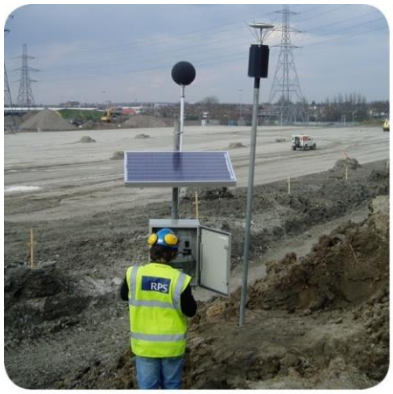
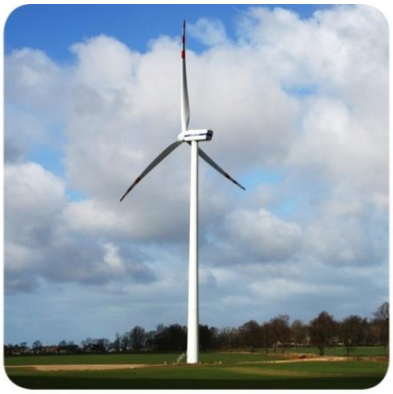
Air Quality Assessment

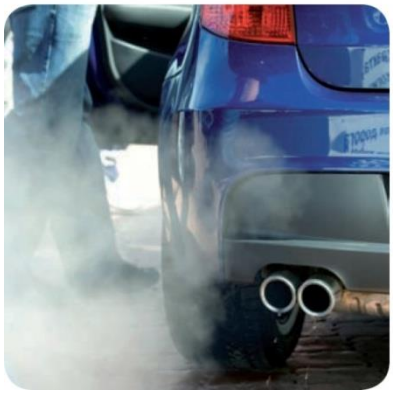
The Warehouse Proposed Development

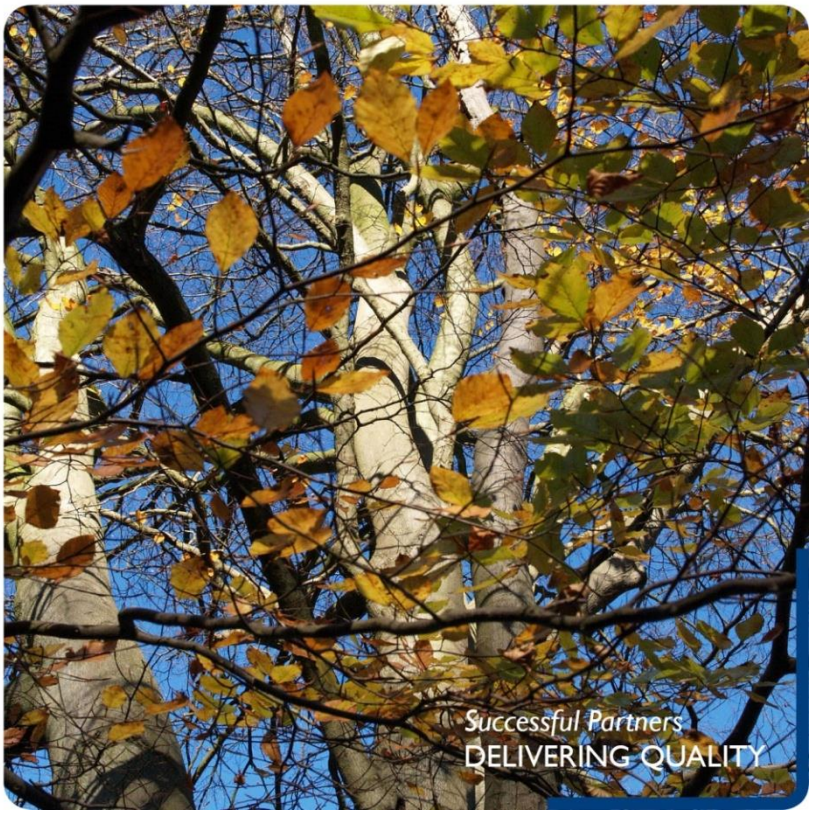
1A St Leonards Road, East Sheen, London, SW14 7LY

For T J Simmons









Quality Management

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Executive Summary

The proposed development comprises the conversion of the existing warehouse at 1A St Leonards Road in East Sheen to form six one-bedroom residential dwellings. The Application Site is located within the administrative area of the London Borough of Richmond Upon Thames (LBRT). The entire borough is designated as an Air Quality Management Area (AQMA) due to elevated concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10}) attributable to road traffic emissions.

The assessment has been undertaken based upon appropriate information on the Proposed Development provided by T J Simmons and the project team. In undertaking this assessment, RPS experts have exercised professional skills and judgement to the best of their abilities and have given professional opinions that are objective, reliable and backed with scientific rigour. These professional responsibilities are in accordance with the code of professional conduct set by the Institution of Environmental Sciences for members of the Institute of Air Quality Management (IAQM).

No substantive demolition or construction works are proposed. As such, dust impacts during construction are highly unlikely. During the operational phase, the development is unlikely to generate significant traffic movements compared with the existing site use. As such, this assessment focuses on whether the site is suitable for residential development in relation to the traffic-related pollutants, NO_2 and PM_{10}. The results of air quality monitoring in the vicinity of the proposed development have been reviewed and indicative calculations have been undertaken to derive the likely pollutant concentrations at the façades of the proposed residential dwellings. Pollutant concentrations are expected to be well within the relevant health-based air quality objectives at the façades of proposed receptors. Therefore, air quality is acceptable at the development site, making it suitable for its proposed uses.

The proposed development does not, in air quality terms, conflict with national or local policies, or with measures set out in the LBRT's Air Quality Action Plan. There are no constraints to the development in the context of air quality.

Contents

Tables and Figures

Tables

Figures

1 Introduction

1.1 This report details the air quality assessment undertaken for the proposed conversion of the existing warehouse at 1A St Leonards Road in East Sheen to form six one-bedroom residential dwellings. The Application Site is located within the administrative area of the London Borough of Richmond Upon Thames (LBRT). The entire borough is designated as an Air Quality Management Area (AQMA) due to elevated concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10}) attributable to road traffic emissions.

1.2 No substantive demolition or construction works are proposed. As such, dust impacts during construction are highly unlikely.

1.3 During the operational phase, the development is unlikely to generate significant traffic movements. There are no proposals for centralised boilers or a Combined Heat and Power (CHP) plant. As such, this air quality assessment covers the impacts on future occupants of the development from their exposure to the prevailing levels of NO_2 and PM_{10} concentrations, which can be a factor in the suitability of the site for its proposed uses.

1.4 This report begins by setting out the policy and legislative context for the assessment. The baseline air quality conditions have been established taking into account Defra estimates, local authority documents and the results of local monitoring. A conclusion has been drawn on the suitability of the site for its proposed residential use.

2 Policy and Legislative Context

Ambient Air Quality Legislation and National Policy

The Ambient Air Quality Directive and Air Quality Standards Regulations

2.1 The 2008 Ambient Air Quality Directive (2008/50/EC) [1] aims to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants; it sets legally binding concentration-based limit values, as well as target values. There are also information and alert thresholds for reporting purposes. These are to be achieved for the main air pollutants: particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), ozone (O_3), carbon monoxide (CO), lead (Pb) and benzene. This Directive replaced most of the previous EU air quality legislation and in England was transposed into domestic law by the Air Quality Standards (England) Regulations 2010 [2], which in addition incorporates the 4th Air Quality Daughter Directive (2004/107/EC) that sets targets for ambient air concentrations of certain toxic heavy metals (arsenic, cadmium and nickel) and polycyclic aromatic hydrocarbons (PAHs). Member states must comply with the limit values (which are legally binding on the Secretary of State) and the Government and devolved administrations operate various national ambient air quality monitoring networks to measure compliance and develop plans to meet the limit values.

UK Air Quality Strategy

2.2 The Environment Act 1995 established the requirement for the Government and the devolved administrations to produce a National Air Quality Strategy (AQS) for improving ambient air quality, the first being published in 1997 and having been revised several times since, with the latest published in 2007 [3]. The Strategy sets UK air quality standards♦ and objectives# for the pollutants in the Air Quality Standards Regulations plus 1,3-butadiene and recognises that action at national, regional and local level may be needed, depending on the scale and nature of the air quality problem. There is no legal requirement to meet objectives set within the UK AQS except where equivalent limit values are set within the EU Directives.

2.3 The 1995 Environment Act also established the UK system of Local Air Quality Management (LAQM), that requires local authorities to go through a process of review and assessment of air quality in their areas, identifying places where objectives are not likely to be met, then declaring Air Quality Management Areas (AQMAs) and putting in place Air Quality Action Plans to improve

♦ Standards are concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. Standards, as the benchmarks for setting objectives, are set purely with regard to scientific evidence and medical evidence on the effects of the particular pollutant on health, or on the wider environment, as minimum or zero risk levels.

Objectives are policy targets expressed as a concentration that should be achieved, all the time or for a percentage of time, by a certain date.

air quality. These plans also contribute, at local level, to the achievement of EU limit values. Defra is currently reviewing the LAQM process.

2.4 For the purposes of this assessment, the limit values set out in the Air Quality Standards Regulations 2010 and the objective levels specified under the current UK AQS have been used.

2.5 The limit values and objectives relevant to this assessment are summarised in Table 2.1.

Table 2.1 Summary of Relevant Air Quality Limit Values and Objectives

Pollutant	Averaging Period	Objectives/ Limit Values	Not to be Exceeded More Than	Target Date
Nitrogen Dioxide (NO_2)	1 hour	200 µg.m^{-3}	18 times per calendar year	-
	Annual	40 µg.m^{-3}	-	-
Particulate Matter (PM_{10})	24 Hour	50 µg.m^{-3}	35 times per calendar year	-
	Annual	40 µg.m^{-3}	-	-
Particulate Matter ($PM_{2.5}$)	Annual	Target of 15% reduction in concentrations at urban background locations	-	Between 2010 and 2020 (a)
		Variable target of up to 20% reduction in concentrations at urban background locations (c)		Between 2010 and 2020 (b)
	Annual	25 µg.m^{-3}	-	01.01.2020 (a)
		25 µg.m^{-3}		01.01.2015 (b)

(a) Target date set in UK Air Quality Strategy 2007

(b) Target date set in Air Quality Standards Regulations 2010

(c) Aim to not exceed 18 µg.m^{-3} by 2020

National Planning Policy

National Planning Policy Framework

2.6 The National Planning Policy Framework (NPPF) [4] is a material consideration for local planning authorities and decision-takers in determining applications. At the heart of the NPPF is a presumption in favour of sustainable development. For determining planning applications, this means approving development proposals if they accord with the local development plan, unless material considerations indicate otherwise. If the development plan is absent, silent or the policies

are out of date, then planning permission should be granted unless any adverse impacts would significantly outweigh the benefits, or specific policies in the NPPF indicate development should be restricted.

2.7 The NPPF sets out 12 core land-use planning principles. The relevant core-principle in the context of this air quality assessment is that planning should "*contribute to conserving and enhancing the natural environment and reducing pollution*". (Paragraph 17)

2.8 Under the heading 'Conserving and Enhancing the Natural Environment', the NPPF states:

"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… (Paragraph 109)*

National Planning Practice Guidance

2.9 The National Planning Practice Guidance (NPPG) was issued in March 2014 and is updated periodically by government as a live document. The Air Quality section of the NPPG describes the circumstances when air quality, odour and dust can be a planning concern, requiring assessment.

2.10 The NPPG advises that whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife).

2.11 The NPPG states that when deciding whether air quality is relevant to a planning application, considerations could include whether the development would:

- *"Significantly affect traffic in the immediate vicinity of the proposed development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or result in construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more.*
- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; or extraction systems (including chimneys) which require approval under pollution control legislation or biomass boilers or biomass-fuelled*

CHP plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area;

- *Expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality.*
- *Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations.*
- *Affect biodiversity. In particular, is it likely to result in deposition or concentration of pollutants that significantly affect a European-designated wildlife site, and is not directly connected with or necessary to the management of the site, or does it otherwise affect biodiversity, particularly designated wildlife sites."*

2.12 The NPPG provides advice on how air quality impacts can be mitigated and notes *"Mitigation options where necessary will be locationally specific, will depend on the proposed development and should be proportionate to the likely impact. It is important therefore that local planning authorities work with applicants to consider appropriate mitigation so as to ensure the new development is appropriate for its location and unacceptable risks are prevented. Planning conditions and obligations can be used to secure mitigation where the relevant tests are met.*

Regional Policy Guidance – The London Plan

2.13 The Mayor of London is responsible for all strategic planning in London. Amongst the Mayor's duties is the requirement to develop a Spatial Development Strategy for London, known as the London Plan [5]. The current version of the London Plan was published in March 2015 and incorporates Further Alterations to the London Plan published in July 2011. The Plan acts as an integrating framework for a set of strategies, including improvements to air quality.

2.14 The key policy relating to air quality is Policy 7.14: Improving Air Quality:

"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.

2.15 The Mayor's Air Quality Strategy (MAQS) [6], referred to in Policy 7.14, sets out policies and proposals seeking to improve London's air quality to the point where air pollution no longer poses a significant risk to human health.

2.16 In April 2014, the Greater London Authority (GLA) published Supplementary Planning Guidance (SPG) Sustainable Design and Construction [7]. The SPG reinforces the existing need for a *'conventional'* Air Quality Assessment where pollutant concentrations, at the point of human exposure, are compared with the relevant national objectives; however, the SPG also details how major developments must demonstrate they are achieving the Mayor of London's *'Air Quality Neutral'* Policy 7.14. The Air Quality Neutral calculations have been undertaken for the Proposed Development and are provided in a separate report.

Local Planning Policy

2.17 The LBRT's *Local Plan Pre-publication version for consultation 8th July - 19th August 2016* sets intended policies for the next 15 years. Policy LP10 *Local Environmental Impacts, Pollution and Land Contamination* is relevant in the context of air quality. It states that:

"The Council promotes good air quality design and new technologies. Developers should commit to 'Emissions Neutral' development where practicable. To consider the impact of introducing new developments in areas already subject to poor air quality, the following will be required:

1. an air quality impact assessment, including where necessary, modelled data;

2. mitigation measures to reduce the development's impact upon air quality, including the type of equipment installed, thermal insulation and ducting abatement technology;

3. measures to protect the occupiers of new developments from existing sources;

4. strict mitigation for developments to be used by sensitive receptors such as schools, hospitals and care homes in areas of existing poor air quality; this also applies to proposals close to developments used by sensitive receptors."

3 Assessment Methodology

Approach

3.1 Neither the NPPF nor the NPPG is prescriptive on the methodology for assessing air quality effects or describing significance; practitioners continue to use guidance provided by Defra and non-governmental organisations, including Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM). However, the NPPG does advise that *"Assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality, and because of this are likely to be locationally specific. The scope and content of supporting information is therefore best discussed and agreed between the local planning authority and applicant before it is commissioned."* It lists a number of areas that might be usefully agreed at the outset.

3.2 This air quality assessment covers the elements recommended in the NPPG. The approach is consistent with the EPUK/IAQM Land-Use Planning & Development Control: Planning For Air Quality document [8] and, where relevant, the Mayor of London's Local Air Quality Management Technical Guidance: LLAQM.TG16[9]. It includes the key elements listed below:

- assessment of the existing air quality in the study area (existing baseline) and prediction of the future air quality without the development in place (future baseline), using official government estimates from Defra, publically available air quality monitoring data for the area, and relevant Air Quality Review and Assessment (R&A) documents; and
- a semi-quantitative assessment of the likely impacts on future occupants of the development from their exposure to the prevailing levels of air pollution, which can be a factor in the suitability of the site for its proposed uses.

3.3 In line with the guidance set out in the NPPG, the Environmental Health Department at the London Borough of Richmond Upon Thames was consulted on 28 July and the scope and approach to the assessment was agreed.

3.4 Air quality guidance advises that the organisation engaged in assessing the overall risks should hold relevant qualifications and/or extensive experience in undertaking air quality assessments. The RPS air quality team members involved at various stages of this assessment have professional affiliations that include Member of the Institute of Air Quality Management, Chartered Chemist, Chartered Scientist, Chartered Environmentalist and Member of the Royal Society of Chemistry and have the required academic qualifications for these professional bodies. In addition, the Director responsible for authorising all deliverables has over 25 years' experience.

Summary of Key Pollutants Considered

3.5 The main pollutants from road traffic with potential for local air quality impacts are nitrogen oxides (NO_x) and PM_{10}. Emissions of total NO_x from combustion sources comprise nitric oxide (NO) and

NO_2. The NO oxidises in the atmosphere to form NO_2. The assessment of operational impacts therefore focuses on changes in NO_2 and PM_{10} concentrations. The impact from fine particulate matter, known as $PM_{2.5}$ (a subset of PM_{10}) concentrations has also been considered.

Locations Where the Objectives Apply

3.6 LLAQM.TG16 [9] provides examples of exposure locations and these are summarised in Table 3.1.

Table 3.1 Example of Where Air Quality Objectives Apply

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual-mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building's façades), or any other location where public exposure is expected to be short-term.
Daily-mean	All locations where the annual-mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building's façade), or any other location where public exposure is expect to be short-term.
Hourly-mean	All locations where the annual and 24 hour mean would apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations to which the public might reasonably be expected to spend 1-hour or longer.	Kerbside sites where the public would not be expected to have regular access

3.7 The annual, daily and hourly-mean AQS objectives apply at the front and rear façades of the proposed residential properties.

Pollutant Concentrations at Façades of the Proposed Development

3.8 In urban areas, pollutant concentrations are primarily determined by the balance between pollutant emissions that increase concentrations, and the ability of the atmosphere to reduce and remove pollutants by dispersion, advection, reaction and deposition.

3.9 The atmospheric pollutant concentrations in an urban area depend not only on local sources at a street scale, but also on the background pollutant level made up of the local urban-wide background, together with regional pollution and pollution from more remote sources brought in on the incoming air mass. Background pollution levels are described in detail in Section 4.

3.10 The results of monitoring in the vicinity of the proposed development have been reviewed and indicative calculations have been undertaken to derive likely pollutant concentrations at the façades of the proposed residential dwellings.

Significance Criteria for New Population Exposure (Site Suitability)

3.11 The EPUK/IAQM guidance considers an exceedance of an air quality objective at a building façade to be a significant adverse effect unless provision is made to reduce the residents' or occupants' exposure by some means.

3.12 Additionally, the London Councils' Air Quality and Planning Guidance [10] provides Air Pollution Exposure Criteria (APEC) for assessing the significance on exposure to air pollution and the levels of mitigation required when considering site suitability. Table 3.2 provides a summary of the criteria.

Table 3.2 Summary of Air Pollution Exposure Criteria (APEC)

Criteria	Applicable Range NO_2 Annual-Mean	Applicable Range PM_{10}	Recommendation
APEC-A	> 5% below national objective	Annual-Mean >5% below national objective 24-Hour >1-day less than national objective	No air quality grounds for refusal; however mitigation of any emissions should be considered.
APEC-B	Between 5% below or above national objective	Annual-Mean Between 5% above or below national objective 24-Hour Between 1-day above or below national objective	May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered, e.g. maximise distance from pollutant source, proven ventilation systems, parking considerations, winter gardens, internal layout considered and internal pollutant emissions minimised.
APEC-C	>5% above national objective	Annual-Mean >5% above national objective 24-Hour >1-day more than national objective	Refusal on air quality grounds should be anticipated, unless the Local Authority has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated. Worker exposure in commercial/industrial land uses should be considered further. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures.

3.13 Concentrations have been predicted at proposed receptors to determine the APEC category that would apply.

4 Baseline Air Quality Conditions

Overview

4.1 The background concentration often represents a large proportion of the total pollution concentration, so it is important that the background concentration selected for the assessment is realistic. National Planning Practice Guidance and EPUK/IAQM guidance highlight public information from Defra and local monitoring studies as potential sources of information on background air quality. LLAQM.TG16 recommends that Defra mapped concentration estimates are used to inform background concentrations and states that: "*Where appropriate these data can be supplemented by and compared with local measurements of background, although care should be exercised to ensure that the monitoring site is representative of background air quality*".

4.2 For this assessment, the background air quality has been characterised by drawing on information from the following public sources:

- Defra maps [11], which show estimated pollutant concentrations across the UK in 1 km grid squares; and
- published results of local authority Review and Assessment (R&A) studies of air quality, including local monitoring and modelling studies.

4.3 A detailed description of how the baseline air quality has been derived for this Proposed Development site is summarised in the following paragraphs.

Review and Assessment Process

4.4 The LBRT has designated the entire borough as an AQMA due to elevated concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10}) attributable to road traffic emissions.

4.5 In 2014, the LBRT prepared an action plan setting out the measures it intends to take to improve air quality. The measure relevant to this development is that the council will *"Refuse planning consent for activities, which are likely to lead to a significant worsening of air pollution in 'hot spot' areas. Each application is considered on its merits, with special reference to new sources of pollution in proximity of existing receptors or new receptors near to existing sources of pollution."*

4.6 The development is not a new source of pollution. The issue for this assessment is limited to the impacts from existing sources of pollution on new occupants.

Local Urban Background Monitoring

4.7 Monitors at urban background locations measure concentrations away from the local influence of emission sources and are therefore broadly representative of residential areas within large conurbations. Monitoring at local urban background locations is considered an appropriate source of data for the purposes of describing baseline air quality for this Proposed Development site.

4.8 The LBRT does not monitor air quality using continuous automatic instruments at an urban background location; however, the LBRT does manually monitor NO_2 concentrations at one urban background location using a passive diffusion tube. The most measured annual-mean concentrations are presented in Table 4.1.

Table 4.1 Passively Monitored Urban Background Annual-Mean NO_2 Concentrations

Monitor ID	Monitor Name	Approximate Distance to Site (km)	x	y	Concentration (µg.m^{-3})				
					2010	2011	2012	2013	2014
28	Holly Lodge, Richmond Park	1.8	519467	173993	24	20	22	21	18

All concentrations have been adjusted for bias

Defra Mapped Concentration Estimates

4.9 Defra's total annual-mean NO_2 concentration estimates have been collected for the 1 km grid square of the Holly Lodge monitoring site. The Defra concentration estimate and the monitored concentrations are compared in Table 4.2.

Table 4.2 Defra Mapped Annual-Mean Background NO_2 Concentration Estimates

Monitor ID	Monitor/Site Name	Distance to Site (km)	Concentration (µg.m^{-3})	
			Range of Monitored	Estimated Defra Mapped
28	Holly Lodge, Richmond Park	1.8	18 - 24	21.8

Appropriate Background Concentrations for the Development Site

4.10 For NO_2, the Defra mapped background concentration estimate is within the range of the results from monitoring and this indicates that the Defra mapped value is a reasonable estimate of the concentration at this location.

4.11 Historically the view has been that background traffic-related NO_2 concentrations in the UK would reduce over time, due to the progressive introduction of improved vehicle technologies and increasingly stringent limits on emissions. However, the results of recent monitoring across the UK suggest that background annual-mean NO_2 concentrations have not decreased in line with expectations. Inspection of the results of local monitoring presented here indicates suggest that there may be a downward trend over time for NO_2 concentrations in the vicinity of the Application Site; however, to ensure that the assessment presents conservative results, no reduction in the background has been applied for future years.

4.12 Table 4.3 summarises the annual-mean background concentrations for NO_2 and PM_{10} used in this assessment.

Table 4.3 Summary of Background Annual-Mean (Long-term) Concentrations used in the Assessment

Pollutant	Data Source	Concentration (µg.m^{-3})
NO_2	Defra Mapped Concentration Estimates (2013)	29.2
PM_{10}		19.2

5 Assessment of Operational-Phase Air Quality Impacts

NO_2 Concentrations

5.1 LLAQM.TG16 refers to a *"NO_2 fall-off with distance calculator available on the LAQM Support website"*. The Application Site and its proximity to nearby monitors are shown in the Figure 1. The LAQM Support website states that the calculator works for distances less than 50 m from the source of emissions. The Application Site is approximately 24 m from Sheen Lane, 147 m from Upper Richmond Road and 320 m from Lower Richmond Road. Consequently, the calculator can be used to determine the reduction in NO_2 pollutant concentrations with increasing distance from Sheen Lane.

5.2 The basis of the calculation is as follows:

$$C_Z = ((C_y-C_b) / (-0.5476 \times Ln(D_y) + 2.7171)) \times (-0.5476*Ln(D_z)+2.7171) + C_b$$

where:
C_z is the total predicted concentration ($\mu g.m^{-3}$) at distance D_z;
C_y is the total measured concentration ($\mu g.m^{-3}$) at distance D_y;
C_b is the background concentration ($\mu g.m^{-3}$);
D_y is the distance from the kerb at which concentrations were measured;
D_z is the distance from the kerb (m) at which concentrations are to be predicted; and
Ln(D) is the natural log of the number D.

5.3 The LBRT monitors annual-mean NO_2 concentrations at Sheen Lane near the railway crossing and the junction of Sheen Lane with Upper Richmond Road West. The concentrations at the monitors at the junction of Sheen Lane with Upper Richmond Road West are likely to be higher than the Application Site and the monitor on Sheen Lane, due to slow moving traffic on the exit and approach to the junction. Also, the Application Site is approximately 155 m from the junction.

5.4 The LAQM calculator has therefore been used for the concentrations measured at Sheen Lane. LBRT's Updating and Screening and Assessment 2015 reports that the monitor is 0.4 m from Sheen Lane. This is D_y in the formula above. The measured concentrations (or C_y in the formula above) between 2010 and 2014 are presented in Table 5.1.

Table 5.1 Measured Annual-Mean NO_2 Concentrations at Sheen Lane.

Monitor	2010	2011	2012	2013	2014	2015
Sheen Lane	39	32	36	34	34	28

5.5 For C_b in the expression above, the background annual-mean NO_2 concentration of 29.2 $\mu g.m^{-3}$ has been obtained from the 2013 Defra mapped concentration estimate.

5.6 The nearest part of the Application Site is 24 m from Sheen Lane. This distance has been used as D_z in the formula above.

5.7 The annual-mean concentrations derived for each year of monitoring are presented in Table 5.2.

Table 5.2 Predicted Annual-Mean NO_2 Concentrations at the Application Site.

2010	2011	2012	2013	2014	2015
32.1	30.1	31.2	30.6	30.6	28.8

5.8 The calculated annual-mean NO_2 concentrations are more than 5% below the AQS objective of 40 µg.m^{-3} and the site would therefore be classified as APEC-A. Table 3.2 advises that there should be no air quality grounds for refusal.

5.9 Research undertaken in support of LLAQM.TG16 has indicated that the hourly-mean limit value and objective for NO_2 is unlikely to be exceeded at a roadside location where the annual-mean NO_2 concentration is less than 60 µg.m^{-3}. In May 2008, a re-analysis of the relationship between annual and hourly-mean NO_2 concentrations was undertaken using data collated between 2003 and 2007 [12]. The conclusions and recommendations of that report are:

"Analysis shows that statistically, on the basis of the dataset available here, the chance of measuring an hourly nitrogen dioxide objective exceedence whilst reporting an annual-mean NO_2 of less than 60 µg.m^{-3} is very low….

It is therefore recommended that local authorities continue to use the threshold of 60 µg.m^{-3} NO_2 as the guideline for considering a likely exceedence of the hourly-mean nitrogen dioxide objective."

5.10 Although there is no APEC classification for hourly-mean NO_2 concentration, the predicted concentrations are below 60 µg.m^{-3} and the short-term AQS objective should be met.

PM_{10} Concentrations

5.11 The LBRT measures PM_{10} concentrations at two fixed locations in the borough and one mobile location.

Table 5.3 Measured Annual-Mean PM_{10} Concentrations in Richmond

Monitor Name	Site Type	2010	2011	2012	2013	2014
Barnes (R1)	Roadside	21 (2)	23 (15)	21 (14)	22 (10)	20 (4)
Wetlands Centre, Barnes (R2)	Suburban	19 (1)	22 (17)	18 (13)	20 (6)	18 (3)
Mobile Air Quality Unit	Mostly roadside locations	22 (1)	27 (12)	24 (10)	25 (8)	23 (6)

The number of daily-mean concentrations above 50 µg.m^{-3} are given in brackets

5.12 The measured annual-mean concentrations are more than 5% below the AQS objective of 40 $\mu g.m^{-3}$ at all monitoring locations in the borough. The measured number of daily-mean PM_{10} concentrations is more than one day below the 35 permitted in the short-term AQS objective. This indicates that the site would be classified as APEC-A. Table 3.2 advises that there should be no air quality grounds for refusal.

6 Mitigation

Mitigation for New Population Exposure (Site Suitability)

6.1 The pollutant concentrations at proposed sensitive receptors are expected to be below the relevant AQS objectives. As such, the air quality effect of exposure on future occupants is considered to be “not significant”. On that basis, no mitigation measures are considered necessary.

7 Conclusions

7.1 This assessment has considered dust effects during the construction phase and the air quality impacts during the operational phase.

7.2 Regarding suitability of air quality at the site for introducing new occupants, pollutant concentrations at the façades of proposed residential receptors are predicted to be well within the relevant health-based air quality objectives. On that basis, future occupants of the proposed development will be exposed to acceptable air quality and the site is deemed suitable for its proposed future use in this respect.

7.3 The 'golden thread' running through the NPPF is a presumption in favour of sustainable development. For determining planning applications, this means approving development proposals if they accord with the local development plan, unless material considerations indicate otherwise. If the development plan is absent, silent or the policies are out of date, then planning permission should be granted unless any adverse impacts would significantly outweigh the benefits, or specific policies in the NPPF indicate development should be restricted.

7.4 The NPPG advises that in considering planning permission, the relevant question for air quality is *"will the proposed development (including mitigation) lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or national objectives for pollutants or fail to comply with the requirements of the Habitats Regulations?"* The proposed development will not.

7.5 The Warehouse proposed development does not, in air quality terms, conflict with national or local policies, or with measures set out in LBRT's Air Quality Action Plan. There are no constraints to the development in the context of air quality.

Glossary

AADT	Annual Average Daily Traffic Flow
ADMS	Atmospheric Dispersion Modelling System
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
Deposited Dust	Dust that has settled out onto a surface after having been suspended in air.
DMP	Dust Management Plan
Dust	Solid particles suspended in air or settled out onto a surface after having been suspended in air
Effect	The consequences of an impact, experienced by a receptor
EPUK	Environmental Protection UK
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
Impact	The change in atmospheric pollutant concentration and/or dust deposition. A scheme can have an 'impact' on atmospheric pollutant concentration but no effect, for instance if there are no receptors to experience the impact.
LGV	Light Goods Vehicle
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
R&A	Review and Assessment
Receptor	A person, their land or property and ecologically sensitive sites that may be affected by air quality.
Risk	The likelihood of an adverse event occurring
Trackout	The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicle using the network

Figures

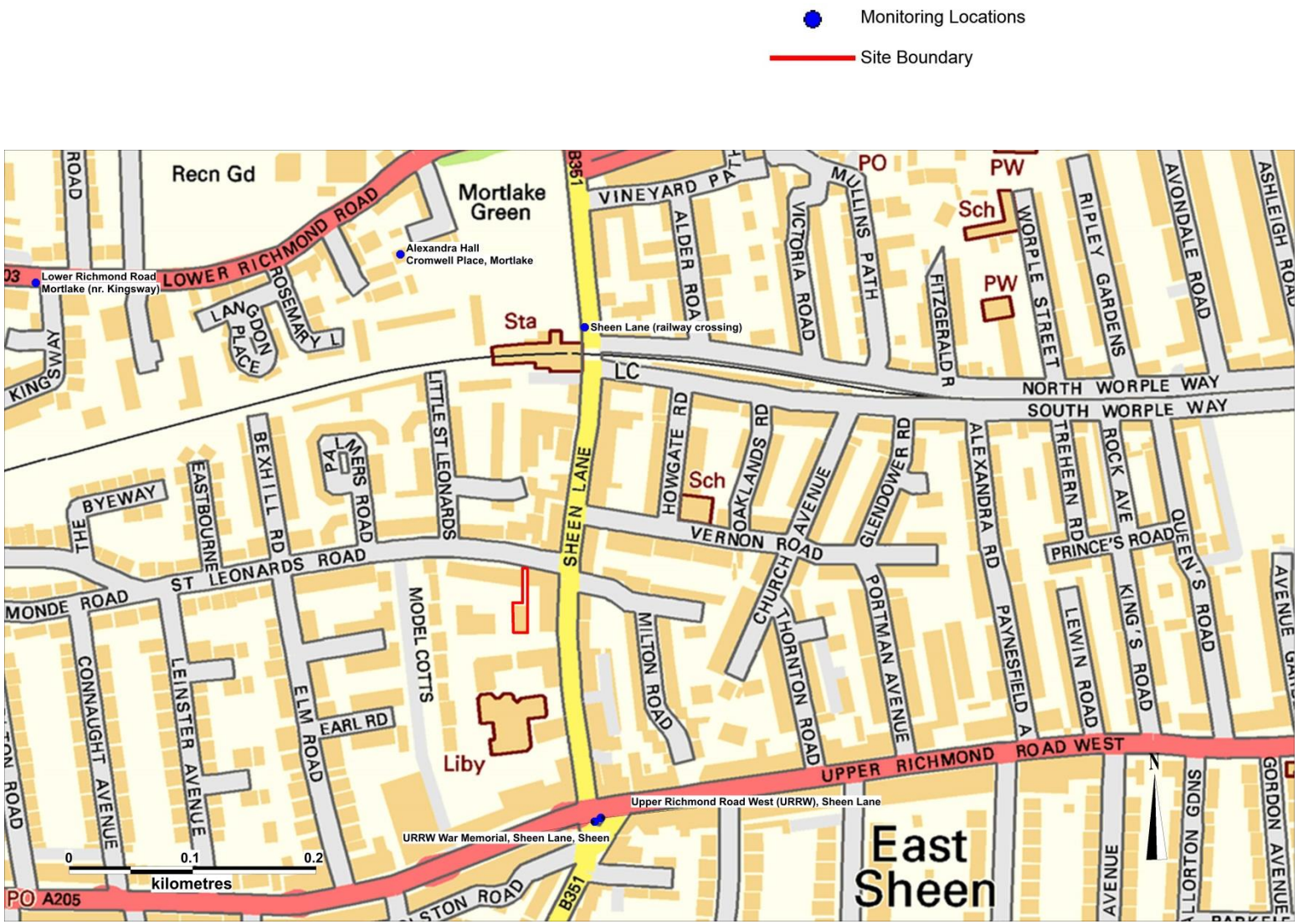

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Figure 1: Site and Air Quality Monitoring Locations

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