Redmore environmental

Air Quality Assessment

Whittle Street, Liverpool

Client: Mr Paul Lloyd

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Executive Summary

Redmore Environmental Ltd was commissioned by Mr Paul Lloyd to undertake an Air Quality Assessment in support of a planning application for a mixed-use development of residential, commercial and leisure land uses on land off Whittle Street, Liverpool.

The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road traffic exhaust emissions associated with vehicles travelling to and from the site during operation, as well as expose future occupants to elevated pollution levels. As such, an Air Quality Assessment was required in order to determine baseline conditions, consider site suitability for the proposed end-use and assess potential effects as a result of the scheme.

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

Potential impacts during the operational phase of the proposals may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. Dispersion modelling was therefore undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the local highway network both with and without the development in place. Results were subsequently verified using local monitoring data.

Review of the dispersion modelling results indicated that predicted air quality impacts as a result of traffic generated by the development were not significant at any sensitive location in the vicinity of the site.

The results of the assessment also indicated pollution levels above the relevant criteria at ground floor level. As such, suitable mitigation in the form of mechanical ventilation has been specified for the affected units. This should ensure future occupants are not exposed to poor air quality.

Based on the assessment results, air quality factors are not considered a constraint to planning consent for the development, subject to the inclusion of the specified mitigation.

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by Mr Paul Lloyd to undertake an Air Quality Assessment in support of a planning application for a mixed-use development on land off Whittle Street, Liverpool.

1.1.2 The proposed development has the potential to cause air quality impacts at sensitive locations during the construction and operational phases, as well as expose future occupants to elevated pollution levels. As such, an Air Quality Assessment was required in order to determine baseline conditions, consider site suitability for the proposed end-use and assess potential effects associated with the scheme.

1.2 Site Location and Context

1.2.1 The site is located on land off Whittle Street, Liverpool, at approximate National Grid Reference (NGR): 335076, 392924. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposals comprise the development of 177 residential units, commercial and leisure space alongside 123 car parking bays, 86 cycle parking spaces and associated infrastructure. Reference should be made to figure 2 for a site layout plan.

1.2.3 The development has the potential to cause impacts at sensitive locations. These may include fugitive dust emissions associated with construction works and road traffic exhaust emissions from vehicles travelling to and from the site during the operational phase. Further to this, there are concerns that the proposals may introduce future users to exceedences of the relevant Air Quality Objectives (AQOs). An Air Quality Assessment was therefore undertaken in order to determine baseline conditions, consider site suitability for the proposed end-use and consider potential effects as a result of the proposals. This is detailed in the following report.

2.0 LEGISLATION AND POLICY

2.1 European Directives

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

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

2.1.2 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

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

2.2.2 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 exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

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

Table 1 Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration (μg/m³)	Averaging Period
NO_2	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM_{10}	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum

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

Table 2 Examples of Where the Air Quality Objectives Apply

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed 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

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

2 Local Air Quality Management (TG16), DEFRA, 2016.

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
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 and 8-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

2.3 Local Air Quality Management

2.3.1 Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure, as summarised in Table 2, are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.4 Dust

2.4.1 The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations (2016), 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."

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

2.5 National Planning Policy

2.5.1 The National Planning Policy Framework[3] (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 the proposed development:

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

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

[3] NPPF, Department for Communities and Local Government, 2012.

2.6 National Planning Practice Guidance

2.6.1 The National Planning Practice Guidance[4] (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. Why should planning be concerned about air quality?
2. What is the role of Local Plans with regard to air quality?
3. Are air quality concerns relevant to neighbourhood planning?
4. What information is available about air quality?
5. When could air quality be relevant to a planning decision?
6. Where to start if bringing forward a proposal where air quality could be a concern?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?
9. How do considerations about air quality fit into the development management process?

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

2.7 Local Planning Policy

2.7.1 The local planning policy currently adopted by Liverpool City Council (LCC) is detailed within the Unitary Development Plan[5] (UDP), a statutory document which sits within the Local Plan. The UDP will gradually be replaced when the Liverpool Local Plan and the Joint Merseyside and Halton Waste Local Plan are adopted, until this time the UDP policies are used to determine planning applications.

2.7.2 A review of the UDP was undertaken in order to identify any planning policies relevant to the assessment. This indicated the following:

"Environmental Protection GEN 8

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[4] http://planningguidance.planningportal.gov.uk.

[5] Liverpool UDP, LCC, 2002.

The Plan aims to protect and enhance Liverpool's environment by:

[…]

ii. Controlling uses which can contribute to the incidence of land, air, water pollution and light spillage;

[…]"

"Pollution EP11

1. Planning permission will not be granted for development which has the potential to create unacceptable air, water, noise or other pollution or nuisance.
2. Where existing uses adversely affect the environment through noise, vibration, soot, grit, dust, smoke, fumes, smell, vehicle obstruction or other environmental problems, the City Council will:
i) Seek to reduce the problem on site;
ii) Refuse planning permission for development which would result in a consolidation or expansion of uses giving rise to environmental problems;
iii) Impose appropriate conditions on any permission which may be granted and/or obtain legal agreements in relation to such a permission, in order to regulate uses;
iv) Take enforcement action where appropriate; and
v) In appropriate circumstances, compulsorily acquire the premises whilst endeavouring to assist in the relocation of the firm, where resources permit.
In the case of new development close to existing uses which are authorised or licensed under pollution control legislation, and which are a potential nuisance to the proposed development, planning permission will not be granted unless the City Council is satisfied that sufficient measures can and will be taken to protect amenity and environmental health."

2.7.3 These policies have been considered throughout the report by assessing potential air quality impacts as a result of the proposed development.

3.0 METHODOLOGY

3.1 Introduction

3.1.1 The proposed development has the potential to cause air quality impacts during the construction and operational phases, as well as expose future occupants to elevated pollution levels. These issues have been assessed in accordance with the following methodology which was discussed with Paul Farrell, Environmental Health, LCC, on 12th February 2018.

3.2 Construction Phase Assessment

3.2.1 There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction V1.1'[6].

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

- Earthworks;
- Construction; and,
- Trackout.

3.2.3 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}.

3.2.4 The assessment steps are detailed below.

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

Step 1

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

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

Step 2

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

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

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

3.2.9 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 10,000m^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

Magnitude	Activity	Criteria
	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

3.2.10 Step 2B defines the sensitivity of the area around the development to potential dust impacts. The influencing factors are shown in Table 4.

Table 4 Construction Dust - Examples of Factors Defining Sensitivity of an Area

Receptor Sensitivity	Examples	
	Human Receptors	Ecological Receptors
High	• Users expect 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 (SSSI)
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, shopping streets, playing fields, farmland, short term car parks and roads	• Locally designated site e.g. Local Nature Reserve

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

- Any history of dust generating activities in the area;
- The likelihood of concurrent dust generating activity on nearby sites;
- Any pre-existing screening between the source and receptors;
- Any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which works will take place;
- Any conclusions drawn from local topography;

- Duration of the potential impact, as a receptor may become more sensitive over time; and,
- Any known specific receptor sensitivities which go beyond the classifications given in the document.

3.2.12 These factors were considered in the undertaking of this assessment.

3.2.13 The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in Table 5.

Table 5 Construction Dust - 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

3.2.14 Table 6 outlines the criteria for determining the sensitivity of the area to human health impacts.

Table 6 Construction Dust - 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

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
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 - 28μg/m^3	More than 100	High	Medium	Low	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	Less than 24μg/m^3	More than 100	Medium	Low	Low	Low	Low
		10 - 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	Greater than 32μg/m^3	More than 10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	28 - 32μg/m^3	More than 10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	24 - 28μg/m^3	More than 10	Low	Low	Low	Low	Low
		1 -10	Low	Low	Low	Low	Low
	Less than 24μg/m^3	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	-	1 or more	Low	Low	Low	Low	Low

3.2.15 Table 7 outlines the criteria for determining the sensitivity of the area to ecological impacts.

Table 7 Construction Dust - 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

3.2.16 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 Construction Dust - Dust Risk Category from Earthworks and Construction Activities

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

3.2.17 Table 9 outlines the risk category from trackout activities.

Table 9 Construction Dust - Dust Risk Category from Trackout Activities

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

Step 3

3.2.18 Step 3 requires the identification of site specific mitigation measures within the IAQM guidance[7] 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

3.2.19 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**.

3.2.20 The determination of significance relies on professional judgement and reasoning should be provided as far as practicable. The IAQM guidance suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix 2.

3.3 Operational Phase Assessment

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

- 2016 - Verification;
- Opening year Do-Minimum (DM) (predicted traffic flows in 2022 should the proposals not proceed); and,
- Opening year Do-Something (DS) (predicted traffic flows in 2022 should the proposals be completed).

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

3.3.2 Reference should be made to Appendix 1 for assessment input data and details of the verification process.

Potential Development Impacts

3.3.3 Locations sensitive to potential changes in pollutant concentrations were identified within 200m of the highway network in accordance with the guidance provided within the Design Manual for Roads and Bridges (DMRB)[8] on the likely limits of pollutant dispersion from road sources. The criteria provided within DEFRA guidance[9] on where the AQOs apply, as summarised in Table 2, was utilised to determine appropriate receptor positions.

3.3.4 The significance of predicted air quality impacts was determined in accordance with the guidance provided within the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'[10]. Using this methodology impacts were defined based on the interaction between the predicted pollutant concentration from the DS scenario and the magnitude of change between the DM and DS scenarios, as outlined in Table 10.

Table 10 Significance of Impact

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

3.3.5 The matrix shown in Table 10 is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which makes it clearer which cell the impact falls within. It should be noted that changes of 0%, i.e. less than 0.5%, are described as **negligible**.

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8 DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

9 Local Air Quality Management (TG16), DEFRA, 2016.

10 Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

3.3.6 Following the prediction of impacts at discrete receptor locations, the IAQM document[11] provides guidance on determining the overall air quality impact significance of the operation of a development. The following factors are identified for consideration by the assessor:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and,
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

3.3.7 The IAQM guidance states that an assessment must reach a conclusion on the likely significance of the predicted impact. It should be noted that this is a binary judgement of either it is **significant** or it is **not significant**.

3.3.8 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[12] suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix 2.

Future Exposure

3.3.9 The proposed development has the potential to expose future residents to poor air quality. Pollutant concentrations were therefore quantified across the site using dispersion modelling. The results were subsequently compared with the relevant AQOs to determine the potential for any exceedence. Reference should be made to Appendix 1 for details of the relevant modelling inputs.

[11] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

[12] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

4.0 BASELINE

4.1 Introduction

4.1.1 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.

4.2 Local Air Quality Management

4.2.1 As required by the Environment Act (1995), LCC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual mean concentrations of NO_2 are above the AQO within the city. As such, one AQMA has been declared. This is described as follows:

> "An area encompassing the whole of the City of Liverpool"

4.2.2 The development is located within the AQMA. As such, there is the potential for vehicles travelling to and from the site to increase pollution levels in this sensitive area, as well as the exposure of future occupants to poor air quality. These issues have been considered throughout the assessment.

4.2.3 LCC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs. As such, no further AQMAs have been designated.

4.3 Air Quality Monitoring

4.3.1 Monitoring of pollutant concentrations is undertaken by LCC throughout their area of jurisdiction. Recent NO_2 results recorded in the vicinity of the development are shown in Table 11. Exceedences of the annual mean AQO are shown in **bold**.

Table 11 Monitoring Results

Monitoring Site		Monitored NO_2 Concentration (µg/m³)		
		2014	2015	2016
N72	Country Road/Spellow Lane	**53.78**	**53.05**	**50.25**

4.3.2 As shown in Table 11, annual mean NO_2 concentrations were above the AQO at the N72 - Country Road/Spellow Lane diffusion tube in recent years. This would be expected based on the AQMA designation. Reference should be made to Figure 3 for a map of the survey position.

4.3.3 LCC do not undertake PM_{10} monitoring within the vicinity of the site.

4.4 Background Pollutant Concentrations

4.4.1 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: 335500, 392500. Data for this location was downloaded from the DEFRA website[13] for the purpose of the assessment and is summarised in Table 12.

Table 12 Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration (µg/m³)		
	2016	2018	2022
NO_2	18.89	17.31	14.19
PM_{10}	12.09	11.91	11.68

4.4.2 As shown in Table 12, predicted background NO_2 and PM_{10} concentrations are below the relevant AQOs at the development site.

13 https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015.

4.5 Sensitive Receptors

4.5.1 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 dust and road vehicle exhaust emission impacts in the following Sections.

Construction Phase Sensitive Receptors

4.5.2 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 13.

Table 13 Earthworks and Construction Dust Sensitive Receptors

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

4.5.3 Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 500m of the site access. These are summarised in Table 14. For the purpose of the assessment it was anticipated construction phase traffic would access the site from the Whittle Street.

Table 14 Trackout Dust Sensitive Receptors

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

4.5.4 There are no ecological receptors within 50m of the site or the trackout boundary. As such, ecological impacts have not been assessed further within this report.

4.5.5 A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 15.

Table 15 Additional Area Sensitivity Factors

Guidance	Comment
Whether there is any history of dust generating activities in the area	The desk top study did not indicate any dust generating activities in the local area
The likelihood of concurrent dust generating activity on nearby sites	A review of the planning portal did not indicate any additional development proposals likely to result in concurrent dust generation in the vicinity of the site
Pre-existing screening between the source and the receptors	There is no significant screening around the site boundary
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	As shown in Figure 4, the predominant wind bearing at the site is from the north-east. As such, receptors to the south-west of the boundary are most likely to be affected by dust releases
Conclusions drawn from local topography	There are no significant topographical constraints to dust dispersion
Duration of the potential impact, as a receptor may become more sensitive over time	Currently it is unclear as to the duration of the construction phase. However, it is possible that it will extend over one year
Any known specific receptor sensitivities which go beyond the classifications given in the document	No specific receptor sensitivities identified during the baseline assessment

4.5.6 Based on the criteria shown in Table 4, the sensitivity of the receiving environment to potential dust impacts was determined as **high**. This was because the identified receptors included residential properties. As such, users would expect to enjoy a reasonable level of amenity, aesthetics or value of their property could be diminished by soiling and people would be expected to be present for extended periods of time.

4.5.7 The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria shown in Section 3.2, is shown in Table 16.

Table 16 Sensitivity of the Surrounding Area

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

Operational Phase Sensitive Receptors

4.5.8 Locations sensitive to potential operational phase road vehicle exhaust emission impacts were identified from a desk-top study and are summarised in Table 17.

Table 17 Sensitive Receptor Locations

Receptor		NGR (m)	
		X	Y
R1	Residential - Sterling Way	335017.9	392871.8
R2	Residential - Great Homer Street	335049.6	392776.1
R3	Residential - Kirkdale Road	334945.8	392717.4
R4	Residential - Kirkdale Road	335173.4	392951.4
R5	Residential - Walton Road/Everton Valley	335274.1	393107.3
R6	Residential - Walton Road	335430.0	393377.8
R7	Residential - Barlow Lane/Walton Road	335534.6	393945.1
R8	Educational - Barlow Lane	335213.5	393430.8
R9	Residential - Everton Valley	335475.1	393163.2
R10	Residential - Walton Lane	335667.8	393265.3

4.5.9 The sensitive receptors identified in Table 17 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 proposals that have not been individually identified above. Reference should be made to Figure 5 for a graphical representation of road vehicle exhaust emission sensitive receptor locations.

5.0 ASSESSMENT

5.1 Introduction

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

5.2 Construction Phase Assessment

Step 1

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

5.2.2 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.

5.2.3 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.

Step 2

Earthworks

5.2.4 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. The proposed development site is estimated to cover an area between 2,500m^2 and 10,000m^2. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from earthworks is therefore **medium.**

5.2.5 Table 16 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 **medium** risk site for dust soiling as a result of earthwork activities.

5.2.6 Table 16 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 8, the development is considered to be a **low** risk site for human health impacts as a result of earthwork activities.

Construction

5.2.7 Due to the size of the development the total building volume is likely to be less than 25,000m^3. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from construction is therefore **small**.

5.2.8 Table 16 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 construction activities.

5.2.9 Table 16 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 8, the development is considered to be a **negligible** risk site for human health impacts as a result of construction activities.

Trackout

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

5.2.11 Table 16 indicates the sensitivity of the area to dust soiling effects on 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.

5.2.12 Table 16 indicates the sensitivity of the area to human health impacts is **medium.** In accordance within the criteria outlined in Table 9, the development is considered to be a **negligible** risk site for human health impacts as a result of trackout activities.

Summary of the Risk of Dust Effects

5.2.13 A summary of the risk from each dust generating activity is provided in Table 18.

Table 18 Summary of Potential Unmitigated Dust Risks

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

5.2.14 As indicated in Table 18, the potential risk of dust soiling is **medium** from earthworks and **low** from construction and trackout. The potential risk of human health impacts is **low** from earthworks and **negligible** from construction and trackout.

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

Step 3

5.2.16 The IAQM guidance[14] provides potential mitigation measures to reduce impacts as a result of fugitive dust emissions during the construction phase. These have been adapted for the development site as summarised in Table 19. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan if required by the LA.

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

Table 19 Fugitive Dust Emission Mitigation Measures

Issue	Control Measure
Communications	• Develop and implement a stakeholder communications plan that includes community engagement before work commences on site • Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager • Display the head or regional office contact information • Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the LA
Site management	• Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken • Make the complaints log available to the LA upon request • Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book
Monitoring	• Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the LA upon request • Increase the frequency of site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions
Site preparation	• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible • Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site • Fully enclose specific operations where there is a high potential for dust production and they are active for an extensive 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 • Cover, seed or fence stockpiles to prevent wind whipping
Operating vehicle/machinery and sustainable travel	• Ensure all vehicles switch off engines when stationary - no idling vehicles • Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable • Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials

Issue	Control Measure
Operations	• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques • Ensure an adequate water supply on the site for effective dust suppression, using non-potable water where possible and appropriate • Use enclosed chutes and conveyors and covered skips • Minimise drop heights and use fine water sprays wherever appropriate • Ensure equipment is available to clean any dry spillages, and clean up spillages as soon as reasonably practicable using wet cleaning methods
Waste management	• Avoid bonfires and burning of waste materials
Construction	• Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out
Trackout	• Ensure vehicles entering and leaving site are covered to prevent escape of materials • Implement a wheel washing system, if required

Step 4

5.2.17 Assuming the relevant mitigation measures outlined in Table 19 are implemented, the residual impacts from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance[15].

5.3 Operational Phase Assessment

5.3.1 Vehicle movements associated with the operation of the proposal will generate exhaust emissions on the local and regional road networks. An assessment was therefore undertaken using dispersion modelling in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the site, as well as consider potential exposure of future occupants to AQO exceedences.

5.3.2 The assessment considered the following scenarios:

- 2016 - Verification;
- 2022 - DM; and,

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

- 2022 - DS.

5.3.3 The DM scenario (i.e. without development) included anticipated baseline traffic data, inclusive of anticipated growth for the relevant assessment year. The DS scenario (i.e. with development) included anticipated baseline traffic data, inclusive of anticipated growth for the relevant assessment year, in addition to predicted vehicle trips associated with the operation of the proposals.

5.3.4 For the purpose of the assessment traffic data for 2022 was utilised as the development opening year. Air quality is predicted to improve in the future. However, in order to provide a robust assessment, emission factors and background concentrations for 2016 were utilised within the dispersion model. The use of 2022 traffic data and 2016 emission factors and background concentrations is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

5.3.5 Reference should be made to Appendix 1 for full assessment input details.

Potential Development Impacts

Predicted Concentrations

5.3.6 Annual mean NO_2 concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 20. Exceedences of the relevant AQO are shown **bold.**

Table 20 Predicted Annual Mean NO_2 Concentrations

Receptor		Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)		
		DM	DS	Change
R1	Residential - Sterling Way	36.51	36.67	0.16
R2	Residential - Great Homer Street	38.99	39.07	0.08
R3	Residential - Kirkdale Road	35.49	35.54	0.05
R4	Residential - Kirkdale Road	31.49	31.54	0.05

Receptor		Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)		
		DM	DS	Change
R5	Residential - Walton Road/Everton Valley	36.10	36.16	0.06
R6	Residential - Walton Road	34.39	34.42	0.03
R7	Residential - Barlow Lane/Walton Road	**40.19**	**40.27**	0.08
R8	Educational - Barlow Lane	28.55	28.59	0.04
R9	Residential - Everton Valley	39.26	39.33	0.07
R10	Residential - Walton Lane	33.29	33.35	0.06

5.3.7 As indicated in Table 20, predicted annual mean NO_2 concentrations were below the relevant AQO at nine sensitive receptors and above at one location in both scenarios. It should be noted that there were no new exceedences in the DS scenario when compared with the DM.

5.3.8 Reference should be made to Figures 6 and 7 for graphical representations of annual mean NO_2 concentrations across the assessment area for the DM and DS scenarios, respectively.

5.3.9 Annual mean PM_{10} concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 21.

Table 21 Predicted Annual Mean PM_{10} Concentrations

Receptor		Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)		
		DM	DS	Change
R1	Residential - Sterling Way	15.78	15.81	0.03
R2	Residential - Great Homer Street	15.96	15.97	0.01
R3	Residential - Kirkdale Road	15.65	15.66	0.01
R4	Residential - Kirkdale Road	14.95	14.96	0.01
R5	Residential - Walton Road/Everton Valley	15.62	15.63	0.01

Receptor		Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)		
		DM	DS	Change
R6	Residential - Walton Road	15.28	15.29	0.01
R7	Residential - Barlow Lane/Walton Road	15.68	15.70	0.01
R8	Educational - Barlow Lane	14.46	14.46	0.01
R9	Residential - Everton Valley	15.93	15.94	0.01
R10	Residential - Walton Lane	15.21	15.22	0.01

5.3.10 As indicated in Table 21, predicted annual mean PM_{10} concentrations were below the relevant AQO at all sensitive receptors in both scenarios. Reference should be made to Figures 8 and 9 for graphical representations of annual mean PM_{10} concentrations across the assessment area for the DM and DS scenarios, respectively.

Predicted Impacts

5.3.11 Predicted impacts on annual mean NO_2 concentrations at the sensitive receptor locations are summarised in Table 22.

Table 22 Predicted Impacts - NO_2

Receptor		Predicted Annual Mean NO_2 Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Sterling Way	76 - 94% of AQO	0	Negligible
R2	Residential - Great Homer Street	95 - 102% of AQO	0	Negligible
R3	Residential - Kirkdale Road	76 - 94% of AQO	0	Negligible
R4	Residential - Kirkdale Road	76 - 94% of AQO	0	Negligible
R5	Residential - Walton Road/Everton Valley	76 - 94% of AQO	0	Negligible
R6	Residential - Walton Road	76 - 94% of AQO	0	Negligible
R7	Residential - Barlow Lane/Walton Road	95 - 102% of AQO	0	Negligible

Receptor		Predicted Annual Mean NO_2 Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R8	Educational - Barlow Lane	Below 75% of AQO	0	Negligible
R9	Residential - Everton Valley	95 - 102% of AQO	0	Negligible
R10	Residential - Walton Lane	76 - 94% of AQO	0	Negligible

5.3.12 As indicated in Table 22, impacts on annual mean NO_2 concentrations as a result of the proposed development were predicted to be **negligible** at all receptors.

5.3.13 Predicted impacts on annual mean PM_{10} concentrations at the sensitive receptor locations are summarised in Table 23.

Table 23 Predicted Impacts - PM_{10}

Receptor		Predicted Annual Mean PM_{10} Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Sterling Way	Below 75% of AQO	0	Negligible
R2	Residential - Great Homer Street	Below 75% of AQO	0	Negligible
R3	Residential - Kirkdale Road	Below 75% of AQO	0	Negligible
R4	Residential - Kirkdale Road	Below 75% of AQO	0	Negligible
R5	Residential - Walton Road/Everton Valley	Below 75% of AQO	0	Negligible
R6	Residential - Walton Road	Below 75% of AQO	0	Negligible
R7	Residential - Barlow Lane/Walton Road	Below 75% of AQO	0	Negligible
R8	Educational - Barlow Lane	Below 75% of AQO	0	Negligible
R9	Residential - Everton Valley	Below 75% of AQO	0	Negligible

5.3.14 As indicated in Table 23, impacts on annual mean PM_{10} concentrations as a result of the proposed development were predicted to be **negligible** at all receptors.

Potential Future Exposure

5.3.15 The proposed development has the potential to cause exposure of future residents to elevated pollution levels. Dispersion modelling was therefore undertaken with the inputs described in Appendix 1 to quantify air quality conditions at the site. Reference should be made to Figures 7, 9, 10 and 11 for graphical representations of the results.

5.3.16 The proposals comprise residential, commercial and leisure space at ground floor level. As shown in Table 2, leisure land use is considered a location of relevant exposure for short-term AQOs, including the 1-hour NO_2 and the 24-hour PM_{10} AQO. These have therefore been considered at this location.

Nitrogen Dioxide

5.3.17 Dispersion models are inherently less accurate at calculating exceedences of short-term AQOs. As such, predictions of 1-hour NO_2 concentrations were not produced as part of the assessment. However, as stated in the DEFRA guidance[16], if annual mean NO_2 concentrations are below 60μg/m^3 then it is unlikely that the 1-hour AQO will be exceeded. As shown in Figure 7, annual mean NO_2 concentrations were predicted to be below 60μg/m^3 at all locations across ground floor level. The maximum level at the building façade was 43.09μg/m^3. As such, exceedences of the 1-hour AQO are not predicted at the development location.

5.3.18 As shown in Figure 7, annual mean NO_2 concentrations were predicted to be above the AQO of 40μg/m^3 at some residential units at ground floor level. The maximum level at the building façade was 43.09μg/m^3.

5.3.19 As shown in Figure 10, annual mean NO_2 concentrations were predicted to be below the AQO of 40μg/m^3 at all residential units at first floor level. The maximum level at the building façade was 39.35μg/m^3. As such, future occupants are not predicted to be exposed to NO_2 concentrations above the AQO.

5.3.20 Based on the assessment results, annual mean NO_2 concentrations were predicted to be above the relevant AQO at residential units at ground floor level. Mitigation to reduce

[16] Local Air Quality Management (TG16), DEFRA, 2016.

potential exposure of future residents to elevated levels is therefore provided in Section 6.0.

5.3.21 It should be noted that pollutant levels decrease with distance from pollutant sources. As NO_2 concentrations were predicted to be below the relevant AQOs at all first floor locations, further assessment above this height was not considered necessary.

Particulate Matter

5.3.22 As shown in Figure 11, the number of days with PM_{10} concentrations greater than 50µg/m^3 was predicted to be below the permitted number of 35 at all locations across the ground floor. The maximum number of days with PM_{10} concentrations above 50µg/m^3 at the building façade was 1. As such, exceedences of the 24-hour PM_{10} AQO are not predicted at the development location.

5.3.23 As shown in Figure 9, annual mean PM_{10} concentrations were predicted to be below the AQO of 40µg/m^3 at all residential units across ground floor level. The maximum level at the building façade was 14.20µg/m^3. As such, future occupants are not predicted to be exposed to PM_{10} concentrations above the AQO.

5.3.24 Based on the assessment results, future occupants are not predicted to be exposed to PM_{10} concentrations above the AQOs at any location within the development.

5.3.25 It should be noted that pollutant levels decrease with distance from pollutant sources. As PM_{10} concentrations were predicted to be below the relevant AQOs at all ground floor locations, further assessment above this height was not considered necessary.

Mitigation

5.3.26 The dispersion modelling results indicated predicted annual mean NO_2 concentrations were above the AQO at some residential units across ground floor level. As such, mitigation is required to ensure a supply of clean air for future occupants. This should be provided in the form of a mechanical ventilation system. The air inlet should be positioned on the north-west façade of the building. This will ensure the air supply is taken from a location where predicted NO_2 concentrations are below the relevant AQO. Alternatively, if there are design issues associated with providing inlets at the designated location, a

NO_2 absorption filter could be included within the system to reduce pollutant concentrations within the airstream prior to entering the units. Reference should be made to Figure 11 for a plan of the residential units that require mitigation.

5.3.27 The development should also incorporate a high specification of air tightness on the windows fronting Kirkdale Road, so that when these are closed, the apartments would be ventilated by clean air from the mechanical system. The arrangement will ensure the units are kept under positive pressure by providing air into the rooms, rather than removing it. This will naturally inhibit the movement of air from outside into the units during periods of open windows as well as flushing the internal environment after closure.

5.3.28 Mechanical ventilation is suggested within the IAQM 'Land-Use Planning & Development Control: Planning for Air Quality' guidance document [17] and as such is considered a suitable solution for a development of this size and nature.

5.3.29 As air quality impacts as a result of operational phase road vehicle exhaust emissions were predicted to be **negligible**, further mitigation to control effects is not considered necessary. However, a number of additional measures have been included within the scheme in accordance with the requirements of the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'[18] to encourage the use of sustainable transport modes, manage vehicle flow and reduce pollution around the site. These include the following:

- Provision of a comprehensive Travel Plan to encourage sustainable modes of transport to and from the site; and,
- Provision of 86 secure cycle parking spaces.

5.3.1 The inclusion of the above mitigation measures should control potential exposure and help minimise operational phase road vehicle exhaust emissions associated with the proposals. As such, they are considered suitable for a development of this size and nature.

17 Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

18 Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

Overall Impact Significance

5.3.2 The overall significance of operational phase road traffic emission impacts was determined as **negligible**. This was based on the overall predicted impacts at discrete receptor locations and the considerations outlined previously. Further justification is provided in Table 24.

Table 24 Overall Impact Significance

Guidance	Comment
The existing and future air quality in the absence of the development	Predicted annual mean NO_2 concentrations were below the relevant AQO at nine sensitive receptors and above at one in the DM scenario. Annual mean PM_{10} concentrations were below the AQO at all receptors in the DM scenario. It is considered unlikely that future air quality conditions will change significantly in the absence of the development given the relatively established nature of the area
The extent of current and future population exposure to the impacts	The development is not predicted to affect the population exposed to exceedences of the AQOs
The influence and validity of any assumptions adopted when undertaking the prediction of impacts	The assessment assumed that vehicle exhaust emission rates and background pollutant levels will not reduce in future years. This provides worst-case results when compared with DEFRA and Highways Agency methodologies Due to the adopted assumptions it is considered the presented results are sufficiently robust for an assessment of this nature

5.3.3 The IAQM guidance[19] states that only if the impact is greater than **slight**, the effect is considered significant. As impacts were predicted to be **negligible**, overall effects are considered **not significant**, in accordance with the stated methodology.

[19] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

6.0 CONCLUSION

6.1.1 Redmore Environmental Ltd was commissioned by Mr Paul Lloyd to undertake an Air Quality Assessment in support of a planning application for a mixed-use development on land off Whittle Street, Liverpool.

6.1.2 The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road traffic exhaust emissions associated with vehicles travelling to and from the site during operation, as well as expose future residents to any existing air quality issues. As such, an Air Quality Assessment was required in order to determine baseline conditions and assess potential effects as a result of the scheme.

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

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

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

6.1.6 The results of the dispersion modelling assessment indicated that annual mean NO_2 concentrations were predicted to be above the relevant AQO at some residential locations across ground floor level. As such, suitable mitigation in the form of mechanical ventilation has been specified for the relevant units. This is suggested within the IAQM 'Land-Use Planning & Development Control: Planning for Air Quality'[20] guidance

20 Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

document and as such is considered a suitable solution for a development of this size and nature.

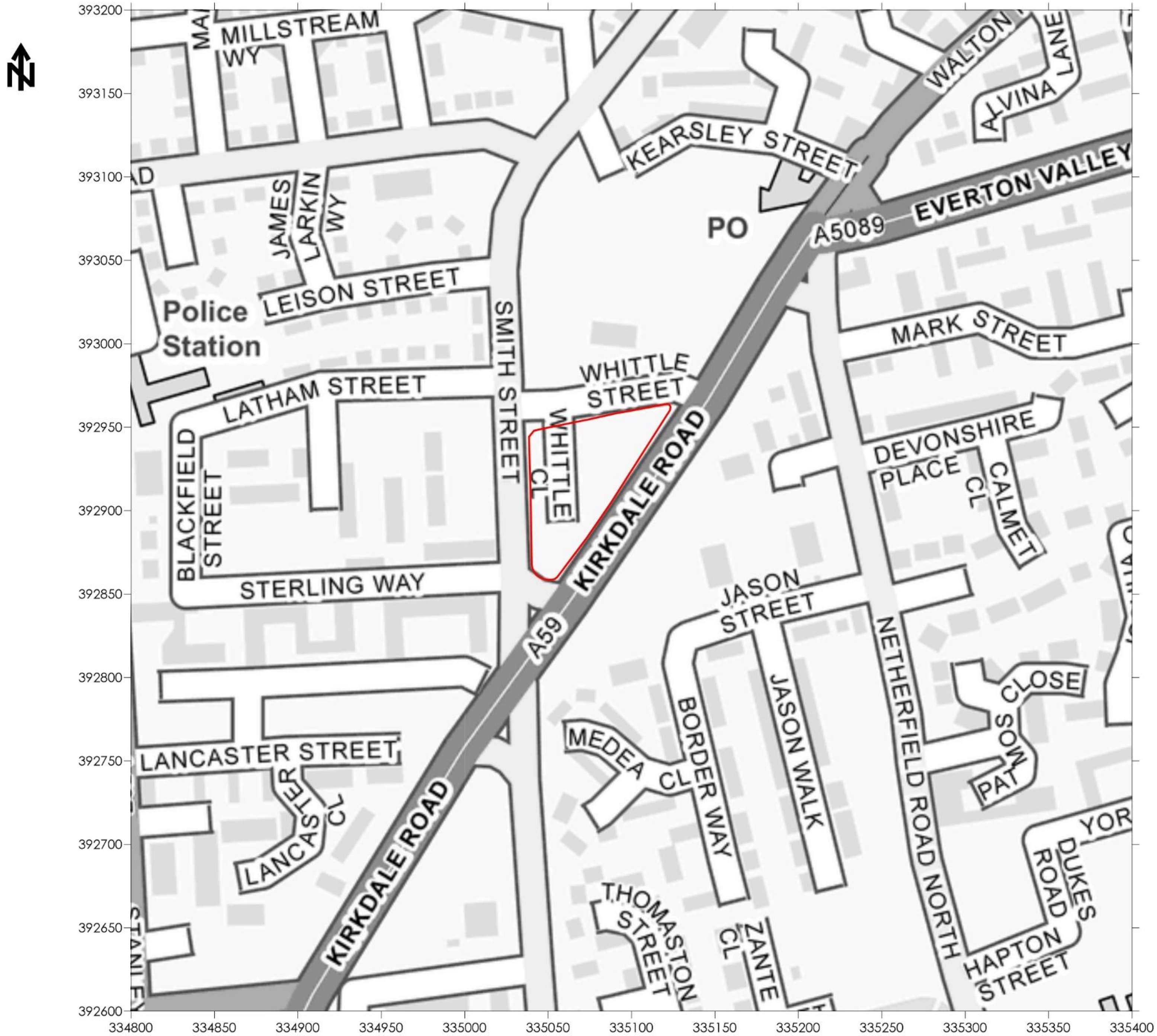
6.1.7 Following consideration of the relevant issues, air quality impacts as a result of the operation of the proposals were considered to be **not significant**, in accordance with the IAQM guidance.

6.1.8 Based on the assessment results, air quality factors are not considered a constraint to planning consent for the development, subject to the inclusion of the specified mitigation.

7.0 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 Objective
AQS	Air Quality Strategy
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DM	Do-Minimum
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
DS	Do-Something
EU	European Union
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
LCC	Liverpool City Council
NGR	National Grid Reference
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
NB	Northbound
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
PM_{10}	Particulate Matter with an aerodynamic diameter of less than 10µm
SB	Southbound
UDP	Unitary Development Plan
z_0	Roughness length

Figures



Legend

Site Boundary

Title
Figure 1 - Site Location Plan

Project
Air Quality Assessment, Whittle Street, Liverpool

Project Reference
2066

Client
Mr Paul Lloyd

Redmore environmental

www.red-env.co.uk | 0161 7060075

Legend

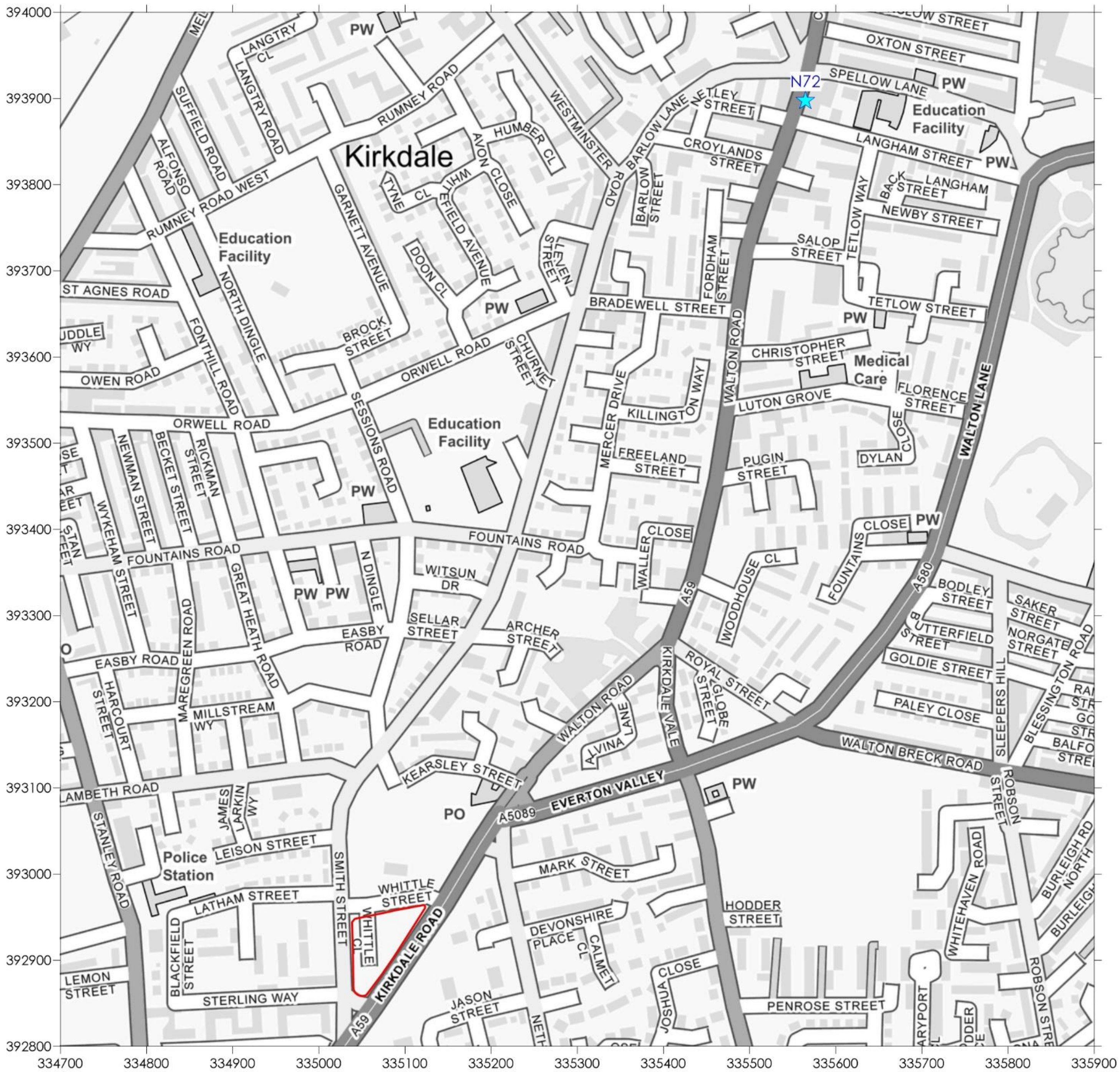
Title
Figure 2 - Site Layout Plan

Project
Air Quality Assessment,
Whittle Street, Liverpool

Project Reference
2066

Client
Mr Paul Lloyd

Redmore environmental



Legend

Site Boundary

Monitor

Title

Figure 3 - Monitoring Location

Project

Air Quality Assessment, Whittle Street, Liverpool

Project Reference

2066

Client

Mr Paul Lloyd

Redmore environmental

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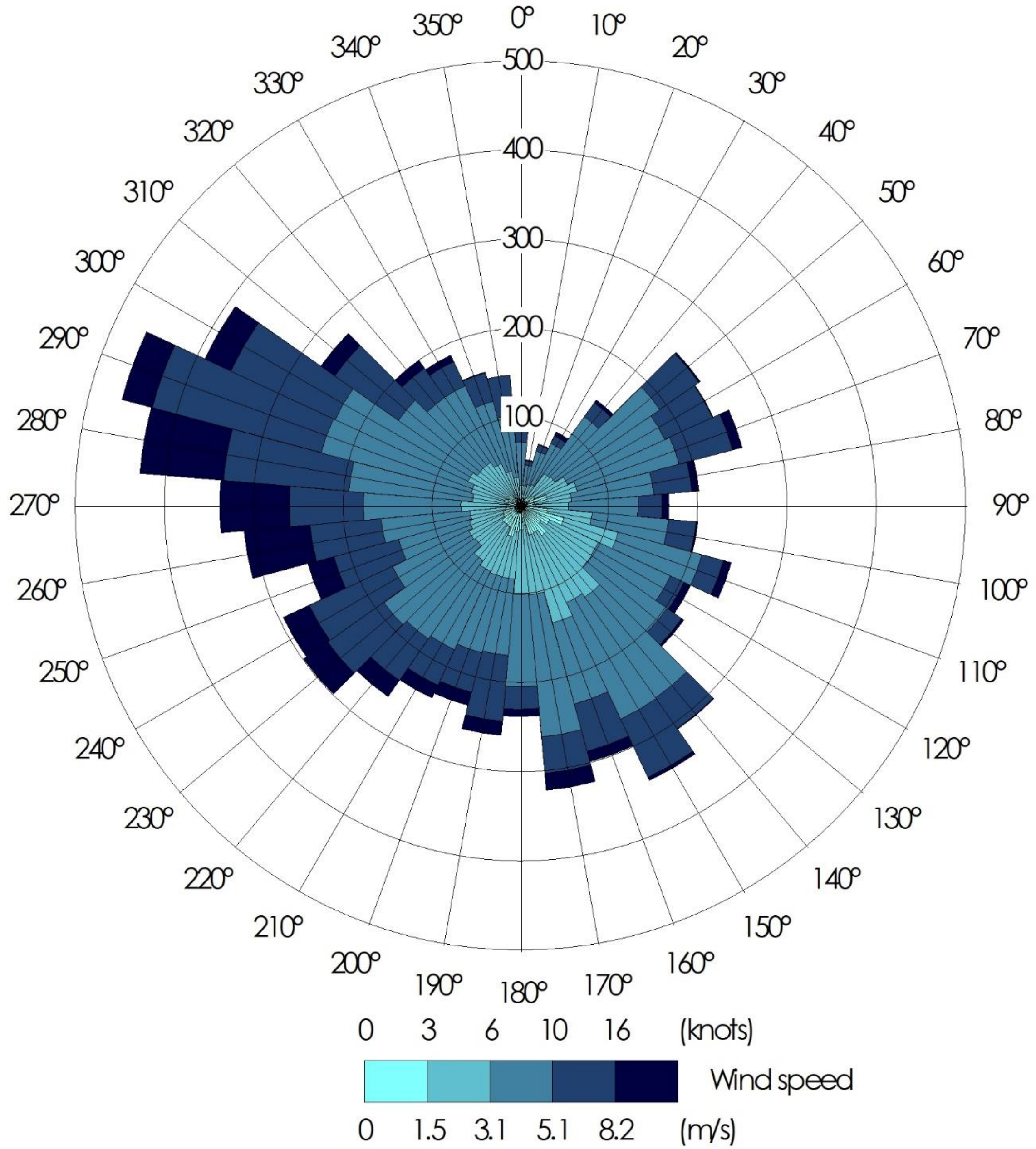

Legend

Title

Figure 4 - Wind Rose of 2016 Liverpool Airport Meteorological Data

Project

Air Quality Assessment, Whittle Street, Liverpool

Project Reference

2066

Client

Mr Paul Lloyd

Redmore environmental

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Legend

Site Boundary

Sensitive Receptor

Title

Figure 5 - Sensitive Receptors

Project

Air Quality Assessment,
Whittle Street, Liverpool

Project Reference

2066

Client

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Legend

Site Boundary

Annual Mean NO_2 Concentration ($\mu g/m^3$): 68, 64, 60, 56, 52, 48, 44, 40, 36, 32, 28, 24

Title

Figure 6 - Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$) Do-Minimum

Project

Air Quality Assessment, Whittle Street, Liverpool

Project Reference

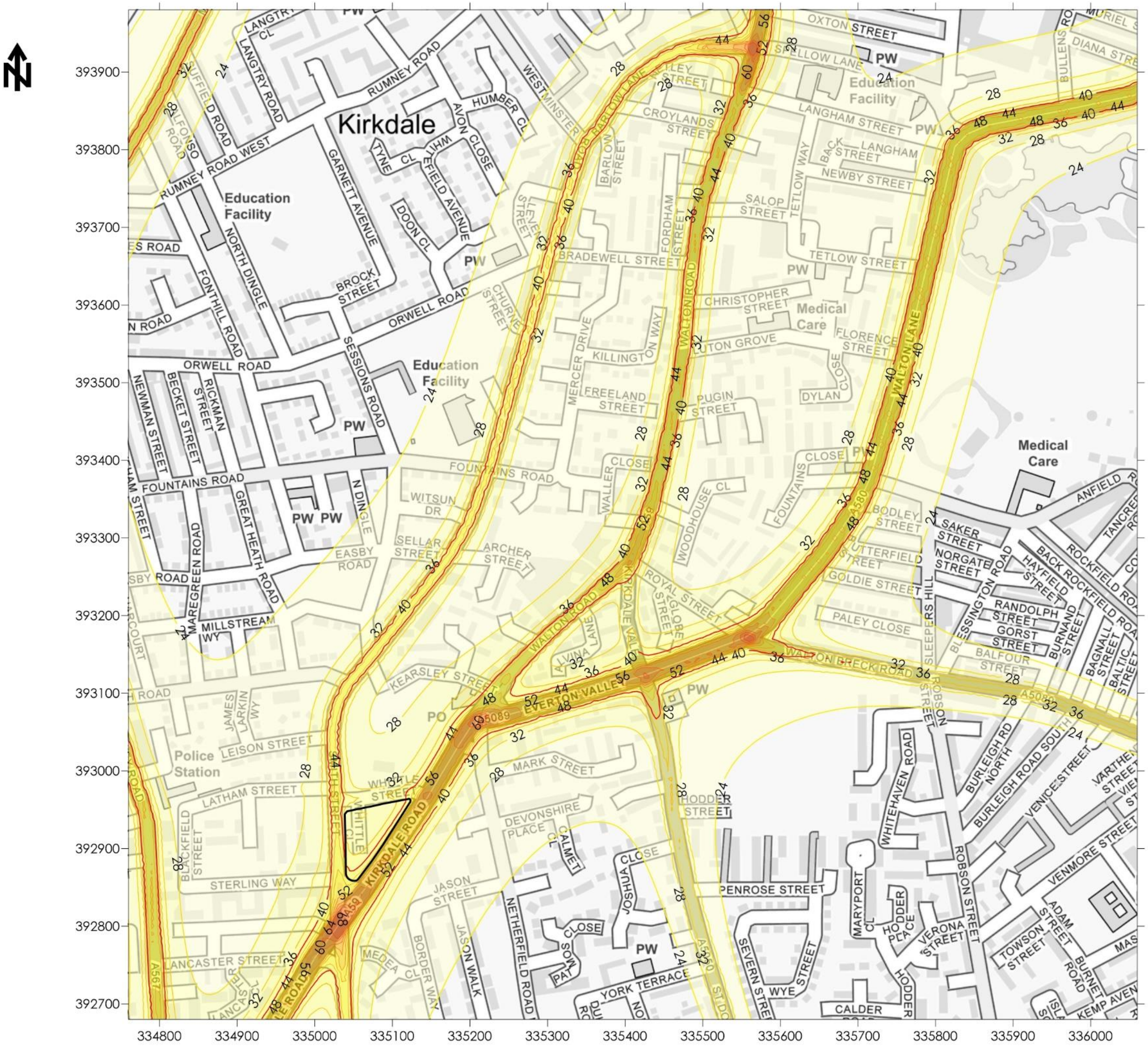
2066

Client

Mr Paul Lloyd

Redmore environmental

www.red-env.co.uk | 0161 7060075



Legend

Site Boundary

Annual Mean NO_2 Concentration (µg/m³)

68
64
60
56
52
48
44
40
36
32
28
24

Title

Figure 7 - Predicted Annual Mean NO_2 Concentration (µg/m³) Do-Something

Project

Air Quality Assessment, Whittle Street, Liverpool

Project Reference

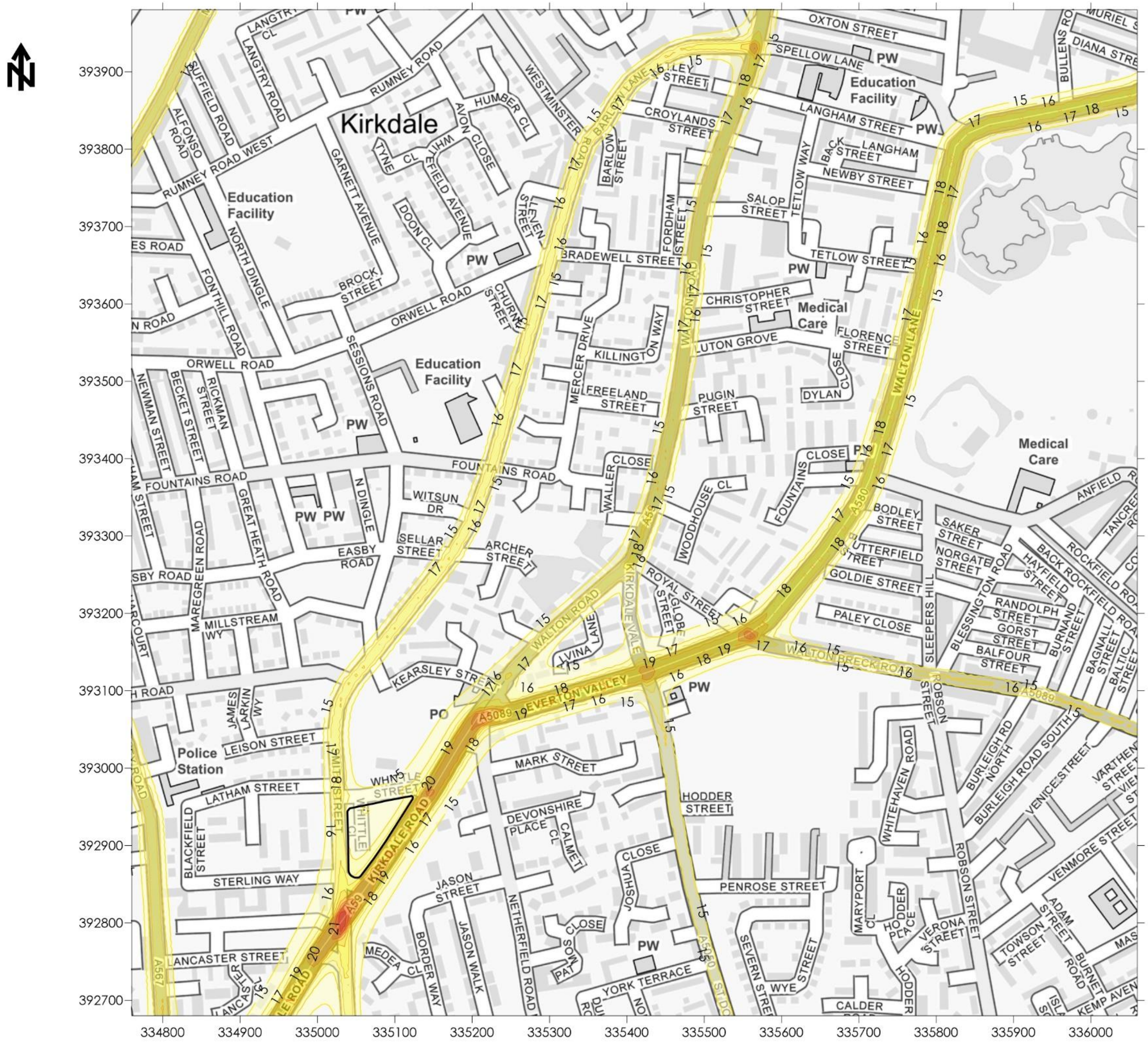
2066

Client

Mr Paul Lloyd

Redmore environmental

www.red-env.co.uk | 0161 7060075



Legend

Site Boundary

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

24
23
22
21
20
19
18
17
16
15

Title

Figure 8 - Predicted Annual Mean PM_{10} Concentration (µg/m³) Do-Minimum

Project

Air Quality Assessment, Whittle Street, Liverpool

Project Reference

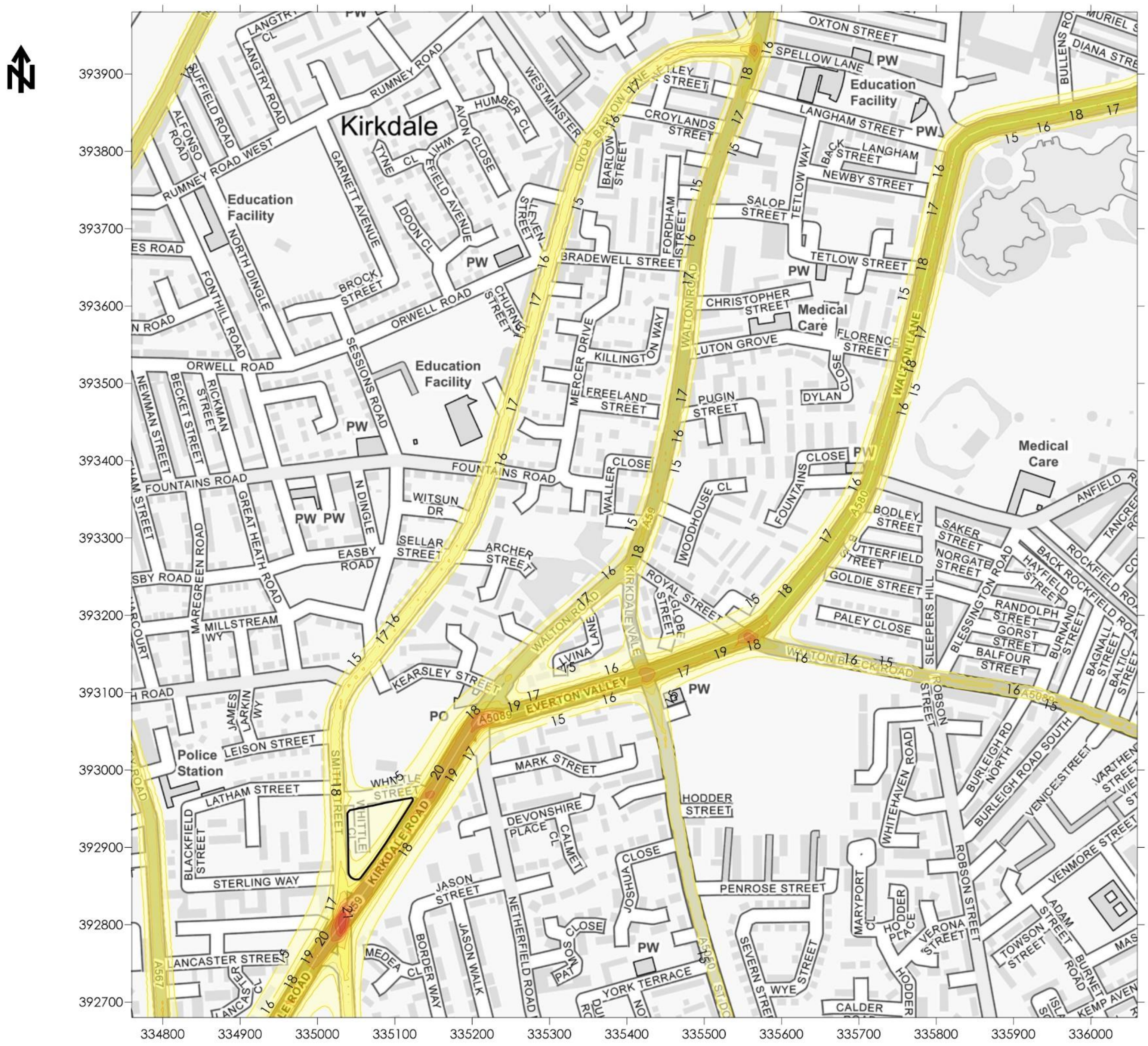
2066

Client

Mr Paul Lloyd

Redmore environmental

www.red-env.co.uk | 0161 7060075



Legend

Site Boundary

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

24
23
22
21
20
19
18
17
16
15

Title

Figure 9 - Predicted Annual Mean PM_{10} Concentration (µg/m³) Do-Something

Project

Air Quality Assessment, Whittle Street, Liverpool

Project Reference

2066

Client

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Legend

Site Boundary

Annual Mean NO_2 Concentration (µg/m³)

48
44
40
36
32
28
24

Title

Figure 10 - Predicted Annual Mean NO_2 Concentration (µg/m³) at First Floor Level

Project

Air Quality Assessment, Whittle Street, Liverpool

Project Reference

2066

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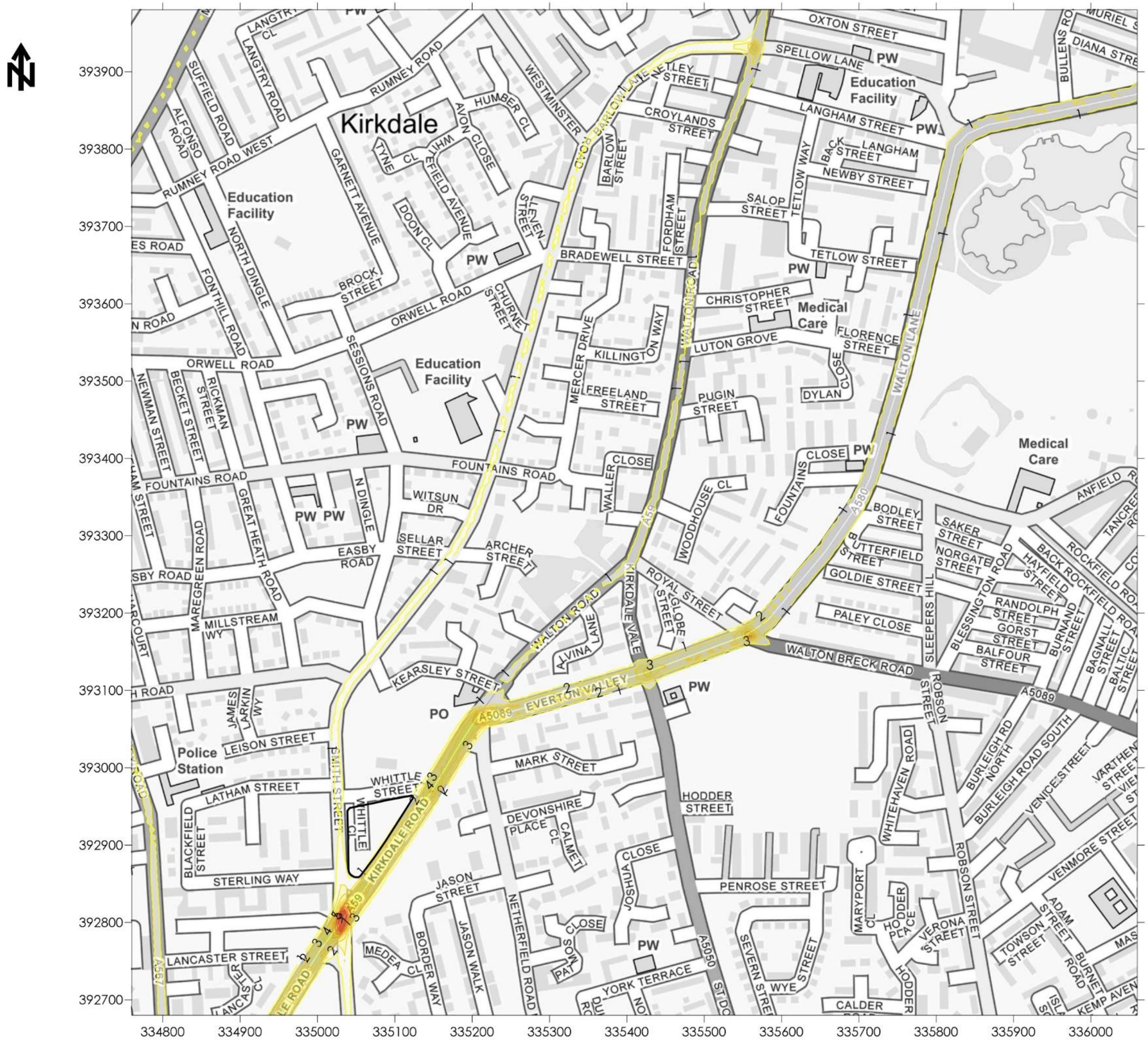

Legend

Site Boundary

Number of Days with PM_{10} Concentrations above 50µg/m³ (Days)

1, 2, 3, 4, 5, 6, 7, 8

Title

Figure 11 - Predicted Number of Days with PM_{10} Concentrations above 50µg/m³ (Days)

Project

Air Quality Assessment, Whittle Street, Liverpool

Project Reference

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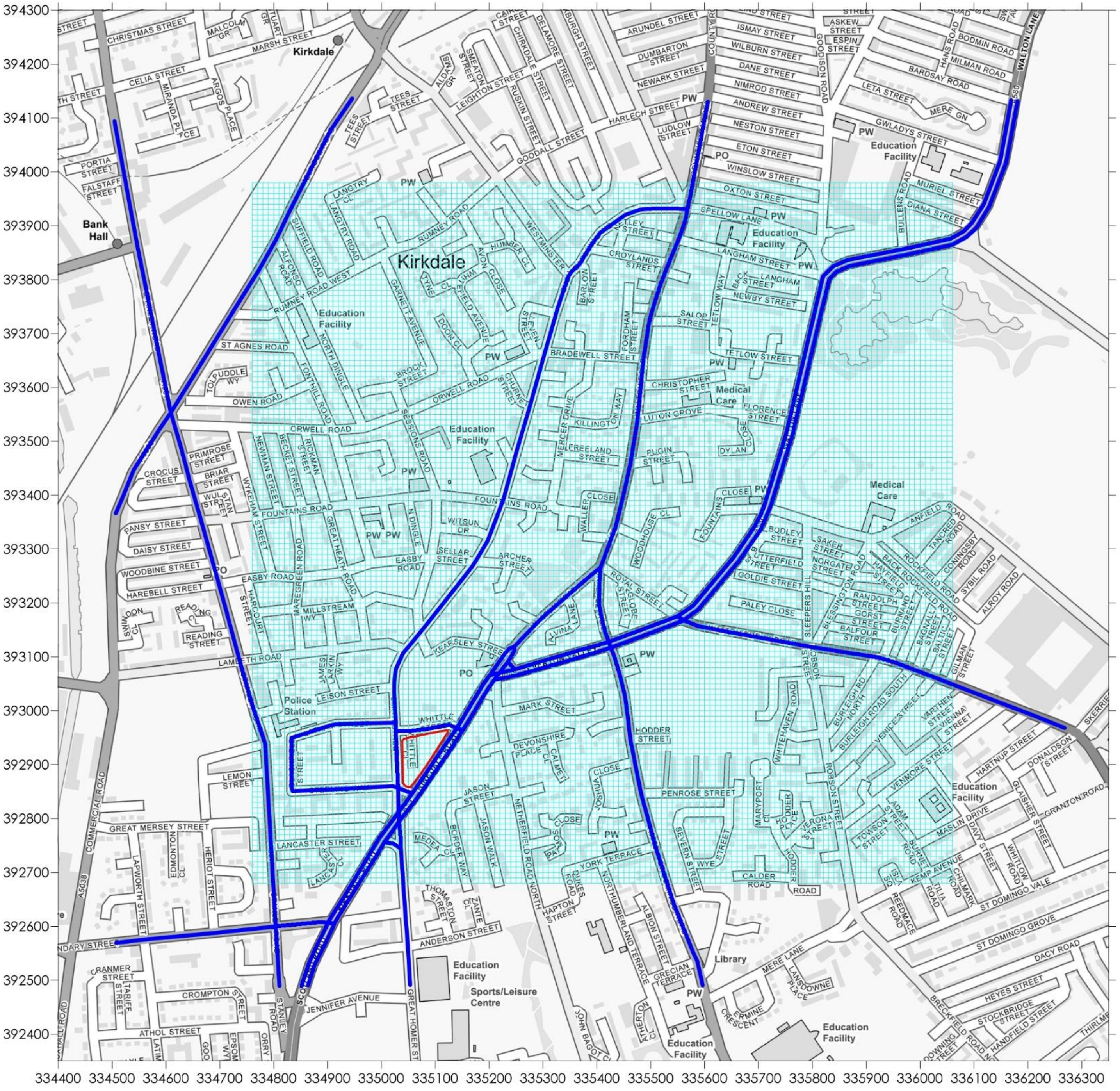

Legend

Site Boundary

Road Link

Output Grid

Title

Figure 12 - ADMS-Roads Inputs

Project

Air Quality Assessment, Whittle Street, Liverpool

Project Reference

2066

Client

Mr Paul Llyod

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Legend

Residential Unit Requiring Mitigation

Title

Figure 13 - Residential Units Requiring Mitigation

Project

Air Quality Assessment, Whittle Street, Liverpool

Project Reference

2066

Client

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Appendix 1 - Assessment Input Data

Introduction

The proposed development has the potential to cause air quality impacts as a result of vehicles travelling to and from the site, as well as expose future occupants to elevated pollution levels. In order to assess NO_2 and PM_{10} concentrations at sensitive locations, detailed dispersion modelling was undertaken in accordance with the following methodology.

Dispersion Model

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

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 (z_0); and,
- Monin-Obukhov length.

These are detailed in the following Sections.

Assessment Area

Ambient concentrations were predicted over the area NGR: 334760, 392680 to 336060, 393980. One Cartesian grid was used within the model to produce data suitable for contour plotting using the Surfer software package.

Reference should be made to Figure 12 for a graphical representation of the assessment grid extents.

Receptors potentially sensitive to changes in pollutant concentrations were included in the assessment as outlined in the main report text.

Traffic Flow Data

Traffic data for use in the assessment was provided by DTPC, the Transport Consultants for the project. Flows were not available for all roads included within the modelling extents. As such, information for these links was obtained from the Department for Transport (DfT)[21]. The DfT web tool enables the user to view and download traffic flows on every link of the 'A' road and motorway network as well as selected minor roads, in Great Britain for the years 1999 to 2016. It should be noted that the DfT web tool is referenced in DEFRA guidance[22] as being a suitable source of data for air quality assessments and it is therefore considered to provide a reasonable estimate of traffic flows in the vicinity of the site.

Baseline traffic data was converted to the site opening year utilising factors obtained from TEMPro (version 7.2). This software package has been developed by the DfT to calculate future traffic growth throughout the UK.

A summary of the traffic flows is provided in Table A1.1. Road widths and vehicle speeds were estimated from aerial photography and UK highway design standards.

Table A1.1 Traffic Flows

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Average Vehicle Speed (km/h)
		Verif.	2022 DM	2022 DS			
L1	County Road A59	16,010	17,627	17,744	5.17	9.2	40
L2	County Road A59 Junction to Walton Road	16,010	17,627	17,744	5.17	16.9	15
L3	Walton Road Junction from County Road A59	16,010	17,627	17,661	5.17	10.6	15
L4	Walton Road	16,010	17,627	17,661	5.17	11.6	40
L5	Walton Road Junction to Kirkdale Vale	16,010	17,627	17,661	5.17	10.8	25

21 http://www.dft.gov.uk/traffic-counts/.

22 Local Air Quality Management (TG16), DEFRA, 2016.

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Average Vehicle Speed (km/h)
		Verif.	2022 DM	2022 DS			
L6	Walton Road Junction from Kirkdale Vale	12,319	13,563	13,597	5.74	10.4	25
L7	Walton Road Between Kirkdale Vale and Everton Valley	12,319	13,563	13,597	5.74	10.2	45
L8	Kirkdale Vale	4,448	4,897	4,897	2.32	11.5	30
L9	Walton Lane A580 Northbound (NB)	11,814	13,007	13,075	4.82	7.1	45
L10	Walton Lane A580 NB Between Kirkdale Vale and Walton Beck Road	13,419	14,774	14,842	4.69	10.9	30
L11	Walton Lane A580 Southbound (SB)	11,814	13,007	13,075	4.82	7.7	45
L12	Walton Lane A580 SB Junction to Walton Beck Road	11,814	13,007	13,075	4.82	7.1	25
L13	Walton Lane A580 SB Between Kirkdale Vale and Walton Beck Road	13,419	14,774	14,842	4.69	6.9	30
L14	Walton Lane A580 SB Junction to Everton Valley	13,419	14,774	14,842	4.69	10.3	30
L15	Everton Valley SB	12,686	13,967	14,034	3.63	7.4	40
L16	Everton Valley Junction to Kirkdale Road	12,686	13,967	14,034	3.63	7.2	25
L17	Everton Valley NB Junction to Kirkdale Vale	12,686	13,967	14,034	3.63	9.7	25
L18	Everton Valley NB	12,686	13,967	14,034	3.63	7.6	40
L19	Kirkdale Road NB Junction to Walton Road	18,686	20,530	20,615	2.73	11.5	25
L20	Walton Road NB	6,160	6,782	6,799	5.74	7.0	45
L21	Walton Road SB Junction to Kirkdale Road	5,544	6,103	6,120	5.74	9.0	25
L22	Walton Road SB Slip Road to Everton Valley	616	678	678	5.74	7.5	25
L23	Kirkdale Road NB Junction to Walton Road	18,686	20,530	20,615	2.73	11.9	45
L24	Kirkdale Road NB Between Whittle Street and Smith Street	17,397	19,114	19,155	2.84	11.3	45

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Average Vehicle Speed (km/h)
		Verif.	2022 DM	2022 DS			
L25	Kirkdale Road NB Junction to Smith Street	16,232	17,834	17,909	2.81	9.5	25
L26	Kirkdale Road SB Between Everton Valley and Whittle Street	18,686	20,530	20,615	2.73	9.6	45
L27	Kirkdale Road SB Between Whittle Street and Smith Street	17,397	19,114	19,155	2.84	9.6	45
L28	Kirkdale Road SB Junction to Smith Street	17,397	19,114	19,155	2.84	9.7	25
L29	Kirkdale Road NB Between Smith Street and Boundary Street	16,232	17,834	17,909	2.81	9.8	45
L30	Scotland Road NB Junction to Boundary Street	16,232	17,834	17,909	2.81	8.7	25
L31	Scotland Road NB	16,232	17,834	17,909	2.81	10.0	45
L32	Kirkdale Road SB Between Smith Street and Boundary Street	16,232	17,834	17,909	2.81	8.8	45
L33	Kirkdale Road SB Junction to Boundary Street	16,232	17,834	17,909	2.81	9.3	25
L34	Scotland Road SB	16,232	17,834	17,909	2.81	9.9	45
L35	Boundary Street Between Scotland Road and Stanley Road	8,363	9,208	9,208	3.07	8.9	25
L36	Stanley Road Between Boundary Street and Scotland Road	17,042	18,763	18,763	10.46	12.3	40
L37	Boundary Street	11,005	12,117	12,117	6.35	7.9	45
L38	Stanley Road	15,010	16,526	16,526	9.00	13.1	45
L39	Stanley Road North of Commercial Road	12,372	13,622	13,622	10.44	13.4	45
L40	Melrose Road	16,059	17,681	17,681	3.98	10.8	45
L41	Commercial Road	9,410	10,360	10,360	3.10	10.5	45
L42	Smith Street Junction to Kirkdale Road	12,194	13,397	13,654	1.88	11.7	25
L43	Smith Street Slip Road to Kirkdale Road	1,355	1,489	1,530	1.88	6.7	25
L44	Sterling Way/Latham Street	313	344	344	0.00	6.3	25

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Average Vehicle Speed (km/h)
		Verif.	2022 DM	2022 DS			
L45	Smith Street South of Whittle Street	13,548	14,886	15,184	1.88	11.6	45
L46	Smith Street North of Whittle Street	16,184	17,782	17,865	1.81	9.0	45
L47	Smith Street Junction to County Road A59	16,184	17,782	17,865	1.81	9.8	15
L48	Whittle Street Adjacent to Smith Street	2,770	3,043	3,425	1.38	8.8	25
L49	Whittle Street Adjacent to Kirkdale Road	2,642	2,903	2,989	1.21	8.5	25
L50	Great Homer Street Junction to Kirkdale Road	12,912	14,186	14,253	4.49	10.9	25
L51	Great homer Street Slip Road to Kirkdale Road	1,435	1,576	1,576	4.49	5.5	25
L52	Great Homer Street	14,346	15,762	15,829	4.49	10.7	45
L53	St Domingo Road Junction to Everton Valley	8,565	9,430	9,430	3.84	11.9	25
L54	St Domingo Road	8,565	9,430	9,430	3.84	11.3	45
L55	Walton Beck Road Junction to Walton Lane	9,214	10,145	10,145	5.26	10.5	25
L56	Walton Beck Road	9,214	10,145	10,145	5.26	9.9	45

Reference should be made to Figure 12 for a graphical representation of the road link locations.

Emission Factors

The emission factors were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 8.0.1). This has been produced by DEFRA and incorporates COPERT 5 vehicle emission factors and fleet information.

There is current uncertainty over NO_2 concentrations within the UK, with the implementation of new vehicle emission standards not resulting in the previously expected reduction in roadside levels. Therefore, 2016 emission factors were utilised in preference to the development opening year in order to provide robust model outputs. As predictions for 2016 were verified, it is considered the results are a robust indication of worst case concentrations for the future year.

Meteorological Data

Meteorological data used in the assessment was taken from Liverpool Airport meteorological station over the period 1st January 2016 to 31st December 2016 (inclusive). Liverpool Airport meteorological station is located at NGR: 343488, 381791, which is approximately 14.1km south-east of the development. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

All meteorological records used in the assessment were provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 4 for a wind rose of utilised meteorological data.

Roughness Length

The z_0 is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 1m was used to describe the modelling extents. This value of z_0 is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'cites, woodlands'.

A z_0 of 0.1m was used to describe the meteorological site. This value of z_0 is considered appropriate for the morphology of the area due to the large expanse of surrounding flat land such as runways, grassland and open water, and is suggested within ADMS-Roads as being suitable for 'root crops'.

Monin-Obukhov Length

A minimum Monin-Obukhov length of 30m was used to describe the modelling extents and meteorological site. This value is considered appropriate for the nature of both areas and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

Background Concentrations

Annual mean NO_2 and PM_{10} background concentrations for use in the assessment were obtained from the DEFRA mapping study for the grid square containing the N72 - Country Road/Spellow Lane diffusion tube, NGR: 335500, 393500. These are shown in Table A1.2.

Table A1.2 Background Concentrations - Modelling Extents

Pollutant	Predicted 2016 Background Pollutant Concentration (µg/m³)
NO_2	20.46
PM_{10}	12.09

The values shown in Table A1.2 were chosen to represent concentrations throughout the dispersion modelling extents without the contribution from road vehicles as they were higher than the DEFRA background for the grid square containing the site, as shown in Table 12.

Similarly to emission factors, the background concentrations from 2016 were utilised in preference to the future year. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of the proposal.

NO_x to NO_2 Conversion

Predicted annual mean NO_x concentrations were converted to NO_2 concentrations using the spreadsheet (version 6.1) provided by DEFRA, which is the method detailed within DEFRA guidance[23].

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;

23 Local Air Quality Management (TG16), DEFRA, 2016.

- Overall model limitations; and,
- Uncertainties associated with monitoring data, including locations.

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

For the purpose of the assessment, model verification was undertaken for 2016 using traffic data, meteorological data and monitoring results from this year.

LCC undertook diffusion tube monitoring of NO_2 concentrations at one location within the modelling extents during 2016. The result was obtained and the road contribution to total NO_x concentration calculated following the methodology contained within DEFRA guidance[24]. The monitored annual mean NO_2 concentration and calculated road NO_x concentration is summarised in Table A1.3.

Table A1.3 Verification - Monitoring Result

Monitoring Location		Monitored NO_2 Concentration ($\mu g/m^3$)	Calculated Road NO_x Concentration ($\mu g/m^3$)
N72	Country Road/Spellow Lane	50.2	66.79

The annual mean road NO_x concentration predicted from the dispersion model and the 2016 road NO_x concentration calculated from the NO_2 monitoring result is summarised in Table A1.4.

Table A1.4 Verification - Modelling Result

Monitoring Location		Calculated Road NO_x Concentration ($\mu g/m^3$)	Modelled Road NO_x Concentration ($\mu g/m^3$)
N72	Country Road/Spellow Lane	66.79	32.52

The monitored and modelled road NO_x concentrations were compared to calculate the associated ratio. This indicated a verification factor of 2.0540 was required to be applied to all modelling results.

24 Local Air Quality Management (TG16), DEFRA, 2016.

Monitoring of PM_{10} concentrations is not undertaken within the assessment extents. The NO_x verification factor was therefore used to adjust PM_{10} model predictions in lieu of more accurate data in accordance with DEFRA guidance[25].

[25] Local Air Quality Management (TG16), DEFRA, 2016.

Appendix 2 - Curricula Vitae

JETHRO REDMORE

Director

BEng (Hons), MSc, MIAQM, MIEnvSc, PIEMA, CEnv

KEY EXPERIENCE:

Jethro is a Chartered Environmentalist and Director of Redmore Environmental with specialist experience in the air quality and odour sectors. His key capabilities include:

- Production and management of Air Quality, Dust and Odour Assessments for a wide-range of clients from the retail, residential, infrastructure, commercial and industrial sectors.
- Production and co-ordination of Environmental Permit applications for a variety of industrial sectors.
- Detailed dispersion modelling of road vehicle and industrial emissions using ADMS-Roads, ADMS-5, AERMOD-PRIME and BREEZE-ROADS. Studies have included impact assessment of ground level pollutant and odour concentrations and assessment of suitability of development sites for proposed end-use.
- Project management and co-ordination of Environmental Impact Assessments and scoping reports for developments throughout the UK.
- Provision of expert witness services at Planning Inquiries.
- Design and project management of pollutant monitoring campaigns.
- Co-ordination and management of large-scale multi-disciplinary projects and submissions.
- Provision of expert advice to local government and international environmental bodies, as well as involvement in production of industry guidance.

SELECT PROJECTS SUMMARY:

Industrial

Shanks Waste Management - Odour Assessments of two waste management facilities to support Environmental Permit Applications.

Tatweer Petroleum - dispersion modelling of Bahrain oil field.

Doha South Sewage Treatment Works - AQA for works extension in Qatar.

IRIS Environmental Appraisal Report Reviews, Isle of Man Government - odour assessment reviews.

Lankem, Greater Manchester - Environmental Permit Application for chemical manufacturing plant.

Newport Docks Bulk Drying, Pelleting and CHP Facility - air quality EIA for gas CHP.

Springshades, Leicester - Environmental Permit Variation Application for textile manufacturing plant.

Valspar, Chester - Odour Assessment and production of Odour Management Plan for a paint manufacturing plant in response to neighbour complaints.

Agrivert - dispersion modelling of odour and CHP emissions from numerous AD plants.

James Cropper Paper Mill, Cumbria - air quality EIA, Environmental Permit Variation and Human Health Risk Assessment for new biomass boiler adjacent to SSSI.

Rigg Approach, Leyton - Air Quality Assessment in support of waste transfer site.

Lynchford Lane Waste Transfer Station - biomass facility energy recovery plant.

Barnes Wallis Heat and Power, Cobham - biomass facility adjacent to AQMA.

Residential

Wood St Mill, Bury - residential development adjacent to scrap metal yard.

Hyams Lane, Holbrook - Odour Assessment to support residential development adjacent to sewage works.

North Wharf Gardens, London - peer review of EIA undertaken for large residential development.

Loxford Road, Alford - Air Quality EIA for residential development, included consideration of impacts from associated package sewage works

Elephant and Castle Leisure Centre - baseline AQA for redevelopment.

Carr Lodge, Doncaster - EIA for large residential development.

Queensland Road, Highbury - residential scheme including CHP.

Bicester Ecotown - dispersion modelling of energy centre.

Castleford Growth Delivery Plan - baseline air quality constraints assessment for town redevelopment.

York St, Bury - residential development adjacent to AQMA.

Temple Point Leeds - residential development adjacent to M1.

Commercial and Retail

Etihad Stadium - Air Quality EIA for the extension to the capacity of the Etihad Stadium, Manchester.

Wakefield College - redevelopment of city centre campus in AQMA.

Manchester Airport Cargo Shed - commercial development.

Manchester Airport Apron Extension - EIA including aircraft emission modelling.

National Youth Theatre, Islington - redevelopment to provide new arts space and accommodation.

PEARL POULTON

Air Quality Consultant

BSc (Hons), GradIEMA

Tel: 0161 706 0075 | Email: pearl.poulton@red-env.co.uk

KEY EXPERIENCE:

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

- Production of Air Quality Assessments in accordance with Department for Environment, Food and Rural Affairs (DEFRA) methodologies for a range of residential, commercial and industrial sectors.
- Detailed dispersion modelling of road vehicle exhaust emissions using ADMS-Roads. Studies have included assessment of road traffic exhaust emissions on sensitive receptors and exposure of new residents to poor air quality.
- Assessment of construction dust impacts from a range of development sizes.
- Assessment of fugitive dust impacts from a range of mineral extraction developments.
- Production of air quality mitigation strategies specifically tailored to address issues at individual sites.
- Definition of baseline air quality and identification of sensitive areas across the UK.
- Odour surveys to assess amenity and suitability of sites for potential future development for residential use.
- Odour monitoring at industrial sites to quantify odour emission rates.

SELECT PROJECTS SUMMARY:

Maid Marian House, Nottingham

Air Quality Assessment for a change of use from office units to residential use. Concerns were raised regarding the exposure of future occupants to poor air quality due to road traffic emissions from the A6008 Maid Marian Way. Dispersion modelling took place at several different heights reflective of residential units within the development. Predicted concentrations of NO_2 were found to exceed air quality criteria at numerous levels of the proposed building. Mechanical ventilation was specified in the appropriate units within the development as a form of mitigation.

Victoria Quarter, London

Air Quality Assessment in support of residential development in an AQMA. Dispersion modelling was undertaken to consider the potential impact of development generated vehicles and CHP/Boiler emissions on air quality at sensitive receptor locations within the vicinity of the site. Different heights within the development, reflective of the proposed residential units, were also considered. The assessment identified a range of impacts, as such, a range of mitigation was specified. Mechanical ventilation was also specified in the appropriate units predicted to be exposed to poor levels of air quality.

Monks Farm, Townsend Grove

Air Quality EIA in support of residential development comprising 456 dwellings and primary school. NO_2 and PM_{10} concentrations were predicted to be below the air quality objectives at the sensitive receptors considered. Air quality effects as a result of the proposals was determined to be not significant.

Stanton Harcourt, West Oxford

Odour Assessment for the redevelopment of the former Stanton Harcourt Airfield to residential properties. Due to the location of the site, being adjacent to a recently capped landfill, odour surveys were required to assess the level of odour across the site. A risk assessment was also undertaken in accordance with appropriate odour guidance. Taking into account the results of the odour surveys, recent odour complaint history and odour risk assessment the potential for odour effects across the site was determined to be not significant.

Hunter Street, Chester

Air Quality Assessment in support of a development for student accommodation. Concerns were raised regarding the exposure of future occupants to poor air quality due to road traffic emissions from the A5268. Dispersion modelling took place at several different heights of the proposed building. Predicted concentrations of NO_2 were found to exceed air quality criteria at ground to first floor level for those apartments facing the A5268. Mechanical ventilation was specified in these units as a form of mitigation.

Botley Road, West End, Southampton

Co-ordination and management of a six month diffusion study in support of a proposed residential development. Concerns were raised regarding the exposure of future residents to poor air quality due to road traffic emissions from the M27. The results of the monitoring study identified NO_2 concentrations across the site to be below the air quality objective and therefore deemed suitable for residential use.

OLIVER HANLON

Graduate Air Quality Consultant

BSc (Hons), GradIEMA

Tel: 0161 706 0075 | Email: oliver.hanlon@red-env.co.uk

KEY EXPERIENCE:

Oliver is a Graduate Environmental Consultant with specialist experience in the air quality sector. His key capabilities include:

- Production of Air Quality Assessments in accordance with Department for Environment, Food and Rural Affairs (DEFRA) methodologies for a range of residential, commercial and industrial sectors.
- Detailed dispersion modelling of road vehicle exhaust emissions using ADMS-Roads. Studies have included assessment of road traffic exhaust emissions on sensitive receptors and exposure of new residents to poor air quality.
- Detailed dispersion modelling of industrial emission sources using ADMS-5. Studies have included assessment of pollutant concentrations and consideration of associated impacts.
- Assessment of construction dust impacts from a range of development sizes.
- Production of air quality mitigation strategies specifically tailored to address issues at individual sites.
- Definition of baseline air quality and identification of sensitive areas across the UK.
- Air quality monitoring at industrial sites to quantify pollutant concentrations.

SELECT PROJECTS SUMMARY:

Millharbour, Isle of Dogs

Air Quality Assessment for the development of residential units within an Air Quality Management Area (AQMA). Concerns were raised regarding the exposure of future occupants to poor air quality due to road traffic emissions. Detailed dispersion modelling was undertaken using ADMS-roads to assess PM_{10} and NO_2 concentrations across the site. Results identified that pollution levels were below the air quality standards across the development.

Station Road, Howden

Air Quality Assessment in support of a residential development. Using sensitive receptors located in areas where increased road traffic may affect NO_2 concentrations, a comparison was made between overall concentrations with and without the development in place. Results indicated pollutant concentrations were below the relevant standards across the site and impacts associated with the development were not significant.

Honeycombe Beach, Bournemouth

Air Quality Assessment to determine air quality conditions within a covered car park serving a residential complex and evaluate the effectiveness of the existing ventilation system. Monitoring of pollutant concentrations over a three-month period at four locations at the site was undertaken. Internal concentrations of pollutants were below the relevant Work Exposure Limits (WELs) at all locations. As such, natural ventilation was considered to provide adequate control of internal air quality.

Matching Airport, Abbess Roding

Air Quality Assessment in support of a flexible generation facility. Dispersion modelling was undertaken to determine potential changes in pollution levels as a result of emissions from the installation and consider the potential impact at nearby sensitive receptor locations. Predicted concentrations of NO_2 were below the relevant air quality criteria at all locations of relevant exposure across all meteorological data sets modelled. The overall effects of the development were predicted to be not significant in accordance with the stated guidance.

High Road, Wood Green, London

Air Quality Assessment for a residential scheme located in an AQMA. Detailed dispersion modelling was undertaken at several heights reflective of residential units within the development. Results indicated that NO_2 and PM_{10} concentrations were below air quality criteria across the development.

Anlaby Road, Hull

Air Quality Assessment for the development of a six storey hotel and associated infrastructure within an AQMA. Concerns were raised about the exposure of future occupants to elevated pollution concentrations during operation due to road traffic exhaust emissions. Detailed dispersion modelling was undertaken using ADMS-roads to assess PM_{10} and NO_2 concentrations across the site. Results indicated that pollution levels were below the air quality standards across the development.