09 Air Quality

Replacement Environmental Statement
Volume I

09 Air Quality

Preface – Update 2015

- This replacement November 2015 Environmental Statement (hereafter referred as the 'November 2015 Replacement ES' or 'this Replacement ES') takes into account the design changes to the Blossom Street project (refer *Chapter 4: Proposed Development*) that have occurred since the submission of the application in December 2014 ES and concludes if any changes to the likely significant effects occur as a result of those changes. This Replacement ES consolidates the environmental assessment of the design changes into a single ES, presenting commentary (under the heading 'Update 2015') for the design changes in the March 2015 ES Addendum (the 'March 2015 ES Addendum') by blue text, and the design changes arising from the current design changes by red text. Where relevant, text removed will be denoted by strike-through, e.g. ~~effect~~), and updated tables and figures will be denoted by the suffix 'A' (e.g. Table 2.10A).
- This Replacement ES adopts the following terminology to describe the development descriptions and design changes:
    - Proposed Development: description of the development presented in the December 2014 ES;
    - Revised Scheme: description of the scheme incorporating the design changes to the Proposed Development in March 2015 (the design changes referred as the 'March 2015 amendments'), assessed within the March 2015 ES Addendum;
    - Amended Proposed Development: description of the development incorporating the current design changes to the Revised Scheme (the design changes referred as the 'November 2015 amendments'), to be assessed within the November 2015 Replacement ES.
- For clarification, since the preparation of the December 2014 ES, AECOM has merged with URS Infrastructure & Environment UK Limited (URS) to become a single environmental consultancy. Reference within the text to 'URS' in the November 2015 Replacement ES has now been replaced by AECOM Infrastructure and Environment UK Limited (hereafter referred to as 'AECOM').
- Further details in regard to the approach taken in this November 2015 Replacement ES are outlined in *Chapter 2: EIA Methodology*.

Introduction

9.1 This chapter provides the potential effects on local air quality resulting from the Blossom Street development (the "Site") located in the London Borough of Tower Hamlets (LBTH). In particular, it assesses the potential effects associated with dust generation and additional road traffic during both the demolition and construction phase and occupation of the Site.

9.2 This chapter includes a description of the assessment methodology, baseline conditions at the Site and its surroundings, the mitigation measures required to prevent, reduce or offset any significant adverse effects, and likely residual effects after these measures have been employed. The likely air quality effects of the Site in combination with the potential effects associated with other schemes in the surrounding area are also discussed.

9.3 Descriptions of the scenarios considered are provided in the Assessment Methodology and Effect Significance Criteria section of this chapter. For the purpose of this air quality ES chapter, the scenarios assessed for the potential opening year "With" and "Without the Development" have been based upon predictions which inherently include cumulative schemes, providing worst case predications for future year air quality. This chapter therefore presents the likely effect of the Site in terms of magnitude of change of pollutants, over baseline scenarios which incorporate the potential effects associated with other schemes in the surrounding area. Emissions calculations have also been prepared to consider whether the operation of the Site is 'air quality neutral'.

9.4 This chapter has been prepared by AECOM and is supported by ***ES Volume III: Appendix D***.

Legislation and Planning Framework

National Legislation

9.5 The Clean Air for Europe (CAFE) programme revisited the management of Air Quality within the EU and replaced the EU Framework Directive 96/62/EC (Ref. 9-1), its associated Daughter Directives 1999/30/EC (Ref. 9-2), 2000/69/EC (Ref. 9-3), 2002/3/EC (Ref. 9-4), and the Council Decision 97/1010/EC (Ref. 9-5) with a single legal act, the Ambient Air Quality and Cleaner Air for Europe Directive 2008/50/EC (Ref. 9-6). Directive 2008/50/EC (Ref. 9-6) is currently transcribed into UK legislation by the Air Quality Standards Regulations 2010 (Ref. 9-7). These limit values are binding on the UK and have been set with the aim of avoiding, preventing or reducing harmful impacts on human health and on the environment as a whole.

National Policy and Guidance

National Planning Policy Framework (2012)

9.6 The National Planning Policy Framework (NPPF) (Ref. 9-8) (8) states (para 109) that:

"The planning system should contribute to and enhance the natural and local environment by: preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels or soil, air, water, or noise pollution or land instability…"

9.7 Annex 2 of the NPPF defines 'Pollution' as:

"Anything that affects the quality of land, air, water or soils, which might lead to an adverse impact on human health, the natural environment or general amenity. Pollution can arise from a range of emissions, including smoke, fumes, gases, dust steam, odour, noise and light."

9.8 Paragraph 124 of the NPPF states that:

"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative effect on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."

9.9 There are both national, regional (i.e. London) and local policies for the control of air pollution and local action plans for the management of local air quality in the London Borough of Tower Hamlets (LBTH). The achievement of such policies and plans are matters that may be a material consideration by planning authorities, when making decisions for individual planning applications.

Planning Practice Guidance (2014)

9.10 The Planning Practice Guidance (PPG) (Ref. 9-9), provides a summary of the air quality issues set out in the NPPF and goes on to note that the assessment should include the following information:

- The existing air quality in the study area (existing baseline);
- The future air quality without the development in place (future baseline), and
- The future air quality with the development in place (with mitigation).

9.11 The guidance then advises that the application should proceed to decision with appropriate planning conditions or planning obligation, if the development proposed (including mitigation) would not lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or fail to comply with the requirements of the Habitats Regulations.

National Air Quality Strategy (2012)

9.12 The UK National Air Quality Strategy (Ref. 9-10) was initially published in 2000, under the requirements of the Environment Act 1995 (Ref. 9-11). The most recent revision of the strategy (Ref. 9-12) sets objective values for key pollutants as a tool to help Local Authorities manage local air quality improvements in accordance with the EU Air Quality Framework Directive. Some of these objective values have subsequently been laid out within the Air Quality (England) Regulations 2000 (Ref. 9-13) and later amendments (Ref. 9-14).

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9.13 The Air Quality Strategy (AQS) Objective values referred to in Table 9.1 have been set down in regulation solely for the purposes of local air quality management. Under the local air quality management regime, LBTH has a duty to carry out regular assessments of air quality against the objective values and if it is unlikely that the objective values will be met in the given timescale, they must designate an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) with the aim of achieving the objective values. The boundary of an AQMA is set by the governing local authority to define the geographical area that is to be subject to the management measures to be set out in a subsequent action plan. Consequently, it is not unusual for the boundary of an AQMA to include within it, relevant locations where air quality is not at risk of exceeding an air quality objective.

9.14 The UK's national AQS Objective values for the pollutants of relevance to this assessment are displayed in Table 9.1.

Table 9.1 National Air Quality Strategy Objectives

Pollutant	Objective (µg/m³)	Averaging Period	Not to be exceeded more than
Nitrogen dioxide (NO_2)	200	1 hour	18 times per year (i.e. 99.8th percentile)
	40	Annual	Not applicable
Particulate matter (PM_{10})	40	Annual	Not applicable
	50	24 hour	35 times per year (i.e. 90.4th percentile)
Particulate matter ($PM_{2.5}$)	25	Annual	Not applicable

Regional Policy and Guidance

The London Plan - (2011)

9.15 The London Plan 2011 (Ref. 9-15) applies the following regional planning policy to air quality:

- Policy 5.7 - Renewable energy, states all renewable energy systems should be located and designed to minimise any potential adverse effects on air quality;
- Policy 6.13 - Parking, states outer London boroughs wishing to promote a more generous standard for office developments would need to demonstrate no significant adverse effect on congestion or air quality; and
- Policy 7.14 - emphasises the need to achieve reductions in pollutant emissions and public exposure to pollution.

Revised Early Minor Alterations to the London Plan (2013)

9.16 The Revised Early Minor Alterations (REMA) (Ref. 9-16) proposes changes to Policy 7.14 *'Improving Air Quality'*. It confirms the intention of the Mayor to support Local Authorities with the development of Supplementary Planning Guidance (SPG) to aid the determination of planning applications and to assist in identifying appropriate mitigation measures.

Draft Further Alterations to the London Plan (2014)

9.17 The Draft Further Alterations to the London Plan (FALP) (Ref. 9-17) sets out changes to Policy 7.14 *'Improving Air Quality'* and confirms the intention of the Mayor to support Local Authorities with the development of SPG to aid the determination of planning applications and to assist in identifying appropriate mitigation measures.

'Clearing the Air' – The Mayor's Air Quality Strategy (2010)

9.18 The Mayor's 2010 Air Quality Strategy for London (Ref. 9-18) was published in December 2010 and replaces the 2001 Air Quality Strategy (Ref. 9-19), which identified that the main pollutants of concern in London are nitrogen dioxide and particulate matter.

9.19 The 2010 Air Quality Strategy targets 'air quality neutral' developments.

The Mayor's Transport Strategy (2010)

9.20 The Mayor's Transport Strategy was published in May 2010 (Ref. 9-20) and will be the principal tool through which the Mayor exercises his responsibilities for the planning, management and development of transport in London, for both the movement of people and goods. It replaces the 2001 Transport Strategy and supports the London Plan and Economic Development Strategy.

London Council's Air Quality and Planning Guidance (2007)

9.21 The London Councils 'Air Quality and Planning Guidance' (Ref. 9-21) provides an overview of the planning system, and justification as to when air quality assessments for developments should be undertaken.

Sustainable Design and Construction Supplementary Planning Guidance (2014)

9.22 The London Plan includes a policy relating to 'air quality neutral development' and aims to bring forward developments that are air quality neutral or better and that do not degrade air quality in areas where EU limit values (or air quality objectives) are not currently achieved. In 2013 the GLA drafted a revised SPG, which underwent consultation and was recently published in April 2014 (Ref. 9-22).

9.23 The publication states that "Developers and contractors should follow the guidance set out in the emerging SPG on The control of dust and emissions from construction and demolition when constructing their development", referring to the most recent Institute of Air Quality Management (IAQM) guidance (Ref. 9-23).

GLA The Control of Dust and Emissions During Construction and Demolition in London Supplementary Planning Guidance (2014)

9.24 The GLA's The Control of Dust and Emissions During Construction and Demolition in London Supplementary Planning Guidance (SPG) (Ref. 9-24) contains a comprehensive list of dust control measures for construction and demolition activities.

Local Policy and Guidance

LBTH Core Strategy (2010)

9.25 The LBTH Core Strategy (Ref. 9-25) aims to pro-actively protect and enhance the local environment by minimising poor air quality in the Borough. Policy SP03 of the strategy aims to create a healthy and liveable neighbourhood by addressing the effect of air pollution in the Borough. It aims to achieve this by targeting air quality management along transport corridors and traffic-congestion points.

LBTH Managing Development Document (2013)

9.26 The LBTH Managing Development Document (MDD) (Ref. 9-26) presents policy DM9 '*Improving air quality*', which states that major development will be required to submit an Air Quality Assessment demonstrating how it will prevent or reduce associated air pollution during construction and demolition. Minor developments will be required to submit details outlining practices to prevent or reduce associated air pollution during construction or demolition. Developments located in the LBTH Clear Zone will also need to demonstrate consideration of the Clear Zone objectives.

9.27 The Site is located within the LBTH Clear Zone and should consider the objective within the Clear Zone Plan 2010-2025 (Ref. 9-27) to "*Reduce air pollution from transport sources to improve air quality in the Aldgate area across the Clear Zone*".

LBTH Code of Construction Practice (2006)

9.28 The LBTH has their own Code of Construction Practice (CoCP) which must be followed by all contractors working on new developments (Ref. 9-28). With specific reference to air quality matters, the CoCP provides guidance and mitigation measures for works within the construction site.

LBTH Air Quality Action Plan (2003)

9.29 Under the requirements of Part IV of the Environment Act (1995) (Ref. 9-11), LBTH has carried out a phased review and assessment of local air quality within their district. (Ref. 9-29 and Ref. 9-30).

9.30 In 2000, a review and assessment process was undertaken for air quality in the borough, which resulted in the Air Quality Management Area (AQMA) being declared for the whole Borough of LBTH for exceedances of the 24-hour mean Particulate Matter (PM_{10}) and nitrogen dioxide (NO_2) annual mean air quality objectives. The Air Quality Action Plan (Ref. 9-31) was produced to address the issues from the review and assessment process, and focuses on tackling the sources of pollutants.

9.31 The Air Quality Progress Report (Ref. 9-30) identified that: carbon monoxide, benzene, 1,3-butadiene, lead and sulphur dioxide were not at significant risk of the objectives being exceeded in the Council's area.

9.32 The 2014 Air Quality Progress Report findings conclude that the LBTH AQMA should be maintained.

Other Relevant Policy and Guidance

9.33 There is currently no statutory guidance on the method by which an air quality assessment should be undertaken. The following organisations have published their own guidance for carrying out air quality assessments for development control. These guidance documents have been used in this air quality assessment to present best practice for mitigation measures and significance of effects for the refurbishment and construction and operational phases of the Proposed Development.

- The Institute of Air Quality Management (IAQM) (Ref. 9-23) - Guidance on the assessment of dust from demolition and construction (2014);
- Environmental Protection UK (EPUK) (Ref. 9-34) - Development Control: Planning for Air Quality (2010);
- Department for Environment, Food and Rural Affairs (Ref. 9-37) - Local Air Quality Management Technical Guidance (2003, 2009); and
- Building Research Establishment (BRE) - Control of Dust from Construction and Demolition Activities (2003) (Ref. 9-33).

Legislation and Planning Framework - Update 2015

March 2015 ES Addendum

9.34 Since the submission of the December 2014 ES, no changes to air quality legislation or planning policy have been made that affect the assessment in the December 2014 ES.

November 2015 Amendments

The London Plan (2015)

9.35 The adoption of the FALP in March 2015 resulted in the consolidation of changes to the London Plan (2011) to become the 'London Plan (2015)' (Ref. 9-44). The London Plan (2015) also incorporates the REMA, which were published in October 2013.

9.36 No changes were made to the policy affecting the assessment as part of the adoption of the London Plan 2015 and does not alter the overarching content of the policy review undertaken as part of the December 2014 ES.

Minor Alterations to the London Plan (2015)

9.37 On the 11th of May 2015 the Mayor of London published for six weeks public consultation (11th May to 22nd June) two sets of Minor Alterations to the London Plan – on Housing Standards and on Parking Standards (Ref. 9-42). Both sets of minor alterations were to be considered at a public examination, commencing on 21st October 2015.

9.38 These minor alterations have been prepared to bring the London Plan in line with new national housing standards and car parking policy. No changes were made to the policy affecting the assessments as part of the Minor Alterations, so does not alter the overarching content of the policy review undertaken as part of the December 2014 ES.

Other Relevant Policy and Guidance

9.39 In April 2015, the IAQM and EPUK have released an updated guidance for planning purposes. The new guidance has been produced to ensure that air quality is adequately considered in the land-use planning and development control processes and supersedes the one used in the December 2014 ES and March 2015 ES Addendum.

Assessment Methodology and Significance Criteria

Consultation

9.40 LBTH were consulted throughout the evolution of the Proposed Development. The scope of the air quality assessment for the EIA was set out in the EIA Scoping Report submitted to LBTH in July 2014. The EIA Scoping Opinion identified a list of information to be accounted for within the assessment. These have been addressed within this chapter (refer below) or where topics have not been addressed, justification has been provided.

9.41 Matters addressed include:

Table 9.2 Matters raised within Scoping Opinion

Topic	Reference in Chapter / Application Documentation
London Borough of Tower Hamlets	
The Applicant will need to discuss the methodology in more detail with the Air Quality Officer.	Refer '*Further Consultation*' and '*Assessment Methodology*' sections below
With respect to the proposed monitoring locations, LBTH requests an additional location mid-way between monitoring sites 3 and 4.	It is considered that the data collected at monitoring locations 3 and 4 will be sufficient to appropriately represent the area suggested for an additional monitoring location, The proposed residential receptor between these two monitoring sites (P3) has been considered as part of the detailed dispersion modelling. LBTH Response (October 2014): LBTH don't always require air quality monitoring to be undertaken, and therefore would assume that we can make do with the locations that have been used.
LBTH prefers the use of GLA guidance on demolition and construction dust rather than IAQM guidance.	The Control of Dust and Emissions During Construction and Demolition, Supplementary Planning Guidance(July 2014) notes in the Risk Evaluation Considerations section that: *'The approach outlined below is based on the site evaluation process set out in the Institute of Air Quality Management's (IAQM) 2014 Guidance on the Assessment of dust from demolition and construction. This guidance is periodically updated and, therefore, the latest version of the IAQM Guidance should be used.'* Therefore, the use of the latest IAQM guidance for assessing potential impacts during the demolition and construction phase is consistent with GLA Guidance requirements.
It is not considered appropriate for an increase in emissions, however small, to be categorised as negligible.	In line with IAQM guidance, a change of 0.4 or less in pollutant concentration is classified as a negligible impact. We will follow the guidance as it accounts for the uncertainty within dispersion modelling and relates to the air quality objective value (i.e. 0.4 is 1% of the 40 ug/m3 annual mean objective for NO_2 and PM_{10}). In order to account for the small changes in overall air pollution levels, an Air Quality Neutral (AQN) assessment will be undertaken in accord with the GLA 'Sustainable Design and Construction Supplementary Planning Guidance (SPG)' (refer ***ES Volume III: Appendix D***). This method of assessment has been put in

Topic	Reference in Chapter / Application Documentation
	place by the GLA in order to enable consideration of, and account for, any small changes in emissions at the local (site) level.
The ES should provide a transparent account of the modelling undertaken, all assumptions made and all input data (for example, traffic flows) used	Refer '*Assessment Methodology*' and '*Potential Effects and Mitigation Measures*' sections, and ***ES Volume III: Appendix D***
When assessing the heating plant emissions, consideration should be given to the fuel type, thermal rating and location of the equipment	The energy strategy for the Site adopts a centralised site-wide system that based on electric supply that will not generate additional emissions at the location of the Site. The Site will be entirely served by heat pumps for all air conditioning and domestic hot water applications. The proposed heating system based on electric supply will not generated additional emissions at the location Site sits (*refer to the 'Energy Strategy' submitted with the Application*).

Further Consultation

9.42 In the scoping response received from LBTH, it was requested for further discussion to be held relating to the methodology and that an additional monitoring location be included half-way between monitoring locations 3 and 4.

9.43 The LBTH Air Quality Officer was contacted via email on 22nd October 2014 to address the requests within the Scoping Opinion further however no response has been received at the time of writing. Despite this, it was confirmed by the LBTH EIA Officer that air quality monitoring is not always required to be undertaken, and therefore would assume that we can rely on the locations that have been used (further correspondence details, refer ***ES Volume III: Appendix A***).

9.44 The monitoring sites which have been used within the assessment are considered to provide a suitably robust understanding of local air quality conditions for use in verifying dispersion model predictions. Proposed residential receptor P3 (see figure 9-1) has been included within the dispersion modelling to represent the location requested by LBTH - refer '*Potential Effects and Mitigation Measures*' section below.

Assessment Methodology

9.45 This section presents the methodology used to assess the potential effects on air quality during the demolition and construction phase and on the completion and occupation of the Site.

9.46 This section will explain the methods used to assess the significance of:

- Fugitive emissions of particulate matter from demolition and construction phase activities;
- The suitability of the Site for residential uses; and
- Traffic exhaust emissions on nearby receptors.

9.47 The methods used to determine the significance of effects associated with air quality impacts are described in the Significance Criteria sub-section of this ES Chapter.

Description of Pollutants Assessed

Construction Dust Emissions - Fugitive Emissions of Particulate Matter

9.48 This construction assessment is consistent with the overarching approach to the assessment of the impacts of construction as set out in current guidance from the Institute of Air Quality Management (IAQM) (Ref. 9-23). The method for this assessment however differs from the IAQM's guidance in taking a more conservative, site specific approach to assigning the significance of potential effects. The assessment considers the significance of potential effects with standard mitigation in place (i.e. measures required by legislation) and recommends additional mitigation measures appropriate to the identified risks to receptors.

9.49 Fugitive emissions (i.e. emissions which are not associated with a single fixed release point) of airborne particulate matter are readily produced through the action of abrasive forces on materials and therefore a wide range of site preparation and construction activities have the potential to generate this type of emissions, including:

- Demolition work;
- Earthworks, including the handling, working and storage of materials;
- Construction activities; and
- The transfer of dust making materials from the site onto the local road network.

9.50 'Dust' is defined in BS 6069:1994 (Ref. 9-32) as particulate matter in the size range 1µm - 75µm in diameter, and is primarily composed of mineral materials and soil particles. This definition is also referred to in NPPF technical guidance (Ref. 9-9) in the context of dust impacts from mineral extraction operations and this definition of dust has been adopted in this assessment.

9.51 PM_{10} is a size fraction of particulate matter that is composed of material with an aerodynamic diameter of less than 10 micrometers (µm) in diameter, and includes the size fractions of greatest concern to impacts on human health. The majority of construction dust is larger than 10 µm in diameter and, therefore, increased levels of dust in the air do not necessarily equate to an increase in levels of PM_{10}. In general, construction dust rarely represents an adverse risk to human health and adverse effects are more typically associated with consequences of material depositing onto property.

9.52 Particulate matter may have an impact whilst airborne or as a result of its deposition onto a solid or liquid surface. Consequently the nature of the impact requiring assessment varies between different types of receptor. In general receptors associated with higher baseline dust deposition rates are less sensitive to impacts, such as farms, light and heavy industry or outdoor storage facilities. In comparison some hi-technology industries or food processing plants operate under clean air conditions and increased airborne particulate matter concentrations may have an increased economic cost associated with the extraction of more material by the plants air filtration units.

9.53 Table 9.3 provides some generic examples of the type of impacts that may result from fugitive emissions of particulate matter. The sensitivity of receptor types is listed for selected impacts, with sensitivity being described as 'high' for receptors that are especially sensitive to the specified impact. For example, industrial painting operations are considered to be more sensitive to the impact of material becoming soiled by depositing material, than residential properties or schools are.

Table 9.3 Types of Impacts from Emissions of Particulate Matter

Potential Effect	Receptor Types	Relative Sensitivity
Change in 24 hour mean PM_{10} concentrations	Residential properties	Receptor sensitivity was considered when Air Quality Objective Value was set.*
	Schools	
	Hospitals and clinics	
Change in the rate at which air filtration units require maintenance	Hospitals and clinics	High
	Hi-tech industries	High
	Food processing industries	High
Change in the rate at which dust is deposited on glossy surfaces such as glass or paint work	Painting and furnishing operations	High
	Residential properties	Medium
	Schools	Medium
	Food retailers	Medium
	Offices	Medium
	Museums and Galleries	Medium
	Glasshouses	Medium
Change in the rate at which property or	Food processing industries	High

Potential Effect	Receptor Types	Relative Sensitivity
products becomes soiled by deposited material	Painting and furnishing operations	High
	Museums and Galleries	High
	Residential properties	Medium
	Food retailers	Medium
	Offices	Medium
	Horticultural Land	Medium
Change in the rate at which mineral material is deposited onto vegetation	Ecological sites	Medium – Low
Change in chemical composition of mineral material deposited	Ecological sites	Medium - Low
	Outdoor Storage	Medium – Low
	Horticultural Land	Low
	Agricultural	Low

**Receptor sensitivity to changes in 24 Hours PM10 concentrations is not subdivided as they were all considered of equal sensitivity when setting the National Air Quality Strategy objectives.*

Road Traffic Emissions- Hydrocarbon Emissions and NO_2 and Particulate Matter Emissions.

9.54 The incomplete combustion of fuel in vehicle engines results in the presence of hydrocarbons (HC) such as benzene and 1,3-butadiene, and sulphur dioxide (SO_2), carbon monoxide (CO), PM_{10} and $PM_{2.5}$ (aerodynamic diameter less than 2.5 µm) in exhaust emissions. In addition, at high temperatures and pressures found within vehicle engines, some of the nitrogen in the air and the fuel is oxidised to form NO_x, mainly in the form of nitric oxide (NO), which is then converted to NO_2 in the atmosphere. The presence of NO_2 in the atmosphere is associated with adverse effects on human health.

9.55 Better emission control technology and fuel specifications are expected to reduce emissions per vehicle in the long term.

9.56 Although SO_2, CO, benzene and 1,3-butadiene are also present in motor vehicle exhaust emissions, detailed consideration of the associated effects on local air quality is not considered relevant in the context of this assessment. This is because road traffic emissions of these substances have been reviewed by LBTH and the latest published AQAP (Ref. 9-30) confirms that NO_2 and PM_{10} are the two pollutants of concern within the Borough.

9.57 During operation, the Site has the potential to change vehicle movements on the surrounding road network. An increase in vehicle emissions can increase the exposure at sensitive receptors to concentrations of the key pollutants NO_2 and particulate matter (PM_{10} and $PM_{2.5}$). Therefore, these pollutants will be the focus of the assessment of the significance of road traffic effects.

Method for Determining Demolition and Construction Phase Effects

Demolition and Construction Dust Emissions

9.58 A qualitative assessment has been undertaken to assess the significance of any effects on sensitive receptors. The assessment, in accordance with the IAQM guidance (Ref. 9-23) for assessing dust during the demolition and construction works, will assess potential sources of emissions on the basis of the four main activity groupings:

- Demolition;
- Earthworks;
- Construction; and
- Track-out.

9.59 For each activity group the following steps are applied with respect to identifying the potential effects, before coming to an overall conclusion about the significance of the effects predicted.

9.60 The approach to the assessment involves the following process:

- Identify the nature, duration and the location of activities being carried out;
- Establish the risk of adverse impacts occurring as a result of these activities, in terms of the sensitivity of the receptor and risk of the impact;
- Review the proposed or embedded mitigation against good site practice (described in the '*Environmental Design and Management*' section);
- Identify additional mitigation measures, if necessary, to reduce the risk of an adverse effect occurring at receptors; and
- Summarise the overall residual effect of the works with respect to fugitive emissions of particulate matter and then report the significance.

9.61 The emphasis of the regulation and control of demolition and construction dust should be the adoption of good working practices. Good practice is a process that is informed by the assessment, which seeks to avoid the potential for adverse effects. This approach assumes that mitigation measures will be implemented during works to ensure potential significant adverse effects do not occur. Examples of accepted good site and best practice include the BRE guidelines (Ref. 9-33), the GLA's SPG (Ref. 9-24), LBTH CoCP (Ref. 9-28) and the Considerate Contractor Schemes.

Construction Phase Road Traffic Emissions

9.62 Road traffic associated with the demolition and construction phase has been sourced from ***Chapter 5 Demolition and Construction***. An impact assessment of the construction vehicle movements on the surrounding road network is presented with ***Chapter 8: Traffic and Transport***.

9.63 As stated in the ***Chapter 5 Demolition and Construction*** of this ES, the number of demolition and construction related vehicles journeys during the demolition and construction phase have been calculated based on demolition/excavated waste material, together with imported concrete, piling, and cladding. An assessment of the demolition and construction vehicle movements on the surrounding road network is presented within ***Chapter 8: Traffic and Transport***.

9.64 It is anticipated that during the peak period of construction traffic activities there will be maximum of 15 construction vehicles arriving and leaving the Site per day, with the majority of trips as HGVs. It should be noted that this volume of traffic is temporary and will take place only during weeks 32 to 36 of construction.

9.65 The EPUK guidance (Ref. 9-34) set out criteria to establish the need for an air quality assessment for the construction phase of a development as being:

"*Large, long-term construction sites that would generate large HGV flows (>200 per day) over a period of a year or more*."

9.66 Given the information above, it is therefore unlikely that the Site will lead to this number of additional vehicle movements during demolition or construction phase. The additional number of vehicle movements is not considered to be high enough to have the potential to cause a significant adverse effect in terms of road traffic emissions at any local air quality sensitive receptor.

9.67 Demolition or construction phase road traffic emissions are therefore not assessed further and the effect on local air quality sensitive receptors will not be significant. This is reflected within the residual effects section of this chapter.

9.68 Whilst the number of construction vehicle movements is unlikely to generate significant effects, to ensure emissions are kept to a minimum and best practice is implemented, mitigation measures are proposed (refer '*Environmental Management and Design – Construction Phase Road Traffic Emissions*' section) to minimise the likelihood of congestion during the demolition and construction phase of the development.

Construction Phase Plant Emissions

9.69 There will be emissions to air during construction activities associated with on-site construction plant. However, it is anticipated that there will be relatively few plant present in any area on-site at any one time,

and that the total number used will be relatively small compared to background road traffic levels in the area.

9.70 Therefore this temporary source of pollution is not considered to be significant and is not assessed further within this assessment.

Method for Determining Operational Air Quality Effects

Method for Determining Receptors For Assessment

Receptors Potentially Affected by Emissions from Operational Road Traffic

9.71 Pollutant concentrations from road traffic emissions have been quantified along the facades of the future residential building (Site S3) of the Site, as well as at residential receptors located in the surroundings of the Site, along the local road network, that comprise the study area.

9.72 The AQS Objective values for pollutants associated with road traffic emissions have been set at a level below the lowest concentration at which the more sensitive members of society have been observed to be adversely affected by exposure to each pollutant. Therefore all receptors that represent exposure of the public are of equal sensitivity as any member of the public could be present at those locations.

9.73 All relevant receptors that have been selected to represent locations where people are likely to be present are based on impacts on human health. The air quality objective values have been set at concentrations that provide protection to all members of society, including more vulnerable groups such as the very young, elderly or unwell. As such the sensitivity of receptors was considered in the definition of the air quality objective values and therefore no additional subdivision of human health receptors on the basis of building or location type is necessary.

9.74 Impacts from road traffic have been quantified at 11 existing sensitive receptors (Residential Receptor 1 (R1) to Residential Receptor 11 (R11)) in the vicinity of the Site.

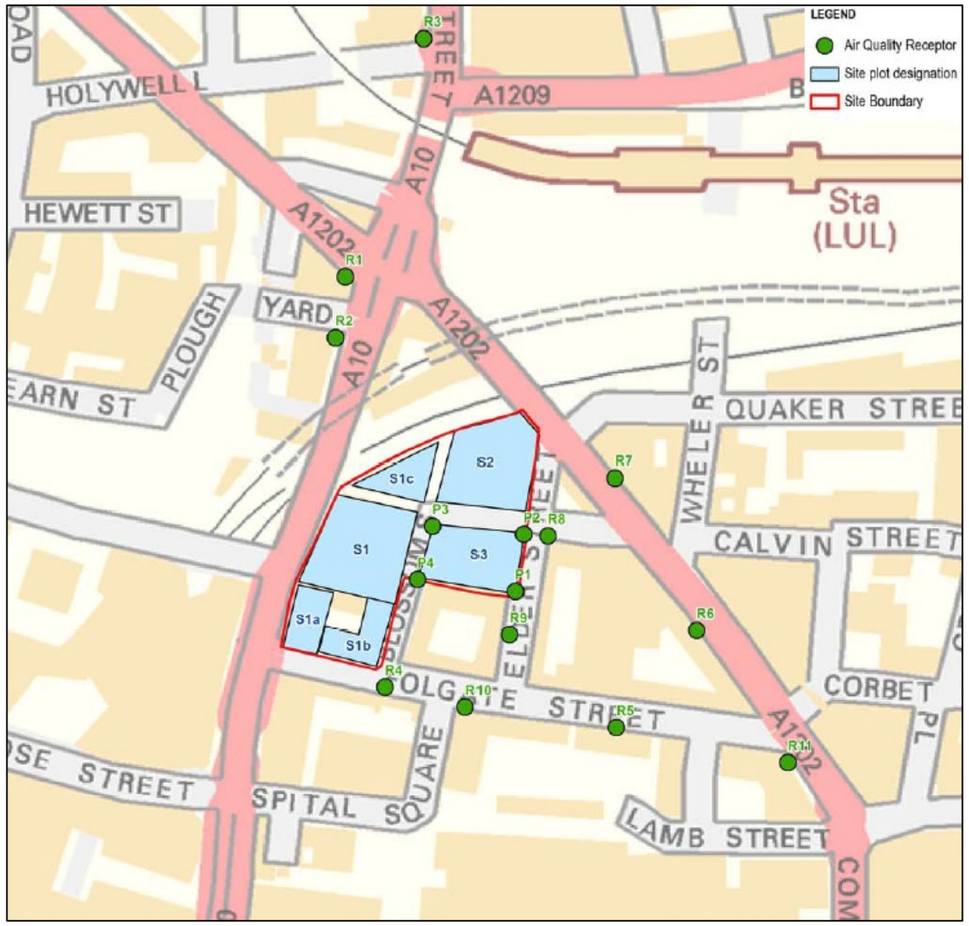
9.75 Four proposed receptors (Proposed 1 (P1) to Proposed 4 (P4)) representing the corners of the Site S3 (provides residential units) will be adopted for the purpose of the site suitability assessment (refer section '*Assessment of Site Suitability – Predicted Future With Development*').

9.76 Each of the receptors chosen represents the maximum level of exposure that would be experienced at other receptors in their vicinity. These existing and proposed receptors are listed in Table 9.4 and presented in Figure 9.1.

Table 9.4 Location of Sensitive Receptors

Receptor	Location	OS Grid reference		Height (m)
		X	Y	
R1	1 Great Eastern St- first floor	533437	182184	3.0
R2	225 Shoreditch High Street - first floor	533432	182153	3.0
R3	193 Shoreditch High St- first floor	533476	182305	3.0
R4	16 Folgate St	533457	181976	1.5
R5	40 Folgate Street	533574	181956	1.5
R6	135-140 Commercial Street	533614	182005	1.5
R7	153 Commercial Street	533573	182083	1.5
R8	1 -3 Fluer De Lis Street	533539	182053	1.5
R9	30 Elder Street	533519	182003	1.5
R10	26 Folgate Street	533497	181966	1.5
R11	Commercial Street Nursery	533661	181938	1.5
Site Suitability Assessment				
P1	South east corner of the Site S3	533522	182025	1.5
P2	North east corner of the Site S3	533526	182054	1.5
P3	North west corner of the Site S3	533481	182058	1.5
P4	South west corner of the Site S3	533473	182031	1.5

Figure 9.1 Locations of Existing Sensitive Receptors



Assessment Modelling - Operational Road Traffic Emissions

9.77 For the assessment of road traffic emissions during the operational phase, the latest version of the dispersion model software Atmospheric Dispersion Modelling System (ADMS-Roads (version 3.2.4.0)) has been used to quantify pollution levels at selected receptors. ADMS-Roads is a modern dispersion model that has an extensive published track record of use in the UK for the assessment of local air quality effects, including model validation and verification studies (Ref. 9-35). To reflect queuing traffic at selected links traffic speed was change to 20km per hour.

9.78 A 'Street Canyon Effect' was modelled within ADMS Roads for those road links where the height of the buildings on both sides of the road is greater than the road width (i.e. creating a canyon effect, preventing normal air dispersion). Applied canyon heights are presented in the Table 9.9.

9.79 The scenarios considered within the assessment of road traffic impacts include:

- 2013 Baseline (Including existing traffic);
- 2017 Future Baseline (Including existing traffic, traffic associated with cumulative developments);
- 2017 Future with Development (Including existing traffic, traffic associated with cumulative developments and traffic associated with the Site).

Dispersion Model Input Data and Model Conditions

9.80 Details of general model conditions are provided in Table 9.5 for ADMS-Roads.

Table 9.5 ADMS-Roads Model Conditions

Variables	Model Input
Surface roughness at source	1.5 m
Minimum Monin-Obukhov length for stable conditions	100 m
Terrain types	Flat
Receptor location	X, Y coordinates determined by GIS z – various
Emissions	NO_X, PM_{10}*, $PM_{2.5}$*
Emission factors	EFT Version 6.0.1 (2VC) emission factor dataset
Meteorological Data	1 year (2013) hourly sequential data from Heathrow Airport Meteorological station
Emission profiles	None used for conservative estimated of road traffic emissions.
Receptors	Selected receptors (see Table 9.4)
Model output	Long-term annual mean NO_X concentrations Long-term annual mean PM_{10} concentrations Long-term mean $PM_{2.5}$ concentrations

Traffic data

9.81 ADMS-Roads calculates concentrations of pollutants using the following parameters:

- Traffic volume: The number of vehicles travelling a length of road in given time will affect the subsequent ground level concentrations of pollutants;
- Fleet composition: The proportions of Heavy Duty Vehicles (HDVs) (e.g. HDVs and buses) to Light Duty Vehicles (LDVs) (e.g. cars and LGVs) will affect the mass flux of pollutants;
- Fleet velocity: The speed of the fleet affects the mass flux of study pollutants (vehicles engines emit the least pollution at speeds between 60-80 kilometres per hour); and
- Receptors locations: the location of the receptors in relation to the source affects the extent of dispersion.

9.82 The traffic data used in this assessment has been supplied in 24 hour Annual Average Daily traffic flow format (AADT) for the routes in the vicinity of the Site.

NO_X to NO_2 Conversion

9.83 To accompany the publication of the guidance document LAQM.TG(09) (Ref. 9-36), a 'NO_X to NO_2' conversion spreadsheet (Ref.9-43) was made available by the Department for Environment, Food and Rural Affairs (DEFRA) as a tool to calculate the road NO_2 contribution from modelled road NO_X contributions. The tool comes in the form of an MS Excel spreadsheet and uses Borough specific data to calculate annual mean concentrations of NO_2 from dispersion model output values of annual mean concentrations of NO_X. The most recent release of this tool (v4.1, released in June 2014) was used to calculate the total NO_2 concentrations at receptors from the modelled road NO_X contribution and associated background concentration. Due to the location of the Site, the 'All London' traffic setting has been selected.

Model Verification

9.84 In the absence of published local monitoring data or measured data within the air quality study area, a three month diffusion tube survey was completed by URS between 11th of April to 2nd of July 2014. The survey consisted of 8 monitoring sites. The results of the survey are presented in Table 9.10. This assessment has used the results of this survey to inform the verification exercise of the road traffic emissions model, as well as to establish baseline conditions near to the Site.

9.85 Three monitoring sites 2, 4 and 6 located within close proximity to the modelled road network, were selected to be suitable for model bias adjustment.

9.86 Monitoring site 1 situated at the corner of Fleur de Lis Street and Elder Street were established to inform upon site suitability for residential use at the Site. This site is not located close enough to the major traffic network to be suitable for use in the model verification process.

9.87 Monitoring site 3 is situated at the railway bridge located at Commercial Street. This monitoring site recorded higher concentrations than the other monitoring sites situated along the same stretch of the road, indicating that it may be subjected to unique conditions which influence measured results at this location, such as being located close to the railway line and traffic congestion at the narrow lanes of the railway bridge. Hence, it has been assumed that this monitoring site is not representative of the conditions in the vicinity of the proposed site and was excluded from the model verification exercise.

9.88 Monitoring sites 5 and 7 are situated in locations for which traffic data have not been provided. For that reason, the diffusion tubes have been excluded from the model verification exercise.

9.89 Monitoring site 8 is a background site and was therefore not used in the model verification exercise.

9.90 The results of the monitoring were compared to modelled results for those locations, and a bias adjustment factor calculated in line with methods outlined in LAQM (TG(09) (Ref. 9-36). Details of this comparison can be found in Table 9.7.

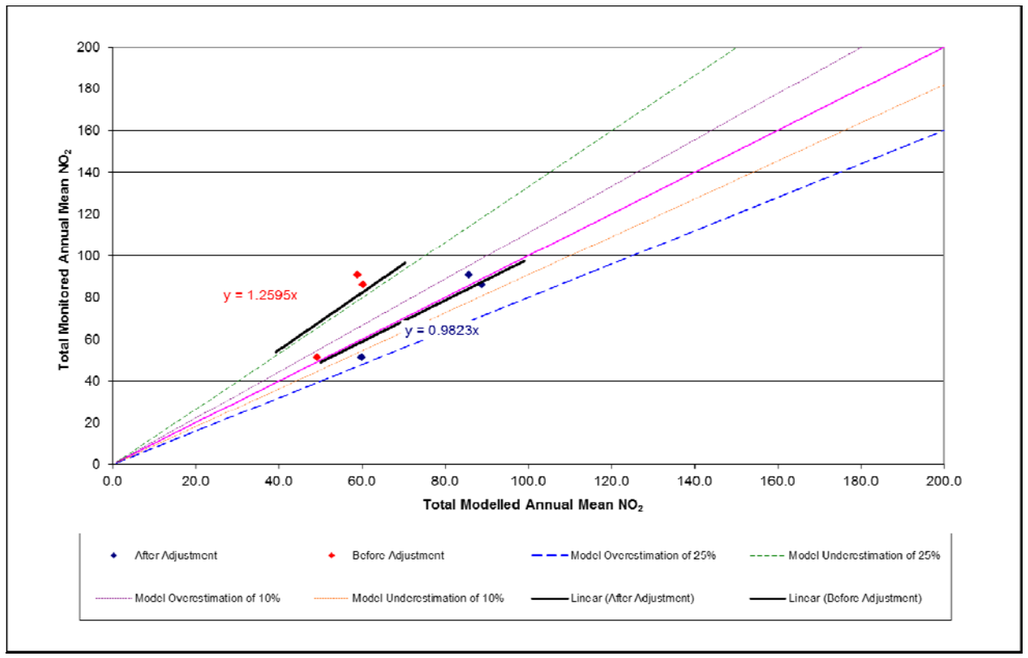
Table 9.6 Summary of NO_2 Verification Exercise

Site ID	Projected Measured Total NO_2 Concentration. ($\mu g/m^3$)	Projected Measured Road NO_X Contribution ($\mu g/m^3$)	Modelled Road NO_X Contribution ($\mu g/m^3$)	Road NO_X Factor
Site 2	51.5	17.5	11.9	1.5
Site 4	86.2	133.4	42.1	3.2
Site 6	90.8	152.0	38.3	4.0
Overall Road NO_X Factor				**3.4**

9.91 Table 9.6 and Figure 9.2 show that the unadjusted model (represent by the red dots) under-predicts annual mean concentrations of NO_2.To account for this bias, the factor of the difference between the modelled and

measured road NO_X contribution at the projected diffusion tube locations were compared, in line with the methodology described in LAQM TG(09) (Ref. 9-36).

Figure 9.2 Modelled Annual Mean NO2 Before And After The Adjustment.



Predicting the Number of Days in which the PM_{10} 24-hr Mean Objective is Exceeded

9.92 In order to assess model results against the Air Quality Strategy 24-hour mean objective for PM_{10}, the guidance document LAQM.TG(03) (Ref. 9-37) sets out the method by which the number of days in which the PM_{10} 24-hr objective is exceeded can be obtained based on a relationship with the predicted PM_{10} annual mean concentration.

9.93 The most recent guidance (Ref. 9-37) suggests no change to this method. As such, the formula used within this assessment is below, where (C) denotes the annual mean concentration of PM_{10}:

$$\text{No. of } Exceedances = 0.0014 * C^3 + \frac{206}{C} - 18.5$$

Predicting the Number of Days in which the NO_2 Hourly Mean Objective is Exceeded

9.94 The assessment evaluates the likelihood of exceeding the hourly mean NO_2 objective by comparing predicted annual mean NO_2 concentrations at all receptors to an annual mean equivalent threshold of 60 $\mu g/m^3$ NO_2. The threshold of 60 $\mu g/m^3$ is derived from research projects (Ref. 9-38 and Ref. 9-39) which identified that the hourly mean NO_2 objective is unlikely to be exceeded if annual mean concentrations are predicted to be less the 60 $\mu g/m^3$.

9.95 Where predicted concentrations are below this value, it can be concluded with confidence that the hourly mean NO_2 objective (200 $\mu g/m^3$ NO_2 not more than 18 times per year) will be achieved.

Air Quality Neutral

9.96 An Air Quality Neutral Assessment has also been undertaken in line with the GLA's Sustainable Design and Construction SPG (Ref. 9-22) and the accompanying air quality neutral guidance document (Ref. 9-41).

9.97 The energy strategy for the Site adopts a centralised site-wide system that is based on an electric supply that will not generate additional emissions at the location of the Site. Hence only transport emissions are considered within the Air Quality Neutral Assessment.

Significance Criteria

Effect and Significance Terminology Overview

9.98 The assessment of effect significance outlined within the below sections is consistent with the terminology and criteria outlined within ***Chapter 2: EIA Methodology*** of this ES and accords with the relevant British Standards and guidance. The terminology used to describe the sensitivity of resources / receptors and magnitude of the impact will be as follows:

- High;
- Medium;
- Low; and
- Very Low.

9.99 The key terminology to be used to describe the classification of effects is as follows and is further described in the 'Significance of Environmental Effects section of this chapter:

- Major;
- Moderate;
- Minor; and
- Negligible.

9.100 The nature of the effects may be either adverse (negative) or beneficial (positive).

9.7 The construction assessment does not use a magnitude of change approach, but rather a risk based approach as described in the '*Demolition and Construction Phase*' section.

Assessment Significance Conclusion

9.101 In accordance with the methodology set out within ***Chapter 2: EIA Methodology***, the following criteria is applied:

- 'Moderate' or 'major' are deemed to be **'significant'**.
- 'Minor' are considered to be **'not significant'**, although they may be a matter of local concern; and
- 'Negligible' effects are considered to be **'not significant'**.

Evaluation of Effect and Significance – Air Quality

9.102 This section is divided in to three sub-sections:

- *Section 1: Demolition and Construction Phase* - discusses the assessment of significance for the demolition and construction phase;
- *Section 2: Operational Phase (Human Receptors)* - outlines the approach to the assessment of significant effects at individual receptors which may be affected by the Site by emissions of different pollutants; and
- *Section 3: Overall Assessment of Significance* – discusses an overall determination of significant or non-significant effects is determined using the individual evaluations of significance at receptors and overall compliance with AQS objectives and relevant planning policy.

Demolition and Construction Phase

9.103 For amenity effects (including that of dust), the aim is to bring forward a scheme, including mitigation measures if necessary, that does not introduce the potential for additional complaints to be generated as a result of the Proposed Development.

9.104 The scale of the risk of adverse effects occurring due to each group of activities, with mitigation in place, is described using the terms high risk, medium risk and low risk.

9.105 In situations where very low or low risk is identified then this is considered to be a negligible to minor adverse effect. However, if a medium or higher risk is identified this suggests that further site specific mitigation is required as without additional measures a potentially significant temporary effect could occur i.e. moderate adverse effect.

Operational Phase (Human Receptors)

9.106 The assessment of potential impacts and their effect significance has been based on the criteria outlined by EPUK (Ref. 9-34).

9.107 The significance of an effect is a factor of both the magnitude of the change caused by the Site and the absolute concentrations in relation to the air quality objective.

9.108 Table 9.77 presents criteria for the determination of the 'magnitude of change', based on the percentage increase in concentrations. For consistency with the other Chapters of the ES the following terminology was adopted as set out in Table 9.7 (the equivalent terminology from within the IAQM Guidance (Ref 9-39) is also presented:

- Very Low - referred to as 'imperceptible' in the IAQM guidance;
- Low - referred to as 'small' in the IAQM guidance;
- Medium – referred to as 'medium' in the IAQM guidance; and
- High referred to as 'large' in the IAQM guidance.

9.109 The effects of the change on local air quality and risk of exceeding the air quality objectives value is summarised in Table 9.8 (Ref. 9-39) The changes relative to the objectives have been presented in terms of their absolute change however, rather than the percentage change to assist comparison with the modelled results.

9.110 A change in predicted annual mean concentrations of NO_2, or PM_{10} of less than 0.4 µg/m^3 is considered to be so small as to be imperceptible (in the Table 9.7 described as "very low"). A change (impact) that is "imperceptible" (given normal bounds of variation) is not capable of having a direct effect on local air quality, and so is considered to be a negligible effect. .

9.111 It should be noted that it is possible for both an increase or decrease in concentration to occur as a result of a development, for example a change in the routing of traffic could lead to a decrease in road traffic on specific roads.

9.112 The magnitude of the change in the predicted number of exceedences of the 24-hour objective is directly derived from the predicted annual mean value using the relationship defined in the DMRB Screening Tool. The magnitude descriptors in the table above are as proposed by Environmental Protection UK (Ref. 9-34).

9.113 The criteria in Table 9.7 relate to air quality statistics that are elevated about the objective values in many urban locations: this is not the case with $PM_{2.5}$. A change in the annual mean concentration of $PM_{2.5}$ equivalent to 1% of the objective value is 0.25 µg/m^3.

9.114 For receptors that are predicted to experience a perceptible change, the effect of the change on local air quality and the risk of exceeding the air quality objective value is summarised in Table 9.8. A small increase, for example, in annual mean concentrations, (at receptors exposed to baseline concentrations that are just below the objective value (36 µg/m^3 to 40 µg/m^3)) is considered to have a minor adverse effect (as referred to as slight adverse within IAQM guidance (Ref. 9-39)) as there is a minor increase in the risk of the absolute concentration exceeding the objective value. However, a small increase in annual mean concentration at receptors exposed to baseline concentrations that are below or well below (< 36 µg/m^3) is not considered likely to affect the achievement of the objective value and is therefore a negligible effect.

Table 9.7 Magnitude of Changes in Ambient Pollutant Concentrations of NO_2, PM_{10} and $PM_{2.5}$

Magnitude of Change	Annual Mean Concentrations of NO_2 (µg/m^3)	Annual Mean Concentrations of PM_{10} (µg/m^3)	Annual Mean Concentrations of $PM_{2.5}$ (µg/m^3)	Number of 24 hour mean values of PM_{10} over 50 µg/m^3 (days)
High	Increase/decrease > 4	Increase/decrease > 4	Increase/decrease > 2.5	Increase/decrease > 4
Medium	Increase/decrease 2 - 4	Increase/decrease 2 - 4	Increase/decrease 1.25 - 2.5	Increase/decrease 2 to 4
Low	Increase/decrease 0.4 – 2	Increase/decrease 0.4 – 2	Increase/decrease 0.25 – 1.25	Increase/decrease 1 to 2
Very Low	Increase/decrease < 0.4	Increase/decrease < 0.4	Increase/decrease < 0.25	Increase/decrease < 1

Table 9.8 Air Quality Impact Significance Descriptors for Changes in Ambient Pollutant Concentrations of NO_2

Absolute Concentration in Relation to Objective/Limit Value	Magnitude of Change in Concentration *			
	Very low	Low	Medium	High
	Nature of Effect - Adverse			
Above Objective/Limit Value *With* Scheme (>40 µg/m^3)	Negligible	Minor	Moderate	Major
Just Below Objective/Limit Value *With* Scheme (36-40 µg/m^3)	Negligible	Minor	Moderate	Moderate
Below Objective/Limit Value *With* Scheme (30-36 µg/m^3)	Negligible	Negligible	Minor	Minor
Well Below Objective/Limit Value *With* Scheme (<30 µg/m^3)	Negligible	Negligible	Negligible	Minor
	Nature of Effect - Beneficial			
Above Objective/Limit Value *Without* Scheme (>40 µg/m^3)	Negligible	Minor	Moderate	Major
Just Below Objective/Limit Value *Without* Scheme (36-40 µg/m^3)	Negligible	Minor	Moderate	Moderate
Below Objective/Limit Value *Without* Scheme (30-36 µg/m^3)	Negligible	Negligible	Minor Beneficial	Minor
Well Below Objective/Limit Value *Without* Scheme (<30 µg/m^3)	Negligible	Negligible	Negligible	Minor

**As described in the Table 9.7 and paragraph 9.100 Reference to 'minor adverse' represents 'slight adverse' within the IAQM guidance.*

Overall Evaluation of Effect and Significance

9.115 The significance of all of the reported impacts is then considered for the development in overall terms. The potential for the scheme to contribute to or interfere with the successful implementation of policies and strategies for the management of local air quality are considered if relevant, but the principle focus is any change to the likelihood of future achievement of the air quality objective values set out in Table 9.1 for the following pollutants:

- Annual mean nitrogen dioxide (NO_2) concentration of 40 µg/m^3;

- NO_2 concentration of 200 µg/m^3 not to be exceeded on more than 18 times per year (99.79th percentile);
- Annual mean Particulate Matter (PM_{10}) concentration of 40 µg/m^3;
- 24 hour PM_{10} concentration of 50 µg/m^3 not to be exceeded on more than 35 times per year; and
- Annual Mean fine Particulate Matter ($PM_{2.5}$) of 25 µg/m^3.

9.116 The achievement of local authority goals for local air quality management are directly linked to the achievement of the AQS Objective values described above and as such this assessment focuses on the likelihood of future achievement of the AQS Objective values.

9.117 The findings of the Air Quality Neutral Assessment are also considered in the overall evaluation of significance along with the ambient air quality effects of the Proposed Development.

Limitations and Assumptions

9.118 The assessment of the operational phase of the Proposed Development has adopted the following limitation and assumptions:

- Modelling has used traffic dataset sourced from traffic survey and estimated to represent 2014 data;
- 2013 emission factors have been used for all years as conservative assumption;
- 2013 background pollution concentrations have been assumed to provide conservative estimated for all years of assessment; and
- Worst case receptors have been assumed, which represents the location of maximum exposure of air pollutants within an area.

Assessment Methodology and Significance Criteria - Update 2015

March 2015 ES Addendum

9.119 Since the submission of the December 2014 ES, no changes have been made to the air quality assessment methodology and the methodology presented in the December 2014 ES remains valid for the purposes of this ES Addendum.

November 2015 Amendments

Evaluation of Effect and Significance

9.120 The only change to the methodology presented in the December 2014 ES and March 2015 ES Addendum is the criteria for determining effect significance, which is taken from the updated EPUK/ IAQM. The new significance criterion supersedes Table 9.7 and Table 9.8 and is summarised in Table 9.1R, Table 9.2R and Table 9.3R.

9.121 The terminology used in Tables above has been adapted from the EPUK/ IAQM guidance in order to maintain consistency with the assessments presented in other technical chapters of this ES. For example, Major is used instead of 'Substantial' and Minor in place of 'Slight'. The description of each significance level, as well as the terms Moderate and Negligible, remain the same.

Table 9.1R Impact Descriptors at Individual Receptors- NO_2 and PM_{10} Annual Mean Concentrations

Annual Mean Pollutant Concentration at Receptor in Assessment Year	Change in Annual Mean Concentration of NO_2 and PM_{10} (µg/m^3)				
	<0.2	0.2 - <0.6	0.6 - <2.2	2.2 - ≤4.0	>4.0
≤30.2	Negligible	Negligible	Negligible	Minor	Moderate
30.2 – 37.8	Negligible	Negligible	Minor	Moderate	Moderate
37.8 – 41.0	Negligible	Minor	Moderate	Moderate	Major
41.0 – 43.8	Negligible	Moderate	Moderate	Major	Major
≥43.8	Negligible	Moderate	Major	Major	Major

Table 9.2R Impact Descriptors at Individual Receptors- $PM_{2.5}$ Annual Mean Concentrations

Annual Mean Pollutant Concentration at Receptor in Assessment Year	Change in Annual Mean Concentration of $PM_{2.5}$ (µg/m^3)				
	<0.1	0.1 - <0.4	0.4 - <1.4	1.4 -≤ 2.5	>2.5
<18.9	Negligible	Negligible	Negligible	Minor	Moderate
18.9 - <23.6	Negligible	Negligible	Minor	Moderate	Moderate
23.6 - <25.6	Negligible	Minor	Moderate	Moderate	Major
25.6 - <27.4	Negligible	Moderate	Moderate	Major	Major
≥27.4	Negligible	Moderate	Major	Major	Major

Table 9.3R Impact Descriptors at Individual Receptors- PM_{10} Daily Mean Concentrations

Annual Mean Pollutant Concentration at Receptor in Assessment Year	Change Daily Mean based upon Annual Mean Equivalent of PM_{10}				
	<0.2	0.2 - <0.5	0.5 - <1.8	1.8 - ≤3.2	>3.2
<24.2	Negligible	Negligible	Negligible	Minor	Moderate
24.2 - <30.2	Negligible	Negligible	Minor	Moderate	Moderate
30.2 - <32.8	Negligible	Minor	Moderate	Moderate	Major
32.8 - <35.0	Negligible	Moderate	Moderate	Major	Major
≥35.0	Negligible	Moderate	Major	Major	Major

9.122 The EPUK / IAQM guidance includes seven explanatory notes to accompany the terminology for the effect descriptors. In particular it is noted that the descriptors are for individual receptors only and that overall significance is determined using professional judgement. Additionally, it is noted that it is unwise to ascribe undue accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the objective value. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the objective value, rather than being exactly equal to it. The exception to this includes:

- A change in predicted annual mean concentrations of NO_2 or PM_{10} of less than 0.5% (0.2 µg/m^3) is considered to be so small as to be 'negligible'. A change (impact) that is negligible, given normal bounds of variation, would not be capable of having a direct effect on local air quality that could be considered to be significant; and
- A change in predicted annual mean concentrations of $PM_{2.5}$ of less than 0.5% (0.12 µg/m^3) is considered to be so small as to be negligible. A change (i.e. the impact) that is negligible, given normal bounds of variation, would not be capable of having a direct effect on local air quality that could be considered to be significant.

9.123 It is understood from the EPUK / IAQM guidance that it is the intention of the effect descriptors to capture the potential risk associated with cumulative development whereby changes of 1% of a relevant air quality objective value could, under the EPUK / IAQM guidance, result in slight to moderate air quality effects at individual receptors. In practice this assessment inherently considers cumulative impacts through the use of traffic data, Defra background concentrations and predictions associated with other development schemes. Therefore it is considered highly unlikely that significant air quality impacts could occur with the Amended Proposed Development for changes in concentrations of 1%.

9.124 Additionally, the EPUK / IAQM guidance also includes the potential for minor to major air quality effects as a result of changes in pollutant concentrations between 2 and 5% of relevant air quality objective value. For annual average nitrogen dioxide concentrations, this relates to changes in concentrations ranging from 0.6 – 2.2 µg/m^3. In practice, changes in concentration of this magnitude, and in particular changes at the lower end of this band, are likely to be very difficult to distinguish through any post operational monitoring regime due to the number of sources of NO_2 in an existing urban environment and the inter annual effects of varying meteorological conditions. Therefore, in the overall evaluation of significance the potential for significant air quality impacts within this band will be considered in this context.

9.125 Changes in concentration of more than 5% (the two highest bands) are considered to be of a magnitude which is far more likely to be discernible and as such carry additional weight within the overall evaluation of significance for air quality.

Baseline Conditions

9.126 To determine the baseline environment, the following sources of information will be used:

- Baseline Dust Climate;
- Traffic Data;
- Meteorological Data;
- Local Monitoring Data;
- Measurement Data;
- Background Pollutant Concentration Data; and
- Predicted Baseline Pollutant Concentrations for years 2013 and 2017.

Baseline Dust Climate

9.127 A background level of dust exists in all urban and rural locations in the UK. Dust can be generated on a local scale from vehicle movements and from the action of wind on exposed soils and surfaces. Dust levels can be affected by long range transport of dust from distant sources into the local vicinity.

9.128 Residents currently experience dust deposition at a rate that is determined by the contributions of local and distant sources. This baseline rate of soiling varies dependent on prevailing climatic conditions. The tolerance of individuals to deposited dust is therefore shaped by their experience of baseline (or 'normal') conditions.

9.129 Existing local sources of particulate matter includes wind-blown dust from exhaust emissions from energy plant and road vehicles, brake and tyre wear from road vehicles and the long range transport of material from outside the study area.

Traffic Data

9.130 The traffic data used in this assessment has been derived from the traffic assessment presented within ***Chapter 7: Traffic and Transport***.

9.131 The traffic data includes the 2014 Baseline AADT (assumed to represent 2013 baseline traffic data in the dispersion modelling), 2017 Future Baseline, and 2017 Future Baseline plus the proposed Site is presented in Table 9.9.

Table 9.9 Two-way Traffic Data for the Existing, Future Base and Future with Development Scenarios

Link	Street Canyon Effect**	2014 Baseline AADT		2018 Future Base* AADT		2018 Future Base + Site * AADT	
	Building Heights (m)	LGV	HGV	LGV	HGV	LGV	HGV
Norton Folgate		13450	4701	14451	5122	14780	5202
Commercial Street	15	16406	2538	17715	2714	17881	2722
Folate Street	10	1104	300	1138	377	1171	449

** Includes committed developments, LGV: Light Goods Vehicles, HGV: Heavy Goods Vehicles.*

*** 'Street Canyon Effect' applied at parts of the traffic link.*

National speed limits were applied to roads, with speeds reduced close to junctions to 15 km per hour and to 20 km per hour at congested parts of the following roads: Northen Folgate, Commercial Street and Folgate Street.

Meteorological Data

9.132 One year (2013) of hourly sequential observation data from Heathrow Airport meteorological station has been used in this assessment. The station is located approximately 30 kilometres west of the Site and experiences meteorological conditions that are representative of those experienced at the Site and across the study area.

Local Monitoring Data

9.133 The LBTH measured the NO_2 within the borough by means of automatic monitoring stations. The monitoring station located the nearest to the Site is Mile End Road CMS roadside. This station is located approximately 2.5km east from the Site and it is not considered a representative of the study area. LBTH currently does not carry out a diffusion tube survey within borough. Therefore none of the LBTH monitoring stations are suitable to use in determining background, baseline scenario or for verification purposes.

Measurement Data

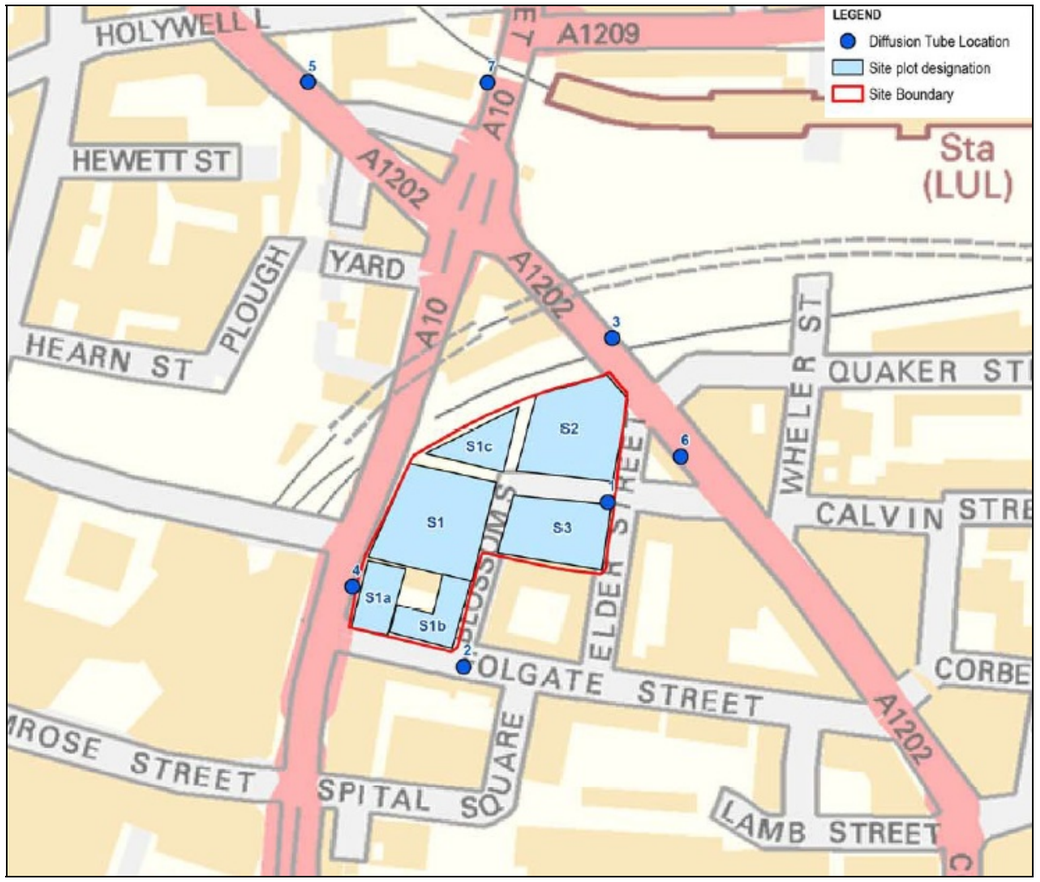
9.134 Due to the lack of available recent local monitoring data, a three month NO_2 diffusion tube survey was undertaken by URS between 11th of April to 2nd of July in order to inform the model verification process. The triplicate NO_2 diffusion tube monitoring sites were established in 8 locations around the Site. The locations of the diffusion tubes are presented in Table 9.10, and illustrated on Figure 9.3.

Table 9.10 Locations of Diffusion Tube Sites

Monitoring Site ID	Locations	Description	X	Y	Height (m)	2013 Projected Measured Total NO_2 Concentration. ($\mu g/m^3$)*
Site 1	Corner of Fleur de Lis Street and Elder Street	Site suitability – unsuitable for verification	533525	182056	2.45	51.2
Site 2	16 Folgate Street	Roadside – model verification	533458	181978	2.50	51.5
Site 3	Commercial Street – Bridge	Roadside – site located at railway bridge- not suitable for verification	533527	182133	2.70	105.7
Site 4	15-16 Norton Folgate Street	Roadside – model verification	533406	182016	2.48	86.2
Site 5	Great Eastern Street	Roadside – traffic data not provided – site unsuitable for verification	533385	182254	2.35	94.2
Site 6	Commercial Street	Roadside model verification	533560	182077	2.56	90.8
Site 7	201-207 Shoreditch High Street	Roadside traffic data not provided – site unsuitable for verification	533469	182253	2.30	82.8
Site 8	Allen Gardens	Background	533970	182174	2.70	34.8

** The 3 months of measurement data have been annualised to provide annual mean concentrations for 2013 following the procedure described in LAQM.TG(09) (Ref. 9-36)*

Figure 9.3 Location Of Monitoring Points



Background Pollutant Concentration Data

9.135 Background NO_2, PM_{10} and $PM_{2.5}$ were sourced from Defra background maps for 2013 for the baseline and 2017 for the future scenarios (Ref. 9-40). Whilst near future background concentrations aren't likely to decrease at the rate previously anticipated, a drop off in background pollutant concentrations is still likely to occur in the future as emission technology improves, particularly with the introduction of Euro VI emissions standards. Due to the uncertainty in rate of year on year reductions in background pollutant concentrations in the LBTH area, a conservative approach to background concentrations has been taken and the background concentrations used for the assessment scenario years (construction and operation) are as presented in Table 9.11.

Table 9.11 Defra Background Data for 2013 and 2017 (opening year)

Receptor	2013			
	NO_X (µg/m^3)	NO_2 (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
R1	77.1	44.5	25.9	17.8
R2	77.1	44.5	25.9	17.8
R3	77.1	44.5	25.9	17.8
R4	77.1	44.5	25.9	17.8
R5	77.1	44.5	25.9	17.8
R6	77.1	44.5	25.9	17.8
R7	77.1	44.5	25.9	17.8
R8	77.1	44.5	25.9	17.8
R9	77.1	44.5	25.9	17.8
R10	77.1	44.5	25.9	17.8
R11	77.1	44.5	25.9	17.8
Site Suitability Assessment				
P1	77.1	44.5	25.9	17.8
P2	77.1	44.5	25.9	17.8
P3	77.1	44.5	25.9	17.8
P4	77.1	44.5	25.9	17.8

Predicted Baseline Pollutant Concentrations

Predicted Baseline Pollutant Concentrations – 2013

9.136 Predicted annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$, and the number of exceedances of the 24-hr 50 µg/m^3 PM_{10} air quality objective value, at the selected receptors in the baseline scenario, are listed in Table 9.12. Exceedances of the AQS Objectives values (from Table 9.1) are denoted in bold type.

Table 9.12 Air Quality Statistics Predicted for Baseline Scenario in 2013

Receptor	Annual Mean Concentration (µg/m^3)			Number of 24 hour mean values of PM_{10} over 50 µg/m^3 (days)
	Annual Mean NO_2 (µg/m^3)	Annual Mean PM_{10} (µg/m^3)	Annual Mean $PM_{2.5}$ (µg/m^3)	
R1	**82.2**	29.8	20.3	27
R2	**76.3**	29.1	19.9	25
R3	**73.3**	28.7	19.6	23
R4	**58.7**	27.3	18.7	19
R5	**55.0**	27.0	18.5	18
R6	**67.4**	28.8	19.7	24
R7	**78.5**	29.6	20.2	27
R8	**59.2**	27.3	18.7	19
R9	**54.2**	26.8	18.4	18
R10	**55.4**	26.9	18.5	18
R11	**67.6**	29.0	19.7	24

Note: Bold Denotes exceedances of an AQS Objective (refer Table 9.1)

9.137 Annual mean NO_2 concentrations are expected to exceed the AQS Objective values at all sensitive receptors. This is predominantly due to background concentrations being in excess of 40 µg/m^3 in the study area.

9.138 Annual mean concentrations are below 60 µg/m^3 at the receptors locations, except for receptors R4, R5, R8, R9 and R10, which is indicative that concentrations might be exceeding the short-term, 1 hour NO_2 objective value in these locations.

9.139 In contrast, the annual mean and daily PM_{10} and $PM_{2.5}$ objective values are expected to be met at all modelled receptor points.

Predicted Future Baseline - 2017

9.140 Future predicted baseline pollutant concentrations at the site and nearby modelled sensitive receptors, incorporating background concentrations and local road traffic emissions are presented in Table 9.13. Traffic flows are expected to increase by the anticipated opening year (2017) due to other committed and cumulative developments within the area (details of which can be found in ***Chapter 8: Traffic and Transportation*** of this ES).

9.141 Emission factors are assumed to stay the same as in 2013 as a conservative approach. As with the predicted 2013 Baseline pollutant concentrations, the predicted 2018 Without-Development pollutant concentrations do not include the effect of any additional road traffic attributed to the Site.

Table 9.13 Air Quality Statistics Predicted for Future Baseline Scenario in 2017

Receptor	Annual Mean Concentration (µg/m^3)			Number of 24 hour mean values of PM_{10} over 50 µg/m^3 (days)
	Annual Mean NO_2 (µg/m^3)	Annual Mean PM_{10} (µg/m^3)	Annual Mean $PM_{2.5}$ (µg/m^3)	
R1	**84.6**	30.1	20.5	28
R2	**78.3**	29.3	20.0	25
R3	**75.1**	28.9	19.7	24
R4	**59.6**	27.4	18.7	19
R5	**55.7**	27.1	18.5	18
R6	**68.9**	29.0	19.8	25
R7	**80.6**	29.9	20.4	28
R8	**60.2**	27.4	18.8	19
R9	**54.8**	26.9	18.4	18
R10	**56.1**	27.0	18.5	18
R11	**69.1**	29.2	19.9	25

* Note: Bold Denotes an exceedance of an AQS Objective (refer Table 9.1)

9.142 Annual mean NO_2 concentrations are expected to exceed the AQS Objective at all sensitive receptors. This is predominantly due to background concentrations already being in excess of the Objective (40 µg/m^3).

9.143 Annual mean concentrations are below 60 µg/m^3 at all selected receptors, except R4, R5, R9 and R10, which is indicative that concentrations might exceed the short-term, 1 hour NO_2 objective in these locations.

9.144 In contrast, the annual mean and daily PM_{10} and $PM_{2.5}$ objectives are expected to be met at all modelled receptor points.

Summary of Sensitivity of Resources / Receptors

9.145 When assessing the impact of dust emissions generated during demolition and construction, receptors are defined as the nearest potentially sensitive receptor to the boundary of the Site in each direction. These receptors have the potential to experience impacts of greater magnitude, when compared with other more distant receptors or less sensitive receptors due to emissions of particulate matter generated by the works.

9.146 Potential sensitive receptors to construction dust nuisance have been considered within a 350m radius of the Site that are likely to be sensitive to dust. The predominant receptor considered are residential properties (given their permanent occupation) located along Folgate Street to the south and Elder Street to the east of the Site. Offices are also located within the area to the west of the Site along Shoreditch High Street, as is a hotel located on Folgate Street.

9.147 In accord with the IAQM guidance (Ref. 9-23), the sensitivity of resources / receptors are as follows:

- Amenity and Property: There are between 10 to 100 properties within 20 m of the Site. Sensitivity to dust soiling is therefore assessed as high; and
- Human Health: Annual mean PM_{10} background concentrations at the Site are currently greater than 24 µg/m^3, with approximately 10 and 100 properties within 20 m of the Site. Sensitivity to human health impacts is therefore assessed as high.

9.148 There are no ecologically sensitive receptors in close proximity to the Site, therefore effects on designated ecology sites have been scoped out of the ES.

9.149 Table 9.14 summarises the resources / receptors likely to be affected by the Site and their sensitivity.

Table 9.14 Likely Resource / Receptor and Sensitivity

Resource / Receptor	Sensitivity of Resource / Receptor
Demolition and Construction	
Neighbouring Property And Amenity	High
Neighbouring Residential / Occupants Human Health	High
Operational	
Receptors R1 to R11 (for operational road traffic emissions modelling)	High
Site Suitability	
Receptors P1 to P4	N/A

Baseline Conditions – Update 2015

March 2015 ES Addendum

9.150 Since the submission of the December 2014 ES, air quality baseline conditions are unlikely to have changed significantly. This is due to prevailing trends in air quality in London which do not show large reductions in pollutants year to year.

November 2015 Amendments

Traffic Data

9.151 Revised traffic data has been provided for the indicative future (2019) scenarios, both with and without development for assessment in this Replacement ES. The main change relative to the traffic data used in the December 2014 ES and March 2015 ES Addendum includes greater base flows being accounted for as a result of future development schemes coming forward for the expected year of opening (2019). The revised traffic data is presented below:

Table 9.4R Two-way Traffic Data for the Future Base and Future with Development

Link	2019 Future Base* AADT		2019 Future Base + Site * AADT	
	LGV	HGV	LGV	HGV
Norton Folgate	15125	5361	15449	5416
Commercial Street	18544	2838	18708	2846
Folate Street	1190	395	1223	457

** Includes committed developments, LGV: Light Goods Vehicles, HGV: Heavy Goods Vehicles. National speed limits were applied to roads, with speeds reduced close to junctions to 15 km per hour and to 20 km per hour at congested parts of the following roads: Northen Folgate, Commercial Street and Folgate Street.*

Predicted Future Baseline 2019

9.152 The future baseline for the indicative opening year 2019 for NO_2, PM_{10} and NO_2 concentrations are summarised in **Error! Reference source not found.**~~Table 9.5R~~ below.

Table 9.5R Air Quality Statistics Predicted for Future Baseline Scenario in 2019

Receptor	Annual Mean Concentration (µg/m^3)			Number of 24 hour mean values of PM_{10} over 50 µg/m^3 (days)
	Annual Mean NO_2 (µg/m^3)	Annual Mean PM_{10} (µg/m^3)	Annual Mean $PM_{2.5}$ (µg/m^3)	
R1	**86.0**	30.3	20.7	29
R2	**79.6**	29.5	20.1	26
R3	**76.3**	29.0	19.8	25
R4	**60.2**	27.4	18.8	19
R5	**56.1**	27.1	18.6	18
R6	**69.8**	29.2	19.9	25
R7	**81.9**	30.1	20.5	28
R8	**60.8**	27.5	18.8	20
R9	**55.3**	26.9	18.5	18
R10	**56.6**	27.1	18.5	18

Receptor	Annual Mean Concentration (µg/m^3)			Number of 24 hour mean values of PM_{10} over 50 µg/m^3 (days)
	Annual Mean NO_2 (µg/m^3)	Annual Mean PM_{10} (µg/m^3)	Annual Mean $PM_{2.5}$ (µg/m^3)	
R11	**70.0**	29.3	20.0	26

** Note: Bold Denotes an exceedance of an AQS Objective (refer Table 9.1)*

9.153 From review of the future baseline (2019) presented in Table 9.5R, the annual mean NO_2 concentrations are expected to exceed the AQS Objective value at all sensitive receptors. This is predominantly due to background concentrations already being in excess of the objective value (40 µg/m^3).

9.154 Predicted NO_2 concentrations for the future baseline will be above 60 µg/m^3 at the majority of the receptors, with the exception of receptors R5, R9 and R10. Receptors with concentrations above 60µg/m^3 are also likely to exceed the hourly objective value.

9.155 It should be noted that the air quality assessment, including the assessment presented in the December 2014 ES, conservatively assumed that no improvements in either background concentrations or emission rates from road traffic between 2013 and the indicative opening year (2019). However, it is considered that emission rates and background pollutant concentrations in 2019 are likely to be lower than those used in the assessment, in light of known improvements to vehicle emissions technology and the evolution of the general population vehicle fleet.

9.156 It is assumed that the PM_{10} and $PM_{2.5}$ objective values would be met at all modelled receptor points for the future indicative opening year (2019).

Environmental Design and Management

9.157 If applicable, the way that potential environmental impacts have been or will be avoided, prevented, reduced or off-set through design and / or management of the Site are outlined below and will be taken into account as part of the assessment of the potential effects. Proposed environmental enhancements are also described where relevant.

9.158 The measures accounted for both the demolition and construction, and operational phases, are outlined below.

Demolition and Construction

Overview

9.159 This section presents a discussion of the mitigation measures associated with the demolition and construction of the Site, that will be adopted to control dust outlined within the IAQM guidance (Ref. 9-23)

9.160 The adoption of good site practice through the measures to control dust outlined within the following documents:

- Building Research Establishment (BRE) : Control of Dust from Construction and Demolition Activities (Ref. 9-33)
- Greater London Authority (GLA): The Control of Dust and Emissions During Construction and Demolition, Supplementary Planning Guidance (Ref. 9-24); and
- LBTH, Code of Construction Practice: CoCP (Ref. 9-28).

9.161 On-site, the implementation of good industry standards, guidance and practice procedures (i.e. Considerate Contractors scheme) will be followed in order to minimise noise effects. Dust and emissions will be managed to reduce impacts, and mitigation measures will be documented within a Construction Environmental Management Plan (CEMP), to be agreed with LBTH pre-commencement of the works, which will take into account the above documents.

Plant Exhaust Emissions

9.162 Demolition and construction plant emissions have not been explicitly modelled, as these are considered to be a small, insignificant and temporary emission source relative to ambient conditions.

- However, suitable best practice mitigation measures for site plant include: Vehicle exhausts should be directed away from the ground and positioned so they are not directed at site entrances.
- No vehicles or plant will be left idling unnecessarily.
- NRMM (vehicles and plant) should be well maintained. Should any emissions of dark smoke occur (except during start up) then the relevant machinery should be stopped immediately and any problem rectified before being used.
- Engines and exhaust systems should be regularly serviced according to manufacturer's recommendations and maintained to meet statutory limits/opacity tests.
- Locate plant away from the boundaries close to residential areas.
- Avoid use of diesel or petrol powered generators by using mains electricity or battery powered equipment where possible and if safety concerns can be overcome.

Road Traffic Emissions

9.163 Vehicles arriving to the Site will need to be managed carefully in order to prevent on-site congestion and prevent peaks in the number of vehicles arriving simultaneously, therefore limiting the impact on the local highway network.

9.164 To minimise the likelihood of congestion, monitoring and control of all vehicles entering and exiting the Site will be maintained by:

- Setting of specific delivery dates and collection times, where feasible;
- Consolidating deliveries where feasible;
- Using a system of 'just in time' deliveries;
- A requirement for authorisation when visiting the Site via vehicles; and
- Safely maintaining pedestrian access around the Site perimeter.

Dust Emissions

9.165 The nature and duration of specific aspects of the construction works are outlined in ***Chapter 5: Demolition and Construction*** of this ES. It is anticipated that the demolition and construction work will last approximately 29 months.

9.166 As with the majority of construction projects of this type, the early phases of the works are likely to involve demolition, excavations and earthworks and temporary stockpiling of potentially dusty materials, which are the principal sources of dust.

9.167 During the middle phases, when the buildings are erected, the principal sources of dust are likely to be from the cutting and grinding of materials and the movement of construction related road vehicles.

9.168 The latter phases, when the majority of the buildings and infrastructure are complete, will involve the landscaping and finishing works. During these phases, the principal sources of dust will include the storage, handling and movement of materials generated during the associated earthworks.

9.169 Standard mitigation measures for high risk sites (specified in the IAQM guidance (Ref. 9-23)) which should be implemented for each of the four phases of construction work (Demolition; Earthworks; Construction; and Trackout) include:

Demolition:

- Soft strip inside buildings before demolition;
- Ensure effective water suppression is used during demolition operations;
- Avoid blasting techniques, using appropriate manual or mechanical alternatives; and
- Bag and remove any biological debris or damp down such material before demolition.

Earthworks:

- Avoid scabbling (i.e. mechanical process of removing a thin layer of concrete from a structure, typically achieved by compressed air powered machines) if possible;
- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable; and
- Only remove the cover in small areas during work and not all at once.

Construction:

- Avoid scabbling (roughening of concrete surfaces) if possible;
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery; and
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored to prevent dust.

Trackout:

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
- Record all inspections of haul routes and any subsequent action in a site log book;
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits; and
- Access gates to be located as far (at least 10 m) from receptors where possible.

Operational

Heating and Cooling – Energy Strategy

9.170 The energy strategy for the Site adopts a centralised site-wide system that is based on electric supply that will not generate additional emissions at the location of the Site. The Site will be entirely served by heat pumps for all air conditioning and domestic hot water applications.

Environmental Design and Management - Update 2015

March 2015 ES Addendum

9.171 No Additional mitigation measures to those presented in the December 2014 ES are required.

November 2015 Amendments

9.172 No additional mitigation measures to those presented in the December 2014 ES and the March 2015 ES Addendum are required to alleviate impacts associated with the proposed design changes. However, other measures incorporated as part of the travel plan prepared for the Amended Proposed Development will encourage sustainable choices of transport, including walking and cycling, resulting in likely reduction of emissions associated with vehicle trips associated with the Amended Proposed Development.

Potential Effects and Mitigation Measures

9.173 This section discusses the potential impacts and likely effects pertaining to air quality during the demolition and construction phase, and during the operation phase.

Site Preparation, Demolition and Construction Effects

9.174 Information regarding demolition and construction works have been sourced from ***Chapter 5: Demolition and Construction*** of the ES. It is expected that the demolition and construction works would be for a duration of approximately 29 months. During this period the various phases of demolition and construction works will take place at several areas of the Site.

9.175 As there are human receptors within 200 m of the Site, an assessment is required as set out in IAQM guidance (Ref. 9-23). Based on the guidance, the potential impacts considered at the receptors identified are:

- Effects on Amenity and Property including changes to the rate of deposition of particulate matter onto glossy surface and other property; and
- Changes in 24 hour mean concentrations that might increase the risk of exposure to PM_{10} at levels that could exceed the 24-hr air quality objective.

Potential Demolition and Construction Effects

Demolition

9.176 The demolition work will include demolition of existing buildings during the Site preparation period. The total building/material volume for demolition is estimated to be 20 000 m^3 or more, with activity no greater than 10 m above ground level (i.e. building heights). The potential dust emission risk for demolition is therefore assessed as medium.

9.177 A number of mitigation measures can be implemented on the Site to either avoid or reduce potential effects to neighbouring receptors, and are outlined within the 'Environmental Design and Management' section. Below is a summary of the measures proposed:

- Soft strip inside buildings;
- Water suppression is used;
- Avoid blasting techniques; and
- Bag and remove debris.

9.178 The adoption of these mitigation measures would reduce the risk of potential impact on the receptors (property and amenity; human health) to a very low risk, resulting in a likely residual **negligible to minor adverse** effect.

Earthworks

9.179 Site clearance works, the digging of trenches for foundations and utilities and temporary stockpiling of material represent the principal activities that may generate emissions of particulate material. The potential for stockpiles of materials to generate dust depends on the nature of the material. Earth is soft and friable compared to hardcore. However, hardcore generally has lower moisture content than soil, and consequently they can both be a potential source of dust.

9.180 The total area of the site is less than 10 000 m^2. The potential dust emission risk for earthworks is therefore assessed as medium.

9.181 A number of mitigation measures can be implemented on the Site to either avoid or reduce potential effects to neighbouring receptors, and are outlined within the 'Environmental Design and Management' section. Below is a summary of the measures proposed:

- Avoid scabbling if possible;

- Stabilise earthworks and exposed areas; and
- Remove the cover incrementally.

9.182 The adoption of these mitigation measures would reduce the risk of potential impact on the receptors (property and amenity; human health) to a very low risk, resulting in a likely residual **negligible to minor adverse** effect.

Construction

9.183 Dust emissions during construction can give rise to elevated dust deposition and PM_{10} concentrations. These are generally short-lived changes over a few hours or days, which occur over a limited time period of several weeks or months.

9.184 The total building volume is estimated to be greater than 100 000 m^3. The potential dust emission risk for construction is therefore assessed as high.

9.185 A number of mitigation measures can be implemented on the Site to either avoid or reduce potential effects to neighbouring receptors, and are outlined within the 'Environmental Design and Management' section. Below is a summary of the measures proposed:

- Avoid scabbling if possible;
- Ensure aggregates are stored in bunded areas and are not allowed to dry out;
- Ensure cement and other fine powder materials are delivered and stored in enclosed tankers; and
- For smaller supplies of fine powder materials ensure bags are sealed and stored.

9.186 The adoption of these mitigation measures would reduce the risk of potential impact on the receptors (property and amenity; human health) to a very low risk, resulting in a likely residual **negligible to minor adverse** effect.

Trackout of Material

9.187 The assessment of the construction vehicle movements on the surrounding road network outlined within ***Chapter 5: Demolition and Construction*** provides the number of daily HGVs movements at the peak of construction to be 15 vehicles daily, what accounts for approximately 29 vehicles movements. The potential dust emission risk for trackout is therefore assessed as medium.

9.188 A number of mitigation measures can be implemented on the Site to either avoid or reduce potential effects to neighbouring receptors, and are outlined within the 'Environmental Design and Management' section. Below is a summary of the measures proposed:

- Use water-assisted dust sweeper(s) on access and roads;
- Vehicles entering and leaving are covered;
- On-site haul routes undergo repairs;
- Install hard surfaced haul routes, which are regularly damped down and cleaned;
- Implement a wheel washing system; and
- Access gates to be located away from receptors, where possible.

9.189 The adoption of these mitigation measures would reduce the risk of potential impact on the receptors (property and amenity; human health) to a very low risk, resulting in a likely residual **negligible to minor adverse** effect.

Overall Significance – Construction Dust Emissions

9.190 With the implementation of mitigation measures proposed, in accord with the IAQM guidance, the risk of the potential impacts on the receptors (property and amenity; human health) would be minimised or prevented, resulting in a very low risk and a likely residual effect that is **negligible to minor adverse**.

Site Preparation, Demolition and Construction Effects - Update 2015

March 2015 ES Addendum

9.191 The revised scheme results in no change to the air quality effects identified from the Demolition and Construction phase of the December 2014 Scheme. It is considered that predicted effects to amenity and property and changes in 24 hour mean concentrations of PM_{10} will remain the same as those presented in the December 2014 ES.

November 2015 Amendments

9.192 Taking into account the nature and scale of the November 2015 Amendments, it is not considered that the Amended Proposed Development would result in any new or change to the likely effects and significance concluded within the Decmber2014 ES and March 2015 ES Addendum.

Effects Once the Site is Operational

Predicted Future With-Development Impact at Existing Receptors

9.193 Future predicted With-Development pollutant concentrations at nearby modelled sensitive receptors, incorporating background concentrations and local road traffic emissions are presented in Table 9.155.

9.194 Traffic flows are expected to increase by the opening year due to traffic associated with the Site (details of which can be found in the ***Chapter 8: Traffic and Transportation***. The predicted 2017 With-Development pollutant concentrations include (and therefore solely represents) the effect of additional road traffic attributed to the Site.

9.195 Emission factors are assumed to stay the same in 2017 as in 2013, to provide a very conservative estimate of future year pollutant concentrations.

Table 9.15 Air Quality Predicted for the 'With-Development' (2017) Scenario Relative to the Future Baseline

Receptor	Annual Mean Concentration ($\mu g/m^3$)				Number of 24 hour mean values of PM_{10} over 50 $\mu g/m^3$ (days)			
	NO_2 ($\mu g/m^3$)	Change NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	Change PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	Change $PM_{2.5}$ ($\mu g/m^3$)	No. Days	Change in No. Days
R1	**84.8**	0.3	30.1	<0.1	20.6	<0.1	28	<1
R2	**78.7**	0.4	29.4	<0.1	20.0	<0.1	26	1
R3	**75.6**	0.4	28.9	0.1	19.8	<0.1	24	<1
R4	**60.3**	0.7	27.4	0.1	18.8	<0.1	19	<1
R5	**56.3**	0.6	27.1	<0.1	18.6	<0.1	18	<1
R6	**69.1**	0.1	29.1	<0.1	19.8	<0.1	25	<1
R7	**80.7**	0.1	29.9	<0.1	20.4	<0.1	28	<1
R8	**60.3**	0.1	27.4	<0.1	18.8	<0.1	19	<1
R9	**55.1**	0.2	26.9	<0.1	18.4	<0.1	18	<1
R10	**56.7**	0.6	27.1	<0.1	18.6	<0.1	18	<1
R11	**69.3**	0.2	29.2	<0.1	19.9	<0.1	25	<1
Site Suitability Assessment								
P1	**56.1**	n/a	27.0	n/a	18.5	n/a	18	n/a
P2	**59.0**	n/a	27.3	n/a	18.7	n/a	19	n/a
P3	**59.2**	n/a	27.3	n/a	18.7	n/a	19	n/a
P4	**57.9**	n/a	27.2	n/a	18.6	n/a	19	n/a

Note: Bold Denotes an exceedances of an AQS Objective (refer Table 9.1)

9.196 The results show that the Site results in only 'very low' changes in annual mean NO_2, at all existing receptors around the Site, with exception of Receptors R2 to R5 and R10 where the change is low.

9.197 Annual mean NO_2 concentrations are expected to exceed the AQS Objective at all sensitive receptors, this is predominantly due to the background concentrations being above the level of 40 µg/m^3 (refer Table 9.12)

9.198 Annual mean concentrations are above 60 µg/m^3 at all existing receptors with exception of receptors R5, R9 and R10, which is indicative that concentrations might be exceeding the short-term, 1 hour NO_2 objective in these locations. The short term objective was also exceeded at all those locations, with exception receptor R4 in the 'Without-Development' scenario.

9.199 In terms of the changes in annual mean NO_2, the 'With Development (2017)' scenario has been modelled to result in a likely **negligible** effect, with the exception at receptor locations R2 to R5 and R10, where the likely effect has been modelled as **minor adverse**.

9.200 The annual mean and daily PM_{10} and $PM_{2.5}$ AQS Objectives are expected to be met at all modelled receptor locations. Therefore, results identify very low changes in annual mean PM_{10} and $PM_{2.5}$ at the receptor locations, resulting in a likely **negligible** effect.

Assessment of Site Suitability- Predicted Future With-Development

9.201 This Site Suitability Assessment does not assess the significance of effect as the proposed receptors (P1 to P4) do not exist in the baseline scenario. The purpose of the following section is therefore to assess the Site for suitability for residential use in air quality terms.

9.202 The concentration of NO_2, PM_{10} and $PM_{2.5}$ predicted at the proposed residential receptors (P1 to P4) within the Proposed Development, as a result of road traffic emissions in the 'With Development' scenario are presented in Table 9.15. The results presented represent the worst case façade for the ground floor of Site S3 where residential receptors are being proposed.

9.203 The predictions indicate that the development would not result in new public exposure to elevated concentrations of PM_{10} or $PM_{2.5}$, but the predictions do suggest that that annual mean concentrations of NO_2 may be elevated above the relevant AQS Objective (40 µg/m^3) at the façade of Site S3. This is consistent with the Site being within the LBTH AQMA.

9.204 The predicted results suggest that there will not be exceedances of the 1-hour NO_2 AQS Objective.

9.205 Whilst a series of conservative assumptions have been made in this assessment (as presented in the '*Limitations and Assumptions*' section) , the predicted concentrations of NO_2 are high enough that mitigation is considered appropriate as part of the detailed design for the Site to be suitable for residential occupation, in order to minimise the exposure of new residents to poor air quality. This could include the use of NO_2 filters or drawing in air from height away from elevated pollutant concentrations.

Air Quality Neutral Assessment

9.176 An Air Quality Neutral Assessment has been undertaken using the GLA's SPG (Ref. 9-22) and the accompanying air quality neutral guidance document (Ref. 9-41). The results of the assessment are presented in full in ***ES Volume III: Appendix D***.

9.177 In summary, the Total Transport Emissions for the Site are below the calculated Total Benchmarked Transport Emissions (referred in the SPG) for both NO_X and PM_{10} emissions

9.178 The calculated Total Transport Benchmark emissions are 1550.0 kg for NO_X and 278 kg for PM_{10}.

9.179 The calculated Total Transport Emissions for the Site are 446 kg for NO_X and 80 kg for PM_{10}, which gives a difference of -1104.0kg for NO_X emissions and -198 kg for PM_{10} emissions. Therefore, the transport emissions associated with the Site are below the calculated benchmarks for the Site and no further mitigation will be required for this source of emissions.

Odour Effects

9.180 Floorspace for Class A3 Uses (i.e. restaurant, café) is proposed to be provided within the Site on the ground floor levels of Buildings S1, S1a, S1c and S2. Provision of floorspace for Class A4 Use (i.e. public house) is within Building S1b.

9.181 The extraction of air from these units / buildings has the potential to cause odour issues at the proposed residential units that are part of the Site and the existing neighbouring residential properties within the surrounding area.

9.182 The potential effect of odour will be controlled from exhaust ducts in accordance with Defra's 'Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems' (Ref. 9-42). The location of exhaust ducts, and details of an appropriate extraction and abatement system, will be determined at detailed design stage post-consent, and installed prior to occupation / operation. It is considered that adherence with the Defra guidance will avoid the potential of significant effects arising associated with odour emissions during occupation of the Site.

9.183 This mitigation can be covered by planning conditions requiring that the details of any extraction system are agreed with the LBTH prior to occupation / operation of the commercial units.

Effects Once the Site is Operational – Predicted Future With-Development Impact at Existing Receptors – Update 2015

March 2015 ES Addendum

9.184 The revised scheme will not change the building volume compared to the 2014 Scheme and, as such, the energy consumption and emissions associated with on-site energy generation will remain as reported in the December 2014 ES (i.e. no on site point source emissions are included within the Proposed Scheme).

9.185 The revised scheme results in a decrease of 31 trips per day across all modes of transport. It is therefore considered that the revised scheme has a negligible impact on vehicle trip generation and therefore would not alter the results of the ADMS Road dispersion modelling presented within the December 2014 ES.

9.186 It is therefore considered that the effects of the revised scheme on existing receptors are likely to remain the same as those presented in the December 2014 ES.

November 2015 Amendments

9.187 The traffic data modelled for the Amended Proposed Development included a reduction in vehicle trips on Norton Folgate, Commercial Road and Folgate Street, relative to the traffic flows modelled for the December 2014 ES and March 2014ES Addendum, and account for the reduced floor areas of B1 office and A1 / A3 retail associated with the November 2015 Amendments.

9.188 The revised predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for the opening year (2019) of the Amended Proposed Development are summarised in Table 9.6R.

Table 9.6R Air Quality Predicted for the 'With-Development' (2019) Scenario Relative to the Future Baseline

Receptor	Annual Mean Concentration (µg/m^3)						Number of 24 hour mean values of PM_{10} over 50 µg/m^3 (days)	
	NO_2	Change NO_2	PM_{10}	Change PM_{10}	$PM_{2.5}$	Change $PM_{2.5}$	No. Days	Change in No. Days
R1	**86.4**	**0.4**	**30.3**	<0.1	20.7	<0.1	29	0
R2	**80.0**	**0.4**	**29.5**	<0.1	20.1	<0.1	26	0
R3	**76.7**	**0.4**	**29.1**	0.1	19.9	0.1	25	0
R4	**60.8**	**0.6**	**27.5**	0.1	18.8	<0.1	20	1
R5	**56.7**	**0.6**	**27.2**	0.1	18.6	<0.1	19	1
R6	**70.1**	**0.3**	**29.2**	<0.1	19.9	<0.1	25	0
R7	**82.2**	**0.3**	**30.1**	<0.1	20.6	0.1	28	0

Receptor	Annual Mean Concentration (µg/m^3)						Number of 24 hour mean values of PM_{10} over 50 µg/m^3 (days)	
	NO_2	Change NO_2	PM_{10}	Change PM_{10}	$PM_{2.5}$	Change $PM_{2.5}$	No. Days	Change in No. Days
R8	**61.0**	**0.2**	**27.5**	<0.1	18.8	<0.1	20	0
R9	**55.5**	**0.2**	**26.9**	<0.1	18.5	<0.1	18	0
R10	**57.1**	**0.5**	**27.1**	<0.1	18.6	0.1	19	1
R11	**70.3**	**0.3**	**29.4**	0.1	20.0	<0.1	26	0
Site Suitability Assessment								
P1	56.6	n/a	27	n/a	19	n/a	18	n/a
P2	59.6	n/a	27	n/a	19	n/a	19	n/a
P3	59.8	n/a	27	n/a	19	n/a	19	n/a
P4	58.4	n/a	27	n/a	19	n/a	19	n/a

Note: Bold Denotes an exceedances of an AQS Objective values (refer Table 9.1)

9.189 Annual mean NO_2 concentrations are expected to exceed the AQS Objective values at all external receptors with the Amended Proposed Development in operation. This is as a result of the elevated background concentrations being already well above the objective value (40 µg/m^3) (refer Table 9.6R).

9.190 Where annual mean concentrations of NO_2 are above 60 µg/m^3 at all existing external receptors, with the exception of receptors R5, R9 and R10. The short term objective value was also exceeded at the same locations, with exception receptor R4, in the 'Without-Development' scenario.

9.191 In terms of assessing the changes in annual mean NO_2, in light of the updated EPUK / IAQM guidance, the 'With Development (2019)' scenario model predicts a **moderate adverse** effect at the majority of locations within the study area, and a **major adverse** effect at limited locations within the study area.

9.192 The air quality assessment described in the December 2014 ES and for the current consent have conservatively assumed no improvement in vehicle emissions rates and background pollutant concentrations, from 2013 to the year of opening in 2019. This approach is considered to be conservative as some improvements in vehicle technology, such as the introduction of Euro-standard vehicles, and their evolution into the London vehicle fleet, is likely to occur, along with the potential impact that this will have on background pollutant concentrations. The conservative nature of the assessment is emphasised by the updated IAQM and EPUK significance criteria (2015), which increases the likelihood of moderate and major adverse effects occurring where total pollutant concentrations are already elevated beyond the relevant objective value. In this instance, concentrations are elevated beyond the objective value mainly as a result of high backgrounds pollutant concentrations, based on the conservative approach described, rather than the contribution predicted as a result of the Amended Proposed Development.

9.193 For PM_{10} and $PM_{2.5}$, the results presented above show that the effects are considered to be **negligible**. This conclusion is consistent with the conclusion of the December 2014 ES and March 2015 ES Addendum.

Effects Once the Site is Operational – Assessment of Site Suitability – Predicted Future With-Development – Update 2015

March 2015 ES Addendum

9.194 Building parameters have not changed across the revised scheme and the changes in road traffic associated with the revised scheme from those considered in the December 2014 ES are considered to be negligible. As such, the emissions associated with on-site energy generation and road traffic emissions reported in the December 2014 ES remain valid. It is therefore considered that the Site is suitable for its proposed use.

November 2015 Amendments

9.195 As with the December 2014 ES and March 2015 ES Addendum, the building parameters considered for the Amended Proposed Development remain unchanged. As presented in the December 2014 ES, annual mean NO_2 concentrations are high enough that mitigation is considered appropriate as part of the detailed design for the Site to be suitable for residential occupation, in order to minimise the exposure of new residents to poor air quality. This could include the use of NO_2 filters or drawing in air from height away from elevated pollutant concentrations.

9.196 Providing that mitigation measures are in place for new residential areas, as presented in the December 2014 ES, it is concluded that the Site will experience an appropriate standard of air quality possible, bearing in mind that background concentrations of NO_2 are already in excess of the relevant objective value.

9.197 Table 9.7R takes into account the maximum pollutant concentrations modelled for the different residential floors (accounting for terraces and balconies) for the operational phase of the Amended Proposed Development.

Table 9.7R Maximum Pollutant Concentrations across the residential areas at different floors

Residential Receptors Areas	Annual Mean Concentration (µg/m^3)			Number of 24 hour mean values of PM_{10} over 50 µg/m^3 (days)
	NO_2	PM_{10}	$PM_{2.5}$	No. Days
Ground	**59.1**	27	19	19
First	**58.2**	27	19	19
Second	**57.3**	27	19	18
Third	**55.2**	27	18	18
Fourth	**53.0**	27	18	17
Fifth	**50.9**	26	18	17
Roof	**49.1**	26	18	16

9.198 Modelled concentrations at all receptors presented in Table 9.7R are below the hourly mean equivalent of 60 µg/m^3, which would be the target objective value for use of the balconies and roof terraces, and is considered suitable for the proposed use.

9.199 It should be noted that the predictions of total pollutant concentrations at height have utilised the same background concentration as used for ground floor locations. In reality, there will be some reduction in concentration with increasing height from the source. Therefore, actual concentrations at height are likely to be lower than those predicted here. Additionally, the background concentrations in the area are estimated to be 44.5 µg/m^3 in 2013. The assessment has conservatively assumed no improvements in either background pollutant concentrations or emission rates from road traffic from 2013 to 2019. It is likely that some improvements will materialise as a result of improving vehicle emissions technology and the evolution of the London vehicle fleet.

Effects Once the Site is Operational – Air Quality Neutral Assessment – Update 2015

March 2015 ES Addendum

9.200 As reported in the December 2014 ES, there are no on-site emissions from energy plant sources associated with the scheme and therefore the revised scheme building emissions remain air quality neutral.

9.201 The change in of floor space for each land use class with the revised scheme result in revised transport emissions benchmarks. The negligible changes to the trip generation per land use class associated with the Revised Scheme has led to the revised schemes benchmark transport emission rates being calculated as 1,579 kg/year for NOx and 283 kg/year for PM_{10}. The actual transport emission rate has been recalculated as 502 kg/year NO_X and 90 kg/year for PM_{10}. As the actual emission rates remain lower than the benchmark emission rates, the transport emissions associated with the revised scheme are considered to be air quality neutral.

9.202 The conclusions of the December 2014 ES therefore remain valid and the revised scheme is considered to be Air Quality Neutral.

November 2015 Amendment

9.203 The change in floor space for each land use class arising from the November 2015 Amendments produces revised transport emissions benchmarks, as a result of a reduction in trip generation associated with the Amended proposed Development. The revised scheme's transport emission benchmark is 1,542 kg/year for NO_X and 277 kg/year for PM_{10}. The revised transport emission rate has been recalculated as 434 kg/year NO_X and 78 kg/year for PM_{10}. As the actual emission rates remain lower than the benchmark emission rates, the transport emissions associated with the revised scheme are considered to be Air Quality Neutral.

9.204 The conclusions of the December 2014 ES and March 2015 ES Addendum remain valid.

Effects Once the Site is Operational – Odour Effects – Update 2015

March 2015 ES Addendum

9.205 The nature and scale of the design changes proposed are not likely to alter the conclusions regarding odour assessment presented in the December 2014 ES.

November 2015 Amendment

9.206 On review of the Amended Proposed Development, the nature and scale of the description changes are not likely to alter the conclusions of the odour assessment presented in the December 2014 ES and March 2015 ES Addendum, and remains valid for the Replacement ES.

Mitigation and Monitoring Measures

9.207 From the assessment, this section outlines the mitigation measures proposed, that are over-and-above the environmental design and management measures covered previously. Where appropriate, future monitoring and / or environmental management required to verify the predictions and/or fine tune mitigation measures, or ensure the potential effects are adequately controlled, are also outlined.

9.208 The measures accounted for both the demolition and construction, and operational phases, are outlined below.

Demolition and Construction

9.209 The assessment of demolition, construction and refurbishment phase impacts has been undertaken in line with current IAQM guidance. As such, it has been assumed that best practice dust and particulate control measures will be implemented on Site as is standard practice on all well managed construction sites across the UK.

9.210 No further measures are suggested beyond those identified for industry best practice, as described within guidance including the BRE (Ref. 9-33), the GLA SPG (Ref. 9-22) and LBTH CoCP (Ref 9-25) documents.

Operational

9.211 The new residential units included in the Site introduce new receptors in to an area of exceedences of the annual mean National Air Quality Objective for NO_2. This is mostly due to the background concentrations exceeding the AQS Objective at the Site. To improve the air quality for residential occupation, it is recommended that air brought into the building is from a height away from elevated pollutant concentrations or sufficiently cleaned using NO_2 filters.

9.212 The potential effect of odour will be controlled from exhaust ducts in accordance with Defra's 'Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems' (Ref. 9-42). The location of exhaust ducts, and details of an appropriate extraction and abatement system, will be determined at detailed design stage post-consent, and installed prior to occupation / operation.

Mitigation and Monitoring Measures – Update 2015

March 2015 ES Addendum

9.213 No additional mitigation measures or changes to those measures identified previously are assessed as being required to alleviate the impacts associated with the proposed changes.

November 2015 Amendment

9.214 No additional mitigation measures or changes to those measures identified previously are assessed a being required to alleviate the impacts associated with the November 2015 Amendments.

Residual Effects and Conclusions

Residual Effects – Update 2015

9.215 ~~The residual effects resulting from the Proposed Development are summarised in Table 9.16 below~~ Table 9.16 below presents the residual effects following the assessment of the Amended Proposed Development.

Table 9.16 Summary of Residual Effects On Air Quality

Resource / Receptor	Effect (incorp. environmental design & management)	Mitigation and Monitoring	Residual Effect (incorp. mitigation & monitoring)	Significance Conclusion
Demolition and Construction				
Neighbouring Property And Amenity				
Demolition	Negligible to Minor Adverse	No further mitigation proposed	**Negligible to Minor Adverse**	**Not Significant**
Earthworks	Negligible to Minor Adverse	No further mitigation proposed	**Negligible to Minor Adverse**	**Not Significant**
Construction	Negligible to Minor Adverse	No further mitigation proposed	**Negligible to Minor Adverse**	**Not Significant**
Trackout Material	Negligible to Minor Adverse	No further mitigation proposed	**Negligible to Minor Adverse**	**Not Significant**
Neighbouring Residential / Occupants Human Health				
Demolition	Negligible to Minor Adverse	No further mitigation proposed	**Negligible to Minor Adverse**	**Not Significant**
Earthworks	Negligible to Minor Adverse	No further mitigation proposed	**Negligible to Minor Adverse**	**Not Significant**

Resource / Receptor	Effect (incorp. environmental design & management)	Mitigation and Monitoring	Residual Effect (incorp. mitigation & monitoring)	Significance Conclusion
Construction	Negligible to Minor Adverse	No further mitigation proposed	**Negligible to Minor Adverse**	**Not Significant**
Trackout Material	Negligible to Minor Adverse	No further mitigation proposed	**Negligible to Minor Adverse**	**Not Significant**
Completed and Operational- Roads NO_2				
Residential Receptors	~~Negligible~~ Moderate (External Receptors R1 to R3, R6 to R11) to Major Adverse (External Receptors R4 and R5)	No further mitigation proposed	~~**Negligible**~~ **Moderate to Major Adverse**	~~**Not Significant**~~ **Significant**
Completed and Operational- Roads PM_{10} and $PM_{2.5}$				
Residential Receptors	Negligible	No further mitigation proposed	**Negligible**	**Not Significant**

Conclusion – Update 2015

9.216 It is concluded that the nature and scale of the November 2015 amendments are unlikely to alter the likely demolition and construction phase effects presented in the December 2014 ES and March 2015 ES Addendum.

9.217 In terms of the NO_2 annual mean concentrations during the operational phase, it is considered that the air quality assessment has conservatively assumed 2013 background concentrations and 2013 vehicle emission rates to represent the opening year scenarios in 2019. This approach is considered to be conservative as some improvement is likely due to improving vehicle emissions technology and the evolution of the vehicle fleet.

9.218 For the operational phase, PM_{10} and $PM_{2.5}$ concentrations will remain with the same effects, negligible, as presented in the December 2014 ES.

9.219 The assessment has identified that at individual external receptor locations, the likely effect in terms of local air quality has been identified as being moderate for the majority of the study area, and major adverse at some localised areas. The updated EPUK / IAQM guidance states that significance should be defined for the study area as a whole, rather than as a result of the effect at specific or individual locations. Where impacts are predicted to have a likely major adverse effect on local air quality, the change has been modelled at the lower end of that magnitude band (0.6 µg/m3).

9.220 As discussed, it is inherently difficult to accurately predict annual mean pollutant concentrations, due to the diurnal, seasonal and year on year variation that naturally occurs in background pollutant concentrations. Changes of the magnitude identified in this assessment are generally considered to be within the range of seasonal and year on year variation (<2 µg/m3), and therefore is not likely to affect the achievement of air quality objective values in themselves. The major impacts predicted have been identified to occur at locations away from the busiest roads, where air quality is considered a greater issue. Therefore, it is suggested that the Amended Proposed Development is unlikely to affect the implementation of measures described within the LBTH AQAP, which are aimed at reducing emissions on the busiest routes through the LBTH.

9.221 An AQN assessment has also been undertaken and concludes that road traffic emissions associated with the Amended Proposed Development is below the benchmark values.

9.222 It is considered that the overall potential effects associated with the construction and operational phases of the Amended Proposed Development remain consistent with the conclusions presented in the December 2014 ES. The Amended Proposed Development is also assessed to remain Air Quality Neutral.

Effect Interactions and Cumulative Effect Assessment

Assessment of Combined Effect of Individual Effects on a Single Receptor

9.223 The combined effects of individual effects occur when a single receptor is affected by more than one impact at any point in time. An exercise which tabulates the residual effects of this ES against relevant receptors, and so identifies the potential for combined cumulative effects, has been undertaken.

9.224 Reference should be made to ***Chapter 16: Effect Interactions*** of this ES.

Assessment of Cumulative Effect of the Site with Other Development Schemes

9.225 This section of the chapter assesses the potential effects of the Site in combination with the potential effects of other development schemes within the surrounding area, as listed within ***Chapter 2: EIA Methodology*** of this ES.

Cumulative Effects during Demolition and Construction

9.226 The demolition and construction works will be delivered with mitigation measures as specified through a CEMP that will be approved by LBTH.

9.227 Each individual cumulative construction site will have to adopt controls to prevent significant transfer of airborne pollutants beyond the site boundaries and the use of monitoring to confirm the effectiveness of these measures. The cumulative effect at existing and future receptor locations would therefore be managed by the contractors to avoid the occurrence of significant cumulative effects.

9.228 Cumulative impact of the demolition, construction and refurbishment phase is therefore considered to be temporary, local and overall **negligible to minor adverse** effect (not significant).

Cumulative Effects Once the Site is Completed and Operational

9.229 The traffic data provided includes local cumulative schemes in the future 'Without Development' and 'With Development' scenarios. The results of the assessment therefore inherently include the consideration of the cumulative air quality impact providing a worst case scenario. These are considered to be of long-term, local **negligible to minor adverse** effect (not significant).

Assessment of Cumulative Effect of the Site with Other Development Schemes – Update 2015

March 2015 ES Addendum

9.230 As the list of cumulative schemes remains unchanged, the cumulative impact Assessment presented in the December 2014 ES remains valid.

November 2015 Amendments

9.231 The traffic data provided includes local cumulative schemes in the future 'Without Development' and 'With Development' scenarios. The results of the assessment therefore inherently include the consideration of the cumulative air quality impact providing a worst case scenario. These are considered to be of long-term, local **negligible to minor adverse** effect (not significant).

Summary of the 2011 Consented Scheme

9.232 An Air Quality Report was produced (dated September 2010) and comprised of a qualitative assessment of the potential impact on local air quality from construction activities, a quantitative assessment of the potential impacts to local air quality due to traffic generated by the development during the operational phase, and an assessment of the potential exposure of future occupants and users to poor air quality.

9.233 The report made the following conclusions:

- Dust particles and pollution were anticipated to be released during the demolition and construction phase, however the residual effects on air quality were considered to be minor adverse to negligible;
- During the operational phase there would be a negligible to neutral effect for air quality emissions as a result of traffic generated by the development; and
- There would be high levels of NO_2 concentrations at a small number of residential receptor locations, however mitigation measures are proposed that would be adequate to address the potential increase in exposure.

9.234 An air quality planning statement was produced in June 2011. As the development no longer features a residential component, the potential adverse effects to residential receptor locations in the September 2010 report were no longer applicable.

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