

4. Methodology

Introduction

The proposed development has the potential to expose future residents to poor air quality. In order to assess NO_2 and PM_{10} concentrations across the site, detailed dispersion modelling was undertaken in accordance with the following methodology.

Modelling was undertaken for 2016 for verification purposes and 2019 to represent the development opening year.

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: 505310, 177380 to 506110, 178180. One Cartesian grid was used within the model to produce data suitable for contour plotting using the Surfer software package. It should be noted that although the grid only covered the proposed site, road links were extended in order to ensure the impact of all relevant vehicle emissions in the vicinity of the development were considered.

Reference should be made to Figure 3 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 London Atmospheric Emissions Inventory (LAEI). The LAEI was produced by the GLA and provides traffic flows throughout London for a number of scenarios. It should be noted that the LAEI is referenced in the GLA guidance⁸ as being a suitable source of data for air quality assessments and is therefore considered to provide a reasonable estimate of traffic flow in the vicinity of the site.

Traffic data was not available from the LAEI for High Street and Moor Lane. As such, data was obtained from Poyle Road. These links are all classified as minor roads within the same area of London. As such, they are considered likely to have reasonably similar traffic flows.

The baseline traffic data was converted to the appropriate assessment years utilising factors obtained from TEMPro. This software package has been developed by the Department for Transport (DfT) to calculate future traffic growth within the UK.

Road widths were estimated from aerial photography and UK highway design standards. A summary of the traffic data used in the assessment is provided in Table 6.

Table 6 Traffic Data

Link		24-hour AADT Flow		Mean Vehicle Speed (km/h)	Road Width (m)
		2016	2019		
L1	Holloway Lane between Harmondsworth Road and approach to Cherry Lane Roundabout	19,132	19,663	75	7.5
L2	Exit from Junction 4 Roundabout to Cherry Lane Roundabout	27,872	28,645	25	21.7
L3	Approach to Junction 4 Roundabout from Cherry Lane Roundabout	27,872	28,645	25	15.6
L4	Slip road from Junction 4 Roundabout to M4 eastbound (EB)	21,868	22,475	50	9.3
L5	Slip road from M4 EB to Junction 4 Roundabout	21,868	22,475	35	13.0
L6	Slip road from Junction 4 Roundabout to M4 westbound (WB)	21,868	22,475	50	8.8
L7	Approach to Junction 4 Roundabout from M4 northbound (NB)	29,308	30,120	25	19.1
L8	Exit from Junction 4 Roundabout to M4 southbound (SB)	29,308	30,120	25	15.6
L9	Slip road from M4 WB to Junction 4 Roundabout	21,868	22,475	50	10.0
L10	M4 EB west of M25 Junction 15 SB	65,605	67,424	110	11.9

⁸

London Local Air Quality Management (TG16), Technical Guidance 2016 (LLAQM.TG (2016)), GLA,

Link		24-hour AADT Flow		Mean Vehicle Speed (km/h)	Road Width (m)
		2016	2019		
L11	M4 WB west of M25 Junction 15 NB	65,605	67,424	110	11.4
L12	Holloway Lane between Harmondsworth Road and High Street	19,132	19,663	75	5.9
L13	Hatch Lane approach to Colnbrook By-pass	16,596	17,057	25	7.4
L14	Colnbrook By-pass east of Hatch Lane	21,230	21,819	75	11.8
L15	Colnbrook By-pass west of Hatch Lane	21,230	21,819	75	16.9
L16	M4 south of Junction 4	58,616	60,241	90	24.0
L17	Sipson Road	10,676	10,972	30	6.0
L18	M4 EB at Junction 4	65,605	67,424	110	10.4
L19	M4 WB at Junction 4	65,605	67,424	110	11.0
L20	Holloway Lane approach to High Street Roundabout	19,132	19,663	25	9.6
L21	Hatch Lane approach to High Street Roundabout	16,596	17,057	25	7.2
L22	Hatch Lane between High Street Roundabout and Colnbrook By-pass	16,596	17,057	45	8.4
L23	High Street approach to High Street Roundabout	991	1,019	25	6.6
L24	High Street	991	1,019	35	6.5
L25	Site Entrance	991	1,019	35	6.0
L26	Slip road from M4 WB to M25 Junction 15	21,868	22,475	100	7.3
L27	M4 WB between Junction 4 and M25 Junction 15	87,473	89,898	110	14.6
L28	Slip road from M4 WB to M25 Junction 15 SB	10,934	11,237	100	7.5
L29	M4 EB between Junction 4 and M25 Junction 15	87,473	89,898	110	14.8
L30	Slip road from M25 Junction 15 to M4 EB	21,868	22,475	100	7.9
L31	Slip road from M25 Junction 15 SB to M4 EB	10,934	11,237	100	7.4
L32	Slip road from M25 Junction 15 NB to M4 EB	10,934	11,237	100	4.5
L33	Slip road from M4 WB to M25 Junction 15 NB	10,934	11,237	100	4.4
R1	Junction 4 Roundabout	27,872	28,645	45	16.4
R2	High Street Roundabout	16,596	17,057	25	5.9

Fleet composition data as a proportion of total flows on each link for cars, taxis, Light Goods Vehicles (LGV), Heavy Goods Vehicles (HGVs), buses and coaches and motorcycles is summarised in Table 7.

Table 7 Fleet Composition Data

Link	Proportion of Fleet (%)						
	Car	Taxi	LGV	Rigid HGV	Artic HGV	Bus and Coach	Motor cycle
L1	79.6	0.9	10.4	3.9	0.5	3.4	1.3
L2	86.8	1.0	6.6	3.4	0.6	1.0	0.6
L3	86.8	1.0	6.6	3.4	0.6	1.0	0.6
L4	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L5	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L6	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L7	88.3	5.9	2.2	1.0	0.0	2.2	0.3
L8	88.3	5.9	2.2	1.0	0.0	2.2	0.3
L9	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L10	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L11	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L12	79.6	0.9	10.4	3.9	0.5	3.4	1.3
L13	84.0	1.0	7.4	3.1	0.2	3.2	1.1
L14	83.2	1.2	6.9	2.9	0.4	4.8	0.6
L15	83.2	1.2	6.9	2.9	0.4	4.8	0.6
L16	88.3	5.9	2.2	1.0	0.0	2.2	0.3
L17	81.8	1.0	10.6	2.1	0.0	4.1	0.3
L18	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L19	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L20	79.6	0.9	10.4	3.9	0.5	3.4	1.3
L21	84.0	1.0	7.4	3.1	0.2	3.2	1.1
L22	84.0	1.0	7.4	3.1	0.2	3.2	1.1
L23	75.7	2.1	8.7	10.6	1.4	0.0	1.5

Link	Proportion of Fleet (%)						
	Car	Taxi	LGV	Rigid HGV	Artic HGV	Bus and Coach	Motor cycle
L24	75.7	2.1	8.7	10.6	1.4	0.0	1.5
L25	75.7	2.1	8.7	10.6	1.4	0.0	1.5
L26	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L27	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L28	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L29	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L30	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L31	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L32	86.2	0.5	8.1	2.7	0.9	0.8	0.7
L33	86.2	0.5	8.1	2.7	0.9	0.8	0.7
R1	86.8	1.0	6.6	3.4	0.6	1.0	0.6
R2	84.0	1.0	7.4	3.1	0.2	3.2	1.1

Reference should be made to Figure 3 for a graphical representation of the road link locations.

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 7.0). This has been produced by DEFRA and incorporates updated COPERT4v11 vehicle emission factors and fleet information.

There is current uncertainty over NO₂ 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 concentration predictions. As predictions for 2016 were verified, it is considered results are a robust indication of worst case concentrations for the future year.

Meteorological Data

Meteorological data used in the assessment was taken from Heathrow Airport meteorological station over the period 1st January 2016 to 31st December 2016 (inclusive). Heathrow Airport is located at NGR: 506947, 176515, which is approximately 1.9km south-east of the proposed 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

A z_0 of 0.3m was used to describe the modelling extents and meteorological site. This value of z_0 is considered appropriate for the morphology of both areas and is suggested within ADMS-Roads as being suitable for 'agricultural areas (max)'.

Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 100m 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 'large conurbations > 1 million'.

Background Concentrations

Background concentrations provided by DEFRA were used in the assessment to represent annual mean NO_2 and PM_{10} levels in the vicinity of the site. In order to avoid 'double-counting' of road vehicle exhaust emissions, the proportion of the relevant background concentrations from primary A roads and minor roads within the grid square was removed in accordance with the methodology outlined in GLA guidance⁹. These sectors were considered to be most representative of those being modelled within ADMS-Roads. Background concentrations before and after adjustment are shown in Table 8.

Table 8 Background Pollutant Concentrations - Modelling Extents

Pollutant	Total Predicted 2016 Background ($\mu\text{g}/\text{m}^3$)	Predicted 2016 Background with Sectors Removed ($\mu\text{g}/\text{m}^3$)
NO_2	31.25	24.98
PM_{10}	19.00	16.81

The annual mean background concentrations were taken from the grid square containing the HD31 - AURN Site and HIL - London Hillingdon monitors, NGR: 506500, 178500. These values were chosen to represent levels throughout the dispersion modelling extents as the predicted annual mean NO_2 background from the grid squares containing the remaining monitoring positions was higher than the results included in the verification process.

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

It is noted that the GLA have released background concentration maps with a spatial resolution of 20m for 2013, 2020, 2025 and 2030. However, as the modelling area is considerably greater than 20m, and values were not available for the verification year, this data was not considered appropriate for use in the assessment.

⁹

London Local Air Quality Management (TG16), Technical Guidance 2016 (LLAQM.TG (2016)), GLA,

NO_x to NO₂ Conversion

Predicted annual mean NO_x concentrations were converted to NO₂ concentrations using the spreadsheet (version 5.1) provided by DEFRA, which is the method detailed within the GLA guidance¹⁰.

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

Nitrogen Dioxide

LBoH undertook monitoring of NO₂ concentrations at nine locations within the modelling extents during 2016. Review of the site positions identified that the HD65, HD59 and SIPS monitors were positioned a considerable distance from roads included in the model. Further to this, the HD60 diffusion tube recorded NO₂ concentrations well below the background concentration during 2016. As such, these sites were removed from the verification process to avoid potential under- and overestimations of pollutant emissions. Additionally, the HD31 diffusion tube is co-located with the HIL automatic monitor. As such, it was removed from the verification process as results from continuous monitors are considered to provide a more accurate record of pollutant concentrations.

Results were obtained from the remaining monitors and the road contributions to total NO_x concentrations calculated following the methodology contained within the GLA guidance¹¹. The monitored annual mean NO₂ concentrations and calculated road NO_x concentrations are summarised in Table 9.

¹⁰ London Local Air Quality Management (TG16), Technical Guidance 2016 (LLAQM.TG (2016)), GLA, 2016.

¹¹ London Local Air Quality Management (TG16), Technical Guidance 2016 (LLAQM.TG (2016)), GLA, 2016.

Table 9 NO_x Verification - Monitoring Results

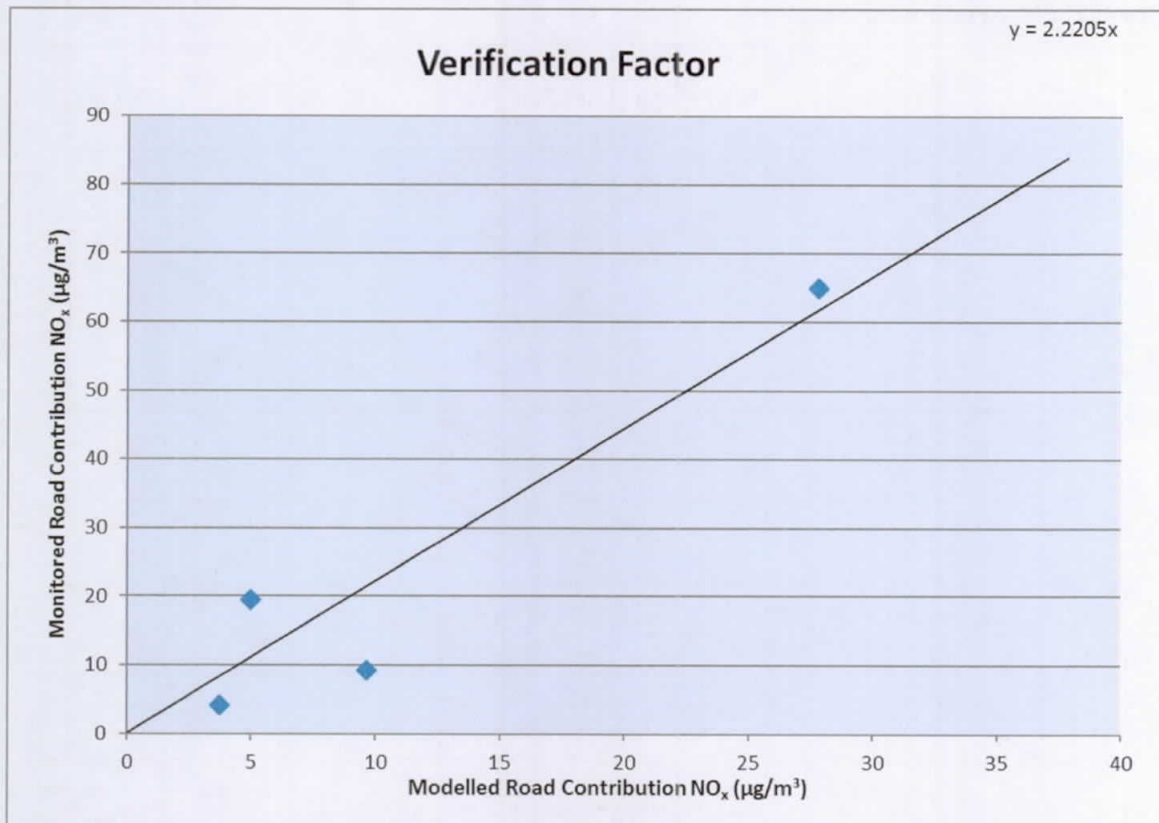
Monitoring Location		Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
HD 200	49 Zealand Avenue	29.40	9.24
HIL 1	London Harmondsworth	27.00	4.17
T55	Heathrow Green Gates	34.00	19.38
HIL	London Hillingdon	52.00	65.02

The annual mean road NO_x concentrations predicted from the dispersion model and the road NO_x concentrations calculated from the 2016 monitoring results are summarised in Table 10.

Table 10 NO_x Verification - Modelling Results

Monitoring Location		Calculated Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)
HD 200	49 Zealand Avenue	9.24	9.64
HIL 1	London Harmondsworth	4.17	3.75
T55	Heathrow Green Gates	19.38	4.98
HIL	London Hillingdon	65.02	27.80

The monitored and modelled road NO_x concentrations were graphed and the equation of the trendline based on linear progression through zero calculated. This indicated a verification factor of 2.2205 was required to be applied to all road NO_x modelling results, as shown in Graph 1.

Graph 1 NO_x Verification Factor


Particulate Matter

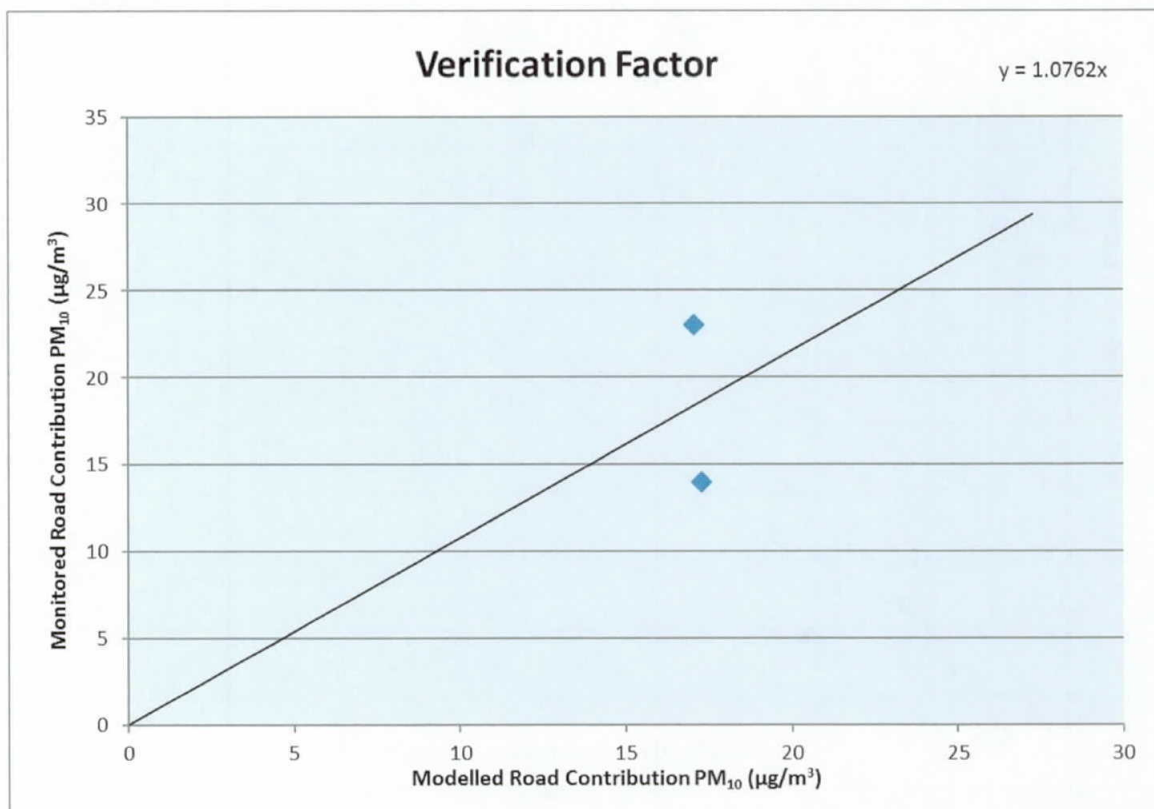
LBoH undertook monitoring of PM₁₀ concentrations at three locations within the modelling extents during 2016. Review of the site positions identified that the HIL4 continuous analyser was located a considerable distance from roads included within the model. As such, it was removed from the verification process in order to prevent an underestimation of pollutant emissions.

The monitored annual mean PM₁₀ concentrations and modelled PM₁₀ concentrations from the remaining sites are shown in Table 11.

Table 11 Verification - Modelling Results PM₁₀

Monitoring Location		Monitored PM ₁₀ Concentration (µg/m³)	Modelled PM ₁₀ Concentration (µg/m³)
HIL 1	London Harmondsworth	23.0	17.1
T55	Heathrow Green Gates	14.0	17.3

The monitored and modelled PM₁₀ concentrations were graphed and the equation of the trendline based on a linear progression through zero calculated. This indicated that a verification factor of 1.0762 was required to be applied to all PM₁₀ modelling results, as shown in Graph 2.

Graph 2 PM₁₀ Verification Factor


Determination of Impacts

The proposed development includes residential units and as such has the potential to introduce new receptors into an area of existing poor quality. The results of the dispersion modelling assessment were therefore compared against the Air Pollution Exposure Criteria (APEC) contained within the London Councils Air Quality and Planning Guidance¹². These are outlined in Table 12 and allow determination of the significance of predicted pollution levels and associated exposure.

Table 12 Air Pollution Exposure Criteria

Category	Annual Mean NO ₂ or PM ₁₀ Concentration	Recommendation
APEC-A	Below 5% of the annual mean AQO	No air quality grounds for refusal; however, mitigation of any emissions should be considered
APEC-B	Between 5% below or above the annual mean AQO	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

¹²

Category	Annual Mean NO ₂ or PM ₁₀ Concentration	Recommendation
APEC-C	Above 5% of the annual mean AQO	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 NO₂ 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 residents is therefore considered a suitable way to progress sustainable schemes in these locations and has been considered within this assessment.

Operational Phase Road Traffic Assessment

The development has the potential to impact on existing air quality as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site. A screening assessment was therefore undertaken using the criteria contained within the Highways Agency 'Design Manual for Roads and Bridges' (DMRB)¹³ and Institute of Air Quality Management (IAQM) 'Land-Use Planning & Development Control: Planning for Air Quality'¹⁴ guidance documents to determine the potential for trips generated by the development to affect local air quality.

The DMRB¹⁵ provides the following criteria for determination of road links potentially affected by changes in traffic flow:

- Daily AADT flows change by 1,000 or more;
- Daily HDV AADT flows change by 200 or more;
- Daily average speed changes by 10km/hr or more; or,
- Peak hour speed changes by 20km/hr or more.

The IAQM 'Land-Use Planning & Development Control: Planning for Air Quality' guidance¹⁶ document provides the following criteria to help establish when an assessment of potential impacts on the local area is likely to be considered necessary:

- A change of Light Duty Vehicle (LDV) flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- A change of HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- Realignment of roads where the change is 5m or more and the road is within an AQMA; or,
- Introduction of a new junction or removal of an existing junction near to relevant receptors.

¹³ DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

¹⁴ Land-Use planning & Development Control: Planning for Air Quality, IAQM, 2017.

¹⁵ DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

¹⁶ Land-Use planning & Development Control: Planning for Air Quality, IAQM, 2017.

Should these criteria not be met, then the DMRB¹⁷ and IAQM guidance¹⁸ documents consider air quality impacts associated with a scheme to be **negligible** and no further assessment is required.

Should screening of the relevant data indicate that any of the above criteria are met, then potential impacts at sensitive receptor locations can be assessed by calculating the 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 IAQM guidance¹⁹.

¹⁷ DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

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

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

5. Assessment

Future Exposure

The proposed development has the potential to expose future residents to elevated pollution levels. Dispersion modelling was undertaken with the inputs described in Section 4.0 to quantify concentrations at the site. Reference should be made to Figures 5 and 6 for graphical representations of predicted annual mean NO₂ and PM₁₀ concentrations across the proposed development site, respectively.

Predicted concentrations above 5% of the annual mean AQO are shown in blue on the contour plot. These relate to areas defined as APEC-C within the London Councils Air Quality and Planning Guidance²⁰. Predicted concentrations between 5% below and 5% above the annual mean AQO are shown in green. These relate to areas defined as APEC-B within the guidance. Predicted concentrations below 5% of the annual mean AQO are shown in white on the contour plot. These relate to areas defined as APEC-A within the guidance.

As shown in Figure 5, annual mean NO₂ concentrations were predicted to be below the annual mean AQO of 40µg/m³ at all locations across the development. The maximum level at the site boundary was 29.77µg/m³, which is classified as APEC-A in accordance with the London Council Air Quality and Planning Guidance²¹.

As shown in Figure 6, annual mean PM₁₀ concentrations were predicted to be below the annual mean AQO of 40µg/m³ at all locations across the development. The maximum level at the site boundary was 18.40µg/m³, which is classified as APEC-A in accordance with the London Council Air Quality and Planning Guidance²².

Based on the assessment results, exposure of future site users to exceedences of the relevant AQOs for NO₂ and PM₁₀ is considered unlikely as a result of the proposed development. As such, the location is considered suitable for the proposed use from an air quality perspective.

Potential Development Impacts

Any additional vehicle movements associated with the development will generate exhaust emissions on the local and regional road networks. Information provided by the Milestone Transport Planning, the project Transport Consultants, indicated that the development is anticipated to generate a total of 73 daily vehicle trips.

Based on the above information, the development is not anticipated to result in a change in AADT flows of more than 1,000, produce over 200 HDV movements per day or significantly affect average speeds on the local road network. Additionally, it is not predicted to result in a change of LDV flows of more than 100 AADT, the proposals do not include road realignment or the introduction of a junction and there will not be a requirement for more than 25 HDV deliveries per day. As such, potential air quality impacts associated with operational phase road vehicle exhaust emissions are predicted to be **negligible**, in accordance with the DMRB²³ and IAQM²⁴ screening criteria shown previously.

²⁰ London Councils Air Quality and Planning Guidance, London Councils, 2007.

²¹ London Councils Air Quality and Planning Guidance, London Councils, 2007.

²² London Councils Air Quality and Planning Guidance, London Councils, 2007.

²³ DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

²⁴ DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

6. Conclusion

This report has been prepared to support the planning application for a residential development on land at Manor Court, Hillingdon, London.

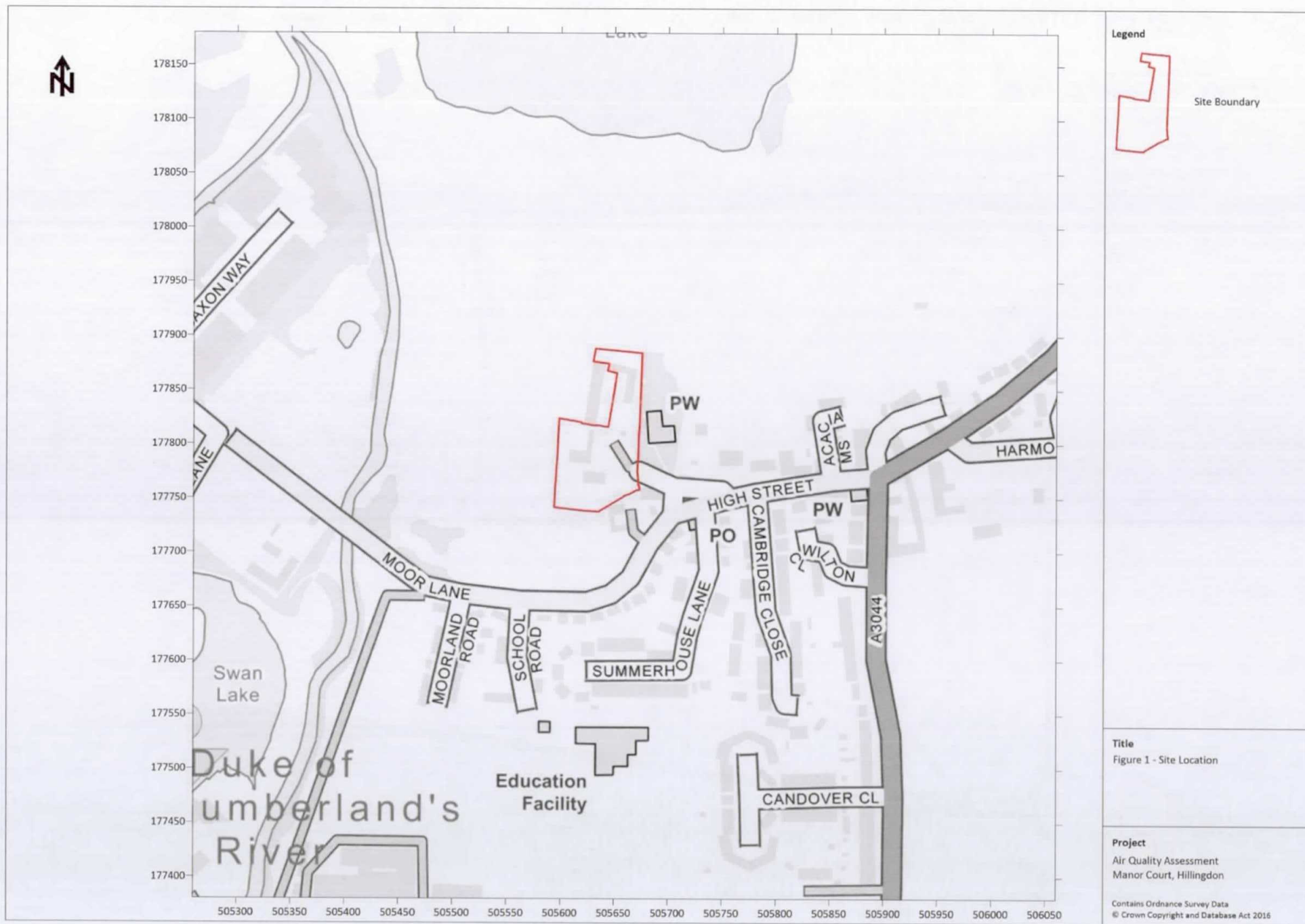
The proposed development has the potential to expose future residents to elevated pollution levels. As such, an Air Quality Assessment was required in order to determine baseline conditions at the site, consider its suitability for the proposed end-use and assess potential impacts associated with the scheme.

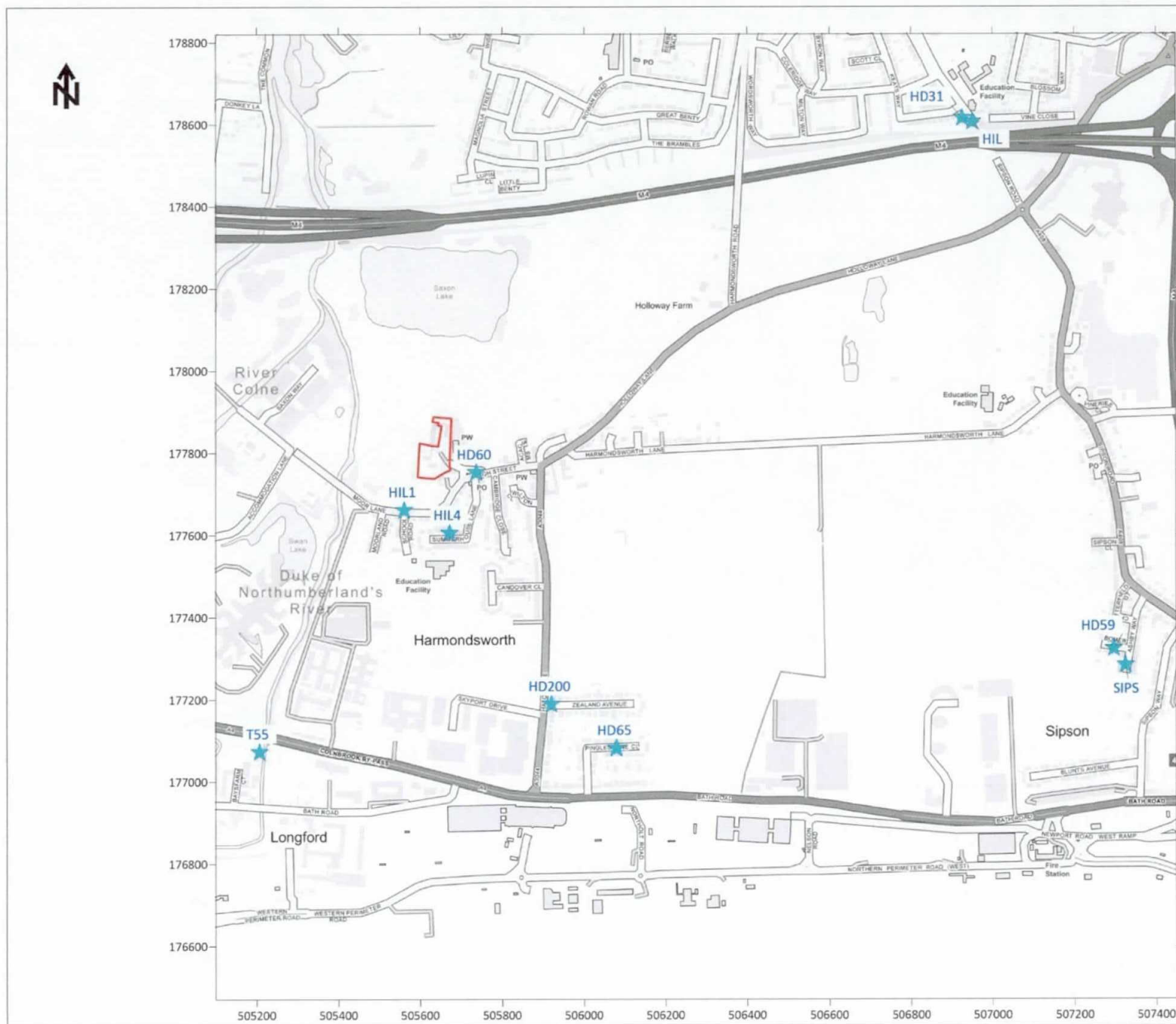
Dispersion modelling was undertaken using ADMS-Roads in order to predict pollutant concentrations at the development location associated with emissions from the local highway network. Results were subsequently verified using monitoring data obtained from LBoH.

The results of the dispersion modelling assessment indicated that predicted annual mean NO₂ and PM₁₀ concentrations were below the relevant AQO at all locations across the development. Levels were classed as APEC-A in accordance with the London Councils Air Quality and Planning Guidance²⁵. As such, the location is considered suitable for the proposed use from an air quality perspective.

During the operational phase of the development there is the potential for air quality impacts as a result of traffic exhaust emissions associated with vehicles travelling to and from the site. These were assessed against the screening criteria provided within the DMRB and IAQM guidance documents. Due to the low number of trips anticipated to be produced by the proposals, **negligible** impacts were predicted.

Based on the assessment results, air quality issues are not considered a constraint to planning consent for the development.





Legend



Site Boundary



Monitor

Title

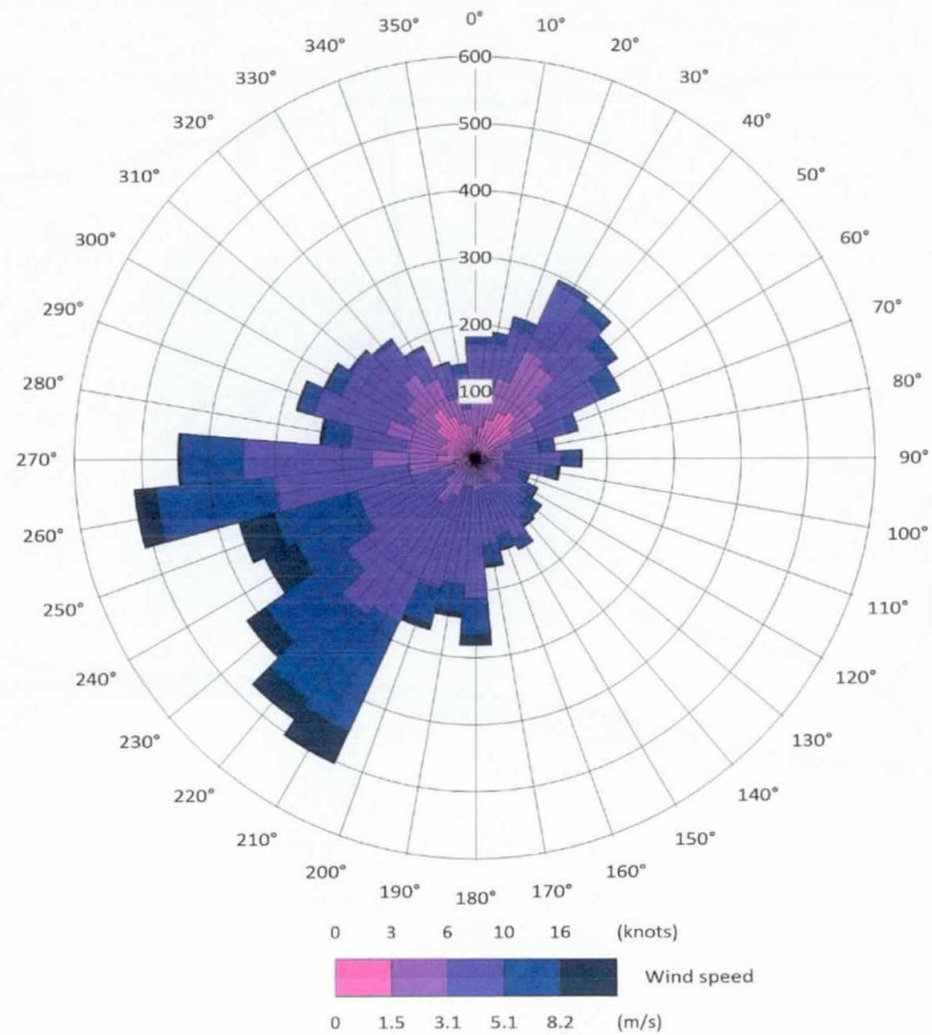
Figure 2 - Monitoring Locations

Project

Air Quality Assessment
Manor Court, Hillingdon

Contains Ordnance Survey Data
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Legend

Title

Figure 4 - Wind Rose of 2016
Heathrow Airport Meteorological Data

Project

Air Quality Assessment
Manor Court, Hillingdon

