Investland Group plc / PCP Consultants

White Lodge, 252 Finchley Road

Air Quality Assessment

Status: Final **Date: 26.03.2010**

Investland Group plc / PCP Consultants

Air Quality Assessment

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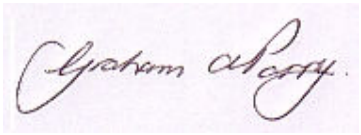
Approved By	 Graham Parry Managing Director
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1. INTRODUCTION

ACCON UK Limited (ACCON) have been commissioned by PCP Consultants on behalf of Investland Group plc to carry out an air quality assessment in support of the planning application for the redevelopment of White Lodge, 252 Finchley Road, in the London Borough of Camden (LBC).

The development proposals are for the demolition of the existing substantial residential property, replacing it with a five storey building comprising 14 private apartments, undercroft parking and landscaped gardens.

The development site is located close to the junction of Finchley Road (the A41), West End Lane and Frognal Lane, in the West Hampstead area of London. The area is mainly characterised by dense urban development, mainly consisting of residential developments, with some shops and other commercial premises on Finchley Road. Immediately adjacent to the site to the south-east is St. Andrews Church. **Appendix 1** shows a map of the development site.

Discussions with Gloria Esposito, the Air Quality Officer for LBC have determined, in accordance with Camden's Supplementary Planning Guidance on Air Quality, that the planning application must be accompanied by an Air Quality Assessment.

This report addresses the effects of air pollutant emissions from traffic using the adjacent roads, and emissions from the development site itself. The report assesses the overall levels of hydrocarbons, nitrogen dioxide (NO_2) and particulates (PM_{10}) in the vicinity of the site which is displayed in **Appendix 1**. The constraints which existing air quality may have on the proposed development have been considered and forms the main part of this assessment.

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2. LEGISLATION AND PLANNING POLICY CONTEXT

2.1. Introduction

In the UK at the present time, emissions from road transport account for a substantial proportion of national air pollutant emissions. Road transport currently contributes almost 21% of national carbon dioxide emissions (UK Emissions of Air Pollution 1970-2000). Whilst the UK is set to meet its international commitments on carbon dioxide emission reductions, the transport sector carbon dioxide emissions are continuing to grow.

Private car ownership has grown from 20.5 million in 1994 to 24.5 million in 2002 (Vehicle Licensing Statistics 2002) and, whilst total pollutant emissions peaked in 1990/91 and are currently declining, emissions are forecast to begin increasing again in approximately 2010, unless further measures are implemented. Cars and taxis accounted for 81% of all motor traffic in 2001, ranging from 75% on motorways and 85% on minor built up roads (Transport Statistics Bulletin – Road Traffic Statistics 2001).

2.2. National Air Quality Strategy

In 1997 the United Kingdom National Air Quality Strategy (NAQS) was published and this document, for the first time in history, set out an analysis of the magnitude and potential health and environmental problems associated with air pollutant emissions, particularly those emanating from road traffic.

It proposed a schedule of air quality objectives, which were to be met for various pollutants in the years up to 2005. In setting these objectives, due account was taken of health and socio-economic cost-benefit factors, together with consideration of the practical and pragmatic aspects of whether targets would be achievable. Whilst it was identified in the Strategy that the objectives for benzene, butadiene, lead and carbon monoxide could be achieved as a result of improvement measures already put in place, complying with targets for NO_2 and PM_{10} would be more difficult. In considering what additional measures would have to be introduced to counter these apparent shortfalls, the Government voiced the following thought: “changes in planning and transport policies (are needed) which would reduce the need to travel and reliance on the car”. With regard to the necessity for encouraging a shift away from private car usage, the Strategy commented, in terms of the new package approach to transport funding, “As a general rule, traffic demand management and restraint measures should be included and this, together with proposals to promote and enhance other modes of transport, should aim to achieve modal shifts away from the private car”.

The White Paper on Integrated Transport (July 1998) proposed a range of measures at both national and local level to address issues of congestion and environmental effects. During the consultation process in 1997, the environmental issue most frequently cited by

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responses was air quality and it is therefore clear that this problem is uppermost in the mind of the public. The implementation of measures to relieve congestion in urban areas, by means of improvements in provision of public transport and encouragement of a modal shift, will also benefit urban air quality.

The Environment Act 1995, specifically sections 82-84, requires that local authorities should carry out reviews of air quality within their administrative areas and, where it is assessed that the air quality objectives may not be complied with in the future, an Air Quality Management Area must be declared. The local authority must then formulate an action plan, setting out the measures that will be employed to achieve compliance with the objectives.

A review of the UK Air Quality Strategy was undertaken in 1998 and a consultation document was published in January 1999, outlining proposals for amending the Strategy. In August 1999, in response to the consultation, the Government then published a draft Air Quality Strategy for England, Scotland, Wales and Northern Ireland. The Air Quality Regulations (England) 2000 enacted in April 2000, and the Air Quality (England) (Amendment) Regulations 2002 gives legal force to the air quality standards set out in the Strategy. A new strategy was released in July 2007 with various amendments to the air quality objectives. The proposals, in brief, consisted of recommendations to adopt the provisions of the EU Air Quality Daughter Directives. The National Air Quality Objectives (NAQO's) included in the Regulations are set out in **Table 2.1.**

Table 2.1: UK Air Quality Objectives For the purpose of Local Air Quality Management

Pollutant	Air Quality Objective Levels	Measured as	Air Quality Objective Dates
Benzene All Authorities	16.25 µg/m^3	Running Annual Mean	31 December 2003
Benzene Authorities in England and Wales only	5 µg/m^3	Annual Mean	31 December 2010
Benzene Authorities in Scotland and Northern Ireland only[a]	3.25 µg/m^3	Running Annual Mean	31 December 2010
1,3-Butadiene	2.25 µg/m^3	Running Annual Mean	31 December 2003
Carbon monoxide Authorities in England, Wales and Northern Ireland only[a]	10.0 mg/m^3	Maximum daily running 8 Hour Mean	31 December 2003
Carbon monoxide Authorities in Scotland only	10.0 mg/m^3	Running 8 Hour Mean[b]	31 December 2003

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Pollutant	Air Quality Objective Levels	Measured as	Air Quality Objective Dates
Lead	0.5 µg/m^3	Annual Mean	31 December 2004
	0.25 µg/m^3	Annual Mean	31 December 2008
Nitrogen dioxide[c]	200 µg/m^3 Not to be exceeded more than 18 times per year	1 Hour Mean	31 December 2005
	40 µg/m^3	Annual Mean	31 December 2005
Particles (PM_{10}) (gravimetric)[d] All authorities	50 µg/m^3 Not to be exceeded more than 35 times per year	24 Hour Mean	31 December 2004
	40 µg/m^3	Annual Mean	31 December 2004
Particles (PM_{10}) Authorities in Scotland only[e]	50 µg/m^3 Not to be exceeded more than 7 times per year	24 Hour Mean	31 December 2010
	18 µg/m^3	Annual Mean	31 December 2010
Sulphur dioxide	266 µg/m^3 Not to be exceeded more than 35 times per year	15 Minute Mean	31 December 2005
	350 µg/m^3 Not to be exceeded more than 24 times per year	1 Hour Mean	31 December 2004
	125 µg/m^3 Not to be exceeded more than 3 times per year	24 Hour Mean	31 December 2004

Notes:
a. In Northern Ireland none of the objectives are currently in regulation. Air Quality (Northern Ireland) Regulations are scheduled for consultation early in 2003.
b. The Quality Objective in Scotland has been defined in Regulations as the running 8-hour mean, in practice this is equivalent to the maximum daily running 8-hour mean
c. The objectives for nitrogen dioxide are provisional.
d. Measured using the European gravimetric transfer sampler or equivalent.
e. These 2010 Air Quality Objectives for PM 10 apply in Scotland only, as set out in the Air Quality

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Pollutant	Air Quality Objective Levels	Measured as	Air Quality Objective Dates
(Scotland) Amendment Regulations 2002. µg/m^3 - micrograms per cubic metre mg/m^3 - milligrams per cubic metre			

Source: The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007)

Given the significant influence that motor vehicle exhausts exert on air quality in the UK and the apparent links between elevated levels of certain air pollutants and premature mortality, it is clear that current and emerging Government policy is geared towards several essential objectives, which are:

- continued action to reduce pollutant emissions from vehicles across the EU, which can be exemplified by the plethora of Directives concerning limitation of motor vehicle emissions since the 1970's and specific targeted initiatives such as the Auto-Oil Study programme;
- concerted action at a National level to reduce private car trips in urban and inter-urban uses and encourage use of alternative forms of transportation;
- action at a local level to manage transportation and air quality in order to reduce the number of car trips in urban areas specifically and to aim for compliance with the National Air Quality Standards by the appointed dates; and
- to ensure that Local Authorities in the execution of their development control responsibilities take account of the consequent air quality impacts.

It is evident that continued growth in private car ownership and usage will continue to result in further deterioration of air quality in urban areas and increasing emissions of greenhouse gases. Whilst current technological improvements will extend the reduction in emissions to approximately 2010, additional measures will be required in order to prevent re-growth of emissions, both to meet ambient air quality targets in urban areas and to offer an alternative to the car for urban journeys. Consequently, where new development can be located in relatively close proximity to public transport and local services, a contribution to the UK's target of reducing emissions will have been made.

Levels of lead and sulphur dioxide are also controlled by the National Air Quality Objectives. Lead levels have reduced significantly since its reduced use as a fuel additive, and the abolition of four-star petrol in January 2000 means that the amount of lead in petrol is reduced to a negligible level. Sulphur dioxide (SO_2) is predominantly associated with emissions from industrial processes, and, accordingly, when assessing the effects of traffic neither SO_2 or lead need be assessed.

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3. METHODOLOGY AND ASSESSMENT CRITERIA

3.1. Assessment of the prevailing air quality

This section summarises the methodology used to consider whether there are significant air pollution impacts on the proposed residential development.

The criteria and methodology for carrying out this assessment has been agreed with Gloria Esposito, the Air Quality Officer for the LBC.

In order to determine the extent to which air quality issues will affect the development of the site, the study has considered the following:

- Any air quality measurements carried out in the Finchley Road area of West Hampstead;
- The Review and Assessment of air quality carried out by the LB Camden for the area, as submitted to the Department for the Environment, Food and Rural Affairs (Defra);
- Predictions of air pollutant concentrations for the site. The predictions have been carried out utilising the methodology described in the Design Manual for Roads and Bridges (DMRB) Volume 11, details of which can be seen in **Appendix 2**.

3.2. Assessment Criteria

In determining whether air pollutant levels may constrain development, the results of the study have been compared against the acceptability criteria agreed by the LPA.

The National Air Quality Objectives are derived from air quality standards set to protect health. The Objectives address social and economic factors as well as the health standards.

It was agreed with Gloria Esposito on behalf of LBC that, for the purposes of this development proposal, the National Air Quality Objectives, should form the basis of the air quality assessment. The NAQO's are based on an assessment of the effects of each pollutant on public health. Therefore, they are a good indicator in assessing whether, under normal circumstances, the air quality in the vicinity of a development is likely to be detrimental to human health.

3.3. Sources of Data

The future air pollutant concentrations at representative sensitive receptors in the vicinity of the existing highway network have been predicted using the calculation procedure defined

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in DMRB (Version 1.03c, July 2007) and utilising the forecast traffic flows for the local road network.

Traffic flow data used in the predictions is taken from the London Atmospheric Emissions Inventory for 2000 and the data for the proposed occupation date of 2010. The traffic information is detailed in **Table 3.1** below.

Table 3.1: Traffic Flow Data for the Proposed Occupation Year of 2010

Location	Total Flow (24-Hour)	Speed (km/h)	% Heavy Vehicles
Finchley Road	46046	28	5.1
West End Lane	8549	18	5.7

Background concentrations of air pollutants for the model were obtained from the UK National Air Quality Information Archive, in accordance with the 'Procedure to avoid double counting background for a major road or suburban area' (Local Air Quality Management Technical Guidance TG03). **Table 3.2** shows the background concentrations used in the DMRB model.

Table 3.2: Background Concentrations of Pollutants

Year	Benzene µg/m^3	1,3-butadiene µg/m^3	NO_2 µg/m^3	PM_{10} µg/m^3
2010	0.791	0.16	31.13	21.15

3.4. Receptors

Pollutant concentrations have been predicted in 2010 for the closest facade of the proposed development to Finchley Road, as identified in **Appendix 1**.

3.5. Validation

As part of their routine monitoring of NO_2 across the Borough, the Council have carried out monitoring at a location adjacent to Frognal Lane. This location is close to the proposed development site. In the 2002 Stage 4 Air Quality Review and Assessment, LB Camden recorded an annual mean for NO_2 of 48 µg/m^3 in 2000.

We have carried out a DMRB modelling exercise for this location in order to validate any predictions that are made using DMRB. This exercise resulted in a modelled pollutant concentration of 47.94µg/m^3. Accordingly no validation correction is required for predictions of pollutant concentrations for the development site.

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4. BASELINE CONDITIONS

4.1. Air Quality Review and Assessment

As previously indicated, Local Authorities have been required to carry out a review of local air quality within their boundaries to assess areas that may fail to achieve the NAQO's. Where these objectives are unlikely to be achieved, local authorities must designate these areas as Air Quality Management Areas (AQMA's) and prepare a written action plan to achieve the NAQO's.

The review of air quality takes on several prescribed stages, of which each stage is reported. The LB Camden's Air Quality Review and Assessment Reports, and their most recent Progress Report (April 2005) indicate that there is a risk of exceedances in the NAQO for Nitrogen Dioxide (NO_2) and Particulate Matter (PM_{10}) through the Borough.

As a result of the potential exceedances for NO_2 and $PM_{10,}$ LB Camden declared an AQMA across the whole of the Borough, including the development site area.

Camden's Stage IV Report shows that the results of the Borough Wide diffusion tube NO_2 and Benzene survey, indicate that at St Andrews Church, close to the junction of Finchley Road and Frognal Lane, the measured nitrogen dioxide concentrations for 2000 were in the region of 48 µg/m^3, with measured benzene concentrations for 2001 in the region of 2.3 µg/m^3.

4.2. Pollutant Concentrations

To characterise the air quality adjacent to roads, predictions of air pollutant concentrations at the development site have been made for the proposed occupation date of 2010 using the Design Manual for Roads and Bridges (DMRB Version 1.03c July 2007) prediction methodology. The results of these predictions can be seen in **Table 4.1**.

Table 4.1: Predicted Air Quality Concentrations 2010 (including any validation adjustment factor)

Receptor	Benzene	1,3-butadiene	NO_x	NO_2	PM_{10}	
	Annual mean µg/m^3	Annual mean µg/m^3	Annual mean µg/m^3	Annual mean µg/m^3	Annual mean µg/m^3	Days >50µg/m^3
White Lodge	1.09	0.43	85.94	37.73	24.67	11.61
NAQO	**16.25**	**2.25**	**-**	**40**	**40**	**35**

If the pollutant concentrations in **Table 4.1** are compared to the National Air Quality Objectives, it can be seen that concentrations of most pollutants, are well below these

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objectives, although concentrations of NO_2 are relatively high, which is characteristic of locations close to roads with relatively high traffic volumes. This is also consistent with LBC's conclusions from their air quality reviews.

4.3. Developmental Constraints

This section considers whether there are any significant air pollution constraints on the proposed residential elements of the development.

In determining whether air quality may constrain the proposed development it is important to determine what the pollutant levels will be when the proposal will be complete and occupied; which in this case is anticipated to be 2010.

Predictions using DMRB have been carried out to estimate pollution levels for 2010. These estimated levels have then been compared against agreed acceptability criteria. It was agreed with the LB Camden that, for the purposes of this development proposal, the National Air Quality Objectives should form the basis of the air quality assessment.

Table 4.1 details the predicted baseline air quality concentrations for 2010. This table also compares these levels to the NAQO's.

Table 4.1 shows that in 2010, all pollutant concentrations will meet the National Air Quality Objectives. Accordingly, local air quality in 2010 should not be a constraint on the development of the site, and no mitigation measures are necessary to protect the future residential occupants.

Discussions with Gloria Esposito from LB Camden concluded that it was their expectation that a recommendation would be made within this report for a system to mitigate the effects of poor air quality on the future occupants of the property. However, it has been determined through the prediction methodologies that the concentration of NO_2 will be below the NAQO, therefore mitigation will not be required. Sensitivity testing of the air quality model has determined that this is likely to be due to the fact that the closest facade of the proposed development is location 18 metres from the centre line of the main road. Sensitivity testing has shown that had the proposed property been immediately adjacent to or within a couple of metres of the kerb, the facade would experience levels of NO_2 in excess of the NAQO.

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5. AIR QUALITY IMPACT ASSESSMENT

The environmental air quality impact of the proposed development on the surrounding area has been assessed initially by considering the changes in traffic flows which will occur on the existing highway network with the development. It has been determined that in line with normal practice, only if the predicted traffic increases exceed a particular threshold will a more detailed assessment be carried out.

5.1. Traffic Generation

Due to the small size of this development, a Traffic Assessment Study has not been carried out. In the absence of traffic data, it has been estimated that as a worst-case level of traffic flow generation, each new dwelling will generate 8 new vehicle movements, totalling 104 new movements per day across the whole development.

5.2. Air Quality Impact of Traffic - Acceptability Criteria

It was agreed with LB Camden that the need for an air quality impact assessment should be judged against the Association of London Government's (ALG's) technical guidance[1] on Air Quality Assessments for Planning Applications. This advises that a full air quality assessment should normally be undertaken for proposals which will result in increases in traffic volumes of 5% or more, on individual road links with more than 10,000 vehicles per day. It also advises of the need for an assessment where a development is likely to have an adverse impact on air quality, particularly in sensitive areas (e.g. where predicted NO_2 concentrations exceed Air Quality Objective levels by 10% or more).

It was also agreed that if this screening assessment indicated the need for a specific air quality impact assessment, then any impact would be considered significant, if the Air Quality Objective were predicted to be breached, and, in line with ALG guidance, the development is predicted to increase NO_2 levels by 1.0µg/m^3 or more.

5.3. Air Quality Impact Screening Assessment

At the present time the traffic flow through the junction is approximately 46000 vehicles per day (based on data from the London Atmospheric Emissions Inventory[2]). The total number of additional vehicular movements, compared to its current vacant state, is likely to be very low, around 104 movements a day. In the context of the ALG criteria above, the proposed development will, by comparison with of the number of movements generated by the

[1] ALG Transport and Environment Committee: Air Quality Assessments for Planning applications - Technical Guidance Note, Association of London Government, 2001

[2] London Atmospheric Emissions Inventory 2001, Greater London Authority, October 2003

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previous use, result in a traffic volume increase of less than 1%. This is well below the ALG's 5% criterion.

Overall, since the level of traffic generation is so low, a detailed assessment of the effects of air quality will not be required and and changes in pollutant concentrations should not be deemed significant. It is certain that any detailed assessment of increases in air pollutant concentrations as a result of traffic generation would result in increases in NO_2 concentrations of considerably less than 1.0µg/m^3.

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6. CONCLUSIONS

DMRB calculations and LBC's review and assessment of air quality suggests that across the Borough there are a number of places where it may be difficult to achieve the NAQO objectives and where exceedances in the NAQO are likely to be experienced in the future.

Whilst is was expected by LBC that additional mitigation would be required, due to the distance from the road to the facade of the new development, the predicted concentrations of major pollutants will fall below NAQO levels at the development site. Therefore, the development of this site should not be constrained in any way by air quality.

Additionally, it has been shown that the air quality impacts of development related traffic generation onto the local traffic network will be insignificant.

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Appendix 1
Site Plan

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Appendix 1: Site Plan

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Appendix 2
DMRB Air Quality Assessment Screening Methodology

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Appendix 2: DMRB Air Quality Assessment Screening Methodology

The Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, describes the so-called 'DMRB Screening Method'. Whilst, the methodology has been in use for some considerable time a number of revisions have recently been made to the methodology and underpinning algorithms in order to include the latest vehicle emission rate data released by Defra. At the same time the opportunity was taken to re-evaluate a range of additional parameters to ensure consistency and compatibility with related applications. The parameters revised were:

- Vehicle fleet composition based on the latest version of the National Atmospheric Emission Inventory (NAEI),
- Roadside dispersion curves,
- Empirical relationships to estimate NO_2 from NO_x concentrations,
- The relationships between the annual mean concentrations and others relevant to air quality objectives, and
- Calibration of the pollutant concentration estimates to reflect latest monitoring data.

The methodology is provided in spreadsheet format and is designed to estimate pollutant concentrations at specific locations and from the road network.

The methodology has undergone a number of significant revisions over the period 2002-2007 with the latest version becoming available in July 2007. The methodology provides estimates of air pollutant concentrations that in general provide very good agreement with measured data and those levels predicted utilising more detailed dispersion models.

Where local information is available on traffic composition the method allows for the division of traffic into a range of classes. Within these classes it is assumed that the distribution of vehicles according to fuel type, emission standard and engine size, would conform to national average statistics.

An atmospheric dispersion equation was derived from calculations using an atmospheric dispersion model developed by TRL. The rate at which exhaust pollutants disperse depends on the atmospheric conditions, with the speed and direction of the wind being of particular importance. In deriving the dispersion equation a wind speed of 2m/s was assumed and no weighting for wind direction assumed.

A comparison of modelled with measured pollutant concentration values showed that overall there was good agreement at the majority of the AURN and HA monitoring sites providing further confidence in the model.

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The model does not take account of annualised meteorological data, height of source or receiver nor is it able to model canyon effects. Nevertheless, it is useful as a screening tool and in particular for comparing the effects of various road traffic conditions where the road is in close proximity to receptor location.

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