URS

Esso Garage Site on Chalk Farm Road

Student Accommodation
Air Quality Assessment

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Prepared for:
Risetall Ltd

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REVISION SCHEDULE

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1 INTRODUCTION

1.1 Overview

URS Infrastructure & Environment Limited (URS) has been appointed by Risetall Ltd to assess the impact that their proposals will have on local air quality. The development proposal comprises the construction of a four storey building consisting of 63 rooms of student accommodation accompanied by 810.1 m^2 of A1/A3 retail land use on the ground and lower ground floors.

The proposed development site is centrally located within the London Borough of Camden (LBC) on the site of a former Esso garage. The surrounding area is densely populated with a large number of residential buildings, shops and educational facilities within the vicinity of the site. The location of the development site in the context of the local area is shown on Figure 1 in Appendix A.

The potential effects of the proposed development with proposed mitigation on local air quality sensitive receptors are considered with respect to existing planning policies. Additional mitigation measures have been recommended where appropriate, to minimise the potential for adverse residual effects from being experienced by sensitive receptors during the construction and operational phases of the proposed development.

1.2 Scope of Works

A review of the published ambient air quality data forms the basis for the prediction of current and future baseline conditions against which the magnitude of predicted impacts due to the proposed scheme are assessed.

During the demolition and construction phase of the proposed development there is the potential for demolition activities, earthworks and construction activities to generate fugitive emissions of particulate matter (dust and PM_{10}). There is the risk of such emissions giving rise to significant adverse effects on amenity or health at receptors located within 100 m of the source of emissions (IAQM, 2012) unless appropriate mitigation measures are adopted. There are receptors located within 100 m of the site boundary and therefore an assessment of the significance of effects from fugitive emissions of dust and PM_{10} from the site has been undertaken. The assessment includes consideration of the risk of adverse effects associated with the potential track out of material at receptors located within 50 m of roads extending up to 200 m from the site access.

The Transport Statement for the proposed development (URS, 2012) has concluded that "*the removal of the former Esso petrol filling station will significantly reduce vehicular trips in the vicinity of the site*" and that "*the development is unlikely to have a material impact on the surrounding highway network*", hence there is no need to quantify the potential for changes to long term and short term mean concentrations of particulate matter (PM_{10} and $PM_{2.5}$) and nitrogen dioxide (NO_2) to occur as a result of predicted changes in road traffic movements on the local road network.

The Energy Statement for the proposed development (Richard Hodkinson Consultancy, 2012) proposed to use electricity and heat generated by a Combined Heat and Energy (CHP) in an adjacent student accommodation development to meet the requirement of reduced CO_2 emissions. There would be no CHP or boiler exhaust emissions within the site boundary of this development.

The proposed development will introduce new air quality sensitive receptors to the site. The concentrations of particulate matter (PM_{10} and $PM_{2.5}$) and nitrogen dioxide (NO_2) these new receptor would experience are predicted using ADMS-Roads for traffic emissions. Due to the uncertainty in predicting vehicle emissions in future years, this assessment considers only a current scenario, assuming that 2011 background pollutant concentrations were the same as Defra's mapped 2010 background pollutant concentration (Defra, 2012).

2 LEGISLATION AND POLICY

2.1 Air Quality Legislation

The Clean Air for Europe (CAFE) programme revisited the management of Air Quality within the European Union (EU) and replaced the EU Framework Directive 96/62/EC (Council of European Communities, 1996), its associated Daughter Directives 1999/30/EC (Council of European Communities, 1999), 2000/69/EC (Council of European Communities, 2000), 2002/3/EC (Council of European Communities, 2002), and the Council Decision 97/101/EC (Council of European Communities, 1997) with a single legal act, the Ambient Air Quality and Cleaner Air for Europe Directive 2008/50/EC (Council of European Communities, 2008).

Directive 2008/50/EC (Council of European Communities, 2008) is currently transcribed into UK legislation by the Air Quality Standards Regulations 2010 (H.M. Government, 2010), which came into force on 11th June 2010. These EU limit values are binding on the UK and have been set with the aim of avoiding, preventing or reducing harmful effects on human health and on the environment as a whole.

2.2 National Air Quality Strategy

The UK National Air Quality Strategy (DOE, 1997) was first adopted in 1997, under the requirements of the Environment Act 1995 (H.M. Government 1995). The most recent revision of the strategy (Defra, 2007) sets objective values for key pollutants as a tool to help Local Authorities manage local air quality improvements in accordance with the EU Air Quality Framework Directive. Some of these objective values have been laid out within the Air Quality (England) Regulations 2000 (H.M. Government, 2000) and later amendments (H.M. Government, 2002).

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

The UK's national air quality objective values for the pollutants of relevance to this assessment are displayed in Table 2.1.

TABLE 2.1: AIR QUALITY OBJECTIVE VALUES FOR ENGLAND

Pollutant	Averaging Period	Value	Maximum Permitted Exceedences	Target Data
Nitrogen Dioxide (NO_2)	Annual Mean	40 μg/m^3	None	31/12/05
	Hourly Mean	200 μg/m^3	18 times per year	31/12/05
Particulate Matter (PM_{10})	Annual Mean	40 μg/m^3	None	31/12/04
	24-hour	50 μg/m^3	35 times per year	31/12/04
Fine Particulate Matter ($PM_{2.5}$)	Annual Mean	25 μg/m^3	None	2020

2.3 National Planning Policy Framework

The National Planning Policy Framework (NPPF) published in March 2012 (Department for Communities and Local Government, 2012a), paragraph 109 of the NPPF states that:

"The planning system should contribute to and enhance the natural and local environment by:

- *preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability…"*

Annex 2 of the NPPF defines 'Pollution' as *"Anything that affects the quality of land, air, water or soils, which might lead to an adverse impact on human health, the natural environment or general amenity. Pollution can arise from a range of emissions, including smoke, fumes, gases, dust, steam, odour, noise and light".*

There are both national and local policies for the control of air pollution and local action plans for the management of local air quality within the LBC area. The effect of the proposed development on the achievement of such policies and plans are matters that may be a material consideration by planning authorities, when making decisions for individual planning applications. Paragraph 124 of the NPPF states that:

> *"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative 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."*

The different roles of a planning authority and a pollution control authority is addressed by the NPPF in paragraph 122:

> *"... local planning authorities should focus on whether the development itself is an acceptable use of the land, and the impact of the use, rather than the control of processes or emissions themselves where these are subject to approval under pollution control regimes. Local planning authorities should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.'*

The NPPF is accompanied by Technical Guidance to the National Planning Policy Framework (NPPF-TG) (Department for Communities and Local Government, 2012b). The NPPF does not include any specific guidance for the assessment of air quality impacts from residential developments, but does provide some broader guidance on assessments of dust impacts from mineral extraction site that have been citied in the methodology of this assessment.

2.4 Regional Policies

The Greater London Authority (GLA) Act 1999 requires the GLA to prepare and to keep under review an Air Quality Strategy for Greater London that sets out air quality objectives (to be no less than national objectives), assess present and forecast future air quality, and present measures that the Mayor, the GLA and other functional bodies (e.g. London Boroughs and local authorities bordering London) will take towards meeting these objectives. The latest Mayor's Air Quality Strategy was published in December 2010 (GLA, 2010). The objective of the strategy is "*to reduce air pollution in London so that the health of Londoners is improve*". It also points out that the most effective means to achieve the objective is "*to achieve the European Union (EU) air quality limit values as soon as possible*".

The Mayor of London published the replacement of the spatial development strategy in July 2011, which sets out an integrated economic, environment, transport and social framework for the development of Greater London to 2031 (Greater London Authority, 2011). Policy 7.14 of the London Plan focuses on improving air quality. It states:

Strategic

A The Mayor recognises the importance of tackling air pollution and improving air quality to London's development and the health and well-being of its people. He will work with strategic partners to ensure that the spatial, climate change, transport and design policies of this plan support implementation of his Air Quality and Transport strategies to achieve reductions in pollutant emissions and minimise public exposure to pollution.

Planning decisions

B Development proposals should:

a minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAs) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see Policy 6.3)

b promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition'

c be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAs).

d ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches

e where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations. Permission should only be granted if no adverse air quality impacts from the biomass boiler are identified

LDF preparation

C Boroughs should have policies that:

a seek reductions in levels of pollutants referred to in the Government's National Air Quality Strategy having regard to the Mayor's Air Quality Strategy

b take account of the findings of their Air Quality Review and Assessments and Action Plans, in particular where Air Quality Management Areas have been designated.

2.5 Local Planning Policy

LBC adopted its Core Strategy (LBC, 2010a) and Development Policies (LBC, 2010b) on 8 November 2010. The Core Strategy recognises the impact of poor air quality on health and resolves to improve air quality in the Borough through Core Strategy policies CS1, CS9, SC11 and CS16, including implementation of Camden's Air Quality Action Plan (AQAP). Particularly relevant to this assessment, Development Policy DP32 states:

"The Council will require air quality assessments where development could potentially cause significant harm to air quality. Mitigation measures will be expected in developments that are located in areas of poor air quality.

"The Council will also only grant planning permission for development in the Clear Zone region that significantly increases travel demand where it considers that appropriate measures to minimise the transport impact of development are incorporated. We will use planning conditions and legal agreements to secure Clear Zone measures to avoid, remedy or mitigate the impacts of development schemes in the Central London Area."

2.6 Local Air Quality Management

LBC's latest air quality review and assessment report (LBC, 2011) was published in September 2011. It concluded that Camden complied with air quality standards in 2010 for benzene, butadiene, lead, sulphur dioxide, carbon monoxide, particulate matter and ozone, but failed to achieve the long and short term air quality objectives for nitrogen dioxide (NO_2).

The whole borough was declared as an Air Quality Management Area (AQMA) for the long term objective for NO_2 and the short and long term objectives for particulate matter (PM_{10}), as a result of the first of round of review and assessment of air quality. Even though PM_{10} objectives were not breached in 2010, LBC council did not intend to change their air quality management order (LBC, 2011), but would kept it under review over the next five years.

Camden introduced a new Air Quality Action Plan (LBC, 2009) in 2009. The impact on local air quality of the proposed development has to be considered in the context of this air quality action plan.

3 METHODOLOGY

3.1 Overview

There is currently no statutory guidance on the method by which an air quality impact assessment should be undertaken. Several non-statutory bodies have published their own guidance relating to air quality and development control (EPUK, 2010) or to the assessment of the significance of air quality effects (IAQM, 2009).

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

- impact of fugitive emissions of particulate matter from construction phase activities; and
- the impact of road traffic emission on existing air quality sensitive receptors and new receptors associated with the proposed development.

Potentially affected air quality sensitive receptors have been identified for each element of the assessment and the magnitude of the change in air quality statistics at each receptor has been considered. The methods used to determine the significance of effect associated with air quality impacts are described in Section 3.6.

3.1.1 *Fugitive Emissions of Particulate Matter*

Fugitive emissions of airborne particulate matter are readily produced through the action of abrasive forces on materials and therefore a wide range of site preparation and construction activities have the potential to generate this type of emissions, including;

- demolition work;
- earthworks, including the handling, working and storage of materials;
- construction activities and
- the transfer of dust making materials from the site onto the local road network.

'Dust' is defined in BS 6069:1994 (BSI, 1994) as particulate matter in the size range 1µm - 75µm in diameter, and is primarily composed of mineral materials and soil particles. This definition is also referred to in NPPF technical guidance (Department for Communities and Local Government, 2012b) in the context of dust impacts from mineral extraction operations and has been adopted in this assessment.

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

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

Table 3.1 provides some generic examples of the type of impacts that may result from fugitive emissions of particulate matter. The sensitivity of receptor types is listed for selected impacts, with sensitivity being described as 'high' for receptors that are especially sensitive to the specified impact. For example, industrial painting operations are consider to be more sensitive to the impact of material becoming soiled by depositing material, than residential properties or schools are.

TABLE 3.1: TYPES OF IMPACTS FROM EMISSIONS OF PARTICULATE MATTER		
Nature of Impact	**Receptor Types Affected**	**Relative Sensitivity**
Change in 24 hour mean PM_{10} concentrations	Residential properties Schools Hospitals and clinics	Receptor sensitivity was considered when Air Quality Objective Value was set.
Change in rate at which air filtration units require maintenance	Hospitals and clinics	High
	Hi-tech industries	High
	Food processing industries	High
Change in the rate at which material accumulates on glossy surfaces, such as glass or paint work	Painting and furnishing operations	High
	Residential properties	Medium
	Schools	Medium
	Food retailers	Medium
	Offices	Medium
	Museums and Galleries	Medium
	Glasshouses	Medium
Change in the rate at which property or products becomes soiled by deposited material	Food processing industries	High
	Painting and furnishing operations	High
	Museums and Galleries	High
	Residential properties	Medium
	Food retailers	Medium
	Offices	Medium
	Horticultural Land	Medium
Change in the rate at which mineral material is deposited onto vegetation	Ecological sites	medium - low
Change in chemical composition of mineral material deposited	Ecological sites	medium - low
	Outdoor Storage	medium - low
	Horticultural Land	low
	Agricultural Land	low

This assessment is consistent with the overarching approach to the assessment of the impacts of construction and the determination of their significance set out in current guidance from the Institute of Air Quality Management (IAQM, 2012). The method adopted for this assessment differs from the IAQM's guidance in taking a more conservative, site specific, approach to assigning the significance of potential effects. The assessment considers the significance of potential effects with standard mitigation in place and recommends mitigation measures appropriate to the identified risks to receptors.

3.1.2 *Road Traffic Emissions*

The incomplete combustion of fuel in vehicle engines results in the presence of hydrocarbons (HC) such as benzene and 1,3-butadiene, and sulphur dioxide (SO_2), carbon monoxide (CO),

PM_{10} and $PM_{2.5}$ in exhaust emissions. In addition, at the high temperatures and pressures found within vehicle engines, some of the nitrogen in the air and the fuel is oxidised to form NO_X, mainly in the form of nitric oxide (NO), which is then converted to NO_2 in the atmosphere. NO_2 is associated with adverse effects on human health. Better emission control technology and fuel specifications are expected to reduce emissions per vehicle in the long term.

Exhaust emissions from road vehicles affect the concentrations of principal pollutants of concern, NO_2 PM_{10} and $PM_{2.5}$, at sensitive receptors in the vicinity of the development. Therefore, these pollutants will be the focus of the assessment of the significance of road traffic impacts.

Although SO_2, CO, benzene and 1,3-butadiene are also present in motor vehicle exhaust emissions, detailed consideration of the associated impacts on local air quality is not considered relevant in the context of this proposal. Road traffic emissions of these substances have been reviewed by the LBC and nowhere within the LBC administrative area is at risk of exceeding these objectives. The development proposals would not be capable of compromising the achievement of the relevant air quality objectives for the protection of human health. Emissions of SO_2, CO, benzene and 1, 3-butadiene from road traffic are therefore not considered further within this assessment.

The magnitude of road traffic emissions are calculated from traffic flow data for the 2011 London Atmospheric Emission Inventory scenario.

This assessment follows current guidance for the determination of baseline pollutant concentrations, and uses emissions factors for road traffic from the Highways Agency's current emissions factors toolkit EFT 4.2 within the ADMS-Roads model.

3.2 Use of Measurement Data

LBC undertakes extensive monitoring and measurement of concentrations of NO_2 within its administrative area, in support of its local air quality management review and assessment process.

The diffusion tube sampling at locations in the nearby area of Camden Town includes locations CA18, CA19 and CA23. CA19 is the closest to the development site, although it is about 50 metres away from the A502 road. The other two tube locations are relevant to the A4201 (CA18) or the A503 (CA23), rather than the A502 road where the proposed development is located. NO_2 concentrations from CA19 are used to verify the modelling of road traffic emissions.

As there are currently no locally available sources of background NO_2, PM_{10} and $PM_{2.5}$ in close proximity to the site, background concentrations have been sourced from the air quality archive (Defra, 2012) in accordance with the procedures described in Local Air Quality Management Technical Guidance 2009 (LAQM TG(09), Defra, 2009).

3.3 Air Quality Sensitive Receptors

3.3.1 *Receptors Potentially Affected by Emissions from Construction Phase Works*

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

There are a number of receptors that are sensitive to dust in the immediate vicinity of the proposed development site. These receptors include the existing residential properties surrounding the site on Harmood Street, Chalk Farm Road and Hartland Road. The location of these receptors (R1 – R9) relative to the application site boundary is illustrated on Figure 1 in Appendix A. These receptors have also been used in the assessment of impacts from road traffic exhaust emissions and these receptors are also included in Table 3.2.

3.3.2 *Receptors Potentially Affected by Emissions from Road Traffic*

The concentration of road traffic emitted pollutants at the roadside or at sensitive receptors is influenced by a number of factors. These include background pollution levels and the amount of traffic emissions, which is dictated by traffic flow rates, composition and speed.

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

Impacts from road traffic emissions are quantified at nine existing representative receptors in the vicinity of the scheme and local highway network, where there is the potential for a significant effect from road traffic flows. In addition to these existing receptors, one proposed receptor has also been modelled. The receptors are listed in Table 3.2 and their location displayed in Figure 1 in Appendix A. For the new proposed hotel (R10), the receptor height is set at 5 metres of the window sill level of the first floor. The ground floor is designed for retail A1 and A3 uses. For R3 to R5 on Chalk Farm Road, the ground floors have been used for commercial purposes, so the receptor height is set at 4 metres for first floor and above residential uses. The receptor height is assumed at a flagpole height of 1.5 metres for the rest receptors.

TABLE 3.2: AIR QUALITY SENEITIVE RECEPTORS

Receptor	Description	Grid Reference	Height (m)
R1	Residential on Hartland Road	528635, 184314	1.5
R2	Residential on Hartland Road	528594, 184290	1.5
R3	Residential on Chalk Farm Road	528590, 184256	4
R4	Residential on Chalk Farm Road	528523, 184284	4
R5	Residential on Chalk Farm Road	528441, 184309	4
R6	Residential on Harmood Street	528530, 184308	1.5
R7	Residential on Harmood Street	528551, 184368	1.5
R8	Residential on Harmood Street	528567, 184345	1.5
R9	Residential off Clarence Way	528597, 184336	1.5
R10	Newly proposed hotel accommodation	528562, 184269	5

3.4 Prediction of Construction Phase Impacts

At present, there are no statutory UK or EU standards relating to the assessment or control of nuisance dust. The emphasis of the regulation and control of demolition and construction dust should therefore be the adoption of good working practices on site. Good design practice is a process that is informed by impact assessments and is able to avoid the potential for significant adverse environmental effects at the design stage. This approach assumes that mitigation measures, beyond those inherent in the proposed design, that are identified as being necessary in the impact assessment, will be applied during works (possibly secured by planning conditions, legal requirements or required by regulations) to ensure potential significant adverse effects do not occur.

Examples of accepted good site practice include guidelines published by the Building Research Establishment (Building Research Establishment, 2003), the Greater London Authority (Greater London Authority, 2006) and considerate contractor schemes.

A qualitative assessment has been undertaken to assess the significance of any effects on sensitive receptors. The steps in the assessment process are to consider potential sources of emissions on the basis of the four main activity groupings of Demolition, Earthworks, Construction and Trackout. For each activity group the same steps are applied with respect to the potential impacts at identified receptors, before coming to an overall conclusion about the significant of the effects predicted. The steps are:

- identify the nature, duration and the location of activities being carried out;
- establish the risk of significant effects occurring as a result of these activities;
- review the proposed or embedded mitigation against good site practice;
- identify additional mitigation measures, if necessary, to reduce the risk of a significant adverse effect occurring at receptors; and
- summarise the overall effect of the works with respect to fugitive emissions of particulate matter and then report the significance of the effects.

3.4.1 *Construction Phase Road Traffic Emissions*

The construction phase of the proposed development is likely to lead to a small number of vehicles on the local highway network, for the duration of the construction works only. Environmental Protection UK (EPUK) (EPUK, 2010) set out criteria to establish the need for an air quality assessment for the construction phase of a development as being:

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

It is unlikely that a development of this size would lead to this number of vehicle movements. The additional number of vehicle movements is not considered to be high enough to have the potential to cause a significant adverse effect at any local air quality sensitive receptor. Construction phase road traffic emissions are not considered further as it can be concluded with confidence that the effect on local air quality sensitive receptors will be, not significant.

3.5 Prediction of Air Quality Impacts

This assessment has used the latest version of dispersion model software ‘ADMS-Roads’ to quantify pollution levels at selected receptors. ADMS-Roads model is a modern dispersion model that has an extensive published track record of use in the UK for the assessment of local air quality impacts, including model validation and verification studies (CERC, 2010).

3.5.1 *Dispersion Model Input Data and Model Conditions*

Details of general model conditions are provided in Table 3.3.

TABLE 3.3: GENERAL ADMS-ROADS MODEL CONDITIONS

Variables	Model Input
Surface roughness at source	1.0 m
Minimum Monin-Obukhov length for stable conditions	Model default
Terrain types	Flat
Receptor location	x,y coordinates determined by GIS z =1.5m or relevant heights
Emissions	NO_X, PM_{10}, $PM_{2.5}$
Emission factors	EFT 4.2 emission factor dataset
Meteorological data	1 year (2011) hourly sequential data from Heathrow Airport meteorological station
Emission profiles	None
Receptors	Selected receptors only
Model output	Long-term annual mean NO_X concentrations Long-term annual mean PM_{10} concentrations Long-term annual mean $PM_{2.5}$ concentrations

3.5.2 *Emission Data*

The traffic data used within this assessment has been extracted from the London Atmospheric Emission Inventory for 2011 (GLA, 2010). The roads considered in the modelling are the A502 Chalk Farm Road, the A502 Camden High Street, and some sections of the A4201 Parkway, the A400 Camden High Street, the A503 Camden Road, the A400 Kentish Town Road, the A502 Castlehaven Road, and the B517 Ferdinand Street.

Due to the current uncertainty in the year on year drop off in UK vehicle fleet emission rates, this assessment has assumed that there would no reduction in vehicle emission rates from the baseline year (2011) when predicting the air pollutant concentrations the proposed receptors would experience in future years.

3.5.3 *Meteorological Data*

One year (2011) of hourly sequential observation data from Heathrow Airport meteorological station has been used in this assessment. The station is located approximately 24 km west southwest of the site and experiences meteorological conditions that are representative of the conditions experienced in the greater London area. The surface roughness of land surrounding the meteorological station of a value of 0.2 m has been used to represent the airport area.

3.5.4 *Background Data*

As discussed in section 3.2 background data has been sourced from Defra's background maps (Defra, 2012). As not all the roads within the square kilometre area are modelled, contributions to annual mean NO_X, PM_{10} and $PM_{2.5}$ from road sources were not removed from the background to avoid underestimation of the background by the removal. The background data used in this assessment is set out in Table 3.4. Due to the uncertainty in the assumption that year on year background NO_2 concentrations will decrease, 2010 background data has been used for both the baseline and future year assessment.

TABLE 3.4: ANNUAL MEAN BACKGROUND POLLUTANT CONCENTRATION DATA			
Receptor	**NO_2 (µg/m^3)**	**PM_{10} (µg/m^3)**	**$PM_{2.5}$ (µg/m^3)**
R1 – R10, all in a grid cell centred at (528500, 184500)	38.8	21.4	15.3

3.5.5 *Bias Adjustment of Road Contribution Pollutant Concentrations*

In the absence of published local monitoring or measurement data within the air quality study area, suitable for model bias adjustment, comparison of modelled values against measured values has not been undertaken directly. Based on the diffusion tube data for CA19, annualised to 2011 (see Table 4.1 later), the ADMS-Roads model output requires an adjustment factor of 2.4 to be applied to the predicted road NO_X contribution to total annual mean NO_X concentrations. A conservative approach has been adopted and the road source contributions to annual mean concentrations of NO_X, PM_{10} and $PM_{2.5}$ have been factored by 2.4.

3.5.6 *NO_X to NO_2 Conversion*

To accompany the publication of the guidance document LAQM TG(09), a NO_X to NO_2 converter was made available as a tool to calculate the road NO_2 contribution from modelled road NO_X contributions. The tool comes in the form of an MS Excel spreadsheet and uses borough specific data to calculate annual mean concentrations of NO_2 from dispersion model output values of annual mean concentrations of NO_X. This tool was used to calculate the total NO_2 concentrations at receptors from the modelled road NO_X contribution and associated background concentration. Due to the location of the proposed development, the all London traffic setting has been selected.

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

The guidance document LAQM TG(03) set out the method by which the number of days in which the PM_{10} 24-hr objective is exceeded can be obtained based on a relationship with the predicted PM_{10} annual mean concentration. The most recent guidance (Defra, 2009) suggests no change to this method. As such, the formula used within this assessment is:

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

Where C is the annual mean concentration of PM_{10}.

3.6 Method for Assessment of Significance

3.6.1 *Construction Phase Emissions Assessment of Significance*

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

The scale of the risk of adverse effects occurring due to each group of activities, with mitigation in place is described using the terms high, medium and low risk. The basis for the choice of descriptor is set out for each section. Experience in the UK (IAQM, 2012) is that good site practice is capable of mitigating the impact of fugitive emissions of particulate matter effectively. So that in all but the most exceptional circumstances, effects at receptors (Table

3.5) can be controlled to ensure effects are of negligible or slight adverse significance at worse.

TABLE 3.5: DESCRIPTORS APPLIED TO THE PREDICTED ADVERSE EFFECTS OF FUGITVE EMISSIONS OF PARTICULATE MATTER

Significance of Effect at Single Receptor	Description
Substantial	A significant effect that is likely to be a material consideration in its own right.
Moderate	An significant effect that may be a material consideration in combination with other significant effects, but is unlikely to be a material consideration in its own right
Slight	An effect that is not significant but that may be of local concern
Negligible	An effect that is not significant change

3.6.2 *Road Traffic Emissions Assessment of Significance*

With regard to road traffic emission, the change in pollutant concentrations with respect to baseline concentrations has been quantified at receptors that are representative of exposure to impacts on local air quality within the study area. The absolute magnitude of pollutant concentrations in the baseline and with development scenario is also quantified and this is used to consider the risk of the air quality limit values being exceeded in each scenario.

For a change of a given magnitude, the Institute of Air Quality Management have published recommendations for describing the magnitude of impacts at individual receptors (Table 3.6) and describing the significance (Table 3.7) of such impacts (IAQM, 2009).

TABLE 3.6: MAGNITUDE OF CHANGES IN AMBIENT POLLUTANT CONCENTRATIONS OF NO_2

Magnitude of Change	Annual Mean Concentrations of NO_2 ($\mu g/m^3$)
Large	Increase/decrease > 4
Medium	Increase/decrease 2 – 4
Small	Increase/decrease 0.4 – 2
Imperceptible	Increase/decrease < 0.4

A change in predicted annual mean concentrations of NO_2 of less than 0.4 $\mu g/m^3$ is considered (IAQM, 2009) to be so small as to be imperceptible. A change (impact) that is imperceptible, given normal bounds of variation, would not be capable of having a direct effect on local air quality that could be considered to be significant.

TABLE 3.7: AIR QUALITY IMPACT DESCRIPTORS FOR CHANGES IN AMBIENT POLLUTANT CONCENTRATIONS OF NO_2			
Absolute Concentration in Relation to Objective/Limit Value	**Change in Concentration**		
	Small	**Medium**	**Large**
Increase with Scheme			
Above Objective/Limit Value *With* Scheme (>40 μg/m³)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value *With* Scheme (36-40 μg/m³)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value *With* Scheme (30-36 μg/m³)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value *With* Scheme (<30 μg/m³)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value *Without* Scheme (>40 μg/m³)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value *Without* Scheme (36-40 μg/m³)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value *Without* Scheme (30-36 μg/m³)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value *Without* Scheme (<30 μg/m³)	Negligible	Negligible	Slight Beneficial

The magnitude of the change in the predicted number of exceedences of the 24-hour objective is directly derived from the predicted annual mean value using the relationship defined in the DMRB Screening Tool. The magnitude descriptors in the table above are as proposed by Environmental Protection UK (EPUK, 2010).

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

For receptors that are predicted to experience a perceptible change, the effect of the change on local air quality and the risk of exceeding the air quality objective value is summarised in Table 3.9. A small increase in annual mean concentrations, at receptors exposed to baseline concentrations that are just below the objective value (36 μg/m³ to 40 μg/m³) is considered to have a slight adverse effect as the slight increase in the risk of exceeding the objective value is significant. However, a small increase in annual mean concentration at receptors exposed to baseline concentrations that are below or well below (< 36 µg/m^3) is not likely to affect the achievement of the objective value and is therefore not a significant effect (negligible).

3.6.3 *Assessment of Significance*

The significance of all of the reported impacts is then considered for the development in overall terms. The potential for the scheme to contribute to or interfere with the successful implementation of policies and strategies for the management of local air quality are considered if relevant, but the principle focus is any change to the likelihood of future achievement of the air quality objective values set out in Table 2.1 for the following pollutants:

- Annual mean nitrogen dioxide (NO_2) concentration of 40 µg/m^3;
- Annual mean particulate matter (PM_{10}) concentration of 40 µg/m^3;
- Annual mean fine particulate matter ($PM_{2.5}$) concentrations of 25 µg/m^3; and
- 24-hour mean PM_{10} concentration of 50 µg/m^3 not to be exceeded on more than 35 days per year

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

4 POTENTIAL AIR QUALITY IMPACTS

4.1 Baseline Conditions

Local air quality is a combination of background air quality, which is representative of the general levels of pollution in the area away from busy roads and industrial activity (in parks and quiet residential areas, for example), and added emissions from local emission sources.

The Defra Local Air Quality Management Background Maps (Defra, 2012) were downloaded, which provides estimates of background pollutant concentrations in 1 km by 1 km grid cells. The background concentrations at each receptor have been taken from the grid cell centred at (528500, 184500), as shown in Table 3.4.

In light of recent debate about whether air quality in London is improving as forecast, it has been conservatively assumed that there will be no change in background concentrations between the mapped data obtained for 2010 and the anticipated year of opening. This is considered a worst-case approach, based on research published by Defra (Defra , 2010) advising that background concentrations and vehicle emissions have remained relatively stable since 2002-2004 and will continue to do so until about 2016 (when EURO 6 vehicle emissions legislation comes into effect).

4.1.1 *Monitoring and Measurement Data*

LBC has declared the whole borough as an AQMA for the long term objective for NO_2 and the short and long term objectives for PM_{10}.

However, only diffusion tube CA19 located on Inverness Street is useful for this assessment (see Section 3.2). NO_2 concentrations for recent years are shown in Table 4.1.

TABLE 4.1: MONITORING DATA IN THE VECINITY OF THE SITE (µg/m³)							
Sampling Site ID	**Location**	**NGR**	**2007**	**2008**	**2009**	**2010**	**2011**
Tube CA19	Inverness Street	528815, 183909	52.6	41.5	45.7	55	47.8
Auto CD1	Swiss Cottage	526633, 184392	77	75	84	82	71
Auto CD3	Shaftesbury Avenue	530060, 181290	75	78	87	89	-
Auto LB	London Bloomsbury	530120, 182034	61	55	54	55	48

The measured concentrations up to 2010 are from LBC's latest progress report (LBC, 2011). For 2011, annual mean NO_2 concentrations at Auto CD1 and Auto LB are downloaded from the London Air Quality Network (King's College London, 2012). Annual mean NO_2 concentration in 2011 has been annualised from 2010 using the automatic data shown in Table 4.1.

4.1.2 *Predicted Baseline Pollutant Concentrations*

Predicted annual mean concentrations of NO_2, PM_{10}, $PM_{2.5}$ and the number of exceedances of the 24-hr 50 µg/m^3 air quality objective, at the selected existing receptors during the baseline scenarios, are listed in Table 4.2.

TABLE 4.2: AIR QUALITY STATISTICS PREDICTED FOR THE BASELINE SCENARIO, AS IN 2011				
	Annual Mean Concentration (µg/m³)			
Receptor	**Annual Mean NO_2 (µg/m³)**	**Annual Mean PM_{10} (µg/m³)**	**Annual Mean $PM_{2.5}$ (µg/m³)**	**No. Days PM_{10} >50 µg/m³**
R1	42.7	22.0	15.7	6
R2	44.5	22.4	16.0	6
R3	47.2	22.9	16.3	7
R4	47.5	23.0	16.4	7
R5	50.8	23.5	16.8	8
R6	45.5	22.5	16.1	7
R7	42.5	22.0	15.7	6
R8	42.7	22.0	15.7	6
R9	42.5	22.0	15.7	6
R10	45.7	22.6	16.1	7
Objective Value	**40**	**40**	**25**	**35**

The 2011 baseline annual mean concentrations of NO_2 are predicted to be exceeding the air quality objective for that pollutant (40 µg/m^3) at all locations within the air quality study area. The highest annual mean concentrations are predicted to occur at locations adjacent to Chalk Farm Road and Ferdinand Street (R5), where they peak at more than 50 µg/m^3. Properties near to the site itself, on Chalk Farm Road, (R3 and R4) are predicted to experience concentrations of just below 50 µg/m^3.

Baseline annual mean concentrations of PM_{10} and $PM_{2.5}$ are all well below their respective air quality objectives (40 µg/m^3 and 25 µg/m^3) in 2011. Annual mean concentrations of PM_{10} and $PM_{2.5}$ are highest at locations adjacent to the Chalk Farm Road/Ferdinand Street junction (R5), where they peak at 23.5 µg/m^3 and 16.8 µg/m^3 respectively in 2011. The predicted number of exceedences of the 24-hr PM_{10} objective is also below its respective objective value (35 days) at all of the receptors considered.

4.1.3 *Baseline Dust*

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

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

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

4.2 Predicted Impacts

4.2.1 *Construction Dust Emissions*

The nature and duration of specific aspects of the construction works are, as yet, unknown. In the absence of detailed construction information, the assessment of construction dust effects has made several assumptions on the likely activities and phasing to be undertaken during the construction works.

As with the majority of construction projects of this type the early phases of the works are likely to involve excavations and earthworks, temporary stockpiling of potentially dusty materials and the use of unsurfaced haul roads. These activities are likely to be the principle sources of dust during these early phases. During the middle phases, when the buildings are erected the principle sources of dust are likely to be from the cutting and grinding of materials, and the movement of construction related road vehicles. The latter phases, when the majority of the buildings and infrastructure are complete, will involve the landscaping and finishing works. During these phases, the principal sources of dust will include the storage, handling and movement of materials generated during the associated earthworks.

The receptors located close enough to the application site to potentially be adversely effected by the works, are residential properties on Hartland Road (R1 and R2) and on Chalk Farm Road on either sides of the site (R3, R4 and R5). The properties to the south of Chalk Farm Road, opposite to the site are considered to be of low sensitivity to impacts resulting from the fugitive emission of particulate matter.

The potential impacts considered at the residential properties are:

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

Demolition

The Esso Garage is a low rise structure that would be demolished at the application site. Given the size and materials in the structure the demolition works are considered to be small in scale and with good site practice represent a low risk to the nearest receptors.

Mitigation measures considered good practice include:

- Agree lines of communication between local authority pollution control officer and contractor(s) prior to commencement of works and procedure for reporting dust events or complaints from local residents;
- Demolition of building to be undertaken in a phased and controlled manner, especially at locations within 100 m of nearest receptors;
- regular inspections of works for visible signs of emissions of dust and early application of measure to minimise emissions at source;
- considerate location of temporary storage of dusty materials and material transfer operations on land that is not between site access and nearest receptors (R2 and R3); and
- operation of mobile crushing plant to requirements of permit.

With good site practice the demolition works would have a negligible effect on amenity and short term PM_{10} concentrations at all receptors.

Earthworks

Site clearance works, the digging of trenches for foundations and utilities and temporary stockpiling of material represent the principle activities that may generate emissions of particulate material.

The potential for stockpiles of materials to generate dust depends on the nature of the material. Earth is soft and friable compared to hardcore. However, hardcore generally has a lower moisture content than soil, and consequently they can both be a potential source of dust.

Mitigation measures considered good practice include:

- Agree lines of communication between local authority pollution control officer and contractor(s) prior to commencement of works and procedure for reporting dust events or complaints from local residents;
- minimise drop heights and chutes where practicable;
- during extended periods of dry weather (especially over holiday periods) plan for additional mitigation measures to avoid wind blown dust issues both within and outside normal working hours;
- avoid long term stockpiles of material on site without application of measures to stabilise the material surface, such as application of suppressants or seeding.

The risk of amenity effects and the amount of mitigation effort required is strongly influenced by weather conditions at the time of the works. With good site practice the earthworks would have a negligible to slight effect on amenity and a negligible effect on short term PM_{10} concentrations at all receptors.

Construction

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

Screening activities which are a potential source of PM_{10} such as cutting and grinding of materials and cement mixing (if there is any) away from boundaries would minimise the possibility of exposure to PM_{10} at receptors within 30 m of the site boundary. If this measure is implemented, then impacts on PM_{10} concentrations at local receptors are capable of being reduced to a negligible level.

Good site practice measures during this phase of the project are similar to those described above. The additional measures should also be considered:

- Treat occupied properties that where constructed in the earlier phases of the construction programme as sensitive receptors in the same way as off site receptors;
- construction of site roads early enough to avoid the use of haul routes on site; and
- adoption of mobile booths for cutting and grinding operations if work can not be undertaken away from sensitive receptors.

With good site practice the construction works would have a negligible effect on amenity and on short term PM_{10} concentrations at all receptors.

Trackout of Material

Facilities for the washing of vehicles and vehicle wheels might provide an appropriate means of minimising the potential for material to be transferred onto the local road network. However, the use of washing also leads to wetting of local roads near the access and can if not carefully managed spread material further along the local road network.

Once on site roads have been constructed wheel washing provides less benefit and is not recommended. However regular inspection of the local roads within 200 m of the site access point(s) should be undertaken and street cleaning applied as necessary.

The effect of track out of material can be minimised by limiting the amount of material transferred onto local roads and by removal of any transferred material from the roads. The impacts associated with trackout of material can be controlled such that it would have a negligible to slight effect on amenity and a negligible effect on short term PM_{10} concentrations at all receptors.

The conclusions of the construction dust assessment are summarised in table 4.3. Overall the effect of the demolition and construction phase activities is considered to be slight adverse and this is not considered to represent a significant effect.

TABLE 4.3: SUMMARY OF CONSTRUCTION PHASE EMISSIONS SIGNIFICANCE, WITH MITIGATION			
Source	**Effects on Amenity and Property**	**Ecological Effects**	**Exposure to PM_{10} at levels that could exceed the 24-hr air quality objective**
Demolition	Negligible	None	Negligible
Earthworks	Slight Adverse	None	Negligible
Construction	Negligible	None	Negligible
Trackout	Negligible	None	Negligible
Overall Significance			Slight Adverse

4.2.2 *Operational Road Traffic Emissions*

The proposed development will reduce traffic flows in the vicinity of the site because of the removal of the existing petrol filling station, which will in turn benefit the local air quality.

However, the proposed development will introduce new receptors in existing Air Quality Management Area (AQMA). The proposed student accommodation is represented by a receptor R10, located at the façade facing the Chalk Farm Road. The predicted annual mean concentrations of NO_2, PM_{10}, $PM_{2.5}$ and the number of PM_{10} exceedences of the 24-hr 50 $\mu g/m^3$ air quality objective, at the proposed air quality sensitive receptors are also listed in Table 4.2, based on 2011 background and vehicle emission factors.

The new receptor (R10) would experience ambient air pollutant concentrations similar to other receptors on Chalk Farm Road (R3 and R4). If the new receptors will not experience ambient air quality any worse than existing nearby receptors, the introduction of new receptors will not delay the timing when the EU air quality limits will be met through air quality action plans put forward by LBC Council and the Greater London Authority.

5 CONCLUSIONS

The impact on local air quality of the proposed development of a student accommodation building with retail land use on the basement and ground floors has been assessed with respect to air quality legislation and planning policies.

In general, construction activities have the potential to generate fugitive dust emissions as a result of demolition, construction, earth works or trackout of material. For the proposed development, the concentrations of any airborne particulate matter generated by these activities would be controlled using on site management practices (to be agreed with LBC Council before commence of the construction works) to the extent that the proposed development should give rise to effects of slight/negligible significance on dust deposition rates at the nearest sensitive receptors. The impact of fugitive emissions of PM_{10} at these receptors, with proposed mitigation applied would be negligible. Overall the effect of fugitive emissions of particulate matter (dust and PM_{10}) from the proposed works is considered to be not significant with respect to potential effects on health and amenity.

The proposed car free development to replace the existing Esso petrol filling station will significantly reduce vehicular trips in the vicinity of the site; hence will benefit the local air quality.

The proposed development will meet the requirement of reduced CO_2 emissions for sustainable developments by using electricity and heat generated by a Combine Heat and Energy (CHP) at neighbouring student accommodation development; hence will not have CHP or boiler exhaust emissions within the site boundary.

The proposed development will introduce new receptors into an existing Air Quality Management Area (AQMA). The advanced dispersion model ADMS has been used to quantify the pollutant concentrations at representative existing air quality sensitive receptors in the vicinity of the proposed development site, for baseline and operational scenarios as in 2011.

The 2011 baseline annual mean concentrations of NO_2 are predicted to be exceeding the air quality objective for that pollutant (40 $\mu g/m^3$) at all existing receptors (R1 to R9) within the air quality study area. The new receptor (R10) would experience ambient air pollutant concentrations similar to other receptors on Chalk Farm Road (R3 and R4). As the new receptors will not experience ambient air quality any worse than existing nearby receptors, the introduction of new receptors will not delay the timing when the EU air quality limits will be met through air quality action plans put forward by LBC Council and the Greater London Authority.

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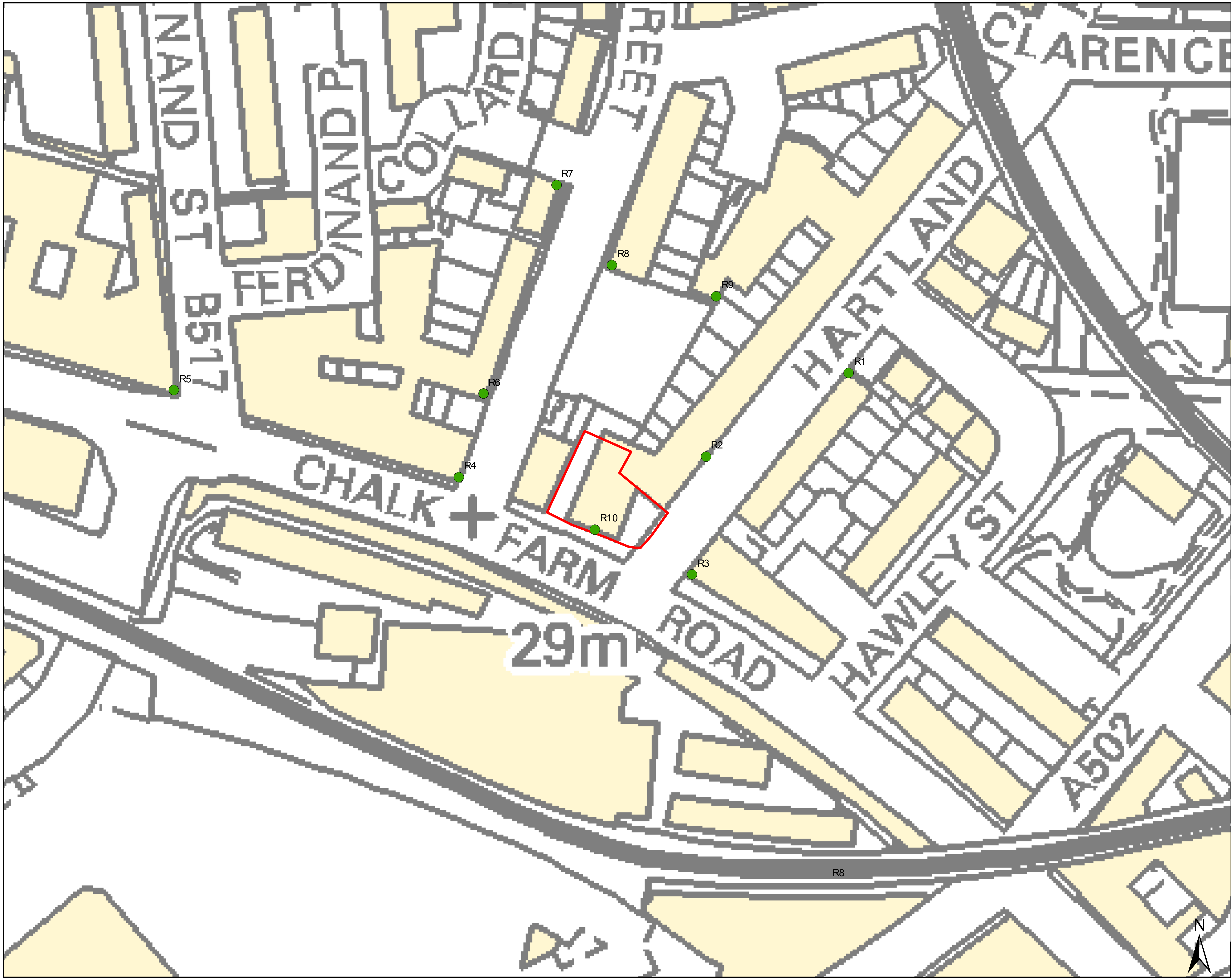
APPENDICES

Appendix A

Figure 1: Air Quality Study Area



NOTES

Air Quality Selected Receptors

Indicative Site Boundary

Revision Details	By / Check	Check Date	Suffix

Purpose of Issue

Final

Client

Risetall Ltd

Project Title

Esso Garage Site
on Chalk Farm Road

Drawing Title

Student Accommodation
Air Quality
Study Area

Drawn	Checked	Approved	Date
CR	GG	GG	15/5/2012

URS Internal Project No.	Scale @ A3
47062883	1:1,000

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Drawing Number	Rev
Figure 1	01

Plot Date:
File Name: