
# WARREN COURT
# EUSTON ROAD
# LONDON. NW1 3AA

## APPENDIX 06: AIR QUALITY ASSESSMENT REPORT

**By**

**A Q Consultants**

**to be read**

**in conjunction with**

## DESIGN & ACCESS STATEMENT

for submission to the London Borough of Camden to accompany an application for the demolition of one residential unit (Class C3) at 6th floor level and the construction of two new residential units (Class C3) at 6th and 7th floor levels.

Prepared by Moxley Architects
for
Warren Court Investments LLP.

September 2016

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## 8.0 APPENDICES:

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| APPENDIX 06: | AIR QUALITY ASSESSMENT | A Q CONSULTANTS |

# Air Quality Assessment:
## Warren Court, Camden

March 2016

Experts in air quality
management & assessment



## Document Control

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# 1 Introduction

1.1 This report describes the potential air quality impacts associated with the proposed replacement of the existing 6th floor apartment within Warren Court, 293 Euston Road, NW1 with two new residential storeys, each containing one apartment. The assessment has been carried out by Air Quality Consultants Ltd on behalf of Warren Court LLP.

1.2 The approach to the assessment has been discussed with Camden Council[1] and it has been agreed that a 'basic assessment' as described on the Camden Council website[2] would be appropriate.

1.3 The assessment focuses on the impact of local air quality upon occupants of the new apartments. It also considers best practice measures to minimise dust emissions during the construction phase.

1.4 No car parking or centralised energy plant are proposed as part of the development and thus impacts of the development upon local air quality during operation are not considered further.

1.5 The likely air quality impacts are described in the following sections.

1 Email correspondence between Penny Wilson (Air Quality Consultants Ltd) and Adam Webber (Camden Council) on 17th February 2016.

2 https://www.camden.gov.uk/ccm/content/environment/planning-and-built-environment/two/planning-applications/making-an-application/supporting-documentation/air-quality-assessment.en





Warren Court, Camden Air Quality Assessment

# 2 Assessment Criteria

2.1 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations, 2000, Statutory Instrument 928 (2000) and the Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043 (2002).

2.2 The objectives for nitrogen dioxide and $PM_{10}$ were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The $PM_{2.5}$ objective is to be achieved by 2020. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded where the annual mean concentration is below 60 $\mu g/m^3$ (Defra, 2009). Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level. Measurements have also shown that the 24-hour $PM_{10}$ objective could be exceeded where the annual mean concentration is above 32 $\mu g/m^3$ (Defra, 2009). The predicted annual mean $PM_{10}$ concentrations are thus used as a proxy to determine the likelihood of an exceedence of the 24-hour mean $PM_{10}$ objective. Where predicted annual mean concentrations are below 32 $\mu g/m^3$ it is unlikely that the 24-hour mean objective will be exceeded.

2.3 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2009). The annual mean objectives for nitrogen dioxide and $PM_{10}$ are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour objective for $PM_{10}$ is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

2.4 The European Union has also set limit values for nitrogen dioxide, $PM_{10}$ and $PM_{2.5}$. The limit values for nitrogen dioxide are the same numerical concentrations as the UK objectives, but achievement of these values is a national obligation rather than a local one (Directive 2008/50/EC of the European Parliament and of the Council, 2008). In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded.



 

2.5 The relevant air quality criteria for this assessment are provided in Table 1.

**Table 1: Air Quality Criteria for Nitrogen Dioxide, $PM_{10}$ and $PM_{2.5}$**

| Pollutant | Time Period | Objective |
|---|---|---|
| **Nitrogen Dioxide** | 1-hour Mean | 200 µg/m$^3$ not to be exceeded more than 18 times a year |
| | Annual Mean | 40 µg/m$^3$ |
| **Fine Particles ($PM_{10}$)** | 24-hour Mean | 50 µg/m$^3$ not to be exceeded more than 35 times a year |
| | Annual Mean | 40 µg/m$^3$ [a] |
| **Fine Particles ($PM_{2.5}$) [b]** | Annual Mean | 25 µg/m$^3$ |

[a] A proxy value of 32 µg/m$^3$ as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean $PM_{10}$ objective being exceeded. Measurements have shown that, above this concentration, exceedences of the 24-hour mean $PM_{10}$ objective are possible (Defra, 2009).

[b] The $PM_{2.5}$ objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.





# 3 Description of Development and Baseline Conditions

## Proposed Development

3.1 The development site is located at 293 Euston Road, as shown in Figure 1. The site is located above Warren Court tube station, adjacent to Euston Road, Tottenham Court Road and Warren Street.

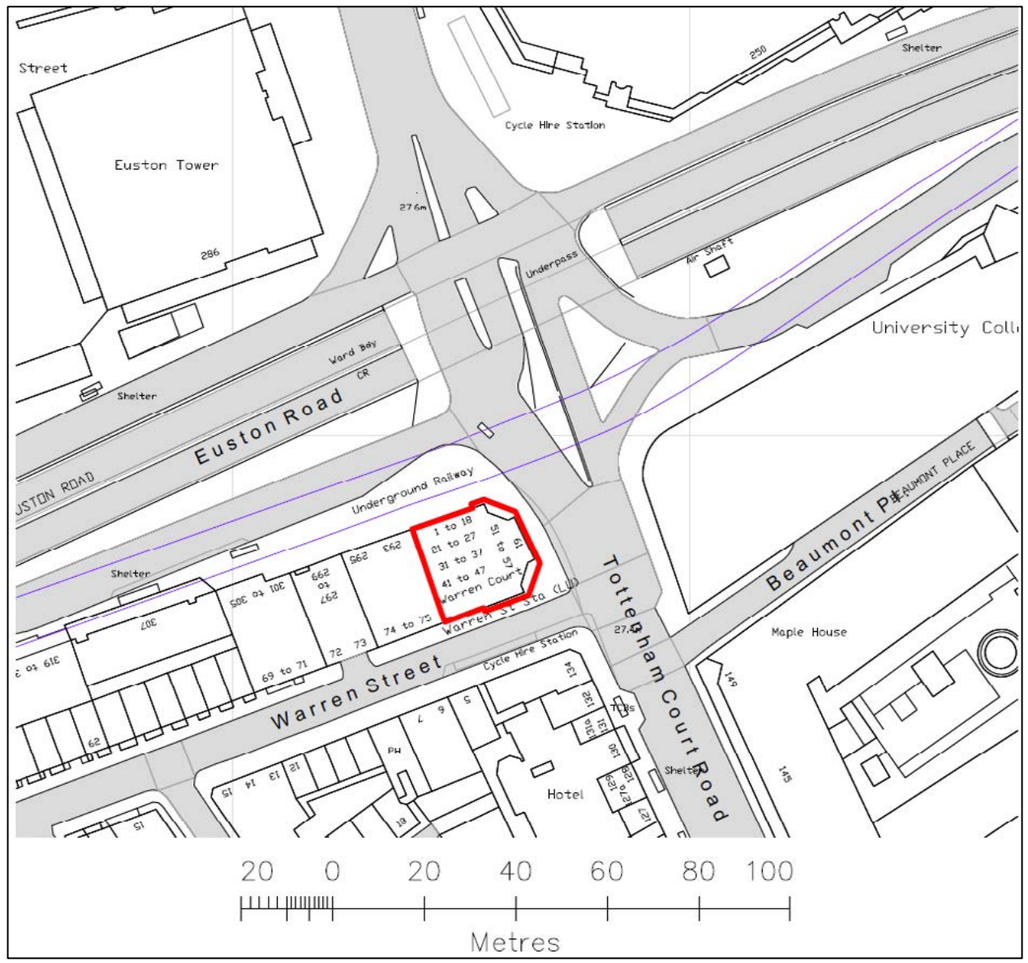


**Figure 1: Site Location**

Reproduced from drawing 706-1.001 prepared by Mosley Architects, January 2016.


**Figure 2: Proposed South Elevation (Warren Street)**

Reproduced from drawing 706-4.003 prepared by Mosley Architects, December 2015.

3.2 The proposals for the 6th and 7th floor are shown in Figure 2. They include demolition of the existing 6th floor apartment and replacement with two new storeys, each containing 1 residential apartment.

## Baseline Air Quality

3.3 Measured annual mean nitrogen dioxide concentrations at a number of sites in the area are presented in Table 2. These show that at kerbside/roadside sites alongside Euston Road and Tottenham Court Road, the annual mean nitrogen dioxide objective is being exceeded by a substantial margin. Much lower concentrations have been measured at the 'background' monitoring sites, with the objective being achieved at the Wakefield Gardens monitoring site in 2014. The objective was, however, exceeded at the Bloomsbury and Tavistock Gardens background sites. It should be noted that at all of the sites, the monitors are located only 2-3m above ground-level.

3.4 The results of $PM_{10}$ monitoring, presented in Table 3, indicate that in 2013 and 2014 the annual mean and 24-hour objectives were achieved even at the Marylebone Road monitoring site, which measures some of the highest concentrations in the UK. At the Bloomsbury background monitoring site, concentrations are well below the objectives.







**Table 2: Summary of Nitrogen Dioxide ($NO_2$) Monitoring (2009 – 2014) [a]**

| Site No.[b] | Site Type | Location | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|
| **Automatic Monitors - Annual Mean (µg/m$^3$) [c]** | | | | | | | | |
| **LB** | Urban Background | London Bloomsbury | **54** | **55** | **50** | **55** | **51** | **45** |
| **CD9** | Roadside | Euston Road | **-** | **-** | **122** | **106** | n/a | **98** |
| **Objective** | | | **40** | | | | | |
| **Automatic Monitors - No. of Hours > 200 µg/m$^3$ [c]** | | | | | | | | |
| **LB** | Urban Background | London Bloomsbury | 2 | 1 | 0 | 1 | 0 | 0 |
| **CD9** | Roadside | Euston Road | - | - | **712** | **293** | **398** | **170** |
| **Objective** | | | **40** | | | | | |
| **Diffusion Tubes - Annual Mean (µg/m$^3$) [d]** | | | | | | | | |
| **CA6** | Urban Background | Wakefield Gardens | 39.4 | 34 | 45.6 | 39.3 | **40.3** | 38.3 |
| **CA10** | Urban Background | Tavistock Gardens | **50.1** | **52** | **47.6** | **40.1** | **49.4** | **48.9** |
| **CA11** | Kerbside | Tottenham Court Road | **107.7** | **92** | **91.7** | **83.3** | **88.1** | **91.2** |
| **Objective** | | | **40** | | | | | |

[a] Exceedences of the objectives are shown in bold

[b] The Site No. is a site identification code used by Camden Council.

[c] Data downloaded from the London Air website (King's College London, 2016).

[d] Data have been taken from the 2013 Progress Report (London Borough of Camden, 2013). 2014 diffusion tube data has been provided by Camden Council.

**Table 3: Summary of $PM_{10}$ Automatic Monitoring (2009 – 2014) [a]**

| Site No. [b] | Site Type | Location | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|
| **$PM_{10}$ Annual Mean (µg/m$^3$) [c]** | | | | | | | | |
| **LB** | Urban Background | London Bloomsbury | 23 | n/a | 23 | 19 | 18 | 19 |
| **-** | Kerbside | Marylebone Road (Westminster) TEOM | 36 | 35 | **41** | 38 | 33 | 35 |
| **-** | | Marylebone Road (Westminster) FDMS | 37 | 32 | 38 | n/a | 29 | 31 |
| **Objective** | | | **40** | | | | | |
| **$PM_{10}$ No. Days >50 µg/m$^3$ [c]** | | | | | | | | |
| **LB** | Urban Background | London Bloomsbury | 13 | n/a | 17 | 10 | 3 | 10 |
| **-** | Kerbside | Marylebone Road (Westminster) TEOM | **36** | **40** | **73** | **48** | 29 | 21 |
| **-** | | Marylebone Road (Westminster) FDMS | **43** | 23 | **57** | n/a | 21 | 17 |
| **Objective** | | | **35** | | | | | |

[a] Exceedences of the objectives are shown in bold

[b] The Site No. is a site identification code used by Camden Council.

[c] Data downloaded from the London Air website (King's College London, 2016).

3.5 Estimated ground-level background concentrations at the development site are presented in Table 4. They are broadly similar to measured concentrations in the area. The results indicate that the $PM_{10}$ and $PM_{2.5}$ objectives are being achieved at the development site. The background annual mean nitrogen dioxide concentration is currently slightly above the objective. There is a risk that concentrations may remain marginally above the objective in 2018. However, concentrations are expected to reduce in future years and, beyond 2018, the objective is expected to be achieved.

3.6 It should be noted that Defra has prepared a revised Action Plan with the aim of achieving the EU limit values (Defra, 2015). It anticipates that with the plan in place, annual mean nitrogen dioxide concentrations alongside Euston Road in 2020 will be substantially lower than in 2014. The measures in the revised plan are not taken into account in the estimated background concentrations shown in Table 4, and thus it is reasonable to assume that concentrations in the future will reduce more quickly than indicated here.





**Table 4: Background Pollutant Concentrations (µg/m$^3$) [a]**

| | $NO_2$ | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|---|
| **2016** | **42.4** | 24.6 | 16.6 |
| **2018 [b]** | 39.0 | 24.2 | 16.1 |
| **2018 – Sensitivity Test [c]** | **40.1** | n/a | n/a |
| **Objectives** | **40** | **40** | **25 [d]** |

n/a = not applicable. Exceedences of the objectives shown in bold.

[a] Derived from Defra mapped background concentrations using the method described by AQC (Air Quality Consultants , 2016)

[b] In line with Defra's forecasts

[c] Assuming higher emissions from modern diesel vehicles.

[d] The $PM_{2.5}$ objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

## Impacts upon the Development

3.7 The new apartments on the 6$^{th}$ and 7$^{th}$ floors would represent relevant exposure in the context of the air quality objectives. The apartments would be representative with regards to the annual mean and 1-hour nitrogen dioxide objectives, and the 24-hour $PM_{10}$ objective. The outdoor space is only considered as relevant exposure in the context of the 1-hour nitrogen dioxide objective.

3.8 Warren Court is approximately 30m from the main carriageway of Euston Road, and 14m from the slip road, whilst it is approximately 4m from both Tottenham Court Road and Warren Street. The main carriageway of Euston Road is in a cutting at its closest point to the site and the slip road is level with ground-level at the site. The proposed development would introduce two new properties at 6$^{th}$ and 7$^{th}$ floor only, at 20-25m above ground-level (at least 25-30m above Euston Road).

3.9 The road layout in Warren Street is representative of 'canyon' conditions, although the proposed 6$^{th}$ and 7$^{th}$ floors would be higher than the buildings on the opposite side of the road and thus the receptors would be located above the top of the canyon. There are tall buildings alongside Euston Road and Tottenham Court Road, however, the distances between these buildings are greater and thus allow more space for dilution of pollutants.

3.10 Measurements in similar urban environments have shown that nitrogen dioxide concentrations reduce significantly with height above the road, as shown in Figure 3. These demonstrate that nitrogen dioxide concentrations reduce substantially with height above the road and indicate that at 3$^{rd}$ floor and above concentrations are similar to background levels (Air Quality Consultants Ltd, 2015). It is therefore reasonable to assume that at the 6$^{th}$ and 7$^{th}$ floor, where new receptors are proposed, concentrations will be close to background levels.

3.11 The measured and estimated background concentrations presented in Table 2, Table 3 and Table 4 indicate that the $PM_{10}$ and $PM_{2.5}$ objectives are being achieved at the development site. The background annual mean nitrogen dioxide concentration, however, is currently slightly above the objective. There is a risk that concentrations may remain marginally above the objective in 2018. However, concentrations are expected to reduce in future years and, beyond 2018, the objective is expected to be achieved. On this basis, air quality for occupants of the proposed apartments is considered to be acceptable.

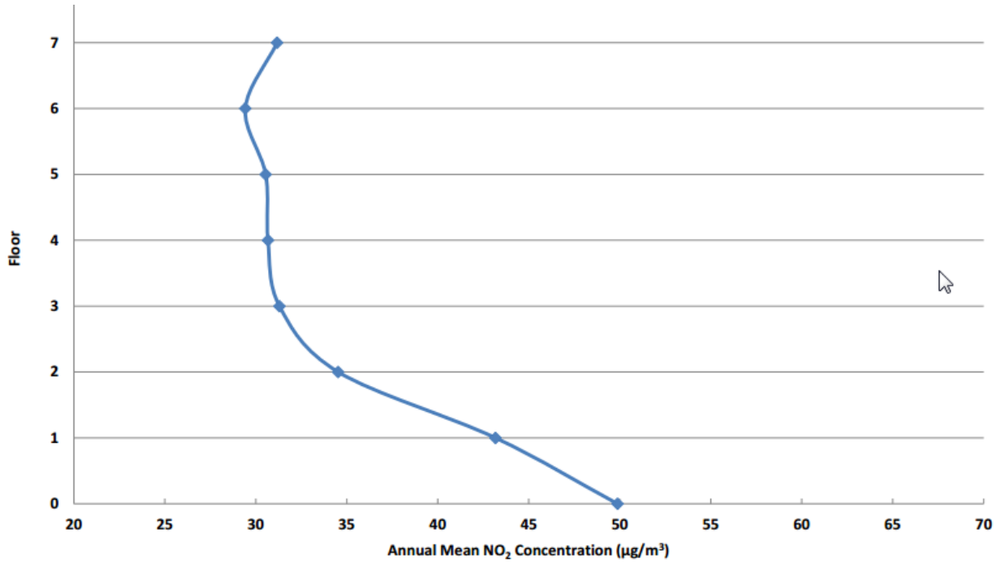


**Figure 3: Measured Nitrogen Dioxide Concentrations at Various Heights**

Based on diffusion tube measurements in Bristol City Centre (Air Quality Consultants Ltd, 2015)

## Impact of the Development

3.12 There is some potential for localised dust impacts during construction of the development. The highest risk of dust impacts would occur during demolition of the existing 6th floor, with a lower risk of dust impacts once the new building is under construction. However, the building to be demolished is relatively small, as are replacement 6th and 7th floors. The site is therefore considered *Low Risk*, in accordance with the GLA's SPG (GLA, 2014).





# 4 Mitigation

## Impact upon the Development

4.1 It is considered that by the time the apartment becomes occupied, the pollutant concentrations will be below the air quality objectives, and air quality for the occupants will be acceptable. The apartments would be located at 6th and 7th floors, as far as possible from the road, and thus no further mitigation is required.

## Impact of the Development

4.2 There is potential for the construction phase of the development to lead to localised dust impacts, particularly during the demolition and basement excavation phases. Suitable measures for a Low Risk site, similar to those described in Appendix A2 will be put in place to minimise dust impacts in accordance with the SPG (GLA, 2014).

# 5 Conclusion

5.1 The proposed development will introduce two new residential apartments at 6th and 7th floor. At this location pollutant concentrations are likely to be, significantly lower than at ground floor and close to background levels. Annual mean nitrogen dioxide concentrations at the two new receptors are likely to be close to the air quality objective in the opening year, falling below the objective in the near future. $PM_{10}$ concentrations are expected to be well below the objectives.

5.2 The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emission. With these measures in place, it is expected that any residual effects will be 'not significant'





# 6 References


Air Quality Consultants . (2016). *Deriving Background Concentrations of NOx and NO2.*

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GLA. (2014). *The Control of Dust and Emissions from Construction and Demolition SPG.*

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*The Air Quality Regulations, 2000, Statutory Instrument 928.* (2000). HMSO.

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# 7 Glossary

| | |
|---|---|
| **AQC** | Air Quality Consultants |
| **AQMA** | Air Quality Management Area |
| **Defra** | Department for Environment, Food and Rural Affairs |
| **Exceedence** | A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure |
| **µg/m$^3$** | Microgrammes per cubic metre |
| **NRMM** | Non-road Mobile Machinery |
| **NO** | Nitric oxide |
| **$NO_2$** | Nitrogen dioxide |
| **NOx** | Nitrogen oxides (taken to be $NO_2$ + NO) |
| **Objectives** | A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides |
| **$PM_{10}$** | Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter |
| **$PM_{2.5}$** | Small airborne particles less than 2.5 micrometres in aerodynamic diameter |
| **SPG** | Supplementary Planning Guidance |
| **Standards** | A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal |





# 8 Appendices

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# A1 Plans of Proposed Development

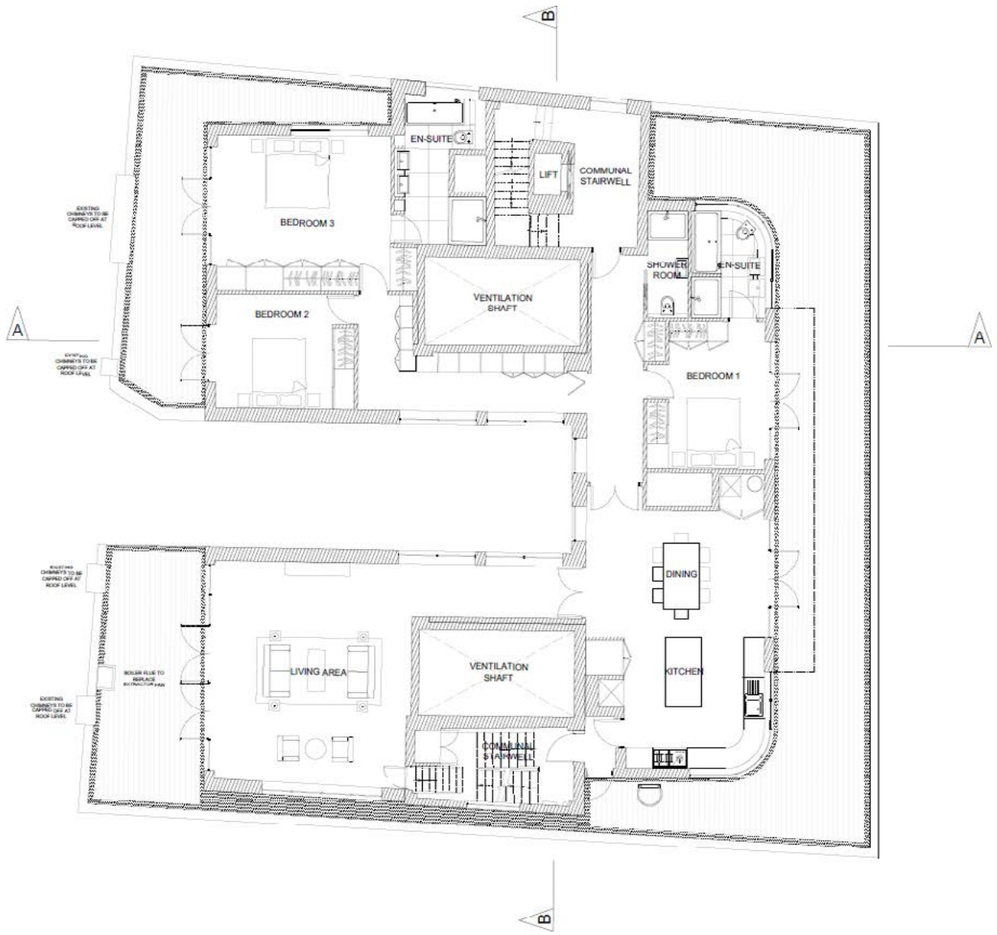


**Figure A1.1 Proposed 6th Floor Plans**

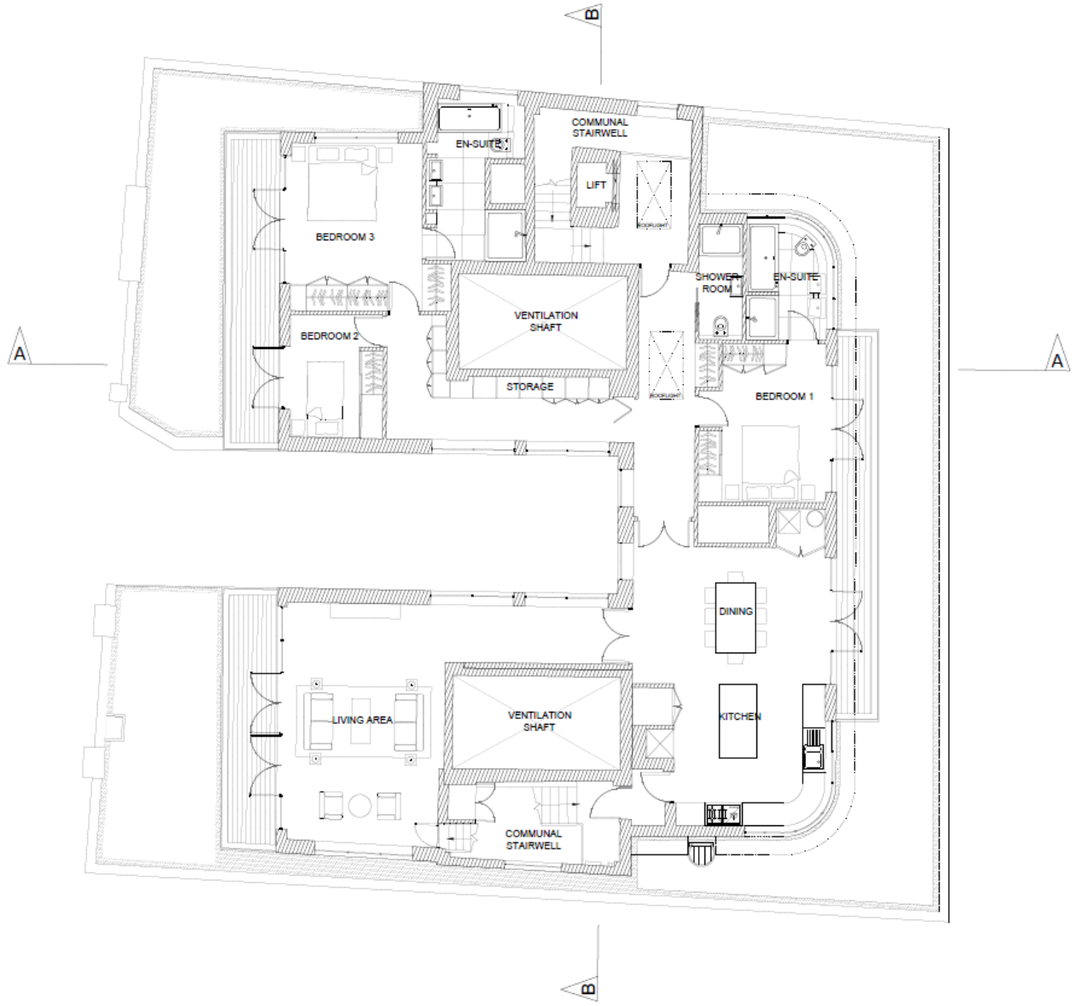


**Figure A1.2 Proposed 7th Floor Plans**

# A2 Construction Mitigation

A2.1 The following is a set of measures that could be incorporated into the specification for the works:

## Site Management

- display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary;
- display the head or regional office contact information;
- record and respond to all dust and air quality pollutant emissions complaints;
- make a complaints log available to the local authority when asked;
- carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the Local Authority when asked;
- increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions are being carried out and during prolonged dry or windy conditions;
- record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and ensure that the action taken to resolve the situation is recorded in the log book; and

## Preparing and Maintaining the Site

- Plan the 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;
- avoid site runoff of water or mud;

## 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 GLA's Control of Dust and Emissions During Construction and Demolition SPG. This outlines that, from 1st September 2015, all NRMM of net power 37 kW to 560 kW used on the site of a major development in Greater London must meet Stage IIIA of EU Directive 97/68/EC (Directive 97/68/EC of the European Parliament and of the Council, 1997) and its subsequent amendments as a minimum. NRMM used on any site within the Central Activity Zone or Canary Wharf will be required to meet Stage IIIB of the Directive as a minimum. From 1st September 2020 NRMM used on any site within Greater London will be required to meet Stage IIIB of the Directive as a minimum, while NRMM used on any site within the Central Activity Zone or Canary Wharf will be required to meet Stage IV of the Directive as a minimum;
- 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;

## 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 recycled water where possible and appropriate;
- use enclosed chutes and covered skips;
- minimise drop heights from loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; and

## Waste Management

- Reuse and recycle waste to reduce dust from waste materials; and
- avoid bonfires and burning of waste materials.

## Measures Specific to Demolition

- ensure water suppression is used during demolition operations;
- using appropriate manual or mechanical demolition techniques; and
- bag and remove any biological debris or damp down such material before demolition.