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YPG DEVELOPMENTS

MONARCHS QUAY, LIVERPOOL

AIR QUALITY ASSESSMENT

MARCH 2018

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AIR QUALITY ASSESSMENT

MARCH 2018

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EXECUTIVE SUMMARY

The air quality assessment has considered the potential air pollution and dust effects associated with the Proposed Development. In summary, the assessment has considered (i) dust arising from construction of the development and (ii) air quality effects as a result of additional traffic generated by the development.

Dust and Particulate Matter Arising from Construction of the Proposed Development

An assessment has been carried out to determine the risk of potential dust soiling and effects on human health of nearby residents. The risk for dust soiling effects is considered to be medium for earthworks, construction and trackout. The risk for human health effects is considered to be low for earthworks, construction and trackout.

These results indicate that site specific mitigation measures will be required. The implementation of such measures (as detailed in section 8) will substantially reduce the potential for unacceptable quantities of dust and particulate matter to be generated.

Air Quality Effects as a Result of Additional Traffic on Human Receptors

An assessment has been carried out, which also considers relevant other developments in the local area, to determine the effect of traffic generated by the Proposed Development on nearby residents. The assessment has predicted that the proposed development will have a not significant effect on nearby residents. It may however be possible to further reduce the impact with the implementation of various mitigation strategies as detailed in section 8. The implementation of effective mitigation measures should assist in reducing potential effects of the development at roadside residential locations situated along the A5036 Wapping and the A562 Parliament Street within Liverpool.

Air Quality Effects as a Result of Additional Traffic on Ecological Receptors

The potential effect of the proposed development on nearby designated habitat sites has also been discussed in section 6.3 of the report. Given the scale of the proposed development, in accordance with DMRB guidance, it's considered that an assessment of the operational impacts of the proposed development on the nearby designated habitat sites is not required.

The Potential Pollution Levels for Future Occupiers of the Site

An assessment has been carried out to predict future pollution levels at proposed residential area of the proposed development, taking into account various heights relating to the storeys of the building where residential uses are proposed. Air quality within the proposed development site is deemed to be acceptable for potential future residents.

1 INTRODUCTION

1.1.1 Wardell Armstrong LLP has been commissioned to undertake an air quality assessment for a proposed development at Monarchs Quay, Liverpool.

1.1.2 The proposed development site is located to the south of Liverpool City Centre. The site is currently in use as a flat surface car park, including a small amount of landscaping with trees and grassed areas. The site is bonded by Keel Wharf to the West; by Wapping Dock to the North; by Queens Dock to the East and South, with the A5036 beyond.

1.1.3 The proposals comprise an interpretation centre with commercial area, and residential apartments with commercial space at ground floor and a 33 space car park.

1.1.4 This report details the results of an air quality assessment undertaken in support of an outline planning application for the proposed development. The assessment considers the potential dust soiling and human health effects associated with the demolition and construction works, and the potential air quality effects associated with vehicles accessing the site during the operational phase. In addition, air quality within the site has also been reviewed and assessed in order to determine its suitability for the proposed uses.

2 LEGISLATION AND POLICY CONTEXT

2.1 Air Quality Legislation and National Air Quality Strategy

2.1.1 The Environment Act 1995 requires the UK government to prepare a National Air Quality Strategy. The UK National Air Quality Strategy (NAQS) was therefore published in March 1997 setting out policies for the management of ambient air quality. The Strategy set objectives for eight pollutants which may potentially occur in the UK at levels that give cause for concern. These pollutants are: nitrogen dioxide (NO_2), sulphur dioxide, carbon monoxide, lead, fine particulate matter (PM_{10}), benzene, 1, 3–butadiene and ozone.

2.1.2 The Strategy was reviewed and a Review Report[1] and Consultation Document[2] were published by the Department of the Environment, Transport and the Regions (DETR) in 1999. A revised version (The Air Quality Strategy (AQS) 2000), which superseded the 1997 Strategy, was published in January 2000. The AQS 2000 strengthened the objectives for a number of pollutants with the exception of that for fine particulate matter, which was replaced with the less stringent EU limit value.

2.1.3 The objectives for the eight pollutants in the Strategy provide the basis of the implementation of Part IV of the Environment Act 1995. The Air Quality Strategy objectives for each pollutant, except ozone, were given statutory status in the Air Quality (England) Regulations, 2000[3] and Air Quality (England) (Amendment) Regulations 2002[4].

2.1.4 In 2007 the Air Quality Strategy was revised. This latest strategy[5] does not remove any of the objectives set out in the previous strategy or its addendum, apart from replacing the provisional 2010 objective for PM_{10} in England, Wales and Northern Ireland with the exposure reduction approach for $PM_{2.5}$. The UK Government and the Devolved Administrations have now therefore set new national air quality objectives for particulate matter smaller than 2.5µm diameter ($PM_{2.5}$).

[1] Department of the Environment, Transport and the Regions, January 1999. Report on the Review of the National Air Quality Strategy, Proposals to amend the Strategy
[2] Department of the Environment, Transport and the Regions 1999, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. A consultation document
[3] The Air Quality (England) Regulations 2000. SI No 928
[4] The Air Quality (Amendment) Regulations 2002
[5] Department of Environment, Food and Rural Affairs, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. July 2007

2.1.5 EU Ambient Air Quality Directive 2008/50/EC[6] came into force in June 2008 and was transposed into legislation in England on 11th June 2010 as 'The Air Quality Standards Regulations 2010'[7]. This EU Directive consolidates existing air quality legislation and makes achievement of the objectives a national objective rather than a local one. It also provides a new regulatory framework for $PM_{2.5}$.

2.1.6 The current Air Quality Standards and Objectives, as set out in the Air Quality Standards Regulations 2010 are included in Table 1.

Table 1: UK Air Quality Objectives and Pollutants

Pollutant	Objective	Averaging Period	Obligation
Nitrogen Dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	All local authorities
	40µg/m^3	Annual mean	All local authorities
Particulate Matter (PM_{10})	50µg/m^3 not to be exceeded more than 35 times a year	24-hour mean	All local authorities
	50µg/m^3 not to be exceeded more than 7 times a year	24-hour mean	Scotland only
	40µg/m^3	Annual mean	All local authorities
	18µg/m^3	Annual mean	Scotland only
Particulate Matter ($PM_{2.5}$)	25µg/m^3	Annual mean	England only
	10µg/m^3	Annual mean	Scotland only
Sulphur Dioxide (SO_2)	266µg/m^3 not to be exceeded more than 35 times a year	15-minute mean	All local authorities
	350µg/m^3 not to be exceeded more than 24 times a year	1-hour mean	All local authorities
	125µg/m^3 not to be exceeded more than 3 times a year	24-hour mean	All local authorities
Benzene (C_6H_6)	16.25µg/m^3	Running annual mean	All local authorities
	5µg/m^3	Annual mean	England and Wales only
	3.25µg/m^3	Running annual mean	Scotland and Northern Ireland only
1,3-Butadiene (C_4H_6)	2.25µg/m^3	Running annual mean	All local authorities

[6] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on Ambient Air Quality and Cleaner Air for Europe
[7] Statutory Instruments 2010 No. 1001 The Air Quality Standards Regulations 2010

Table 1: UK Air Quality Objectives and Pollutants			
Pollutant	**Objective**	**Averaging Period**	**Obligation**
Carbon Monoxide (CO)	10mg/m^3	Maximum daily running 8-hour mean	England, Wales and Northern Ireland only
	10mg/m^3	Running 8-hour mean	Scotland only
Lead (Pb)	0.5µg/m^3	Annual mean	All local authorities
	0.25µg/m^3	Annual mean	All local authorities

2.2 Legislative Requirement for Local Air Quality Management Guidance

2.2.1 The 2007 Air Quality Strategy for England, Scotland, Wales and Northern Ireland establishes the framework for air quality improvements based on measures agreed at a national and international level. However, despite these measures, it is recognised that areas of poor air quality will remain and these should be dealt with through the Local air Quality Management (LAQM) process using locally implemented measures.

2.2.2 LAQM legislation in the Environment Act 1995 requires local authorities to conduct periodic review and assessments of air quality. These aim to identify all those areas where the air quality objectives are being, or are likely to be, exceeded.

2.2.3 All authorities were required to undertake the first stage of review and assessment which concluded in September 2001. In those areas identified as having the potential to experience elevated levels of pollutants the authority was required to undertake a more detailed second stage review comprising two steps; Updating and Screening Assessments and Detailed Assessments. Where it was predicted that one or more of the air quality objectives would be unlikely to be met by the end of 2005, local authorities were required to proceed to a third stage and, if necessary, declare Air Quality Management Areas (AQMAs) and make action plans for improvements in air quality, in pursuit of the national air quality objectives.

2.2.4 An Evaluation Report, commissioned by the UK Government and Devolved Administrations in 2007, led to the publication of the LAQM Technical Guidance document LAQM.TG(09) in February 2009[8]. This technical guidance was subsequently updated following a consultation process, and in April 2016 the LAQM Technical Guidance document LAQM.TG(16) was published by Defra[9].

2.2.5 LAQM.TG(16) presents the changes to the LAQM system across the UK. A new streamlined approach has been adopted in England and Scotland; however Wales and Northern Ireland are still considering changes to LAQM and therefore work according to the previous regimes.

2.2.6 The previous structure of Review and Assessment, comprising updating and screening assessments and detailed assessments has been replaced by the introduction of an Annual Status Report (ASR) for England and an Annual Progress Report (APR) for Scotland.

2.2.7 The ASR replaces all other reports which previously had to be submitted as part of the LAQM system including review and assessment, and action plan progress reports.

2.2.8 Local authorities now have the option of a fast track AQMA declaration option. This allows more expert judgement to be used and removes the need for a detailed assessment where a local authority is confident of the outcome. Detailed assessments should still be used if there is any doubt.

2.2.9 Examples of where the Air Quality Objectives should/should not apply are also detailed in LAQM.TG(16) and are included in Table 2 below.

Table 2: Examples of Where the Air Quality Objectives Should 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, etc.	Building facades 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.

[8] Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance document LAQM.TG(09), February 2009
[9] Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance document LAQM.TG(16), April 2016

Table 2: Examples of Where the Air Quality Objectives Should Apply		
Averaging Period	**Objectives Should Apply at:**	**Objectives Should Generally Not Apply at:**
		Kerbside sites (as opposed to locations at the building façade) or any other location where public exposure is expected to be short term
24-hour mean and 8-hour mean	All locations where the annual mean objectives would apply together with hotels. Gardens of residential properties[a]	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24 and 8-hour objectives apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks 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 one hour or longer	Kerbside sites where public would not be expected to have regular access
15-minute mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer	
[a]: Such locations should represent parts of the garden where relevant public exposure is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure to pollutants would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied		

2.3 National Planning Policy and Guidance

2.3.1 The National Planning Policy Framework[10], introduced in March 2012, requires that planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of AQMAs and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in AQMAs is consistent with the local air quality action plan.

[10] Department for Communities and Local Government, National Planning Policy Framework, March 2012

2.3.2 The Planning Practice Guidance[11], updated in March 2014, states 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 impacts 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).

2.3.3 Where a proposed development is anticipated to give rise to concerns about air quality an appropriate assessment needs to be carried out. Where the assessment concludes that the proposed development (including mitigation) will not lead to an unacceptable risk from air pollution, prevent sustained compliance with national objectives or fail to comply with the requirements of the Habitats Regulations, then the local authority should proceed to decision with appropriate planning conditions and/or obligations.

2.4 Local Planning Policy

2.4.1 Liverpool Local Plan (The Draft, September 2016) has identified a number of development principles, as these are being of particular importance to the future of Liverpool. In respect of Air Quality, it includes:

STP2. Sustainable Growth Principles and Managing Environmental Impacts (i): *Minimise adverse impacts on, and include measures to improve air quality within the City.*

Policy GI 1 – Green Infrastructure: *The recreational function, visual amenity, historic and structural quality and value of the City's green infrastructure resource will be protected and enhanced.* Green infrastructure can help to reduce the heat island effect and assist in alleviating air quality issues.

Policy R1 – Air, Light and Noise Pollution: *Planning Permission will not be granted for development which has the potential to create unacceptable air, water, noise or other pollution or nuisance*.

Policy TP1 – Improving Accessibly and Managing Demand for Travel.

2.4.2 The Liverpool City Council (LCC) Air Quality Action Plan for the City-Wide AQMA sets out a work programme for the improvement of air quality within the city of Liverpool.

[11] Department for Communities and Local Government, Planning Practice Guidance: Air Quality, March 2014

The LCC Air Quality Action Plan indicates that the predominant source of NOx in Britain is road transport and the highest concentrations of NO_2 are generally found close to busy roads in urban areas. NO_2 pollution levels within the Liverpool city region follow a similar pattern with the majority of NO_x emissions being road transport related. Two categories of measures have been identified in the Action Plan to improve air quality in Liverpool:

- Direct Measures – aimed at reducing high emissions from buses and tackling congestion; and
- Supplementary Measures – Supplementary measures aimed at integrating air quality into all relevant areas of decision making within Liverpool City Council and its partner organisations.

2.5 Liverpool City Council Local Air Quality Management Review and Assessment

2.5.1 Liverpool City Council (LCC) designated a city wide Air Quality Management Area (AQMA) in 2009 as a result of exceeding the air quality objective of annual mean NO_2 across various areas of the city. The 2017 Air Quality Annual Status Report presents air pollutant monitoring data collected throughout the city of Liverpool during 2016.

2.5.2 LCC undertook automatic (continuous) monitoring at two sites, and non-automatic (passive diffusion tubes) monitoring of NO_2 at 43 sites during 2016. The closest monitoring location to the PDS are triplicate passive diffusion tubes, which is classified as roadside and monitored an annual mean NO_2 concentration of 60-67µg/m^3 in 2016.

3 ASSESSMENT METHODOLOGY

3.1 Consultation and Scope of Assessment

3.1.1 Consultation was undertaken, between 10th February 2017 and 23rd March 2018, with Mr Paul Farrell (Operations Manager within the Environmental Protection Unit for LCC). The following points have been discussed and agreed with Mr Farrell:

- A construction phase assessment will be undertaken in accordance with the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction' (February 2014). This will consider the potential dust soiling and human health effects, at existing sensitive receptor locations, as a result of demolition, earthworks, construction and the trackout of dirt and mud onto the public highway. Mitigation measures will be recommended, where necessary;
- Air dispersion modelling, using ADMS-Roads will be undertaken to consider the impact of changing traffic flows, as a result of the proposed development, at existing sensitive receptor locations. Pollutant concentrations will also be predicted for location considered representative of the proposed residential use at the site. The assessment will consider nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$) concentrations;
- Meteorological data will be obtained from Liverpool Airport meteorological recording station, which is closest and the most similar in terms of altitude;
- Emission Factor Toolkit (EFT) v8.0.1 and associated background data have been released on Defra's website, which supersedes the previous EFT v7.0. Therefore, EFT v8.0.1 and associated background data will be used in the air quality assessment;
- Background NO_2, PM_{10} and $PM_{2.5}$ concentrations will be obtained from the 2015-based Defra default concentration maps;
- There is a representative roadside diffusion tube monitoring location on Water Street, this Nitrogen Dioxide (NO_2) monitoring location will be used within the verification procedure;

- Predicted pollutant concentrations at the development will be compared with the current air quality objectives as set out in the Air Quality Standards Regulations 2010. Changes in pollutant concentrations, as a result of the proposed development, will be calculated and compared against the recently published IAQM and Environmental Protection UK guidance document on planning for air quality: 'Land-Use Planning and Development Control: Planning for Air Quality' (January 2017). Mitigation will be recommended, where necessary; and
- It is understood that EFT v8.0.1 takes into consideration of the latest European Environment Agency (EEA) COPERT 5 emission calculation tool and updated fleet assumptions and Euro class compositions, in line with DfT (2015) projections and TfL data. Overall, it is considered that the newly released EFT v8.0.1 is more accurate / realistic than the previous EFT v7.0. As there is currently no basis for doubting the assumptions made in EFT v8.0.1 and that there are reasons to suspect that EFT v8.0.1 may even over-predict future NO_x emissions. Therefore, on this basis, it is not considered necessary at this time to include a sensitivity analysis alongside our road traffic emissions assessment using EFT v 8.0.1.

3.1.2 During consultation with Mr Farrell, it is understood that 2017 air pollution data has become available. However, the bias adjusted data will not be able to be provided to us before the submission of this report. Therefore, 2016 bias adjusted air pollution data has been used in this assessment.

3.2 Construction Phase Assessment – Dust and Fine Particulate Matter Emissions

3.2.1 To assess the impacts associated with dust and PM_{10} releases, during the construction phase, an assessment has been undertaken in accordance with IAQM guidance[12].

Step 1

3.2.2 Step 1 of the assessment is to screen the requirement for a more detailed assessment.

3.2.3 The guidance states that an assessment will normally be required where there are existing human sensitive receptors within 350m of the site boundary and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

[12] Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction, February 2014

3.2.4 With regards to ecological receptors, the guidance states that an assessment will normally be required where there are existing ecological receptors within 50m of the site boundary and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

3.2.5 Where there are existing sensitive receptors locations within 350m of the site boundary, it is necessary to proceed to Step 2 of the assessment.

Step 2

3.2.6 Step 2 of the assessment determines the potential risk of dust and PM_{10} arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts. The risk is related to:

- The activities being undertaken (demolition, number of vehicles and plant etc);
- The duration of these activities;
- The size of the site;
- The meteorological conditions (wind speed, direction and rainfall);
- The proximity of receptors to the activity;
- The adequacy of the mitigation measures applied to reduce or eliminate dust; and
- The sensitivity of receptors to dust.

3.2.7 The risk of dust and PM_{10} effects is determined using four risk categories: negligible, low, medium and high risk. A site is allocated to a risk category based upon two factors:

- **Step 2A** – the scale and nature of the works which determines the potential dust emission magnitude as small, medium or large; and
- **Step 2B** – the sensitivity of the area to dust impacts which is defined as low, medium or high sensitivity.

3.2.8 These two factors are combined in **Step 2C** to determine the risk of dust impacts with no mitigation applied.

3.2.9 The risk of dust effects is determined for four types of construction phase activities, with each activity being considered separately. If a construction phase activity is not taking place on the site, then it does not need to be assessed. The four types of activities to be considered are:

- Demolition;

- Earthworks;
- Construction; and
- Trackout.

Step 3

3.2.10 Step 3 of the assessment determines the site-specific mitigation required for each of the activities, based on the risk determined in Step 2. Mitigation measures are detailed in guidance published by the Greater London Authority[13], recommended for use outside the capital by LAQM guidance and the IAQM guidance document itself. If the risk is classed as negligible, no mitigation measures beyond those required by legislation will be necessary.

Step 4

3.2.11 Step 4 assesses the residual effect, with mitigation measures in place, to determine whether or not these are significant.

Existing Sensitive Receptors – Human Receptors

3.2.12 The closest existing sensitive receptor locations to the proposed development are mainly residential in nature and are detailed in Table 3.

Table 3: Existing Dust Sensitive Receptors Considered in Demolition and Construction Phase Assessment

Receptor	Direction from the Site	Approximate Distance from the Site Boundary
Existing residential apartments (Kings Dock) along the A5036 Wapping	North east	70m at the closest point
Hotel Campanile Liverpool Queens Dock	South east	<20m at closest point

Existing Sensitive Receptors – Ecological Receptors

3.2.13 A review has been undertaken of the nearby designated habitats sites. It is understood that there are no designated statutory ecological receptors located within 50m of the site boundary and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

3.2.14 It is not therefore necessary to consider the potential effects associated with construction phase activities, for ecological effects in this assessment.

[13] Greater London Authority, The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance, 2006

3.3 Operational Phase Assessment – Road Traffic Emissions

Modelling of Road Traffic Emissions

3.3.1 The air dispersion model ADMS-Roads (CERC, Version 4.1) has been used to assess the potential impact of development generated traffic on air quality at existing receptor locations. In addition, pollutant concentrations have been predicted at locations within the site which are considered to be representative of the proposed residential uses.

3.3.2 The air dispersion model has been used to predict NO_2, PM_{10} and $PM_{2.5}$ concentrations, as these are the pollutants considered most likely to exceed the air quality objectives for human health.

3.3.3 Air dispersion modelling has been carried out to estimate pollutant concentrations, due to road traffic emissions, for two assessment years as follows:

- The base year (2016): This is the most recent year for which bias adjusted air quality monitoring data is available. To keep consistency with the air quality monitoring data, 2016 meteorological data and traffic data has been used in the 2016 base year model.
- A proposed opening/future year of the development (2023): This is the anticipated year in which the development is considered to be fully constructed and operational and is considered both without and with the development in place.

Road Traffic Data

3.3.4 The ADMS-Roads model requires the input of detailed road traffic flow information for those routes which may be affected by the proposed development. The traffic flow information used in the assessment is included in Appendix A.

3.3.5 Detailed traffic flow information, for use in the ADMS-Roads air dispersion model, has been provided by Vectio Consulting, the appointed transport consultant for the project.

3.3.6 Traffic flow information has been provided by the transport consultant as 24-hour Annual Average Daily Traffic (AADT) flows, with HGV percentages, for the following links:

- Queens Wharf;
- Keel Wharf;

- Monarchs Quay;
- A5036 Wapping;
- A562 Chaloner Street;
- A5036 The Strand; and
- Water Street

3.3.7 The traffic flow information includes consideration of the following committed developments:

- 15O/1998 – Land bounded by Great George Street/Great George Place St James Street/Duncan Street/Upper Pitt Street/Cookson Street/Grenville Street South/Hardy Street Liverpool L1;
- 16F/0084 – Land bounded by Grafton Street, Hill Street & Brassey Street Liverpool L8;
- 13F/2178 – Robert Cain and Co Ltd Stanhope Street Liverpool L8 5XJ;
- 16F/2879 – Land east of Brassey Street Liverpool L8 5XP;
- 16F/0413 – Land at Hurst Street Liverpool L1 8DN;
- 16F/1889 – Land bounded by Blundell Street, Kitchen Street and Simpson Street, Liverpool L1 5HA;
- 16F/3032 – 70-90 Pall Mall Liverpool L3 7DB;
- 10O/2424 – Liverpool Central & Northern Docks (Bramley Moore, Nelson, Salisbury, Collingwood, Trafalgar, Clarence Graving, West Waterloo, Princes Half Tide & Princes Docks), L3; and
- 16F/0776 – Land adjacent to the Keel Kings Parade/Halftide Wharf Queens Dock Liverpool L3 4GE

3.3.8 In addition, traffic flow information also includes consideration of the first phase of the proposed development (i.e. The Contact Company, planning application - 17F/2490).

3.3.9 Air quality modelling has been carried out to predict pollutant concentrations, due to road traffic emissions, for a total of three scenarios:

- Scenario 1: 2016 Base Year;
- Scenario 2: 2023 Opening/Future Year, Without Development + Committed Developments; and
- Scenario 3: 2023 Opening/Future Year, With Development + Committed Developments.

Meteorological Data

3.3.10 The meteorological data used in the air quality modelling has been obtained from ADM Limited. Meteorological data has been obtained for 2016 from the Liverpool Airport Meteorological Recording Station, which is closest and the most similar in terms of altitude. This station is located approximately 10.9km from the proposed development site.

3.3.11 The meteorological data provides hourly wind speed and direction information. The 2016 wind rose for the Liverpool Airport meteorological recording station is included in Appendix B.

3.3.12 **Existing Sensitive Human Receptor Locations**

3.3.13 Seven representative existing sensitive receptor locations (identified as ESR 1 to ESR 7) have been considered in the air quality assessment. These receptor locations are residential in nature and have been selected as they are locations at which the annual mean air quality objectives apply and are the most likely to be impacted by the proposed development.

3.3.14 Details of the existing sensitive receptor locations are provided in Table 4 and their locations are shown on drawing MC10155-001.

Table 4: Existing Sensitive Receptor Locations

Receptor	Address	Grid Reference		Receptor Type
		Easting	Northing	
ESR 1	68 Parliament St, Liverpool	335080	389050	Residential
ESR 2	X1 The Studios, 15 Caryl St, Liverpool	334837	388999	Residential
ESR 3	28 Wapping, Liverpool	334521	389365	Residential (First Floor)
ESR 4	2 Hurst St, Liverpool	334497	389512	Residential (First Floor)
ESR 5	33A Wapping, Liverpool	334471	389582	Residential (First Floor)
ESR 6	16 Monarchs Quay, Liverpool	334328	389313	Residential (First Floor)
ESR 7	Keel Apartments, Liverpool	334409	389014	Residential

Proposed Sensitive Receptor Location

3.3.15 Two proposed sensitive receptor locations (identified as PR 1 & PR 2) have been selected within the site boundary. The locations have been selected to represent the

proposed residential area (i.e. the proposed apartment block) closest to the surrounding road network.

3.3.16 Pollutant concentrations at the proposed receptor location have been predicted for scenario 3 (as detailed in paragraph 3.3.9). It is only necessary to consider the 'with development' scenario for the proposed receptor location as they will not experience any 'without development' conditions. It is not therefore necessary to consider the changes in pollutant concentrations at the proposed receptor location.

3.3.17 Details of the proposed sensitive receptor location are provided in Table 5 and the location is shown on drawing MC10155 - 001.

Table 5: Proposed Human Sensitive Receptor Locations

Receptor	Location	Grid Reference	
		Easting	Northing
PR 1	Location considered to be representative of the proposed apartment block residential used situated most adjacent to the A5036 Wapping/ Chaloner Street and Queens Wharf	334485	389228
PR 2	Location considered to be representative of the proposed apartment block residential used situated most adjacent to Queens Wharf	334434	389210

3.3.18 Residential use is proposed at 1st – 6th floor for the proposed apartment block, therefore PR1 and PR2 have been modelled at multiple heights to take account the floors (i.e. 1st – 6th floor) on which residential accommodation will be located.

Existing Ecological Receptor Locations

3.3.19 Using the DEFRA MAGIC tool, it has also been identified that the following designated habitat sites are located in the local area:

- Liverpool Bay Special Protection Area (SPA);
- Mersey Narrows & North Wirral Foreshore SPA and Ramsar;
- Mersey Estuary Site of Special Scientific Interest (SSSI), SPA and Ramsar;
- Ribble & Alt Estuaries SPA and Ramsar; and
- Sefton Coast Special Areas of Conservation (SAC) and SSSI.

Model Validation, Verification and Adjustment

3.3.20 LAQM.TG(16) recognises that model validation generally refers to detailed studies that have been carried out by the model supplier or a regulatory agency. The ADMS-Roads model has been validated by the supplier CERC.

3.3.21 Model verification is used to check the performance of the model at a local level. The verification of the ADMS-Roads model is achieved by modelling concentration(s) at existing monitoring location(s) in the vicinity of the proposed development and comparing the modelled concentration(s) with the measured concentration(s).

3.3.22 LCC undertook automatic (continuous) monitoring at two sites, and non-automatic (passive diffusion tubes) monitoring of NO_2 at 43 sites during 2016. Three of the diffusion tubes are situated along roads within the considered study area (as detailed in section 3.3.6). These three tubes are classified as roadside, and are triplicate located at the junction of Water Street/ Strand Street. Therefore, verification has been carried out for modelled NO_2 concentrations.

3.3.23 Conversely, as no PM_{10} or $PM_{2.5}$ monitoring locations are situated along roads where traffic flow data is available verification could not be carried out for modelled PM_{10} or $PM_{2.5}$ concentrations.

3.3.24 The monitoring data that has been used in the model verification procedure is detailed in Table 6.

Table 6: NO_2 Diffusion Tube Data Used for Verification Purposes

Monitoring Location Reference	Type	Approximate Grid Reference		2016 Bias Adjusted NO_2 Annual Average Concentration* (µg/m3)
		Easting	Northing	
T39 Strand Street/Water Street Junction Road sign L2	Diffusion Tube	333997	390372	67
T40 Strand Street/Water Street Junction Road sign L2	Diffusion Tube	333997	390372	60
T41 Strand Street/Water Street Junction Road sign L2	Diffusion Tube	333997	390372	63

3.3.25 Further details of the model verification are included in Appendix C.

3.4 Information Sources

3.4.1 The air quality assessment has taken into consideration the following third party data: (i) meteorological data from ADM Limited, (ii) traffic data from Vectio Consulting and (iii) pollutant concentration data from Defra and LCC. All modelling works have been undertaken using the air dispersion model ADMS-Roads (version 4.1), developed by CERC, which includes the most up-to-date vehicle emission factors.

3.5 Assumptions and Limitations

3.5.1 Given the scale of the proposed development, it has been assumed that the number of vehicles generated by the construction phase will not be significant. Therefore, the impact of air quality during the construction phase has not been assessed.

4 ASSESSMENT OF SIGNIFICANCE CRITERIA

4.1 Construction Phase Assessment – Dust and Fine Particulate Matter Emissions

4.1.1 The IAQM guidance details criteria for assessing the sensitivity of an area to dust soiling and the health effects of PM_{10}, as summarised in Tables 7 to 9 below.

4.1.2 The guidance then goes on to provide significance criteria for the classification of dust soiling and human health effects from demolition, earthworks, construction activities and trackout, as summarised in Tables 10 to 12 below.

Sensitivity of the Area – Human Receptors

4.1.3 The sensitivity categories for different types of receptors, to both dust soiling effects and the health effects of PM_{10}, are described in Table 7.

Table 7: Sensitivity Categories for Human Receptors

Sensitivity Category	Dust Soiling Effects	Health effects of PM_{10}
High	Users can reasonably expect to enjoy a high level of amenity; Appearance, aesthetics or value of a property would be diminished; Examples include dwellings, museums and other culturally important collections, medium and long term car parks and car show rooms.	Locations where members of the public are exposed over a period of time relevant to the air quality objective for PM_{10}; Examples include residential properties, hospitals, schools, and residential care homes.
Medium	Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; The appearance, aesthetics or value of their property could be diminished; People or property wouldn't reasonably be expected to be continuously present or regularly for extended periods of time; Examples include parks and places of work.	Locations where people are exposed as workers and exposure is over a period of time relevant to the air quality objective for PM_{10}; Examples include office and shop workers but will generally not include workers occupationally exposed to PM_{10}.
Low	Enjoyment of amenity would not reasonably be expected; Property would not be diminished in appearance, aesthetics or value; People or property would expected to be present only for limited periods of time; Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.	Locations where human exposure is transient; Examples include public footpaths, playing fields, parks and shopping streets.

4.1.4 Based upon the category of receptor sensitivity, the sensitivity of the area to dust soiling effects is determined using the criteria detailed in Table 8.

Table 8: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20m	<50m	<100m	<350m
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

4.1.5 Based upon the category of receptor sensitivity, the sensitivity of the area to the health effects of PM_{10} is determined using the criteria detailed in Table 9.

Table 9: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source (m)				
			<20m	<50m	<100m	<200m	<350m
High	>32µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
		>10	High	Medium	Low	Low	Low

Table 9: Sensitivity of the Area to Human Health Impacts							
Receptor Sensitivity	**Annual Mean PM_{10} Concentration**	**Number of Receptors**	**Distance from Source (m)**				
			<20m	**<50m**	**<100m**	**<200m**	**<350m**
	28-32µg/m^3	1-10	Medium	Low	Low	Low	Low
	24-28µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Risk of Dust Impacts

4.1.6 The risk of dust being generated by demolition activities at the site is determined using the criteria in Table 10.

Table 10: Risk of Dust Impacts - Demolition			
Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

4.1.7 The risk of dust being generated by earthworks and construction activities at the site is determined using the criteria in Table 11.

Table 11: Risk of Dust Impacts – Earthworks and Construction			
Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

4.1.8 The risk of dust being generated by trackout from the site is determined using the criteria in Table 12.

Table 12: Risk of Dust Impacts – Trackout			
Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

4.2 Operational Phase Assessment – Road Traffic Emissions

Assessing the Impact of a Proposed Development on Human Health

4.2.1 Guidance has been prepared by Environmental Protection UK (EPUK) and the IAQM with relation to the assessment of the air quality impacts of proposed developments and their significance[14].

4.2.2 The impact of a development is usually assessed at specific receptors, and takes into account both the long term background concentrations, in relation to the relevant Air Quality Assessment Level (AQAL) at these receptors, and the change with the development in place.

4.2.3 The impact descriptors for individual receptors are detailed in Table 13.

Table 13: Impact Descriptors for Individual Receptors				
Long Term Average Concentration at Receptor in Assessment Year*	**Percentage Change in Concentration Relative to Air Quality Assessment Level (AQAL)***			
	1%	**2-5%**	**6-10%**	**>10**
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial
**Percentage pollutant concentrations have been rounded to whole numbers, to make it easier to assess the impact. Changes of 0% (i.e. less than 0.5%) should be described as negligible*				

[14] Environmental Protection UK and the Institute of Air Quality Management, Land-Use Planning and Development Control: Planning for Air Quality, January 2017

Determining the Significance of Effects

4.2.4 Impacts on air quality, whether adverse or beneficial, will have an effect on human health that can be judged as either 'significant' or 'not significant'.

4.2.5 Once the impact of the proposed development has been assessed for the individual impacts, the overall significance is determined using professional judgement. This takes into account a number of factors such as:

- The existing and future air quality in the absence of the development;
- The extent of the current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

4.2.6 A discussion of the impacts of the proposed development and their significance are included in sections 6 and 7 of this report, respectively.

5 BASELINE SITUATION

5.1 Operational Phase Assessment – Road Traffic Emissions

Background Air Pollutant Concentrations

5.1.1 The ADMS assessment needs to take into account background concentrations upon which the local, traffic derived pollution is superimposed. The data may be derived through long term ambient measurements at background sites, remote from immediate sources of air pollution, or alternatively from the default concentration maps which have been provided for use by Defra with the revised LAQM.TG(16) guidance.

5.1.2 In the absence of representative background NO_2, NO_x, PM_{10} and $PM_{2.5}$ monitoring data being available for the local area, background concentrations have been obtained from the 2015-based Defra default concentration maps for the appropriate 1km x 1km grid squares.

5.1.3 The background pollutant concentrations used in the assessment are detailed in Table 14.

Table 14: Background Pollution Concentrations Obtained from the 2015-Based Defra Default Concentration Maps (µg/m³)

Receptor Locations & Grid Reference	Annual Mean Concentration (µg/m³)			
	NO_x	NO_2	PM_{10}	$PM_{2.5}$
2016 Background Pollutant Concentrations				
Strand Street/ Water Street junction (333500, 390500)	27.48	19.18	11.74	7.61
ESR1 (335500, 389500)	31.93	21.85	12.80	8.15
ESR2 (334500, 388500)	21.28	15.33	10.99	7.13
ESR3 – ESR7, PR1 & PR2 (334500, 389500)	28.59	19.91	11.99	7.71
2023 Background Pollutant Concentrations				
Strand Street/ Water Street junction (333500, 390500)	19.52	14.18	11.25	7.10
ESR1 (335500, 389500)	21.23	15.29	12.30	7.59
ESR2 (334500, 388500)	15.22	11.31	10.56	6.69
ESR3 – ESR7, PR1 & PR2 (334500, 389500)	19.71	14.32	11.52	7.21

Modelled Baseline Concentrations

5.1.4 The baseline assessment (i.e. scenarios 1 and 2) has been carried out for the seven existing sensitive receptors considered (i.e. ESR 1 to ESR 7). The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations are detailed in Table 15, and are also included in Appendix D.

Table 15: Predicted NO_2, PM_{10} and $PM_{2.5}$ Concentrations at Existing Sensitive Receptor Locations for 2016 and 2023 'Without Development' Scenarios

Receptor	Calculated Annual Mean Concentrations (µg/m³)					
	NO_2* † (Adjusted)		PM_{10} (Unadjusted)		$PM_{2.5}$ (Unadjusted)	
	Scenario 1: 2016	Scenario 2: 2023	Scenario 1: 2016	Scenario 2: 2023	Scenario 1: 2016	Scenario 2: 2023
ESR 1	47.46	30.90	14.38	14.03	9.10	8.54
ESR 2	33.69	22.14	11.99	11.65	7.73	7.29
ESR 3	36.90	24.26	12.94	12.55	8.28	7.78
ESR 4	41.08	26.82	13.25	12.89	8.47	7.96
ESR 5	40.21	26.28	13.18	12.82	8.43	7.92
ESR 6	23.96	16.79	12.18	11.74	7.83	7.33
ESR 7	21.45	15.22	12.07	11.60	7.76	7.26

** NO_2 concentrations obtained by inputting predicted NO_x concentrations into the NO_x to NO_2 calculator[15] in accordance with LAQM.TG(16).*

† Predicted concentrations adjusted in accordance with verification process.

Scenario 1: 2016 Base Year

5.1.5 The 2016 baseline annual mean NO_2 concentrations (adjusted) are predicted to range from 21.45 to 47.46 µg/m³ for the seven existing sensitive receptor locations considered. Exceedance of the annual mean objective concentration for NO_2 (40µg/m³) is predicted to occur at ESR 1 (68 Parliament St), ESR 4 (2 Hurst St) and ESR 5 (33A Wapping).

5.1.6 ESR 1 is located adjacent to the A562 Parliament Street, and ESR 4 and ESR 5 are located next to the A5036 Wapping. Given the proximity of these receptor locations

[15] NO_x to NO_2 Calculator, Defra Local Air Quality Management web pages (http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOXNO2calc)

to these busy roads, and their location within the existing AQMA, exceedances are therefore considered likely at these locations

5.1.7 The 2016 baseline annual mean PM_{10} concentrations (unadjusted) are predicted to range from 11.99 to 14.38µg/m^3 for the seven existing sensitive receptor locations considered. Exceedance of the annual mean objective concentration for PM_{10} (40µg/m^3) is not predicted to occur.

5.1.8 The 2016 baseline annual mean $PM_{2.5}$ concentrations (unadjusted) are predicted to range from 7.73 to 9.10µg/m^3 for the seven existing sensitive receptor locations considered. Exceedance of the annual mean target level concentration for $PM_{2.5}$ (25µg/m^3) is not predicted to occur.

Scenario 2: 2023 Opening/ Future Year, Without Development

5.1.9 The 2023 baseline annual mean NO_2 concentrations (adjusted) are predicted to range from 15.22 to 30.90 µg/m^3 for the seven existing sensitive receptor locations considered. Exceedance of the annual mean objective concentration for NO_2 (40µg/m^3) is not predicted to occur.

5.1.10 The 2023 baseline annual mean PM_{10} concentrations are predicted to range from 11.60 to 14.03 µg/m^3 for the seven existing sensitive receptor locations considered. Exceedance of the annual mean objective concentration for PM_{10} (40µg/m^3) is not predicted to occur.

5.1.11 The 2023 baseline annual mean $PM_{2.5}$ concentrations are predicted to range from 7.26 to 8.54 µg/m^3 for the seven existing sensitive receptor locations considered. Exceedance of the annual mean target level concentration for $PM_{2.5}$ (25µg/m^3) is not predicted to occur.

6 IMPACT ASSESSMENT

6.1 Construction Phase Assessment – Dust and Fine Particulate Matter Emissions

6.1.1 The main activities involved with the construction phase of works are as follows:

- **Earthworks** which may be required prior to the construction phase of works. Sources of dust can include:
  - Cleaning the site;
  - Stripping and stockpiling of topsoil and subsoil;
  - Ground excavation;
  - Bringing in, tipping and spreading materials on site;
  - Stockpiling materials;
  - Levelling ground;
  - Trenching;
  - Road construction;
  - Vehicle movements on site roads; and
  - Windblown materials from site.
- **Construction** which will involve the construction of the new building, and associated landscaping and infrastructure; and
- **Trackout** which is the transport of dust and dirt by vehicles travelling from a construction site on to the public road network. This may occur through the spillage of dusty materials onto road surfaces or through the transportation of dirt by vehicles that have travelled over muddy ground on the site. This dust and dirt can then be deposited and re-suspended by other vehicles.

6.1.2 There are no demolition activities associated with the proposed development. Demolition activities do not therefore need to be considered further within this assessment.

Step 2A

6.1.3 Step 2A of the construction phase dust assessment has defined the potential dust emission magnitude from demolition, earthworks, construction and trackout in the absence of site specific mitigation. Examples of the criteria for the dust emission classes are detailed in the IAQM guidance documents.

Step 2B

6.1.4 Step 2B of the construction phase dust assessment has defined the sensitivity of the area, taking into account the significance criteria detailed in Tables 7 to 9, for demolition, earthworks, construction and trackout. The sensitivity of the area to each activity is assessed for potential dust soiling and human health effects.

6.1.5 For earthworks and construction, there are estimated to be between 10 and 100 high sensitive receptors (i.e. long term car parking spaces) within 50m of where these activities may take place.

6.1.6 The routing of construction vehicles is unknown at this stage. Therefore, for the purposes of this assessment, worst case routing scenarios have been assumed for assessment of potential trackout impacts at nearby receptor locations.

6.1.7 For trackout, there are estimated between 10 and 100 long term car parking spaces and residential properties within 20m of where trackout may occur, for a distance of up to 200m from the site access.

Step 2C

6.1.8 Step 2C of the construction phase dust assessment has defined the risk of impacts from each activity. The dust emission magnitude is combined with the sensitivity of the surrounding area. The risk of dust impacts from each activity, with no mitigation in place, has been assessed in accordance with the criteria detailed in Tables 10 to 12.

Summary

6.1.9 Table 16 details the results of Step 2 of the construction phase assessment for human receptors.

Table 16: Demolition and Construction Phase Dust Assessment

	Activity			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Step 2A				
Dust Emission Magnitude	N/A	Medium [a]	Large [b]	Medium [c]
Step 2B				
Sensitivity of Closest Receptors (Worst Case Approach Used)	N/A	High	High	High
Sensitivity of Area to Dust Soiling Effects	N/A	Medium	Medium	High
Sensitivity of Area to Human Health Effects	N/A	Low[d]	Low[d]	Low[d]

Table 16: Demolition and Construction Phase Dust Assessment				
	Activity			
	Demolition	Earthworks	Construction	Trackout
Step 2C				
Dust Risk: Dust Soiling	N/A	Medium Risk	Medium Risk	Medium Risk
Dust Risk: Human Health	N/A	Low Risk	Low Risk	Low Risk

a. Total site area estimated to be between 2,500m^2 and 10,000m^2.
b. Total volume of buildings to be constructed estimated to be more than 100,000m^3
c. Number of HGV movements in an average day estimated to be 10-50 outward movements.
d. Background annual mean PM_{10} concentration is less than 24µg/m^3 (as detailed in Table 14)

6.2 Operational Phase Assessment – Road Traffic Emissions

Existing Sensitive Human Receptor Locations

6.2.1 The impact assessment has been carried out for the seven representative existing sensitive receptor locations (i.e. ESR 1 to ESR 7). Table 17 shows the changes in pollutant concentrations for the 2023 Opening / Future Year for 'without development' and 'with development' scenarios. The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations are included in Appendix D.

Table 17: Predicted NO_2, PM_{10} and $PM_{2.5}$ Concentrations at Existing Sensitive Receptor Locations for 2023 'Without Development' and 'With Development' Scenarios				
Receptor	Level of Development	Calculated Annual Mean Concentrations (µg/m^3)		
		NO_2 (Adjusted)	PM_{10} (Unadjusted)	$PM_{2.5}$ (Unadjusted)
ESR 1	Without development	30.90	14.03	8.54
	With development	31.04	14.05	8.55
	Percentage Change Relative to AQAL	*+0.35%*	*+0.04%*	*+0.02%*
ESR 2	Without development	22.14	11.65	7.29
	With development	22.24	11.66	7.29
	Percentage Change Relative to AQAL	*+0.25%*	*+0.03%*	*+0.01%*
ESR 3	Without development	24.26	12.55	7.78
	With development	24.32	12.56	7.78
	Percentage Change Relative to AQLA	*+0.15%*	*+0.02%*	*+0.01%*
ESR 4	Without development	26.82	12.89	7.96

Table 17: Predicted NO_2, PM_{10} and $PM_{2.5}$ Concentrations at Existing Sensitive Receptor Locations for 2023 'Without Development' and 'With Development' Scenarios

Receptor	Level of Development	Calculated Annual Mean Concentrations (µg/m³)		
		NO_2 (Adjusted)	PM_{10} (Unadjusted)	$PM_{2.5}$ (Unadjusted)
	With development	26.86	12.90	7.97
	Percentage Change Relative to AQAL	*+0.10%*	*+0.01%*	*+0.01%*
ESR 5	Without development	26.28	12.82	7.92
	With development	26.31	12.82	7.92
	Percentage Change Relative to AQAL	*+0.07%*	*+0.01%*	*+0.01%*
ESR 6	Without development	16.79	11.74	7.33
	With development	16.85	11.75	7.34
	Percentage Change Relative to AQAL	*+0.15%*	*+0.01%*	*+0.01%*
ESR 7	Without development	15.22	11.60	7.26
	With development	15.24	11.60	7.26
	Percentage Change Relative to AQAL	*+0.05%*	*+/-0.00%*	*+/-0.00%*

Scenario 3: 2023 Opening/ Future Year, With Development

6.2.2 The 2023 'with development' annual mean NO_2 concentrations are predicted to range from 15.24 to 31.04 µg/m³ for the seven existing sensitive receptor locations modelled. Exceedance of the annual mean objective concentration for NO_2 (40µg/m³) is not predicted to occur.

6.2.3 The 2023 'with development' annual mean PM_{10} concentrations are predicted to range from 11.60 to 14.05 µg/m³ for the seven existing sensitive receptor locations modelled. Exceedance of the annual mean objective concentration for PM_{10} (40µg/m³) is not predicted to occur.

6.2.4 The 2023 'with development' annual mean $PM_{2.5}$ concentrations are predicted to range from 7.26 to 8.55 µg/m³ for the seven existing sensitive receptor locations modelled. Exceedance of the annual mean target level concentration for $PM_{2.5}$ (25µg/m³) is not predicted to occur.

Assessment of Impact

6.2.5 Using the descriptors detailed in Table 13, the impact of the proposed development can be assessed at each of the seven existing sensitive receptors considered.

6.2.6 The impact on NO_2 concentrations in 2023 is detailed in Table 18.

Table 18: Impact on NO_2 Concentrations in 2023

Receptor	Percentage Change Relative to AQAL	Annual Mean Concentration in Relation to AQAL	Impact
ESR 1	<0.5%*	76-94%	Negligible
ESR 2	<0.5%*	<75%	Negligible
ESR 3	<0.5%*	<75%	Negligible
ESR 4	<0.5%*	<75%	Negligible
ESR 5	<0.5%*	<75%	Negligible
ESR 6	<0.5%*	<75%	Negligible
ESR7	<0.5%*	<75%	Negligible
* Changes of less than 0.5% should be described as negligible			

6.2.7 The impact on PM_{10} concentrations in 2023 is detailed in Table 19.

Table 19: Impact on PM_{10} Concentrations in 2023

Receptor	Percentage Change Relative to AQAL	Annual Mean Concentration in Relation to AQAL	Impact
ESR 1 – ESR 7	<0.5%*	<75%	Negligible
* Changes of less than 0.5% should be described as negligible			

6.2.8 The impact on $PM_{2.5}$ concentrations in 2023 is detailed in Table 20.

Table 20: Impact on $PM_{2.5}$ Concentrations in 2023

Receptor	Percentage Change in Relation to AQAL	Annual Mean Concentration in Relation to AQAL	Impact
ESR 1 – ESR 7	<0.5%*	<75%	Negligible
** Changes of less than 0.5% should be described as negligible*			

Proposed Sensitive Receptor Location

6.2.9 Air pollutant concentrations have also been modelled for two proposed receptor location for the 2023 'with development' scenario, as detailed in Table 21. Residential use is proposed at 1st – 6th floor for the proposed apartment block, therefore PR1 and PR2 have been modelled at multiple heights to take account the floors (i.e. 1st – 6th floor) on which residential accommodation will be located.

6.2.10 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations are as below, and also included in Appendix D.

Table 21: Predicted NO_2, PM_{10} and $PM_{2.5}$ Concentrations at Proposed Sensitive Receptor Locations for 2023 'With Development' Scenarios

Proposed Receptor Location	Floor Level	Calculated Annual Mean Concentrations (µg/m3)		
		NO_2*†	PM_{10}	$PM_{2.5}$
PR 1	First Floor (3.5m above ground level)	18.47	11.89	7.42
	Second Floor (6.5m above ground level)	17.58	11.82	7.37
	Third Floor (9.4m above ground level)	16.93	11.76	7.34
	Fourth Floor (12.3m above ground level)	16.48	11.72	7.32
	Fifth Floor (15.2m above ground level)	16.12	11.69	7.30
	Sixth Floor (19.5m above ground level)	15.69	11.65	7.28
PR 2	First Floor (3.5m above ground level)	18.55	11.88	7.41
	Second Floor (6.5m above ground level)	17.33	11.78	7.36
	Third Floor (9.4m above ground level)	16.59	11.72	7.32
	Fourth Floor (12.3m above ground level)	16.14	11.68	7.30
	Fifth Floor (15.2m above ground level)	15.83	11.66	7.29
	Sixth Floor (19.5m above ground level)	15.48	11.63	7.27

**NO_2 concentrations obtained by inputting predicted NO_x concentrations into the NO_x to NO_2 calculator[16] in accordance with LAQM.TG(16).*

† *Predicted concentrations adjusted in accordance with verification process.*

Scenario 3: 2023 Opening/ Future Year, With Development

6.2.11 The 2023 'with development' annual mean NO_2 concentrations are predicted to range between 15.48 to 18.55 µg/m^3 for the two proposed receptor locations considered. Exceedance of the annual mean objective concentration for NO_2 (40µg/m^3) is not predicted to occur.

[16] NO_x to NO_2 Calculator, Defra Local Air Quality Management web pages (http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html)

6.2.12 The 2023 'with development' annual mean PM_{10} concentrations are predicted to range between 11.63 to 11.89 µg/m^3 for the two proposed receptor locations considered. Exceedance of the annual mean objective concentration for PM_{10} (40µg/m^3) is not predicted to occur.

6.2.13 The 2023 'with development' annual mean $PM_{2.5}$ concentrations are predicted range between 7.27 to 7.42 µg/m^3 for the two proposed receptor locations considered. Exceedance of the annual mean target level concentration for $PM_{2.5}$ (25µg/m^3) is not predicted to occur.

Existing Sensitive Ecological Receptors

6.2.14 Using the DEFRA MAGIC tool, it has also been identified that the following designated habitat sites are located in the local area:

- Liverpool Bay Special Protection Area (SPA);
- Mersey Narrows & North Wirral Foreshore SPA and Ramsar;
- Mersey Estuary Site of Special Scientific Interest (SSSI), SPA and Ramsar;
- Ribble & Alt Estuaries SPA and Ramsar; and
- Sefton Coast Special Areas of Conservation (SAC) and SSSI.

6.2.15 The Design Manual for Roads and Bridges (Volume 11, Section 3, Part 1, HA207/07, May 2007) states that the potential impacts of changes in air quality on sensitive designated sites, which are located within 200m of an 'affected' road, need to be considered. Currently, the deposition of nitrogen-containing pollutants (e.g. NO_x) is of most concern for sensitive vegetation communities and ecosystems.

6.2.16 It is understood that the DMRB document was withdrawn on 30th May 2017. As no suitable alternative guidance is available, it is considered that the guidance detailed within the DMRB remains appropriate for use. It is understood that a joint IAQM and CIEEM guidance document is being prepared, however it is not currently available.

6.2.17 Following a review of the Air Pollution Information System (APIS) website, it has been identified that, among the aforementioned designated habitat sites, only the following sites contain sensitive features to deposition of nitrogen-containing pollutants:

- Liverpool Bay SPA (sensitive features to nitrogen deposition are Gavia stellate and Melanitta nigra);
- Mersey Estuary SSSI, SPA and Ramsar;
- Ribble & Alt Estuaries SPA and Ramsar; and
- Sefton Coast SAC and SSSI.

6.2.18 Roads are deemed 'affected' if a proposed development leads to:

- A change in road alignment of 5m or more;
- A change in daily traffic flow of 1,000 AADT or more;
- A change in HGV flow of 200 AADT or more;
- A change in daily average speed of 10 kph or more; and
- A change in peak hour speed of 20kph or more.

6.2.19 The proposed development site is estimated to generate an increase in daily traffic flow of 434 AADT. Following a review of the traffic flow information provided for the air quality assessment, it is understood that the Proposed Development will not lead to any of the above changes for the roads located within 200m of the Mersey Estuary SSSI, SPA and Ramsar; Ribble & Alt Estuaries SPA and Ramsar; and Sefton Coast SAC and SSSI. Therefore, the surrounding road network will not be 'affected' by the proposed development and it's considered that an assessment of the operational impacts of the proposed development on the aforementioned designated habitat sites is not required.

7 ASSESSMENT OF SIGNIFICANCE

7.1.1 The significance of the overall effects of the proposed development has been assessed in accordance with the EPUK/IAQM guidance. This assessment is based on professional judgement and takes into account a number of factors, including:

Table 22: Significance of Effect for Operational Phase Road Traffic Emissions Assessment

Factor	Comment
Existing and future air quality in the absence of the development	Existing NO_2 concentrations largely below the annual mean Air Quality Objective (AQO), except for ESR1 (68 Parliament Street), ESR 4 (2 Hurst Street) and ESR 5 (33A Wapping), which are located next to busy roads. No exceedance of the annual mean AQO for NO_2 is predicted to occur in the 2023 opening/future year scenario without the development in place. All PM_{10} and $PM_{2.5}$ concentrations are below the annual mean AQO/target value.
The impact predicted at existing sensitive receptors considered in the assessment	The predicted impacts are all negligible for NO_2, PM_{10} and $PM_{2.5}$ concentrations, with the development in place, in 2023.
Air quality impacts within the proposed development site itself	Proposed receptors have been modelled at multiple heights to take account the floors on which residential accommodation will be located. All predicted pollutant concentrations are to be well below the relevant annual mean AQOs

7.1.2 Based on the above factors, the effect of the proposed development on NO_2, PM_{10} and $PM_{2.5}$ concentrations is considered to be 'not significant', in accordance with the EPUK/IAQM guidance. Therefore, the overall effect of the proposed development on human receptors is considered to be 'no significant'.

8 MITIGATION MEASURES

8.1 Construction Phase Assessment – Dust and Fine Particulate Matter Emissions

Step 3

8.1.1 During the construction phase, the implementation of effective mitigation measures will substantially reduce the potential for nuisance dust and PM_{10} to be generated.

8.1.2 Step 2C of the construction phase assessment identified that:

- The risk of dust soiling effects is classed as medium for construction, earthworks and trackout; and
- The risk of human health effects is classed as low for construction, earthworks and trackout.

8.1.3 This assumes that no mitigation measures are applied, except those required by legislation. Site specific mitigation measures do not need to be recommended if the risk category is negligible.

8.1.4 As the risk categories for majority of the on-site activities are not negligible, site specific mitigation measures will need to be implemented to ensure dust effects from these actives will be 'not significant'.

8.1.5 A best practice dust mitigation plan will be written and implemented for the site. This will set out the practical measures that could be incorporated as part of a best working practice scheme. This will take into account the recommendations included within the IAQM guidance documents, which may include:

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
- Avoid dry sweeping of large areas;
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use;

- Ensure vehicles entering and leaving the sites are covered to prevent escape of materials during transport;
- Implement a wheel washing system with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable;
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever the site size and layout permits; and
- Access gates to be located at least 10m from receptors, where possible.

8.1.6 Other measures which would assist in reducing the potential for nuisance dust and particulate matter to be generated include:

- Protection of surfaces and exposed material from winds until disturbed areas are sealed and stable;
- Dampening down of exposed stored materials, which will be stored as far from sensitive receptors as possible;
- Avoidance of activities that generate large amounts of dust during windy conditions;
- Ensuring that all vehicles will be sheeted when loaded;
- Confining vehicles to areas of the site where appropriate dust control measures can be in operation; and
- Minimisation of vehicle movements and limitation of vehicle speeds – the slower the vehicle speeds, the lower the dust generation.

8.1.7 It is recognised that the final design solutions will be developed with the input of the Contractor to maximise construction efficiencies, to use modern construction techniques and sustainable materials, and to incorporate the particular skills and experience offered by the successful contractor.

Step 4

8.1.8 Step 4 of the construction phase dust assessment has been undertaken to determine the significance of the dust and PM_{10} effects arising from demolition, earthworks, construction and trackout associated with the proposed development.

8.1.9 The implementation of effective mitigation measures during the demolition and construction phase, such as those detailed in Step 3, will substantially reduce the potential for nuisance dust and PM_{10} to be generated, and any residual impact should be 'not significant'.

8.2 Operational Phase Assessment – Road Traffic Emissions

Existing Sensitive Receptor Locations

8.2.1 An air quality assessment has been undertaken to consider the potential impact of development-generated vehicles on air quality at seven existing sensitive receptor locations.

8.2.2 Exceedance of the NO_2, PM_{10}, and $PM_{2.5}$ annual mean air quality objectives/target levels is not predicted to occur in 2023, for any of the seven existing sensitive receptors, for the 'without development' and 'with development' scenarios.

8.2.3 The air quality assessment predicts that there will be a negligible impact on concentrations of NO_2, PM_{10} and $PM_{2.5}$ at all seven of the existing sensitive receptors considered in 2023, with the development in place. Air quality effects are therefore considered to be 'not significant'.

Proposed Sensitive Receptor Location

8.2.4 The assessment has also predicted pollutant concentrations at two proposed receptor locations, taking into account various heights relating to the storeys of the building where residential uses are proposed. The locations have been selected to represent the proposed residential area closest to the A5036 Wapping/ Chaloner Street and Queens Wharf.

8.2.5 The air quality assessment predicts that all on-site pollutant (i.e. NO_2, PM_{10} and $PM_{2.5}$) concentrations will be below the relevant air quality objectives for the apartment block. Air quality effects within the site are, therefore, considered to be 'not significant'.

Recommendations for Mitigation

8.2.6 Based on professional judgement, and a number of factors, the effect of the proposed development on NO_2 concentrations is considered to be 'not significant', in accordance with the EPUK/IAQM guidance. However, mitigation measures will assist in reducing any potential impact resulting from the development

8.2.7 Mitigation measures are to be determined by the developer but could include:

- The implementation of a green travel plan;
- Contributions to highway improvements in order to reduce local traffic congestion; and
- Provision of infrastructure to support the use of low emission vehicles.

9 CONCLUSIONS

9.1 Construction Phase Assessment – Dust and Fine Particulate Matter Emissions

9.1.1 The construction phase assessment has been undertaken to determine the risk and significance of dust effects from demolition, earthworks, construction and trackout at the proposed development site. The assessment has been undertaken in accordance with the guidance on assessing the impacts of construction phase dust published by the IAQM.

9.1.2 The risk of dust soiling effects is classed as medium for earthworks and construction and trackout. The risk of human health effects is classed as low for earthworks, construction and trackout.

9.1.3 With site specific mitigation measures in place, such as those detailed in Section 8 of this report, the significance of dust effects from demolition, earthworks, construction and trackout are considered to be 'not significant'.

9.2 Operational Phase Assessment – Road Traffic Emissions

Existing Sensitive Receptor Locations

9.2.1 An air quality assessment has been undertaken to consider the potential impact of development-generated vehicles on air quality at seven existing sensitive receptor location.

9.2.2 Exceedance of the NO_2, PM_{10} and $PM_{2.5}$ annual mean air quality objective/target levels is not predicted to occur in 2023, for all seven sensitive receptors considered, for both the 'without development' or 'with development' scenarios.

9.2.3 The assessment predicts that there will be a negligible impact and not significant effect on concentrations of NO_2, PM_{10} and $PM_{2.5}$, at all of the seven existing sensitive receptors considered in 2023, with the development in place. Air quality effects are therefore considered to be 'not significant'.

Proposed Sensitive Receptor Locations

9.2.4 The assessment has also predicted pollutant concentrations at two proposed receptor location within the proposed residential development site. The locations have been selected to represent the proposed residential area closest to the A5036 Wapping/ Chaloner Street and Queens Wharf.

9.2.5 Predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations are well below the annual mean air quality objectives/target levels in 2023, at the proposed sensitive receptor locations considered.

9.3 Recommendations for Mitigation

Construction Phase

9.3.1 The Implementation of effective dust mitigation measures during the construction phase, such as those detailed in section 8.1.5, will substantially reduce the potential for nuisance dust and particulate matter to be generated and any residual impact should be 'not significant'.

Operational Phase

9.3.2 The impact of the operation of the proposed development is predicted to be negligible and 'not significant'. It may however be possible to further reduce the impact with the implementation of various mitigation strategies as detailed in section 8.2.7 in this report.

9.4 Summary

9.4.1 The assessment has demonstrated that the proposed development will not lead to an unacceptable risk from air pollution, or to any breach in national objectives, or to a failure to comply with the Habitats Regulations as required by national policy. There are no material reasons in relation to air quality why the proposed scheme should not proceed, subject to appropriate planning conditions.