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**Capital Start Limited**

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# 135 – 149 SHAFTESBURY AVENUE, LONDON
# AIR QUALITY ASSESSMENT

RAMBOLL ENVIRON

# 135 – 149 SHAFTESBURY AVENUE, LONDON
# AIR QUALITY ASSESSMENT

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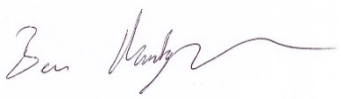

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# EXECUTIVE SUMMARY

Ramboll UK Ltd. has been commissioned by Capital Start Limited ('the applicant'), to carry out an air quality assessment to accompany the planning application for a proposed development at 135 – 149 Shaftesbury Avenue, London Borough of Camden. The development proposals involve the refurbishment and extension of the existing building to re-provide a new four screen cinema at basement level, the provision of a restaurant at ground floor level and a circa 94 bed hotel across six upper levels (which would entail a two storey extension above the existing roof line). No car parking will be provided as part of the development.

The development is located within the London Borough of Camden (LBC). The whole of the borough has been declared an Air Quality Management Area (AQMA) due to potential exceedances of both nitrogen dioxide ($NO_2$) and fine particulate matter ($PM_{10}$) National Air Quality Objectives (NAQO). $NO_2$ concentrations at road side locations immediately adjacent to the proposed development are currently exceeding the NAQO. Thus assurance is required by the council that due consideration has been given to air quality within the design of the proposed development.

The proposed development would be car free and heating and hot water requirements would be provided through air source heat pumps and low NOx boilers. As such the development is not expected to result in an increase of pollutant emissions over the existing situation and has been demonstrated to be air quality neutral.

During the construction phase, emissions of dust and exhaust gases from construction activities can impact air quality. These will be effectively controlled through the use of suitable mitigation measures implemented through the provision of a dust management plan which would be agreed with LBC prior to the start of construction.

Whilst the proposed development would not impact air quality, it would introduce new hotel accommodation into a location where existing air quality would exceed the $NO_2$ objective. It is not anticipated that prospective clients would be in residence for long durations and as such there would no long term exposure to internal air within bedroom units. Nonetheless the design of the development has aimed to reduce the exposure of prospective hotel residents and other users of the building to poor air quality through the use of mechanical ventilation with air intakes placed at roof level where pollutant concentrations would be expected to be reduced compared to that experienced at ground level.

# 1. INTRODUCTION

## 1.1 Overview

Ramboll UK Limited has been commissioned by Capital Start Limited ('the applicant'), to carry out an air quality assessment to accompany the planning application for a proposed development at 135 – 149 Shaftesbury Avenue, London Borough of Camden. The development proposals involve the refurbishment and extension of the existing building to re-provide a new four screen cinema at basement level, the provision of a restaurant at ground floor level and a circa 94 bed hotel across six upper levels (which would entail a two storey extension above the existing roof line). No car parking will be provided as part of the development.

The development is located within the London Borough of Camden (LBC). The whole of the borough has been declared an Air Quality Management Area (AQMA) due to potential exceedances of both the annual mean nitrogen dioxide ($NO_2$) and 24 hour mean 10µm particulate matter ($PM_{10}$) National Air Quality Objectives (NAQO). $NO_2$ concentrations at roadside locations in proximity to the proposed development are currently exceeding the NAQO. Thus, assurance is required by the council that due consideration has been given to air quality within the design of the proposed development.

## 1.2 Scope of the Assessment

The proposed development will be car free with no car parking spaces provided for the hotel visitors, thus the impact on pollutant emissions from road traffic is considered to be negligible.

It is proposed that heating for the development will be provided through the use of air source heat pumps, which will be electrically powered. Two high efficiency, low $NO_x$ natural gas water heaters will be used to meet the hot water demand of the site.

The development is proposed in a location where air quality is currently exceeding the annual mean $NO_2$ air quality objective. Whilst not introducing new residential receptors, the site will introduce hotel accommodation. Information has therefore been provided on the mitigation measures that would be included within the detailed design of the development to reduce the exposure of future users to high concentrations of external pollutants.

Consideration has also been given to the potential for emissions of dust to arise during the construction phase. A qualitative assessment of the risk of dust impacts has been carried out using the Institute of Air Quality Management (IAQM) guidance to identify the appropriate level of mitigation that should be applied to ensure impacts can be effectively mitigated.

In summary, the assessment includes:

- Establishment of baseline air quality;
- Demonstrating that the development will not be a significant source of air pollution;
- Assessment of dust impacts during the construction phase;
- An Air Quality Neutral assessment; and
- Information on the ventilation strategy to limit site users exposure to elevated concentrations of air pollutants.

# 2. SITE DESCRIPTION

## 2.1 Existing Site

The development site, which covers an area of approximately 0.045 hectares, is currently occupied by an existing building covering the entire site. The existing building is bound by New Compton Street to the west, Shaftesbury Avenue to the east Stacey Street to the south and St Giles Passage to the north. The site is located in a highly built up area which comprises offices, shops and residences in multi-story buildings. The site location is shown in Figure 2.1 and an aerial image of the site and surrounds provided in Figure 2.2,

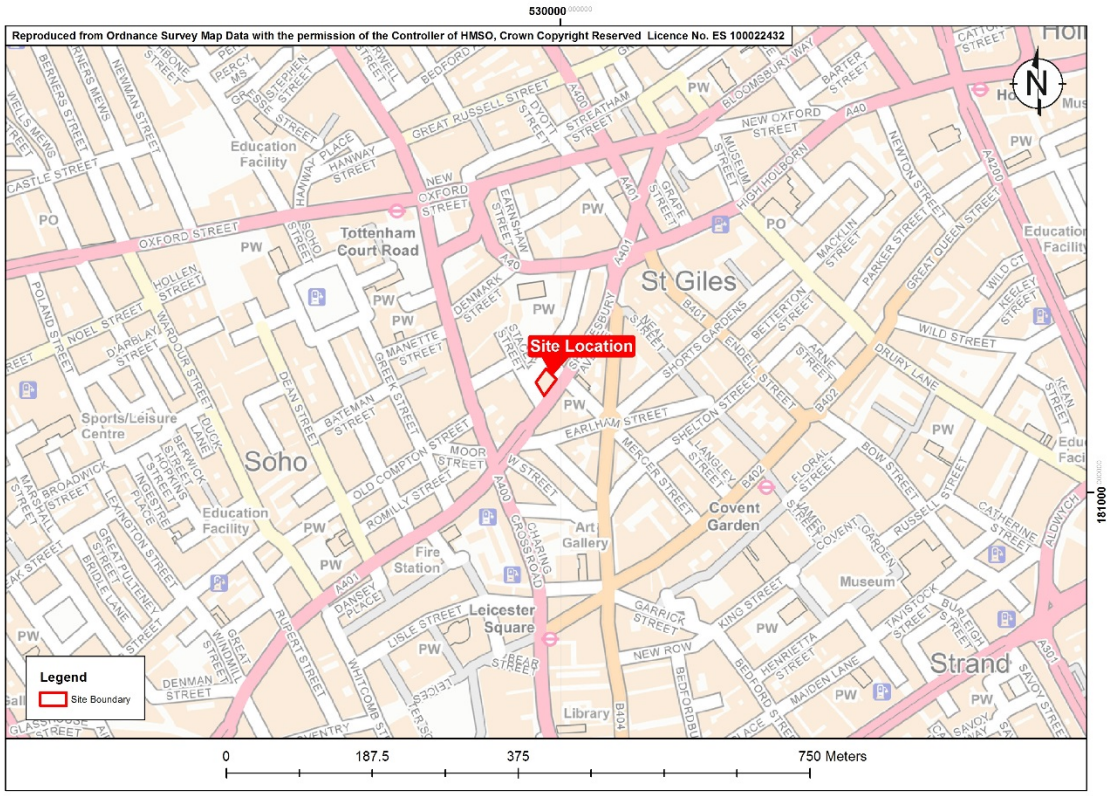


**Figure 2.1: Site Location**

## 2.2 Proposed Development

The proposed development involves the refurbishment and extension of the existing cinema building to create a four screen cinema at basement level, the provision of a restaurant at ground floor and a hotel across the upper seven levels providing approximately 94 beds and which would include a two storey extension above the existing parapet level.

No car parking will be provided within the development. The general arrangement floor plans for the completed development are included in Appendix 1.

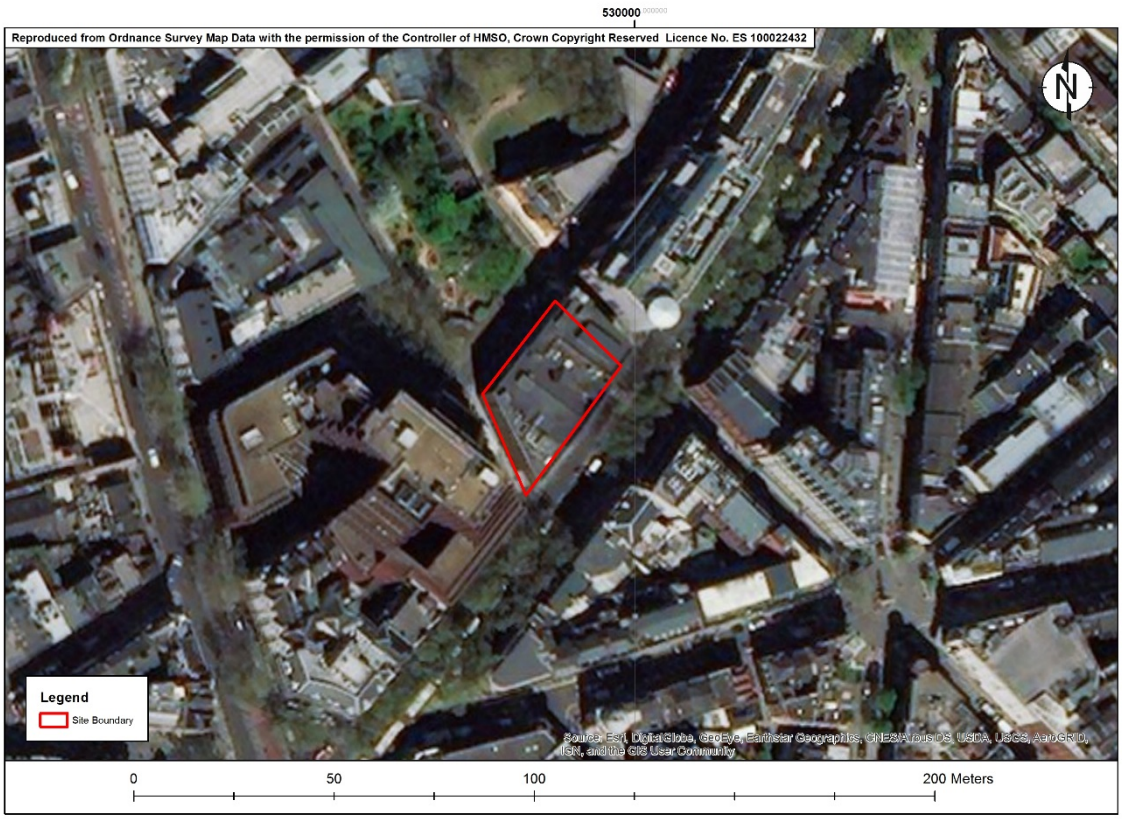


**Figure 2.2: Site Surrounds Aerial Image**

# 3. POLICY CONTEXT

## 3.1 International Legislation and Policy

EU Directive 2008/50/EC[1] on ambient air quality and cleaner air for Europe (the CAFE directive) sets out the ambient air quality standards for nitrogen dioxide ($NO_2$) and particulate matter with an aerodynamic diameter of less than 10 µm ($PM_{10}$) to be achieved by 1 January 2010 and 2005 respectively. The Air Quality Standards Regulations 2010[2] implements the requirements of the Directive into United Kingdom (UK) legislation.

The Directive contains a series of limit values for the protection of human health and critical levels for the protection of vegetation.

Compliance with the European Union (EU) Limit Values is mandatory. However, Member States can apply for a time extension for compliance, subject to approval of an action plan by the European Commission. The UK Government applied in autumn 2011 for a time extension for compliance with the $NO_2$ limit values until 2015 for a number of areas throughout England. However, the UK Government has withdrawn its application for those zones where compliance is not expected until after 2015, which includes central London.

In December 2015, the Department for Environment Food and Rural Affairs (Defra) on behalf of the UK Government produced plans to improve air quality in the UK in order to meet the EU targets in the shortest possible time. An overview document has been produced[3], together with detailed plans for 31 zones where air quality was not predicted to meet the objective in 2020. The plan for the Greater London Urban Area[4] sets out a range of measures to reduce $NO_2$ concentrations and indicates that with these measures air quality in the area will be compliant by 2025. The adequacy of these plans to bring about the necessary improvements in air quality to meet the relevant objectives within the shortest time possible were successfully challenged within the High Court in 2016.

Subsequently, in 2017 a plan for the reduction in roadside $NO_2$ concentrations was released[5] which will require local authorities to identify local actions to accelerate the improvement in air quality in their jurisdictions. It also includes the national measures including banning the sale of conventionally powered cars and light goods vehicles by 2040 and further investment in cleaner transport. A new Clean Air Strategy will be published in 2018, setting out how the UK will significantly reduce harmful air pollutant emissions by 2020 and 2030.

## 3.2 Local Air Quality Management

Part IV of the Environment Act 1995[6], requires the UK Government to publish an Air Quality Strategy and local authorities to review, assess and manage air quality within their areas. This is known as Local Air Quality Management (LAQM).

The 2007 Air Quality Strategy[7] establishes the policy for ambient air quality in the UK. It includes the NAQOs for the protection of human health and vegetation for 11 pollutants. Those NAQOs included as part of LAQM are prescribed in the Air Quality (England) Regulations 2000[8]

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[1] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

[2] Secretary of State, 2010. Statutory Instrument 2010 No. 1001, Air Quality Standards Regulations 2010. HMSO.

[3] Defra, December 2015. Improving air quality in the UK, Tackling nitrogen dioxide in our towns and cities, UK overview document. Defra.

[4] Defra, December 2015. Air Quality Plan for the achievement of EU air quality limit value for nitrogen dioxide ($NO_2$) in Greater London urban area (UK0001). Defra.

[5] Department for Environment, Food and Rural Affairs, 2017. UK plan for tackling roadside nitrogen dioxide concentrations. Defra.

[6] Secretary of State The Environment Act 1995 part IV Air Quality HMSO

[7] Department for Environment, Food and Rural Affairs, July 2007, Air Quality Strategy for England, Scotland, Wales and Northern Ireland

[8] The Air Quality (England) Regulations 2000 (SI 2000 No. 928)

and the Air Quality (Amendment) (England) Regulations 2002[9]. Table 3.1 presents the NAQOs for $NO_2$ and $PM_{10}$.

The Air Quality Strategy also introduced a new policy framework for tackling fine particles ($PM_{2.5}$) including an exposure reduction target. This pollutant is not included within LAQM, and therefore has not been considered further in this assessment.

The NAQOs apply to external air where there is relevant exposure to the public over the associated averaging periods within each objective. Guidance is provided within LAQM Technical Guidance 2009 (LAQM.TG (09))[10] issued by Defra for Local Authorities, on where the NAQOs apply. The objectives do not apply in workplace locations, to internal air or where people are unlikely to be regularly exposed (i.e. centre of roadways).

**Table 3.1: Objectives included in the Air Quality Regulations (England) 2000 for the Purpose of Local Air Quality Management**

| Pollutant | Concentrations | Measured As | Date to be achieved by |
|---|---|---|---|
| **$NO_2$** | 200 µg/m$^3$ not to be exceeded more than 18 times per year | 1 hour mean | 31 December 2005 |
| | 40 µg/m$^3$ | Annual mean | 31 December 2005 |
| **$PM_{10}$** | 50 µg/m$^3$ not to be exceeded more than 35 times per year | 24 hour mean | 31 December 2004 |
| | 40 µg/m$^3$ | Annual mean | 31 December 2004 |

It should be noted that the EU Limit Values are numerically the same as the NAQO values but differ in terms of compliance dates, locations where they apply and legal responsibility. The compliance date for the $NO_2$ Limit Values is 1 January 2010, which is five years later than the date for the NAQO.

The Limit Values are mandatory whereas the NAQOs are policy objectives. Local authorities are not required to achieve them, but have to work towards their achievement. In addition, the Limit Values apply in all locations except: where members of the public do not have access and there is no fixed habitation, on factory premises or at industrial installations, and on the carriageway/central reservation of roads except where there is normally pedestrian access.

Where a local authority's review and assessment of its air quality identifies that air quality is likely to exceed the NAQOs, it must designate these areas as AQMA and draw up an Air Quality Action Plan (AQAP) setting out measures to reduce pollutant concentrations with the aim of meeting the NAQOs.

The LBC latest AQAP for 2016 to 2018[11] has the following overarching aims;

- Continue to meet the EU objectives for Carbon Monoxide, Sulphur Dioxide, Benzene, 1,3-Butadiene, Lead and $PM_{10}$.
- Continue to reduce concentrations of $PM_{10}$ and $PM_{2.5}$; and
- To meet the EU Objective for $NO_2$.

[9] The Air Quality (England) (Amendment) Regulations 2002 (SI 2002 No. 3043) Department for Environment, Food and Rural Affairs (2009) Local Air Quality Management Technical Guidance LAQM.TG(09)
[10] Department for Environment, Food and Rural Affairs (2009) Local Air Quality Management Technical Guidance LAQM.TG(09)
[11] London Borough of Camden, Camden's Clean Air Action Plan 2016-2018

The plan includes the following key objectives to:

- To encourage reductions in fossil fuel use, the adoption of clean fuels and technology and promote energy efficiency;
- Raise awareness about air quality in Camden and promote lifestyle changes which can help reduce levels of air pollution and exposure to air pollution;
- Improve the health and well-being of the local population;
- Work in partnership with national and regional bodies, and with local public and private organisations, to foster improvements in air quality;
- Lead by example and reduce $NO_2$ and $PM_{10}$ emissions associated with the Council's own buildings and transport services;
- Ensure actions which serve to reduce $NO_2$ and $PM_{10}$ emissions complement actions to mitigate $CO_2$ emissions, and vice-versa.

## 3.3 Planning Policy

### 3.3.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF)[12] published in March 2012 sets out the Government's planning policies for England. Planning law requires that applications for planning permission must be determined in accordance with the development plan, unless material considerations indicate otherwise.

The NPPF is also a material consideration in planning decisions. It states that the purpose of the planning system is to contribute to the achievement of sustainable development; and that planning decisions on individual applications must reflect relevant EU obligations and statutory requirements. Specifically, in terms of air quality, it requires the planning system to prevent development from contributing to, or being put at unacceptable risk from unacceptable levels of air pollution.

Planning policies should promote compliance with or contribute towards achievement of EU limit values and NAQOs, taking into account the presence of AQMAs and the cumulative impacts on air quality from individual sites in local areas.

Planning decisions should ensure that new development within an AQMA is consistent with the Local Air Quality Action Plan.

### 3.3.2 The London Plan, 2016 – The Spatial Development Strategy for London Consolidated with Alterations since 2011

The GLA published a revised document consolidating all the alterations for the London Plan since 2011[13]

The following policies of the London Plan[14] are of relevance to this assessment:

- Policy '5.3 - Sustainable design and construction' which states that development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process. Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated

[12] Department for Communities and Local Government (March 2012) National Planning Policy Framework
[13] Greater London Authority (March 2013). The London Plan. The Spatial Development Strategy for London, consolidated with alterations since 2011. Published by Greater London Authority.
[14] Greater London Authority, 2016. The London Plan Spatial Development Strategy for Greater London consolidated with alterations since 2011. London. GLA.

within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:

- "*minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems);*
- *avoiding internal overheating and contributing to the urban heat island effect;*
- *efficient use of natural resources (including water), including making the most of natural systems both within and around buildings; and*
- *minimising pollution (including noise, air and urban run-off)".*

- Policy '7.14 - Improving air quality' which states that development proposals should:
  - *"minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within AQMAs and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality (such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see Policy 6.3);*
  - *promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition';*
  - *be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as AQMAs;*
  - *ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches; and*
  - *where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations. Permission should only be granted if no adverse air quality impacts from the biomass boiler are identified."*

### 3.3.3 Cleaning the Air – The Mayor's Air Quality Strategy, 2010

The Mayor of London has set out a detailed air quality strategy[15] for Greater London in order to deliver the required reductions in $PM_{10}$ and $NO_2$ concentrations to meet the EU limits. The policies and measures within the strategy are divided into transport and non-transport measures. With regard to the proposed development the key policies are as follows:

- Policy '6 - Reducing emissions from construction and demolition sites' which states that the Mayor will work with the London Council to review and update the Best Practice guidance for construction and demolition sites and create supplementary planning guidance to assist implementation;
- Policy '7 - Using the planning process to improve air quality - new developments in London as a minimum shall be 'air quality neutral' which states that the Mayor will encourage boroughs to require emissions assessments to be carried out alongside conventional air quality assessments. Where air quality impacts are predicted to arise from developments these will have to be offset by developer contributions and mitigation measures secured through planning conditions, section 106 agreements or the Community Infrastructure Levy;
- Policy '8 - Maximising the air quality benefits of low to zero carbon energy supply' which states that the Mayor will apply emission limits for both PM and nitrogen oxides ($NO_x$) for new

[15] Greater London Authority, 2010. Clearing the Air - The Mayors London Air Quality Strategy. London. GLA

biomass boilers and $NO_x$ emission limits for Combined Heat and Power (CHP) Plant. Air quality assessments will be required for all developments proposing biomass boilers or CHPs and operators will be required to provide evidence yearly to demonstrate compliance with the emission limits; and

- Policy '9 - Energy efficient buildings' which states that the Mayor will set $CO_2$ reduction targets for new developments which will be achieved using the Mayor's Energy Hierarchy. These measures will result in reductions of $NO_x$ emissions.

3.3.4 Sustainable Design and Construction Supplementary Planning Guidance, 2014

The Supplementary Planning Guidance[16] (SPG) which supports the London Plan was first published in 2006 and was updated in April 2014[17]. The following guidance on air quality is provided in Section 4:

- Developers should design schemes to be air quality neutral;
- Developments should be designed to minimise the generation of air pollutants;
- Developments should be designed to minimise exposure to poor air quality;
- Energy plant, including boilers and CHP plant should meet the relevant emission limits; and
- Developers and contractors should follow the relevant guidance on minimising impacts from construction and demolition

The SPG states that where developers are unable to meet the 'air quality neutral' benchmark, consideration should be given to off-site $NO_x$ and $PM_{10}$ abatement measures.

3.3.5 Mayor of London Supplementary Planning Guidance, the Control of Dust and Emissions from Construction and Demolition, 2014

This guidance[18] updates the previous London Council's guidance to control dust and emissions from construction and demolition activities by identifying appropriate levels of mitigation. The methodology proposed and mitigation outlined is broadly in line with that provided by the Institute for Air Quality Management (IAQM), which is discussed in further detail below.

3.3.6 Draft London Environment Strategy, 2017

The emerging London Environment Strategy[19] was published for public consultation in August 2017. The Strategy identifies the scale and scope of the environmental challenges facing the city of London in becoming a healthier and sustainable city, capable of meeting the needs of future generations. Air quality is singled out as an environmental aspect of urgent human health concern. Objectives relating to air quality are:

- Objective 4.1: Support London and its communities, particularly the most vulnerable and those in priority locations, to help empower people to reduce their exposure to poor air quality. Proposed policies to meet this objective include:
  - Better information provision, doing more to reduce school children's exposure and consideration of development exposure to poor air quality; and
  - Air quality health impacts will continue to be studied, monitored and modelled to better inform policy.

[16] Greater London Authority (2006). Sustainable Design and Construction, The London Plan 2011 Supplementary Planning Guidance. Greater London Authority.
[17] Greater London Authority (April 2014). Sustainable Design and Construction. Supplementary Planning Guidance – London Plan 2011. Published by Greater London Authority, April 2014.
[18] Greater London Authority (2014). The Control of Dust and Emissions during Construction and Demolition, Supplementary Planning Guidance.
[19] Greater London Authority, 2017. London Environment Strategy Draft for Public Consultation. London. GLA.

- Objective 4.2: Achieve legal compliance with UK and EU limits as soon as possible, including mobilising action from London Boroughs, Government and other partners. Proposed policies include:
  - Phasing out of fossil fuelled vehicles, prioritising action on diesel and promoting alternative transport choices;
  - Charging policies to encourage the uptake of ultra-low and zero emission vehicles in private, haulage and public transport fleets;
  - Reducing emissions from non-road transport sources including rail, waterway and air transport;
  - Reducing emissions from non-transport sources such as construction sites, homes, workplaces, large scale commercial generators and industry; and
  - Using the London Local Air Quality Management (LLAQM) framework to assist and empower boroughs to improve air quality.
- Objective 4.3: Establish and achieve new, tighter air quality targets for a cleaner London by transitioning to a zero emission London by 2050, thereby meeting World Health Organisation health based guidelines for air quality. Proposed policies include:
  - Establishing new air quality targets where needed;
  - Encouraging the uptake of ultra-low and zero emission technologies for transport, homes, workplaces and industry; and
  - Implementing local zero emission zones in town centres and central London, paving the way to larger zero emission zones.

### 3.3.7 Local Policy

Camden Local Plan 2017

The Camden Local Plan 2017[20] sets out the policies that will guide development in LBC until 2031. The policies relating to air quality include:

Policy A1 'Managing the impact of Development' – This policy states that the council will seek to protect the quality of life of both occupiers and neighbours to new development, and will consider likely impacts including odour, fumes and dust.

Policy D1 'Design' – This policy requires the council to seek high quality design in a new development, and requires developments to promote the health of occupiers, including consideration of ambient air quality.

Policy CC4 'Air Quality' – This policy requires the council to consider the impact of a development on the boroughs air quality and its potential to expose residents to poor air quality. Air Quality Assessments are required where a development might expose residents to poor air quality, and permission will not be granted unless measures are included to mitigate any impacts or exposure. Developments incorporating significant demolition, earthwork and construction elements will be required to assess both the risks of dust emissions and to provide suitable mitigation in a Construction Management Plan (CMP).

Policy C1 'Health and wellbeing' – This policy requires the council to ensure any development will positively contribute to creating a high quality, active and safe borough.

[20] London Borough of Camden, 2017. Camden Local Plan. LBC

## 3.4 Additional Guidance

### 3.4.1 Environmental Protection UK and Institute of Air Quality Management Guidance

EPUK together with the IAQM has produced guidance[21] on how air quality impacts should be assessed within the land-use planning and development control process. This guidance provides clear criteria to determine when a detailed air quality assessment is required and a methodology for assessing the significance of air quality effects.

### 3.4.2 Institute of Air Quality Management Guidance

The IAQM has produced 'Guidance on the assessment of dust from demolition and construction'[22] to assist in the assessment of air quality impacts from construction activities. This guidance provides a consistent methodology for assessing the risks of dust impacts from demolition and construction activities and for identifying the correct level of mitigation which should be applied to avoid significant air quality effects.

[21] Institute of Air Quality Management and Environmental Protection UK, 2017, Land-Use Planning & Development Control: Planning for Air Quality

[22] Institute of Air Quality Management, 2016, Guidance on the assessment of dust from demolition and construction.

# 4. EXISTING AIR QUALITY

## 4.1 Local Authority Monitoring

LBC monitor existing air quality at a number of locations throughout the borough and in proximity to the site using both automatic continuous monitors and passive diffusion tubes. In addition, the neighbouring London Borough of Westminster (LBW) also conducts air quality monitoring in proximity to the site, using an automatic monitor

A summary of the results from these sites is presented in Table 4.1 – Table 4.3 and their locations shown in Figure 4.1.

**Figure 4.1: Monitoring Stations in Proximity to the Proposed Development**

| Site | Type | Borough | Classification | Pollutants Monitored | Distance from Proposed Development |
|---|---|---|---|---|---|
| Bloomsbury | Automatic | Camden | Urban Background | $NO_2$, $PM_{10}$ | 890 m north |
| Holborn | Automatic | Camden | Kerbside | $NO_2$ | 650 m north east |
| Shaftesbury Avenue | Automatic | Camden | Roadside | $NO_2$, $PM_{10}$ | 155 m north |
| Strand | Automatic | Westminster | Roadside | $NO_2$ | 820 m east |
| Tottenham Court Road | Diffusion Tube | Camden | Kerbside | $NO_2$ | 700 m north west |
| Bloomsbury Street | Diffusion Tube | Camden | Roadside | $NO_2$ | 670 m north |

**Figure 4.2: Recorded $NO_2$ Concentrations at Monitoring Stations**

| Site | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016[1] |
|---|---|---|---|---|---|---|---|
| **Objective** | **Annual Mean µg/m³** | | | | | | |
| Bloomsbury | **55** | **50** | **55** | **44** | **51** | **51** | **42** |
| Holborn | NR | | | | **94** | **83** | **84** |
| Shaftesbury Avenue | **89** | **76** | **71** | **74** | **69** | NA | NA |
| Strand | NR | | | | | **122*** | **101** |
| Tottenham Court Road | **92** | **92** | **83** | **88** | **87** | **86** | NA |
| Bloomsbury Street | 41* | **77** | **72** | **76** | **81** | **71** | NA |
| **Objective** | **Number of Hours exceeding 200 µg/m³** | | | | | | |
| Bloomsbury | 2 | 1 | 0 | 1 | 0 | 1 | 0 |
| Holborn | NR | | | | **202** | **75** | **46** |
| Shaftesbury Avenue | 21 | 15 | 12 | 6 | 1 (140) | NA | NA |
| Strand | NR | | | | | **284*** | **235** |

[1] Data accessed via www.londonair.org.uk

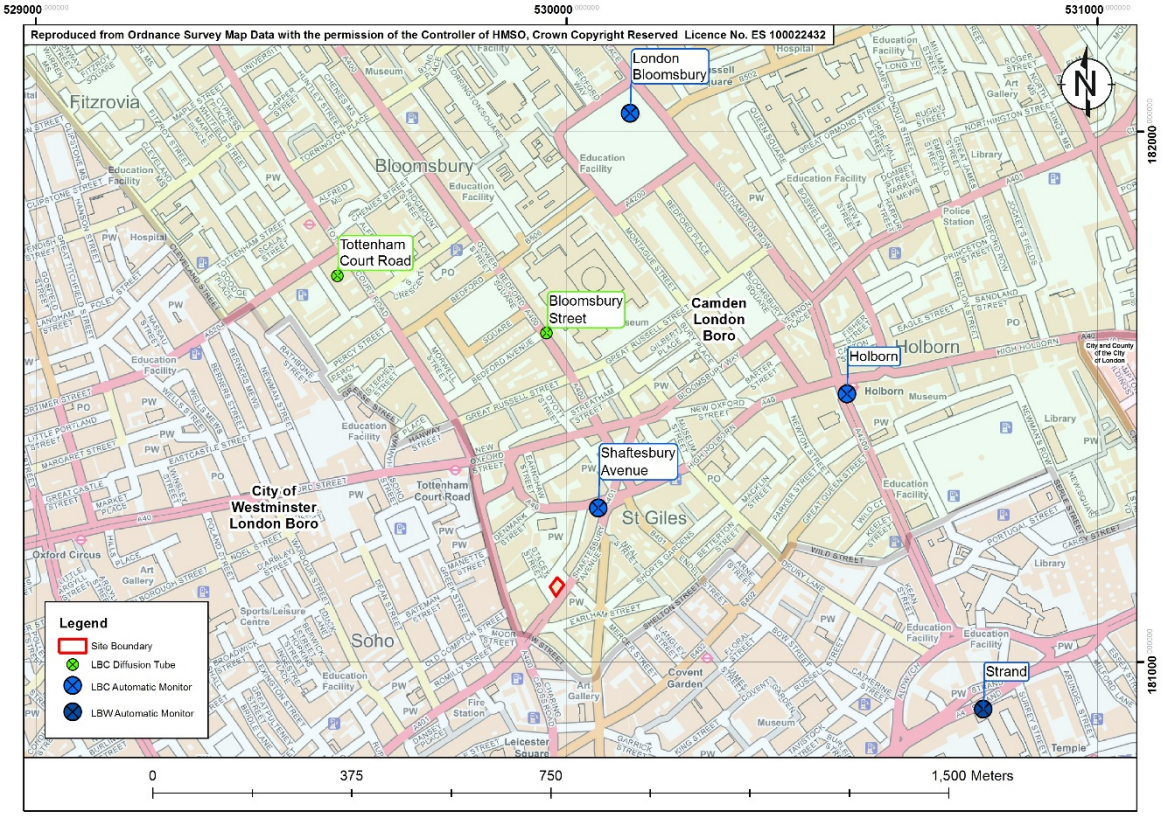
NA: Not Available

| Site | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016[1] |
|---|---|---|---|---|---|---|---|
| NR: Not Recorded<br>**Bold**: concentrations in exceedance of the annual mean objective (40 µg/m$^3$) or hourly mean objective (200 µg/m$^3$, 18 exceedances permitted per year)<br>**Bold underlined**: diffusion tube annual mean > 60 µg/m$^3$, indicating a potential exceedance of the $NO_2$ hourly mean objective.<br>*<75% data capture | | | | | | | |

**Figure 4.3: Recorded PM10 at the Bloomsbury Automatic Monitoring Station**

| Site | Year | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016[1] |
| **Objective** | **Annual Mean µg/m$^3$** | | | | | | |
| Bloomsbury | 23 | 18 | 22 | 19 | 18 | 22 | 20 |
| Shaftesbury Avenue | 29 | 32 | 29 | 29 | 25 | 22 | NR |
| **Objective** | **Days Exceeding 50 µg/m$^3$** | | | | | | |
| Bloomsbury | 15 | 2 | 17 | 10 | 4 | 10[1] | 9 |
| Shaftesbury Avenue | 29 | 27 | 18 | 17 | 16 | 4 | NR |
| [1] Data accessed via from London Air as appose to LBC air quality reports<br>NR: Not Recorded<br>Annual Mean Objective: 40 µg/m$^3$<br>24 hour mean objective: 50 µg/m$^3$, 35 permitted | | | | | | | |

**Figure 4.4: Monitoring Site Locations**



## 4.2 Assessment of Monitoring Data

All monitoring data within the vicinity of the site exceeded the annual mean $NO_2$ NAQO for all years of the monitoring record, including the urban background site.

Exceedance of the hourly mean $NO_2$ objective was recorded at the kerbside automatic monitor at Holborn and the road side automatic monitor at Strand. In addition, the monitoring data at the two closest diffusion tube monitoring sites Tottenham Court Road and Bloomsbury Street show existing air quality at these roadside locations have an annual mean of more than 60 µg/m$^3$, indicating potential exceedances of the hourly mean $NO_2$ NAQO.

$PM_{10}$ concentrations are monitored at the London Bloomsbury Road site and were monitored at the roadside Shaftesbury Avenue site. The monitoring data shown in Table 4.3 indicates that current concentrations meet both the annual mean objective (40 µg/m$^3$) and the 24 hour objective.

## 4.3 LAEI Modelling

Additional information on local air quality can be extracted from modelling carried out for the Greater London Authority as part of the London Atmospheric Emissions Inventory (LAEI) 2013, which has been updated with the latest COPERT 5 emission factors, released in April 2017. This indicates that $NO_2$ concentrations at the proposed development location adjacent to Shaftesbury Avenue and the interior of the site would be in the range of 58 to 73 µg/m$^3$, as shown in Figure 4.5.

The LAEI data indicates that daily mean $PM_{10}$ concentrations are predicted to meet the relevant objective in 2013, as shown in Figure 4.6.

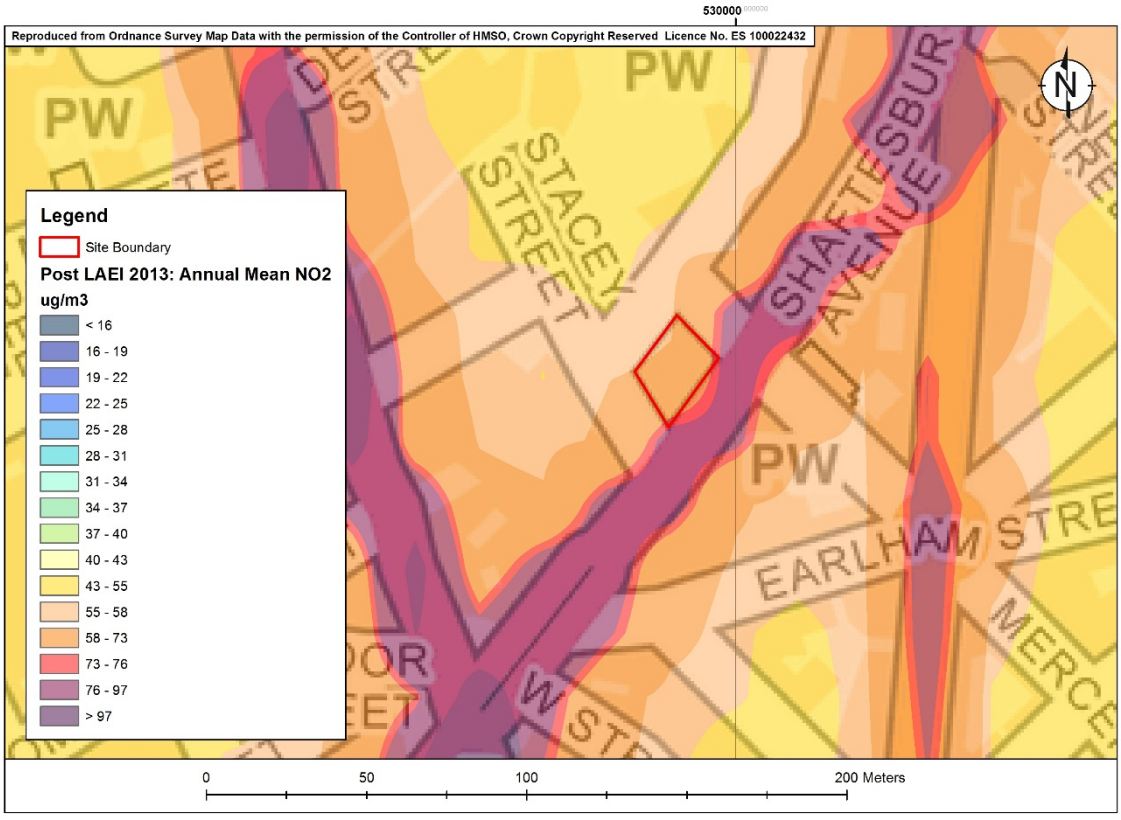



**Figure 4.5: LAEI Modelled NO2 concentrations for 2013**

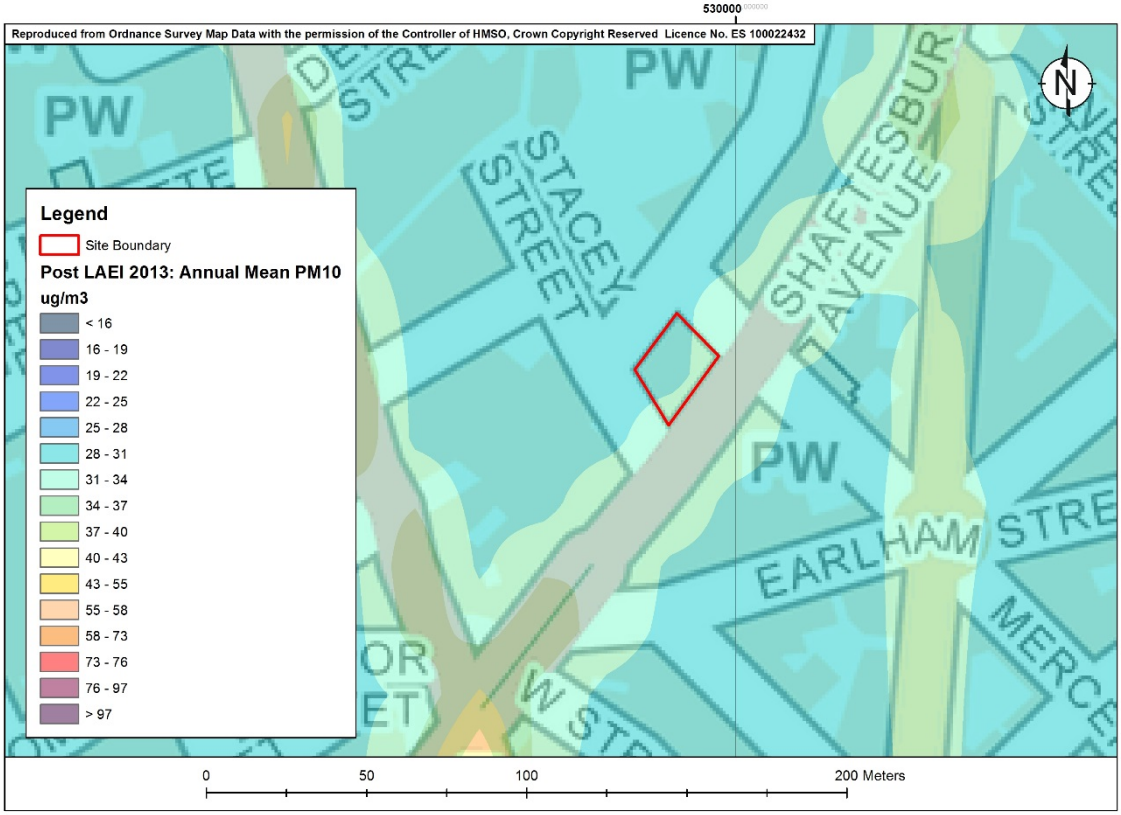



**Figure 4.6: LAEI Modelled PM10 Concentrations for 2013**

## 4.4 Existing On-site Air Quality

From the review of nearby monitoring data and LAEI modelling it is expected that air quality across the site at ground level is likely to be in excess of the annual mean $NO_2$ objective. In addition, it is likely that $NO_2$ concentrations would be in excess of the short term objective at façade locations facing onto Shaftesbury Avenue.

A slight decrease would be expected away from the Shaftesbury Avenue façade as $NO_2$ concentrations decrease rapidly away from the roadside with lower concentrations expected to the rear of the proposed development. Additionally, concentrations would be expected to decrease with height, although dispersion of pollutants would be limited by the presence of buildings effectively forming street canyons on all sides of the building. As such it is expected that $NO_2$ concentrations may remain above the annual mean NAQO at all façade locations.

$PM_{10}$ concentrations are expected to be within relevant objectives at the site.

# 5. CONSTRUCTION PHASE IMPACTS

## 5.1 Introduction

Construction effects as a result of the proposed development have been assessed using the recent guidance provided by the IAQM. This guidance is considered to supersede the current Mayor of London's construction dust guidance SPG and requires the implementation of a similar level of mitigation.

## 5.2 Assessment of Impacts

Whilst the level of construction for the proposed development is relatively minor, residential receptors are located within 20 metres of the site boundary, therefore, according to IAQM guidance a detailed assessment of the demolition and construction impacts is required.

There are no ecological receptors or habitats that would be sensitive to dust impacts within 50 m of the proposed site boundary therefore, no ecological effects are predicted to occur.

Using the evaluation criteria within the IAQM's Guidance the potential dust emission magnitude has been identified for each stage of the proposed development as shown in Table 5.1 below.

**Table 5.1: Dust Emission Magnitude for Each Construction Phase**

| Activity | Dust Emission Magnitude | Justification |
|---|---|---|
| Demolition | Small | Total building volume < 20,000 $m^3$.<br>The existing building facades will be retained screening potential receptors from dust during internal demolition works. |
| Earthworks | Small | Footprint of building will not change – extension of basement. |
| Construction | Small | Total building volume < 25,000$m^3$ although potentially dusty construction material (e.g. concrete) will be used. |
| Trackout | Small | It is assumed that maximum HDV movements over the course of the development will be < 10 outward movements per day[1]. |
| [1] Assumed as no information on construction vehicle movements currently available | | |

The next stage of the process is to define the sensitivity of the assessment area to dust soiling and human health impacts. This process combines the sensitivity of the receptor with distance from the source to determine the overall sensitivity.

The sensitivity of the dust impacts is provided in Table 5.2.

**Table 5.2: Sensitivity of Area to Dust Impacts (taking into account distance to construction activity)**

| Sensitivity to Dust Soiling | Sensitivity to Human Health Impacts | Sensitivity to Ecological Receptors |
|---|---|---|
| **High** – 10 - 100 residential properties within 20 m of the site boundary. Numerous medium and low sensitivity receptors (businesses, public | **Medium** – high number of receptors, 2016 $PM_{10}$ concentrations recorded at the Bloomsbury automatic monitoring site were 20 µg/$m^3$ in 2016. | **Not Applicable** – no ecological receptors sensitive to dust within 50 m of the site or within 50 m of the route used by |

| | | |
|---|---|---|
| rights of way) in close proximity to the site. | | construction vehicles for a distance of 500 m[1] |

The dust emission magnitude determined in Table 5.1 has been combined with the sensitivity assessment in Table 5.2 to define the risk of impacts for each phase of development in the absence of mitigation as shown in Table 5.3.

**Table 5.3: Risk of Dust Impacts in the Absence of Mitigation**

| | Dust Emission Magnitude | | Construction Phase | | | |
|---|---|---|---|---|---|---|
| | | | Demolition | Earthworks | Construction | Trackout |
| | | | Small | Small | Small | Small |
| Sensitivity of the surrounding area | Dust Soiling | High | Medium risk | Low risk | Low risk | Low risk |
| | Human Health | Medium | Low risk | Low risk | Low risk | Negligible |

The need to increase the risk rating due to the proximity of surrounding buildings and pedestrian walkways was not identified due to the retention of the building façades significantly reducing the impacts of dust dispersion.

Therefore the overall risk of dust impacts in the absence of mitigation has been assessed as being **medium risk**.

## 5.3 Mitigation of Construction Impacts

The control of dust emissions from demolition and construction sites relies upon good site management and mitigation techniques to reduce emissions of dust and limit dispersion. A summary of the mitigation measures recommended in the IAQM and Mayor of London's guidance to reduce impacts from medium risk sites is provided in Table 5.4. It is recommended that these measures would be set out in the Dust Management Plan which would form part of the proposed development's overall Construction Management Plan. The requirement to produce a Construction Management Plan would be secured through an appropriately worded s106 Legal Agreement.

**Table 5.4: Dust Mitigation Measures for Medium Risk Sites**

| Phase / Task | Highly Recommended | Desirable |
|---|---|---|
| **Communications** | Implement a stakeholder communication plan.<br>Display name and contact details of responsible person for dust issues on Site boundary in addition to head/regional office contact information. | |
| **Dust Management Plan** | Develop and implement a Dust Management Plan (DMP), to be approved by the Local Authority. | |
| **Site Management** | Record all complaints and incidents in a site log.<br>Take appropriate measures to reduce emissions in a timely manner, and record the measures taken within the log. | |

| Phase / Task | Highly Recommended | Desirable |
|---|---|---|
| | Make the complaints log available to the Local Authority if requested.<br>Record any exceptional dust incidents on or off site. | |
| **Monitoring** | Carry out regular inspections to ensure compliance with the DMP and record results in the site log book.<br>Increase the frequency of inspections during activities with a high potential to create dust or in prolonged dry weather. | Undertake daily on and off site visual inspections where there are nearby receptors. |
| **Preparing and Maintaining the Site** | Plan site layout to locate dust generating activities as far as possible from receptors.<br>Use solid screens around dusty activities and around stockpiles.<br>Avoid site runoff of water and mud.<br>Fully enclose the site or specific operations where there is a high potential for dust production and the site is active for an extensive period.<br>Keep site fencing barriers and scaffolding clean using wet methods.<br>Remove dusty materials from site as soon as possible. Minimise emissions from stockpiles by covering, seeding, fencing or damping down. | |
| **Operating Vehicle / Machinery and Sustainable Travel** | Ensure vehicles switch off engines when stationary.<br>Avoid use of generators where possible.<br>Produce a Construction Logistics Plan to manage the sustainable delivery of materials.<br>Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone.<br>Ensure all NRMM comply with the standards set in the Mayor of London's The Control of Dust and Emissions During Construction and Demolition SPG.<br>The air quality section of the CEMP should include a statement of compliance with the GLA NRMM Low Emission Zone emissions requirements as set out in the Control of Dust and Emissions during Construction and Demolition SPG. | Enforce an on-site speed limit of 15 mph on surfaced roads and 10 mph on unsurfaced areas.<br>Implement a sustainable travel plan for site workers |

| Phase / Task | Highly Recommended | Desirable |
|---|---|---|
| | Site manager to maintain a list of all on-site NRMM using the GLA's nrmm.london database. | |
| **Operations** | Cutting, grinding or sawing equipment only to be used with suitable dust suppression equipment or techniques.<br>Ensure adequate water supply for effective dust and particulate matter suppression.<br>Use enclosed chutes, conveyors and covered skips.<br>Minimise drop heights of materials.<br>Ensure suitable cleaning material is available at all times to clean up spills. | |
| **Waste Management** | Avoid bonfires | |
| **Measures Specific to Demolition** | Ensure effective water suppression is used, preferably through the use of hand held sprays.<br>Avoid explosive blasting.<br>Bag and remove biological debris or damp down material prior to demolition. | Where practical, soft strip inside buildings before demolition of external walls and windows. |
| **Measures Specific to Construction** | Ensure aggregates are stored in bunded areas and are not allowed to dry out | Avoid concrete scabbling, where possible.<br>Ensure bulk cement and other fine powder is delivered in tankers and stored in silos with suitable emission control.<br>Smaller supplies of fine powder material to be in sealed containers and stored appropriately. |
| **Measures Specific to Trackout** | Use water-assisted dust sweepers to clean access and local roads.<br>Avoid dry sweeping of large areas.<br>Ensure vehicles entering and leaving the site are appropriately covered.<br>Inspect on-site haul roads for integrity and repair as necessary.<br>Inspections of haul roads to be recorded in site log, including any remedial action taken.<br>Implement a wheel washing system. | |

# 6. OPERATIONAL IMPACTS

## 6.1 Traffic Impacts

The proposed development would be car free, therefore the development would not be expected to increase road traffic emissions.

## 6.2 Energy Plant Emissions

Heating demand for the development would be met through the use of electrically powered air source heat pumps.

Hot water would be provided through two low $NO_x$ high efficiency gas fired water heaters. These would have a NOx emission level of 36 mg/kWh. The stack associated with these units would discharge to atmosphere via the roof.

## 6.3 Emergency Generators and Sprinkler Pumps

An emergency diesel fuelled generator is to be installed at roof level to provide electrical power in the event of a power cut to vital systems (such as elevators). Planned operations for the emergency generator will only be for maintenance which typically will be for less than an hour in duration once a month.

In addition, an emergency diesel fuelled pump set will be located at roof level to ensure the operation of the buildings sprinkler system in case of power failure. This would only operate in emergencies beyond maintenance runs. As per the emergency generator above, maintenance runs would be typically once a month for less than an hour.

At this stage of the proposed development design, detailed information on the sizing and emissions from these plant are not available.

## 6.4 Ventilation

All areas of the proposed development, including the bedrooms within the hotel would be mechanically ventilated and fitted with heat recovery. The air intakes for the ventilation system would be located at roof top level where pollutant concentrations would be lowest. No fresh air intakes would be located at lower levels within the building. Care will be taken when siting the air intake locations and emergency generators that emissions from the generators cannot be entrained within the air intakes.

# 7. AIR QUALITY NEUTRAL

## 7.1 Introduction

The Sustainable Design and Construction SPG issued by the Mayor of London, indicates that for all new major development an assessment should be undertaken to demonstrate whether the proposed development would meet the relevant air quality neutral emission benchmarks and thus can be considered air quality neutral. Where a development cannot meet the emission benchmarks, additional mitigation may be required either on or off-site to reduce the air quality impacts.

## 7.2 Building Emissions

The proposed development includes two natural gas high efficiency, low NOx boilers to meet the domestic hot water demand of the proposed development. The proposed development would use air source heat pumps to meet the space heating demand and provide cooling.

The annual buildings emission has been calculated as shown in Table 7.1.

The Air Quality Neutral guidance has been used to calculate the relevant Building Emission Benchmarks based on the proposed floor areas as detailed in Table 7.2.

**Table 7.1: Annual Building Emission**

| **Plant** | **$NO_x$ Emission (mg/kWh)** | **Assumed average daily operating hours** | **Annual $NO_x$ Emission (kg/annum)** |
|---|---|---|---|
| 2 x 237 kw boilers | 36[1] | 24 | 149 |
| Total predicted development building emission (kg/annum) | | | 149 |
| Notes<br>[1]Assumed Hot Water Boiler model SUPAflo SF63 EVO | | | |

**Table 7.2: Air Quality Neutral Assessment – Building Emission Benchmark**

| **Class** | **Description** | **Gross Floor (Internal) Area ($m^2$)** | **$NO_x$ Benchmark ($g/m^2$)** | **Estimated Development $NO_x$ Emission (kg/annum)** |
|---|---|---|---|---|
| Class A3 - A5 | Restaurants, Drinking Establishments, Hot Food Takeaway | 782 | 75.2 | 59 |
| Class C1 | Hotels | 5,190 | 70.9 | 368 |
| Class D2 (a-d) | Cinemas, Concert Halls etc. | 1,549 | 90.3 | 140 |
| Class D2 (e)* | Swimming Pools, Gymnasium etc. | 274 | 284.0 | 78 |
| Total Building Emission Benchmark | | | | 644 |
| Total predicted development building emission (kg/annum) | | | | 149 |
| **Difference between predicted development building emission and Building Emission Benchmark** | | | | **-495** |
| Notes<br>*Replacement land use class D2 (e) used for Spa (Sui Generis) due to similarities in use. | | | | |

## 7.3 Transport Emissions

The Transport Emission Benchmarks (TEBs) specified by the guidance are based upon the number of car trips generated by a land use class together with its associated trip length and vehicle emission rates. These TEBs are specific to the area of London the Proposed Development would be located in, to accurately represent transport patterns.

The TEBs have been developed for residential, retail and office land uses. Where TEBs have not been derived for specific land-use classes, such as for A3/4, C1 and D2 use, a comparison of the development trip generation rates to a bench mark trip rate is required. A worst-case scenario, based on the interpretation of the most conservative emissions benchmarks use classes in the planning application area schedule, has been adopted for this assessment.

The proposed development would be car free, with no on-site parking provision. The transport assessment prepared by Iceni Projects Ltd as part of the planning application for this development indicates that servicing of the different land use classes would amount to a total of 24 vehicle movements per day.

The benchmark trip rate for the proposed development is shown below in Table 7.3.

**Table 7.3: Air Quality Neutral Assessment- Benchmark Trip Rate for Underived Land Uses (Central Area Zone (CAZ))**

| Land Use | Trips / m² / Annum | GEA (m²) | Total Benchmark Trips / Annum |
|---|---|---|---|
| A4 | 2.0 | 782 | 1564 |
| C1 | 1.9 | 5190 | 9861 |
| D2 | 5.0 | 1823 | 9115 |
| Notes<br>Land uses A3/A4 assessed as A4 (most stringent benchmark)<br>Land Use D2 includes Cinema and Spa land uses | | | |

A comparison of the benchmark trip rates with the estimated annual trip generation of the proposed development is shown below in Table 7.4.

**Table 7.4: Air Quality Neutral Assessment Comparison of Benchmark and Generated Trip Rates**

| Land Use | Annual Average Daily Trips | Predicted Trips per Annum | Comparison to Benchmark |
|---|---|---|---|
| A4 | 2 | 730 | -834 |
| C1 | 3 | 1095 | -8766 |
| D2 | 19 | 6935 | -2180 |

## 7.4 Conclusion

The assessment demonstrates that the proposed development would be expected to meet the Building Emission Benchmark and the underived Transport Emission Benchmark. As such the Proposed Development can be considered air quality neutral and no additional mitigation is required to meet the air quality neutral criteria.

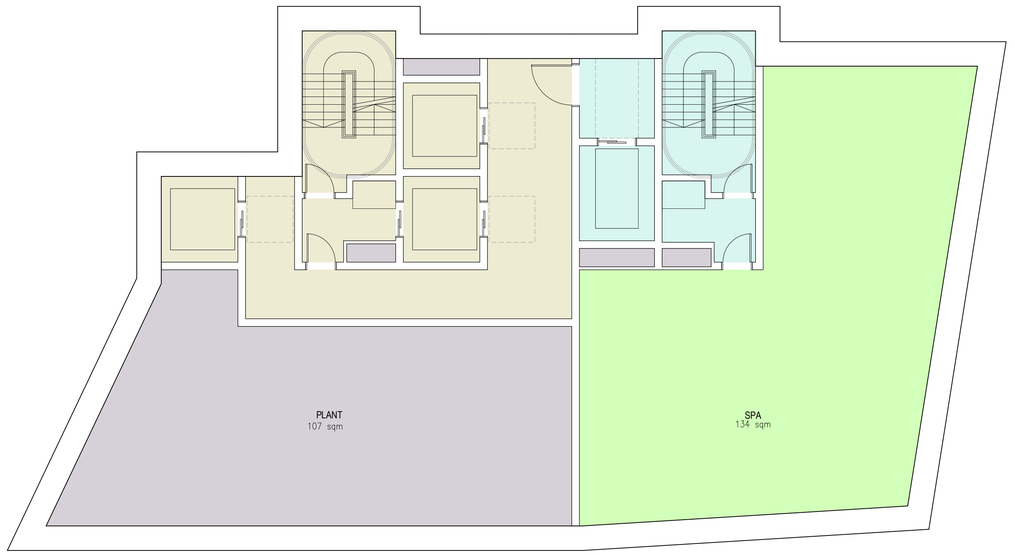
# 8. SUMMARY AND CONCLUSIONS

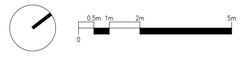
The proposed development would be car free and heating and hot water requirements would be provided through air source heat pumps and low $NO_x$ boilers. As such the development is not expected to result in an increase in pollutant emissions over the existing situation and has been demonstrated to be air quality neutral.

During the construction phase, emissions of dust and exhaust gases from construction activities can impact air quality. These will be effectively controlled through the use of suitable mitigation measures implemented through the provision of a dust management plan which would be agreed with LBC prior to the start of construction.

Whilst the proposed development would not impact air quality, it would introduce new hotel accommodation into a location where existing air quality would exceed the $NO_2$ objective. It is not anticipated that prospective clients would be in residence for long durations and as such there would no long-term exposure to internal air within bedroom units. Nonetheless the design of the development has aimed to reduce the exposure of prospective hotel residents and other users of the building to poor air quality through the use of mechanical ventilation with air intakes placed at roof level where pollutant concentrations would be expected to be reduced compared to that experienced at ground level.

# APPENDIX 1
# PROPOSED GENERAL ARRANGEMENT FLOOR PLANS

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KEY PLAN

NOTES

- CINEMA
- BAR / RESTAURANT
- RECEPTION
- KITCHEN
- SPA / POOL
- PLANT
- CIRCULATION
- BACK OF HOUSE
- STANDARD ROOM
- SUITE

| REV | DATE | DESCRIPTION | DRN | CHK |
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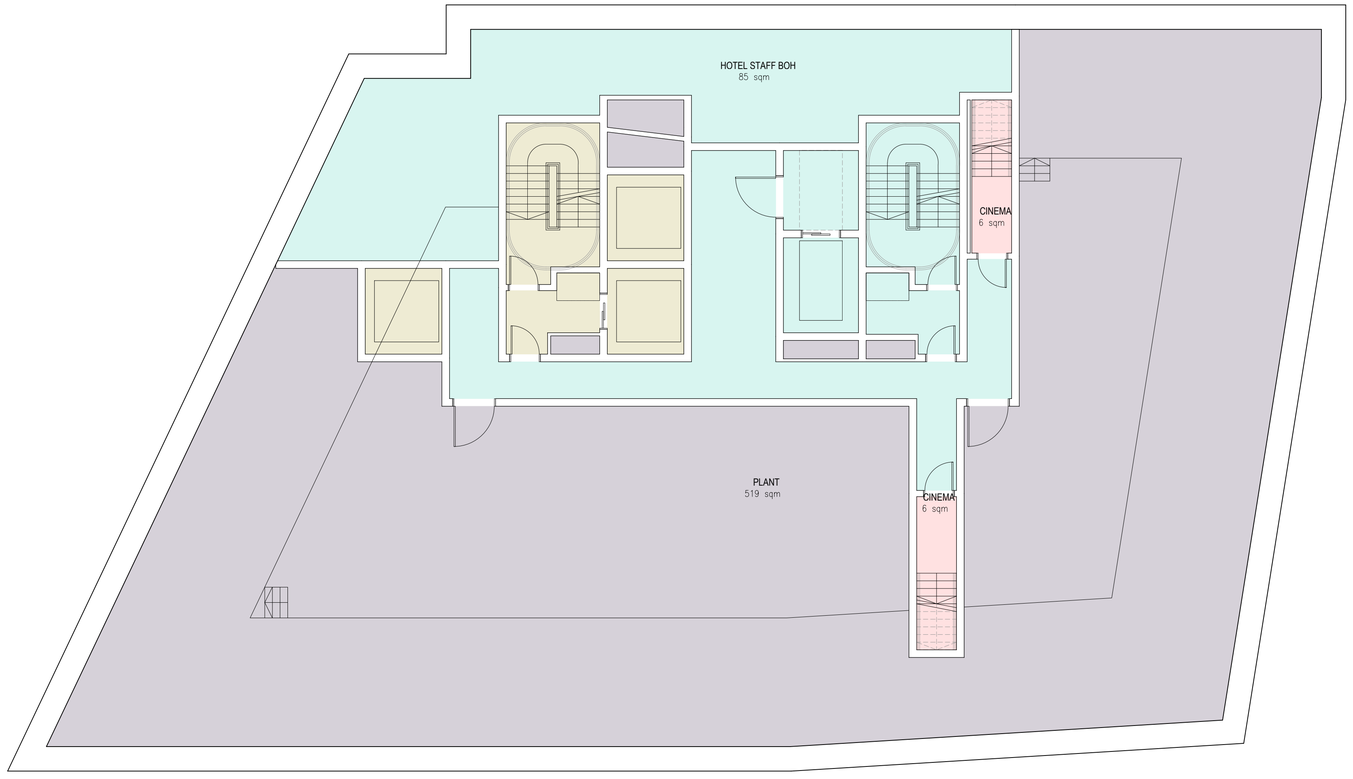


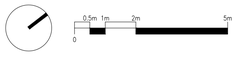


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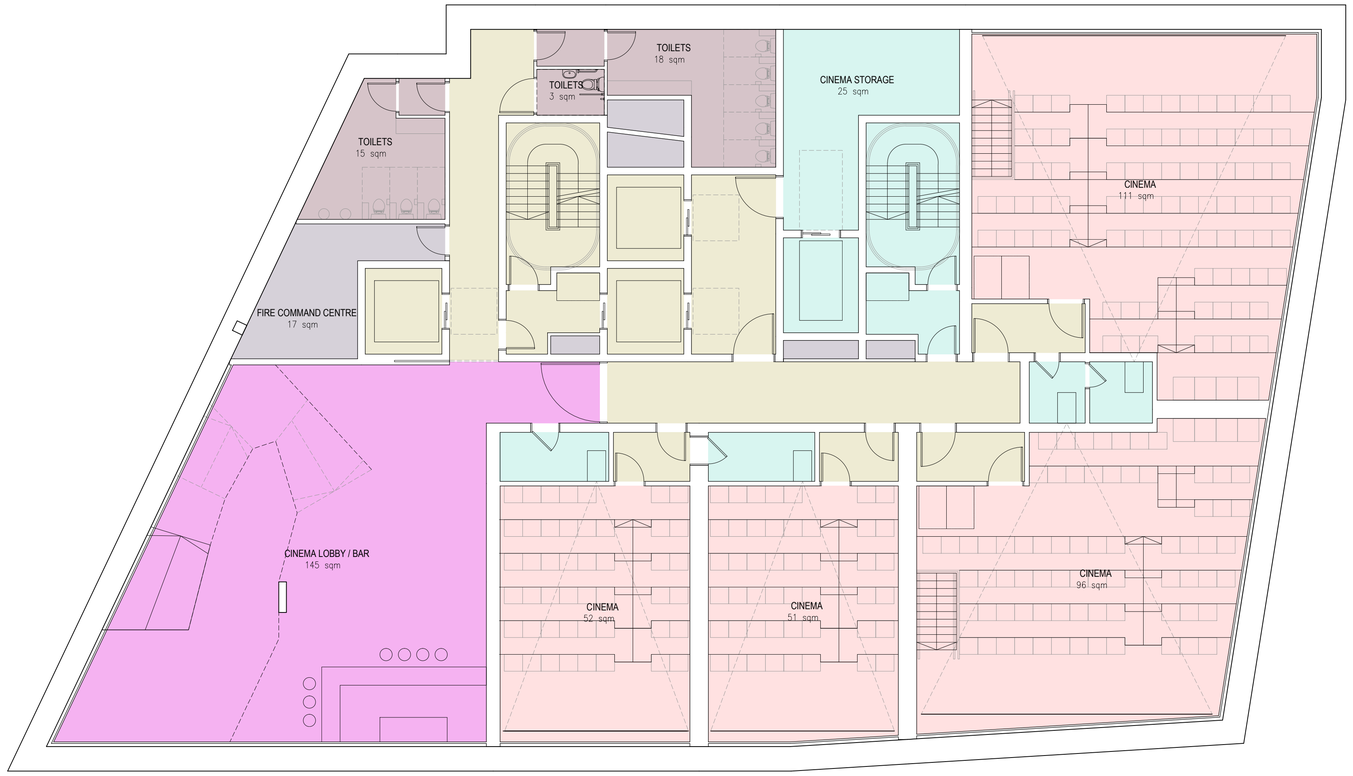


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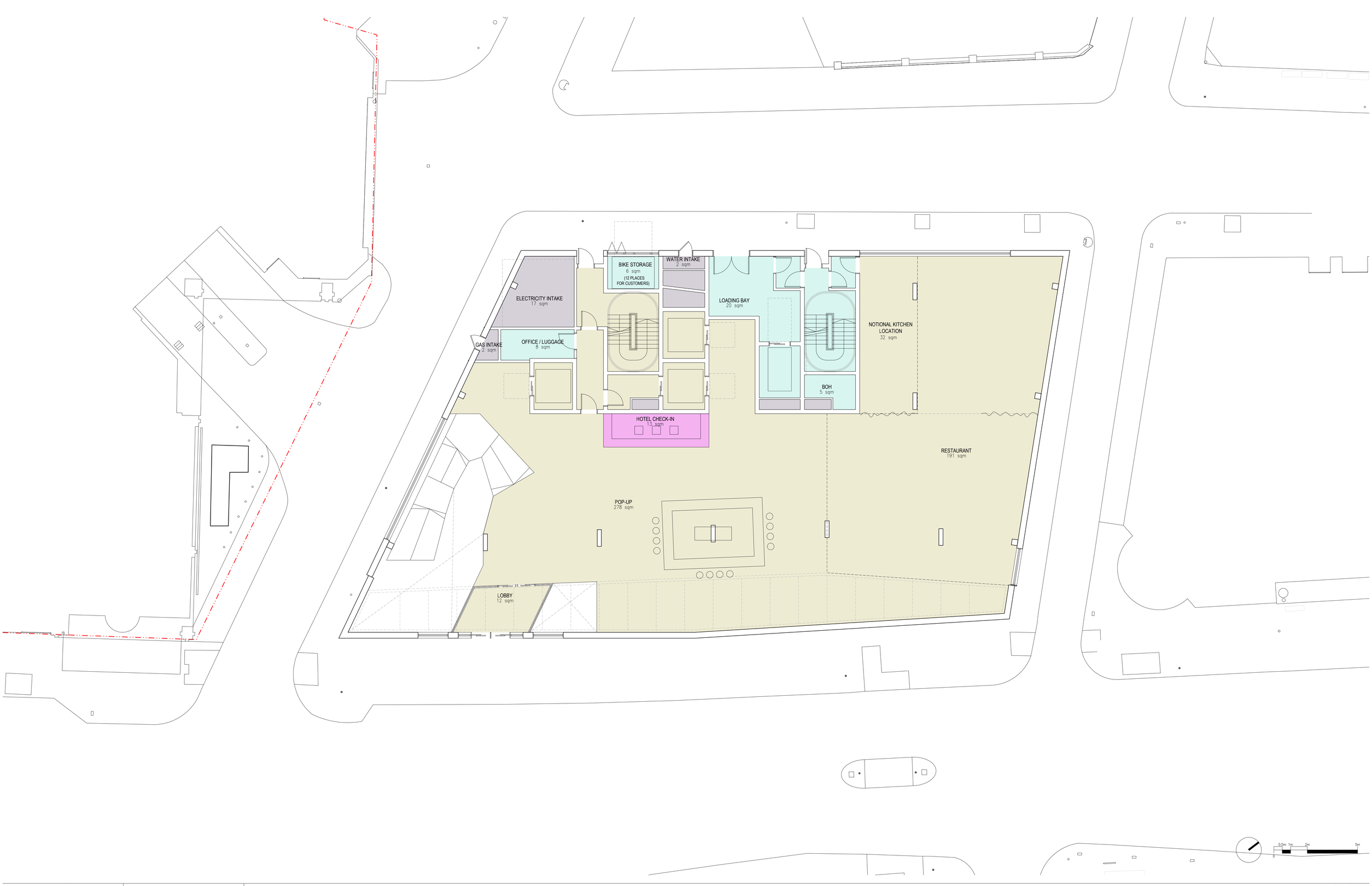


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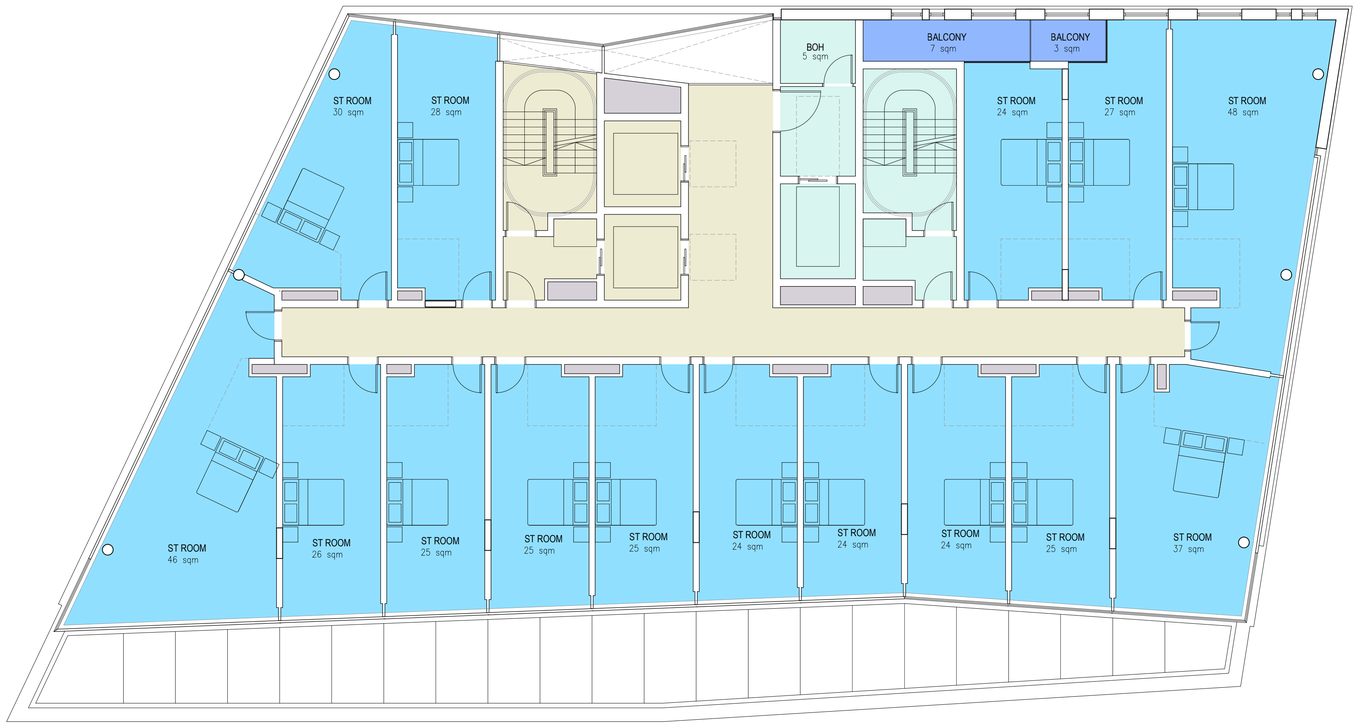


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KEY PLAN

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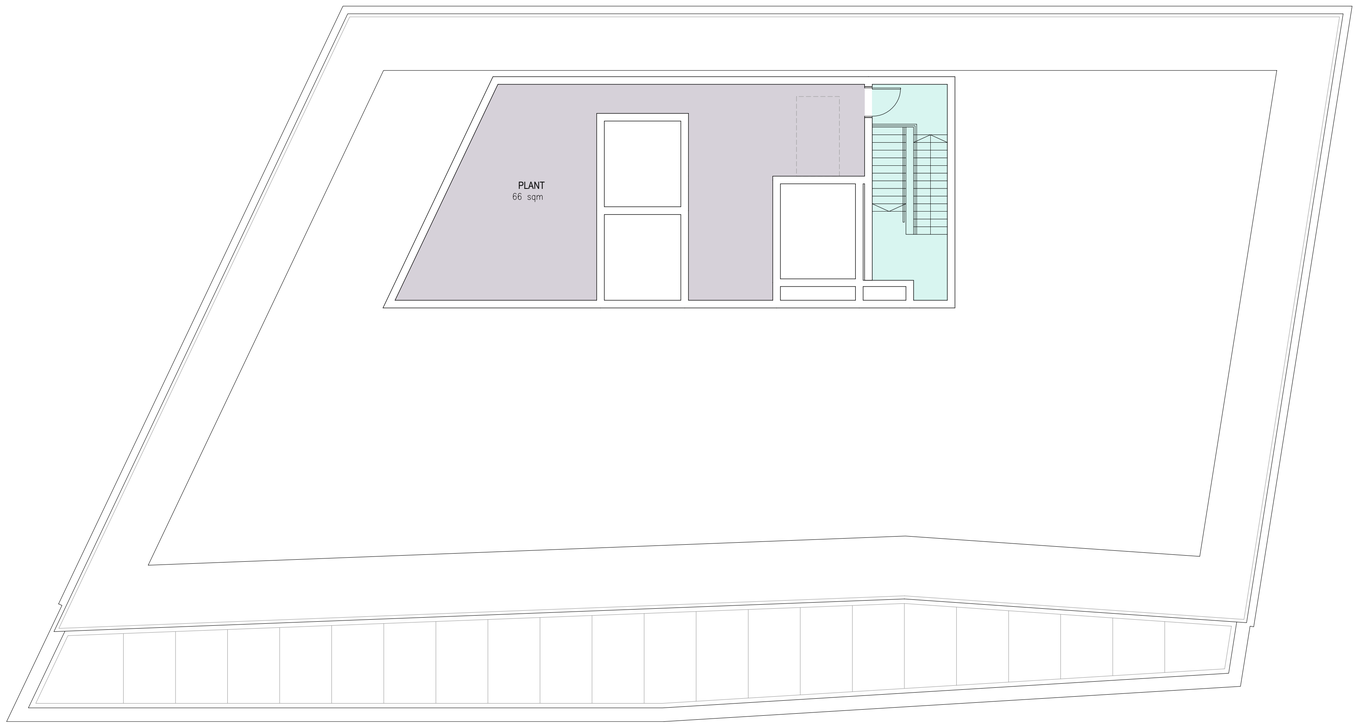


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- CINEMA
- BAR / RESTAURANT
- RECEPTION
- KITCHEN
- SPA / POOL
- PLANT
- CIRCULATION
- BACK OF HOUSE
- STANDARD ROOM
- SUITE

| REV | DATE | DESCRIPTION | DRN | CHK |
|---|---|---|---|---|
| P01 | 08.12.17 | FOR INFORMATION | COS | COS |

DRAFT

DRAWING TITLE
GENERAL ARRANGEMENT
PROPOSED ROOF PLAN
+53.150m F.F.L

SCALE 1:100 A1 SHEET

STATUS
PLANNING

DRAWING NO 2818–JW–122

REV P01

jestico + whiles
Sutton Yard 65 Goswell Road London EC1V 7EN
t +44 (0) 20 7380 0382 w jesticowhiles.com
architecture + interior design london + prague

CLIENT
CAPITAL START LTD

PROJECT
ODEON
SHAFTESBURY AVENUE, LONDON


DO NOT SCALE THIS DRAWING ALL DIMENSIONS MUST BE CHECKED ON SITE INFORM THE ARCHITECT OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION

KEY PLAN

NOTES

| REV | DATE | DESCRIPTION | DRN | CHK |
|---|---|---|---|---|
| P01 | 08.12.17 | FOR INFORMATION | CGS | CGS |

DRAFT

DRAWING TITLE
ELEVATIONS
PROPOSED SOUTH-EAST ELEVATION
SHAFTESBURY AVENUE

SCALE 1:100 A1 SHEET

STATUS
PLANNING

DRAWING NO 2818-JW-132

REV P01

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0 0.5m 1m 2m 5m

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KEY PLAN

NOTES

| REV | DATE | DESCRIPTION | DRN | CHK |
|---|---|---|---|---|
| P01 | 08.12.17 | FOR INFORMATION | COS | COS |

DRAFT

DRAWING TITLE
ELEVATIONS
PROPOSED NORTH-WEST ELEVATION
NEW COMPTON STREET

SCALE 1:100 A1 SHEET

STATUS
PLANNING

DRAWING NO 2818-JW-133

REV P01

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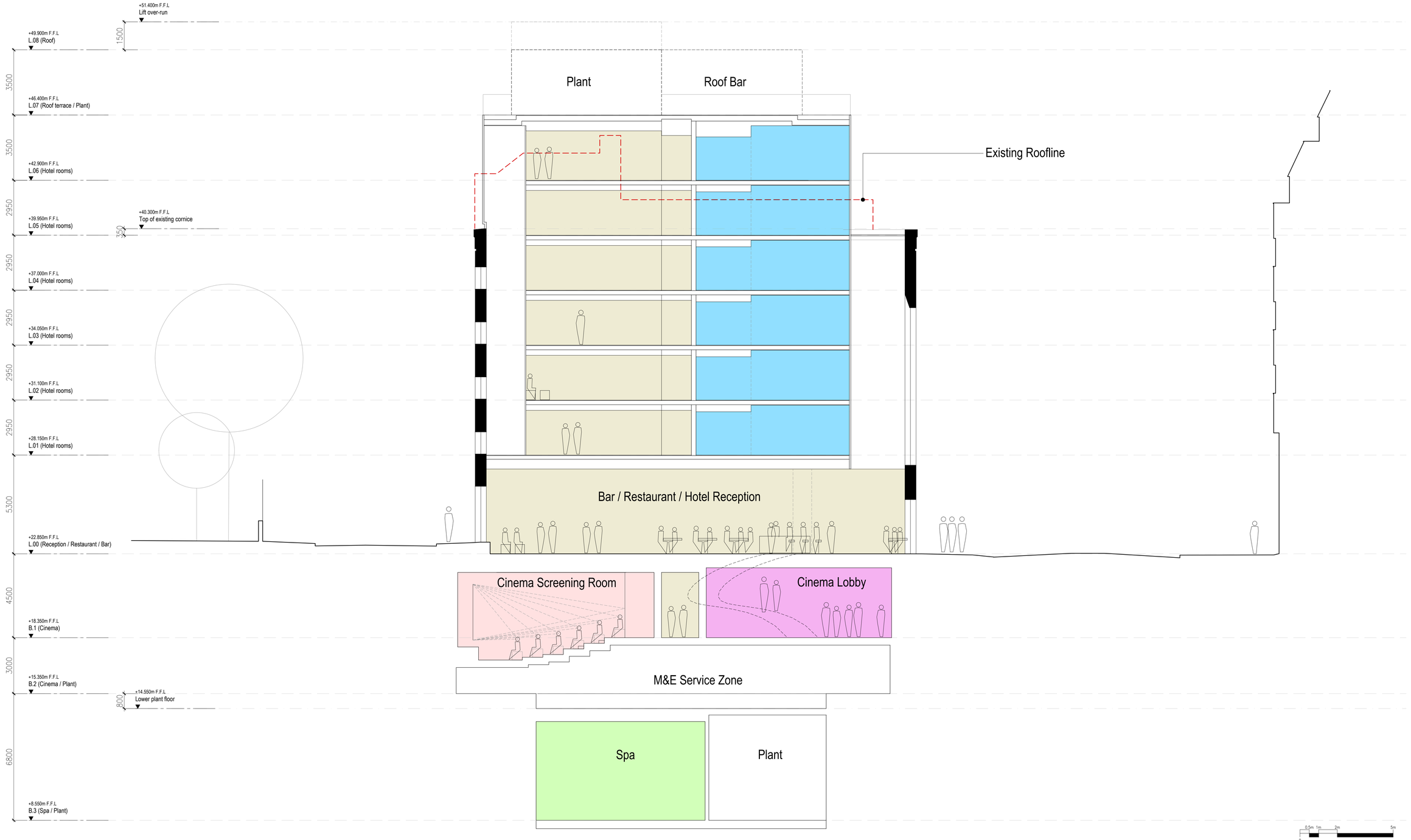
SHAFTESBURY AVENUE, LONDON




DO NOT SCALE THIS DRAWING ALL DIMENSIONS MUST BE CHECKED ON SITE
INFORM THE ARCHITECT OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION

KEY PLAN

NOTES

- CINEMA
- BAR / RESTAURANT
- RECEPTION
- KITCHEN
- SPA / POOL
- PLANT
- CIRCULATION
- BACK OF HOUSE
- STANDARD ROOM
- SUITE

| REV | DATE | DESCRIPTION | DRN | CHK |
|---|---|---|---|---|
| P01 | 08.12.17 | FOR INFORMATION | COS | COS |

DRAFT

DRAWING TITLE
SECTIONS
PROPOSED SECTION AA

SCALE 1:100 A1 SHEET

STATUS
PLANNING

DRAWING NO 2818–JW–142

REV P01

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