R1	Roundabout at Hamble Lane and Jurd Way	40,422	1.63
R2	A27 Roundabout	83,454	2.11
5Ai	Providence Hill - Northbound	9,233	2.69
5Aii	Providence Hill - Southbound	9,233	2.69
5B	Providence Hill - South of Windmill Lane	18,467	2.69
6B	West End Road North	17,387	1.89
6Ci	West End Road South - Southbound	8,694	1.89
6Cii	West End Road South - Northbound	8,694	1.89
7	Bursledon Road - South of Heathhouse Lane	19,576	2.00
7A	Dodwell Lane South	19,576	2.00
7b	Dodwell Lane Junction Approach	9,788	2.00
7c	Dodwell Lane Junction Depart	9,788	2.00
7D	A3024 Junction Depart West	47,380	4.04
7E	A3024 West	47,380	4.04
7F	A3024 Junction Approach East	47,380	4.04
7G	A3024 East	47,380	4.04
8	M27 North Eastbound	65,638	6.82
9	M27 Junction 8 Eastbound	50,904	5.42
9A	M27 South Eastbound	56,561	5.78
9B	M27 South Westbound	80,224	5.42
9C	M27 Junction 8 Westbound	62,908	5.42
9D	M27 South Westbound	69,130	5.78
9E	M27 Off-slip Westbound	6,913	5.78





Road Link		24-hour AADT Flow	HDV Prop. (%)
9F	M27 On-slip Westbound	6,913	5.42
9G	M27 Off-slip Eastbound	5,656	5.42
9H	M27 On-slip Eastbound	5,656	5.78
R3	M27 Junction 8 Roundabout	115,040	5.07
10a	Burlesdon Road Northbound - R2 Exit	10,052	5.78
10b	Burlesdon Road Southbound - R2 Approach	10,052	5.78
10C	Burlesdon Road - North of R2	20,103	5.78

Road Traffic Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 8.0.1) released in 2017, which incorporates updated COPERT 5 vehicle emissions factors for NO_x and vehicle fleet information.

There is current uncertainty over NO₂ concentrations within the UK, with roadside levels not reducing as previously expected due to the implementation of new vehicle emission standards. Therefore, 2016 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 Southampton Airport meteorological station over the period 1st January 2016 to 31st December 2016 (inclusive). Southampton Airport meteorological station is located at approximate NGR: 42880, 205740, which is approximately 4.6km north-west 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

A roughness length (z_0) of 0.5m was used in this dispersion modelling study. This value of z_0 is considered appropriate for the morphology of the assessment area and is suggested within ADMS-Roads as being suitable for 'Parkland, open suburbia'.

A z_0 of 0.3m was utilised to represent the morphology of the meteorological station location and is suggested as being suitable for 'agricultural max''.





Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used in this dispersion modelling study. This value is considered appropriate for the nature of the assessment area and meteorological station location and is suggested within ADMS-Roads as being suitable for 'cities and large town'.

A minimum Monin-Obukhov length of 10m was used in this dispersion modelling study. This value is considered appropriate for the meteorological station location and is suggested within ADMS-Roads as being suitable for 'small town >50, 000'.

Background Concentrations

An annual mean NO₂ concentration of 21.32µg/m³, and PM₁₀ concentration of 16.28µg/m³ as predicted by DEFRA, was used in the dispersion modelling assessment to represent annual mean pollutant levels in the vicinity of the site.

Similar, to emission factors, background concentrations for 2016 were utilised in preference to the development opening year of 2019. This provided a robust assessment and is likely to overestimate actual pollutant concentrations during the operation of the proposals.

Since both the monitoring locations used in the verification process were located in different grid squares to those of the proposed development, predicted concentrations from their exact locations were used to represent their respective background concentrations. Table All.3 displays the specific background concentrations by DEFRA used for each diffusion tube in the verification process. This data was used in to ensure an accurate and robust model.

Table All.3 Predicted Diffusion Tube Monitoring Background Pollutant Concentrations

Diffusion Tube Grid Square	Diffusion Tubes	Pollutant	Predicted Background Concentration (µg/m ³)
			2016
477500, 110500	HL, HL2	NO _x	23.42
		NO ₂	16.58
		PM ₁₀	15.10

NO_x to NO₂ Conversion

Predicted annual mean NO_x concentrations from the dispersion model were converted to NO₂ concentrations using the spreadsheet provided by DEFRA, which is the method detailed within LAQM (TG16)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 2016, using traffic data, meteorological data and monitoring results from this year. EBC undertakes monitoring of NO₂ concentrations at two roadside locations within the assessment extents.

The road contribution to total NO_x concentration of each location was calculated from the monitored NO₂ result for use in the verification process. This was undertaken following the methodology contained within IAQM and EPUK guidance LAQM (TG16)². The dispersion model was run with the traffic input data previously detailed for 2016 to predict the NO_x concentration at the monitoring locations. The results are shown in Table AII.4.

Table AII.4 NO_x Verification Results

Site ID	Monitoring Location	Modelled Road NO _x Concentration (µg/m ³)	Monitored Road NO _x Concentration (µg/m ³)
HL	Hamble Lane	54.40	42.47
HL2	Hamble Lane 2	50.71	49.78

The monitored and modelled NO_x road contribution concentrations were graphed and the equation of the trendline based on the linear progression through zero was calculated, as shown in Graph 1. This indicated that a verification factor of **0.8740** was required to be applied to all NO_x modelling results, showing the model has a tendency to overestimate pollutant concentrations rather than underestimate pollutant concentrations. Therefore, in order to provide a robust assessment, a verification factor of **1.0** was applied to all results in preference to the calculated ratio.





Graph 1 - Primary Verification Adjustment Factor

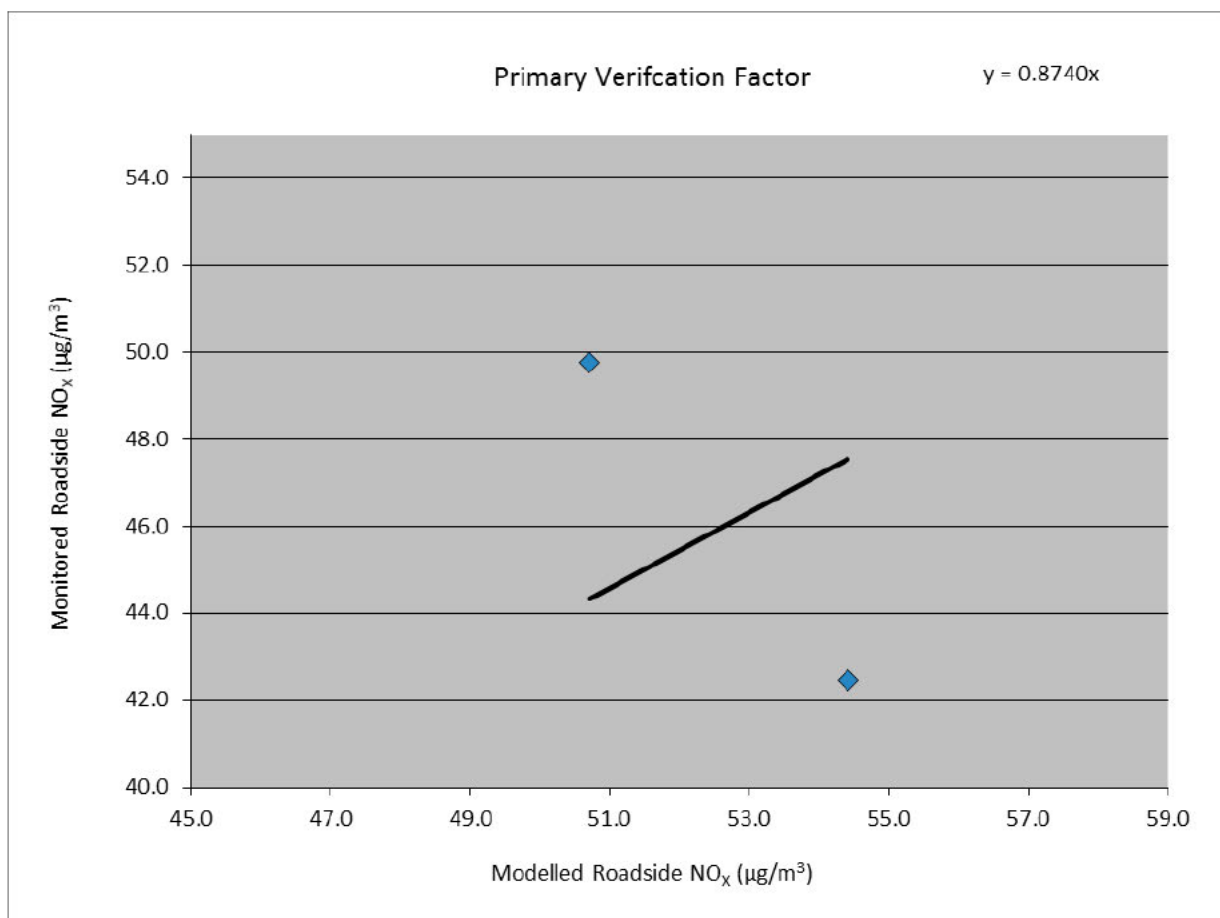


Table All.5 presents the monitored annual mean NO₂ concentrations and the adjusted modelled total NO₂ concentration based on the above verification factor. Exceedances of the relevant AQO are highlighted in **bold**

Table All.5 Verification Results

Site ID	Monitoring Location	Monitored NO ₂ Concentration (µg/m ³)	Adjusted Modelled Total NO ₂ Concentration (µg/m ³)	Difference (%)
HL	Hamble Lane	36.91	41.92	-13.57
HL2	Hamble Lane 2	40.01	40.40	-0.97

As PM₁₀ monitoring is not undertaken within the assessment extents, as such the NO₂ adjustment factor of 1.0 was also utilised to adjust model predictions of this pollutant in accordance with the guidance provided within LAQM ((TG16)².





Air Quality Assessment
Oakdene, Windmill Lane,
Bursledon
June 2018
AQ105125r4

APPENDIX III ASSESSOR'S CURRICULUM VITAE





CONAL KEARNEY

Associate Director

BEng(Hons), MSc, MIAQM, MIEEnvSc

KEY EXPERIENCE:

Conal is a Principal Consultant with specialist experience in the air quality and odour sector. His key capabilities include:

- ▶ Advanced atmospheric air dispersion modelling of road vehicle and industrial emissions using ADMS-ROADS and AIRVIRO.
- ▶ 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.
- ▶ Management and delivery of project work on key, land development and urban regeneration projects.
- ▶ 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.
- ▶ Dust and Odour impact assessments from minerals and waste sites
- ▶ Representing clients at public enquiries and planning hearings.

QUALIFICATIONS:

- ▶ Bachelor of Engineering
- ▶ Master of Science
- ▶ Member of Institute of Air Quality Management
- ▶ Member of the Institute of Environmental Science (IES)

SELECT PROJECTS SUMMARY:

Industrial Developments

Buck Park, Denholme - AQA and dust assessment for proposed mineral extraction and site restoration project.

Messingham Quarry, North Lincolnshire - AQA and dust impacts for proposed new sand extraction site.

Arden Quarry, Derbyshire - AQA for proposed mineral extraction and site restoration

Clayton Hall Landfill, Chorley - AQA and odour assessment for proposed landfill extension and mineral extraction.

Granta Park, Oxfordshire. Assessment of VOC fume emissions.

University of Birmingham. Permit application for CHP scheme.

Arbroath Road, Carnoustie. Odour and AQA for biogas CHP scheme.

Highways Developments

Alderley Edge Bypass, Cheshire - AQA for major new road scheme.

South Heywood – EIA for new link road and mixed use joint development

Residential Developments

Orchard Close, Knaresborough. AQA and public enquiry evidence.

Bredbury Curve, Stockport - AQA assessment for proposed residential development in AQMA.

Hollin Lane, Middlewich – AQA for large scale residential development.

Friars School, Southwark, London. School development for mixed use education and residential building in AQMA.

Abbotsford House, Bearsden, Scotland – AQA and dust assessment for residential development

Westcraig, Edinburgh - EIA chapter for residential development

Queensway, Lytham St Annes. Dust and odour assessment for development.

Manor Place, London. Road and energy generation emissions assessment

Craven Park, London. Mitigation statement and planning hearing expert opinion

Public Sector

Technical advisor on Manchester Airport Consultative Committee - advise members on environmental technical matters in relation to the airport's operations.

Cheshire County Council - compile AQ chapters for Local Transport Plan

Cheshire East Council - specialist AQ advice on highways, minerals and waste projects

Local Air Quality Management

Broughton Gyratory, Chester - dispersion model for City Centre detailed assessment report

Congleton town centre - dispersion modelling assessment for detailed and further assessment reports.

Disley - dispersion modelling assessment for detailed and further assessments

Holmes Chapel - dispersion modelling assessment for detailed and further assessment reports for road and rail sources.

Crewe - town centre dispersion modelling for detailed and further assessment reports.

Commercial Developments

Granta Park Daycare Centre, Oxfordshire. AQA for new build daycare centre adjacent to major road.

Curzon Cinema, Colchester. Air quality assessment for town centre new build cinema.

Newfoundland Circus, Bristol - AQA for hotel development in city centre

Salesians School, Chertsey - AQA for school extension near M25.

Cathedral Street and Thistle Street, Glasgow. University energy generation emission assessments.

