Contaminated Land
Air Quality
Environmental Audit

Partnership No: OC 300776

PROPOSED MIXED USE DEVELOPMENT, ST JAMES' COURT, LIVERPOOL

AIR QUALITY ASSESSMENT

For: Zerum / Citipads

November 2017

R2397-R01-v1

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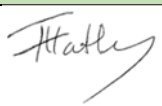
Drafted By	F Hartley BSc	Consultant		23.11.17
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1 Introduction

1.1 Citipads proposes to submit a planning application to Liverpool City Council (LCC) for the construction of a mixed-use development at St James Court in Liverpool. The application incorporates a number of amendments to a previous scheme which was granted planning permission in 2016. Zerum, acting on behalf of Citipads, accordingly instructed Smith Grant LLP (SGP) to undertake an air quality assessment in support of the new planning application.

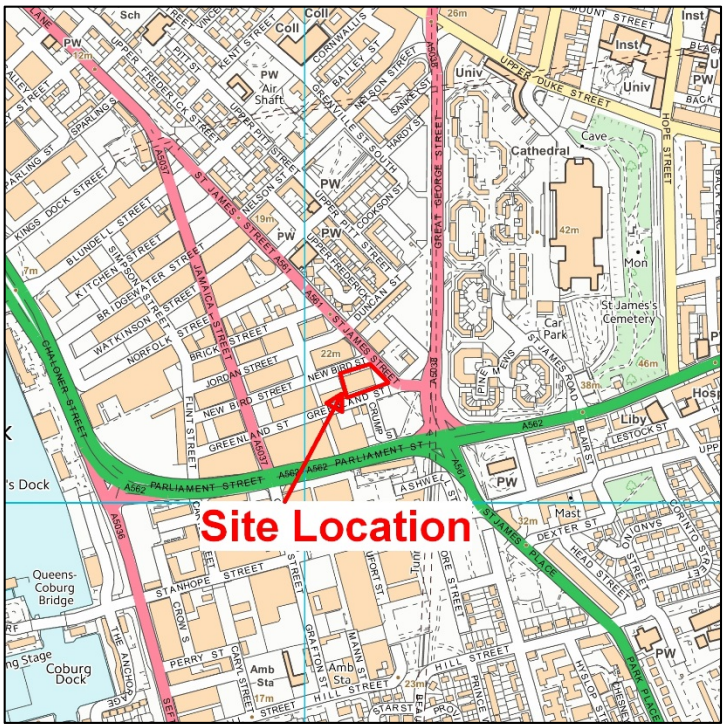
1.2 Site details are:

Table 1.1: Site Details

Address	St James Court, Liverpool
National Grid Reference	335082 389175
Local Authority	Liverpool City Council (LCC)
Site Area	1,522m^2
Nature of Current Site	Single storey commercial building and hardstanding
Proposed Development	Twelve storey building comprising commercial space and enclosed car parking on the ground floor and residential use on the upper storeys.

1.3 The site location is detailed below in Figure 1.1 and drawing D01.

Figure 1.1: Site Location



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1.4 The following report describes the local air quality and baseline conditions of the site and the surroundings. It considers the potential impacts of the local air quality on the receptors to be introduced as part of the proposed development and potential impacts of the development itself on the local air quality.

1.5 SGP is an environmental consultancy specialising in air quality assessments. The report reviewer, Katrina Hawkins, Partner, is a Member of the Institute of Air Quality Management (IAQM).

2 Technical and Legislative Context

2.1 Technical Context

2.1.1 The airborne pollutants of principal concern in connection with road traffic and considered in the following assessment are nitrogen oxides (NO_x), nitrogen dioxide (NO_2) and particulate matter less than 10µm (PM_{10}). Principal airborne pollutants in connection with construction activities, disamenity dust and particulate matter less than less than 10µm (PM_{10}), have also been considered in the assessment.

2.1.2 The term 'dust' typically refers to all airborne particulate matter and can be categorised on the basis of the size of particles[1]. Dust can give rise to both soiling effects through dust deposition (*'disamenity dust'*) and human health effects through suspended particulates. Dust accumulation may also affect sensitive habitats through impacts on vegetation and aquatic ecosystems. Dust soiling will arise from the deposition of particulate matter (PM) in all size fractions, but will be associated mostly with particulate matter greater than 30µm.

2.1.3 Particles below 10µm (referred to as PM_{10}) correspond to the inhalable fraction of particulate matter and have been related to various adverse health effects[2]. $PM_{2.5}$ (those particles of less than 2µm and which form a proportion of PM_{10}) has been shown to give a stronger association with the observed ill-effects.

2.1.4 The majority of construction dust is larger than 10µm and hence the key potential impacts are associated with soiling effects. Road transport is a major contributor to ambient particulate matter (PM) both as direct emissions through vehicle exhausts and as indirect emissions through tyre and brake wear, re-suspension of particulate matter on the road and road wear (mechanical abrasion and corrosion). Road transport may also be responsible for secondary PM formed via gas-to-particle conversion.

[1] Institute of Air Quality Management (IAQM), *Guidance on the Assessment of Dust from Demolition and Construction,* 01.06.16, v1.1
[2] Air Quality Expert Group (AQEP), Fine Particulate Matter ($PM_{2.5}$) in the United Kingdom, December 2012

2.1.5 Road transport is the main source in the UK of oxides of nitrogen (NO_x; comprises nitrogen dioxide (NO_2) and nitric oxide (NO)). NO itself is not considered harmful to human health. However, on release to the atmosphere it usually oxidises rapidly to NO_2 which is associated with adverse effects on human health, causing inflammation of the lungs at high concentrations. Long term exposure to NO_2 can affect lung function and respiratory symptoms. Road transport is also a source of primary particulate matter (PM_{10} and $PM_{2.5}$) both as direct emissions through vehicle exhausts and as indirect emissions through tyre and brake wear, re-suspension of particulate matter on the road and road wear (mechanical abrasion and corrosion).

2.2 European Legislation

2.2.1 Action to manage and improve air quality within the UK is currently driven largely by European (EU) legislation. The majority of European air quality legislation is consolidated under Directive 2008/50/EC on Ambient Air Quality, which came into force on 11th June 2008 consolidating an earlier Directive and three daughter directives. The legislation sets legally binding European-wide air quality limit and interim target values (Ambient Air Directive (AAD) Limit and Target Values) for concentrations in outdoor air of major air pollutants for the protection of human health and ecosystems and prescribes how air quality should be assessed and managed by Member States.

2.3 UK Legislation

Air Quality (Standards) Regulations

2.3.1 The Air Quality (Standards) Regulations 2010 implement EU Directives 2008/50/EC and 2004/107/EC, a fourth daughter directive, transposing the AAD values into UK legislation. In the UK responsibility for meeting the AAD Limit and Target Values is devolved to the national administrations; the Department for Environment, Food and Rural Affairs (Defra) co-ordinates assessment and air quality plans for the UK as a whole.

UK Air Quality Strategy

2.3.2 Under the Environment Act 1995 the UK Government and the devolved administrations are required to produce a national Air Quality Strategy (AQS). This was last reviewed and published in 2007[3]. The UK AQS sets out air quality objectives (AQOs) and policy options to improve air quality within the UK. The strategy sets AQOs for specific pollutants deemed to pose a risk for human health or other receptors, a number of which are derived from the EU AAD limit and target values, although requirements for compliance vary. The UK AQS includes more exacting AQOs for some pollutants than those required by EU legislation.

[3] DEFRA, (2007), *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007*

Local Air Quality Management

2.3.3 Part IV of the Environment Act 1995 imposes a duty on local authorities in the UK to review existing and projected air quality in their area. Any location likely to exceed the UK AQOs must be declared an Air Quality Management Area (AQMA) and an Action Plan prepared and implemented, with the aim of achieving the objectives. This process is referred to as Local Air Quality Management (LAQM). The LAQM process is supported by national statutory policy[4] and technical guidance[5] provided by Defra.

2.3.4 The standards and objectives relevant to the LAQM framework are prescribed through the Air Quality (England) Regulations (2000) and Air Quality (England)(Amendments) Regulations 2002.

2.3.5 The applicable EU AAD limit and target values and UK AQOs relevant to the site and proposed development with regards to protection of human health and vegetation and ecosystems, referred to in this report as Air Quality Assessment Levels (AQALs), are summarised in Table 2.1. below.

Table 2.1: Relevant Air Quality Assessment Levels (AQALs)

Pollutant	AQAL	Averaging Period	Source
NO_2	40 µg/m^3	annual mean	AAD Limit Value / AQO
	200 µg/m^3	hourly mean, not to be exceeded more than 18 times per annum	AAD Limit Value / AQO
NO_x (v)	30 µg/m^3	annual mean	AAD Limit Value / AQO
PM_{10}	40 µg/m^3	annual mean	AAD Limit Value / AQO
	50 µg/m^3	24 hour mean, not to be exceeded more than 35 times per annum	AAD Limit Value / AQO
$PM_{2.5}$	25 µg/m^3	annual mean	AAD Limit Value / AQO[1]
	% reduction relative to average exposure indicator (AEI), dependant on initial concentration; to at least 18 µg/m^3	annual mean	AAD Target Value / AQO[1]

1: standards not included within LAQM system

2.3.6 Statutory objectives, limit and / or target values for NO_2, PM_{10} and $PM_{2.5}$ are provided in the Air Quality Standards Regulations 2010 and Air Quality Strategy 2007, the 2010 Regulations imposing stricter standards on $PM_{2.5}$ than the Strategy. However, there are no regulatory standards for $PM_{2.5}$ within the LAQM system, and $PM_{2.5}$ is currently regulated at a national, rather than local, level. Local Authorities do not presently have an obligation to review and monitor $PM_{2.5}$ but are expected to work towards reducing $PM_{2.5}$ emissions and concentrations in their area as is practicable.

[4] Defra, Local Air Quality Management, Policy Guidance (PG16), April 2016
[5] Defra, Local Air Quality Management, Technical Guidance (TG16), April 2016

2.3.7 For the purposes of the AQALs ambient air refers to the outdoor air and excludes workplaces where members of the pubic do not have regular access. Advice is given in Defra guidance[5] as to where the UK AQOs should apply as summarised below; slightly different compliance requirements are provided for EU limit and target values:

Table 2.2: Summary of where the AQOs should apply

averaging period	objective should apply at
annual mean	all locations where members of the public might be regularly exposed; including facades of residential properties, schools, hospitals, care homes etc
24-hour mean and 8-hr mean	all locations where the annual mean objectives apply together with hotels and gardens of residential properties
1-hr mean	all locations where the annual mean, 24-hour and 8-hour means apply; also kerbside sites, parts of car parks, bus stations and railway stations which are not fully enclosed and any outdoor locations where members of the public might reasonably be expected to spend 1 hour or longer.
15-min mean	all locations where members of the public may be reasonably exposed for a period of 15 minutes

Note: the AQOs do not apply at building facades or other places of work where members of the public do not have regular access

Dust Standards and Control

2.3.8 Disamenity dust as such is not regulated as a pollutant under the above requirements. Controls of soiling and nuisance impacts are typically achieved through conditions within planning permissions and / or environmental permits requiring the implementation of a dust management plan to prevent amenity impacts. For industrial and trade premises that do not require an Environmental Permit to operate dust is also controlled under Part III of the Environmental Protection Act 1990 (EPA 1990) where nuisance is defined as *'any **dust**, steam, smell or other effluvial arising on industrial or trade or business premises and being prejudicial to health or a nuisance'*.

2.3.9 Public concerns in relation to dust include the rate of deposition and/or the level of dustiness. Nuisance may be alleged when the dust coverage on surfaces is visible in contrast with other cleaner areas, especially if it occurs regularly. Severe nuisance is likely to be alleged when dust is perceptible without reference to a clean surface. There are no UK statutory or recommended levels of dust deposition which constitute an acknowledged nuisance.

2.3.10 Controls of soiling and nuisance impacts are typically achieved through conditions within planning permissions and / or Environmental Permits requiring the implementation of a dust management plan to prevent amenity impacts.

2.4 National Planning Policy and Guidance

National Planning Policy Framework 2012[6]

2.4.1 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. The Framework provides some general guidance to local authorities on taking air pollution into account in planning policies and decisions. Paragraph 109 of the Framework 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.'

2.4.2 Annex 2 of the NPFF defines pollution as '*[…] anything that affects that quality of the 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*'.

2.4.3 In addition, paragraph 124 of the Framework states:

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

2.4.4 Further guidance is provided in the supporting Planning Practice Guidance on Air Quality[7] which provides guiding principles on how planning can take account of the impact of new development on air quality. Of note the PPG states:

'Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values […]. It is important that the potential impact of new development on air quality is taken into account in planning where the national assessment indicates that the relevant limits have been exceeded or are near the limit'; and;

'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

[6] Department for Communities and Local Government, (March 2012), *National Planning Policy Framework*
[7] Department of Communities and Local Government, Planning Practice Guidance, Air Quality, 6th March 2014

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).'

2.4.5 The guidance states that the level of air quality assessment should be proportionate to the nature and scale of air quality assessment and level of concern about air quality and that each assessment is location specific.

2.5 Local Planning Policy

Unitary Development Plan for Liverpool (2002)

2.5.1 The Unitary Development Plan for Liverpool was adopted in November 2002. It contains the Core Strategy and forms the principal basis for which development is promoted and controlled. Policy EP11 'Pollution' of the Unitary Development Plan states that:

*'Planning permissions will not be granted for development which has the potential to create unacceptable **air**, water, noise or other pollution or nuisance.*

2.6 Additional Guidance and Best Practice

IAQM: Planning for Air Quality[8]

2.6.1 The IAQM documents provides specific non-statutory guidance on air quality and the planning system for new development. The guidance clarifies when an air quality assessment is required, what it should contain and how impacts should be described and assessed. The guidance sets out a recommended approach to assess the significance of the air quality impacts and sets out suggested approaches to reducing emissions and impacts.

IAQM: Guidance on the Assessment of Dust from Demolition and Construction[9]

2.6.2 The IAQM document provides specific non-statutory guidance on the assessment of the impacts of dust and fine particulate matter (PM_{10}) from demolition and construction activities. The guidance also provides recommended mitigation measures taking into account the risk posed by a Site.

[8] Institute of Air Quality Management (IAQM), (2017), *Land-use Planning & Development Control: Planning for Air Quality.* v1.2.
[9] Institute of Air Quality Management (IAQM), (February 2014), *Guidance on the Assessment of Dust from Demolition and Construction,* v1.1

3 Proposed Development

3.1 Full details of the proposed development are provided elsewhere with the planning application and only those aspects of relevance to the air quality assessment are described here.

3.2 The site is currently occupied by a single storey commercial building and hardstanding. Planning permission was granted in 2016 by LCC for demolition of the existing building and construction of a 7/11 storey mixed-use development at the site (ref: 15F/2835, dated 6th May 2016). The scheme included for commercial use and car parking on the lower ground floor with residential use on the upper floors. Provision was for 32 car parking spaces.

3.3 The new proposals are for a twelve-storey mixed-use development. As previously, lower ground floor use is to be retained for parking and commercial use. Car parking provision is to be increased to 37 parking spaces.

3.4 The key components of the proposed development include:

- demolition of the current structures onsite;
- construction of a new twelve-storey building;
- car parking on the lower ground floor with 37 spaces (including two disability accessible parking spaces) with vehicular access to be provided off New Bird Street to the north;
- provision of 156 cycle parking spaces on the lower ground floor within a cycle store with access provided off Greenfield Street to the south;
- provision of a residential entrance lobby on the lower ground floor with foot access provided off Greenfield Street;
- two commercial units on the lower ground floor, of 187m^2 and 151m^2 respectively, with foot access provided off St James Street;
- residential usage on the upper floors (upper ground floor and first–eleventh floors), comprising 217 studio, one bed, and two bed apartments; and
- private roof terraces for eight of the apartments spread over the ninth, tenth and eleventh storeys.

4 Assessment Methodology

4.1 It is understood that LCC did not require the submission of an air quality assessment with the original (15F/2835) planning application and no specific requirements in relation to air quality aspects are contained within the permission. However, to provide a comprehensive application, an air quality assessment has been conducted of the new development proposals. Focus has been paid in particular to the implications of any changes in the new proposals to the existing permitted development.

4.2 Scope of Work

4.2.1 In undertaking the air quality assessment, SGP has carried out the following activities:

- review of development proposal and elevation and layout plans;
- review of LCC air quality reports and background air quality data;
- assessment of potential local air quality;
- review of information on development related traffic movements and Transport Assessment;
- review of information on pollutant concentrations and height;
- provision of air quality assessment.

4.2.1 To inform the assessment reference has been made to relevant current guidance provided by the IAQM[10] as appropriate with regards to air quality and planning.

4.2.2 Details of the proposed development and scope of work were provided in advance to Paul Farrell, Officer within the Environmental Protection Unit of LCC. At the time of the preparation of this report a response had not been received.

4.3 Sources of Information

4.3.1 In undertaking the assessment reference was made to the following background information:

Table 4.1: Information Sources

date and reference	author and source	purpose and information content
background and topographical information		
Promap, accessed November 2017	Ordnance Survey (OS), includes 1:10,000 and 1:25,000 scale mapping	general mapping information including topography, ground features, rights of way, communications etc
Satellite imagery (imagery date 2016)	aerial photography	site setting

[10] Institute of Air Quality Management (IAQM). *Land-Use Planning & Development Control: Planning for Air Quality*. v1.2. January 2017.

date and reference	author and source	purpose and information content
www.magic.gov.uk; accessed November 2017	multi-agency	web-based interactive map containing information on nature conservation areas
air quality information		
2017 Annual Status Report for LCC, August 2017	Liverpool City Council	status of local authority air quality monitoring and assessment
www.uk-air.defra.gov.uk	Defra	information on air quality and air pollution in the UK including details of monitoring networks
www.aqma.defra.gov.uk	Defra	details and maps of AQMAs throughout UK
www.laqm.defra.gov.uk	Defra	Local Authority air quality management support; background pollutant mapping
other information		
www.dft.gov.uk	DfT	traffic count data for every junction-to-junction link on the 'A' road and motorway network in the UK

4.3.2 Transport information for the proposed development was provided by Vectos.

4.3.3 A site visit was undertaken by K Hawkins, Partner, on 21st April 2017 to view the site and its setting. A photographic record of the visit is provided in Appendix A.

5 Baseline Conditions

5.1 General Site Setting

5.1.1 The site setting has been established through a review of Ordnance Survey mapping, satellite imagery and a site visit.

5.1.2 The site is located in the centre of Liverpool to the immediate southwest of the A561, St James Street, between New Bird Street to the north and Greenland Street to the south. The site is currently occupied by a single-storey commercial building divided into several units.

5.1.3 The site surroundings are of mixed usage. The immediate surroundings are commercial with the Jamaica Street Industrial Estate to the north to southwest and isolated commercial premises to the east, with residential usage to the further north and east. Liverpool Cathedral is located 290m to the northeast. The A562 Parliament Street is located 80m south of the site. The junction between the A561 and the A5038 is located 50m to the east.

5.1.4 Site boundaries and immediate environs are:

Table 5.1: Site Boundaries and Immediate Environs

	Boundary	Neighbouring land
north	hardstanding	New Bird Street
east	pavement	St James Street (A561)
south	hardstanding	Greenland Street
west	pavement	Lee Florstok Ltd

5.1.5 The closest residential receptors are located 80m north off Prince Albert Mews and Upper Frederick Street and 115m to the east on Pine Mews. The residential receptors at Prince Albert Mews are set back approximately 7m from the A561 St James Street; the residential receptors on Pine Mews are set back from the junction between the A561 and the A5038 by approximately 20m, with screening in the form of trees between the residences and the kerbside.

5.1.6 LIPA Primary School is located 415m to the northeast. Windsor House Day Hospital is located 420m to the east of the site off the A562. The Duke Street campus of The City of Liverpool College is located 440m north. No other schools, hospitals, or other such highly sensitive receptors are located within 500m of the site.

5.1.7 No statutory designated ecological sites, such as SSSIs, SPAs, or SACs etc have been identified within 2km of the site. No known local wildlife sites or ancient woodlands are located within 1km.

5.1.8 The site is located at approximately 22m AOD with the ground rising gently to the northeast (towards Liverpool Cathedral); contours on Ordnance Survey mapping and the site visit place the site between 20m and 25m AOD.

5.1.9 Drawing D01 shows the site location and setting, and features of note in the surrounding area.

5.2 Local Air Quality Review

5.2.1 Reference has been made to the 2017 Annual Status Report (ASR) prepared by LCC in fulfilment of the Council's Local Air Quality Management (LAQM) reporting requirements

5.2.2 A single Air Quality Management Area (AQMA) covering the whole of the city of Liverpool has been declared by LCC. As such the site is located within the AQMA. The AQMA has been declared due to exceedances of the long-term NO_2 objective.

5.3 Background Air Quality Data

5.3.1 The Defra LAQM website provides predicted background air quality data for the key pollutants oxides of nitrogen (NO_x and NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) for 1km x 1km grid squares across the UK, including those in which the site and nearest receptors are located. The predicted data is based on 2015 ambient monitoring and meteorological data and the latest information on the age and distribution of vehicles and emission factors. Predicted data is provided by Defra for each year from 2015 to 2030.

5.3.2 Predicted background pollutant concentrations for the grid squares in which the site and surroundings are located for the current year (2017) and a future year (2022) are detailed below.

Table 5.2: Predicted Background Air Quality Data – 2017

Grid Square	Location	Annual Mean Concentration (µg/m^3)			
		NO_2	NO_x	PM_{10}	$PM_{2.5}$
335500 389500	Site	20.95	30.33	12.70	8.04
334500 389500	St James Street A561	19.17	27.33	11.89	7.61
AQAL (annual mean)		**40**	**30**	**40**	**n/a**

Note: Data downloaded on 14 November 2017; data issued by Defra on 13 November 2017

Table 5.3: Predicted Background Air Quality Data – 2022

Grid Square	Location	Annual Mean Concentration (µg/m^3)			
		NO_2	NO_x	PM_{10}	$PM_{2.5}$
335500 389500	Site	16.03	22.36	12.33	7.63
334500 389500	St James Street A561	14.95	20.67	11.55	7.24
AQAL (annual mean)		**40**	**30**	**40**	**n/a**

Note: Data downloaded on 14 November 2017; data issued by Defra on 13 November 2017

5.3.3 In 2017 the average background NO_2 and PM_{10} concentrations for the grid square in which the site is located are predicted to be below the annual mean objectives established in the UK for the protection of human health at 48% and 36% respectively. The objective for NO_x is established for the protection of vegetation / nature conservation sites; predicted background concentrations for NO_x are at 100% of the objective.

5.3.4 Background concentrations of the key pollutants are predicted to decrease in the future, although PM_{10} is to decrease at a lesser rate that NO_2. These figures are based on the latest Defra predictions on the UK vehicle fleet and vehicle emission factors as released in November 2017.

5.3.5 It should be noted that the data are effectively an average concentration across each 1 km square. Pollutant concentrations will therefore be higher close to any significant source, such as the nearby major roads, junctions, and concentrated habitation.

5.4 Monitored Air Quality

5.4.1 LCC undertakes ambient air quality monitoring within the Borough using a combination of continuous analysers and diffusion tubes. Monitoring considered of relevance to the assessment is discussed below.

Automatic Monitoring

5.4.2 LCC operated two continuous monitors in the borough in 2016, at Speke and at Queens Drive in Walton. Neither monitor is located within the vicinity of the Site, being 10.3km and 5.8km distant respectively.

Non-Automatic Monitoring

5.4.3 LCC monitors NO_2 concentrations across the district using a network of diffusion tubes. 43 locations were monitored in 2016. Tubes located within 1 km of the site are detailed below.

Table 5.4: Diffusion Tube Monitoring Sites

Monitor	Location	Grid Ref.	Distance to Site	Height above ground (m)	Type
T42	Berry Street o/s St. Luke's Church Pedestrian Lights	335221 389886	705m NNE	3-4	Urban Roadside
T43	Renshaw Street/Bold Street corner LP Rapid	335222 389937	755m NNE	3-4	Urban Roadside
T44	Clarence St/Mount Pleasant J LP o/s JMU	335432 390107	975m NE	3-4	Urban Roadside

5.4.4 Bias-adjusted data available for annual NO_2 concentrations as reported in the LCC ASR 2017 for the relevant diffusion tubes are as detailed below and shown on Drawing D01:

Table 5.5: Diffusion Tube Monitors – Nitrogen Dioxide Concentrations

Monitor	Annual Mean (µg/m^3)				
	2012	2013	2014	2015	2016
T42	**59**	**53**	**52**	**51**	**49**
T43	**68**	**67**	**60**	**64**	**57**
T44	**53**	**51**	**50**	**48**	**47**

5.4.5 Exceedances of the NO_2 annual mean objective are highlighted in bold, while exceedances of 60 µg/m^3 (indicating a potential exceedance of the NO_2 1-hour objective in accordance with Defra guidance[5]) are underlined. All three diffusion tube locations recorded exceedances of the annual mean objective in 2016. Concentrations were above 60 µg/m^3 at T43 in 2012-2015 indicating potential exceedance of the short-term objective, but were marginally below in 2016

5.4.6 All measured results above the annual mean objective have been adjusted by LCC to account for the distance between the monitoring location and the nearest relevant exposure e.g. residential receptor to understand the extent of exceedances. LCC's calculations to account for distance to relevant exposure used the LAQM tool 'NO_2 Fall-Off with distance calculator' (version 4.1) released in April 2016 and provided by Defra[11]. The distance corrected results of the three relevant diffusion tubes for 2016 are summarised below:

Table 5.6: Diffusion Tube Monitors – Distance-Corrected Nitrogen Dioxide Concentrations

Monitor	Distance to kerb (m)	Distance to relevant exposure (m)	Measured annual mean (bias adjusted) (µg/m^3)	Distance-corrected annual mean (µg/m^3)
T42	2	50	**49**	29
T43	0.5	50	**57**	29
T44	1	20	**47**	33

Note: data from LCC ASR 2017

5.4.7 The distance-corrected 2016 annual means for relevant exposure at each diffusion tube location do not exceed the annual mean objective.

5.5 Other Activities

5.5.1 No permitted installations with emissions to air have been identified within a 1km radius of the site.

5.6 Wind speed and direction

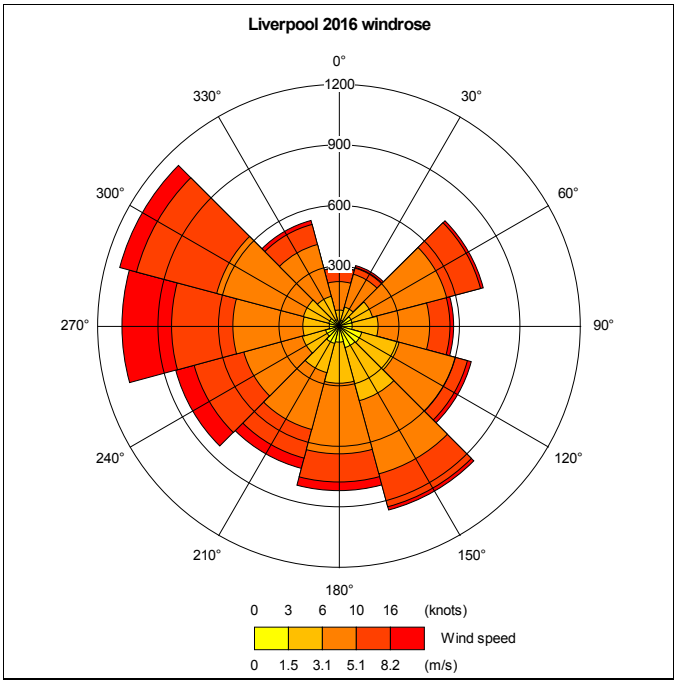
5.6.1 The most important meteorological parameters governing the atmospheric dispersion of pollutants are:

- wind direction: determines the broad direction of the transport of the emission;
- wind speed: affects the ground levels emissions by determining the initial dilution of pollutants emitted;
- atmospheric stability: a measure of the turbulence and hence dispersion of pollutants.

5.6.2 The closest location for which appropriate meteorological data is available is Liverpool Airport about 11.2 km to the southeast of the Site. The annual windrose derived from data provided by ADM Ltd, a recognised supplier of meteorological data, is provided below. This depicts average wind speeds and directions for the latest whole year i.e. 2016.

[11] Defra, LAQM Support, Tools for monitoring data: Nitrogen Dioxide fall off with distance. Available at: https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html

Figure 5.1: Summary Wind Rose – Liverpool Airport (2016)



5.6.3 The wind rose shows the prevailing wind direction to be from the southeast through to north west, the direction being influenced by the presence of the River Mersey.

6 Air Quality Assessment

6.1 The principal aspects of concern with regards to the development are:

- local air quality (primarily NO_2) and its potential impacts on the new receptors to be introduced by the development due to the proximity of St James Street and other nearby A roads; and,
- potential impacts of additional traffic generated by the development on local air quality and nearby sensitive receptors.

6.2 These aspects are considered in turn below.

6.3 Introduction of New Receptors

6.3.1 LCC has declared a city-wide AQMA and as such the site falls within the AQMA. However, as the AQMA covers the entire City, rather than a specific hot-spot, it does not automatically infer that the site is located in an area of poor air quality or that the location may be unsuitable for the development.

6.3.2 There is no air quality monitoring data in the immediate proximity of the site to inform the assessment. The nearest LCC monitoring locations of relevance to the assessment are T42 and T43, 700m to the northeast on the A5038 (Berry Street), as shown in Drawing D01. Annual mean roadside NO_2 concentrations in 2016 at these locations were above the AQAL of 40 µg/m^3, at 49 µg/m^3 and 57 µg/m^3. Distance-corrected NO_2 concentrations to the nearest relevant receptors at these locations were 29 and 33 µg/m^3, substantially below the AQAL.

6.3.3 The site is not located alongside a busy road where high NO_2 concentrations may be expected. Department of Traffic (DfT) traffic counts for 2016 for the stretch of St James Street on which the site is located are given as 5,696 AADT[12], substantially below the level of 10,000 AADT that may be considered to be 'busy' and requiring consideration with regard to air quality[5] (where exposure is present within 10m from the kerb).

6.3.4 The site is located 70m from the A5038, Great George Street and 80m from the A562, Parliament Street. DfT data provides higher traffic counts for these roads at 10,962 and 24,463 AADT respectively. These roads will therefore contribute to NO_2 levels in the area and at the site. However, NO_2 concentrations drop off rapidly from the roadside[13]; and given the distance of the site from these roads and a set-back distance of 6m between the development and St James Street, ground floor façade NO_2 concentrations would be expected to be below both the long-term and short-term AQALs at the site.

6.3.5 NO_2 concentrations typically decline rapidly with height[14]. NO_2 from vehicles is emitted at ground level and hence the greatest concentrations of NO_2 will be experienced at / near ground level. Concentrations are generally rapidly diluted with increasing height due to increased dispersion.

6.3.6 It is possible for the presence of obstacles that modify wind flow locally and reduce dispersion to lead to trapping of pollutants and thus elevated concentrations, termed the 'canyon effect'. Tall buildings on both sides of a road can create a 'street canyon', particularly when the height of the buildings on both sides is greater than the road width. In this case, although the proposed development is twelve storeys high, taking into account the height of existing surrounding buildings, it is not considered that a 'street canyon' would be created on St James Street by the addition of the proposed development.

6.3.7 It is therefore anticipated that NO_2 concentrations will fall off rapidly with height in the locality. Monitoring and modelling studies have found that there is a sharp fall-off with height, with concentrations typically dropping to background levels when there is no canyon effect[15]. Modelling

[12] http://www.dft.gov.uk/traffic-counts/cp.php
[13] Air Quality Consultants (AQC): NO_2 Concentrations and Distance from Roads, July 2008
[14] Laxen et al, Atmospheric Environment Vol. 21: Nitrogen Dioxide Distribution in Street Canyons, 1987
[15] Air Quality Consultants, Variation in NO_2 Concentrations with Height, and Implications for Planning, Ricky Gellatly, IAPSC Conference, 9th June 2015

and diffusion tube studies have demonstrated fall-offs to 80-90% of the near ground-level concentrations at the first and second floors, with further decreases to the fourth floor.

6.3.8 On this basis, air quality at the upper storey facades is expected to be well below the AQALs. No specific requirements for mitigation of air quality for residential development, such as provision of non-opening windows, are indicated.

6.4 Development Related Traffic Movements

6.4.1 Where a development results in a change in LDV flows of more than 100 AADT within or near an AQMA, and where relevant exposure is present, the non-statutory IAQM guidance[10] advises that an air quality assessment should be undertaken. Where the changes in traffic flows are distant from an AQMA then the indictive criterion is where the development results in changes of LDV flows of more than 500 AADT. Where an AQAM is city-wide, and local air quality in the vicinity of a site and affected road network are away from poor air quality hotspots, it may be more appropriate to refer to the higher indicative criteria of change in flows of more than 500 AADT rather than 100 AADT to indicate the need for an assessment. Such an assessment may take the form of a simple or detailed assessment.

6.4.2 Vectos has advised the proposals will generate 346 2-way LDV movements (173 in / 173 out) to / from the site. These are therefore above the lower IAQM screening criterion, but below the higher criterion.

6.4.3 Given the nature of the road layout near the site these maximum movements will only be experienced at the site access. Away from the site entrance vehicle movements will be distributed along St James Street, Great George Street, Parliament Street and Upper Parliament Street. A number of residential properties are located along St James Street to the northwest of the site and at Pines Mews close to the junction of St George Street and Upper Parliament Street to the east of the site passed which development related traffic will travel. Resulting movements passed each of these receptors will however be substantially reduced to the maximum of 346 AADT.

6.4.4 The residential properties on St James Street are set-back a distance of about 10m from the road-side. Taking into account the above comments on expected local air quality, and the DfT traffic count data for St James Street, it is considered highly unlikely the proposals would result in significant adverse impacts on air quality at these property facades due to increase vehicle movements. Similarly, the properties at Pine Mews are set-back from the highways by at least 15m. Again, given the distribution in traffic and set-back distance of these properties from the roadside, the development proposals are considered highly unlikely to result in significant adverse impacts on air quality at these property facades.

6.4.5 The development incorporates a number of elements that will serve to encourage the use of sustainable travel modes and thereby serve mitigate any impacts of traffic movements generated by the proposals and associated vehicle exhaust emissions. This includes the provision of only a limited number of parking spaces, lower than that generally prescribed by LCC, and the provision of 156 cycle spaces[16]. In addition, the application is to be supported by a Travel Plan provided by Vectos which will detail a range of initiatives to actively promote sustainable travel modes.

6.4.6 It is noted that the new proposals allow for an additional 5 car parking spaces compared to the existing consented scheme. In addition, the revisions to the commercial / retail space result in a small increase in vehicle trips compared to the consented scheme[16]. The additional movements generated by the new proposals will be below the lower IAQM screening threshold and compared to the existing permission are not considered significant.

6.5 Construction Dust

6.5.1 Potential impacts that may arise from the generation of dust during demolition and construction activities can be readily mitigated through the use of standard measures. It is noted that the 2016 permission does not require the submission of a dust management plan pre-commencement of development and accordingly a detailed construction assessment has not been undertaken for the new proposals. However, the following points are noted with regards to construction dust and potential impacts.

6.5.2 With reference to IAQM guidance the surrounding area has *low sensitivity* to the effects of dust soiling and *low sensitivity* to the human health effects of PM_{10} from dust emissions.

6.5.3 There is therefore potential a *low* risk for dust emissions from the demolition and construction phases of the development to impact the air quality of the local area without mitigation. Any such impacts will be short-lived and can be readily mitigated by standard site management practice and the design implementation of a construction dust management plan (DMP), which can be enforced as a condition of the planning permission.

6.5.4 Recommended outline measures are provided in the IAQM guidance. For the scale of the development such measures which would be expected in a DMP include:

- planning the site layout so that dust-causing activities are located as far away from receptors as possible;
- erecting barriers around dusty activities;
- avoiding site runoff of water or mud;
- ensuring that all vehicles switch off engines when stationary;
- use of mains electricity or battery powered equipment where practicable;

[16] Proposed Mixed Use Development, St James Court, Liverpool, Transport Assessment, Vectos, November 2017, VN70913

- dust suppression by regular spraying, particularly in dry conditions;
- the use of clean water for dust suppression, to avoid re-suspension of fine material;
- the availability of a water supply in all weather conditions;
- covering skips, chutes and conveyors;
- sweeping of the access road;
- ensuring that transport vehicles entering and leaving the site are covered to prevent escape of materials during transport;
- a preventative maintenance programme, including readily available spares, to ensure the efficient operation of plant and dust suppression equipment;
- effective staff training with respect to the causes of and prevention of dust emissions;
- carrying out regular site investigations to ensure compliance with the DMP and recording inspection results; and
- investigations and taking appropriate action to address any complaints that may be substantiated.

7 Summary and Conclusions

7.1 Proposals are for the construction of a twelve-storey mixed-use development, incorporating commercial use and enclosed parking spaces on the lower ground floor and residential usage on the upper storeys, at a site off the A561 (St James Street) in Liverpool. SGP has been instructed to undertake an air quality assessment in support of the planning application.

7.2 The site benefits from an existing recently granted planning permission for a similar development. Both schemes provide for the provision of commercial use and car parking on the lower ground floor and residential use on the upper floors. The only differences of relevance between the two schemes with regards to air quality aspects are the provision of an additional 5 car parking spaces in the new scheme and amendments to the type and size of the lower ground floor commercial space.

7.3 The site lies within the city-wide AQMA declared by LCC. However, the presence of the AQMA does not automatically infer that local air quality is poor or that the location is unsuitable for the proposed end-use.

7.4 The proposals are for the use of the lower ground floor as an enclosed car park and commercial units. No external areas where members of the public may be expected to spend one hour or more on the ground floor is proposed. The proposed lower ground floor use would not therefore present a sensitive end-use with regards to either long-term or short-term NO_2 concentrations.

7.5 Taking into account the site location, set-back distance from major roads and floor elevations, concentrations of NO_2 at the proposed residential facades are expected to be well below the long-term and short-term objectives. The site is considered suitable for the proposed end-use with regards to air quality.

7.6 The proposals include for an additional 5 car parking spaces to the existing permitted scheme and revisions to the commercial / retail space. The resulting additional movements generated by the new scheme will be below the screening criterion that would indicate the need for an air quality assessment. These additional movements and associated vehicle exhaust emissions would not be expected to result in significant air quality impacts on nearby residential facades.

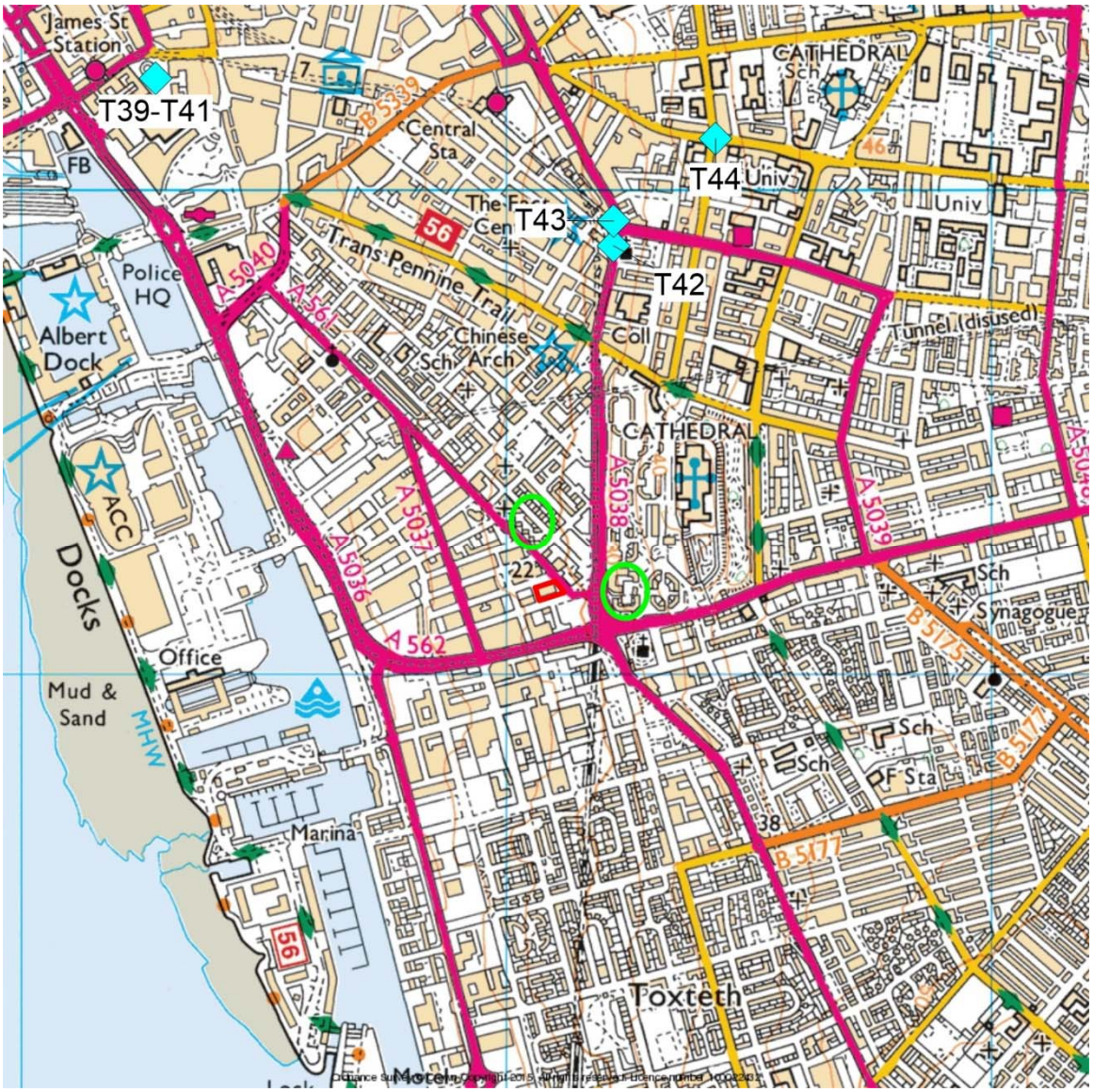
7.7 The total traffic movements generated by the scheme are not considered likely to give rise to significant adverse impacts on air quality at nearby residential facades.

7.8 Any fugitive dust impacts during the construction phase of the development can be readily minimised through standard management practices.

7.8.1 The air quality assessment does not indicate the need for any specific mitigation measures either with the building design or otherwise. However, it is noted that the proposals include for the provision of 156 cycle parking spaces. These are substantially increased on the original 48 cycle spaces and will serve to encourage sustainable means of transport by residents and employees. The application is to be supported by a Travel Plan prepared by Vectos which will outline sustainable travel modes.

7.8.2 The site is considered suitable for the proposed development and no constraints with regards to air quality have been identified.

DRAWINGS



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Site

Nearest Existing Receptors

Diffusion Tubes

Drawing D01: Site Location and Nearby Features

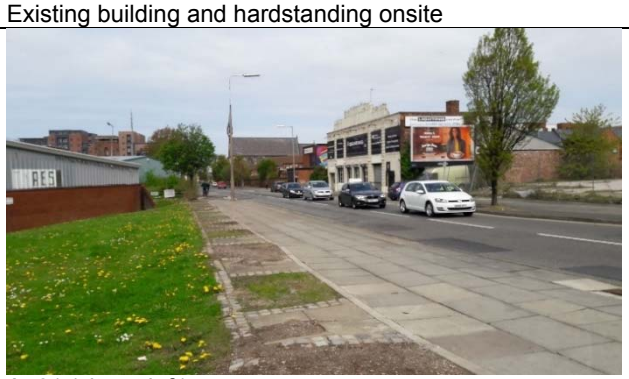
APPENDIX A

Photographic Record

Existing building onsite (A561 St James Street at left)

Existing building and hardstanding onsite

Greenland Street, looking west (site at right)



A561 (site at left)

Junction of A561 (left) and A5038 Great George Street (ahead), with residential receptors off Pine Mews (behind trees on right)

Queuing traffic on A561 at junction between A561 and A5038

New Bird Street, looking west (site at left)

A561, looking north towards residential receptors on Prince Albert Mews (site behind)

Site visit: 21st April 2017
K Hawkins, Partner