14. Air Quality and Dust

14.1 Introduction

14.1.1 This Chapter, which has been prepared by Waterman, provides further environmental information pursuant to the s.73 ES and updates Chapter 14: Air Quality and Dust of the s.73 ES. The impact assessment has been updated specifically to assess the potential construction and operational impacts arising from the Scheme with detailed design of Phase 1A (North) elements in place (hereafter referred to as 'the Development') on existing and future sensitive receptors.

14.1.2 Air quality modelling has been updated on the basis of the outputs of further traffic modelling undertaken to inform the detailed highway design (the BXC – Detailed Design Model (DDM)) recently produced principally for technical approvals for highway authorities' functions), the detailed highway design (as defined by Phase 1A (North) RMAs) and baseline air quality monitoring.

14.1.3 A review of the s.73 and preceding ESs has been undertaken to determine the validity of existing environmental information and to identify any new or different likely significant impacts arising from the Development with the Phase 1A (North) detailed design now produced. The outcome of this review is reflected in the content of this Chapter and where relevant it is indicated where information relies on data from the s.73 ES or where it has been updated.

14.1.4 The scope of this assessment for short and long term air quality impacts associated with the Development replicates that of the s.73 ES, and is summarised as follows:

Short Term:

- Dust arising from the demolition of the existing infrastructure and construction activities on Site;;
- Vehicular emissions from construction traffic; and
- Impact of the Temporary Bus Station and Bus Stops (Plots 114 and 113 respectively), which will be required during the construction phase until the opening of the new permanent bus station.

Long Term

- Vehicular emissions from traffic utilising the new road network and accessing the waste handling facility;
- Emissions from the CHP plant and waste handling facility; and
- Emissions associated with the new mainline railway station and freight handling facility.

14.1.5 This Chapter is supported by appendices containing details of the air quality monitoring survey carried out by Waterman from the end of August to the end of November 2014, and the air quality modelling results. These can be found respectively in **Appendix 14.1: Air Quality Monitoring Survey**, and **Appendix 14.2: Air Quality Modelling Study**.

14.2 Legislation, Planning Policies and Guidance

Legislation

European Legislation

14.2.1 European Union (EU) legislation on air quality forms the basis for UK legislation and policy on air quality. The EU Framework Directive 2008/50/EC[i] on ambient air quality assessment and management came into force in May 2008 and was implemented by Member States, including the

UK, by June 2010. The Directive aims to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants.

National Legislation

Air Quality Standards Regulations, 2010

14.2.2 The Air Quality Standards Regulations[ii] implement Limit Values prescribed by the EU Framework Directive 2008/50/EC. The limit values are legally binding and the Secretary of State, on behalf of the UK Government, is responsible for their implementation.

The UK Air Quality Strategy, 2007

14.2.3 In a parallel process to the above, the Environment Act 1995[iii] required the preparation of a national air quality strategy setting health-based air quality objectives for specified pollutants and outlining measures to be taken by local authorities to meet these objectives (the Local Air Quality Management (LAQM) regime).

14.2.4 The UK Air Quality Strategy (AQS), adopted in 1997[iv], was subsequently reviewed and revised in 2000 as the Air Quality Strategy for England, Scotland, Wales and Northern Ireland[v]. An amendment to the Strategy was published in 2003[vi].

14.2.5 The current UK AQS was published in July 2007[vii]. It updates any previous strategy and sets out new objectives for local authorities in undertaking their LAQM duties. The 2007 UK AQS introduces a national level policy framework for exposure reduction for fine particulate matter. Objectives in the current UK AQS are in some cases more onerous than the Limit Values set out within the relevant EU Directives and the Air Quality Standards Regulations. In addition, objectives have been established for a wider range of pollutants.

14.2.6 The Limit Values and AQS objectives of air pollutants relevant to this assessment are summarised in **Table 14.1**.

Table 14.1 - Summary of Relevant Air Quality Limit Values and UK AQS Objectives

Pollutant	Objective / Limit Value		Date by which Objective to be Met
	Concentration	Measured As	
Nitrogen Dioxide (NO_2)	200µg/m^3	1 hour mean not to be exceeded more than 18 times per year	31/12/2005
	40µg/m^3	Annual Mean	31/12/2005
Particulate Matter (PM_{10}) (a)	50µg/m^3	24 hour mean not to be exceeded more than 35 times per year	31/12/2004
	40µg/m^3	Annual Mean	31/12/2004
Particulate Matter ($PM_{2.5}$) (b)	Target of 15% reduction in concentrations at urban background locations	Annual Mean	Between 2010 and 2020

Pollutant	Objective / Limit Value		Date by which Objective to be Met
	Concentration	Measured As	
	Variable target of up to 20% reduction in concentrations at urban background locations*	Annual Mean	Between 2010 and 2020
	25µg/m^3	Annual Mean	01/01/2020

Notes: [a] Particulate matter with a mean aerodynamic diameter less than 10 microns (µm).

[b] Particulate matter with a mean aerodynamic diameter less than 2.5 microns (µm).

* Aim to not exceed 18µg/m^3 by 2020.

14.2.7 There are currently no statutory UK standards in relation to deposited dust and its propensity to cause nuisance. However, a deposition rate of 200mg/m^2/day (averaged over a month) is sometimes used as a threshold value for potentially significant nuisance impacts[viii].

Environment Act, 1995

14.2.8 Under Part IV of the Environment Act 1995, local authorities are required to review and assess air quality in their area by way of a staged process. Should this process suggest that any of the UK Air Quality Strategy (AQS) objectives will not be met by the target dates, the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) to improve the air quality and work towards meeting the AQS objectives. To note, a recent EU Court ruling (November, 2014)[ix] in relation to the ClientEarth case regarding the UK's continued breach of legal air quality limits has resulted in the Government stating that they will revise their air quality plans '*to reflect recent action so we can be compliant as soon as possible*' with EU law on NO_2 emissions levels, and to limit the duration of any periods of non-compliance.

14.2.9 The London Borough of Barnet (LBB) has designated the entire Borough as an AQMA for the NO_2 annual and 1-hour mean and the PM_{10} 24-hour mean objectives. The London Borough of Brent (LB Brent), adjacent to the west of LBB, also has declared an AQMA for the NO_2 annual mean and the PM_{10} 24-hour mean objectives. Details of the Air Quality Action Plan and a summary of the air quality statutory reports from both local authorities is provided later in this Chapter.

Planning Policies

National Planning Policy

National Planning Policy Framework, 2012

14.2.10 The National Planning Policy Framework (NPPF)[x] identifies that the planning system should aim to conserve 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 of land, air, water or noise pollution or land instability.*"

14.2.11 Paragraph 124 of the NPPF states:

"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 impacts 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."

Regional Planning Policy

The London Plan - Spatial Development Strategy for Greater London, 2011

14.2.12 Policy 7.14 'Improving Air Quality' of the adopted London Plan[xi] tackles the issue of air quality by proposing the following measures:

- minimising increased exposure to existing poor air quality and make provision to address local problems of air quality;
- promoting the use of sustainable design and construction methods in accordance with the Greater London Authority Best Practice Guidance;
- ensuring provisions are made to reduce emissions from a development on-site; and
- if the development includes the use of a biomass boiler, pollutant concentrations should be forecast and planning permission given only if there are no adverse air quality impacts identified.

Revised Early Minor Alterations to the London Plan, 2013

14.2.13 Revised Minor Alterations to the London Plan (REMA)[xii] were published to ensure for consistency with the NPPF. Alterations relating to air quality are as follows:

- reference to the now superseded Planning Policy Statement 23: Planning and Pollution Control changed to paragraph 120 -124 of the NPPF; and
- removal of the definition of 'air quality neutral' from the Glossary.

14.2.14 However, there are no alterations to the overall air quality policy within the London Plan. As such, Policy 7.14 of the London Plan remains valid.

Draft Further Alterations to the London Plan, 2014

14.2.15 In January 2014, the Mayor published Draft Further Alterations to the London Plan[xiii] (FALP) for public consultation. The Draft FALP does not alter any existing air quality policies within the London Plan.

Local Planning Policy

Barnet Unitary Development Plan, 2006

14.2.16 LBB's Unitary Development Plan[xiv] adopted in 2006 states in Policy ENV7 – Air Quality that: "*Development proposals that could lead to unacceptable levels of air pollution will not be permitted unless the developer is able to demonstrate that measures can be implemented that will mitigate these impacts. The Council will seek to minimise the impact of pollution through the careful location of potentially polluting uses, the siting of uses sensitive to pollution away from the sources of pollution and through planning development to reduce road traffic and the need to travel. Barnet's Air Quality Action Plan will use policies from the UDP and specify others to reduce pollution in designated Air Quality Management Areas*."

14.2.17 LBB published their document "Supplementary Planning Document: Sustainable Design and Construction" as part of their Local Plan in April 2013[xv]. This document reinforces Policy ENV7 and also provides guidance on what should be included in any air quality assessment.

Guidance

14.2.18 The air quality assessment was prepared in accordance with the methodology and recommendations set out in a number of guidance documents. A summary of relevant guidance is provided below.

National Planning Policy Guidance, 2014

14.2.19 The Government's online National Planning Practice Guidance[xvi] (NPPG) states that air quality concerns are more likely to arise where development is proposed within an area of existing poor air quality, or where it would adversely impact upon the implementation of air quality strategies and / or action plans.

14.2.20 The NPPG notes that when deciding whether air quality is relevant to a planning application, considerations would include whether the development would lead to:

- significant impacts on traffic, such as volume, congestion, vehicle speed, or composition;
- the introduction of new point sources of air pollution, such as furnaces, centralised boilers and CHP plant; and
- exposing occupants of any new developments to existing sources of air pollutants and areas with poor air quality.

Mayor of London, Supplementary Planning Guidance: Sustainable Design and Construction, 2014

14.2.21 The Sustainable Design and Construction Supplementary Planning Guidance[xvii] (SPG) provides guidance to support the implementation of the London Plan. Section 4.3 of the SPG focusses on air pollution and the impacts from the construction and operation of new developments.

Design Manual for Roads and Bridges Guidance

14.2.22 The Design Manual for Roads and Bridges (DMRB)[xviii] published by the Highways Agency (HA) provides guidance for air quality assessments on the assessment of the impact that road projects may have on local and regional air quality. The guidance was recently updated following publication of the HA's Interim Advice Notes (IAN) 170/12 "Updated air quality advice on the assessment of future NO_x and NO_2 projections"[xix] and IAN 174/13 "Updated advice for evaluating significant local air quality impacts"[xx].

Environmental Protection UK Guidance; Development Control: Planning for Air Quality, 2010

14.2.23 The Environmental Protection UK (EPUK) Guidance[xxi] responds to the need for closer integration between air quality and development control. It provides a framework for air quality considerations within local development control processes, promoting a consistent approach to the treatment of air quality issues. It is widely used by local authorities, air quality consultants and developers.

14.2.24 The guidance provides a method for assessing the significance of the likely impacts of a development on air quality. The need for early and effective dialogue between the developer and the local authority is identified, to allow air quality concerns to be addressed as early as possible. The guidance also provides some clarification as to when air quality constitutes a material consideration in the planning decision process.

Institute of Air Quality Management: Guidance on the Assessment of dust from demolition and construction, 2014

14.2.25 The Institute of Air Quality Management (IAQM) Construction Dust Guidance[xxii] provides guidance on how to assess air quality impacts from construction related activities. It provides a risk based approach, considering the potential dust emission magnitude of the site (small, medium or large) and the sensitivity of the area to dust impacts. It also recommends that once the risk class of the site has identified, the appropriate level of mitigation measures are implemented to ensure that the construction activities have no significant impacts. Finally, the importance of professional judgement is also noted throughout the guidance.

Mayor of London, Supplementary Planning Guidance: The Control of Dust and Emissions during Construction, 2014

14.2.26 The SPG[xxiii] seeks to reduce emissions of dust, PM_{10} and $PM_{2.5}$ from construction and demolition activities in London. It also aims to manage emissions of NO_x from construction and demolition machinery by means of a new non-road mobile machinery Ultra-Low Emissions Zone. The SPG provides guidance on the implementation of London Plan Policy 7.14 - Improving Air Quality, as well as a range of policies that deal with environmental sustainability, health and quality of life,

Building Research Establishment - Pollution Control Guide: 'Controlling Particles, Vapour and Noise from Construction Sites', 2003

14.2.27 The Building Research Establishment produced a guide[xxiv] to help controlling air pollution and noise emissions from construction sites. The document sets out guidance on controlling pollution emissions through effective pre-project planning and management issues, which should be an essential part of any construction project. 'Other Guides' in the series provide methods for controlling air and noise pollution from various construction and demolition activities.

Local Air Quality Management Technical Guidance LAQM.TG(09), 2009

14.2.28 Defra published Technical Guidance LAQM.TG(09)[xxv] in February 2009. Although the guidance is mainly aimed at helping air quality specialist prepare statutory air quality review and assessment reports for local authorities, required as part of the LAQM regime, it is often used for air quality assessments of developments, as it provides detailed methodology and recommendations related to air quality monitoring and modelling.

Barnet Air Quality Action Plan, 2003

14.2.29 Following the declaration of the borough-wide AQMA in 2001, LBB published an AQAP in January 2003, setting out actions for reducing air pollution. Most actions focus on helping reducing road traffic emissions, including introducing fines for leaving stationary cars running, vehicle emissions testing, promoting public transport and measures to improve traffic flow in the Borough.

Brent Air Quality Action Plan 2012-2015

14.2.30 LB Brent's revised and updated Air Quality Action Plan 2012-2015 outlines the measures the Council will take to reduce air pollution in hotspots throughout the Borough. The AQAP includes measures such as encouraging modal shift to non-car modes, installing electric charging points in strategic areas, or reducing congestion associated with new or proposed traffic management schemes. NO_2 and particulates remain the focus of the new plan since concentrations of these pollutants continue to exceed the air quality objectives.

14.3 Relevant Phase 1A (North) RMA Details

14.3.1 The Phase 1A (North) RMA elements are shown in **Figure 1.3**.

14.3.2 Key Phase 1A (North) infrastructure elements of relevance where detailed design is now available for the assessment comprise the following structures:

- Primary and secondary routes: new roads, junctions and routes to link the future Development to the existing infrastructure;
- Engineering works: alteration and diversion of the River Brent;
- Bridge structures: construction of the replacement Templehof Bridge (A406) (B1), new River Brent bridges, Living Bridge (B7) and new pedestrian and cycle bridge at the M1 junction (B6).

14.3.3 The proposed public open spaces included in Phase 1A (North) RMA are listed below. These have been previously assessed in the s.73 ES in outline, however detailed design is now available which requires further consideration particularly in respect to amenity value:

- Claremont Park Improvements;
- Clitterhouse Playing Fields Improvements Part 1; and
- Central Brent Riverside Park including River Brent Nature Park.

14.3.4 The residential Plots 53 and 54 located on Brent Terrace will provide 47 units of replacement housing for existing residents of Whitefield Estate and will include 47 car parking spaces for residents. The detailed design of these residential buildings at plots 53 and 54 have been considered in the air quality assessment, to determine the suitability of air quality for the future residents. The construction and operation of these plots is also assessed to determine their air quality and dust impacts on existing surrounding sensitive receptors as new emission and dust sources will be introduced through construction activities, construction and operational traffic and operational activities.

14.3.5 A small gas-fired Combined Heat and Power (CHP) unit would be provided within the car park of Plot 53 to provide heat and power the residents of Plots 53 and 54. Detailed design of the CHP unit is not currently finalised, therefore detailed dispersion modelling of the CHP emissions has not been possible. However, given that this would be a small plant only serving 47 units, the impact of emissions are unlikely to be significant.

14.4 Assessment Methodology

14.4.1 The assessment of potential significant air quality and dust impacts is based on the following:

- Identifying potentially sensitive existing and future sensitive receptors on the Site and within the surrounding area of the Site;
- Establishing baseline air quality (and dust) conditions currently existing on the Site and at sensitive receptors surrounding the Site using appropriate air quality (and dust) surveys and data collection;
- Assessing potential air quality emissions and dust levels generated during the demolition and construction works associated with the Development;
- Assessing the suitability of the Site for residential development (in specific areas such as Brent Terrace plots 53 and 54 where detailed design is provided) in terms of the background and future air quality;

- Assessing potential air quality levels from the completed Development including road, rail, CHP and WHF emission sources (with reference to current legislation and guidance, as detailed earlier in this Chapter);
- Providing proposals for mitigation, where necessary and appropriate; and
- Assessing the potential significance of residual air quality and dust impacts.

14.4.2 The main pollutants of concern associated with road traffic emissions are NO_2, and particulate matter (PM_{10} and $PM_{2.5}$), due to their adverse impact on human health. Both LBB and LB Brent have declared an AQMA for NO_2 and particulate matter. The assessment therefore focuses on these pollutants.

Baseline Conditions

Nitrogen Dioxide (NO_2)

14.4.3 The s.73 ES air quality chapter relied on baseline data from automatic monitoring stations and NO_2 diffusion tubes operated by local authorities (LBB and LB Brent). A total of seven automatic monitoring stations for NO_2 were reported in the s.73 ES, with monitoring data ranging from 1996 to 2010. A summary of annual and hourly mean NO_2 concentrations were presented in the ES chapter for 2006 and 2008 to 2012. Additionally, a review of the local authorities' NO_2 diffusion tube locations in the vicinity was also undertaken and one tube operated by LBB was identified at 337 Hendon Way, for which data was available from 2009 and 2012.

14.4.4 NO_2 and PM_{10} background concentrations Defra background pollution maps were used in the s.73 ES. These background maps have again been used for this assessment. Background maps currently only extrapolate future concentrations up to the year 2030, which was deemed appropriate to apply as the end state year is 2031.

14.4.5 For the Phase 1A (North) RMAs, a full review of the existing baseline data from the s.73 ES and available resources, including the local authorities air quality monitoring sites and the Defra background maps has been carried out. Following this review, considering the detailed design now available and the opportunity to obtain more site-specific background pollutant information, it was deemed appropriate to carry out an additional NO_2 monitoring survey to supplement the NO_2 monitoring data available from the local authorities' air quality network. Suitable diffusion tube monitoring locations were selected based on proposed works and sensitive receptor locations, and were agreed with the Environmental Health Officer (EHO) at LBB (see **Figure 14.1**). Monitoring commenced end of August 2014.

14.4.6 Updated automatic monitoring data was also obtained from LBB and LB Brent air quality data online (see **Figure 14.7**), and the latest Defra background maps concentrations were used to determine relevant background NO_2 concentrations.

Particulate Matter (PM_{10} and $PM_{2.5}$)

14.4.7 In the s.73 ES, baseline PM_{10} data was obtained from local authority automatic monitoring stations, as for NO_2. Annual average and 24-hour mean concentrations for years 2006 and 2008 to 2012, were used in the s.73 ES.

14.4.8 For the Phase 1A (North) RMAs, the latest available PM_{10} and $PM_{2.5}$ data from the local authorities' automatic monitoring stations, and PM_{10} and $PM_{2.5}$ background concentrations from the Defra background pollution maps, were used for the air quality assessment.

Meteorological Data

14.4.9 In the s.73 ES, five years (2002 to 2006) of hourly sequential meteorological data from Heathrow Airport, were used. Data for the year 2006 was used in the assessment, to be consistent with the baseline traffic data.

14.4.10 For the Phase 1A (North) RMAs, updated meteorological from Heathrow Airport weather station was used. Data for the year 2012 was used for dispersion modelling, to be consistent with the baseline traffic data. The 2012 wind rose for Heathrow Airport weather station is shown in **Figure 14.6**.

Demolition and Construction Assessment

Construction Dust

14.4.11 Potential adverse impacts on air quality during construction works arise from dust-generating activities and vehicle emissions from plant and vehicles, both on and accessing / egressing construction sites. Potentially, the deposition of construction derived dust can cause nuisance.

14.4.12 Dust emissions are generally fugitive, and cannot be easily quantified. Therefore, a qualitative approach has been used to assess these impacts. The emphasis of this approach lies in the minimisation of potential dust emissions at source, through appropriate environmental management controls (such as good practice site management procedures). In particular, this includes:

- Identification of good working practices and suitable mitigation measures in order to minimise the potential for dust emissions, and nuisance risk; and
- The likely generation of construction vehicle movements.

14.4.13 Premises and occupants within 100m of a construction site are generally considered to experience the most significant adverse impacts from construction dust. Typical examples of dust-sensitive receptors and their associated sensitivity level are listed in **Table 14.2**. The proximity of sensitive receptors and their orientation in relation to the prevailing wind, in addition to the scale and duration of construction activities have a bearing on potential nuisance impacts.

Table 14.2 - Dust Sensitive Receptors

High Sensitivity	Medium Sensitivity	Low Sensitivity
Hospitals and Clinics	Schools	Farms
Retirement Homes	Residential Areas	Light and Heavy Industry
Hi-Tech Industries	Food Retailers	Outdoor Storage
Food Processing	Offices	

Construction Vehicle and Plant Emissions

14.4.14 To note, the construction traffic data used in this assessment remains the same as that presented in the s.73 ES. This is because the Indicative Construction Programme (ICP) (**Appendix 4.3**) and the Construction Impact Assessment (CIA) Addendum (**Appendix 2.2**) as per the 2014 Permission remain valid and no further information is available at this stage. Therefore, no further construction traffic analysis or assessment has been carried out since the s.73 Application. As a result, the air quality and dust impact assessment from construction vehicles has not been updated from the s.73 ES Chapter 14, as this is deemed to remain valid.

Temporary Bus Station and Bus Stops

14.4.15 The potential impacts of the Temporary Bus Station and Bus Stops (Plots 114 and 113 respectively) proposed as part of the construction phase in Plot 114 (bus station) and Plot 113 (bus stops) have been assessed using the atmospheric dispersion model ADMS-Roads™. The model was used to predict the change in air pollutant concentrations at nearby sensitive receptors (see **Figure 14.11**), due to increased bus emissions along the local road network and at the proposed bus stops during idling.

14.4.16 Both Do-Minimum (without the temporary bus station) and Do-Something (with the temporary bus station) scenarios were modelled for the year 2019.

14.4.17 Road traffic data, including Annual Average Daily Traffic (AADT) flows, proportion of Heavy-Duty Vehicles (HDVs) including buses, and average vehicle speeds were provided by URS. Additional information about the forecast number of buses that would call at the drop-off and pick-up bus stops (Plot 113), including hourly variation during weekdays and over the weekend, and average idling times were also provided. This information, combined to the latest bus emission factors published by Defra in the Emission Factors Toolkit (EFT), was used to calculate average idling bus emissions, which were added to road traffic emissions in the model.

14.4.18 Background pollutant concentrations have been added to the modelled contribution of road traffic emissions to estimate the overall pollutant concentration.

14.4.19 Modelled pollutant concentrations have been adjusted based on available monitoring data (from nearby diffusion tubes), following the same methodology used for the dispersion modelling of operational traffic, presented further below.

Operational Development Assessment

14.4.20 Full details of the methodology followed to assess the impact of the Development on air quality once completed are provided in **Appendix 14.2: Air Quality Modelling Study**, including presentation of input data, assumptions, and model verification. The methodology for the air quality assessment is consistent with that of the s.73 ES. This section provides a brief summary of this methodology.

14.4.21 The potential impacts of road traffic emissions due to the Development, once completed, have been assessed using the atmospheric dispersion model ADMS-Roads™. Modelled scenarios included the baseline year 2012 (existing conditions) and future scenarios for the year 2031 (assumed opening year) 'without' and 'with' the Development in place.

14.4.22 Background pollutant concentrations have been added to the modelled contribution of road traffic emissions, to estimate the overall pollutant concentration.

14.4.23 Air pollutant concentrations have been modelled at a number of air quality monitoring sites to verify and adjust the model, and subsequently at a series of sensitive receptors (façade of existing residential properties and other sensitive land use such as schools) along the affected road network (see **Figure 14.3**), to determine the change in air quality (increase or decrease in air pollutant concentrations) following completion of the Development. Diurnal variations in traffic are accounted for within the traffic data provided and emission modelling (see **Figure 14.2**).

14.4.24 In regards to operational traffic data, this has been reviewed and updated in line with the latest traffic data available from the Detailed Design Model (BXC - DDM). The BXC DDM includes the most recent baseline traffic survey counts and represents the detailed design highways network as per the Phase 1A (North) RMA.

14.4.25 The decision was made to update the traffic data from the Transport Model (BXC TM) as previously used in the s.73 ES, although it remains a robust tool to estimate the future transport impacts of the Development on both the highway network and the public transport network. As the Scheme has progressed into detailed design and technical approvals, a further transport model (the BXC DDM) was developed in agreement with Transport for London (TfL), the HA and LBB, principally for technical approvals for highway authorities' functions. Therefore, the opportunity has arisen to use this new model to examine any impacts on the local roads within the study area of the A5 Corridor Study, the junction assessment report for the Phase 1A (North) Reserved Matters Transport Report and to provide traffic data from the DDM for the updated noise and air quality assessments for the ES Further Information Report. The BXC DDM has the same spatial and temporal scope as the BXC TM, with the exception of additional spatial scope to include for the A5 corridor (including local roads to the west of the A5 Edgware Road) to provide for the A5 Corridor Study. The BXC DDM has a significantly increased level of detail of both existing and forecast traffic movements on the local roads within the study area by means of a greater level of zonal disaggregation. This greater level of detail on local roads has been made possible by use of TfL's new North London Highway Assignment Model when preparing the BXC DDM. A good level of agreement in the detailed design assessed by the DDM and the previous preliminary assessments of the BXC TM strategic model have been observed. Further details of the BXC – DDM are presented in **Chapter 7: Traffic and Transport.**

NO_2 Sensitivity Analysis

14.4.26 Analyses of historical monitoring data by Defra[xxvi] have identified a disparity between actual measured NO_x and NO_2 concentrations and the expected decline associated with emission forecasts, which form the basis of the air quality modelling. The precise reason for the disparity is not fully understood but is thought to be related to the on-road performance of certain vehicles compared to calculations based on Euro emission standards, which inform emission forecasts.

14.4.27 A note 'Projecting NO_2 Concentrations'[xxvii] published by Defra in 2012 provides a number of alternative approaches that can be followed in air quality assessments, in relation to the modelling of future NO_2 concentrations, considering that future NO_x / NO_2 road-traffic emissions and background concentrations may not reduce as previously expected. This includes the use of revised background pollution maps, alternative projection factors and revised vehicle emission factors. It is important to note that the Defra note does not form part of statutory guidance and no prescriptive method is recommended for use in an air quality assessment.

14.4.28 However, this discrepancy between forecast reductions in NO_x emissions from road-traffic and recent NO_2 concentration trends is also recognised in the Highways Agency's Interim Advice Note (IAN) 170/12, which updated the DMRB guidance in November 2013. This IAN provides additional guidance for air quality assessment, stating that although NO_2 concentrations have clearly decreased between 1996 and 2002, these have stabilised since then, with little to no reduction observed between 2004 and 2010. The IAN therefore confirms the analysis provided in the Defra note, and concludes that there is now a gap between current projected vehicle emission reductions and projections on the annual rate of improvements in ambient NO_2 levels as previously published in Defra's technical guidance, and observed trends. As a result, it requires air quality assessments to include a sensitivity test (referred to as "gap analysis" in the IAN) assuming that NO_2 levels would not decrease in the future as currently expected.

14.4.29 This air quality assessment has been based on current guidance from Defra, i.e. using existing forecast emission rates and background concentrations to the completion year of 2031, which assume a progressive reduction compared to the baseline year 2012. However, in addition, to comply with the DMRB guidance updated following publication of HA's IAN170/12, and to follow the

recommendation of the Defra note on projecting NO_2 concentrations, a sensitivity analysis has been undertaken, assuming no decrease in NO_x and NO_2 levels between 2012 and 2031. The sensitivity approach presented in this air quality assessment is now typically agreed and accepted by local authorities as being robust, and provides a clear method to account for the uncertainty in future NO_x and NO_2 concentrations in air quality assessments. It is however important to note that such sensitivity test is likely to be overly conservative. The HA has now recognised this in the latest version of IAN 170/12 (November 2013), which states that: "*Emerging evidence indicates that currently published future NOx and NO_2 projections in this IAN may be too pessimistic, when taking into account emerging evidence associated with the performance of Euro 6/VI vehicles and anticipated reductions in vehicle emissions. The HA are currently working with Defra and other Government Departments to agree a revised set of NOx and NO_2 projections for use to support scheme assessment*". This is especially the case for this assessment, given the long period of time between the baseline scenario (2012) and future scenarios (2031), as even if NO_x and NO_2 don't reduce as currently expected by the latest tools and guidance, it is very unlikely that NO_2 background and NOx vehicle emissions will be the same in 2031 as they are now.

14.4.30 The results of this sensitivity analysis, which represents a conservative assessment scenario, are presented in **Appendix 14.2: Air Quality Modelling Study**.

Significance Criteria

Demolition and Construction

14.4.31 The assessment of demolition and construction impacts was based on:

- construction-related traffic data for the Development in comparison to the total existing traffic on the surrounding road network, and
- a review of the sensitive uses in the area immediately surrounding the Site based on their distance and orientation to the construction site.

14.4.32 The significance of impacts was determined through professional judgement based on the following:

- the existing air quality conditions in the area surrounding the Site;
- the mitigation measures that would be proposed, including those agreed under Planning Conditions of the 2014 Permission; and
- a knowledge of how such mitigation measures are routinely and successfully applied to construction projects throughout the UK.

14.4.33 This methodology is in line with the one used in the s.73 ES. The classification system provided in **Table 14.3** was also adopted, again based on professional judgement, for the assessment of potential adverse air quality impacts arising from dust generated by construction activities associated with the Development. Whether a construction site is considered to be minor or major is based on professional judgement on the basis of the size of the site, size of the development and duration of the works.

Table 14.3 - Significance Criteria for Demolition and Construction

Significance Criteria	Definition
Substantial Adverse impact	Receptor is less than 10m from a major active construction or demolition site.
Moderate Adverse impact	Receptor is 10m to 100m from a major active construction or demolition site, or up to 10m from a minor active construction or demolition site.

Significance Criteria	Definition
Slight Adverse impact	Receptor is between 100m and 200m from a major active construction or demolition site or 10m to 100m from a minor active construction site or demolition site.
Negligible	Receptor is over 100m from any minor active construction or demolition site or over 200m from any major active construction or demolition site.

Operational Development

14.4.34 The significance of any changes in local air quality that are predicted, based on background pollutant concentrations and predicted traffic flows, can be established through the consideration of the following factors:

- the geographical extent (local, district or regional) of impacts;
- their duration (temporary or long term);
- their reversibility (reversible or permanent);
- the magnitude of changes in pollution concentrations;
- the exceedance of standards (e.g. AQS objectives); and
- changes in pollutant exposure.

14.4.35 The EPUK Guidance provides an approach to defining the magnitude of changes and describing the air quality impacts at specific receptors recommended by the IAQM.

14.4.36 **Table 14.4** presents the magnitude of change descriptors, based on the change in concentration predicted to be brought about by a scheme as a percentage of the relevant AQS objective. **Table 14.5** and **Table 14.6** present the impact significance descriptors that take account of the magnitude of changes (both beneficial and adverse) and the concentration in relation to the AQS objective. These criteria are the same as previously used in the s.73 ES.

Table 14.4 - Magnitude of Change in Relation to Changes in Concentrations of NO_2 and PM_{10}

Magnitude of Change	Changes in Pollutant Concentration Relative to the AQS Objective	Annual Mean NO_2/PM_{10}	N.o. PM_{10} Daily Means >50µg/m^3 [(a)]
Large	Increase/decrease >10%	>4µg/m^3	>4 days
Medium	Increase/decrease 5-10%	2-4µg/m^3	2-4 days
Small	Increase/decrease 1-5%	0.4-2µg/m^3	1-2 days
Imperceptible	Increase/decrease <1%	<0.4µg/m^3	<1 days

Note: [(a)] Based on percentage of 35 days, rounded to most appropriate whole number of days

Table 14.5 - Significance Criteria for Changes in Annual Mean NO_2 and PM_{10}

Concentration in Relation to Standard	Small	Medium	Large
Decrease with Development Scenario			
Above objective ***without*** development (>40µg/m^3)	**Slight Beneficial impact**	**Moderate Beneficial impact**	**Substantial Beneficial impact**
Just below ***without*** development (36-40µg/m^3)	**Slight Beneficial impact**	**Moderate Beneficial impact**	**Moderate Beneficial impact**
Below objective ***without*** development (30-36µg/m^3)	**Negligible**	**Slight Beneficial impact**	**Slight Beneficial impact**
Well below objective ***without*** scheme (<30µg/m^3)	**Negligible**	**Negligible**	**Slight Beneficial impact**
Increase with Development Scenario			
Above objective ***with*** development (>40µg/m^3)	**Slight Adverse impact**	**Moderate Adverse impact**	**Substantial Adverse impact**
Just below ***with*** development (36-40µg/m^3)	**Slight Adverse impact**	**Moderate Adverse impact**	**Moderate Adverse impact**
Below objective ***with*** development (30-36µg/m^3)	**Negligible**	**Slight Adverse impact**	**Slight Adverse impact**
Well below objective ***with*** scheme (<30µg/m^3)	**Negligible**	**Negligible**	**Slight Adverse impact**

Note: An **Imperceptible** change would be described as **Negligible**

Table 14.6 - Significance Criteria for Changes in 24-hour Mean PM_{10}

Concentration in Relation to Standard	Small	Medium	Large
Decrease with Development Scenario			
Above objective ***without*** development (>35days)	**Slight Beneficial impact**	**Moderate Beneficial impact**	**Substantial Beneficial impact**
Just below ***without*** development (32-35 days)	**Slight Beneficial impact**	**Moderate Beneficial impact**	**Moderate Beneficial impact**
Below objective ***without*** development (26-32 days)	**Negligible**	**Slight Beneficial impact**	**Slight Beneficial impact**
Well below objective ***without*** scheme (<26 days)	**Negligible**	**Negligible**	**Slight Beneficial impact**
Increase with Development Scenario			
Above objective ***with*** development (>35days)	**Slight Adverse impact**	**Moderate Adverse impact**	**Substantial Adverse impact**

Concentration in Relation to Standard	Small	Medium	Large
Just below ***with*** development (32-35 days)	**Slight Adverse impact**	**Moderate Adverse impact**	**Moderate Adverse impact**
Below objective ***with*** development (26-32 days)	**Negligible**	**Slight Adverse impact**	**Slight Adverse impact**
Well below objective ***with*** scheme (<26 days)	**Negligible**	**Negligible**	**Slight Adverse impact**

Note: An **Imperceptible** change would be described as **Negligible**

Limitations and Constraints

14.4.37 The assessment of the operational phase is based on dispersion modelling, which includes a number of assumptions and limitations associated to input data (road traffic, weather, air pollution monitoring and background pollution data, model verification). These are reported in **Appendix 14.2: Air Quality Modelling Study**.

Energy Centre, CHP and Waste Handling Facility

14.4.38 As per the s.73 ES, it is a Site-wide energy strategy with CHP providing onsite energy and heat generation, and a district heating network linking future development plots, would be proposed as part of the Development. The Energy Strategy of the s.73 Application has been revised following the completion of feasibility studies for Refuse Derived Fuel (RDF) in line with pre-RMA Conditions of the 2014 Permission. Despite a Revised Energy Strategy (RES) being available, there is currently not enough detailed information on the proposed CHPs / energy centres and fuel type to carry out a detailed assessment based on dispersion modelling of stack emissions. At the RMA for the relevant Development phase within which the energy centres are located (the first is expected to be within Phase 1B (North)), the detailed design of the energy centre and details of the fuel type will be agreed so that dispersion modelling of stack emissions can be undertaken and added to the contributions of road traffic emissions. The assessment in this Chapter therefore retains the energy centre details as per the s.73 Scheme.

14.4.39 As previously mentioned the small gas fired CHP on Plots 53 and 54 have not yet been designed in detail with regards to the exact plant and emission details and therefore it has not been possible to undertake a dispersion modelling assessment on the potential impacts, however in consideration of the small scale of the CHP and natural gas fuel it is expected that the impacts will be insignificant.

14.5 Consultation

14.5.1 In its informal scoping review, LBB noted the unavailability of energy centre emission data for this Further Information Report to carry out a detailed assessment at this stage (see **Appendix 4.2**). It has therefore been requested that in the absence of detailed information, a qualitative commentary is provided on the updated RES.

14.5.2 In addition to the scoping review, the EHO at LBB was provided with details of the scope and methodology for the air quality assessment prior to the commencement of the assessment; and no specific issues was raised.

14.5.3 LBB's response to the Scoping Opinion request, received in December 2014, mentioned that the recommendations of the Scoping Report in relation to the air quality assessment were adequate, but recommended that the ES also considers the following information:

- LBB's latest air quality monitoring data for the year 2013; and
- Using the latest data from the London Atmospheric Emissions Inventory (LAEI), compiled by the GLA.

14.5.4 These data were considered, but not used in the assessment for the following reasons:

- Air quality monitoring data from LBB (as well as LB Brent) were used, but for year 2012 rather than 2013 to match the baseline traffic data provided for 2012; and
- Although the LAEI includes emissions from all sources within Greater London, including transport (road, rail, airport and shipping) industrial (stacks) and various other sources, this database does not provide estimates of future concentrations. Consequently, using the LAEI would require

modelling the dispersion of emissions from all pollution sources within the study area (other than road traffic). This would not be practical, and is not recommended in standard methodology for air quality assessments. The alternative methodology, which has been followed for this assessment, consists in modelling road traffic emissions and adding the contributions of any other sources using the Defra background pollution maps, which already include the contribution of industry/airport/domestic sources to pollutant concentrations. Moreover, the LAEI only provides data for a baseline year (2010) and projections/estimates for future years (2012, 2015 and 2020). Therefore, the LAEI could not have been used for the future Do-Minimum/Do-Something 2031 scenarios - as opposed to the methodology followed in this assessment, which considered estimated traffic data, emission rates and background pollutant concentrations for year 2031.

14.6 Baseline Conditions

Summary of Local Authority Review and Assessment of Air Quality

Background

14.6.1 The Site lies within LBB. However, a number of roads considered in this assessment extend into LB Brent, the adjacent authority to the west of the Site. Both authorities have long-established AQMA for NO_2 and PM_{10} on the basis of widespread exceedences of the annual mean NO_2 and 24-hour mean PM_{10} objectives at roadside and kerbside locations.

London Borough of Barnet

14.6.2 LBB declared a Borough-wide AQMA in April 2001 as a result of predicted exceedences of the NO_2 annual mean objective and the PM_{10} 24-hour mean objective along large stretches of main roads in the Borough. In July 2010, the original AQMA Order was amended to include the NO_2 1-hour mean objective. Following the declaration of the AQMA, LBB has developed an Action Plan including introducing vehicle emissions testing, fines for leaving stationary cars running, promoting public transport and measures to improve traffic flow in the Borough.

London Borough of Brent

14.6.3 The most recent iteration of the LB Brent AQMA was declared in December 2006 for the NO_2 annual mean and PM_{10} 24-hour mean objectives. The AQMA covers the entire Borough south of the North Circular Road and all housing, schools and hospitals along the North Circular Road, Harrow Road, Bridgewater Road, Ealing Road, Watford Road, Kenton Road, Kingsbury Road, Edgware Road, Blackbird Hill, Forty Lane, Forty Avenue and East Lane. The AQMA extends to the boundary with the LBB, which runs north-south along the railway line. The majority of the land area of the LB Brent is covered by the AQMA.

14.6.4 All of the roads considered in this assessment lie within the AQMAs and are therefore highly sensitive to changes in the network and traffic flows.

Air Quality Monitoring

14.6.5 Both LBB and LB Brent operate a network of air quality monitoring stations across the boroughs, including both automatic monitors measuring NO_2 and particulate matter, as well as NO_2 diffusion tubes. Moreover, Waterman has carried out a NO_2 monitoring survey between end of August and end of November 2014. Results of the survey, which is based on a range of diffusion tubes installed around the Site and along the affected road network, are reported in this section. The location of the NO_2 diffusion tube monitors installed in 2014 is provided in **Figure 14.1.**

14.6.6 A summary of the most recent monitoring results for NO_2 and particulate matter is presented below.

London Borough of Barnet

14.6.7 The closest automatic monitor is the Chalgrove Primary School site, about 2km northeast from the Site. The site is an urban background monitoring station measuring both NO_2 and PM_{10}. The latest results from this monitoring station are provided in **Table 14.7**.

Table 14.7 – Monitoring Results at the Chalgrove Primary School Automatic Monitor

Pollutant	Averaging Period	AQS Objective	Year		
			2011	2012	2013
NO_2	Annual Mean (µg/m^3)	40µg/m^3	31	32	32
	Hourly (No. of hours)	200µg/m^3 not to be exceeded more than 18 times a year	0	0	0
PM_{10}	Annual Mean (µg/m^3)	40µg/m^3	21	19	19
	No. of Days	50µg/m^3 not to be exceeded more than 35 times per year	14	0	0

14.6.8 It can be seen that all AQS objectives for NO_2 and PM_{10} have been met at the Chalgrove School monitoring site. The site is at an urban background location, and these are chosen on the basis that they are away from major sources of pollution and are regarded as broadly representative of town/city-wide background concentrations.

14.6.9 LBB also operates two NO_2 diffusion tube monitoring sites close to the Site. **Table 14.8** presents the most recent monitoring data for these monitoring sites.

Table 14.8 - LBB Diffusion Tube Annual Mean NO_2 Concentrations (µg/m^3)

Site ID	Site Location	Classification	Approximate Distance to Centre of Site	AQS Objective	2011	2012	2013
PBN19	Rear of 7-12 Dyson Court, Tilling Road	Roadside	0.4km south	40µg/m^3	**49.5**	**50.0**	**55.5**
PBN6	337 Hendon Way	Roadside	0.2km north		**61.0**	**60.1**	**67.8**

Note: In bold, exceedence of the AQS objectives

14.6.10 These results indicate that the annual mean objective (40µg/m^3) has been exceeded at both monitoring locations over the past three years. Both sites are affected by heavy traffic nearby, PBN19 by the A406, and PBN6 by the A41.

London Borough of Brent

14.6.11 The closest automatic monitor is the site Brent Park Ikea, Drury Way, about 3.5km southwest from the Site. The site is a roadside monitoring station measuring NO_2, PM_{10} and $PM_{2.5}$. The latest available results are provided in **Table 14.9**.

Table 14.9 - Monitoring Results at the Brent Park Ikea – Drury Way Automatic Monitor

Pollutant	Averaging Period	AQS Objective	Year		
			2011	2012	2013
NO_2	Annual Mean (µg/m^3)	40µg/m^3	**70**	**76**	N/A
	Hourly (N.o. of hours)	200µg/m^3 not to be exceeded more than 18 times a year	13	**33**	N/A
PM_{10}	Annual Mean (µg/m^3)	40µg/m^3	34	32	34
	Daily (N.o. of Days)	50µg/m^3 not to be exceeded more than 35 times per year	**42**	33	**38**

Notes: In bold, exceedence of the AQS objectives

NO_2 data for 2013 not reported due to low data capture

14.6.12 These results indicate that the annual mean objective (40µg/m^3) has been exceeded at in 2011 and 2012, as well as the 1-hour mean objective in 2012 (data was not available for 2013). The 24-hour mean objective for PM_{10} has also been exceeded at the Brent Park Ikea site in 2011 and 2013, and was close to be exceeded in 2012. The site is affected by heavy traffic on the A406 North Circular Road.

Waterman Monitoring Survey 2014

14.6.13 To support the air quality assessment, Waterman carried out a separate monitoring survey at 14 roadside and background locations around the Site and along the main roads nearby. The survey, based on NO_2 diffusion tubes, was carried out for a period of three months, between the 22nd of August and 21st of November 2014.

14.6.14 Results have been used to estimate the annual mean for year 2012, which is the baseline year used for this assessment. Full details of the survey, including monthly results, and estimated annual averages, are provided in **Appendix 14.1: Air Quality Monitoring Survey**. The location of all diffusion tubes is also shown in **Figure 14.1**. A summary of results is presented in **Table 14.10** below.

14.6.15 Overall, based on the survey, estimated annual averages exceed the NO_2 annual mean objective at the majority of the locations (9 out of 14).

Table 14.10 - Waterman Diffusion Tube Survey - NO_2 Concentrations (µg/m^3)

Location	Overall Average (Sept-Nov 2014)	Bias Adjusted Average*	Adjusted Estimated 2012 Annual Mean**
1. Ethridge Road	83.9	68.8	**71.6**
2. Layfield Road	45.6	37.4	38.9
3. Claremont Road	62.0	50.8	**52.8**
4. Wallcote Avenue	37.8	31.0	32.2
5. Clitterhouse Road	52.9	43.4	**45.1**
6. Purbeck Drive	40.5	33.2	34.6
7. Brent Terrace	40.8	33.4	34.8
8. Handley Grove			

Location	Overall Average (Sept-Nov 2014)	Bias Adjusted Average*	Adjusted Estimated 2012 Annual Mean**
	43.1	35.4	36.8
9. Claremont Road	81.2	66.6	**69.3**
10. 274 Cricklewood Lane	96.8	79.4	**82.6**
11. The Vale	77.9	63.9	**66.4**
12. Brentfield Gardens	76.5	62.7	**65.2**
13. A41 Hendon Way	78.3	64.2	**66.8**
14. Edgware Road	64.9	53.2	**55.3**

Notes * Multiply previous column by 0.82
** Multiply previous column by 1.04
In bold, exceedence of the NO_2 AQS objective of 40µg/m^3

Dust and Odour Nuisance

14.6.16 It is understood that the potential for odour and dust nuisance currently exists within the Claremont Way Industrial Estate and Brent Terrace due to the current operation of waste recycling facilities. Complaints have been received by LBB over the past few years in relation to odour nuisance, which is understood to originate from the McGovern Brothers Haulage and FCC (Hendon WTS) waste facilities on Brent Terrace; whilst dust nuisance complaints have also been received in relation to the Wood Recycling Services facility, also on Brent Terrace.

14.7 Assessment and Mitigation

14.7.1 The following sections present the impacts of the Development both during the construction and operational phases.

14.7.2 Results for the operational phase are based on detailed dispersion modelling of road-traffic emissions on the affected road network to predict air pollutant concentration at selected sensitive receptors (see **Figures 14.4** and **14.5**).

Construction

Potential Impacts

14.7.3 The ICP and the CIA Addendum which formed the basis of the s.73 assessment of construction impacts remain valid (taking into account the sub-phase change submitted under Planning Condition 4.2 of the 2014 Permission). Therefore the construction activities provided within the CIA Addendum and s.73 ES Chapter remain applicable to this assessment.

14.7.4 Given the scale of the Development and timeframe over which it is likely to be constructed (approximately 16 years) during the demolition and construction works, the Site is considered as a 'High Risk' site, as defined by the criteria within the IAQM Guidance on Construction Dust[xxii].

14.7.5 In common with all major construction sites, the demolition and construction works would have the potential to affect local air quality conditions via:

- Fugitive dust generated from demolition and construction activities;

- Exhaust emissions from demolition and construction plant e.g. excavators and breakers, piling rigs etc; and
- Exhaust emissions from demolition and construction related vehicles entering and egressing the Site from / to the local road network.

Construction Dust

14.7.6 The AQS objectives seek to address the health implications of fine particulate matter, which are largely derived from combustion sources such as motor vehicle engines. In the case of particles released from ground excavation works, physical demolition and construction activities and so forth, the majority of these tend to be larger particles, which generally settle out close to the works / activities and may cause annoyance due to their soiling capability. However, there are no formal standards or criteria to determine the adverse impacts caused by deposited particulate matter.

14.7.7 Dust from demolition and construction activities within the urban environment generally does not arise at distances beyond approximately 200m from the works / activities (in the absence of mitigation), and the majority of any deposition that might give rise to significant soiling tends to occur within 50 - 100m of the works / activities. Receptors that are downwind of a construction site are at more risk of dust impacts than those which are upwind. The occupiers of residential properties tend to be more sensitive to dust than occupiers of commercial properties. In addition, in built up areas, neighbouring buildings will limit the movement of dust by acting as a 'screen'.

14.7.8 As defined in the s.73 ES a comprehensive dust mitigation programme will be implemented in line with relevant Planning Conditions under the 2014 Permission, following best practice techniques for the management of dust on Site. These include the Code of Construction Practice (CoCP) and Construction Environmental Management Plans (CEMPs).

14.7.9 The Site is mainly bounded by residential areas from all sides, except on the southwest side which is predominantly commercial or industrial. Given the proximity of existing sensitive receptors to the Site, it is likely that without mitigation, as a worst-case, the impact of construction dust would be:

- **temporary, short-term, local,** and of **Moderate Adverse** significance at receptors within 100m from the Site boundary;
- **temporary, short-term, local** and of **Slight Adverse** significance at receptors within 100m - 200m of the Site boundary; and
- **Negligible** at receptors over 200m from the Site boundary.

14.7.10 Additionally, there are sensitive receptors within the Site, such as the Mapledown and Whitefield schools, and the Rosa Freedman Care Home. The Rosa Freedman Care Home would be removed during Phase 1A (North) and the other uses demolished during the construction of Phase 1A (South). Consequently, construction works are likely to have an impact on these receptors. It is considered that these impacts will be **temporary, short-term** and **of Moderate Adverse** significance, without mitigation measures in place.

Construction Vehicle and Plant Emissions

14.7.11 Plant operating on the Site and demolition and construction related vehicles entering and egressing the Site from / to the local road network would have the potential to increase local air pollutant concentrations, particularly in respect of NO_2 and particulate matter.

14.7.12 Construction traffic would be generated throughout the construction phase. This traffic would vary considerably throughout the duration of works, in line with the activity being undertaken on Site. As mentioned in **Chapter 7: Traffic and Transport**, the access and egress routes would be

predominantly through the Western roundabout entering and existing from and to the A406, and the Eastern roundabout entering the Site from the A406 and exiting onto the A41 northbound, as illustrated in **Figure 7.4**. The forecast construction traffic activity mentioned in the s.73 has not been revised, since it is considered to remain valid. These forecasts for the key junctions, from the CIA Addendum are represented her for ease of reference (maximum hourly flows during peak hour):

- A41/A406 Junction:
  - 5 HGVs per hour (Q3 2017)
  - 10 HGVs per hour (Q3 2020)
- M1 Junction
  - 12 HGVs per hour (Q3 2017)
  - 27 HGVs per hour (Q3 2020)
- Staples Corner junction:
  - 5 HGVs per hour (Q3 2017)
  - 10 HGVs per hour (Q3 2020)

14.7.13 Based on these figures, and associated graphs presented in Appendix 6 (Daily Traffic Movements) of the CIA Addendum (see **Appendix 2.2**), construction traffic on any road would not exceed the 200 Annual Average Daily Traffic (AADT) Heavy-Duty Vehicles (HDV) threshold mentioned in the DMRB guidance[xviii].

14.7.14 Without mitigation, taking into account the current traffic movements and background pollutant concentrations around the Site, it is considered that the likely impact of construction vehicles entering and egressing the Site to air quality would in the worst-case, give rise to a **temporary**, **short-term, local** impact of **Moderate Adverse** significance during the peak construction period. However, at all other times during the demolition and construction works, it is considered that the likely impact would, in the worst-case be temporary, short-term, local and of **Slight Adverse** significance.

14.7.15 Any emissions from plant operating on the Site would be very small in comparison to the emissions from traffic movements on the roads adjacent to the Site. It is therefore is considered that even in the absence of mitigation, their likely impact on local air quality would be **Negligible**.

Temporary Bus Station and Bus Stops

14.7.16 The effects of the temporary bus station (Plot 114) and associated bus stops (Plot 113) on local air quality has been determined by modelling the dispersion of additional buses emissions on the local road network, as well as emissions at bus stops due to idling buses.

14.7.17 The dispersion modelling was based on the ADMS-Roads air quality model. NO_2, PM_{10} and $PM_{2.5}$ concentrations at the façade of the nearest properties (along Layfield Close and Brent Park Road). Both Do-Minimum (without the temporary bus station) and Do-Something (with the temporary bus station) scenarios were assessed for year 2019.

14.7.18 Where relevant, the modelling was carried out using the same assumptions and input data used for the dispersion modelling of the operational traffic, which is fully described in **Appendix 14.2:** Air Quality Modelling Study**,** including the same meteorological data from Heathrow Airport for year 2012.

Traffic Data

14.7.19 Traffic data for both scenarios, including bus frequencies and idling times at bus stops, were provided by URS. Idling emissions at bus stops were included in the dispersion model as volume sources.

14.7.20 The road network considered in the Do-Something scenario includes the permanent road infrastructure including the western roundabout and road upgrades along the western side of the Shopping Centre, as shown in **Figure 14.11 (**rather than temporary works access).

Sensitive Receptors

14.7.21 Details of identified sensitive receptors, representative of the façade of the nearest residential properties to the temporary bus station and bus stops, are provided in **Table 14.11**. The location of these receptors is also illustrated in **Figure 14.11.**

Table 14.11 – Temporary Bus Station and Bus Stops – Sensitive Receptors

Receptor ID	Receptor Name	OS Coordinates		Height (m)
		X(m)	Y(m)	
1	16 Layfield Close	522875	187837	0
2	18 Layfield Close	522880	187828	0
3	20 Layfield Close	522890	187815	0
4	22 Layfield Close	522898	187802	0
5	24 Layfield Close	522907	187788	0
6	26 Layfield Close	522912	187772	0
7	152 Brent Park Road	522953	187753	0
8	148 Brent Park Road	522959	187739	0
9	144 Brent Park Road	522966	187731	0
10	140 Brent Park Road	522967	187714	0
11	136 Brent Park Road	522963	187699	0
12	130 Brent Park Road	522943	187690	0
13	128 Brent Park Road	522934	187688	0
14	124 Brent Park Road	522924	187682	0
15	118 Brent Park Road	522915	187673	0
16	116 Brent Park Road	522904	187667	0
17	110 Brent Park Road	522893	187661	0
18	108 Brent Park Road	522883	187656	0
19	104 Brent Park Road	522870	187651	0
20	100 Brent Park Road	522864	187646	0
21	96 Brent Park Road	522850	187639	0
22	90 Brent Park Road	522841	187631	0
23	86 Brent Park Road	522826	187623	0
24	82 Brent Park Road	522815	187618	0
25	80 Brent Park Road	522807	187615	0
26	76 Brent Park Road	522797	187610	0
27	72 Brent Park Road	522791	187604	0
28	68 Brent Park Road	522782	187598	0
29	66 Brent Park Road	522774	187592	0
30	62 Brent Park Road	522765	187589	0
31	60 Brent Park Road	522756	187583	0
32	56 Brent Park Road	522749	187579	0
33	54 Brent Park Road	522740	187574	0

Receptor ID	Receptor Name	OS Coordinates		Height (m)
		X(m)	Y(m)	
34	50 Brent Park Road	522728	187571	0

Idling Bus Emissions

14.7.22 Emissions at bus stops within Plots 113 and 114 due to idling buses have been determined using emission factors for a typical bus (in g/s) derived from the EFT, combined with the typical dimensions of the proposed bus stops (12m x 3m). The typical height of double-decker buses (4.4m) has been assumed to calculate the volume of each source at bus stops. As the EFT requires a vehicle speed to calculate emissions, the minimum speed of 5km/hr allowed in the EFT has been assumed as a proxy for idling buses. Moreover, the EFT uses the latest projections of national Euro Emissions Standard bus fleet composition for the year of assessment (here 2019) to calculate a weighted emission rate. The emission rates for each pollutant is provided in **Table 14.12**.

Table 14.12 – Temporary Bus Station - Idling Bus Emission Rates (2019)

Pollutant	Emission (g/s) (1)	Volume Source (m^3) (2)	Emission Rate ($g/m^3/s$)
NO_x	2.019E-05	158.4	1.27E-07
PM_{10}	2.502E-07		1.58E-09
$PM_{2.5}$	3.826E-07		2.42E-09

(1) Derived from the Emissions Factors Toolkit, assuming one bus, moving at the speed of 5km/hr

(2) Applied to each bus stop

14.7.23 The above emission rates have been entered in the dispersion model, and the actual emissions for each hour of the day have been determined by combining the forecast number of buses per hour (during weekday and weekends) and average forecast idling times, as provided by URS (see **Table 14.13**).

Table 14.13 – Temporary Bus Station – Hourly Bus Frequencies and Idling Times

Number of Buses / Hour (Monday to Saturday)			Average Idling Time (secs)	
Day (6:00 to 20:00)	Evening (20:00 to 00:00)	Night (00:00 to 6:00)	Monday to Friday	Saturday
154	96	8	20	40

Background Concentrations

14.7.24 Background pollutant concentration data have been added to the modelled concentrations at sensitive receptors along Layfield Close and Brent Park Road. Background annual mean concentrations for year 2019 for all modelled pollutants have been obtained from the UK background pollution maps published by Defra at a $1km^2$ resolution[xxviii] (see **Table 14.14**).

Table 14.14 – Temporary Bus Station - Background Air Pollutant Concentrations

Pollutant	2019 Background Annual Mean Concentrations ($\mu g/m^3$) (1)
NO_2	30.2
NO_x	49.2

PM_{10}	22.8
$PM_{2.5}$	15.2

(1) From background map grid square X=522500, Y=187500

Model Verification

14.7.25 Modelled results have been adjusted using the same methodology used for the impact assessment of operational road-traffic emissions, as described in **Appendix 14.2**. The model verification for NO_x concentrations have been based on monitoring data from the nearest NO_2 diffusion tube (Waterman_DT1), located on Etheridge Road (see **Figure 14.7**). The adjustment factor of 3.35 between monitored and modelled road-NO_x concentrations at this diffusion tube was used to adjust modelled NO_x concentrations. For PM_{10} and $PM_{2.5}$, as there are no monitoring sites nearby, modelled concentrations were adjusted as described in **Appendix 14.2**.

Modelled Results

14.7.26 Modelled results for NO_2, PM_{10} and $PM_{2.5}$ and associated significance of effects are presented in **Tables 14.15** to **Table 14.18** below.

14.7.27 For PM_{10} and $PM_{2.5}$, the temporary bus station and bus stops would not lead to significant changes in concentrations at nearby properties. A maximum increase of 0.3µg/m^3 is predicted for PM_{10} annual mean and 0.2µg/m^3 for $PM_{2.5}$ annual mean, both at properties 136 and 140 Brent Park Road, northwest of the new roundabout (receptors 10 and 11). All concentrations would be well below the air quality objectives, and the potential effect would be **Negligible**.

14.7.28 For NO_2, there would be a more substantial increase in annual mean concentrations, with the maximum increase predicted at the same properties (136 and 140 Brent Park Road), slightly over 4µg/m^3. The change in concentrations at these properties for the four year operational period of the temporary bus station and bus stops is considered as “Large”. The annual mean concentration at these properties would increase from about 32µg/m^3 to just above 36µg/m^3. Although this is still below the AQS objective of 40µg/m^3, given this increase, the potential effect is considered as **Moderate Adverse**.

14.7.29 There would also be a **Slight Adverse** effect at a number of nearby properties along Brent Park Road, due to an increase in NO_2 annual mean within 2-3 µg/m^3. The remaining properties, notably on the western side of Brent Park Road, and along Layfield Close, would not experience any adverse effect, as the increase in NO_2 would be ‘Small’, and the associated impact considered **Negligible**.

14.7.30 All properties are predicted to remain below the air quality objective for the NO_2 annual mean.

14.7.31 It is important to note that the impact of the noise barrier proposed as part of the design of the bus stops within Plot 113 cannot be quantified using dispersion modelling. As it is likely that the noise barrier would also have a beneficial effect on air quality, the results presented in this section are be conservative.

Table 14.15 – Temporary Bus Station - Effect Significance for NO_2 Annual Mean

Receptor ID	NO_2 Annual Mean Concentrations (µg/m^3)			Magnitude	Significance
	Do Minimum 2019	Do Something 2019	Change		
1	30.9	31.9	0.9	Small	Negligible
2	31.0	32.0	1.0	Small	Negligible
3	31.1	32.4	1.2	Small	Negligible

Receptor ID	NO_2 Annual Mean Concentrations (µg/m^3)			Magnitude	Significance
	Do Minimum 2019	Do Something 2019	Change		
4	31.2	32.5	1.4	Small	Negligible
5	31.2	32.7	1.5	Small	Negligible
6	31.2	32.8	1.5	Small	Negligible
7	32.0	34.5	2.5	Medium	Slight Adverse
8	32.0	34.9	2.9	Medium	Slight Adverse
9	32.2	35.7	3.5	Medium	Slight Adverse
10	32.1	36.3	4.1	Large	Moderate Adverse
11	32.0	36.2	4.2	Large	Moderate Adverse
12	31.4	34.7	3.2	Medium	Slight Adverse
13	31.3	34.2	2.9	Medium	Slight Adverse
14	31.2	33.8	2.7	Medium	Slight Adverse
15	31.0	33.6	2.6	Medium	Slight Adverse
16	31.0	33.3	2.4	Medium	Slight Adverse
17	30.9	33.0	2.2	Medium	Slight Adverse
18	30.8	32.8	2.0	Small	Negligible
19	30.7	32.5	1.8	Small	Negligible
20	30.7	32.4	1.7	Small	Negligible
21	30.7	32.2	1.5	Small	Negligible
22	30.6	32.1	1.4	Small	Negligible
23	30.6	31.8	1.3	Small	Negligible
24	30.5	31.7	1.2	Small	Negligible
25	30.5	31.6	1.1	Small	Negligible
26	30.5	31.5	1.0	Small	Negligible
27	30.5	31.5	1.0	Small	Negligible
28	30.5	31.4	1.0	Small	Negligible
29	30.5	31.3	0.9	Small	Negligible
30	30.5	31.3	0.8	Small	Negligible
31	30.4	31.2	0.8	Small	Negligible
32	30.4	31.2	0.7	Small	Negligible
33	30.4	31.1	0.7	Small	Negligible
34	30.4	31.1	0.7	Small	Negligible

Table 14.16 – Temporary Bus Station - Effect Significance for PM_{10} Annual Mean

Receptor ID	PM_{10} Annual Mean Concentrations (µg/m³)			Magnitude	Significance
	Do Minimum 2019	Do Something 2019	Change		
1	22.9	23.0	0.1	Imperceptible	Negligible
2	22.9	23.0	0.1	Imperceptible	Negligible
3	23.0	23.0	0.1	Imperceptible	Negligible
4	23.0	23.1	0.1	Imperceptible	Negligible
5	23.0	23.1	0.1	Imperceptible	Negligible
6	23.0	23.1	0.1	Imperceptible	Negligible
7	23.1	23.3	0.2	Imperceptible	Negligible
8	23.1	23.3	0.2	Imperceptible	Negligible
9	23.2	23.4	0.2	Imperceptible	Negligible
10	23.1	23.5	0.3	Imperceptible	Negligible
11	23.1	23.4	0.3	Imperceptible	Negligible
12	23.0	23.3	0.3	Imperceptible	Negligible
13	23.0	23.2	0.2	Imperceptible	Negligible
14	23.0	23.2	0.2	Imperceptible	Negligible
15	23.0	23.2	0.2	Imperceptible	Negligible
16	22.9	23.1	0.2	Imperceptible	Negligible
17	22.9	23.1	0.2	Imperceptible	Negligible
18	22.9	23.1	0.2	Imperceptible	Negligible
19	22.9	23.1	0.1	Imperceptible	Negligible
20	22.9	23.0	0.1	Imperceptible	Negligible
21	22.9	23.0	0.1	Imperceptible	Negligible
22	22.9	23.0	0.1	Imperceptible	Negligible
23	22.9	23.0	0.1	Imperceptible	Negligible
24	22.9	23.0	0.1	Imperceptible	Negligible
25	22.9	23.0	0.1	Imperceptible	Negligible
26	22.9	23.0	0.1	Imperceptible	Negligible
27	22.9	22.9	0.1	Imperceptible	Negligible
28	22.9	22.9	0.1	Imperceptible	Negligible
29	22.9	22.9	0.1	Imperceptible	Negligible
30	22.9	22.9	0.1	Imperceptible	Negligible
31	22.9	22.9	0.1	Imperceptible	Negligible
32	22.9	22.9	0.1	Imperceptible	Negligible
33	22.9	22.9	0.1	Imperceptible	Negligible
34	22.8	22.9	0.1	Imperceptible	Negligible

Table 14.17 – Temporary Bus Station - Effect Significance for PM_{10} Daily Mean

Receptor ID	N.o. PM_{10} 24-Hour Mean Concentrations > 50 µg/m³			Magnitude	Significance
	Do Minimum 2019	Do Something 2019	Change		
1	8	8	0	Imperceptible	Negligible
2	8	8	0	Imperceptible	Negligible
3	8	8	0	Imperceptible	Negligible
4	8	8	0	Imperceptible	Negligible
5	8	8	0	Imperceptible	Negligible
6	8	8	0	Imperceptible	Negligible
7	8	9	1	Imperceptible	Negligible
8	8	9	1	Imperceptible	Negligible
9	8	9	1	Imperceptible	Negligible
10	8	9	1	Imperceptible	Negligible
11	8	9	1	Imperceptible	Negligible
12	8	9	1	Imperceptible	Negligible
13	8	9	1	Imperceptible	Negligible
14	8	8	0	Imperceptible	Negligible
15	8	8	0	Imperceptible	Negligible
16	8	8	0	Imperceptible	Negligible
17	8	8	0	Imperceptible	Negligible
18	8	8	0	Imperceptible	Negligible
19	8	8	0	Imperceptible	Negligible
20	8	8	0	Imperceptible	Negligible
21	8	8	0	Imperceptible	Negligible
22	8	8	0	Imperceptible	Negligible
23	8	8	0	Imperceptible	Negligible
24	8	8	0	Imperceptible	Negligible
25	8	8	0	Imperceptible	Negligible
26	8	8	0	Imperceptible	Negligible
27	8	8	0	Imperceptible	Negligible
28	8	8	0	Imperceptible	Negligible
29	8	8	0	Imperceptible	Negligible
30	8	8	0	Imperceptible	Negligible
31	8	8	0	Imperceptible	Negligible
32	8	8	0	Imperceptible	Negligible
33	8	8	0	Imperceptible	Negligible
34	8	8	0	Imperceptible	Negligible

Table 14.18 – Temporary Bus Station – Modelled $PM_{2.5}$ Annual Mean

Receptor ID	$PM_{2.5}$ Annual Mean Concentrations (µg/m^3)		
	Do Minimum 2019	Do Something 219	Change
1	15.3	15.3	0.0
2	15.3	15.3	0.0
3	15.3	15.3	0.0
4	15.3	15.3	0.1
5	15.3	15.3	0.1
6	15.3	15.3	0.1
7	15.4	15.5	0.1
8	15.4	15.5	0.1
9	15.4	15.5	0.1
10	15.4	15.6	0.2
11	15.4	15.6	0.2
12	15.3	15.5	0.1
13	15.3	15.4	0.1
14	15.3	15.4	0.1
15	15.3	15.4	0.1
16	15.3	15.4	0.1
17	15.3	15.4	0.1
18	15.2	15.3	0.1
19	15.2	15.3	0.1
20	15.2	15.3	0.1
21	15.2	15.3	0.1
22	15.2	15.3	0.1
23	15.2	15.3	0.1
24	15.2	15.3	0.1
25	15.2	15.3	0.1
26	15.2	15.3	0.0
27	15.2	15.3	0.0
28	15.2	15.3	0.0
29	15.2	15.3	0.0
30	15.2	15.3	0.0
31	15.2	15.2	0.0
32	15.2	15.2	0.0
33	15.2	15.2	0.0
34	15.2	15.2	0.0

Mitigation

Construction Dust

14.7.32 A number of measures would be implemented to minimise the release of dust and air pollution during the demolition and construction works, as detailed in the s.73 ES and s.73 CoCP.

14.7.33 Such measures are routinely and successfully applied to major construction projects throughout the UK, and are proven to reduce significantly the potential for adverse dust impacts associated with the various stages of demolition and construction work. These will be detailed in the CEMPs, as well as the CoCP, which is required prior to the commencement of construction works, as per Planning Condition 8.1 of the 2014 Permission.

Construction Vehicle and Plant Emissions

14.7.34 Planning Condition 12.1 of the 2014 Permission requires a Site-wide Construction Transport Management Plan (CTMP) and Construction Worker Travel Plan (CWTP) to be produced and approved prior to the commencement of development on Site. As such, these are planned for submission prior to construction commencing in mid-2016.

14.7.35 The CTMP will include mitigation measures to be agreed with LBB to minimise potential impact due to emissions from construction vehicles. Consideration will be given to the avoidance, or limited use of, traffic routes in proximity to sensitive routes (such as residential roads) and the avoidance (or limited use) of roads during peak hours, where practicable.

Temporary Bus Station and Bus Stops

14.7.36 The assessment of the temporary bus station and bus stops show potential **Moderate Adverse** impacts at two properties, and **Slight Adverse** impacts at a number of other residential properties on Brent Park Road, in relation to the NO_2 annual mean.

14.7.37 It is important to note that the impact of the noise barrier proposed as part of the design of the bus stops within Plot 113 as a mitigation measure cannot be taken into account by the air quality modelling. It is likely that this noise barrier would also have a beneficial impact on air quality, further reducing the air pollutant levels at nearby properties on Layfield Close and part of Brent Park Road, directly to the west of Plot 113.

14.7.38 However, additional mitigation measures would be required to reduce pollution at source, including:

- Implementation of a no idling engine policy at Plots 113 and 114 to ensure engines are switched off as much as practicable, thus reducing emissions; and
- The Applicant would work with TfL and bus operators to ensure that all (or the majority of) buses calling at Plots 113 and 114 comply with the highest emissions standards.

Residual Impacts

Construction Dust

14.7.39 Following the implementation of appropriate environmental management controls as summarised above, the likely residual impacts of demolition and construction dust would be **temporary**, **short-term, local** of **Slight Adverse** significance at receptors within 100m of the Site boundary, and **Negligible** at receptors over 100m from the Site boundary. This conclusion remains consistent with that of the s.73 ES.

14.7.40 For the sensitive receptors within the Site (Mapledown and Whitefield schools, and the Rosa Freedman Care Home), it is considered that the residual impacts will be **temporary**, **short-term, and** of **Slight Adverse** significance, provided these mitigation measures are implemented.

Construction Vehicle and Plant Emissions

14.7.41 Following the implementation of appropriate mitigation measures included in the CEMPs and CTMP, it is considered that the likely residual impacts of construction traffic on local air quality will be **Negligible**, as identified in the s.73 ES.

14.7.42 Any impacts of construction plant would be **Negligible** without the need for mitigation measures. Therefore, residual impacts would also remain **Negligible**, as identified in the s.73 ES.

Temporary Bus Station and Bus Stops

14.7.43 Following the implementation of appropriate mitigation measures described further above, it is considered that the residual impacts of the temporary bus station at all residential properties where a **Moderate/Slight Adverse** impact has been identified pre-mitigation, should be of **Slight Adverse** significance.

Operation

Potential Impacts

Road Traffic Emissions

14.7.44 Impacts on local air quality associated with the completed and operational Development would likely result from changes to traffic flows associated with the Development.

14.7.45 Detailed results of the air pollutant dispersion modelling of operational traffic for Scenario 1 (2031 End State 'Do Minimum' scenario) and Scenario 2 (2031 End State 'Do Something' scenario) are presented in **Appendix 14.2** for all sensitive receptors considered. These are based on current guidance, i.e. considering vehicle emissions and background concentrations will reduce as forecast between the baseline year (2012) and the completion year (2031). A summary of the predicted impacts of the Development is presented below.

Nitrogen Dioxide (NO_2)

14.7.46 **Table 14.19** provides a summary of the significance of impacts related to the NO_2 annual mean at all modelled sensitive receptors. **Figure 14.8** also shows the significance of impacts at all receptors. Results show that, for the vast majority of sensitive receptors, the significance of impacts would be **Negligible**.

14.7.47 Adverse impacts are however predicted for a number of receptors due to forecast changes in traffic flows, including a **Substantial Adverse** impact at one receptor, a **Moderate Adverse** impact at four receptors, and a **Slight Adverse** impact at a further 17 receptors. However, **Slight Beneficial** impacts are also predicted at three receptors.

Table 14.19 – Summary of Impact Significance for NO_2 Annual Mean at Sensitive Receptors

Significance of Impact (NO_2 Annual Mean)	No. Receptors
Substantial Adverse	1
Moderate Adverse	4
Slight Adverse	17

Significance of Impact (NO_2 Annual Mean)	No. Receptors
Negligible	104
Slight Beneficial	3
Moderate Beneficial	0
Substantial Beneficial	0
Total	**129**

14.7.48 Detailed modelled results focusing on receptors predicted to experience either and adverse or beneficial impacts (i.e. excluding all receptors for which a negligible impact is predicted) are provided in **Table 14.20**. The receptor locations are shown in **Figure 14.4** and **Figure 14.5**, and results at all receptors provided in **Appendix 14.2: Air Quality Modelling Study**.

Table 14.20 – NO_2 Annual Mean Concentrations – Significance of Impacts

Receptor ID	NO_2 Annual Mean Concentrations ($\mu g/m^3$)				Magnitude	Significance	Location
	Baseline 2012	Do Minimum 2031	Do Something 2031	Change			
59	**82.9**	**43.5**	**48.1**	4.6	Large	Substantial Adverse	A5 Cricklewood Broadway / Cricklewood Lane Junction
60	**67.8**	36.5	39.2	2.7	Medium	Moderate Adverse	A407 Cricklewood Lane / Lichfield Road Junction
63	**53.5**	34.6	38.6	3.9	Medium	Moderate Adverse	Claremont Road / The Vale Junction
16	**61.1**	35.6	38.4	2.8	Medium	Moderate Adverse	Claremont Road / Somerton Road Junction
1	**53.6**	34.2	37.4	3.2	Medium	Moderate Adverse	A407 Cricklewood Lane
6	**86.7**	**45.8**	**47.2**	1.5	Small	Slight Adverse	A41 (Finchley Road)
93	**77.0**	**41.9**	**42.9**	1.0	Small	Slight Adverse	A41 (Finchley Road)
86	**74.6**	**41.2**	**41.6**	0.4	Small	Slight Adverse	A4088 Dudden Hill Lane / Dollis Hill Lane Junction
98	**81.0**	39.3	39.8	0.5	Small	Slight Adverse	A406 North Circular Road
91	**71.3**	39.1	39.5	0.5	Small	Slight Adverse	A406 North Circular Road
33	**69.4**	36.9	37.6	0.7	Small	Slight Adverse	Highfield Avenue
122	**61.6**	36.5	37.6	1.0	Small	Slight Adverse	Colindeep Lane
58	**63.1**	34.8	36.2	1.5	Small	Slight Adverse	A5 Cricklewood Broadway / Oaklands Road Junction
3	**53.9**	31.8	35.6	3.8	Medium	Slight Adverse	A5 Cricklewood Broadway / Chichele Road Junction
73	**68.8**	33.2	35.2	2.1	Medium	Slight Adverse	A406 North Circular Road
116	**58.7**	24.6	33.0	8.4	Large	Slight Adverse	Brent Park Road
97	**55.9**	29.4	32.2	2.8	Medium	Slight Adverse	A406 North Circular Road

Receptor ID	NO_2 Annual Mean Concentrations ($\mu g/m^3$)				Magnitude	Significance	Location
	Baseline 2012	Do Minimum 2031	Do Something 2031	Change			
129	**47.9**	30.1	32.2	2.0	Medium	Slight Adverse	Humber Road / Green Road Junction
52	**54.3**	29.3	31.6	2.3	Medium	Slight Adverse	A41 (Hendon Way)
95	**49.6**	28.1	30.7	2.6	Medium	Slight Adverse	Highfield Avenue
128	**54.4**	27.7	30.1	2.4	Medium	Slight Adverse	A41 (Hendon Way)
115	**50.2**	24.3	28.4	4.1	Large	Slight Adverse	Fairfield Avenue
121	**72.1**	**40.5**	38.6	-1.8	Small	Slight Beneficial	A5 Edgware Road / Longley Way Junction
54	**59.7**	34.6	32.4	-2.2	Medium	Slight Beneficial	A5 Edgware Road / Oxgate Gardens Junction
75	**55.3**	31.9	29.7	-2.2	Medium	Slight Beneficial	Brent Park Road, near the M1/A406 junction

In bold, exceedence of the NO_2 annual mean AQS objective of $40\mu g/m^3$

14.7.49 As shown in **Table 14.20** and **Figure 14.8**, the receptor predicted to experience a **Substantial Adverse** impact is receptor 59, located at the A5 Cricklewood Broadway / Cricklewood Lane junction (representative of an existing residential property).This is because, for this receptor, modelled results show an exceedence of the AQS objective ($48.1\mu g/m^3$) combined with a large increase in NO_2 annual mean (over $4\mu g/m^3$). However, for this receptor, predicted results for the "Do Minimum" scenario also show an exceedence of the objective ($43.5\mu g/m^3$); so the Development would not create a new exceedence. This increase in NO_2 concentrations is due to the forecast increase in traffic flows on the A407 Cricklewood Lane (more than doubling on the section between Cricklewood Broadway and Oak Grove; from 9,000 AADT in the Do-Minimum scenario to 18,800 AADT in the Do-Something scenario).

14.7.50 A further four receptors, also representative of existing residential properties, would experience a **Moderate Adverse** impact. These are:

- Receptor 1 on the A407 Cricklewood Lane;
- Receptor 63, at the Claremont Road / The Vale junction;
- Receptor 16 at the Claremont Road / Somerton Road junction; and
- Receptor 60 at the A407 Cricklewood Lane / Lichfield Lane junction.

14.7.51 Again, these adverse impacts are due to an increase in forecast traffic flows in the area (on the section of Claremont Road between Cricklewood Lane and Somerton Road, traffic increases from 11,000 AADT in the Do-Minimum scenario to 17,000 AADT in the Do-Something scenario).

14.7.52 A **Slight Adverse** impact is also predicted at 17 receptors representative of existing residential properties. As seen in **Figure 14.8**, these are located:

- Along the A5 Cricklewood Broadway (receptors 3 and 58);
- Along the A406 North Circular Road (receptors 73, 91, 97 and 98);
- Along the A41 Hendon Way (receptors 52 and 128) and Finchley Road (receptors 6 and 93);

- Along a number of minor roads, including Coles Green Road (receptor 129) and Dollis Hill Lane (receptor 86) to the west of the A4 and south of the A406, Highfield Avenue (receptors 33 and 95), east of theA406/A41 junction, and the A5150 Colindeep Lane (receptor 122) west of the A41/A5150 junction and the M1); and
- Properties on the northern and western side of the existing Brent Cross shopping centre (receptor 115 on Fairfield Avenue, and 116 on Brent Park Road), which are the closest to the circulation roads surrounding the shopping centre.

14.7.53 Most of these receptors are predicted to be below the annual mean AQS objective of 40µg/m^3, except receptors 6 and 93 (along the A41 Finchley Road)and 86 (Dollis Hill Lane). However, all these receptors are also predicted to be above the objective in the "Do Minimum" scenario.

14.7.54 Therefore, it is important to note that, overall, the Development would not create any new exceedence of the NO_2 AQS objective, as for those receptors exceeding the objective in the Do-Something scenario, the objective would also be exceeded in the Do-Minimum scenario.

14.7.55 Finally, the receptors predicted to experience a beneficial impact include Receptors 54 and 121 (A5 Edgware Road) and 75 (Brent Park Road, near the M1/A406 junction), where a **Slight Beneficial** impact is predicted, due to a reduction in NO_2 concentration of about 2µg/m^3. For receptor 121, the reduction in NO_2 would lead to compliance with the objective in the Do-Something scenario (38.6µg/m^3), compared to the Do-Minimum scenario, which shows a slight exceedence of the objective (40.5µg/m^3).

14.7.56 As discussed in **Appendix 14.2**, the 1-hour mean objective for NO_2 is unlikely to be exceeded at a roadside location where the annual mean NO_2 concentration is less than 60µg/m^3. As shown in **Table 14.20**, the annual mean NO_2 concentrations are all predicted to be below 60µg/m^3 with the Development. Therefore, the 1-hour mean objective is likely to be met at all sensitive receptors considered. Accordingly, it is considered that the Development would have a **Negligible** impact on hourly NO_2 concentrations. This is consistent with the findings of the s.73 ES.

Particulate Matter (PM_{10} and $PM_{2.5}$)

14.7.57 **Table A14.9** in **Appendix 14.2**: **Air Quality Modelling Study** shows that PM_{10} annual mean would be well below the AQS objective of 40µg/m^3 (both in the 'Do Minimum' and 'Do Something' scenarios), with the maximum concentration predicted to be 27.6ugm^3. The maximum increase in PM_{10} annual mean would be 1.3µg/m^3 at receptor 59, at the junction of Cricklewood Broadway and Cricklewood Lane.

14.7.58 Similarly, **Table A14.10** in **Appendix 14.2** shows that the number of exceedences of the PM_{10} daily mean (less than 19 exceedences predicted at any receptor) would be well below the objective (35 exceedences per year allowed) in both scenarios.

14.7.59 **Table 14.21** and **Table 14.22** provide a summary of the significance of impacts related to the PM_{10} annual mean and 24-hour mean respectively at all modelled sensitive receptors. Results show that the significance of impacts would be **Negligible** at all modelled receptors.

Table 14.21 - Summary of Impact Significance for PM_{10} Annual Mean at Sensitive Receptors

Significance of Impact	No. Receptors
Substantial Adverse	0
Moderate Adverse	0
Slight Adverse	0
Negligible	129

Significance of Impact	No. Receptors
Slight Beneficial	0
Moderate Beneficial	0
Substantial Beneficial	0
Total	**129**

Table 14.22 - Summary of Impact Significance for PM_{10} 24-Hour Mean at Sensitive Receptors

Significance of Impact	No. Receptors
Substantial Adverse	0
Moderate Adverse	0
Slight Adverse	0
Negligible	129
Slight Beneficial	0
Moderate Beneficial	0
Substantial Beneficial	0
Total	**129**

14.7.60 **Table A14.11** in **Appendix 14.2** shows that $PM_{2.5}$ annual mean in 2031 would be well below the AQS objective of 25µg/m^3 (both in the 'Do Minimum' and 'Do Something' scenarios), with the maximum concentration predicted to be 17.7ugm^3. The maximum increase in $PM_{2.5}$ annual mean would be 0.7µg/m^3 at receptor 59, at the junction of Cricklewood Broadway and Cricklewood Lane.

14.7.61 Given these results, and as for PM_{10}, the significance of impacts would be **Negligible** for $PM_{2.5}$ at all receptors.

Conditions within the Development

Phase 1A (North) Development (Plots 53 / 54)

14.7.62 Phase 1A (North) would include 47 new residential properties on Brent Terrace (Plots 53 and 54). Forecast daily traffic flows for the 2031 End State 'Do Something' scenario are low for both Clitterhouse Road and the proposed new Spine Road North (about 2,500 AADT for both roads). The new properties at Brent Terrace would be about 100m away from both roads, and more than 160m from the nearest busy road, Claremont Road, for which traffic flows forecast is 14,300 AADT.

14.7.63 The estimated 2012 NO_2 annual mean concentration on Brent Terrace, from the Waterman NO_2 diffusion tube survey (see **Table 14.10**) is 38.1µg/m^3, which is close but below the AQS objective of 40µg/m^3. The properties at Plots 53 and 54 would not be occupied before 2018 and therefore, background NO_2 concentrations (and road-traffic emissions) are expected to reduce by then. Particulate matter (PM_{10} and $PM_{2.5}$) should be well below the AQS objectives, as demonstrated by the results of the dispersion modelling at properties along much busier roads.

14.7.64 Based on this, any exceedence of the AQS objectives for NO_2, PM_{10} or $PM_{2.5}$ at the proposed properties is very unlikely. As a result, the impact of introducing new residential use on Brent Terrace is considered **Negligible**.

End State Development

14.7.65 **Table 14.23** provides a summary of modelled NO_2, PM_{10} and $PM_{2.5}$ concentrations at selected future receptors representative of new proposed land use for the Do-Something scenario (2031). This is

based on anticipated primary uses within each Plot and Development Zone for the End State Development, once completed. There receptors include:

- A number of proposed residential properties within the Eastern Lands, Station Quarter, Brent Terrace and Cricklewood Lane Development Zones;
- A Private Hospital (receptor NR9 within Plot 78 of the Eastern Lands Development Zone);
- The New Whitefield Secondary School (receptor NR13 within Plot 27 of the Eastern Lands Development Zone); and
- The replacement Claremont Primary School (receptor NR17 within Plot 46 of the Brent Terrace Development Zone).

14.7.66 The location of all selected future sensitive receptors is shown in **Figure 14.9**.

14.7.67 Results show that the maximum concentrations are predicted within the Eastern Lands Development Zone, especially near the New Whitefield Secondary School (Plot 27) and anticipated residential properties (Plots 18 and 68), where modelled annual mean NO_2 concentrations are within 33-37µg/m^3. Overall, that concentrations would be below the relevant AQS objectives at all selected sensitive receptors.

14.7.68 Based on this, any exceedence of the AQS objectives for NO_2, PM_{10} or $PM_{2.5}$ at the proposed properties is very unlikely. As a result, the impact of introducing new sensitive uses is considered **Negligible**.

Table 14.23 – Modelled Concentrations at Proposed New Receptors

Receptor ID	Plot	Development Zone	Anticipated Primary Uses	Do Something 2031			
				NO_2 Annual Mean (µg/m^3)	PM_{10} Annual Mean (µg/m^3)	N.o. PM_{10} 24-Hour Means > 50 µg/m^3	$PM_{2.5}$ Annual Mean (µg/m^3)
NR1	113	Eastern Lands	Residential	31.4	23.6	9	15.3
NR2	114	Eastern Lands	Residential	28.7	25.1	13	16.2
NR3	114	Eastern Lands	Residential	29.3	25.3	13	16.3
NR4	18	Eastern Lands	Residential, Retail and Leisure	34.3	24.3	11	15.7
NR5	18	Eastern Lands	Residential, Retail and Leisure	33.3	24.1	10	15.6
NR6	11	Eastern Lands	Residential and Retail	31.2	23.9	10	15.5
NR7	57	Eastern Lands	Residential	29.7	25.7	14	16.5
NR8	57	Eastern Lands	Residential	28.2	25.2	13	16.2
NR9	78	Eastern Lands	Private Hospital and Public Car Park	27.4	25.4	13	16.3
NR10	75	Eastern Lands	Residential	27.0	25.8	14	16.5
NR11	75	Eastern Lands	Residential	28.1	26.0	15	16.6
NR12	68	Eastern Lands	Residential and Retail	34.4	24.4	11	15.8
NR13	27	Eastern Lands	New Whitefield Secondary School	37.2	24.9	12	16.0
NR14	93	Eastern Lands	Residential and Retail	27.5	24.8	12	16.0
NR15	22	Station Quarter	Residential and Retail	28.2	23.3	9	15.2
NR16	44	Station Quarter	Residential and Retail	26.5	23.1	8	15.0

Receptor ID	Plot	Development Zone	Anticipated Primary Uses	Do Something 2031			
				NO_2 Annual Mean ($\mu g/m^3$)	PM_{10} Annual Mean ($\mu g/m^3$)	N.o. PM_{10} 24-Hour Means > 50 $\mu g/m^3$	$PM_{2.5}$ Annual Mean ($\mu g/m^3$)
NR17	46	Brent Terrace	Replacement Claremont Primary School	28.9	21.6	6	14.2
NR18	47	Brent Terrace	Residential	27.2	21.2	5	14.0
NR19	58	Cricklewood Lane	Residential and Retail	32.0	22.3	7	14.6

Summary

14.7.69 In summary, the updated air quality modelling of road traffic from the Development as a whole, including the Phase 1A (North) RMAs, have taken account of the improvements in technology and tighter emissions controls through the future pollutant emission rates. Although the modelling results showed that, for NO_2, there would be a **Substantial Adverse** impact on NO_2 at the junction of the A5 Cricklewood Broadway and Cricklewood Lane, and **Moderate Adverse** impacts on NO_2 locally along stretches of Cricklewood Lane and Claremont Road, south of the Development, the impact at the vast majority of sensitive receptors (representative of existing properties) is **Negligible.** Furthermore, **Slight Beneficial** impacts are also predicted at a number of receptors. The impact on particulate matter (both PM_{10} and $PM_{2.5}$) is also **Negligible**, without any mitigation measures in place.

14.7.70 Additional modelled results at future proposed sensitive uses (Plots 53/54, for the Phase 1A (North), and other relevant receptors proposed for the End State Development) show that concentrations would be within the relevant AQS objectives, and therefore, the impact on future properties is considered **Negligible**.

NO_2 Sensitivity Analysis Results

14.7.71 The results of the sensitivity analysis are presented in **Table A14.8** in **Appendix 14.2**. As discussed previously, this sensitivity test is based on the assumptions that NO_x and NO_2 emissions from road traffic, and NO_x and NO_2 background concentrations will not reduce by 2031 (compared to the baseline 2012) as per the latest projection by Defra. It is important to note that this scenario does not form part of guidance from Defra, and although it is required by the HA's DMRB guidance (as introduced by the IAN 170/12), the HA recognises that such conservative scenario may be overly pessimistic, as mentioned before. This is even more likely to be the case as reductions in NO_x and NO_2 are more likely to happen over a such a long period of time (between 2012 and 2031). Therefore, modelled NO_2 results from this sensitivity test, which are much higher than those reported above, are likely to be overly conservative.

14.7.72 Based on these assumptions, all receptors would be above the objective of $40\mu g/m^3$ in 2031, both in the 'Do Minimum' and 'Do Something' scenario. Predicted annual mean NO_2 concentrations in 2031 would also be over $60\mu g/m^3$ at a significant number of receptors (over 40) both in the 'Do Minimum' and 'Do Something' scenarios, which means that it is likely that the 1-hour mean objective would be exceeded at these locations. It is however noted that the Development would not lead to any new exceedence, as all receptors would exceed objectives in the 'Do Minimum' scenario as well.

14.7.73 **Table 14.24** provides a summary of the significance of impacts related to the NO_2 annual mean at all modelled sensitive receptors. **Figure 14.10** also shows the significance of impacts at all receptors. Results show that, based on these conservative assumptions, more sensitive receptors would be subject to adverse impacts, including a **Substantial Adverse** impact at 16 receptors, a **Moderate Adverse** impact at 27 receptors, and a **Slight Adverse** impact at a further 50 receptors.

14.7.74 However, there would also be more receptors subject to beneficial impact, including a **Slight Beneficial** impact at 11 receptors, a **Moderate Beneficial** impact at 7 receptors, and a Substantial Beneficial impact predicted at 2 receptors.

14.7.75 Only a minority of sensitive receptors would experience a **Negligible** impact (16 receptors). This is because these conservative assumptions amplify the change in NO_2 concentrations predicted between the 'Do Minimum' and 'Do Something' scenarios.

Table 14.24 - Summary of Impact Significance for NO2 Annual Mean at Sensitive Receptors (Sensitivity Test)

Significance of Impact	No. Receptors
Substantial Adverse	16
Moderate Adverse	27
Slight Adverse	50
Negligible	16
Slight Beneficial	11
Moderate Beneficial	7
Substantial Beneficial	2
Total	**129**

14.7.76 As shown in **Figure 14.10**, receptors where a **Substantial Adverse** impact is predicted include:

- Most receptors along Cricklewood Lane and on parts of Claremont Road;
- A number of receptors along the A406 North Circular Road, south of the junction with the A1;
- A number of receptors along the A41, south of the junction with the A406.

14.7.77 A **Moderate Adverse** impact is also predicted at a number of receptors along the main roads (A406, A41, M1, A502 Golders Green Road), as well as receptors along minor roads (southwest of the M1/A406 junction, south of the Cricklewood Broadway/Cricklewood Lane junction.

14.7.78 However, it is noted that, again, this sensitivity test is likely to be overly conservative, and modelled results are very likely to significantly overestimate NO_2 concentrations at the horizon 2031, as overall, changes in vehicle technologies, improvements in vehicle emissions and increased energy efficiency should lead to lower road-traffic NO_x emissions and background concentrations by then. It should therefore be regarded as a very worst-case scenario, which highlights changes in NO_2 levels associated to an overall increase in traffic flows on the local road network, combined with a lack of improvement in vehicle emissions and overall background concentrations.

Odour and Dust Emissions

14.7.79 Two existing waste facilities within the Claremont Way Industrial Estate operated by McGovern on Claremont Way, and FCC Waste Services (the Hendon WTS) on Brent Terrace (off Tiling Road), would still be operating following completion of the proposed residential properties for Plots 53 and 54.

14.7.80 Over the past few years, a small number of residents on Clitterhouse Crescent and Whitefield Avenue have raised complaints in relation to odour nuisance due to the operation of these facilities. Therefore, there may be a risk of odour nuisance for future occupiers of proposed properties on Brent Terrace. However, based on complaint records provided by the Environment Agency, only 4 complaints have been received from nearby residents over the past 3 years (1 in 2011, 2 in 2012 and 1 in 2013). One complaint was also received over the past 3 years in relation to dust from the Wood Recycling Services facility on Brent Terrace.

14.7.81 Based on this information, it is considered that the risk of odour and dust nuisance for future residents of the proposed properties along Brent Terrace would be **Negligible**.

Energy Centre, CHP and Waste Handling Facility

14.7.82 The s.73 ES was based on the Energy Strategy as per the 2010 Permission (2009 RES), which included provision within the Scheme for a Waste Handling Facility (WHF) replacing the existing Hendon Waste Transfer Station (Hendon WTS), a CHP plant in Phase 1B (South) and district heating and cooling infrastructure to serve all new significant residential buildings. The 'Preferred Option' of the Energy Strategy comprised the elements listed above, with an advanced thermal technology Energy from Waste (EfW) / CHP plant using RDF generated from onsite waste and sorted within the onsite WHF. The Preferred Option included a conveyor belt from the WHF to the CHP. An 'Alternative Option' was also included in the Energy Strategy in case the Preferred Option is not feasible. This also included a new onsite WHF and a CHP, but with alternative fuel options, such as biomass or natural gas, subject to feasibility. As such, the air quality chapter of the s.73 ES included dispersion modelling of the CHP emissions using the proposed location in Phase 1B (South) and the proposed RDF fuel source.

14.7.83 A RES has recently been produced to discharge pre-RMA Planning Condition 35.6 of the 2014 Permission. This has been based on the outcome of the RDF feasibility studies which have been produced to satisfy pre-RMA Planning Conditions 35.3 and 35.4. The outcome of the feasibility studies has shown that the proposed RDF for the on Site CHP is not deemed a feasible option for the project at this point in time. As such, Condition 35.6 RES provides a description of the alternative fuel options and energy centre options for the Development.

14.7.84 A small CHP plant is also proposed in the south of Plots 53 and 54. Although details are not available at this stage to carry out a detailed assessment the CHP will be a small-scale unit serving only the 47 units within the Plots and would most likely be fuelled by natural gas. Although an emission modelling assessment cannot be undertaken at this stage, it is considered that the contribution of the emissions from the CHP in the immediate locality and Site-wide would be **Negligible**, given the size of the CHP unit and proposed residential units.

14.7.85 The detailed design of the other CHP/energy centres are not available within the Phase 1A North (RMAs) and will follow in subsequent RMAs. The assessment of the CHP emissions as reported in the s.73 ES remains valid for this RMA. It is however proposed that an update of the CHP emissions assessment is undertaken at the RMA stage for the appropriate Development phase within which it lies and once the detailed design is available, to update the assessment of associated air quality impacts, if new or different significant impacts are likely or if required in regard to the mitigation measures.

14.7.86 The WHF assessment reported in the s.73 ES is also deemed to remain valid. There have been no further studies or design on the WHF since the s.73 application and therefore the air quality, dust and odour sources remain valid as per the former ES, whilst the sensitive receptors are also considered to remain unchanged. The sub-phasing change for Plots 53 and 54 would result in residents occupying these plots earlier than expected, however this is not expected to change the outcome of the previous assessment as the existing Hendon WTS operated by FCC Waste Services will remain operational whilst the plots are constructed and occupied, and the new WHF will only become operational when the existing ceases to operate. Therefore the impacts reported in the s.73 are considered to remain valid.

Emissions from Rail Movements

14.7.87 The conclusions of the s.73 was based on the worst-case assumption that all trains going through the Cricklewood Station are diesel locomotive. The pollutant of concern would be NO_x, as PM_{10} emissions would be negligible. The assessment was based on the estimated number of trains accessing the station during AM and PM peak hours at the horizon 2026. This showed that the number of trains in the 'Do Something' scenario would be very small (16 trains per hour both during AM and PM peak, leading to an additional 4 trains during AM peak and 6 trains during PM peak) compared to the 'Do Minimum' scenario.

14.7.88 Conclusions were that any impacts would be confined along the railway track where diesel locomotives are idling, and would not extend beyond 50m at worst. As there are no proposed residential areas within 50 metres of the station, any significant impact of idling trains on NO_2 at sensitive receptors has been ruled out.

14.7.89 In relation to potential air pollutant emissions from trains passing through Cricklewood Station, this have been assessed in the s.73, and conclusions remain valid as there is no new information available.

Impact on Planning Policies

Regional Planning Policies

14.7.90 Policy 7.14 of the London Plan seeks to improve air quality by minimising exposure to poor air quality, promoting sustainable design and construction and reducing emissions from developments. Based on the results presented above, it is considered that the proposed Development would have a **Negligible** impact on this policy.

Local Planning Policies

14.7.91 Policy "ENV7: Air Quality" of LBB's Unitary Development Plan seeks to minimise the impact of developments on air quality through the careful location of sources of pollution, the siting of sensitive receptors away from these sources, and to reduce road traffic and the need to travel. Based on the results presented above, it is considered that the proposed Development would have a **Slight Adverse** impact on this policy.

Mitigation

Road Traffic Emissions

14.7.92 The updated modelling results in this assessment showed that there would be a **Substantial Adverse** impact on NO_2 at the junction of the A5 Cricklewood Broadway and Cricklewood Lane, as well as **Moderate Adverse** impacts locally along stretches of Cricklewood Lane and Claremont Road, south of the Development, whilst **Slight Adverse** impacts are also predicted at a number of sensitive receptors along the main A-Roads and a number of minor roads. The majority of sensitive receptors would however experience **Negligible** impacts, whilst **Slight Beneficial** impacts are also predicted at a number of receptors.

14.7.93 A number of measures to encourage non-car mode travel would be implemented through the Framework Travel Plan (FTP) for the Development. A draft FTP accompanied the s.73 Application and further details are provided in **Chapter 7: Traffic and Transport**. The main objectives of the FTP would be to reduce reliance on the private car and encourage future site occupiers / users to travel in a more sustainable manner. Any reduction in traffic flows through the implementation of the FTP would further reduce predicted impacts on air quality.

14.7.94 Air quality monitoring would be necessary at the locations described above following completion of the Development. Where exceedences of the NO_2 annual mean objective are confirmed, and can be clearly attributed to the Development, specific mitigation measures such as mechanical ventilation and NO_x filtration may be required to ensure appropriate indoor air quality.

Energy Centre, CHP and Waste Handling Facility

14.7.95 No mitigation measures were identified in the s.73 ES, as impacts were **Negligible**. This remains valid.

Odour and Dust Emissions

14.7.96 No mitigation measures were identified in the s.73 ES, as impacts were **Negligible**. This remains valid.

Emissions from Rail Movements

14.7.97 No mitigation measures were identified in the s.73 ES, as impacts were **Negligible**. This remains valid.

Residual Impacts

Road Traffic Emissions

Nitrogen Dioxide (NO_2)

14.7.98 Assuming the above FTP is implemented and can effectively lead to reductions in traffic flows compared to the current forecast flows used in this assessment, it is considered that the residual impacts at the properties where a **Substantial Adverse** impact is predicted without mitigation would likely reduce to **Moderate Adverse**, considering that only a small reduction in NO_x emissions would be required.

14.7.99 Similarly, at properties along Cricklewood Lane, at Cricklewood Broadway / Chichele Road, Claremont Road / Somerton Road and Cricklewood Lane / Lichfield Lane junctions, where a **Moderate Adverse** impact is predicted without mitigations, it is considered that the implementation of the FTP is likely to reduce the residual impacts to **Slight Adverse**.

14.7.100 Finally, the impacts at all other receptors where a **Slight Adverse** impact is predicted would likely reduce to **Negligible** with the FTP.

Particulate Matter (PM_{10} and $PM_{2.5}$)

14.7.101 Residual impacts on particulate matter (PM_{10} and $PM_{2.5}$) would be **Negligible** at all modelled receptors, as predicted impacts are Negligible even without any mitigation in place.

Energy Centre, CHP and Waste Handling Facility

14.7.102 The s.73 ES identified no residual impacts associated with the CHP and WHF (Phase 1 (South). This conclusion remains valid, although this will be confirmed following updated dispersion modelling of stack emissions at the RMA stage for such development once the detailed design for them is available.

Emissions from Rail Movements

14.7.103 The s.73 ES identified no residual impacts associated with changes in traffic patterns or to the rail infrastructure of the Site. This conclusion remains valid, as the Phase 1A (North) RMAs do not affect the rail infrastructure.

14.8 Summary

Table 14.25: Potential Impacts, Mitigation and Residual Impacts

Element / Receptor	Construction / Operation	Potential Impacts	Mitigation	Residual Impacts
Dust Emissions Generated During Construction Work	Construction	- **Moderate Adverse** at receptors within 100m from the Site boundary - **Slight Adverse** at receptors within 100m – 200m of the Site boundary - **Negligible** at receptors over 200m from the Site boundary - All impacts **temporary**	Implementation of the CEMP and CoCP	- **Slight Adverse** at receptors within 100m of the Site boundary - **Negligible** at receptors over 100m from the Site boundary
Construction Road Traffic	Construction	- **Moderate Adverse** during peak construction period - **Slight Adverse** at all other times - All impacts **temporary**	Implementation of the CTMP and Construction Worker Travel Plan	**Negligible**
Temporary Bus Station and Bus Stops	Construction	- **Moderate Adverse** at 2 receptors on the corner of Brent Park Road - **Slight Adverse** at a number of other receptors on Brent Park Road - **Negligible** at receptors along Layfield Close	No idling policy Buses with High Emission Standards	- **Slight Adverse** for the 2 receptors on the corner of Brent Park Road - **Negligible** at all other receptors
Emissions Generated from Construction Site Plant	Construction	**Negligible**	None required	**Negligible**
Road Traffic	Operation	**PM_{10} and $PM_{2.5}$** **Negligible** at all receptors **NO_2** - **Substantial Adverse** at Cricklewood Broadway / Cricklewood Lane junction - **Moderate Adverse** at Claremont Road / The Vale junction, along Cricklewood Lane, and at Cricklewood	Implementation of the Framework Transport Plan (FTP). Ongoing air quality monitoring programme to enable	**PM_{10} and $PM_{2.5}$:** **Negligible** at all receptors **NO_2:** - **Moderate Adverse** at Cricklewood Broadway / Cricklewood Lane junction - **Slight Adverse** at Claremont Road / The Vale junction, along Cricklewood Lane, at

Element / Receptor	Construction / Operation	Potential Impacts	Mitigation	Residual Impacts
		Broadway / Chichele Road, Claremont Road / Somerton Road and Cricklewood Lane / Lichfield Lane junctions - **Slight Adverse** at a number of receptors along the A406 North Circular Road, the A41, a number of minor roads including Coles Green Road and Dollis Hill Lane, Highfield Avenue, and the A5150 Colindeep Lane, and properties on Brent Park Road and Fairfield Avenue (north of the existing shopping centre) - **Moderate Beneficial** at A5 Edgware Road / Oxgate Lane junction **- Slight Beneficial** at number of receptors including along A5 Edgware Road, on Brent Park Road (near the M1/A406 junction) and at Quantock Gardens / Claremont Road and Fordwych Road / Skardu Road junctions **- Negligible** at all other sensitive receptors	reassessment throughout future phase RMAs. If moderate adverse still likely then mechanical ventilation to be considered for nearby residential properties.	Cricklewood Broadway / Chichele Road, Claremont Road / Somerton Road and Cricklewood Lane / Lichfield Lane junctions, and at a number of receptors along the A406 North Circular Road, the A41, a number of minor roads including Coles Green Road and Dollis Hill Lane, Highfield Avenue, and the A5150 Colindeep Lane, and properties on Brent Park Road and Fairfield Avenue (north of the existing shopping centre) **Negligible** for all other modelled receptors, or as stated (if beneficial)
Odour / Dust Emissions from Existing Uses	Operation	**Negligible**	None required	**Negligible**
Rail Emissions	Operation	**Negligible**	None required	**Negligible**

References

i Council Directive 2008/50/EC of 21 May 2008 on ambient air quality and cleaner air for Europe.

ii Defra, 2010, The Air Quality Standards (England) Regulations.

iii Office of the Deputy Prime Minister (ODPM), 1995, 'The Environment Act' 1995

iv HMSO, London. Department of the Environment, 1997, 'The UK National Air Quality Strategy'

v Department of the Environment, Transport and the Regions, 2000, 'UK Air Quality Strategy for England, Scotland, Wales and Northern Ireland'

vi Department for the Environment, Food and Rural Affairs, Scottish Executive, Welsh Assembly Government and the Department of the Environment in Northern Ireland, 2003, 'The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: (Addendum)'

vii Department for the Environment, Food and Rural Affairs, 2007, 'The Air Quality Strategy for England, Scotland, Wales & Northern Ireland'

viii Bate, K.J. and Coppin, N.J., 1991, 'Dust impacts from mineral workings', Mine and Quarry, 20 (3), 1991, pp31 - 35.

ix European Court Judgement in Case C-404/13 (19 November 2014), Judgement of the Court: ClientEarth vs Defra, accessed at http://legal.cleanair-europe.org/legal/united-kingdom/lawsuits-and-decisions/ on 25 November 2014

x Department for Communities and Local Government, 2012, 'National Planning Policy Framework'

xi Greater London Authority, 2011, 'The London Plan'

xii Greater London Authority, 2012, 'Revised Early Minor Alterations; Consistency with the National Planning Policy Framework'

xiii Greater London Authority, 2014, 'Draft Further Alterations to the London Plan'

xiv Barnet Unitary Development Plan, available online at www.barnet.gov.uk/downloads/download/572/adopted_udp

xv Barnet Local Plan, April 2013, 'Supplementary Planning Document: Sustainable Design and Construction' – Available online at www.barnet.gov.uk/downloads/download/518/sustainable_design_and_construction_spd_documents

xvi DCLG, 2014, 'Planning Practice Guidance: Air Quality (ID 32)'

xvii Greater London Authority, 2014, 'Sustainable Design and Construction - Supplementary Planning Guidance'

xviii Highways Agency, Design Manual for Roads and Bridges, 2007, Volume 11, Section 3, Part 1 HA207/07 – Air Quality

xix Highways Agency, Interim Advice Note 170/12, 'Updated air quality advice on the assessment of future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1 Air Quality', published in November 2012, and updated in November 2013 (v3)

xx Highways Agency, Interim Advice Note 174/13, 2013, 'Updated advice for evaluating significant local air quality impacts for users of DMRB Volume 11, Section 3, Part 1 'Air Quality (HA207/07)'

xxi Environmental Protection UK, 2010, 'Development Control: Planning for Air Quality'

xxii Institute of Air Quality Management, 2014, 'Guidance on the Assessment of dust from demolition and construction'

xxiii Greater London Authority, 2014, 'The Control of Dust and Emissions During Construction and Demolition, Supplementary Planning Guidance'

xxiv Building Research Establishment, 2003, 'Controlling particles, vapour and noise from pollution from construction sites'

xxv Department for the Environment, Food and Rural Affairs, 2009, 'Local Air Quality Management Technical Guidance TG(09)'

xxvi http://laqm.defra.gov.uk/faqs/faqs.html

xxvii Department for the Environment, Food and Rural Affairs, 2012, 'Local Air Quality Management: Note on Projecting NO_2 Concentrations'

xxviii Defra (June 2014) UK Background Air Pollution Maps. http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html (Accessed January 2015)