Air Quality Note:
Phoenix Place, Camden

September 2019

Experts in air quality
management & assessment

Document Control

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Executive Summary

This Note has been prepared to support an Air Quality Strategy report which addresses Condition 17 of the Planning Permission for development of land off Phoenix Place (2013/3807/P). This condition relates to the provision of measures to minimise the development's future occupiers' exposure to air pollution.

Following detailed correspondence with LB Camden, it has been agreed to update the modelling using the following; measured annual mean nitrogen dioxide concentration at the Bloomsbury monitoring to represent 'background' concentrations in the model, and a worst-case approach assuming no future improvements in air quality. This Note provides results of this additional modelling using LB Camden's agreed approach.

The updated results show that air quality conditions will be acceptable throughout most of the site, with the exception of a number of flats in Blocks A3 to A6 (up to and including the third floor) and in Block C (up to and including the fourth floor). At these locations, annual mean nitrogen dioxide concentrations are predicted to be above 40.0 µg/m^3 (i.e. above objective value)[1] thus apartment specific mitigation is required.

It is therefore proposed to install NOx filtration within these flats, the specifications of which are presented in Appendix A2. With this mitigation in place, as well as the full suite of measures included within the Air Quality Strategy report, exposure of all residents within the Consented Scheme to air pollution will be minimised.

[1] The London Councils guidance on air quality and planning (The London Air Pollution Planning and the Local Environment working group, 2007) suggests that mitigation is required where pollutant concentrations are predicted to be 5% or more above the objective value

1 Introduction

1.1 The air quality assessment (Air Quality Consultants Ltd, 2018) submitted in support of the consented mixed-use development of land off Phoenix Place in the LB of Camden, (planning permission 2013/3807/P (as amended)) was carried out on behalf of Taylor Wimpey Central London, to discharge Condition 17 and to accord with the approved PP Energy Efficiency Plan.

1.2 Condition 17 states that: "*Prior to superstructure work commencing on the relevant Section, a report detailing measures to minimise the exposure of the development's future occupiers to air pollution with details for a ventilation strategy shall be submitted to and approved in writing by the Local Planning Authority. The development shall thereafter be carried out strictly in accordance with the measures so approved, and shall be maintained as such thereafter, unless otherwise approved in writing by the Local Planning Authority.*"

1.3 An evidence based approach was agreed on Thursday 25th July between AQC and the London Borough of Camden (Camden Council's Senior Sustainability Officer (Katherine Frost), Principal Planning Officer (Jonathan McClue) and Air Quality Officer (Ana Ventura)).The agreed approach is as follows: Predictions should assume no improvement in background concentrations and vehicle emission factors between the base year (2018) and the opening year (2020), in line with Camden's requests. It was also agreed that the annual mean background concentration measured at the London Bloomsbury automatic monitor in 2018 should be used in the assessment.

1.4 The conference call was followed by an email from Jonathan McClue, which stated that,

"*Following the cons call I thought it would be good to clarify an agreed methodology moving forward. We agreed that the Bloomsbury site 2018 figure could be used for background; however, no future predictions/improvements to this background figure could be applied. This is a significant compromise on our position on using the Defra background figure of 45. As per previous advice, you'll need to model to base year with no predicted improvements to year of occupancy. Areas of the site which are above air quality objectives will require mitigation. For areas that are between 5% below or above the national objective (APEC B) as stated in the London Councils' Air Quality and Planning Guidance, 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. As this revised air quality statement is in relation to a condition which relates to a ventilation strategy, we would expect that these units are included in the ventilation strategy however, we are open to consider other mitigation measures for these units.*"

1.5 The results presented in this Note have also been updated in line with new information that has been published or made available to AQC since the initial report and subsequent notes were submitted in July 2018, February 2019 and June 2019 respectively. This includes:

- Confirmation by Camden Council of the ratified annual mean nitrogen dioxide concentrations measured at the London Bloomsbury automatic monitor in 2018 of 36.4 µg/m^3; and
- The final floor plans for the Consented Scheme.

2 Monitoring Data

2.1 The air quality assessment included a section which presented relevant monitoring data from LB of Camden and LB of Islington. Data for automatic monitoring stations within the study area were presented for 2011 to 2016, whilst diffusion tube data was presented for 2011 to 2015. 2016 and 2017 data have since been published by the LB of Camden and the LB of Islington. 2018 data have not been published by either local authority, but have been downloaded from the Londonair website (King's College London, 2019) for the automatic monitoring stations, with the Draft 2018 Islington Air Quality Annual Status Report (ASR) directly provided by the LB of Islington.

2.2 Table 3 of the air quality assessment is reproduced below, with the addition of 2016, 2017 and 2018 data, where available.

Table 1: Summary of Nitrogen Dioxide (NO_2) Monitoring (2011-2018) [a,b]

Site No.	Site Type	Location	2011	2012	2013	2014	2015	2016[c]	2017	2018
Automatic Monitors - Annual Mean (µg/m^3) [a]										
LB	Urban Background	London Bloomsbury	**50**	**55**	**44**	**45**	**48**	**42**	38	36[d]
CD3	Roadside	Shaftesbury Avenue	**76**	**71**	**74**	**69[c]**	No data	-	-	-
CD9	Roadside	Euston Road	**122[c]**	**106**	**106**	**98**	**90**	**88**	**83**	**86[e]**
Objective			**40**							
Automatic Monitors - No. of Hours > 200 µg/m^3										
LB	Urban Background	London Bloomsbury	0	1	0	0	0	0	0	0[e]
CD3	Roadside	Shaftesbury Avenue	15	12	6	1 (140.4)	No data	-	-	-
CD9	Roadside	Euston Road	**726**	**295**	**296**	**170**	**54**	**39**	**25**	**19[e]**
Objective			**18**							
Diffusion Tubes - Annual Mean (µg/m^3)										
CA4	Roadside	Euston Road	**93.1**	**82.1**	**107.8**	**89.7**	**86.8**	**82.7**	**92.5**	-
CA6	Urban background	Wakefield Gardens	**45.6**	39.3	**40.3**	36.4	35.8	31.3	-	-
CA10	Urban background	Tavistock Gardens	**47.6**	**40.1**	**49.4**	**46.5**	**44.6**	39.7	-	-
CA11	Kerbside	Tottenham Court Road	**91.7**	**83.3**	**88.1**	**86.8**	**85.6**	**83.6**	-	-
CA20	Roadside	Brill Place	**50.8**	**50.0**	**49.4**	**52.3**	**48.9**	**47.5**	**57.3**	-
CA21	Roadside	Bloomsbury Street	**76.7**	**71.7**	**76.1**	**80.8**	**71.4**	**72.2**	**80.7**	-
BIS005/02[f]	Roadside	Rosebery Avenue	**70**	**58**	**57**	**58**	**62**	**62**	**54**	**51**
Objective			**40**							

[a] Exceedances of the objectives are shown in bold.

[b] Data sourced from the Air Quality Annual Status Report for 2017 (London Borough of Camden, 2018)

[c] Annualised value due to low data capture

[d] Ratified value of 36.4 µg/m^3 provided by Camden Council.

[e] Data downloaded from the Londonair website (King's College London, 2019)

[f] This diffusion tube is operated by the London Borough of Islington. Data was sourced from the 2017 Islington Air Quality Annual Status Report (London Borough of Islington, 2018) and the Draft 2018 ASR directly provided by the LB of Islington.

3 Modelling Results

3.1 The air quality predictions presented in the original air quality assessment have been updated, based on the new monitoring information, final scheme drawings and updated plant parameters. Modelling parameters are detailed in Appendix A1. The updates have mainly consisted of:

- Use of the background concentrations measured at the London Bloomsbury automatic monitor in 2018;
- Update of receptor locations and heights based on the latest floor plans;
- Update of the CHP and boilers dispersion models, in line with the latest floor plans; and
- Results assume no improvement in background pollutant concentrations and vehicle emission factors between the baseline year (2018) and the opening year (2020).

3.2 The selected receptor locations are presented in Figure 1. A greater number of on-site receptor locations were selected compared to the initial assessment, in order to provide a detailed indication of properties requiring mitigation. Predictions were made at all levels with relevant exposure (i.e. residential properties, as opposed to commercial space where the annual mean objectives do not apply).

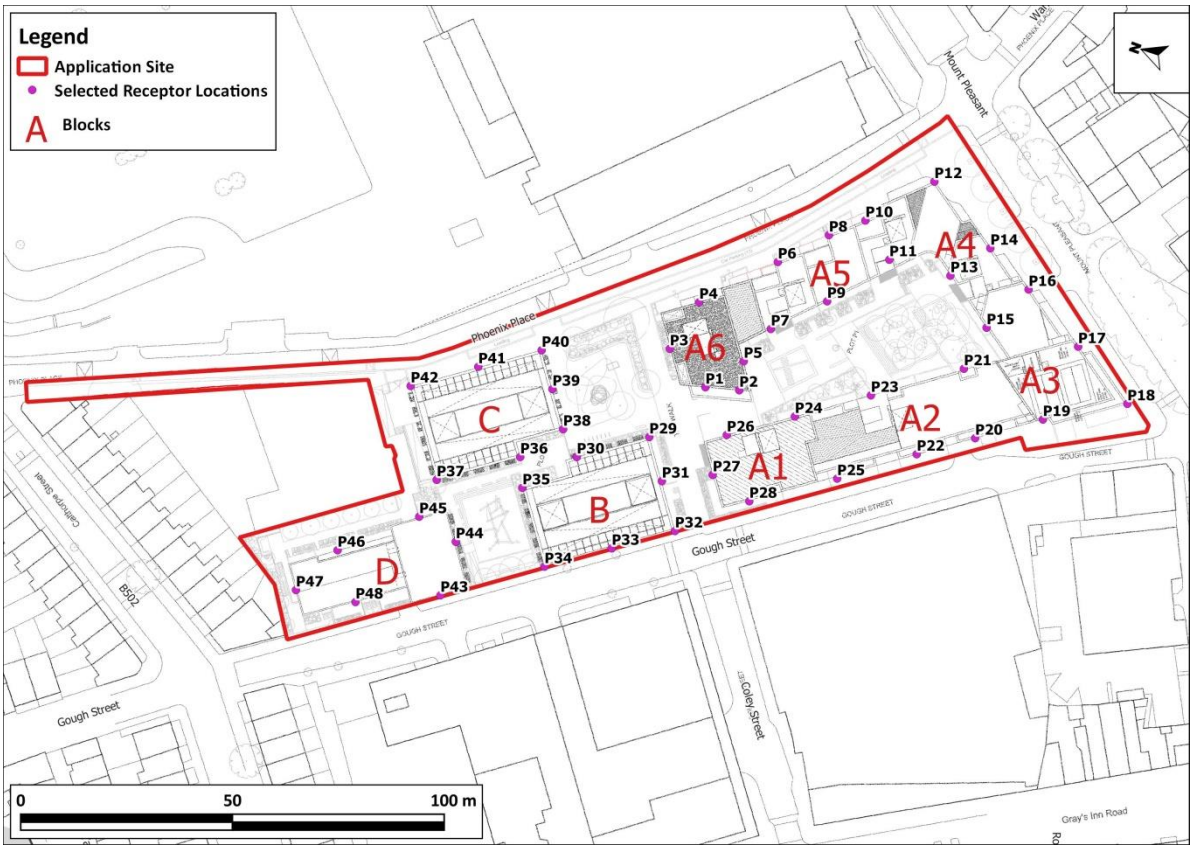

Figure 1: Selected Receptor Locations

Contains data from Broadway Malyan drawing no. P-01-014

3.3 Results are presented in Table 2. Figure 2 to Figure 10 also show the predicted annual mean nitrogen dioxide concentration at each floor level, where exceedances of the annual mean nitrogen dioxide objective are predicted at some residential receptor locations (i.e. values highlighted in orange). The results include background concentrations and the contributions to pollutant concentrations from local road traffic emissions, including traffic generated by the Consented Development (refer to Figure A1.1 in Appendix A1 for extent of modelled roads), and from the proposed energy plant emissions. The results assume the Consented Development is fully complete and operational in 2020. The predictions assume no improvements between the base year (2018) and the opening year (2020) (i.e. 2018 background concentrations and vehicle emission factors were used).

3.4 With regards to annual mean nitrogen dioxide concentration, the London Council's Air Quality and Planning Guidance (The London Air Pollution Planning and the Local Environment working group, 2007) was taken into account. It advises that mitigation should be considered where the annual mean pollutant concentration is comprised within ±5% of the objective, known as Air Pollution Exposure Category (APEC) B, (in this case between 38.0 and 42.0 µg/m^3). This is to account for the uncertainties in the predictions. Where the predicted concentration is more than 5% above the objective (i.e. greater than 42.0 µg/m^3), mitigation measures must be presented with the air quality

assessment. Predictions presented in this Note are based on a conservative approach, such that no improvements in background and vehicle emission factors have been assumed between the base year (2018) and the year of opening (2020). This would have led to conservative results. As such, it has been considered that where the annual mean nitrogen dioxide concentration is predicted to be below 40.0 µg/m^3, which corresponds to the national air quality objective, mitigation is not required.

3.5 Results show that annual mean PM_{10} and $PM_{2.5}$ concentrations are well below the objectives at all receptors. The annual mean nitrogen dioxide concentrations are below 40.0 µg/m^3 at most locations, with the exception of some receptors within Blocks A3 to A6 and Block C.

3.6 Based on this, although air quality conditions will be acceptable throughout most of the site, mitigation will be required for the apartments identified on Figure 2 to Figure 10 below.

3.7 It has been confirmed that all properties within the Consented Development will be ventilated mechanically, through the use of individual Mechanical Heat Recovery Ventilation units (MHRV). It will also be possible to ventilate future properties naturally, through openable windows. In addition to this, it is proposed to install NOx filtration on the flats identified on Figure 2 to Figure 10, the specifications of which are presented in Appendix A2.

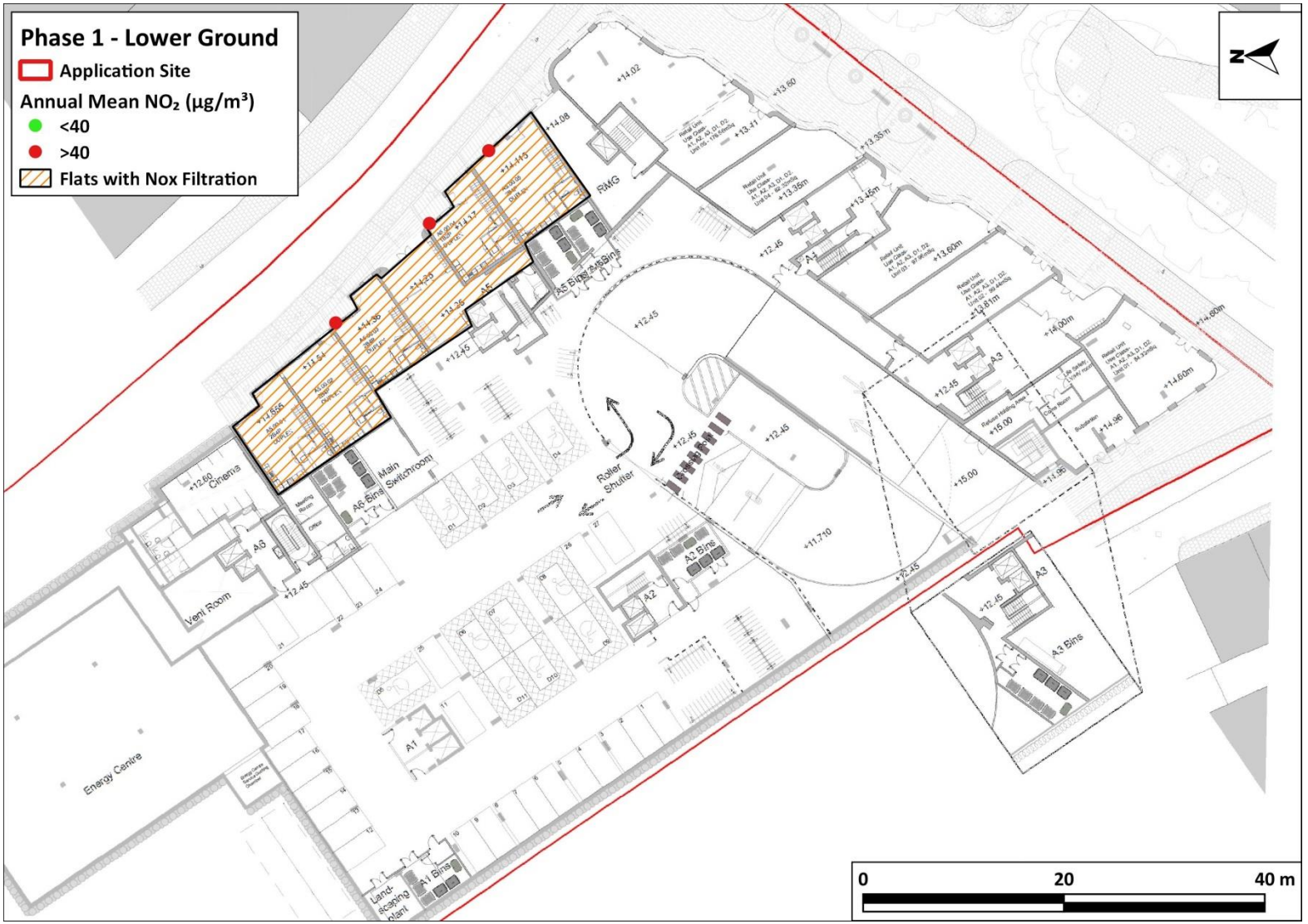

Figure 2: Phase 1 - Mark up of Flats Requiring NOx Filtration – Lower Ground Floor Level

Contains data from Broadway Malyan drawing no. P-03-G00_P04

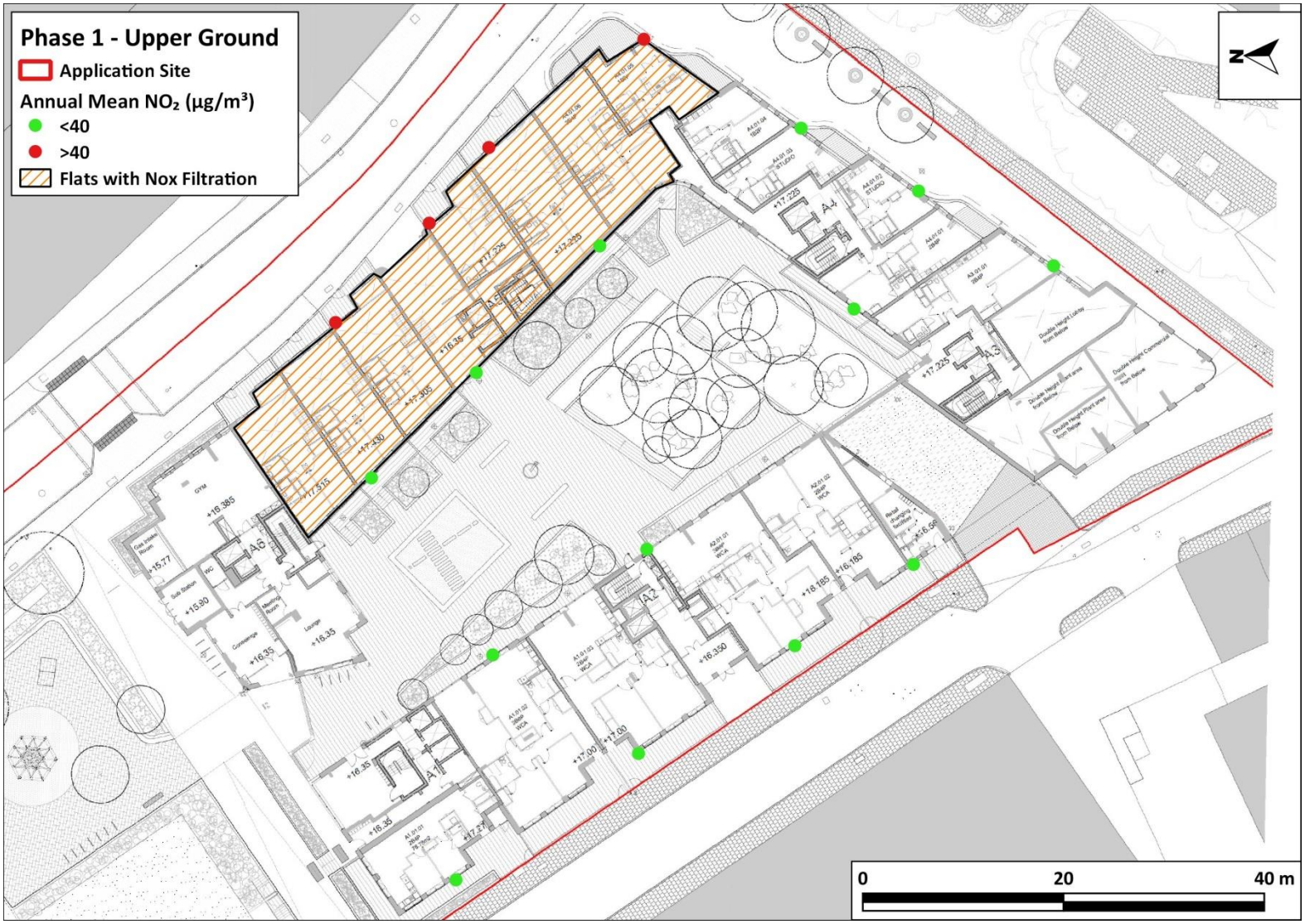

Figure 3: Phase 1 - Mark up of Flats Requiring NOx Filtration – Upper Ground Floor Level

Contains data from Broadway Malyan drawing no. P-03-G01_P03

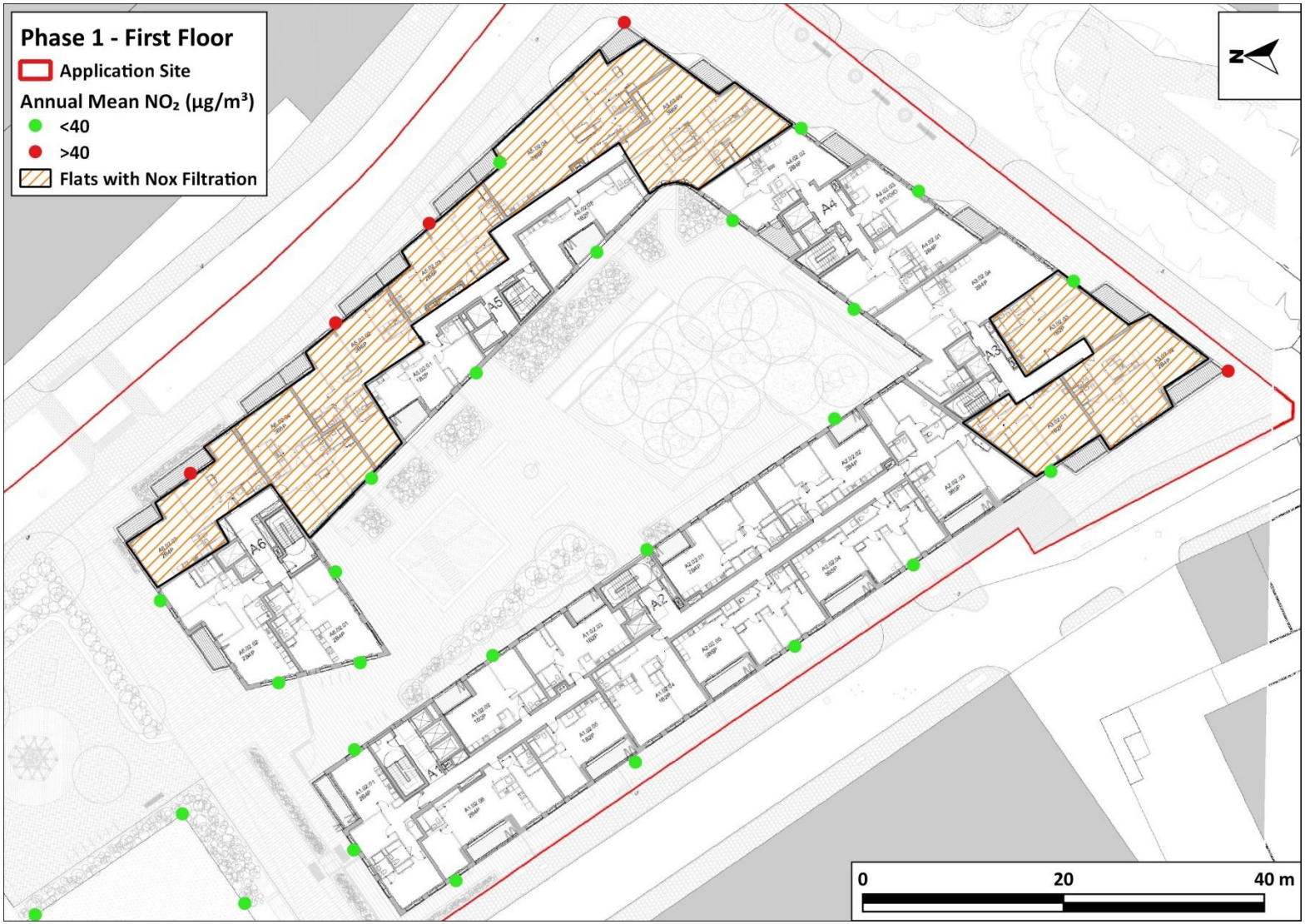

Figure 4: Phase 1 - Mark up of Flats Requiring NOx Filtration – First Floor Level

Contains data from Broadway Malyan drawing no. P-03-001_P03

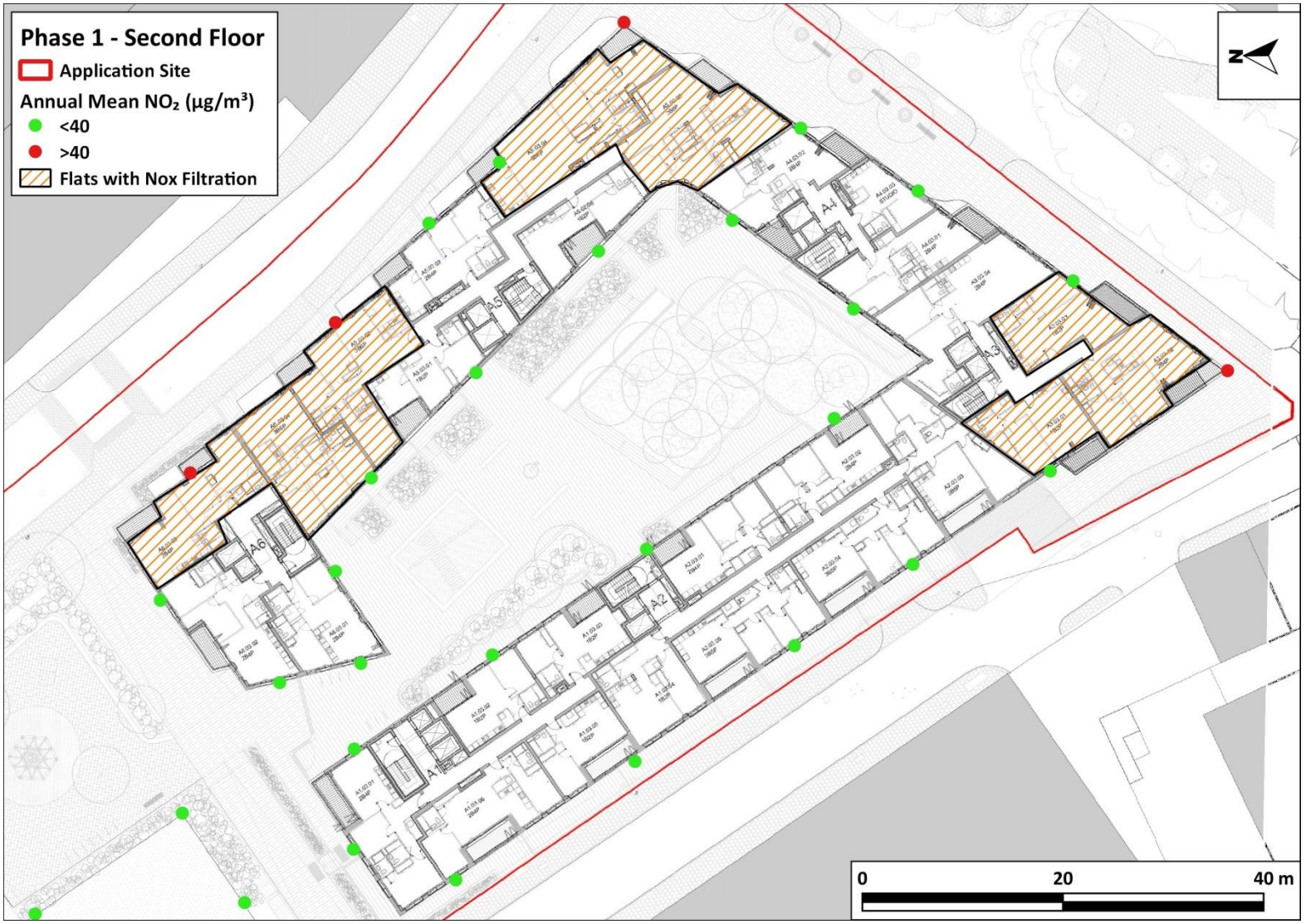

Figure 5: Phase 1 - Mark up of Flats Requiring NOx Filtration – Second Floor Level

Contains data from Broadway Malyan drawing no. P-03-002_P03

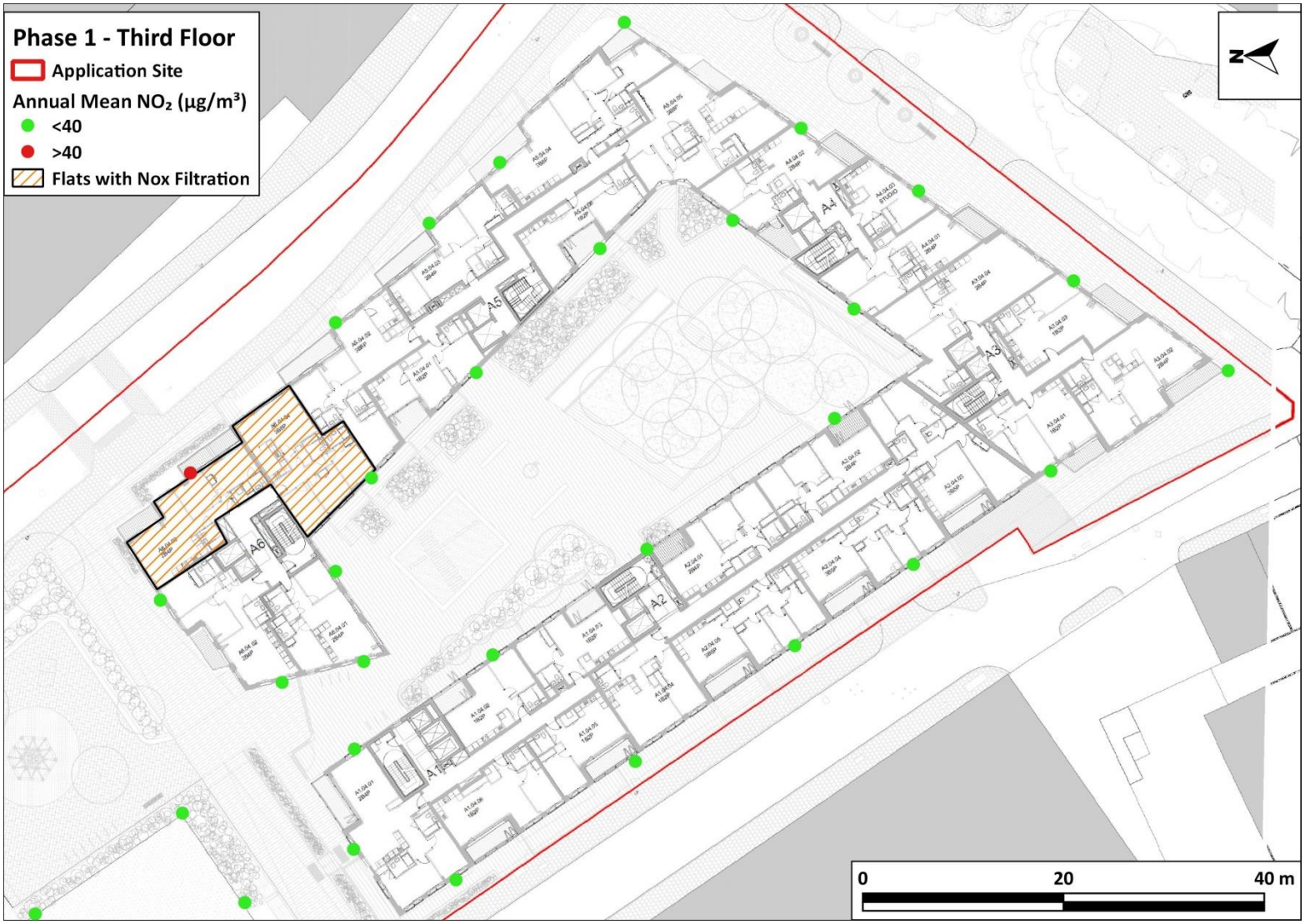

Figure 6: Phase 1 - Mark up of Flats Requiring NOx Filtration – Third Floor Level

Contains data from Broadway Malyan drawing no. P-03-003_P03

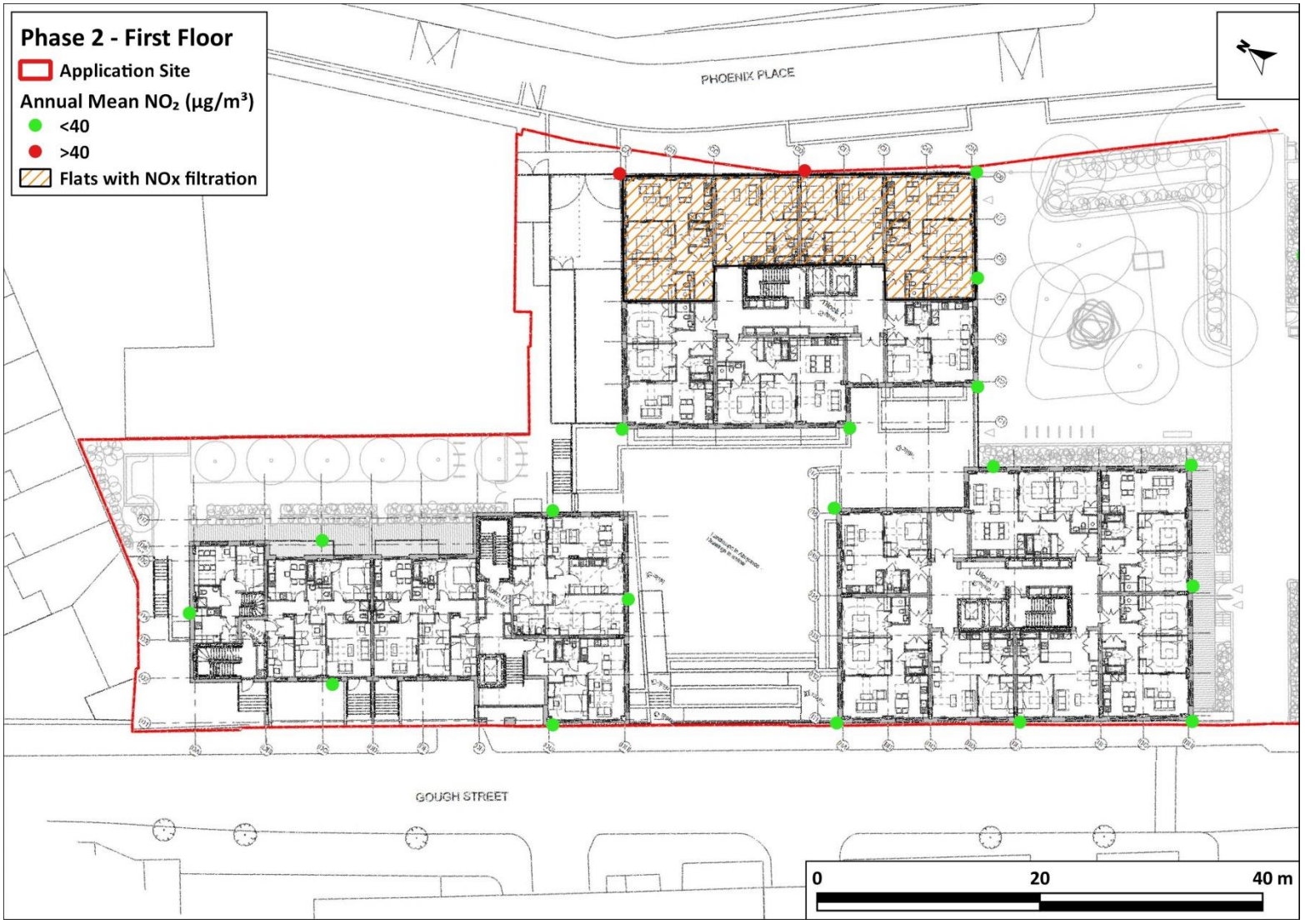

Figure 7: Phase 2 - Mark up of Flats Requiring NOx Filtration – First Floor Level

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Figure 8: Phase 2 - Mark up of Flats Requiring NOx Filtration – Second Floor Level

Contains data from Broadway Malyan drawing no. A-P2-70-PL-02

Figure 9: Phase 2 - Mark up of Flats Requiring NOx Filtration – Third Floor Level

Contains data from Broadway Malyan drawing no. A-P2-70-PL-03

Figure 10: Phase 2 - Mark up of Flats Requiring NOx Filtration – Fourth Floor Level

Contains data from Broadway Malyan drawing no. A-P2-70-PL-04.

Table 2: **Air Quality Conditions for Future Residents and Occupants of the Consented Development (2020) – Consented Development Fully Operational.** Results only presented for locations representative of residential properties.

Level / Block	Receptor	Annual Mean Concentrations (µg/m^3) [a]			Mitigation
		NO_2	PM_{10}	$PM_{2.5}$	
Lower Ground Level / Block A5	P6_LGF	41.1	18.1	10.9	NOx filtration required
	P8_LGF	41.0	18.1	10.9	NOx filtration required
	P10_LGF	40.1	18.0	10.8	NOx filtration required
Upper Ground Level / Block A5	P6_UGF	41.1	18.1	10.9	NOx filtration required
	P7_UGF	38.1	17.6	10.5	Not required
	P8_UGF	41.0	18.1	10.9	NOx filtration required
	P9_UGF	37.9	17.6	10.5	Not required
	P10_UGF	40.1	18.0	10.8	NOx filtration required
	P11_UGF	37.9	17.6	10.5	Not required
Upper Ground Level / Block A4	P12_UGF	40.9	18.1	10.8	NOx filtration required
	P14_UGF	39.0	17.8	10.7	Not required
	P15_UGF	37.8	17.6	10.5	Not required
	P16_UGF	38.1	17.7	10.6	Not required
Upper Ground Level / Block A3	P17_UGF	39.7	17.9	10.7	Not required
Upper Ground Level / Blocks A1/A2	P20_UGF	38.9	17.8	10.6	Not required
	P22_UGF	38.9	17.8	10.6	Not required
	P23_UGF	37.9	17.6	10.5	Not required
	P24_UGF	37.9	17.6	10.5	Not required
	P25_UGF	39.0	17.8	10.6	Not required
	P28_UGF	39.0	17.8	10.6	Not required
Ground Level / Block D	P46_GF	37.9	17.6	10.5	Not required
	P47_GF	38.0	17.6	10.6	Not required
	P48_GF	37.9	17.6	10.5	Not required
First Floor / Block A6	P1_F1	38.2	17.6	10.5	Not required
	P2_F1	38.1	17.6	10.5	Not required
	P3_F1	38.5	17.6	10.5	Not required
	P4_F1	40.8	18.0	10.8	NOx filtration required
	P5_F1	38.3	17.6	10.5	Not required
First Floor / Block A5	P6_F1	40.6	18.0	10.8	NOx filtration required
	P7_F1	38.1	17.6	10.5	Not required
	P8_F1	40.4	18.0	10.8	NOx filtration required

Level / Block	Receptor	Annual Mean Concentrations (µg/m^3) [a]			Mitigation
		NO_2	PM_{10}	$PM_{2.5}$	
	P9_F1	37.9	17.6	10.5	Not required
	P10_F1	39.7	17.9	10.7	Not required
	P11_F1	37.8	17.6	10.5	Not required
First Floor / Block A4	P12_F1	40.5	18.0	10.8	NOx filtration required
	P13_F1	37.8	17.6	10.5	Not required
	P14_F1	38.8	17.8	10.6	Not required
	P15_F1	37.8	17.6	10.5	Not required
	P16_F1	37.9	17.6	10.5	Not required
First Floor / Block A3	P17_F1	39.3	17.8	10.7	Not required
	P18_F1	40.9	18.1	10.9	NOx filtration required
	P19_F1	38.7	17.8	10.6	Not required
First Floor / Blocks A1- A2	P20_F1	38.7	17.8	10.6	Not required
	P21_F1	37.8	17.6	10.5	Not required
	P22_F1	38.7	17.7	10.6	Not required
	P23_F1	37.8	17.6	10.5	Not required
	P24_F1	37.9	17.6	10.5	Not required
	P25_F1	38.7	17.7	10.6	Not required
	P26_F1	38.0	17.6	10.5	Not required
	P27_F1	38.0	17.6	10.5	Not required
	P28_F1	38.8	17.7	10.6	Not required
First Floor / Block B	P29_F1	37.9	17.6	10.5	Not required
	P30_F1	37.7	17.6	10.5	Not required
	P31_F1	37.8	17.6	10.5	Not required
	P32_F1	38.5	17.7	10.6	Not required
	P33_F1	38.5	17.7	10.6	Not required
	P34_F1	38.4	17.7	10.6	Not required
	P35_F1	37.7	17.6	10.5	Not required
First Floor / Block C	P36_F1	37.7	17.6	10.5	Not required
	P37_F1	37.7	17.6	10.5	Not required
	P38_F1	37.7	17.6	10.5	Not required
	P39_F1	37.8	17.6	10.5	Not required
	P40_F1	37.8	17.6	10.5	Not required
	P41_F1	43.0	18.4	11.1	NOx filtration required
	P42_F1	43.0	18.4	11.1	NOx filtration required
First Floor / Block D	P43_F1	38.5	17.7	10.6	Not required
	P44_F1	37.7	17.6	10.5	Not required

Level / Block	Receptor	Annual Mean Concentrations (µg/m^3) [a]			Mitigation
		NO_2	PM_{10}	$PM_{2.5}$	
	P45_F1	37.7	17.6	10.5	Not required
	P46_F1	37.8	17.6	10.5	Not required
	P47_F1	37.9	17.6	10.5	Not required
	P48_F1	37.8	17.6	10.5	Not required
Second Floor / Block A6	P1_F2	38.1	17.6	10.5	Not required
	P2_F2	38.1	17.6	10.5	Not required
	P3_F2	38.3	17.6	10.5	Not required
	P4_F2	40.5	17.9	10.7	NOx filtration required
	P5_F2	38.3	17.6	10.5	Not required
Second Floor / Block A5	P6_F2	40.1	17.9	10.8	NOx filtration required
	P7_F2	38.0	17.6	10.5	Not required
	P8_F2	40.0	17.9	10.8	Not required
	P9_F2	37.8	17.6	10.5	Not required
	P10_F2	39.3	17.8	10.7	Not required
	P11_F2	37.7	17.6	10.5	Not required
Second Floor / Block A4	P12_F2	40.1	18.0	10.8	NOx filtration required
	P13_F2	37.7	17.6	10.5	Not required
	P14_F2	38.6	17.7	10.6	Not required
	P15_F2	37.7	17.6	10.5	Not required
	P16_F2	37.7	17.6	10.5	Not required
Second Floor / Block A3	P17_F2	39.0	17.8	10.7	Not required
	P18_F2	40.4	18.0	10.8	NOx filtration required
	P19_F2	38.5	17.7	10.6	Not required
Second Floor / Blocks A1-A2	P20_F2	38.5	17.7	10.6	Not required
	P21_F2	37.7	17.6	10.5	Not required
	P22_F2	38.5	17.7	10.6	Not required
	P23_F2	37.8	17.6	10.5	Not required
	P24_F2	37.8	17.6	10.5	Not required
	P25_F2	38.5	17.7	10.6	Not required
	P26_F2	37.9	17.6	10.5	Not required
	P27_F2	37.9	17.6	10.5	Not required
	P28_F2	38.6	17.7	10.6	Not required
Second Floor / Block B	P29_F2	37.8	17.6	10.5	Not required
	P30_F2	37.7	17.6	10.5	Not required
	P31_F2	37.8	17.6	10.5	Not required
	P32_F2	38.3	17.7	10.6	Not required

Level / Block	Receptor	Annual Mean Concentrations (µg/m^3) [a]			Mitigation
		NO_2	PM_{10}	$PM_{2.5}$	
	P33_F2	38.3	17.7	10.6	Not required
	P34_F2	38.2	17.7	10.6	Not required
	P35_F2	37.6	17.6	10.5	Not required
Second Floor / Block C	P36_F2	37.6	17.6	10.5	Not required
	P37_F2	37.6	17.6	10.5	Not required
	P38_F2	37.7	17.6	10.5	Not required
	P39_F2	37.7	17.6	10.5	Not required
	P40_F2	37.7	17.6	10.5	Not required
	P41_F2	41.9	18.2	10.9	NOx filtration required
	P42_F2	41.9	18.2	10.9	NOx filtration required
Second Floor / Block D	P43_F2	38.3	17.7	10.6	Not required
	P44_F2	37.7	17.6	10.5	Not required
	P45_F2	37.7	17.6	10.5	Not required
	P46_F2	37.7	17.6	10.5	Not required
	P47_F2	37.8	17.6	10.5	Not required
	P48_F2	37.8	17.6	10.5	Not required
Third Floor / Block A6	P1_F3	38.0	17.6	10.5	Not required
	P2_F3	38.0	17.6	10.5	Not required
	P3_F3	38.2	17.6	10.5	Not required
	P4_F3	40.2	17.9	10.7	NOx filtration required
	P5_F3	38.2	17.6	10.5	Not required
Third Floor / Block A5	P6_F3	39.8	17.9	10.7	Not required
	P7_F3	37.9	17.6	10.5	Not required
	P8_F3	39.6	17.9	10.7	Not required
	P9_F3	37.7	17.6	10.5	Not required
	P10_F3	39.1	17.8	10.7	Not required
	P11_F3	37.6	17.6	10.5	Not required
Third Floor / Block A4	P12_F3	39.8	17.9	10.7	Not required
	P13_F3	37.6	17.6	10.5	Not required
	P14_F3	38.4	17.7	10.6	Not required
	P15_F3	37.6	17.6	10.5	Not required
	P16_F3	37.6	17.6	10.5	Not required
Third Floor / Block A3	P17_F3	38.7	17.7	10.6	Not required
	P18_F3	40.0	18.0	10.8	Not required
	P19_F3	38.3	17.7	10.6	Not required
Third	P20_F3	38.3	17.7	10.6	Not required

Level / Block	Receptor	Annual Mean Concentrations (µg/m^3) [a]			Mitigation
		NO_2	PM_{10}	$PM_{2.5}$	
Floor / Blocks A1-A2	P21_F3	37.6	17.6	10.5	Not required
	P22_F3	38.3	17.7	10.6	Not required
	P23_F3	37.7	17.6	10.5	Not required
	P24_F3	37.7	17.6	10.5	Not required
	P25_F3	38.4	17.7	10.6	Not required
	P26_F3	37.8	17.6	10.5	Not required
	P27_F3	37.8	17.6	10.5	Not required
	P28_F3	38.5	17.7	10.6	Not required
Third Floor / Block B	P29_F3	37.7	17.6	10.5	Not required
	P30_F3	37.6	17.6	10.5	Not required
	P31_F3	37.7	17.6	10.5	Not required
	P32_F3	38.1	17.6	10.6	Not required
	P33_F3	38.2	17.6	10.6	Not required
	P34_F3	38.1	17.7	10.6	Not required
	P35_F3	37.6	17.6	10.5	Not required
Third Floor / Block C	P36_F3	37.5	17.6	10.5	Not required
	P37_F3	37.6	17.6	10.5	Not required
	P38_F3	37.6	17.6	10.5	Not required
	P39_F3	37.6	17.6	10.5	Not required
	P40_F3	37.6	17.6	10.5	Not required
	P41_F3	41.3	18.2	10.9	NOx filtration required
	P42_F3	41.4	18.2	10.9	NOx filtration required
Third Floor / Block D	P43_F3	38.1	17.7	10.6	Not required
	P44_F3	37.6	17.6	10.5	Not required
	P45_F3	37.6	17.6	10.5	Not required
	P46_F3	37.7	17.6	10.5	Not required
	P47_F3	37.8	17.6	10.5	Not required
	P48_F3	37.7	17.6	10.5	Not required
Fourth Floor / Block A6	P1_F4	37.9	17.6	10.5	Not required
	P2_F4	37.9	17.6	10.5	Not required
	P3_F4	38.2	17.6	10.5	Not required
	P4_F4	40.0	17.8	10.7	Not required
	P5_F4	38.1	17.6	10.5	Not required
Fourth Floor / Block A5	P6_F4	39.5	17.8	10.7	Not required
	P7_F4	37.8	17.6	10.5	Not required
	P8_F4	39.3	17.8	10.7	Not required

Level / Block	Receptor	Annual Mean Concentrations (µg/m^3) [a]			Mitigation
		NO_2	PM_{10}	$PM_{2.5}$	
	P9_F4	37.6	17.6	10.5	Not required
	P10_F4	38.8	17.8	10.6	Not required
	P11_F4	37.6	17.6	10.5	Not required
Fourth Floor / Block A4	P13_F4	37.5	17.6	10.5	Not required
	P14_F4	38.2	17.7	10.6	Not required
	P15_F4	37.5	17.6	10.5	Not required
	P16_F4	37.5	17.6	10.5	Not required
Fourth Floor / Block A3	P17_F4	38.5	17.7	10.6	Not required
	P18_F4	39.5	17.9	10.7	Not required
	P19_F4	38.1	17.7	10.6	Not required
Fourth Floor / Blocks A1-A2	P20_F4	38.1	17.7	10.6	Not required
	P21_F4	37.5	17.6	10.5	Not required
	P22_F4	38.0	17.6	10.6	Not required
	P23_F4	37.6	17.6	10.5	Not required
	P24_F4	37.6	17.6	10.5	Not required
	P25_F4	38.1	17.6	10.6	Not required
	P26_F4	37.8	17.6	10.5	Not required
	P27_F4	37.8	17.6	10.5	Not required
	P28_F4	38.2	17.6	10.6	Not required
Fourth Floor / Block B	P29_F4	37.6	17.6	10.5	Not required
	P30_F4	37.5	17.6	10.5	Not required
	P31_F4	37.6	17.6	10.5	Not required
	P32_F4	37.9	17.6	10.5	Not required
	P33_F4	37.9	17.6	10.5	Not required
	P34_F4	37.9	17.6	10.5	Not required
	P35_F4	37.5	17.6	10.5	Not required
Fourth Floor / Block C	P36_F4	37.5	17.6	10.5	Not required
	P37_F4	37.5	17.6	10.5	Not required
	P38_F4	37.5	17.6	10.5	Not required
	P39_F4	37.5	17.6	10.5	Not required
	P40_F4	37.5	17.6	10.5	Not required
	P41_F4	40.2	18.0	10.8	NOx filtration required
	P42_F4	40.2	18.0	10.8	NOx filtration required
Fourth Floor / Block D	P43_F4	37.9	17.6	10.5	Not required
	P44_F4	37.5	17.6	10.5	Not required
	P45_F4	37.5	17.6	10.5	Not required

Level / Block	Receptor	Annual Mean Concentrations (µg/m^3) [a]			Mitigation
		NO_2	PM_{10}	$PM_{2.5}$	
	P46_F4	37.6	17.6	10.5	Not required
	P47_F4	37.6	17.6	10.5	Not required
	P48_F4	37.6	17.6	10.5	Not required
Fifth Floor / Block A6	P1_F5	37.8	17.5	10.5	Not required
	P2_F5	37.8	17.5	10.5	Not required
	P3_F5	38.1	17.5	10.5	Not required
	P4_F5	39.6	17.8	10.6	Not required
	P5_F5	38.0	17.5	10.5	Not required
Fifth Floor / Block A5	P6_F5	39.1	17.8	10.6	Not required
	P7_F5	37.7	17.5	10.5	Not required
	P8_F5	38.9	17.8	10.6	Not required
	P9_F5	37.5	17.5	10.5	Not required
	P10_F5	37.5	17.6	10.5	Not required
	P11_F5	37.5	17.6	10.5	Not required
Fifth Floor / Block A4	P13_F5	37.4	17.5	10.5	Not required
	P14_F5	38.1	17.7	10.6	Not required
	P15_F5	37.4	17.5	10.5	Not required
	P16_F5	37.4	17.5	10.5	Not required
Fifth Floor / Block A3	P17_F5	38.2	17.7	10.6	Not required
	P18_F5	38.8	17.8	10.6	Not required
	P19_F5	37.8	17.6	10.5	Not required
Fifth Floor / Blocks A1-A2	P20_F5	37.8	17.6	10.5	Not required
	P21_F5	37.4	17.5	10.5	Not required
	P22_F5	37.7	17.6	10.5	Not required
	P23_F5	37.5	17.5	10.5	Not required
	P24_F5	37.6	17.5	10.5	Not required
	P25_F5	37.8	17.6	10.5	Not required
	P26_F5	37.7	17.5	10.5	Not required
	P27_F5	37.7	17.5	10.5	Not required
	P28_F5	37.9	17.6	10.5	Not required
Fifth Floor / Block B	P29_F5	37.6	17.5	10.5	Not required
	P30_F5	37.4	17.5	10.5	Not required
	P31_F5	37.5	17.5	10.5	Not required
	P32_F5	37.6	17.6	10.5	Not required
	P33_F5	37.5	17.6	10.5	Not required
	P34_F5	37.5	17.6	10.5	Not required

Level / Block	Receptor	Annual Mean Concentrations (µg/m^3) [a]			Mitigation
		NO_2	PM_{10}	$PM_{2.5}$	
	P35_F5	37.4	17.5	10.5	Not required
Fifth Floor / Block C	P36_F5	37.4	17.5	10.5	Not required
	P37_F5	37.4	17.5	10.5	Not required
	P38_F5	37.4	17.5	10.5	Not required
	P39_F5	37.4	17.5	10.5	Not required
	P40_F5	37.4	17.5	10.5	Not required
	P41_F5	39.1	17.8	10.7	Not required
	P42_F5	39.1	17.8	10.7	Not required
Fifth Floor / Block D	P43_F5	37.5	17.6	10.5	Not required
	P44_F5	37.4	17.6	10.5	Not required
	P45_F5	37.4	17.6	10.5	Not required
Sixth Floor / Block A6	P1_F6	37.8	17.5	10.5	Not required
	P2_F6	37.7	17.5	10.5	Not required
	P3_F6	38.0	17.5	10.5	Not required
	P4_F6	39.1	17.7	10.6	Not required
	P5_F6	37.9	17.5	10.5	Not required
Sixth Floor / Block A5	P6_F6	38.5	17.7	10.6	Not required
	P7_F6	37.7	17.5	10.5	Not required
	P8_F6	38.4	17.7	10.6	Not required
	P9_F6	37.4	17.5	10.5	Not required
Sixth Floor / Block A4	P13_F6	37.3	17.5	10.5	Not required
	P14_F6	37.9	17.6	10.6	Not required
	P15_F6	37.3	17.5	10.5	Not required
	P16_F6	37.3	17.5	10.5	Not required
Sixth Floor / Block A3	P17_F6	37.9	17.6	10.5	Not required
	P18_F6	38.4	17.7	10.6	Not required
	P19_F6	37.5	17.6	10.5	Not required
Sixth Floor / Blocks A1-A2	P20_F6	37.5	17.6	10.5	Not required
	P21_F6	37.3	17.5	10.5	Not required
	P22_F6	37.5	17.6	10.5	Not required
	P23_F6	37.4	17.5	10.5	Not required
	P24_F6	37.5	17.5	10.5	Not required
	P25_F6	37.6	17.6	10.5	Not required
	P26_F6	37.6	17.5	10.5	Not required
	P27_F6	37.6	17.5	10.5	Not required
	P28_F6	37.7	17.6	10.5	Not required

Level / Block	Receptor	Annual Mean Concentrations (µg/m^3) [a]			Mitigation
		NO_2	PM_{10}	$PM_{2.5}$	
Sixth Floor / Block B	P29_F6	37.5	17.5	10.5	Not required
	P30_F6	37.4	17.5	10.5	Not required
	P31_F6	37.4	17.5	10.5	Not required
	P32_F6	37.4	17.5	10.5	Not required
	P33_F6	37.4	17.5	10.5	Not required
	P34_F6	37.4	17.5	10.5	Not required
	P35_F6	37.3	17.5	10.5	Not required
Sixth Floor / Block C	P36_F6	37.3	17.5	10.5	Not required
	P37_F6	37.3	17.5	10.5	Not required
	P38_F6	37.3	17.5	10.5	Not required
	P39_F6	37.3	17.5	10.5	Not required
	P40_F6	37.3	17.5	10.5	Not required
	P41_F6	39.0	17.8	10.7	Not required
	P42_F6	39.0	17.8	10.7	Not required
Seventh Floor / Block A6	P1_F7	37.7	17.5	10.5	Not required
	P2_F7	37.6	17.5	10.5	Not required
	P3_F7	38.0	17.5	10.5	Not required
	P4_F7	38.7	17.6	10.6	Not required
	P5_F7	37.9	17.5	10.5	Not required
Seventh Floor / Block A5	P6_F7	38.1	17.6	10.5	Not required
	P7_F7	37.6	17.5	10.5	Not required
Seventh Floor / Block A4	P15_F7	37.2	17.5	10.5	Not required
	P16_F7	37.2	17.5	10.5	Not required
Seventh Floor / Block A3	P17_F7	37.5	17.6	10.5	Not required
	P18_F7	38.1	17.6	10.6	Not required
	P19_F7	37.4	17.5	10.5	Not required
Seventh Floor / Blocks A1-A2	P20_F7	37.4	17.5	10.5	Not required
	P21_F7	37.2	17.5	10.5	Not required
	P22_F7	37.3	17.5	10.5	Not required
	P23_F7	37.3	17.5	10.5	Not required
	P24_F7	37.4	17.5	10.5	Not required
	P25_F7	37.3	17.5	10.5	Not required
	P26_F7	37.5	17.5	10.5	Not required
	P27_F7	37.5	17.5	10.5	Not required
	P28_F7	37.4	17.5	10.5	Not required
Seventh	P29_F7	37.4	17.5	10.5	Not required

Level / Block	Receptor	Annual Mean Concentrations (µg/m^3) [a]			Mitigation
		NO_2	PM_{10}	$PM_{2.5}$	
Floor / Block B	P30_F7	37.3	17.5	10.5	Not required
	P31_F7	37.3	17.5	10.5	Not required
	P32_F7	37.3	17.5	10.5	Not required
	P33_F7	37.3	17.5	10.5	Not required
	P34_F7	37.3	17.5	10.5	Not required
	P35_F7	37.2	17.5	10.5	Not required
Seventh Floor / Block C	P36_F7	37.2	17.5	10.5	Not required
	P37_F7	37.2	17.5	10.5	Not required
	P38_F7	37.3	17.5	10.5	Not required
	P39_F7	37.3	17.5	10.5	Not required
	P40_F7	37.3	17.5	10.5	Not required
	P41_F7	38.9	17.8	10.6	Not required
	P42_F7	38.9	17.8	10.6	Not required
Eighth Floor / Block A6	P1_F8	37.6	17.5	10.5	Not required
	P2_F8	37.5	17.5	10.5	Not required
	P3_F8	37.9	17.5	10.5	Not required
	P4_F8	37.9	17.5	10.5	Not required
	P5_F8	37.8	17.5	10.5	Not required
Eighth Floor /Block A4	P15_F8	37.1	17.5	10.5	Not required
	P16_F8	37.1	17.5	10.5	Not required
Eighth Floor / Block A3	P17_F8	37.4	17.5	10.5	Not required
	P18_F8	37.7	17.6	10.5	Not required
	P19_F8	37.3	17.5	10.5	Not required
Eighth Floor / Block A1	P24_F8	37.3	17.5	10.5	Not required
	P26_F8	37.4	17.5	10.5	Not required
	P27_F8	37.4	17.5	10.5	Not required
	P28_F8	37.2	17.5	10.5	Not required
Eighth Floor / Block B	P29_F8	37.3	17.5	10.5	Not required
	P30_F8	37.2	17.5	10.5	Not required
	P31_F8	37.2	17.5	10.5	Not required
	P32_F8	37.2	17.5	10.5	Not required
	P33_F8	37.2	17.5	10.5	Not required
	P34_F8	37.2	17.5	10.5	Not required
	P35_F8	37.2	17.5	10.5	Not required
Ninth Floor /	P1_F9	37.5	17.5	10.5	Not required
	P2_F9	37.4	17.5	10.5	Not required

Level / Block	Receptor	Annual Mean Concentrations (µg/m^3) [a]			Mitigation
		NO_2	PM_{10}	$PM_{2.5}$	
Block A6	P3_F9	37.8	17.5	10.5	Not required
	P4_F9	37.8	17.5	10.5	Not required
	P5_F9	37.7	17.5	10.5	Not required
Ninth Floor / Block A4	P15_F9	37.0	17.5	10.5	Not required
	P16_F9	37.0	17.5	10.5	Not required
Ninth Floor / Block A3	P17_F9	37.3	17.5	10.5	Not required
	P18_F9	37.4	17.5	10.5	Not required
	P19_F9	37.0	17.5	10.5	Not required
Ninth Floor / Block B	P29_F9	37.2	17.5	10.5	Not required
	P30_F9	37.1	17.5	10.5	Not required
	P31_F9	37.1	17.5	10.5	Not required
	P32_F9	37.1	17.5	10.5	Not required
	P33_F9	37.2	17.5	10.5	Not required
	P34_F9	37.2	17.5	10.5	Not required
	P35_F9	37.1	17.5	10.5	Not required
Tenth Floor / Block A6	P1_F10	37.4	17.5	10.4	Not required
	P2_F10	37.3	17.5	10.4	Not required
	P3_F10	37.6	17.5	10.4	Not required
	P4_F10	37.6	17.5	10.4	Not required
	P5_F10	37.6	17.5	10.4	Not required
Tenth Floor / Block A3	P17_F10	37.0	17.5	10.4	Not required
	P18_F10	37.1	17.5	10.5	Not required
	P19_F10	37.0	17.5	10.4	Not required
Eleventh Floor / Block A6	P1_F11	37.7	17.5	10.4	Not required
	P2_F11	37.3	17.5	10.4	Not required
	P3_F11	37.5	17.5	10.4	Not required
	P4_F11	37.6	17.5	10.4	Not required
	P5_F11	37.5	17.5	10.4	Not required
Eleventh Floor / Block A3	P17_F11	36.9	17.5	10.4	Not required
	P18_F11	36.9	17.5	10.4	Not required
	P19_F11	36.9	17.5	10.4	Not required
Twelfth Floor / Block A3	P17_F12	36.8	17.4	10.4	Not required
	P18_F12	36.8	17.4	10.4	Not required
	P19_F12	36.8	17.4	10.4	Not required
Twelfth Floor /	P17_F13	36.8	17.4	10.4	Not required
	P18_F13	36.7	17.4	10.4	Not required

Level / Block	Receptor	Annual Mean Concentrations (µg/m^3) [a]			Mitigation
		NO_2	PM_{10}	$PM_{2.5}$	
Block A3	P19_F13	36.8	17.4	10.4	Not required
Objective		40	40	25	-

[a] A colour-code has been adopted, with values highlighted in **green** below the national air quality objective, and values highlighted in **orange** are above the objective.

4 Conclusions

4.1 An air quality impact assessment was prepared by AQC in July 2018 to accord with the updated Energy Efficiency Plan and to support the discharge of Condition 17. Camden's Planner and Sustainability Officer have requested that a worst-case approach should be taken assuming no future improvements in air quality, and that the 2018 background pollutant concentrations measured at the London Bloomsbury automatic monitor should be used in the assessment. This Note provides an update to the air quality predictions at the Consented Scheme's site based on the aforementioned approach, in order to inform the measures implemented on site to minimise the exposure of future occupiers to air pollution.

4.2 Results show that annual mean PM_{10} and $PM_{2.5}$ concentrations will be below the objectives at all receptors. Annual mean nitrogen dioxide concentrations are predicted to be below the objective at most receptor locations, with the exception of some receptor locations within Blocks A3 to A6 and Block C, up to the third and fourth floor levels respectively. Based on these results, mitigation will be required for the apartments identified on Figure 2 to Figure 10.

4.3 It has been confirmed that all properties within the Consented Development will be ventilated mechanically, through the use of individual Mechanical Heat Recovery Ventilation units (MHRV). It will also be possible to ventilate future properties naturally, through openable windows. In addition to this, it is proposed to install NOx filtration on the flats identified on Figure 2 to Figure 10, the specifications of which are presented in Appendix A2. Such filters are considered appropriate to ensure future residents are exposed to acceptable annual mean nitrogen dioxide concentrations, with a claimed 96 to 99.5% reduction in NO_x concentrations. With this mitigation in place, as well as the full suite of measures included within the Air Quality Strategy report, exposure of all residents within the Consented Scheme to air pollution will be minimised.

5 References

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6 Appendices

A1 Modelling Methodology

Model Inputs

Road Traffic

A1.1 Predictions have been carried out using the ADMS-Roads dispersion model (v4.1). The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width, street canyon width, street canyon height and porosity, where applicable). Vehicle emissions have been calculated based on vehicle flow, composition and speed data using the EFT (Version 9.0) published by Defra (Defra, 2019).

A1.2 Hourly sequential meteorological data from London City airport for 2018 have been used in the model. The London City airport meteorological monitoring station is located approximately 11 km to the east of the consented development site. It is deemed to be the nearest monitoring station representative of meteorological conditions in the vicinity of the Consented Development site; both the development site and the London City airport meteorological monitoring station are located in the Greater London area where they will be influenced by the effects of inland meteorology over urban topography.

A1.3 For the purposes of modelling, it has been assumed that most modelled roads form street canyons. These roads have a number of canyon-like features, which reduce dispersion of traffic emissions, and can lead to concentrations of pollutants being higher here than they would be in areas with greater dispersion. Most roads have, therefore, been modelled as street canyons using ADMS-Roads' advanced canyon module, with appropriate input parameters determined from plans and local mapping.

A1.4 AADT flows, speeds, and vehicle fleet composition data have been provided by Sweco, who have undertaken the transport assessment work for the consented development. These have been derived from weekday counts, which may over-predict annual average flows. In addition, traffic data for the Grays Inn Road have been taken from the London Atmospheric Emissions Inventory (LAEI) (GLA, 2016). Traffic speeds have been based on those provided by Sweco, with some having been adjusted based on professional judgement, taking account of the road layout, speed limits and the proximity to a junction. The traffic data used in this assessment are summarised in Table A1.1. Diurnal flow profiles for the traffic have been derived from the national diurnal profiles published by DfT (2019b).

Table A1.1: Summary of Traffic Data used in the Assessment

Road Link	2018		2020 (Without Scheme)		2020 (With Scheme)	
	AADT	%HDV	AADT	%HDV	AADT	%HDV
Calthorpe Street	5,370	4.3	5,561	4.5	5,581	4.6
Coley Street	885	4.0	885	4.0	886	4.0
Farringdon Road	16,926	6.1	16,965	6.2	16,968	6.2
Mount Pleasant	1,880	2.9	1,926	2.9	1,970	3.0
Phoenix Place	2,539	4.3	2,774	4.0	2,831	4.0
Rosebery Avenue	10,868	6.8	10,911	6.8	10,950	6.8
Gough Street	325	5.2	658	2.6	762	2.2
Grays Inn Road	13,000	9.2	13,018	9.2	13,018	9.2

A1.5 The LAEI traffic data include flows for electric vehicles, which generate no tailpipe emissions, but will generate some particulate matter through brake and tyre wear and resuspension. The EFT's default inputs do not allow for electric vehicles to be entered separately, thus they have not been included when calculating emissions. While this may mean that some brake and tyre wear and resuspension may be missed, this is unlikely to have significantly affected the predicted concentrations and will not have affected the conclusions of the assessment. This is because electric vehicle flows are extremely low in comparison to those of other vehicles.

A1.6 Figure A1.1 shows the road network included within the model, along with the speed at which each link was modelled, and defines the study area.

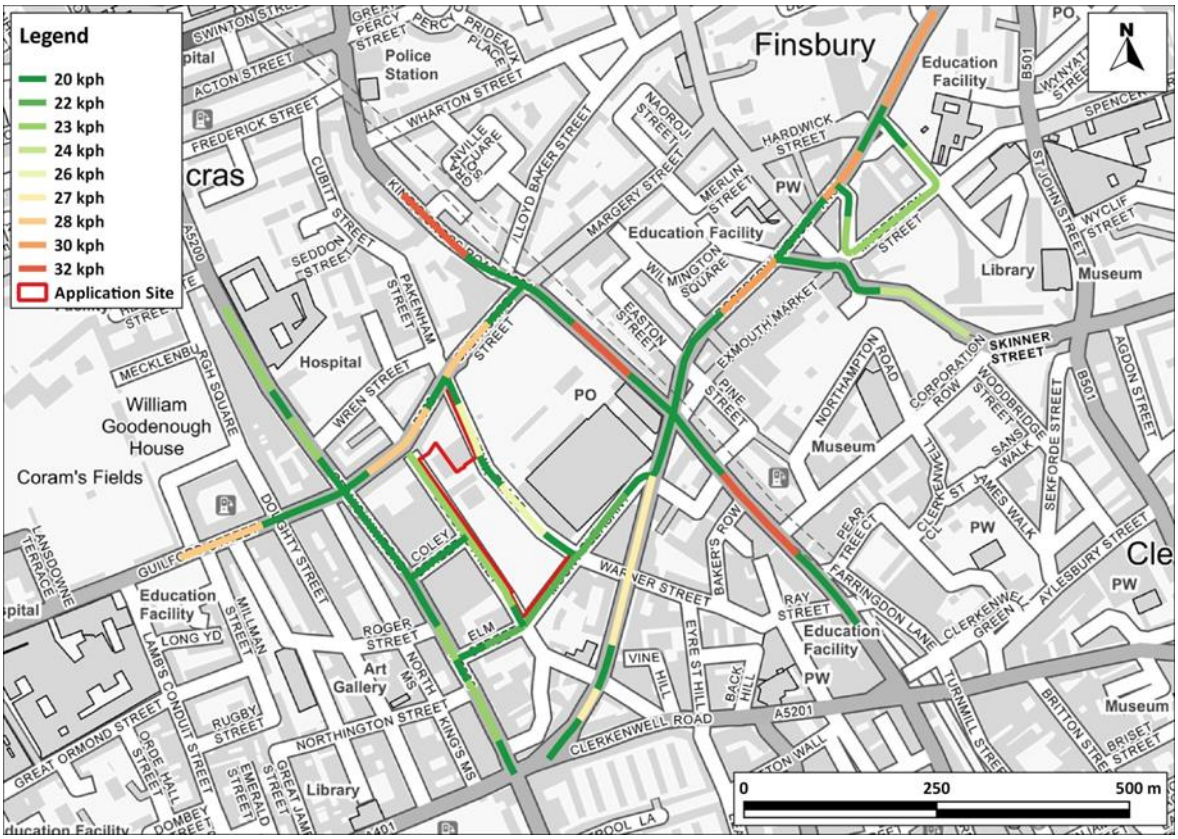


Figure A1.1: Modelled Road Network & Speed

Point Sources

A1.7 The impacts of emissions from the proposed energy plant have been predicted using the ADMS-5 dispersion model. ADMS-5 is a new generation model that incorporates a state-of-the-art understanding of the dispersion processes within the atmospheric boundary layer. The model has been run to predict the contribution of the proposed CHP and boilers emissions to annual mean concentrations of nitrogen oxides and the 99.79th percentile of 1-hour mean nitrogen oxides concentrations.

A1.8 The gas-fired CHP plant that will be installed into the development will have a net fuel input of 694 kWth. The CHP plant will conform to the Sustainable Design and Construction SPG (GLA, 2014) requiring NOx emissions to be <95 mg/Nm^3 at 5% O_2 , with a NOx emission rate of 50 mg/Nm^3. Emissions will rise to roof level in a dedicated flue. A fan assisted flue may be required to aid this. The CHP unit will operate for 80% of the year (80% of the maximum annual load), with the modelling assuming that it is at full load when operational. The exhaust volume flow rate for the natural gas-fired plant has been calculated based on the complete combustion of the assumed natural gas composition in Table A1.2 and the following typical values for CHP units of this size:

- 100% load; and
- 120 ˚C exit temperature from the plant.

Table A1.2: Typical Gas Fuel Composition

Component	Natural Gas
Methane	90.76%
Ethane	4.64%
Propane	1.22%
Carbon Monoxide	-
Hydrogen	-
Carbon Dioxide	1.07%
Nitrogen	2.32%
Net Calorific Value (LHV) (MJ/kg)	46.5
Gross Calorific Value (HHV) (MJ/kg)	51.5
HHV/LHV	1.11
Molecular Mass (g/mol)	17.61

A1.9 The gas-fired boiler plant that will be installed into the development will have net fuel inputs of 1485.8 kWth (calculated gross input of 1,645.6 kWth) and 990.6 kWth (calculated gross input of 1,079.1 kWth). The boiler plant will conform to the Sustainable Design and Construction SPG (GLA, 2014) requiring NOx emissions to be <40 mg/kWh , with NOx emission rates of 38.8 mg/kWh. Emissions will rise to roof level in two flues (one flue for 2 boilers). A fan assisted flue may be required to aid this. The boiler plant will operate for 35% of the year (60% of the time in winter months, and 10% of the time in summer months, or 35% of the maximum annual load), with the modelling assuming that it is at full load when operational. The exhaust volume flow rate for the natural-gas fired plant has been calculated based on the complete combustion of the assumed natural gas composition in Table A1.2 and the following typical values for boilers of this size:

- 100% load;
- 82 ˚C exit temperature;
- 36.7% excess air in (set so that the calculated exhaust gas volume flows matched that on the technical datasheets for the plant); and
- Condensing plant removing 50% of the water from the exhaust.

Table A1.3: Plant Specifications and Modelled Emissions and Release Conditions

Parameter	Value
CHP (Based on Hoval EG240/260)	
Specified Flue Internal Diameter (m)	0.225
Calculated Actual Exhaust Volume Flow (m^3/s) [a]	0.29664
Calculated Exit Velocity (m/s)	7.46
Modelled NOx Emission Rate (mg/Nm^3) [b]	50
Calculated NOx Emission Rate (g/s)	0.01093
Specified Exhaust Temperature (°C)	120
Flue Location (x,y)	530988, 182255
Modelled Flue Height (m)	48.64 (1m above roof)
Gas Boilers (2 x Wessex Modumax mk3 254/762V)	
Specified Flue Internal Diameter (m)	0.5
Calculated Actual Exhaust Volume Flow (m^3/s) [a]	0.70784
Calculated Exit Velocity (m/s)	3.60
Modelled NOx Emission Rate (mg/kWh)	38.8
Calculated Gross Fuel Input (kW)	1,645.6
Calculated NOx Emission Rate (g/s)	0.01774
Specified Exhaust Temperature (°C)	82
Flue Location (x,y)	530989, 182255
Modelled Flue Height (m)	48.64 (1m above roof)
Gas Boilers (2 x Wessex Modumax mk3 254/506V)	
Specified Flue Internal Diameter (m)	0.5
Calculated Actual Exhaust Volume Flow (m^3/s) [a]	0.47193
Calculated Exit Velocity (m/s)	2.40
Modelled NOx Emission Rate (mg/kWh)	38.8
Calculated Gross Fuel Input (kW)	1,097.1
Calculated NOx Emission Rate (g/s)	0.01182
Specified Exhaust Temperature (°C)	82
Flue Location (x,y)	530990, 182256
Modelled Flue Height (m)	48.64 (1m above roof)

[a] Not normalised.

[b] 'Normal' here refers to 5% O_2, 0˚C, 101.325 kPa and 0% H_2O. An emission rate of 95 mg/Nm3 at 5% O_2 equates to 125 mg/Nm^3 at 0% O_2.

A1.10 The restrictions set out in Table A1.4 should be adhered in order to ensure that the final plant design does not lead to impacts greater than those modelled. To further emphasise these, the final design should adhere to the following minimum specifications:

Table A1.4: Energy Plant Specifications

Parameter	Value	Restriction
CHP		
Gross Peak Fuel Input (kW)	768.6	Max
Hours of Use per Annum	7,008	Max
Annual Fuel Input (kWh/annum)	5,386,619	Max
Exhaust Temperature (°C)	120	Min
Flue Internal Diameter (m)	0.225	Max
Efflux Velocity (m/s)	7.46	Min
NOx Emission Rate (mg/Nm^3) [a]	50	Max
Boilers (2 x Wessex Modumax mk3 254/762V)		
Gross Peak Fuel Input (kW)	1,645.6	Max
Hours of Use per Annum	3,066	Max
Annual Fuel Input (kWh/annum)	5,045,395	Max
Exhaust Temperature (°C)	82	Min
Flue Internal Diameter (m)	0.5	Max
Efflux Velocity (m/s)	3.6	Min
NOx Emission Rate (mg/kWh)	38.8	Max
Condensing	Yes	-
Boilers (2 x Wessex Modumax mk3 254/506V)		
Gross Peak Fuel Input (kW)	1,097.1	Max
Hours of Use per Annum	3,066	Max
Annual Fuel Input (kWh/annum)	3,363,823	Max
Exhaust Temperature (°C)	82	Min
Flue Internal Diameter (m)	0.5	Max
Efflux Velocity (m/s)	2.40	Min
NOx Emission Rate (mg/kWh)	38.8	Max
Condensing	Yes	-

A1.11 Entrainment of the plume into the wake of the buildings (the so-called building downwash effect) has been taken into account in the model. The building dimensions and flue location have been obtained from drawings provided by Broadway Malyan. The locations of the flues are shown in Figure A1.2 along with the modelled buildings and their heights. The flues have been modelled at a height of 48.64 m (1 m above the roof level).

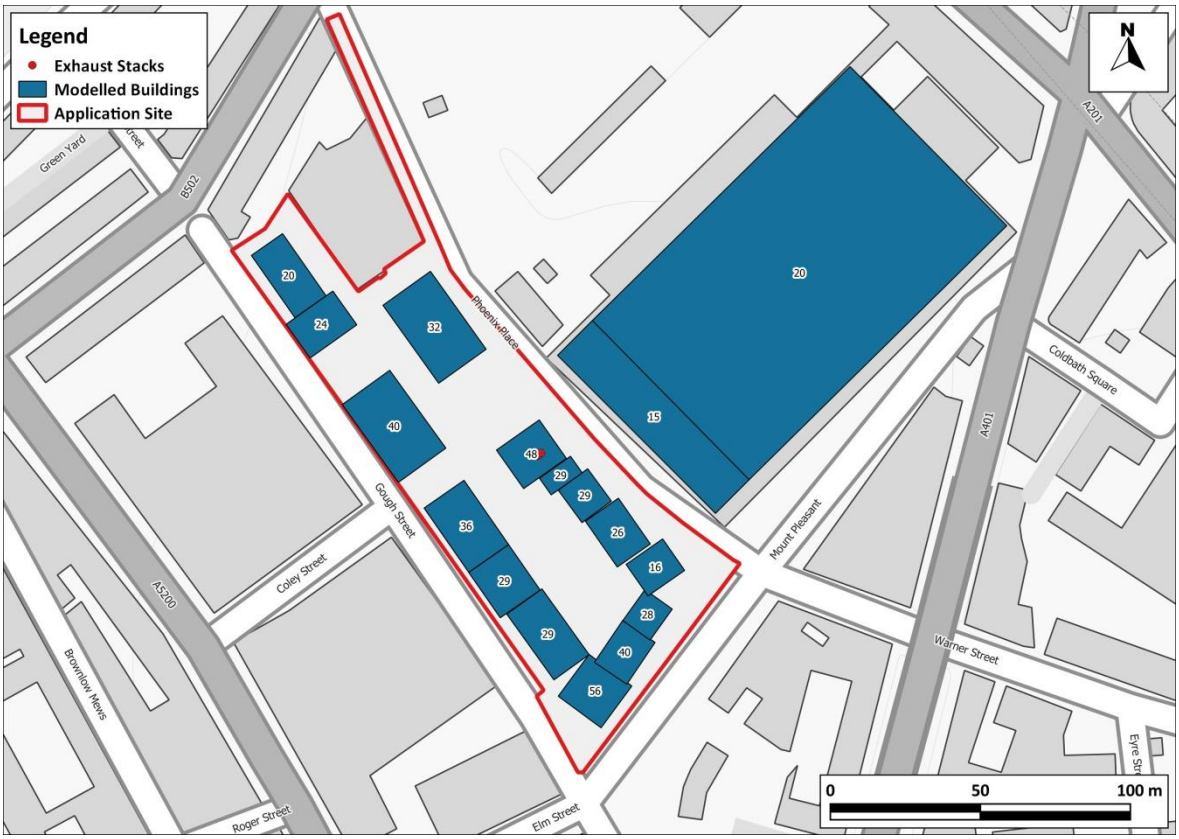


Figure A1.2: Flue Location & Modelled Buildings (with heights, in m)

A1.12 Hourly sequential meteorological data from London City Airport for 2016 have been used in the model.

Background Concentrations

A1.13 The background pollutant concentrations measured in 2018 at London Bloomsbury automatic monitor have been used in this assessment, across the study area. 2018 values were used in the 2020 predictions presented in this Note.

Model Verification

A1.14 In order to ensure that ADMS-Roads accurately predicts local concentrations, it is necessary to verify the model against local measurements. It is not practical, nor usual, to verify the ADMS-5 model, and, because ADMS-5 does not rely on estimated road-vehicle emission factors, the adjustment used for ADMS-Roads cannot be applied to ADMS-5. Predictions made using ADMS-5 have thus not been verified.

Traffic Data

A1.15 AADT flows, and the proportions of HDVs, for the roads adjacent to the monitoring site, have been taken from the London Atmospheric Emissions Inventory (LAEI) (GLA, 2016).

Table A1.5: 2018 AADT Traffic Data used in the Model Verification

Road Link	AADT	%HDV
Rosebery Avenue	9,083	18.7
Tysoe Road	1,371	5.9
Rosoman Street	7,303	2.6
Myddelton Street	5,629	7.6

Nitrogen Dioxide

A1.16 Most nitrogen dioxide (NO_2) is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides (NOx = NO + NO_2). The model has been run to predict the annual mean NOx concentrations during 2018 at the Rosebery Avenue diffusion tube monitoring site operated by the London Borough of Islington. Concentrations have been modelled at 2.5 m, the height of the monitor.

A1.17 The model output of road-NOx (i.e. the component of total NOx coming from road traffic) has been compared with the 'measured' road-NOx. Measured road-NOx has been calculated from the measured NO_2 concentration and the predicted background NO_2 concentration using the NOx from NO_2 calculator (Version 7.1) available on the Defra LAQM Support website (Defra, 2019).

A1.18 An adjustment factor has been determined as the ratio of the 'measured' road contribution and the model derived road contribution. This factor has then been applied to the modelled road-NOx concentration for each receptor to provide adjusted modelled road-NOx concentrations. The total nitrogen dioxide concentrations have then been determined by combining the adjusted modelled road-NOx concentrations with the predicted background NO_2 concentration within the NOx to NO_2 calculator (Defra, 2019).

- The data used to calculate the adjustment factor are provided below:
- Measured NO_2 : 51.0 µg/m^3
- Background NO_2 : 36.4 µg/m^3
- 'Measured' road-NOx (using NOx from NO_2 calculator): 36.8 µg/m^3
- Modelled road-NOx = 17.6µg/m^3

- Road-NOx adjustment factor: 36.8/17.6 = **2.0889**[2]

A1.19 The factor implies that the unadjusted model is under-predicting the road-NOx contribution. This is a common experience with this and most other road traffic emissions dispersion models.

PM_{10} and $PM_{2.5}$

A1.20 There are no nearby PM_{10} or $PM_{2.5}$ monitors. It has therefore not been possible to verify the model for PM_{10} or $PM_{2.5}$. The model outputs of road-PM_{10} and road-$PM_{2.5}$ have therefore been adjusted by applying the adjustment factor calculated for road NOx.

Model Post-processing

Road Traffic

A1.21 The model predicts road-NOx concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background NO_2, has been processed through the NOx to NO_2 calculator available on the Defra LAQM Support website (Defra, 2019). The traffic mix within the calculator has been set to "All London traffic", which is considered suitable for the study area. The calculator predicts the component of NO_2 based on the adjusted road-NOx and the background NO_2.

Point Sources

A1.22 Emissions from the energy plant will be predominantly in the form of nitrogen oxides (NOx). ADMS-5 has been run to predict the contribution of the proposed energy plant emissions to annual mean concentrations of nitrogen oxides and to the 99.79th percentile of 1-hour mean nitrogen oxides concentrations. The approach recommended by the Environment Agency (Environment Agency, 2005) has been used to predict nitrogen dioxide concentrations, assuming that:

- annual mean NO_2 concentration = annual mean NOx concentration multiplied by 0.7; and
- 99.79th percentile of 1-hour mean NO_2 concentrations = 99.79th percentile of 1-hour mean NOx concentrations multiplied by 0.35.

[2] Based on un-rounded values.

A2 Specifications of NOx filtration

Appendix 3: NOx filters for Private Sale Apartments

Q-Aire
IAQ-BOX

With concerns over rising air pollution, Indoor Air Quality (IAQ) has quickly become a serious subject for the building industry. As such an Air Quality report must now be produced at planning stage making this issue one that cannot be ignored.

Nuaire's IAQ-BOX range offers solutions for urban areas where air pollutants such as NO2, Carbon Dioxide and other dangerous Particulate Matter need to be filtered before outdoor air enter the property. These specifiable products will refine traditional filtration and ensure that Air Quality planning obligations are met.

Features & Benefits

- 99.5% NO2 filtration- Highest on the market
- Lowest resistance, meaning MVHR systems are not affected
- Low profile design for flexible installation
- Unique single cell carbon filter
- Innovative Double size unit with multi-spigot option
- Choice of pre-filters for increased Particulate Matter filtration

Coming Soon!

The IAQ-V125 is Nuaire's unique carbon filter supply valve

IAQBOX-S

IAQBOX-D

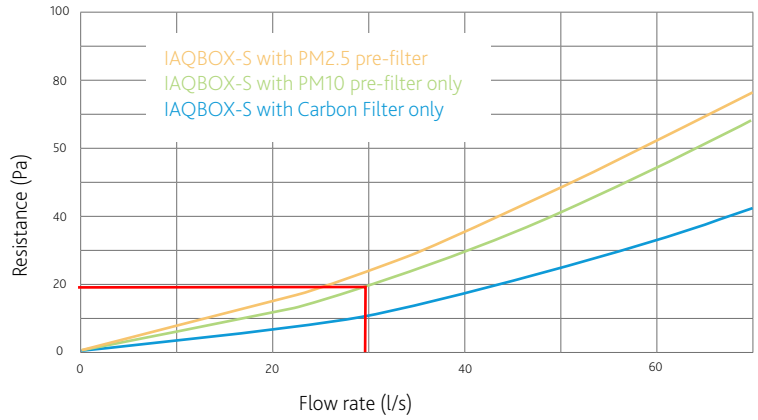
IAQBOX-S

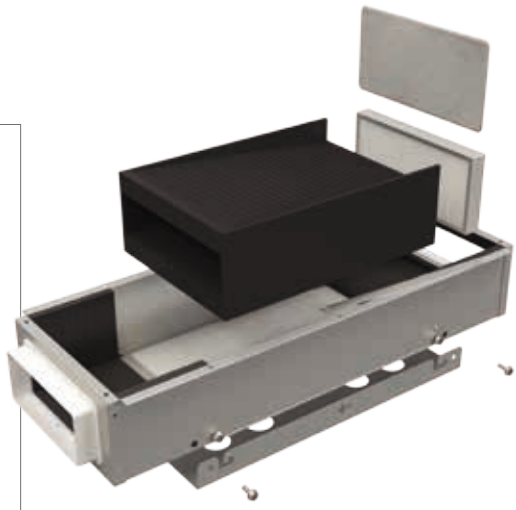
The IAQBOX-S offers a unique approach in carbon filtration by using a single cell carbon filter to refine polluted outdoor air that MVHR systems bring in to properties.

There is a choice of PM2.5 or PM10 pre-filters to further enhance the filtration of polluted, outdoor air when it enters the property. To specify the IAQBOX-S with fitted pre-filters please choose from the following codes.

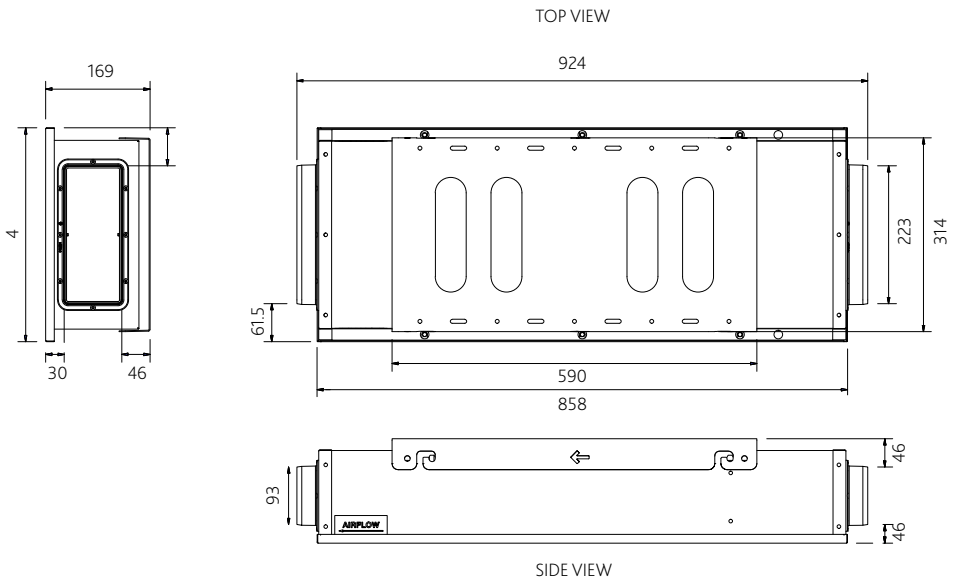
	IAQBOX-S	IAQBOX-S-PM10	IAQBOX-S-PM2.5
NO PRE-FILTER			
PM10 PRE-FILTER			
PM2.5 PRE-FILTER			

Air Resistance Test





DIMENSIONS (mm) for IAQBOX-S unit

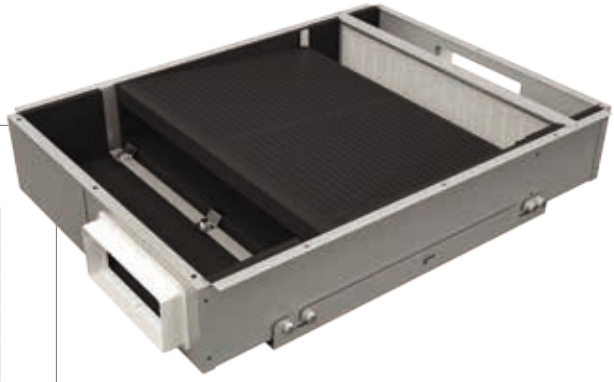


IAQBOX-D

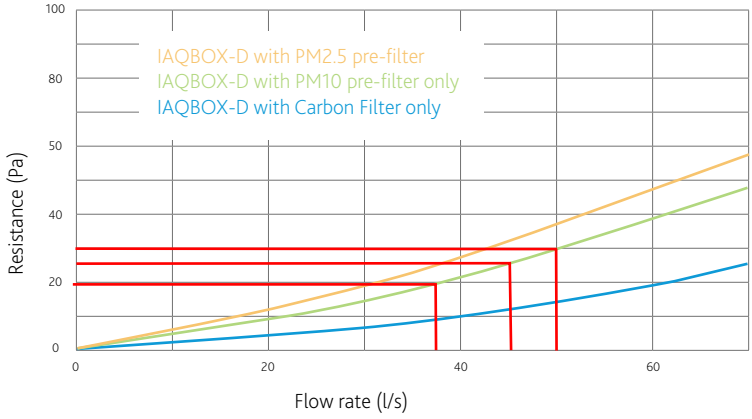
The IAQBOX-D is Nuaire's unique offering, showcasing a Double size unit which allows a larger volume of air flow to pass through the carbon filter resulting in some of the lowest resistances on the market. This unit also comes with the option of 2 outlet spigots, further reducing system pressure and resistance by decreasing the number of duct runs needed to feed to all supply rooms.

There is a choice of PM2.5 or PM10 pre-filters to further enhance the filtration of polluted, outdoor air when it enters the property. To specify this unique carbon filter with fitted pre-filters please choose from the following codes.

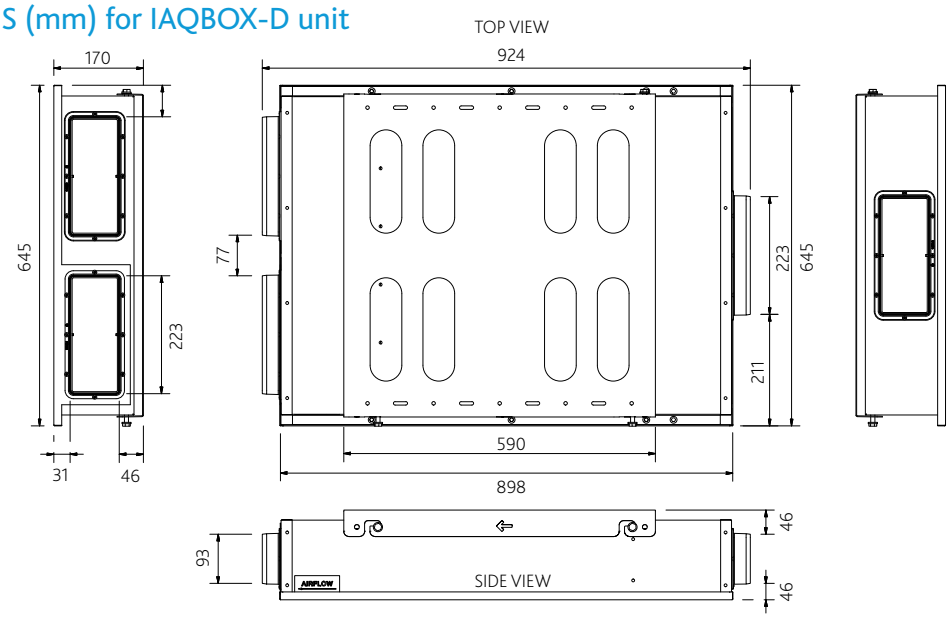
	IAQBOX-D	IAQBOX-D-PM10	IAQBOX-D-PM2.5
NO PRE-FILTER			
PM10 PRE-FILTER			
PM2.5 PRE-FILTER			



Air Resistance Test



DIMENSIONS (mm) for IAQBOX-D unit



Consultants Specification

UNIT SPECIFICATION

The IAQBOX-S and IAQBOX-D (plus pre-filter variant codes) comprise the Q-Aire IAQBOX range and shall be manufactured in galvanised sheet metal, with an integral foam lining to reduce noise & provide internal sealing. Each inline filter shall have the ability to have an optional PM10 or PM2.5 pre-filter inserted into the filter box to be capable of additional particulate filtration; particularly from diesel vehicle fumes.

The IAQBOX shall come complete with a removable mounting bracket.

The double size IAQBOX-D range of units have the option to be configured using a single or double spigot on the outlet. Double spigot on the outlet shall provide lower air resistance and further ducting options.

The IAQBOX shall come complete with a single of plastic construction, containing two 30mm (approx.) beds of activated carbon pellets providing a large surface to filter the airflow. The filters shall be easily removed and replaced when required. The filter shall have a minimum efficiency of between 96% and 99.5% effectiveness in the removal of Nitrogen Oxides/Dioxides.

The unit efficiency shall be confirmed and independently verified by a BRE (Building Research Establishment) test method and the information shall be provided by the filter manufacturer for approval.

The activated carbon shall have at least the following minimum qualities:

Bulk density	kg/m^3	480 (+/-5%)
Nominal diameter of cylindrical pellets	mm	4.0
Nominal length of cylindrical pellets	mm	8.0
Moisture content (approx.)	%	3
Crush strength (minimum)	kg	2
Removal capacity for Cl_2 of own weight	%	10
Minimum design efficiency	%	99.5
Typical air velocity	m/s	0.3 - 2.5
Suitable for relative air humidities	%	10 - 95
Temperature range	°C	-20 - +51

The unit shall be suitable for 220x90mm ducting.

The unit shall be installed in conjunction with the manufacturer's installation and maintenance guidelines.

The unit shall be offered with a 5 year warranty; 1 year parts and labour, remaining years parts only. This warranty is void if the equipment is modified without authorisation, is incorrectly applied, misused, disassembled or not installed, commissioned and maintained in accordance with the details contained in the I&M manual and general good practice.