AIR QUALITY ASSESSMENT
1-6 STATION ROAD, ICKENHAM

ENSAFE PROJECT REFERENCE: AQ108855

PREPARED FOR: GAA DESIGN

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EXECUTIVE SUMMARY

Ensafe Consultants were commissioned by GAA Design to undertake an Air Quality Assessment in support of a proposed residential development at 1-6 Station Road, Ickenham.

The proposed development comprises the erection of approximately 22 residential units alongside associated infrastructure and parking.

The site is located adjacent to an area identified by the London Borough of Hillingdon as experiencing elevated pollution concentrations. As such, an Air Quality Assessment was required to quantify pollution levels across the site, consider its suitability for the proposed end-use and assess potential impacts as a result of the development.

Potential construction phase air quality impacts from fugitive dust emissions were assessed as a result of construction and trackout activities from the site. These were assessed in accordance with the Greater London Authority methodology. Assuming appropriate mitigation measures are implemented, air quality impacts during the construction phase are considered to be acceptable for a development of this size and nature.

Dispersion modelling was undertaken in order to quantify pollutant concentrations at the site and to assess the potential for future users to be exposed to poor air quality. Results were subsequently verified using local monitoring results provided by London Borough of Hillingdon.

The dispersion modelling indicated that pollutant concentrations of across the proposed development at proposed sensitive locations exceeded relevant standards across ground floor levels. The ground floor level therefore would only be considered suitable for the proposed end-use subject to the inclusion of mitigation methods to protect future users from poor air quality. It is recommended that mechanical ventilation is provided for all ground floor residential units at the proposed development. In addition, proven filtration units should be installed and maintained at all ground floor ventilation inlets. This would ensure a clean supply of air to all units.

Potential impacts during the operational phase of the development may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. A screening assessment was therefore undertaken to determine the potential for trips generated by the development to affect local air quality. This indicated that impacts were anticipated to be not significant.

The London Plan states that new developments must be considered Air Quality Neutral. Pollutant emissions associated with anticipated traffic flow were compared to relevant benchmarks. This indicated that transport emissions from the proposals were below the benchmarks and no further action is required.

Based on the assessment results, air quality issues are not considered a constraint to planning consent for the proposed development and complies with the London Borough of Hillingdon Local Plan and relevant Greater London Authority Legislation.

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APPENDICIES

1. INTRODUCTION

1.1 Background

Ensafe Consultants (Ensafe) was commissioned by GAA Design to undertake an Air Quality Assessment in support of a proposed development, comprising of circa 22 residential units, with associated infrastructure and parking. Herein after referred to as the 'Proposed Development'.

1.2 Site Location and Context

The Proposed Development is located at 1-6 Station Road, Ickenham at approximate National Grid Reference (NGR): 508495, 186900. Reference should be made to Figure 1 within Appendix I for a location plan.

The Proposed Development is located adjacent to the London Borough of Hillingdon (LBoH) Air Quality Management Area (AQMA), which has been declared for exceedances of the annual mean Air Quality Objective (AQO) for nitrogen dioxide (NO_2). Subsequently, the development has the potential to introduce future residential occupants into an area of elevated pollution levels. The Proposed Development may also cause impacts at sensitive receptor locations within the AQMA as a result of emissions associated with the construction and operational phases.

An Air Quality Assessment has therefore been requested to quantify pollution levels across the site, consider its suitability for the proposed end-use and assess potential impacts as a result of the development. This is detailed in the following report.

1.3 Limitations

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

2. LEGISLATION AND POLICY

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

- European Union (EU) Directive 2008/50/EC;
- The National Planning Policy Framework (NPPF), updated on 19th February 2019);
- The National Planning Practice Guidance (NPPG), relevant chapters produced on 1th November 2019;
- Section 82 of the Environment Act (1995) (Part IV);
- The Air Quality Standards (Amendment) Regulations (2016).
- London Local Air Quality Management Technical Guidance 2016 LLAQM.TG (16), GLA, 2016;
- The Control of Dust and Emissions During Construction and Demolition Supplementary Planning Guidance, GLA, 2016; and
- Land-Use Planning and Development Control: Planning for Air Quality, Environmental Protection UK and IAQM, January 2017.

2.1 UK Legislation

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

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

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

Table 1 **Air Quality Objectives**

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

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

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

Table 2 Examples of Where the Air Quality Objectives Apply

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

The results of the dispersion modelling assessment will also be compared against the Air Pollution Exposure Criteria (APEC) contained within the London Councils Air Quality and Planning Guidance[3] from the London Air Pollution Planning and the Local Environment (APPLE) working group. These are outlined in Table 11.

Table 3 Air Pollution Exposure Criteria

Category	Applicable Range Annual Mean: NO2 and PM_{10}	Applicable Range 24hr Daily Mean: PM_{10}	Recommendation
APEC - A	Below 5% of the annual mean AQO	> 1-day less than national objective	No air quality grounds for refusal; however, mitigation of any emissions should be considered

2 London Local Air Quality Management Technical Guidance 2016 LLAQM (TG16), DEFRA, 2016.
3 London Councils Air Quality and Planning Guidance, London Councils, 2007.

Category	Applicable Range Annual Mean: NO2 and PM_{10}	Applicable Range 24hr Daily Mean: PM_{10}	Recommendation
APEC - B	Between 5% below or above the annual mean AQO	Between 1-day above or below national objective	May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered e.g. maximise distance from pollutant source, proven ventilation systems, parking considerations, winter gardens, internal layout considered and internal pollutant emissions minimised
APEC - C	Above 5% of the annual mean AQO	>1-day more than national objective	Refusal on air quality grounds should be anticipated, unless the LA has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated. Worker exposure in commercial/industrial land uses should be considered further. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures

It should be noted that a significant area of London would fall under APEC - C due to high NO_2 concentrations throughout the city. As such, a presumption against planning consent in these locations may result in large areas of land becoming undevelopable and prevent urban regeneration. The inclusion of suitable mitigation measures to protect future users is therefore considered a suitable way to progress sustainable schemes in these locations and has been considered within this assessment.

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

2.2 Local Planning Policy

2.2.1 The London Plan

The Minor Alterations to The London Plan[4] was published in March 2016 and sets out a fully integrated economic, environmental, transport and social framework for the development of the capital until 2031. London boroughs' local plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.

The London Plan policies relating to air quality are outlined below:

- **Policy 3.2 Improving health and addressing health inequalities**
- **Policy 5.3 - Sustainable design and construction**
- **Policy 7.14 - Improving air quality**

These policies have been considered throughout the completion of this Air Quality Assessment.

[4] Draft London Plan – consolidated changes version Greater London Authority, July 2019.

2.2.2 The Draft London Plan

The Draft New London Plan sets out the proposed development strategy for London from 2019 to 2041. It was consulted from 29th November 2017 until 2nd March 2018, with the Draft New London Plan showing Consolidated Suggested Changes, which includes clarifications, corrections and factual updates to the Consultation Draft Plan for Examination in Public[5] was published in July 2019. A review of the Draft New London Plan indicated the following policy in relation to air quality

A review of the Draft New London Plan indicated the following policy in relation to air quality:

- **Draft Policy SI1 Improving air quality**

This policy has been considered throughout the undertaking of this Air Quality Assessment. However, it should be noted that the plan carries limited weight in the determination of this application.

2.2.3 London Borough of Hillingdon Local Plan

London Borough of Hillingdon's Local Development Framework (LDF) consists of a portfolio of documents, of which the Local Plan is the principal overarching section. The Hillingdon Local Plan consists of two parts; Part 1: Strategic Policies, which was adopted in November 2012 and Part 2, which is due to replace the existing Unitary Development Plan. The Hillingdon Local Plan - Part 1: Strategic Policies sets out the spatial vision, objectives, development strategy and a series of key policies that will guide the scale, location and type of development in the borough until 2026. As such, the policies contained within the Local Plan - Part 1 provide the current basis for the determination of planning applications within LBoH's area of administration.

A review of the Local Plan-Part 1 indicated the following policies in relation to air quality that are relevant to this assessment:

- ***Policy E2 - Location of Employment Growth***
- ***Policy EM1 - Climate Change and Adaption and Mitigation***
- ***Policy EM8 - Land, Water, Air and Noise***
- ***DMEI 14: Air Quality***
- ***Policy DMT 2: Highways Impacts***
- ***Policy DMEI 1: Sustainable Design Standards Living Walls and Roofs and on-site Vegetation***

Reference has been made to these policies during the undertaking of this Air Quality Assessment.

[5] The EiP commenced on Tuesday 15 January 2019 and the final session was held on Wednesday 22 May 2019

3. METHODOLOGY

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

3.1 Construction Phase Assessment

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the GLA document 'The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance'[6].

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

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

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

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

The assessment steps are detailed below.

3.1.1 Step 1

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

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

3.1.2 Step 2

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

- The scale and nature of the works, which determines the magnitude of dust arising as: small, medium or large (Step 2A); and

[6] The Control of Dust and Emissions During Construction and Demolition Supplementary Planning Guidance, GLA, 2016.

- The sensitivity of the area to dust impacts, which can be defined as low, medium or high sensitivity (Step 2B).

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

3.1.3 Step 3

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

3.1.4 Step 4

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

The determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts.

The relevant GLA[6] construction phase assessment criteria are provided in Appendix III, which details the magnitude of dust emissions, as well as the sensitivity of the surrounding area with regards to dust soiling and to human health impacts. The GLA[6] guidance also suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix IV.

3.2 Operational Phase Assessment

3.2.1 Future Exposure

As stated previously, the Proposed Development includes sensitive land uses and is located within an AQMA and within close proximity to the local highway network. As such, the proposals have the potential to introduce new receptors into an area of elevated pollutant concentrations. Detailed dispersion modelling was therefore undertaken to quantify NO_2, PM_{10} and $PM_{2.5}$ concentrations across the site and determine suitability for the proposed use. The following modelling scenarios were utilised during the assessment:

- 2018 as baseline year for verification against latest ratified data; and
- 2022 Opening Year - Do Something (DS) Scenario (predicted traffic flows in 2022 should the proposals be completed).

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

Air quality is predicted to improve in the future. However, in order to provide a robust assessment, emission factors for 2018 were utilised within the dispersion model. The use of 2022 traffic data and 2018 emission factors is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations. Additionally, sensitivity analysis was undertaking utilising 2022 traffic data and 2021 emission factors to provide a reasonable and more realistic assessment.

In either case, the results of the dispersion modelling assessment were compared against the Air Pollution Exposure Criteria (APEC) contained within the London Councils Air Quality and Planning Guidance[7] from the London Air Pollution Planning and the Local Environment (APPLE) working group as outlined in Table 3.

3.2.2 Road Vehicle Exhaust Emissions

To assess impacts upon air quality as a result of pollutant emissions associated with vehicles travelling to and from the site a screening assessment has been undertaken.

The screening assessment refers to the criteria contained within the Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) 'Land-Use Planning & Development Control: Planning for Air Quality (2017)'[8] guidance document.

This guidance provides the following criteria to help establish when an air quality assessment is likely to be considered necessary:

- Proposals that will cause a change in Light Duty Vehicle (LDV) flows of more than 100 AADT within or adjacent to an AQMA or more than 500 elsewhere;
- Proposals that will cause a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 elsewhere;

Should these criteria not be met, then the EPUK and IAQM guidance[8] documents consider air quality impacts associated with a scheme to be negligible and no further assessment is required.

Should screening of the traffic data indicate that any of the above criteria are met, then potential impacts at sensitive receptor locations can be assessed by calculating the predicted change in pollutant concentrations as a result of the proposed development. The significance of predicted impacts can then be determined in accordance with the methodology outlined in the EPUK and IAQM guidance[8].

3.3 Air Quality Neutral

An assessment is usually undertaken to compare benchmark emissions with the application site use emissions in accordance with the methodology outlined within the GLA Air Quality Neutral Planning Support GLA 80371[9]. The methodology is outlined below:

3.3.1 Air Quality Neutral Assessment

The following potential scenarios have been considered within the assessment:

- Benchmark; and
- Development.

[7] London Councils Air Quality and Planning Guidance, London Councils, 2007.
[8] Land-Use Planning & Development Control: Planning for Air Quality, EPUK and IAQM, January 2017.
[9] Air Quality Neutral Planning Support: GLA 80371, Air Quality Consultants Ltd in association with ENVIRON UK Ltd, 2014.

The benchmark scenario is representative of annual NO_x benchmark emissions, which are target emissions as defined by the GLA Guidance[9]. The development scenario is representative of the annual NO_x emissions from the operation of the proposed development only.

The following emission source was considered during the assessment:

- **Transport Emissions** - road vehicles travelling to and from the site

3.3.2 Benchmarks

The Transport Emissions Benchmark (TEB) for the development is calculated using the GLA Air Quality Neutral Planning Support Guidance based on the land use classes associated with the proposed development. The TEBs for each land use class for a development within the Outer London are provided in the GLA Air Quality Neutral Planning Support Guidance9 and are summarised in Table 4.

Table 4 Transport Emission Benchmarks

Land Use Category	NO_x TEB (g/m^2/year)	PM_{10} TEB ((g/m^2/year)
C3 - Residential	1,553	267

3.3.3 Development Emissions

The development Total Transport Emissions is compared against the development specific TEB in order to determine if the development site is considered to be Air Quality Neutral. Annual vehicle emissions for the development are calculated based on the anticipated traffic generation for the development, with the standard emission factors and the average distance travelled by car per trip for a development within Outer London. The emissions factors and the average distance travelled were taken from the GLA guidance[9] and are summarised in Table 5 and Table 6, respectively.

Table 5 Air Quality Neutral Road Transport Emission Factors

Pollutant	g/vehicle-km in Outer London
NO_x	0.3530
PM_{10}	0.0606

Table 6 Average Distance Travelled by Car per Trip

Land Use Category	Average Distance (km)
C3 - Residential	11.4

4. BASELINE

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

4.1 Local Air Quality Management

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

> *"Hillingdon AQMA - The area from the southern boundary north to the border defined by, the A40 corridor from the western borough boundary, east to the intersection with the Yeading Brook north until its intersection with the Chiltern-Marylebone railway line."*

The application site is located 140m from the Hillingdon AQMA. As such there is the potential for the Proposed Development to introduce future residents to elevated annual mean NO_2 concentrations as well as to cause air quality impacts during the construction and operational phases. This has been considered further within this report.

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

4.2 Air Quality Monitoring

LBoH undertakes monitoring of pollutant concentrations using both periodic and continuous techniques throughout their area of administration. A review of the most recent Air Quality Annual Status Report[10] indicated that the closest continuous monitor to the proposed development is the South Ruislip analyser.

Recent monitoring results from this location are shown in Table 7. Exceedances of the AQO are shown in **bold.**

Table 7 Automatic Monitoring Results

ID	Site Name	Type	NGR (m)		Dist.to Site (m)	Annual Mean Concentration (µg/m^3)		
			X	Y		2016	2017	2018
HI1	Hillingdon 1- South Ruislip	Roadside	510857	184917	3,086	**43**	**46**	36

As indicated in Table 7 the annual mean AQO for NO_2 was exceeded at the monitoring location in recent years. This is likely due to its roadside location within an AQMA.

LBoH also monitor NO_2 concentrations across the borough using passive diffusion tubes. A review of the most recent air quality monitoring data indicated two diffusion tubes located within 3.5km of the application site, presented in Table 8. Exceedances of the AQO are shown in **bold.**

[10] Hillingdon Air Quality Annual Status Report 2018, Hillingdon Council, 2018

Table 8 Diffusion Tube Monitoring Results

ID	Site Name	Type	NGR (m)		Dist.to Site (m)	Annual Mean Concentration (µg/m³)		
			X	Y		2016	2017	2018
HD46	South Ruislip Monitoring Station, West End Road	Roadside	510821	184923	3,055	**40.2**	**46.7**	**43.4**
HD210	340 Long Lane, Uxbridge Lamp Post (71)	Roadside	507649	184611	2,443	**42.5**	**45.5**	**42.4**

As indicated in Table 8, the annual mean AQO for NO_2 was exceeded at both diffusion tube locations in recent years. This is likely due to its roadside locations within an AQMA. Reference should be made to Figure 2 within Appendix I for a graphical representation of the passive monitoring locations.

4.3 Background Pollutant Concentrations

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

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

Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The Proposed Development site is located at NGR: 508500, 186500. Data for this location was downloaded from the DEFRA website[11]. For the purpose of this assessment, background concentrations are summarised in Table 9 for the verification year (2018) and the predicted development opening year (2022).

Table 9 Predicted Background Pollutant Concentrations

Pollutant	Predicted Background Concentration (µg/m³)	
	2018	2022
NO_x	28.76	23.03
NO_2	19.47	16.16
PM_{10}	15.18	14.41
$PM_{2.5}$	10.67	10.03

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

As shown in Table 9, background pollutant concentrations do not exceed the relevant AQOs. Comparison with the monitoring results indicates the impact that vehicle exhaust emissions from the highway network have on pollutant concentrations at roadside locations.

4.4 Sensitive Receptors

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

4.4.1 Construction Phase Sensitive Receptors

Human receptors sensitive to potential dust impacts during demolition, earthworks and construction were identified from a desk-top study of the area up to 350m from the development boundary. These are summarised in Table 10.

Table 10 Demolition, Earthworks and Construction Dust Sensitive Receptors

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

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

Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 500m of the site access route. These are summarised in Table 11. The exact construction vehicle access routes were not available for the purpose of this assessment as they will depend on sourcing of materials. This is likely to be decided by the contractor. However, it was assumed that construction traffic would access the development Station Road, to ensure a worst case trackout assessment is undertaken.

Table 11 Trackout Dust Sensitive Receptors

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

Reference should be made to Figure 4 within Appendix I for a graphical representation of trackout dust buffer zones. A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 12.

Table 12 Additional Area Sensitivity Factors

Guidance	Comment
Whether there is any history of dust generating activities in the area	The site is located in a predominantly residential/commercial location. There is likely to have been a history of dust generating activities due to residential developments and industrial processes.
The likelihood of concurrent dust generating activity on nearby sites.	A review of the LBoH Planning Portal indicated that there are no large-scale planning applications within 500m of the proposed development. There is therefore no potential for concurrent dust generation
Pre-existing screening between the source and the receptors	There is no vegetation present along the boundary of the site. As such there is limited natural protective screening
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	The wind direction is predominantly from the southwest of the development, as shown in Figure 5 within Appendix I. As such, properties to the northeast of the site would be most affected by dust emissions
Conclusions drawn from local topography	The topography of the area appears to be predominantly flat. As such, there are no constraints to dust dispersion
Duration of the potential impact, as a receptor may become more sensitive over time	Currently the duration of the construction phase is unknown but considering the 2022 opening year it is likely to extend over at least a year.
Any known specific receptor sensitivities which go beyond the classifications given in the document.	No specific receptor sensitivities identified during the baseline

4.4.2 Operational Phase Sensitive Receptors

A desk top study was undertaken to identify the closest receptor locations to the application site. This indicated residential locations adjacent to the development boundaries. There are no educational or medical facility in immediate vicinity of the application site, with the nearest school (Pentland Field School) and medical centre (St Martins Medical Centre) located approximately 540m south west and 400m south east of the site, respectively.

5. ASSESSMENT

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

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

5.1 Construction Phase Assessment

5.1.1 Step 1 - Screening

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

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

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

5.1.2 Step 2A – Magnitude

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

Demolition

The proposed development will include the demolition of existing buildings. The volume of buildings to be demolished is likely to be less than 20,000m^3. With this considered the magnitude of potential dust emissions related to demolition activities is ***small***.

Earthworks

The proposed development site is estimated to cover an approximate area of 715m^2. Based on this information the magnitude of potential dust emissions related to earthwork activities is considered ***small***.

Construction

The proposals comprise the construction of 22 residential units, given the scale of the development the total building and infrastructure volume is likely less than 25,000m^3. The magnitude of potential dust emissions related to construction activities is considered ***small***.

Trackout

Information on the number of HDV trips to be generated during the construction phase of the development was not available at the time of assessment. Similarly, the surface material and unpaved road length was not known at this stage of the project. Based on the site area, it is anticipated that the unpaved road length is likely to be less than 50m. The magnitude of potential dust emissions from trackout is considered ***small***.

Table 13 Dust Emission Magnitude

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

5.1.3 Step 2B – Sensitivity

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

Dust Soiling

As shown in Table 10 and Table 11, the desk top study indicated are approximately ***10-100*** sensitive receptors within 50m of the proposed development boundary and ***More than 100*** within 20m of the anticipated trackout routes. Based on the assessment criteria detailed in Appendix III, the sensitivity of the receiving environment to potential dust soiling impacts was considered to be ***medium*** for demolition, earthworks and construction activities and ***high*** for trackout activities. This is because the site is situated in a predominantly residential area and the people or property would reasonably be expected to be present here for extended periods of time.

Human Health

The annual mean concentration of PM_{10} is less than 24µg/m^3 as detailed in Section 4.3. Based on the assessment criteria detailed in Appendix III and given the presence of ***10 - 100*** sensitive receptors within 50m of the proposed development boundary, and ***More than 100*** within 20m of the anticipated trackout routes, the area is considered to be of ***low*** sensitivity for demolition, earthworks and construction activities and ***medium*** for trackout activities.

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

Table 14 Sensitivity of the Surrounding Area

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

5.1.4 Step 2C – Risk

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

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

Table 15 Summary of Potential Unmitigated Dust Risks

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

5.1.5 Step 3 – Mitigation

The GLA guidance[6] provides a number of potential mitigation measures to reduce impacts during the construction phase. These measures have been adapted for the development site as summarised in Table 16. The mitigation measures outlined in Table 16 can be reviewed prior to the commencement of construction works incorporated into the existing strategies as applicable.

Table 16 Fugitive Dust Mitigation Measures

Issue	Control Measure
Communications	• Display the name and contact details of person(s) account- able for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. • Display the head or regional office contact information.
Site Management	• Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. • Make the complaints log available to the local authority when asked. • Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the log book.
Monitoring	• Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority. • Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Preparing and Maintaining the Site	• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. • Erect solid screens or barriers around dusty activities or the site boundary that

Issue	Control Measure
	are at least as high as any stockpiles on site. • Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive time period. • Avoid site runoff of water or mud. • Keep site fencing, barriers and scaffolding clean using wet methods. • Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below. • Cover, seed or fence stockpiles to prevent wind whipping.
Operating vehicle/machinery and sustainable travel	• Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone. • Ensure all non-road mobile machinery (NRMM) comply with the standards set within the guidance • Ensure all vehicles switch off engines when stationary - no idling vehicles. • Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable. • Impose and signpost a maximum-speed-limit of 10 mph on surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate) • Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)
Operations	• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems. • Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. • Use enclosed chutes and conveyors and covered skips. • Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
Waste Management	• Reduce and recycle waste to reduce dust from waste materials • Avoid bonfires and burning of waste materials.
Demolition	• Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). • Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground. • Avoid explosive blasting, using appropriate manual or mechanical alternatives. • Bag and remove any biological debris or damp down such material before demolition

Issue	Control Measure
Earthworks and Construction	• Avoid scabbling (roughening of concrete surfaces) if possible • Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
Trackout	• Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use. • Avoid dry sweeping of large areas. • Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. • Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

5.1.6 Step 4 – Residual Impacts

Assuming the relevant mitigation measures outlined in Table 16 are implemented, the residual effect from all dust generating activities is predicted to be **not significant**, in accordance with the GLA guidance[6].

5.2 Operational Phase Assessment

Given the application site's location adjacent to the Hillingdon AQMA there is potential to expose future site users to elevated pollution levels, as well as to cause impact at nearby sensitive locations. This was assessed through dispersion modelling, with the results presented in the following Sections.

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

5.2.1 Future Exposure

Annual mean NO_2 and PM_{10} concentrations were predicted across the development for the 2022 DS scenario at a height of 1.5m and 4.5m to represent exposure across the ground floor and first floor level respectively, as shown in Figure 7, 8 and 9 (2018 Emissions) and Figures 10, 11 and 12 (2021 Emissions) within Appendix I.

5.2.2 Nitrogen Dioxide

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

Table 17 Modelling Results - Annual Mean NO_2 Across Sensitive Uses

Floor Level	Predicted 2022 Annual Mean NO_2 Concentration Range (µg/m^3)			
	2018 Emission Factors	APEC Category	2021 Emission Factors	APEC Category
Ground (1.5m)	35.29 – **47.19**	C	30.02 – **40.26**	B

Floor Level	Predicted 2022 Annual Mean NO_2 Concentration Range ($\mu g/m^3$)			
	2018 Emission Factors	APEC Category	2021 Emission Factors	APEC Category
First Floor (4.5m)	32.35 – 37.96	A	27.53 – 32.23	A

The predicted concentrations shown in Table 17 indicate that there were exceedances of the AQO across proposed ground level sensitive uses during both assessment scenarios. Annual mean NO_2 concentration are therefore classified as APEC B/C (refusal on air quality grounds is possible) in accordance with the London Councils Air Quality Planning Guidance[3].

There were no predicted exceedances of the AQO on first floor level as a result of both assessment scenarios, with concentrations classified as APEC A at proposed sensitive uses.

Based on the results of the dispersion modelling assessment, the site requires the implementation of mitigation techniques to protect future site users from poor air quality from elevated NO_2 concentrations across the ground floor levels.

No mitigation is required on subsequent floor levels as background NO_2 concentrations are likely to be lower at elevated heights due to increased distance from emission sources, such as roads. Therefore, predicted concentrations at heights above ground floor level across the residential aspects of the developments are considered acceptable in regards to future exposure.

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

Based on the results of the dispersion modelling assessment, the site is considered to be suitable for residential use subject to the implementation of mitigation techniques on ground floor level to protect future site users from elevated NO_2 concentrations.

5.2.3 Particulate Matter (PM_{10})

Predicted annual mean PM_{10} concentrations across the development site during the DS scenario are summarised in Table 18.

Table 18 Modelling Results - Annual Mean PM_{10} Across Sensitive Uses

Floor Level	Predicted 2022 Annual Mean PM_{10} Concentration Range ($\mu g/m^3$)			
	2018 Emission Factors	APEC Category	2021 Emission Factors	APEC Category
Ground (1.5m)	14.04 – 14.73	A	13.47 – 14.11	A

The predicted concentrations shown in Table 18 indicate that there were no exceedances of the AQO throughout the modelling area during both assessment scenarios. As such, it is considered that annual mean PM_{10} levels at the development site should not be viewed as a constraint to development.

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

Based on the results of the dispersion modelling assessment, the site is considered to be suitable for residential use without the implementation of mitigation techniques to protect future site users from elevated PM_{10} concentrations.

5.2.4 Particulate Matter ($PM_{2.5}$)

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

5.3 Air Quality Neutral Assessment

The proposals comprise the development of 22 residential units. The impact of the residential units have been assessed in the following sections.

5.3.1 Benchmarks

The Transport Emissions Benchmark (TEB) has been calculated using the GLA Air Quality Neutral Planning Supporting[9] guidance document based on the land-use class of the proposed development, as outlined in Table 4, and the floor area of proposed land use.

The number of residential units was provided by the developers. The TEBs are those provided in the GLA Air Quality Neutral Planning Support document and are detailed in Table 19.

Table 19 Transport Emission Benchmarks

Land Use	Number of dwellings)	NO_x		PM_{10}	
		TEB ((NO_x (g/dwelling/ year)	NO_x per Land Use (kg/year)	TEB ((PM_{10} (g/dwelling/ year))	PM_{10} per Land Use (kg/year)
C3 - Residential	22	1,553.0	34.2	267	5.9

As indicated in Table 19, the total annual NO_x emission TEB is ***34.2kg/year*** and the total annual PM_{10} emission TEB is ***5.9kg/year****.*

Development Emissions

The Total Transport Emissions for the proposed development were calculated based on the standard emission factors and the average distance travelled by car per trip outlined in Table 5 and Table 6, respectively and utilising an estimated, worst case traffic flow of 12 trips per day. This relates to the anticipated vehicle trip rate associated with provision of 2 disabled parking spaces.

The development Total Transport Emissions are summarised in Table 20.

Table 20 Development Total Transport Emissions

Land Use Category	Net 24-hour AADT Flow	NO_x Emission (kg/year)	PM_{10} Emission (kg/year)
C3 - Residential	12	17.63	3.03

The development specific TEBs was then subtracted from the development Total Transport Emissions to determine if the development transport emissions are within the benchmark. The results are summarised in Table 21.

Table 21 Comparison of Total Transport Emissions with Transport Emission Benchmarks

Scenario	NO_x Emission (kg/year)	PM_{10} Emission (kg/year)
Development Specific TEB	34.17	5.87
Development Total Transport Emission	17.63	3.03
Difference	**-16.54**	**-2.85**

As indicated in Table 21, annual NOx and PM10 road vehicle exhaust emissions associated with the development are predicted to be below the TEB by **16.54kg/yr** for NO_x and **2.85kg/yr** for PM_{10}.

As such, the development is considered to be **Air Quality Neutral** and no further action is required to reduce excess emissions.

6. MITIGATION

There are a number of air quality mitigation options available to reduce potential exposure of future site users to elevated pollutant concentrations.

Detailed dispersion modelling undertaken at heights equivalent to the proposed building floor levels indicated that annual mean NO_2 concentrations across proposed sensitive uses at ground level were classified as APEC – C.

In accordance with the London Councils Air Quality and Planning Guidance[9] protective mitigation measures must be considered for areas classified as APEC – B; It is therefore recommended that the inclusion of appropriate mechanical ventilation should be implemented within the building design to affected residential units on ground floor levels of the Proposed Development.

The air inlet should be located at the highest possible location, and in an area below 38µg/m^3. Alternatively, the air inlet can be located on the building at lower levels within areas exceeding 38µg/m^3 if required by design, providing a NO_x filtration unit is included to the ventilation system. This should ensure the supply of clean air for future site users when the windows or balcony doors are closed.

Additionally, a high specification of air tightness on the windows and doors should be incorporated at the High Road façade to all affected residential units on the ground floor level. This ensures that the windows will remain openable at the affected areas and provides freedom of choice over whether natural ventilation is preferable during certain periods. The high specification of air tightness will also ensure that when the windows are shut, the residential units will be suitable ventilated via mechanical systems.

It should be noted that pollutant concentrations across upper floor levels were classified as APEC – A and do not require the implementation of protective mitigation measures.

Reference should be made to Figure 7 to Figure 12 within Appendix I for a graphical representation of onsite pollutant contours.

7. CONCLUSION

Ensafe was commissioned by GAA Design to undertake an Air Quality Assessment in support of a proposed residential development at 1-6 Station Road, Ickenham.

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

Dispersion modelling was undertaken in order to quantify pollutant concentrations at the site. Concentrations of NO_2 and PM_{10} were predicted across relevant floor levels. This indicated that annual mean NO_2 concentrations across the ground floor level of the development were categorised as APEC – B/C. The location therefore would only be considered suitable for the proposed end-use with the inclusion of mitigation methods at ground floor level to protect future users from poor air quality.

It is recommended that mechanical ventilation is provided for all ground floor residential units at the proposed development. In addition, NOx filtration units should be installed and maintained at all ventilation inlets. This would ensure a clean supply of air to all ground floor units

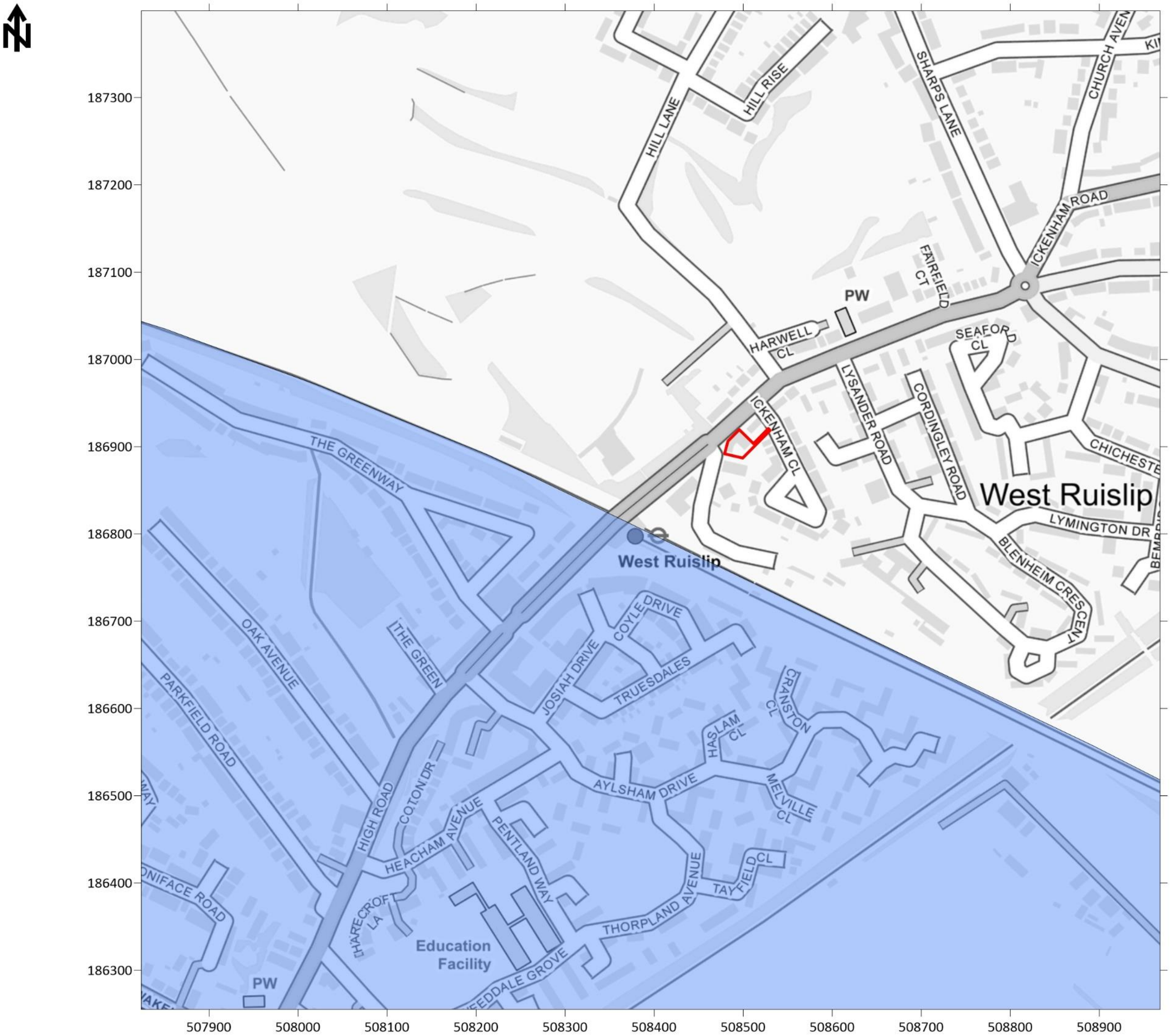
Concentrations of annual mean NO_2 on first floor levels and above and PM_{10} across the entire development were categorised as APEC – A and therefore further mitigation measures and not required to protect future users from exposure.

Based on the assessment results, and the implementation of suitable mitigation measures air quality is not considered a constraint to planning consent and the Proposed Development is considered suitable for residential use.

8. ABBREVIATIONS

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

APPENDIX I - FIGURES



Legend

Site Boundary

Air Quality Management Area

Title

Figure 1

Site Location

Project

Air Quality Assessment
1-6 Station Road, Ickenham

Project Number

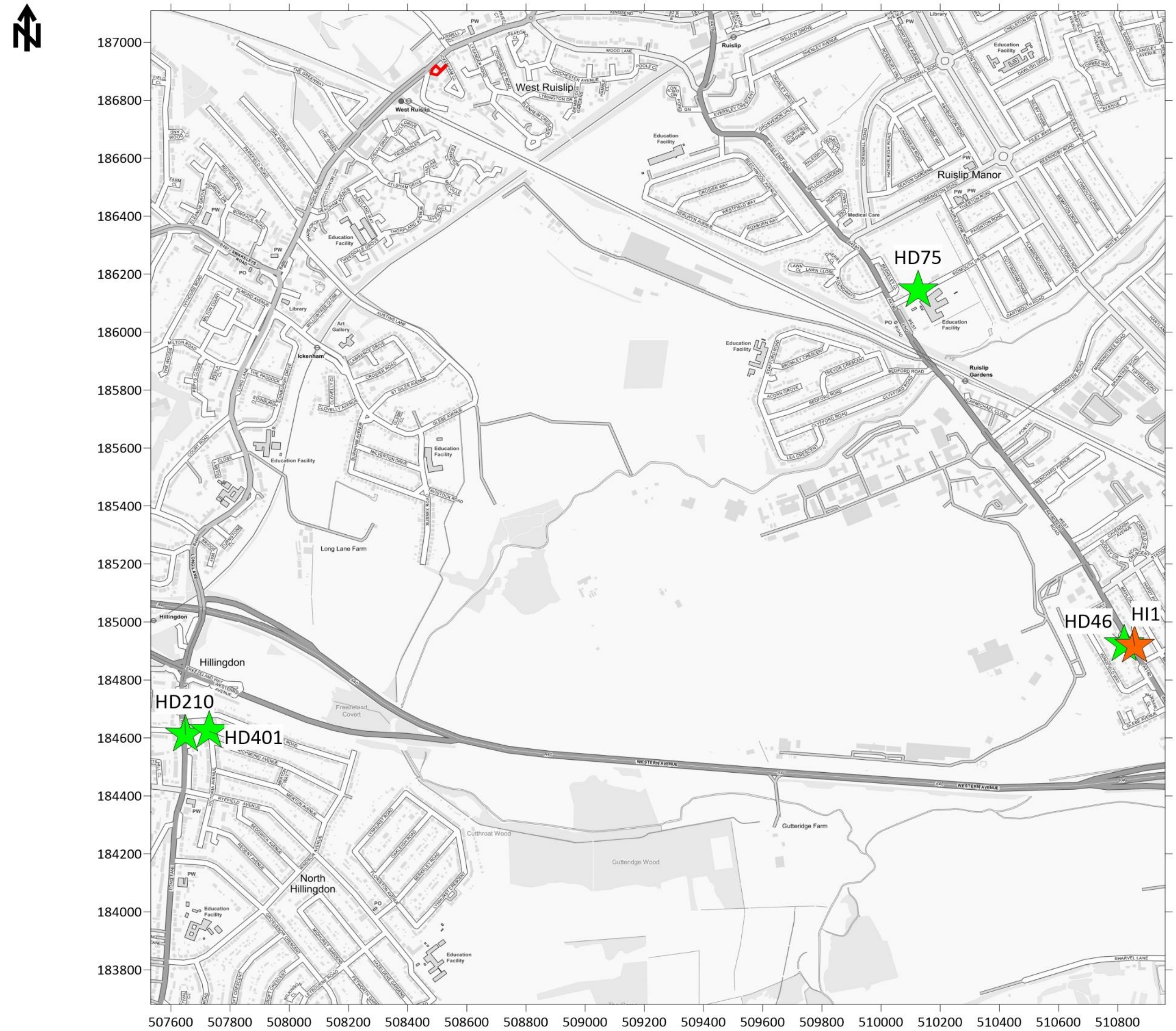
AQ108855

Client

GAA Design

Ensafe Consultants
Osprey House, Broadway, Manchester M50 2UE

Tel – 0161 868 1300
www.ensafe.co.uk



Legend

Site Boundary

Diffusion Tube Monitoring Locations

Automatic Analyser Monitoring Location

Title

Figure 2

Diffusion Tube and Automatic Analyser Monitoring Locations

Project

Air Quality Assessment
1-6 Station Road, Ickenham

Project Number

AQ108855

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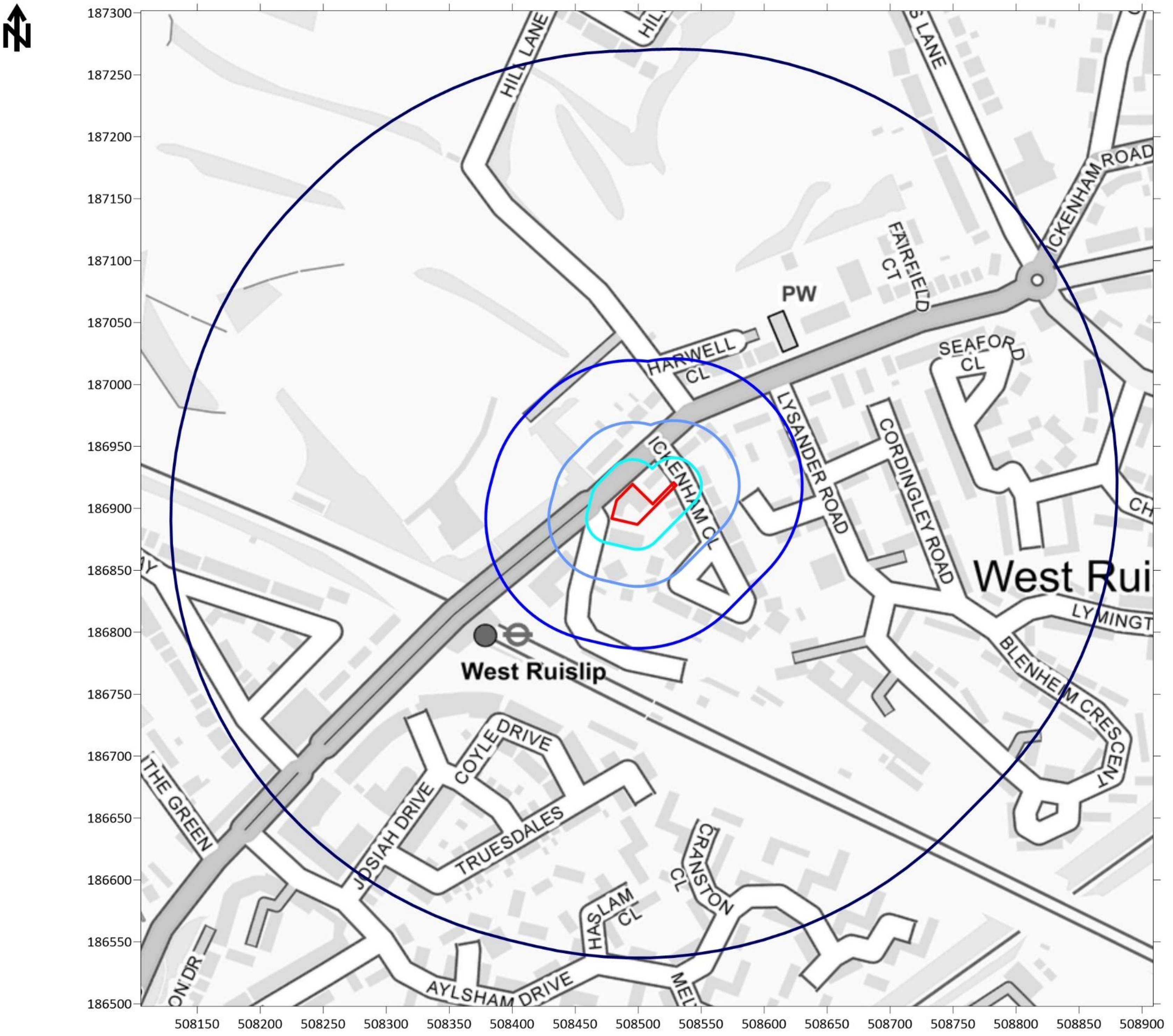

Legend

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

Title

Figure 3

Demolition, Earthworks and Construction Dust Buffer Zones

Project

Air Quality Assessment
1-6 Station Road, Ickenham

Project Number

AQ108855

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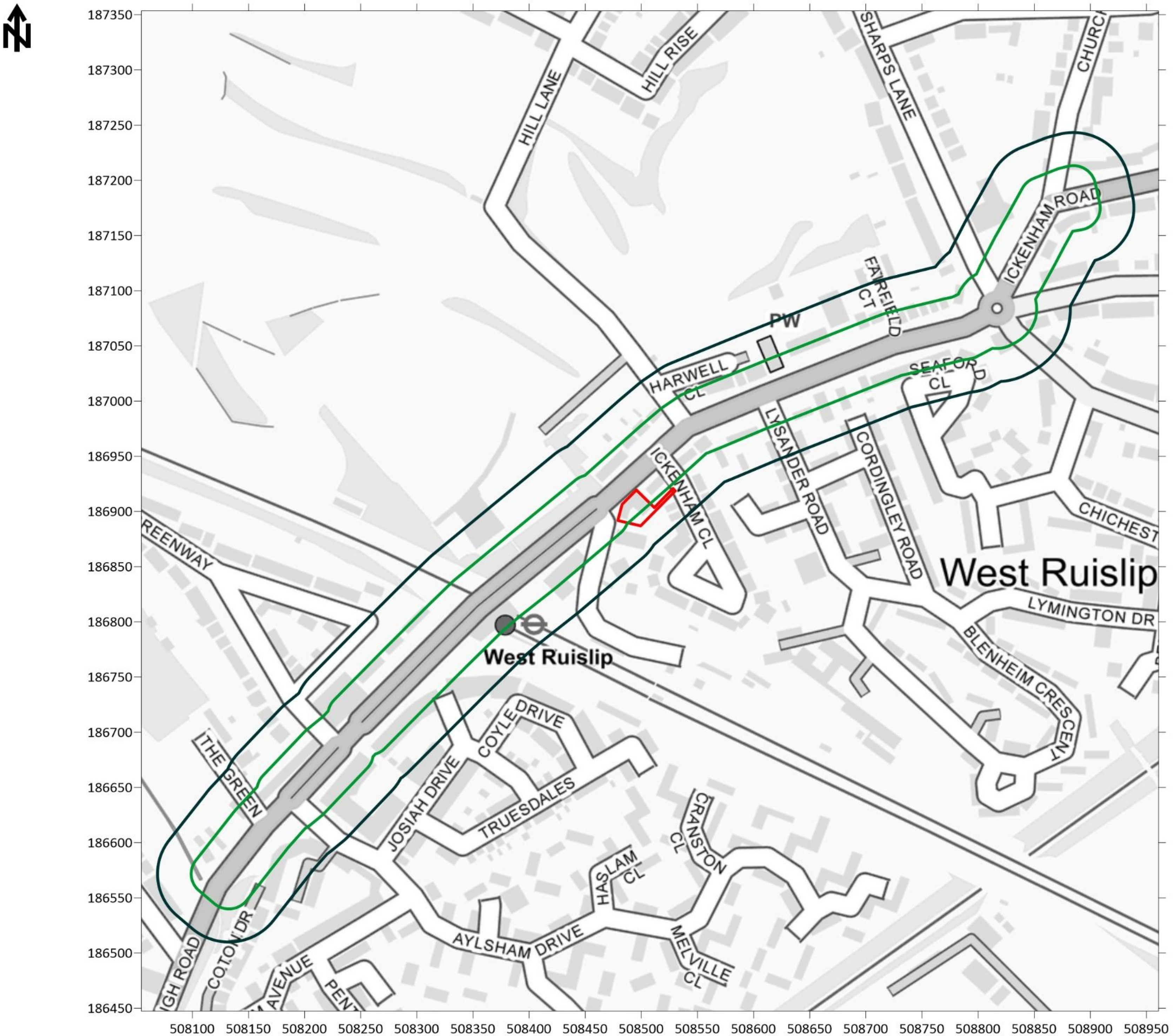

Legend

Site Boundary

20m from Site Access Route

50m from Site Access Route

Title

Figure 4

Trackout Dust Buffer Zones

Project

Air Quality Assessment
1-6 Station Road, Ickenham

Project Number

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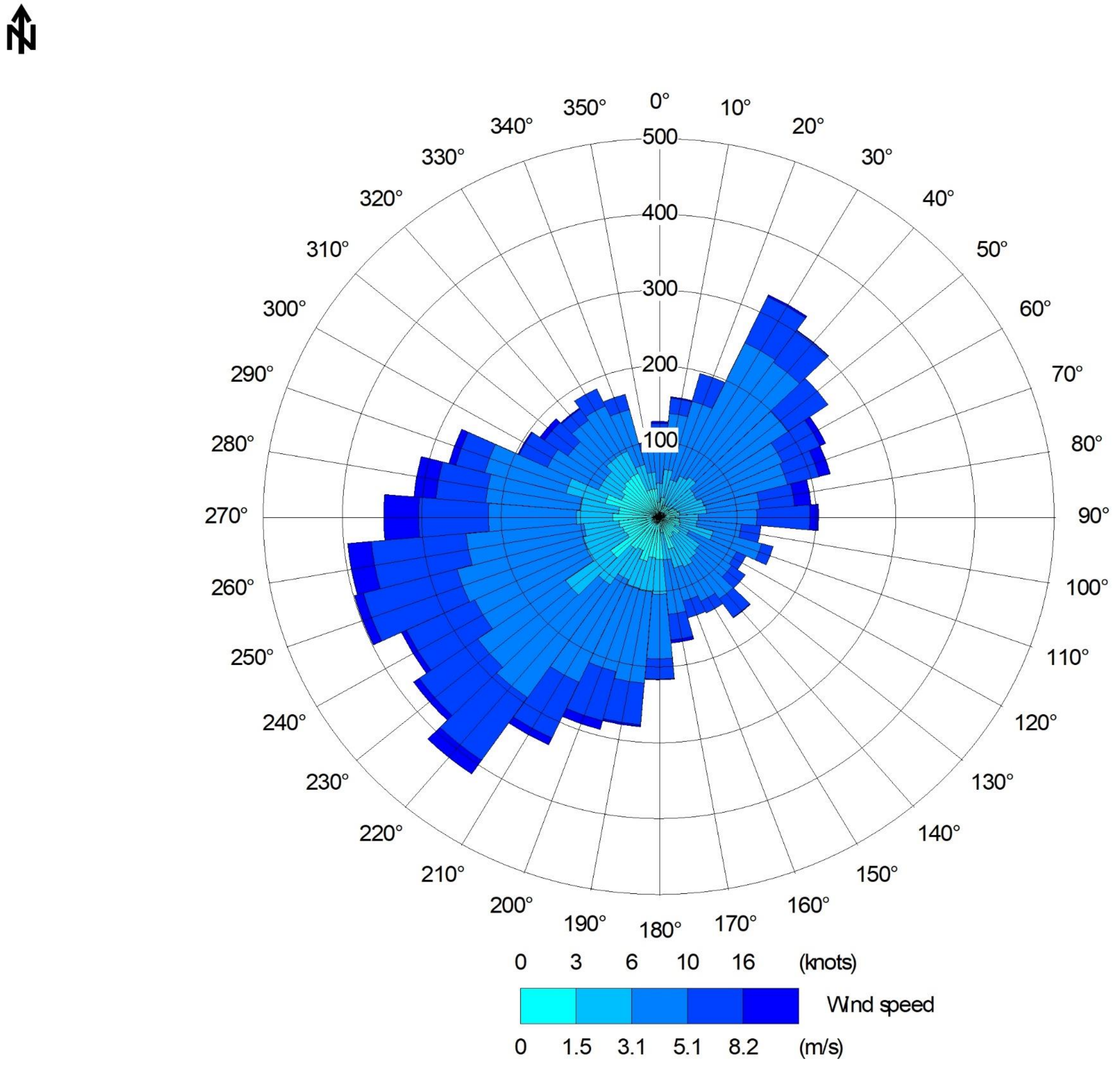

Title

Figure 5

Wind Rose 2018

Northolt Meteorological Station

Project

Air Quality Assessment

1-6 Station Road, Ickenham

Project Number

AQ108855

Client

GAA Design

Ensafe Consultants

Osprey House, Broadway, Manchester M50 2UE

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Legend

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

Title

Figure 6

ADMS-Roads Input

Project

Air Quality Assessment
1-6 Station Road, Ickenham

Project Number

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Client

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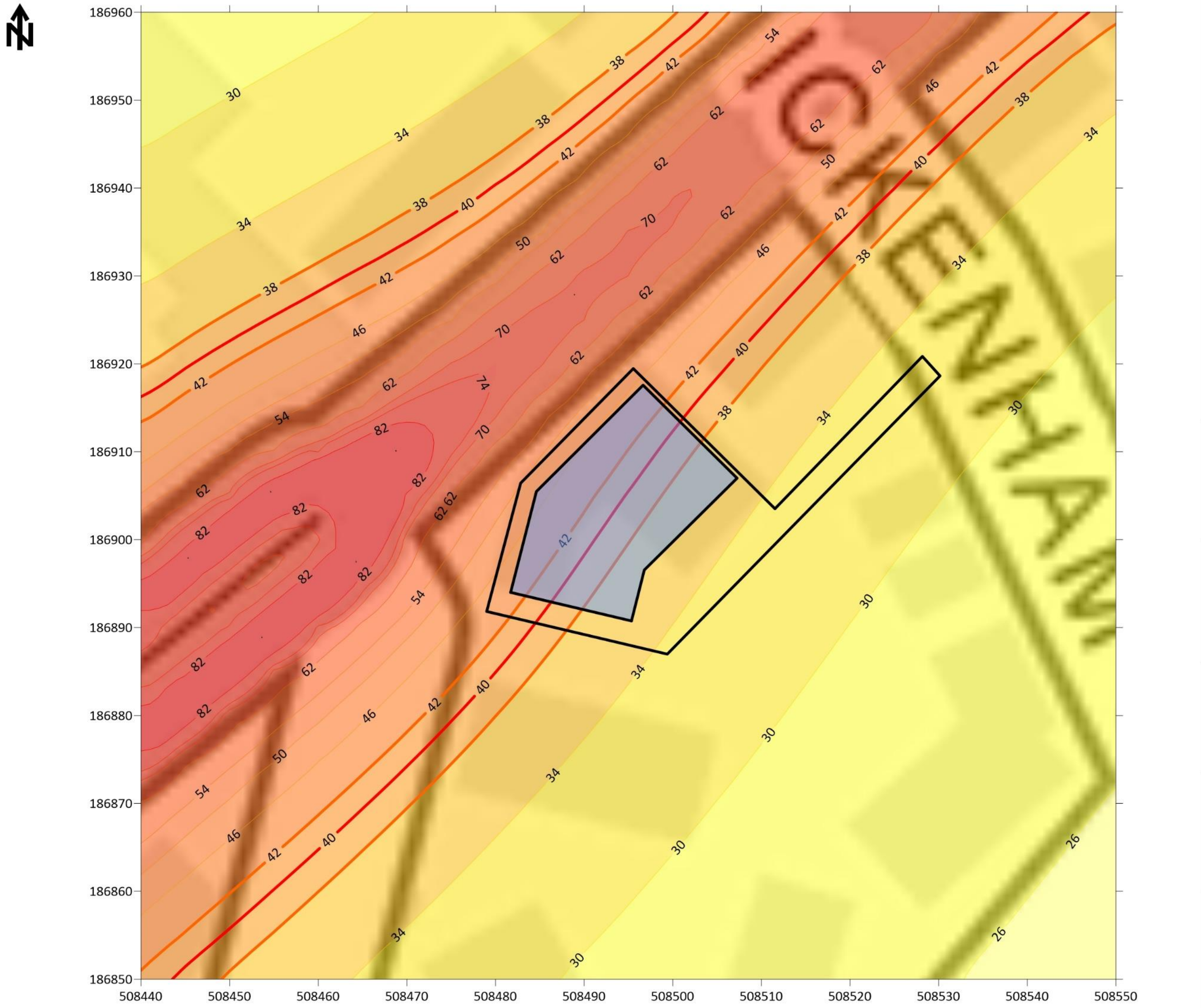

Legend

Site Boundary

Building Layout

82
74
70
62
54
50
46
42
40
38
34
30
26

Predicted Annual Mean NO_2 Concentration (µg/m³)

Title

Figure 7

Predicted Annual Mean NO_2 Concentrations (µg/m³) 2022 (2018 Emissions)

Ground Floor (Z=1.5m)

Project

Air Quality Assessment
1-6 Station Road, Ickenham

Project Number

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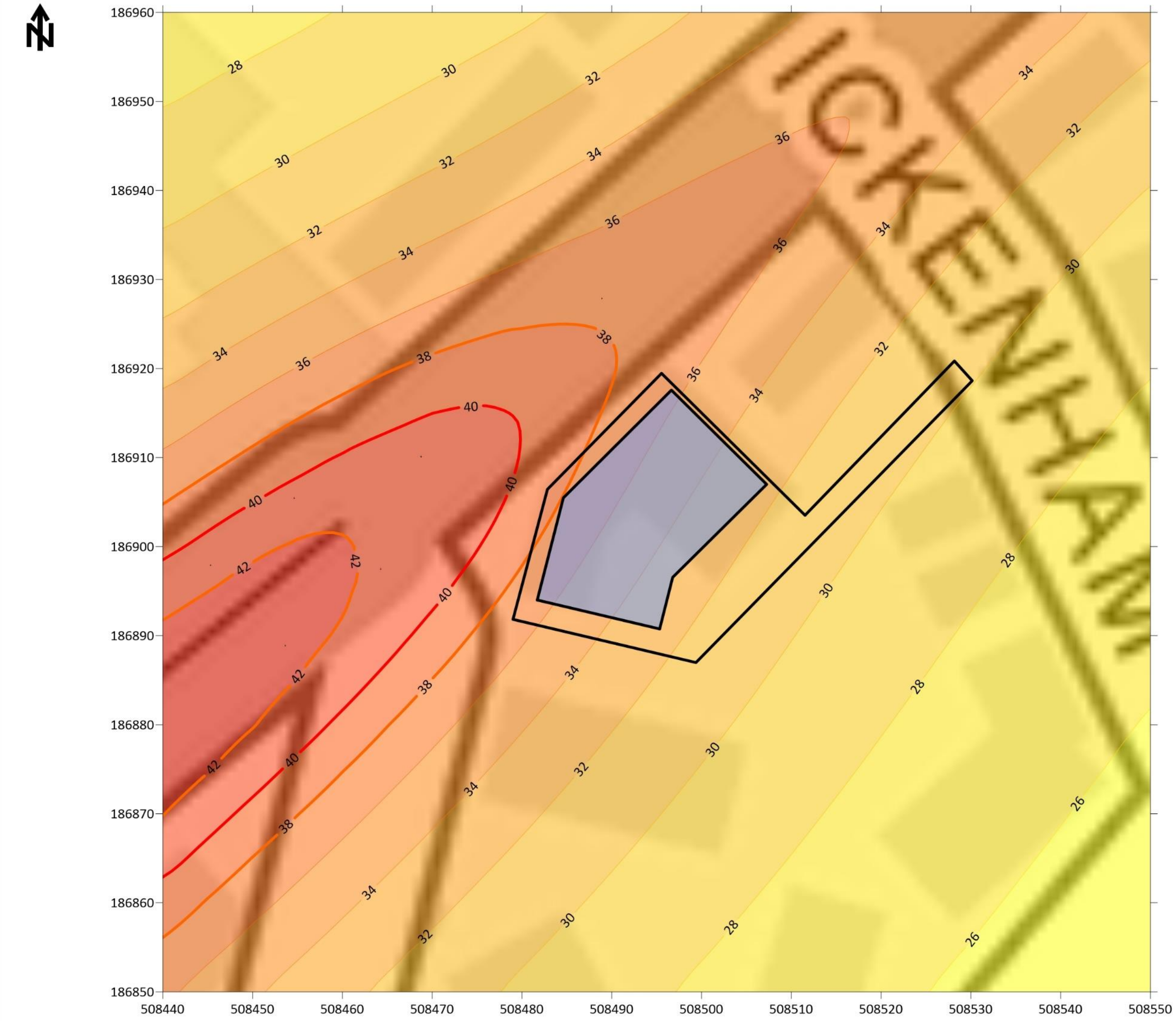

Legend

Site Boundary

Building Layout

44
42
40
38
36
34
32
30
28
26

Predicted Annual Mean NO_2 Concentration (µg/m³)

Title

Figure 8

Predicted Annual Mean NO_2 Concentrations (µg/m³) 2022 (2018 Emissions)

First Floor (Z=4.5m)

Project

Air Quality Assessment
1-6 Station Road, Ickenham

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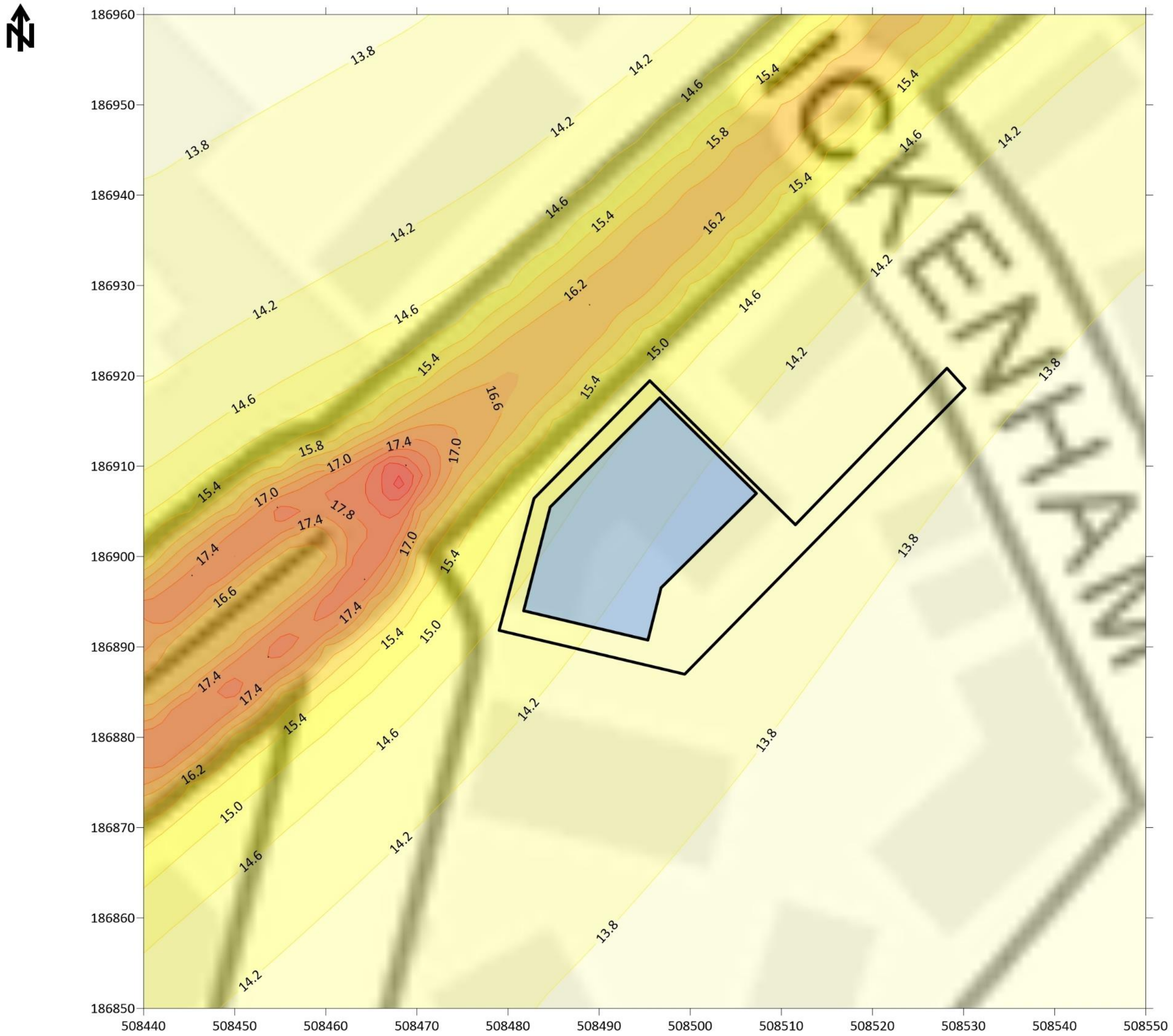

Legend

Site Boundary

Building Layout

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

19.0, 18.6, 18.2, 17.8, 17.4, 17.0, 16.6, 16.2, 15.8, 15.4, 15.0, 14.6, 14.2, 13.8

Title

Figure 9

Predicted Annual Mean PM_{10} Concentrations (μg/m³) 2022 (2018 Emissions)

Ground Floor (Z=1.5m)

Project

Air Quality Assessment
1-6 Station Road, Ickenham

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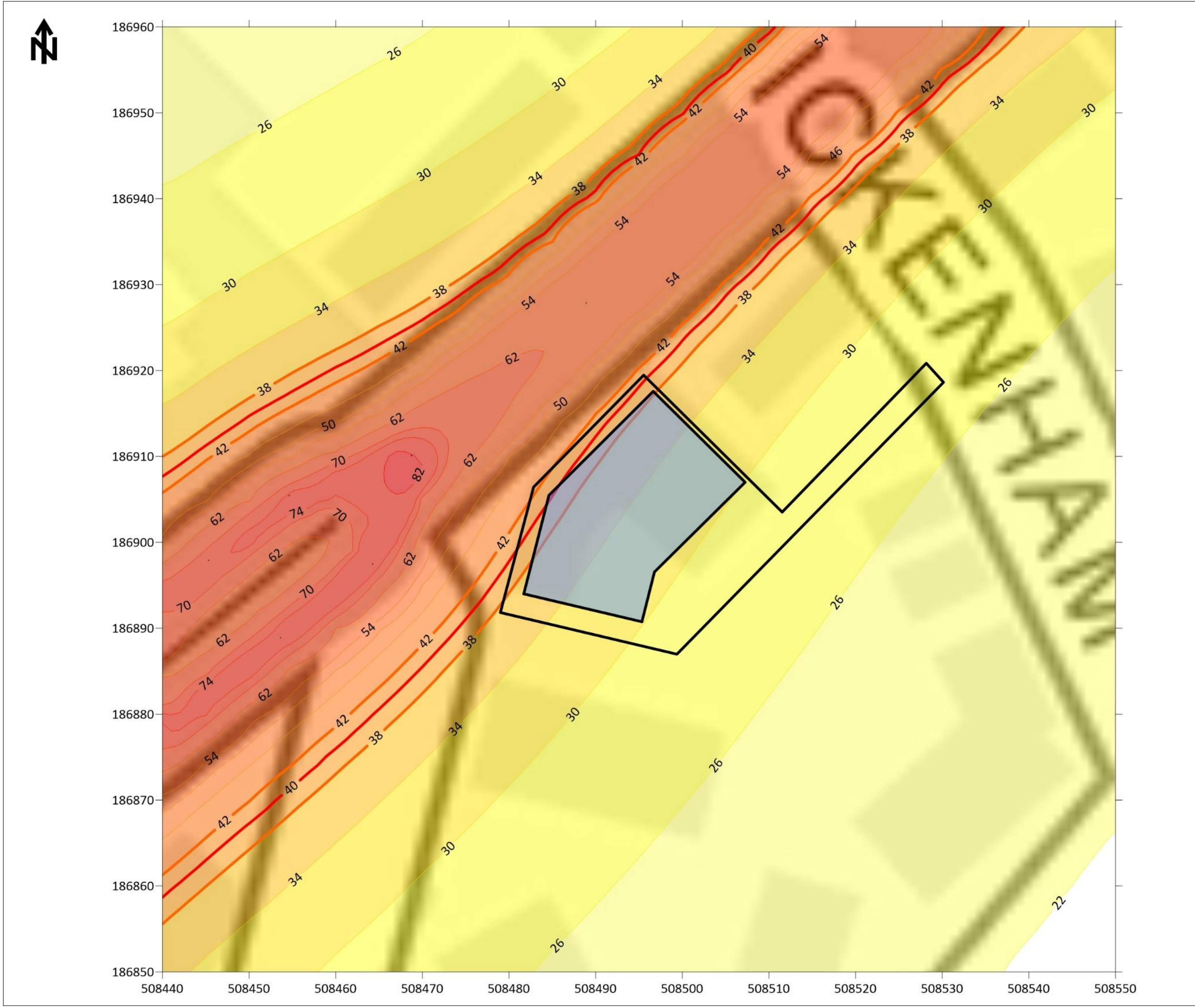

Legend

Site Boundary

Building Layout

82
74
70
62
54
50
46
42
40
38
34
30
26

Predicted Annual Mean NO_2 Concentration (µg/m³)

Title

Figure 10

Predicted Annual Mean NO_2 Concentrations (µg/m³) 2022 (2021 Emissions)

Ground Floor (Z=1.5m)

Project

Air Quality Assessment
1-6 Station Road, Ickenham

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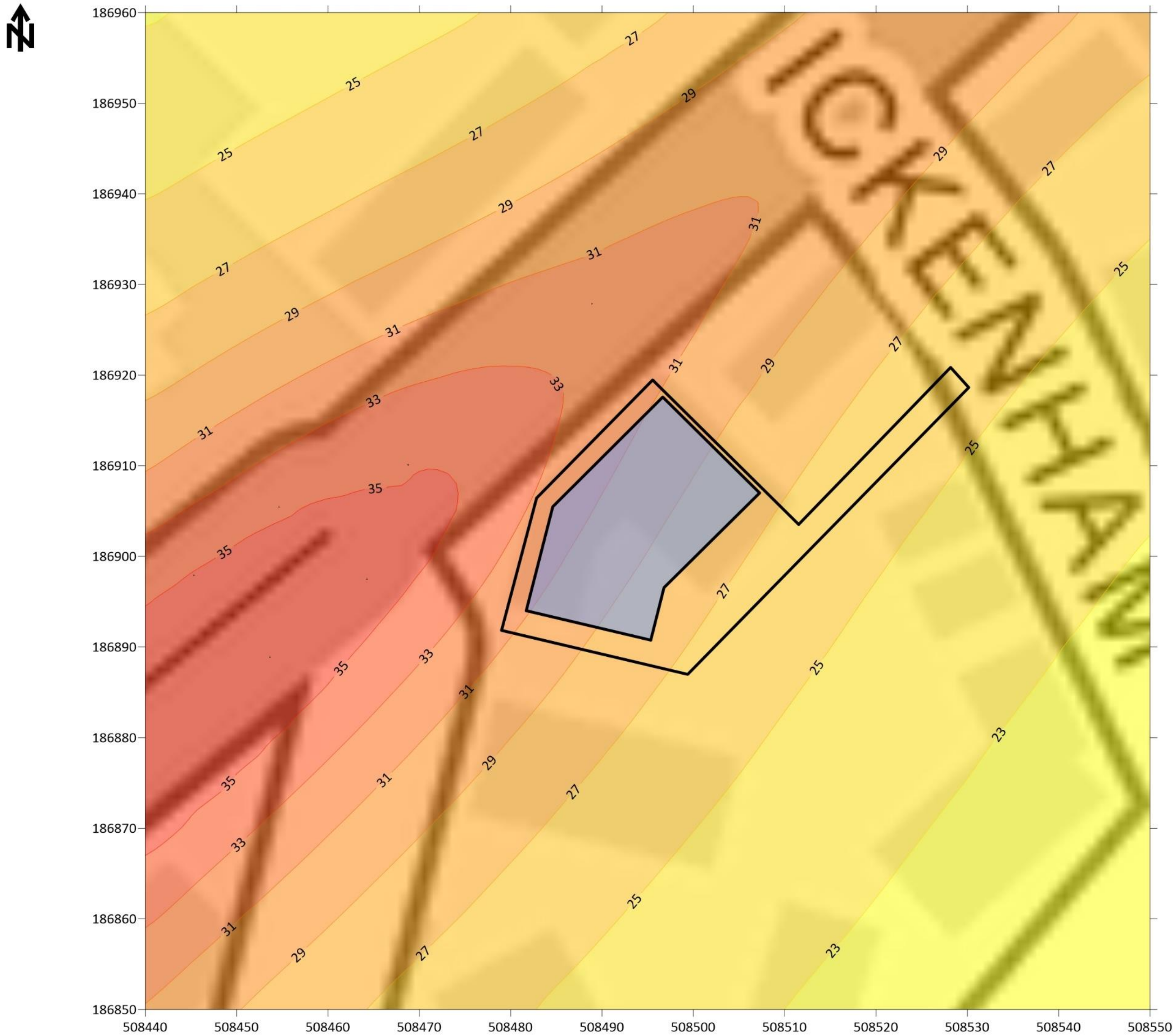

Legend

Site Boundary

Building Layout

37
35
33
31
29
27
25
23

Predicted Annual Mean NO_2 Concentration (μg/m³)

Title

Figure 11

Predicted Annual Mean NO_2 Concentrations (μg/m³) 2022 (2021 Emissions)

First Floor (Z=4.5m)

Project

Air Quality Assessment
1-6 Station Road, Ickenham

Project Number

AQ108855

Client

GAA Design

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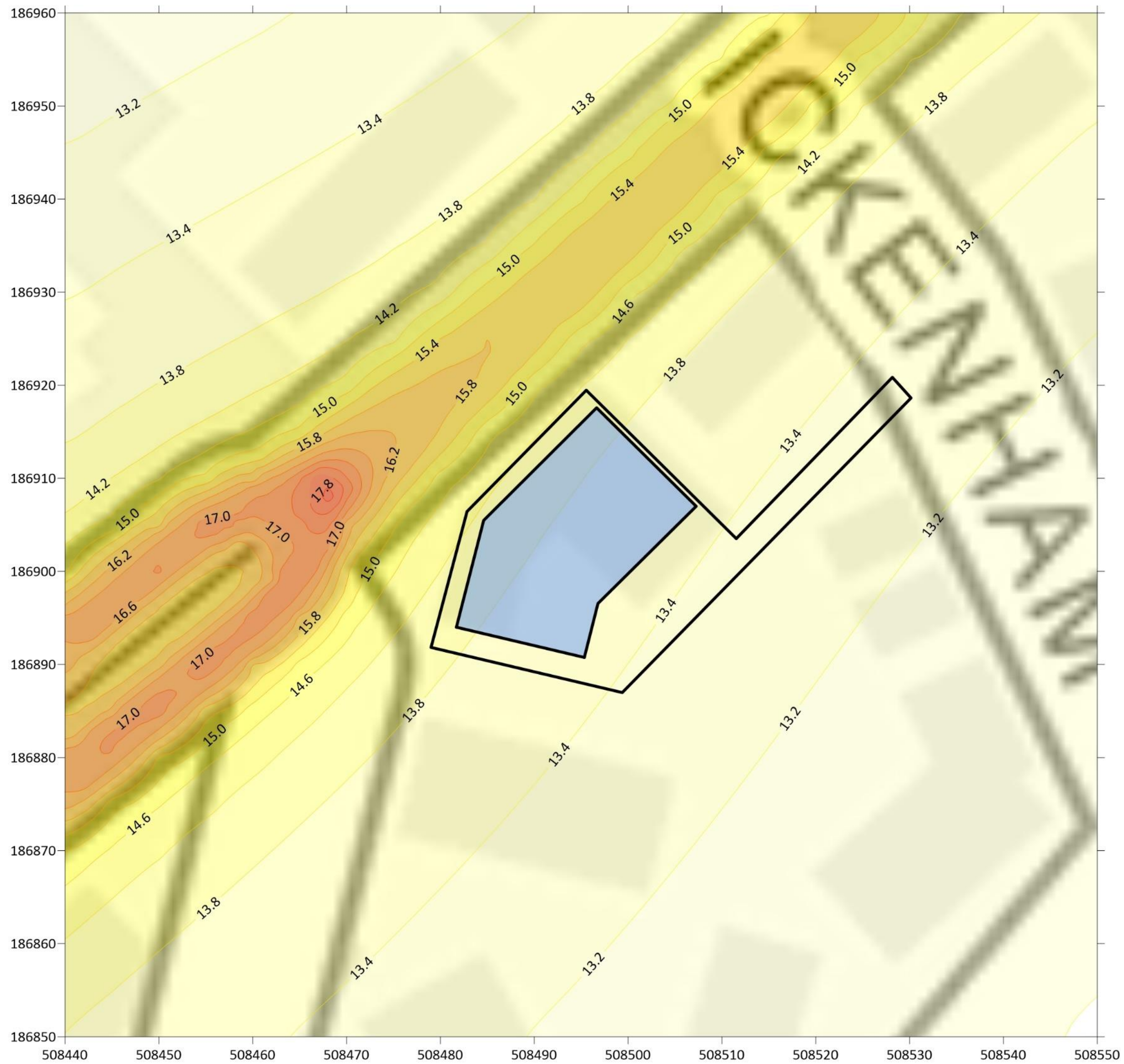

Legend

Site Boundary

Building Layout

19.0
18.6
18.2
17.8
17.4
17.0
16.6
16.2
15.8
15.4
15.0
14.6
14.2
13.8
13.4
13.2

Predicted Annual Mean PM_{10} Concentration (µg/m^3)

Title

Figure 12

Predicted Annual Mean PM_{10} Concentrations (µg/m^3) 2022 (2021 Emissions)

Ground Floor (Z=1.5m)

Project

Air Quality Assessment
1-6 Station Road, Ickenham

Project Number

AQ108855

Client

GAA Design

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APPENDIX II - ASSESSMENT INPUTS

Assessment Inputs

The proposed development has the potential to introduce future site users to poor air quality. Dispersion modelling using ADMS Roads was therefore undertaken to predict NO_2, PM_{10} and $PM_{2.5}$ concentrations across the site and at sensitive locations both with and without the development in place, to consider potential impacts and assess site suitability for the proposed end-use.

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

Dispersion Model

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

The model requires input data that details the following parameters:

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

Assessment Area

Ambient concentrations were predicted over the Proposed Development site and surrounding highway network. One Cartesian grid was included in the model over the area at approximately NGR: 508440, 186850 to 508550, 186960 at height of 1.5m and 4.5m to represent the proposed ground and first floor levels for the 2022 opening year scenario.

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

Traffic Flow Data

Traffic data for use in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition, was obtained from the Department for Transport (DfT) and the London Atmospheric Emissions Inventory (LAEI). The Dft Matrix web tool enables the user to view and download traffic flows on every link of the A-road and motorway network in Great Britain for the years 1999 to 2018. The LAEI tool is a regularly updated database of pollutant emissions and sources including geographically referenced data and maps for the year 2013.

It should be noted that these sources are referenced in DEFRA guidance LLAQM (TG16)[2] as being a suitable source of data for air quality assessments and is therefore considered to provide a reasonable representation of traffic flows in the vicinity of the site.

Growth factors provided by the Trip End Model Presentation Program (TEMPRO) software package were utilised to allow for conversion from the obtained 2013 and 2018 traffic flow to 2022 which was used to represent the opening year scenario. Vehicle speeds were estimated based on the free flow potential of each link and local speed limits. Road widths were estimated from aerial photography and UK highway design standards.

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

Table AII.1 2018 Verification Traffic Data

Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)
L1	High Road	7.8	25,147	2.06	35
L2	High Road Slowdown	9.7	25,147	2.06	15
L3	High Road Northbound	4.3	25,147	2.06	35
L4	High Road Southbound	4.1	25,147	2.06	35
L5	High Road East of Mill Lane	9.4	25,147	2.06	35
L6	High Road East of Mill Lane, Slowdown	10.1	25,147	2.06	15
L7	Ickenham Road Slowdown	8.7	12,785	4.37	15
L8	Ickenham Road	8.4	12,785	4.37	35
L9	Ickenham Road Roundabout	7.3	16,961	3.23	25
L10	Long Lane South of Sweetcroft Lane	10.8	15,887	2.97	35
L11	Long Lane South of Sweetcroft Lane, Slowdown	11.9	15,887	2.97	15
L12	Long Lane North of Sweetcroft Lane, Slowdown	10.7	15,887	2.97	15
L13	Long Lane North of Sweetcroft Lane	10.1	15,887	2.97	35
L14	Long Lane Slowdown at Western Avenue	13.2	15,887	2.97	15
L15	Long Lane Slowdown onto Western Avenue	8.4	8,032	4.05	15
L16	Western Avenue Approach onto Long Lane	6.1	8,032	4.05	25
L17	West End Road South of Edward's Avenue	9.2	16,972	2.52	30
L18	West End Road Slowdown at Wingfield Way	9.6	16,972	2.52	15
L19	West End Road North of Edward's Avenue	9.5	16,972	2.52	30
L20	West End Road Slowdown South of Station Approach	13.6	16,972	2.52	15

Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)
L21	West End Road Slowdown North of Station Approach	13.3	16,972	2.52	15
L22	West End Road North of Station Approach	10.9	16,972	2.52	30

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

Table AII.2 2022 Traffic Data

Road Link		DS	
		24-hour AADT Flow	HDV Prop. (%)
L1	High Road	26,374	2.06
L2	High Road Slowdown	26,374	2.06
L3	High Road Northbound	26,374	2.06
L4	High Road Southbound	26,374	2.06
L5	High Road East of Mill Lane	26,374	2.06
L6	High Road East of Mill Lane, Slowdown	26,374	2.06
L7	Ickenham Road Slowdown	13,409	4.37
L8	Ickenham Road	13,409	4.37
L9	Ickenham Road Roundabout	17,789	3.23
L10	Long Lane South of Sweetcroft Lane	16,492	2.97
L11	Long Lane South of Sweetcroft Lane, Slowdown	16,492	2.97
L12	Long Lane North of Sweetcroft Lane, Slowdown	16,492	2.97
L13	Long Lane North of Sweetcroft Lane	16,492	2.97
L14	Long Lane Slowdown at Western Avenue	16,492	2.97
L15	Long Lane Slowdown onto Western Avenue	8,338	4.05
L16	Western Avenue Approach onto Long Lane	8,338	4.05
L17	West End Road South of Edward's Avenue	17,325	2.52
L18	West End Road Slowdown at Wingfield Way	17,325	2.52
L19	West End Road North of Edward's Avenue	17,325	2.52

Road Link		DS	
		24-hour AADT Flow	HDV Prop. (%)
L20	West End Road Slowdown South of Station Approach	17,325	2.52
L21	West End Road Slowdown North of Station Approach	17,325	2.52
L22	West End Road North of Station Approach	17,325	2.52

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 9.0) released in May 2019, which incorporates updated COPERT 5 vehicle emissions factors for NO_x and PM and EURO 6 vehicle fleet sub-categories.

There is

Therefore, two assessment scenarios were provided. One utilising 2018 emission factors in order to provide a robust assessment which accounts for current uncertainty over NO_2 concentrations within the UK, as roadside levels are not reducing as previously expected due to the implementation of new vehicle emission standards; and a second utilising 2021 to provide sensitivity analysis.

Meteorological Data

Meteorological data used in this assessment was taken from Northolt meteorological station over the period 1st January 2018 to 31st December 2018 (inclusive). Northolt meteorological station is located at approximate NGR: 509780, 184975, which is approximately 2.3km southeast of the Proposed Development and is therefore considered to provide a reasonable representation of conditions at the development site.

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

Roughness Length

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

Table AII.3 Utilised Roughness Lengths

Scenario	Roughness Length (m)	ADMS Description
Verification and Operational phase (DS scenarios) and Meteorological Station	0.5	Parkland, Open Suburbia

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

Monin-Obukhov Length

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

Table AII.4 Utilised Monin-Obukhov Lengths

Scenario	Monin-Obukhov Length (m)	ADMS Description
Verification and Operational phase (DS scenarios) and Meteorological Station	30	Cities and Large Towns

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

Background Concentrations

The annual mean NO_2 concentrations detailed in Table 9, was used in the dispersion modelling assessment to represent annual mean pollutant levels at the Proposed Development site and local monitoring sites.

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

Table AII.5 Predicted Background Pollutant Concentrations for Diffusion Tubes

Monitoring Location	DEFRA Grid Square	Pollutant	2018 Predicted Background Concentration (μg/m^3)
HD210	507500, 184500	NO_x	32.2
		NO_2	21.42
HD46, HI1	510500, 184500	NO_x	35.38
		NO_2	23.21

NO_x to NO_2 Conversion

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

Verification

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

- Estimates of background concentrations;
- Uncertainties in source activity data such as traffic flows and emission factors;

- Variations in meteorological conditions;
- Overall model limitations; and
- Uncertainties associated with monitoring data, including locations.

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

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

LBoH undertakes periodic monitoring of NO_2 concentrations at one roadside monitoring location within the assessment extents. The road contribution to total NO_x concentration was calculated from the monitored NO_2 result for use in the verification process. This was undertaken following the methodology contained within DEFRA guidance LLAQM TG(16)[2]. The monitored annual mean NO_2 concentration and calculated road NO_x concentration are summarised in Table AII.6.

Table AII.6 Monitoring Results

Site ID	Modelled Road NO_x Concentration ($\mu g/m^3$)	Monitored Road NO_x Concentration ($\mu g/m^3$)	Change %
HD46	9.78	48.02	79.63
HD210	14.10	49.58	71.56
HI1	9.78	28.88	66.13

The monitored and modelled NO_x road contribution concentrations were graphed and the equation of the trendline based on the linear progression through zero calculated, as shown in Graph 1. This indicated that a verification factor of **3.7196** was required to be applied to all NO_x modelling results, showing the model overestimated rather than underestimated pollutant concentrations throughout the assessment extents.

Graph 1 Verification Adjustment Factor

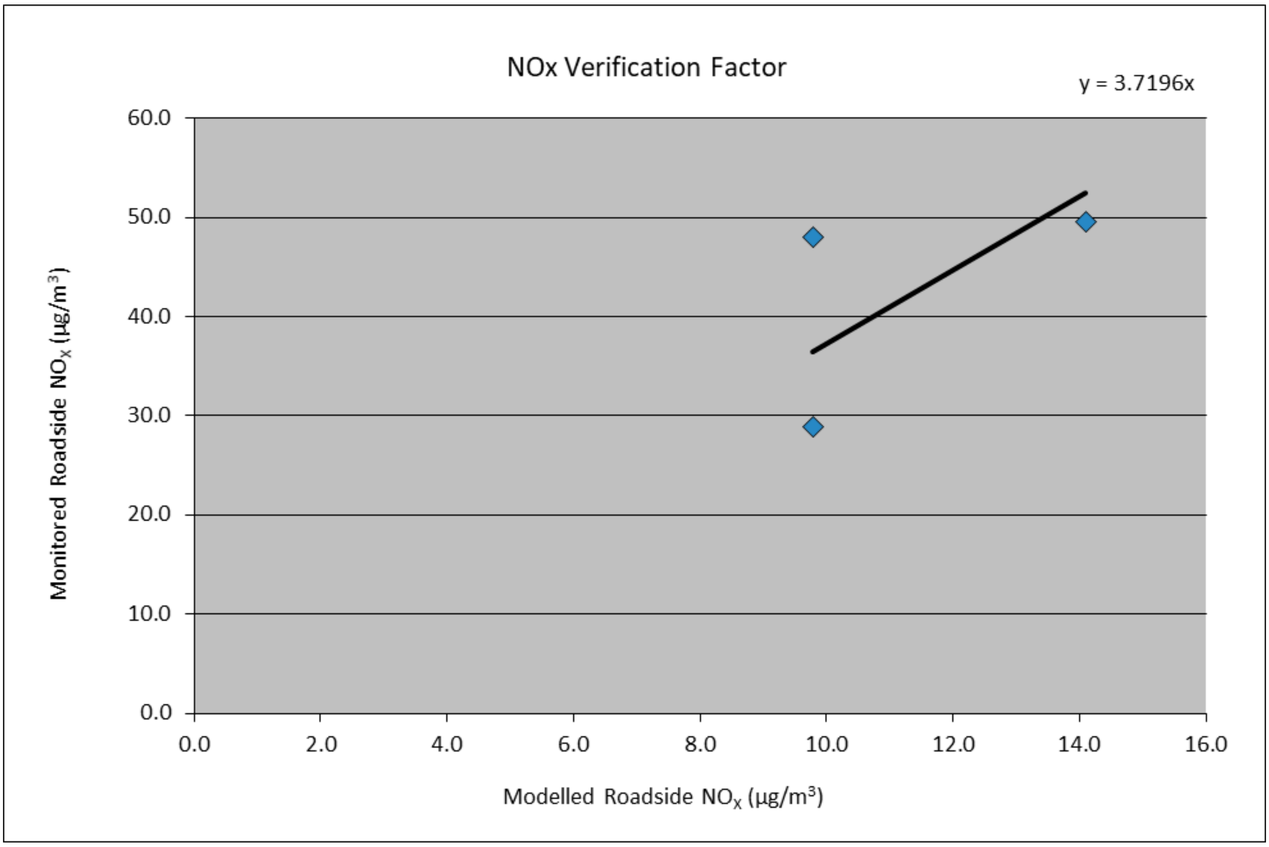

Table AII.7 presents the monitored annual mean NO_2 concentrations and the adjusted modelled total NO_2 concentration based on the above verification factor. Exceedances of the relevant AQO are highlighted in **bold.**

Table AII.7 Modelled Concentrations

Site ID	Monitored NO_2 Concentration (µg/m³)	Adjusted Modelled Total NO_2 Concentration (µg/m³)	Change (%)
HD46	43.40	38.99	10.17
HD210	42.40	43.45	-2.48
HI1	36.00	38.99	-8.30

As demonstrated in Table AII.7, the percentage difference between modelled and monitored concentrations is deemed acceptable and is less than 15%. This reduces uncertainties in the model predictions and provide a robust representation of pollutant concentrations in accordance with the guidance suggested in LLAQM (TG16)[2].

LBoH undertakes monitoring of annual mean PM_{10} concentrations at one monitoring location within the assessment extents, it was therefore possible to provide a separate PM_{10} verification factor.

Table AII.8 indicates the monitored and calculated annual mean PM_{10} concentrations.

Table AII.8 PM_{10} Monitoring Results

Site ID	Monitoring Location	Monitored PM_{10} Concentration (µg/m^3)	Modelled PM_{10} concentration (µg/m^3)	Difference (%)
HI1	South Ruislip	15.18	17.34	-14.25

The monitored and modelled roadside concentrations were compared to calculate the associated ratio. This indicated a verification factor of **0.8753** was required to be applied to all PM_{10} modelling results.

Root Mean Square Error

The root-mean-square error is a measure of the differences between values and was used in this assessment to test the accuracy of the model compared to monitored values. The adjusted modelled NO_2 concentrations have a root-mean-square error of **3.14** when compared to the monitored NO_2 concentrations in accordance with the guidance provided within LLAQM TG(16)[2]. The results are shown in Table AII.9. Exceedances of the relevant AQO are highlighted in **bold.**

Table AII.9 RMSE Results

Monitoring Location		Monitoring Result (Tube)	Secondary Adjusted Total NO_2	Difference
HD46	AURN Site, Keats Way	43.40	38.99	4.41
HD210	London Hillingdon	42.40	43.45	-1.05
HI1	1 Porters Way	36.00	38.99	-2.99
Root Mean Square Error Value				3.14

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APPENDIX III CONSTRUCTION PHASE ASSESSMENT CRITERIA

CONSTRUCTION PHASE METHODOLOGY

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction'[12].

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

- Earthworks;
- Demolition;
- Construction; and
- Trackout.

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

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

The assessment steps are detailed below.

Step 1

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

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

Step 2

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

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

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

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

Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table AIII.1.

Table AIII.1 Construction Dust - Magnitude of Emission

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

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

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

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

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

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

- Any history of dust generating activities in the area;
- The likelihood of concurrent dust generating activity on nearby sites;
- Any pre-existing screening between the source and the receptors;
- Any conclusions drawn from analysing local meteorological data which accurately represent the

area; and if relevant the season during which works will take place;

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

These factors were considered in the undertaking of this assessment.

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

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

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

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

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

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

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

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

Table AIII.5 Sensitivity of the Area to Ecological Impacts

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

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

Table AIII.6 outlines the risk category from earthworks and construction activities.

Table AIII.6 Dust Risk Category from Earthworks and Construction

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

Table AIII.7 outlines the risk category from trackout.

Table AIII.7 Dust Risk Category from Trackout

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

Step 3

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

Step 4

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

APPENDIX IV - ASSESSOR'S CURRICULUM VITAE

JOSHUA DAVIES

Senior Air Quality Consultant

BSc (Hons) AMIEnvSci

KEY EXPERIENCE:

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

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

QUALIFICATIONS:

- Bachelor of Science
- Member of the Institute of Environmental Science (IES)
- Odour Acuity Certified

SELECT PROJECTS SUMMARY:

Back Lane, Congleton - for a residential development of 140 dwellings.

Imperial War Museum, Duxford – Air Quality screening assessment associated with dust and odour as a result of proposed restoration activities

London South Bank University -AQA for redevelopment of the campus, with associated energy centre

Scunthorpe United Football Stadium - AQA for new sports stadium and commercial and retail park

Heineken UK, Manchester – Production of various AQAs for the expansion of the Manchester Brewery site.

Cricklewood Freight Terminal – AQA for an aggregate freight terminal in Brent. Dust and HGV impact assessment and mitigation strategy

Llay Wrexham – AQ associated with a Short-Term Reserve Operation site in line with the Medium Combustion Plant Directive (MCPD)

ES Chapters

Great Jackson Street Framework - Production of a number of ES chapters for large-scale mixed use multi storey buildings

Keele University – Road and Energy Assessment for the proposed re-development of the student campus

Newton Farm, Perth - EIA for a medium scale residential development in close vicinity to the A9.

Odour Assessments

Clipsone House Farm – Quantitative odour and ammonia assessment in support of a proposed extension to a large-scale poultry farm.

Chatteris AD Plant - Quantitative odour modelling and sniff tests to discharge condition on an existing anaerobic digestion plant

Jennychem, Snodland - Risk Assessment and Best Practice Statement in support of the proposed car repairs facility spray booth

SELECT PROJECTS SUMMARY:

London Borough of Southwark Experience

Camberwell Road, Southwark - Exposure assessment for a proposed gym within an AQMA, 24 hour and 1 hour mean AQOs assessed.

Pelier Street- AQA for a residential development located within the Southwark AQMA

Haddonfield Estate - AQA for a residential development located within the Southwark AQMA

Lavington Street - AQA for mixed use scheme in AQMA in Southwark, including an AQN assessment.

Daniels Road - AQA for a residential development within the Southwark AQMA

Educational Developments

Brinsworth Comprehensive School, Rotherham - Baseline and Construction phase assessment for the proposed extension and new Sports Hall. Site suitability due to the Schools close proximity to the M1 Motorway.

Ashton House, Waterloo Street, Bolton – Exposure and impact assessment related to a proposed expansion of the existing site located within the Greater Manchester AQMA

St Marys and Johns CE School, Barnet AQA for the refurbishment of the existing school and the construction of a 3-storey classroom block, within the borough wide Barnet AQMA.

St Peters Catholic School, Guildford - AQA for the redevelopment of the existing site, and the construction of a two-storey classroom block.

Monitoring & Surveying Experience

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

Odour Acuity certified, undertaken numerous site sniff tests