

Environmental Statement Volume One

Monarchs Quay, Kings Dock, Liverpool

Prepared on behalf of Monarchs Quay Holdings Ltd

3 November 2017

Contact details

Monarchs Quay Holdings Ltd

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1 Introduction

- 1.1 Knight Frank LLP have been instructed by Monarchs Quay Holdings Ltd to coordinate a formal Environmental Impact Assessment (EIA), including the preparation of an Environmental Statement (ES) and Non-Technical Summary (NTS), to support the submission of a full planning application for a *‘mixed use redevelopment of the site to include Interpretation Centre, offices, residential, car park and retail with associated landscaping and works at Monarchs Quay, Liverpool.’*
- 1.2 The site is located within the administrative boundary of the city of Liverpool, more specifically to the South of Liverpool City Centre. The site forms part of Liverpool’s waterfront and is one of the remaining key sites to be developed along the former docks. The submission of this ES and planning applications follows detailed dialogue with Liverpool City Council and other consultees and stakeholders.

The Applicant

- 1.3 Monarchs Quay Holdings Ltd is a specialist regeneration company which provides property development, construction and management solutions, delivering both economic and social value to its partners, investors and the communities in which it operates.
- 1.4 Monarchs Quay Holdings Ltd are a business who are active across the UK, with projects and assets spanning housing, commercial, mixed use and student and key worker residential schemes. They are experts at delivering commercially sustainable solutions for both prime and challenging sites, enhancing communities and often acting as a catalyst for wider regeneration and economic development. The focus is always on design and build quality and on delivering the best possible return for both investors and communities. We deliver schemes on schedule and within budget, every single time.
- 1.5 The multi-disciplinary team does this through robust project management systems and by building strong partnerships with local authorities, trusted professional advisers and loyal suppliers. With over 60 years of combined experience in the property investment and development fields, they have a successful track record in developing and selling investment properties and procuring lucrative investments for clients both nationally and internationally.
- 1.6 The success is built upon robust and detailed due diligence processes which we adhere to on every potential project and which gives us the market insight to ensure a successful scheme.

- 1.7 They currently have in excess of £350m of projects in its pipeline and have ambitions to double the size of the portfolio over the next two years. They are now actively seeking development opportunities across the UK and can advise on a range of compelling and sustainable investment opportunities for investors of all kinds.

The Project Team

- 1.8 YPG have appointed a team of professional qualified consultants to prepare this ES and other supporting documents. This includes;
- Knight Frank LLP – Planning Consultants
 - Falconer Chester Hall – Architects
 - Wardell Armstrong – Air Quality
 - Salford Archaeology – Archaeology
 - Delva Patman Redler – Daylight and Sunlight
 - Brooks Ecological – Ecology
 - Enzygo – Flood Risk and Drainage
 - Turley – Heritage
 - Vectio – Highways
 - Layer – Landscaping
 - ENS – Noise
 - Urban Microclimate – Wind
 - Icen Projects – Public Engagement
- 1.9 In accordance with EIA (2017) Regulations (18(5)), a supporting statement setting out the professional expertise and qualifications of the team has been submitted alongside the ES.

The Environmental Statement

- 1.10 Volume One (this report) provides the main body of the ES, and covers the key environmental aspects that may be affected by the proposed development, assessing the impacts that may occur as a result of the development. For each assessment, a methodology for the assessment of the impact is presented, a description of the baseline environmental conditions is provided and where necessary appropriate mitigation measures are set out. Volume Two provides the Technical Appendices that should be read alongside this report. A Non-Technical Summary (NTS) of the ES has also been provided.

- 1.11 Should you wish to comment on the ES (or the planning application), please write to the following address:
- F.A.O Paul Vertigen
Liverpool City Council
Cunard Building
Water Street
Liverpool
L3 1DS
- 1.12 The ES is available to view freely at the above address. Alternative copies can be purchased from Knight Frank, please contact:
- Knight Frank LLP
One Marsden Street
Manchester
M2 1HW

2 Assessment Methodology and Significance Criteria

- 2.1 The purpose of the ES is to describe and assess the likely environmental impacts and effects of the proposed development during its construction and occupational phases. Consideration of mitigation and cumulative impacts (where appropriate) is also assessed.

Environmental Impact Assessment (EIA)

- 2.2 Environmental Impact Assessment (EIA) is defined as '*a systematic process to identify, predict and evaluate the environmental effects of proposed actions and projects*' (Sadler & Fuller, 2002) prior to determination of a planning application. The need to undertake EIA is governed by European and UK legislation. The scale and nature of the proposed development is such that it comprises 'EIA Development' under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (hereafter referred to as 'the EIA Regulations'). The Proposed Development falls within Schedule 2, Paragraph 10 of the EIA Regulations 'Infrastructure projects'. The EIA regulations require that the findings of EIA be reported in an ES.
- 2.3 EIA considers the environmental effects of the development proposals that are likely to arise during construction, operation and, where applicable, decommissioning phases. The aim of EIA is to avoid adverse impacts on the environment, both in and around the application site. Where this is unrealistic, the ES proposes ways to reduce and offset adverse effects through mitigation measures.
- 2.4 Government Circular 2/99 on Environmental Impact Assessment defines EIA in Paragraph 9 as '*a means of drawing together, in a systematic way, an assessment of the project's likely significant environmental effects*'. This helps to ensure that the importance of the predicted effects, and the scope for reducing them, are properly understood by the public and the relevant competent authority before it makes its decision'.
- 2.5 In accordance with the EIA Regulations 2017 (18(3)), the ES presents:
- a) a description of the proposed development comprising information on the site, design and size of the development;
 - b) a description of the likely significant effects of the proposed development on the environment;
 - c) a description of any features of the proposed development, or measures envisaged in order to avoid, reduce and, if possible, offset likely significant adverse effects;
 - d) a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment;

- e) a non-technical summary of the information referred to in the sub-paragraphs (a) to (d); and
- f) any additional information specified in Schedule 4 relevant to the characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.

2.6 The EIA Regulations (Schedule 4) sets out the minimum requirements of information for inclusion in an ES. These are summarised in table below, which also identifies where the information is presented in this ES.

2.7

Specified Information		
1	Description of the development, including in particular -	(See below)
a	a description of the location of the development	Chapter 3 – Site & Surrounding Area
b	a description of the physical characteristics of the whole development, including where relevant demolition works and the land-use requirements during the construction and operational phases.	Chapter 4 - Project Description
c	a description of the main characteristics of the operation phase of the development.	Chapter 4 - Project Description
d	an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc.) resulting from the operation of the Proposed Development.	Chapters 7-17 & Appendices
2	an outline of the reasonable alternatives studied by the developer and an indication of the main reasons for their choice, taking into account the environmental effects.	Chapter 4 - Project Description
3	a description of the relevant aspects of the current state of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets (including telecommunication interference), including the architectural and archaeological heritage, landscape and interrelationship between the above factors.	Chapters 7-17 & Appendices
4	a description of the factors specified in Reg 4(2) likely to be significantly affected by the development	Chapters 7-17 & Appendices

5	a description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from:	Chapters 7-17 & Appendices
a	the construction and existence of the development;	Chapters 7-17 & Appendices
b	the use of natural resources;	Chapters 7-17 & Appendices
c	the emission of pollutants, the creation of nuisances and the elimination of waste.	Chapters 7-17 & Appendices
d	the risks to human health, cultural heritage or the environment	Chapters 7-17 & Appendices
e	the cumulation of effects	Chapters 7-17 & Appendices
f	The impact of the project on the climate and the vulnerability of the project to climate change	Chapters 7-17 & Appendices
g	The technologies and substances used	Chapters 7-17 & Appendices
6	A description of the forecasting methods or evidence	Chapters 7-17 & Appendices
7	A description of the measures envisaged to avoid, prevent, reduce or if possible off-set any identified significant adverse effects	Chapters 7-17 & Appendices
8	A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters, which are relevant to the project concerned.	Chapters 7-17 & Appendices
9	A non-technical summary	See accompanying report
10	A reference list detailing the sources used for the description and assessments	Chapters 7-17 & Appendices

Environmental Statement

- 2.8 This ES comprises two volumes. The first part, Volume One, contains all of the written information about the proposed development, including the detailed assessment of significant environmental effects covered by subject area. The second part, Volume Two, contains a series of Technical Appendices for each of the individual topics contained within this document and includes all the relevant accompanying figures and drawings.

- 2.9 The introductory Chapters of this ES set out the background to the Project and UK Government Policy. This is followed by Chapters that set out the overall approach to the EIA of the development.
- 2.10 The main body of the ES covers the key environmental aspects that may be affected by the proposed development and assesses the potential impacts that may occur as a result of the development. For each technical assessment, a methodology for the assessment of impacts is presented, a description of the baseline environmental conditions is provided and, where necessary, appropriate mitigation measures are set out. A separate Appendices Report, divided into the relevant Chapters is provided within Volume Two.
- 2.11 A Non-Technical Summary (NTS) accompanies the planning submission, which summarises the contents of the ES. Its intended audience is those with an interest in the proposed development and general effects, but who are not concerned with the detailed environmental assessment. This has been issued as a standalone document and accompanies this ES.
- 2.12 Each individual environmental topic has an assessment methodology, which is reported in each Chapter. The approach to assessing any significance to an environmental effect relies on standards or codes of practice, consideration of the EIA Regulations, expert judgement, and the advice and views of the technical consultants. For each Chapter the reporting process has generally been undertaken to account for the following aspects, although the exact order and content of each Chapter may differ.

Introduction, Assessment Criteria and Methodology, Policy and Guidance

- 2.13 These introduce the basis of the assessment, and include reference to the guidance and methodologies followed, the definitions of the significance criteria used in the assessment, and the study areas assessed. This also includes relevant legal information and any particular consultation responses that are taken account of.

Baseline Conditions

- 2.14 These sections provide an explanation of the existing environment into which the development will be introduced. This has been undertaken through a review of literature and environmental records, consultations, site visits and site surveys.

Potential Effects and Impacts of the Development - Significance

- 2.15 Impacts are defined as physical changes to the environment attributable to the construction and operation of the proposed development. The effects of impacts on existing resources and receptors may be adverse or beneficial, direct or indirect, temporary or permanent. An assessment of significance is provided.

Cumulative Effect

- 2.16 Where appropriate, an assessment of the proposal against any other committed development within the study area has been undertaken. As this is assessed by each technical discipline, a separate chapter has not been provided.

Mitigation Measures and Residual Impacts

- 2.17 The incorporation of measures to avoid, reduce, remedy or compensate for potential significant effects as part of the design process is reported, together with mitigation commitments that are envisaged during construction. Impact assessments are made against the mitigated scheme, in recognition of the iterative design process. The residual environmental impacts, after mitigation, are the predicted effects on the environment of the proposed development.

Summary and Conclusion

- 2.18 An overall comment on the impact assessment of the proposed development in relation to the topic is provided.

Environmental Effects

- 2.19 The following environmental disciplines have been assessed with regard to the development proposals and are presented as separate chapters in this ES:

- Air Quality;
- Archaeology
- Daylight, Sunlight and Overshadowing;
- Ecology;
- Flooding and Drainage;
- Heritage;
- Highways;
- Landscaping;
- Noise;
- Contamination; and
- Wind.

This follows the Screening and Scoping of the ES, as set out in Chapter 6.

Supporting Documents

2.20 The following documents have also been prepared to support the planning application, they may be cross referenced in the ES where appropriate:

- Design and Access Statement;
- Planning Statement; and
- Statement of Community Engagement;

3 Site and Surrounding Area

Site

- 3.1 This application relates to a site at Monarchs Quay, Kings Dock, Liverpool. A site location plan is included at **Appendix 1**.
- 3.2 The site is located within the administrative boundary of the city of Liverpool, more specifically to the South of Liverpool City Centre. The site forms part of Liverpool's waterfront and is one of the remaining key sites to be developed along the former docks.
- 3.3 The site is 3.87 acres / 1.57 hectares and is bounded by the Exhibition Centre to the West, by the Echo Arena and BT Convention Centre to the North, the by The Keel to the South and by the Queens Dock and Wapping to the East.
- 3.4 The site is has a relatively flat topography and is currently in use as a flat surface car parks, for car parking and coach parking for visitors to the City. Also within the site, there is a small amount of landscaping with trees and grassed areas.
- 3.5 The site itself does not fall within the World Heritage Site but is within the Buffer Zone. There are a number of listed buildings within close proximity to the site, including the Hydraulic Tower (Grade II listed), the Gatekeepers Lodge (Grade II listed) and the Warehouse at Wapping Dock (Grade II* listed).
- 3.6 The site has a number of points of access but can be most directly accessed from Wapping / Chaloner Street (A5036) via Queens Wharf. The site is also well served by public transport, with Central Station and Liverpool Lime Street both within walking distance. There are a number of bus stops within the site and a major bus terminal located at Liverpool One. The Mersey Ferry Terminal at Pier Head is also within walking distance to the site.

Surrounding Area

- 3.7 There are a number of uses in the immediate and wider surrounding area. Immediately surrounding the site there are a number of residential blocks, including The Keel and Wapping Warehouse. These take the form of apartments converted from former warehouse buildings.

- 3.8 Also within the surrounding area are a number of tourist attractions including The Echo Arena, the BT Convention Centre and the Exhibition Centre Liverpool. These are large venues providing music and cultural events as well as conferences and exhibitions. Further tourist attractions can be found within close proximity at Albert Dock, Liverpool One and the Baltic Triangle. There are also a number of hotels in the surrounding area, including the Pullman Hotel, to serve the leisure and commercial uses.
- 3.9 The building heights in the surrounding area vary from one storey up to twenty four storey apartment blocks. Within the immediate surrounding area, the industrial and residential buildings are between two and ten storeys. Within the docks, the buildings range in height from 24m (Albert Dock Apartments and the Exhibition Centre Liverpool) to 40m (The Pullman Hotel).
- 3.10 The site is in a mixed use and sustainable location, within close proximity to the City Centre and well served by public transport.

4 Project Description

- 4.1 In 2012, Liverpool City Council published a Strategic Investment Framework (SIF) which aimed to guide economic growth within the City Centre over the next 15 years. The SIF identified the culture and visitor economy as one of four key economic sectors to drive growth. The Waterfront in particular was identified as an area that will continue to drive visitor numbers through focused investments
- 4.2 The SIF identified King's Dock for a 'destination' leisure facility, supported by the previous success of ACC and the growth of Liverpool's visitor economy. Since it opened in 2008, Arena and Convention Centre (ACC) has attracted 5 million visitors to 1,700+ events and generated £1 billion in economic benefit for the local economy.
- 4.3 Considering the City Council's aspiration to create a leisure destination at the site, a Masterplan (prepared by BDP) was published in 2012. The Masterplan covers the wider site, an area covering 4.6 hectares and previously owned by the HCA.
- 4.4 The Masterplan is based on the success of the surrounding area including The Echo Arena, BT Convention Centre, the Exhibition Centre Liverpool, three hotels, a multi-storey car park, apartment blocks, two restaurants and areas of public realm.
- 4.5 Following the publication of the SIF, the original Masterplan of 2012 was revisited in 2016 to fully express the opportunities for destination leisure at King's Dock. The site is one of the final development plots along the waterfront and therefore presents an opportunity for investment, whilst supporting the regeneration of the city including the Baltic Triangle and Docks.
- 4.6 A Planning Brief and Masterplan were published in May 2016, which set out the vision and development framework for the site. The King's Dock Masterplan and Planning Brief have been informed by consultation with key stakeholders that have an interest in the site and its operation.
- 4.7 The Masterplan stated that;
King's Dock will be an important destination within Liverpool's waterfront, offering an exciting mix of leisure attractions with year round appeal and associated shops, bars, restaurants, hotels, offices and homes. It will deliver outstanding design within an historic dockside setting and improve the connectivity of the waterfront with the wider city.
- 4.8 This application is the second planning application in respect of the wider masterplan for Kings Dock. These applications will all reflect the Council's Planning Brief and Masterplan to create a leisure destination, and will comprise the following:

Application 1 submitted in full on behalf of Monarchs Quay Holdings Ltd and includes;

- TCC office building (building 1).

Application 2 (i.e. this application) to be submitted in full and including;

- Interpretation centre (building 2);
- Carpark with ground floor retail (building 3); and
- Apartment block (building 4).

Application 3 to be submitted in outline (with details of access) and including;

- Ice Rink and Leisure Uses (building 5);
- Bowling Alley including Restaurants and Bars (building 6);
- Apartments blocks (building 7) and;
- Hotel (building 8).

The Proposal

- 4.9 This application seeks full planning application for a mixed use redevelopment of the site to include Interpretation Centre, offices, residential, car park and retail with associated landscaping and works at Monarchs Quay, Liverpool.

Building 2

- 4.10 Building 2 will be the Interpretation Centre. The Interpretation Centre is located at the entrance of the site and is currently set out over two levels, upper road level and lower water side level. The interpretation centre is conceived as a place where the overall masterplan can be interpreted to the local community, stake holders and end users. The building's proposed use will be as a modern office building with various unique meeting spaces including balcony spaces waterside garden spaces, roof top garden spaces, and casual breakout spaces within the circulation space.
- 4.11 The Interpretation Centre will form a gateway to the site. Due to the nature and shape of the site, the proposed building is triangular shape that can be interpreted as a bow of a ship. The sharp leading edge of the interpretation centre adds a vertical emphasis to the building that compliments the verticality of the hydraulic tower creating a sense of two entrance pillars.

Building 3

- 4.12 Building 3 will be predominately a car park but with ground floor retail space. The ground floor will accommodate a retail and/or commercial unit which will have a street frontage and main entrance facing Monarch's Quay. Vehicles enter and exit off Half Tide Wharf adjacent to the South core escape stair on a two way traffic managed system. The height of the building is circa 22.24 metres above ground level
- 4.13 The carpark will be constructed using a prefabricated steel frame system supported by a concrete frame and substructure up to first floor level. The new building will be a striking addition to the area. It will be seen from a distance when approaching both on foot and by car from all adjoining streets and be identified by its kinetic façade.

Building 4

- 4.14 Building 4 will be apartments with ground floor retail. The proposed development will be 22.20m in height. At the ground floor level the residential entrance is located on the north corner of the building at a key junction creating interaction with the water. Either side of the building there is a commercial unit, one opening out onto Queens Wharf and the other onto Queens Dock.
- 4.15 Vehicular access is provided off Keel Wharf to a covered car park that provides 33 spaces, 10 of these are DDA. Refuse stores and Plant will also be at ground floor level. Refuse storage is provided for the residents and one for each commercial unit.
- 4.16 In total there will be 102 apartments across 6 floors. This will be a mix of 1 bed (38 no.), 2 bed (53 no.) and 3 bed (11 no.) apartments.

Public Realm

- 4.17 As well as the three buildings, the site will include improvements to the public realm. Primary destination spaces will encourage foot fall with sub-spaces along the key routes; street scenes will incorporate tree planting, seating and encourage ground floor retail to spill out on the street to activate the public realm.

Assessment of Reasonable Alternatives

- 4.18 The consideration of reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the options chosen, taking into account effects of the development on the environment, is a mandatory requirement of the ES.

- 4.19 This application site forms part of the scope of the King's Dock Masterplan. A Masterplan for the site has been developed in line with the aspirations of the 2016 Masterplan to create a leisure destination at the site, whilst also creating a place for people to live and work.
- 4.20 Some aspects of the layout cannot be changed, for example the access is an existing point of access and no other alternatives can be provided. The height of the development has also been restricted by LCC and therefore this has limited the development to be within the range of the heights from the surrounding buildings, i.e. less than 24m.
- 4.21 The development options of the site have been considered in line with the King's Dock Masterplan and through discussions with Liverpool City Council. The layout has evolved in terms of design, but the uses and development plots has followed those set out in the Council's Masterplan. We do not consider 'no development' to be an option; the site is brownfield, vacant and identified for leisure use in the Council's plan. Wider benefits such as the level of investment into the economy and number of jobs should also be considered.

Planning Policy Position

- 4.22 The planning applications will be determined in accordance with the Development Plan unless material considerations indicate otherwise. The Planning Statement submitted alongside this application makes reference to the following national and local planning policies and guidance documents:
- The National Planning Policy Framework (NPPF) (March 2012);
 - The Unitary Development Plan (UDP) (November 2002); and
 - Supplementary Planning Guidance and Supplementary Planning Documents
- 4.23 At a national level, planning policy and guidance is contained in the National Planning Policy Framework (NPPF). This document was published in March 2012 and is a material consideration in the planning process.
- 4.24 At a local level planning applications are currently determined using the 'saved' policies of the Unitary Development Plan (UDP) which was adopted in November 2002. The UDP will gradually be replaced by the Liverpool Local Plan but, until this time, the UDP policies will, where they are considered to be consistent with the NPPF, still be used to determine planning applications.
- 4.25 Within the UDP Proposals Map (see **Appendix 2**), the site is allocated as being within;
- A Site for Various Types of Development (Policy E6).
 - A Developed Coastal Zone (Policy OE4)
- 4.26 The relevant policies are enclosed in **Appendix 3**.

5 Screening and Scoping

Screening

- 5.1 The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 require that, before consent may be granted for certain types of development, an EIA must be undertaken. The EIA Regulations set out the types of development which must always be subject to an EIA (Schedule 1 development) and other developments which may require assessments if they have the potential to give rise to significant environmental impacts (Schedule 2 development).
- 5.2 In accordance with the EIA Regulations, a Screening Request was submitted to Liverpool City Council (LCC) by Knight Frank LLP, on behalf of Monarchs Quay Holdings Ltd, in June 2017. This is included at **Appendix 4**.

Scoping

- 5.3 On 8 June 2017, Knight Frank submitted an ES Scoping Report to LCC to agree the scope and format of the ES. This is included at **Appendix 5**. LCC's response advises that critical issues relating to the site and these are what the ES should focus on.
- 5.4 These comments were circulated to the technical consultant team to inform the scope of the ES. The technical consultant team also consulted with statutory consultees independently prior to undertaking their assessments in order to agree the methodology and broad scope of their assessments. Where appropriate and applicable, details of these consultations are set out within the individual Chapters of this ES.

6 Phasing and Construction

Phasing

- 6.1 The development will be needed to be phased and coordinated in order to ensure the right infrastructure is available for each of the different buildings and public realm and the site is completed with priority on the new multi-storey car park being in operation first.
- 6.2 The first phase is likely to be the diversion and coordination of below ground drainage both storm water and foul to the different buildings along with the utilities of water gas and telecoms.
- 6.3 Construction is likely to be within the second quarter of 2018.
- 6.4 On completion of the below ground services works the public highways will be aligned to their new locations in particular Monarchs Quay which will include the provision of the bus stop, car access to the multi-story car park and modification works to the ACCL service yard vehicular entrance.
- 6.5 The multi-storey car park will be the first of the three building to be constructed with construction traffic utilising access from Wapping and Challenger Street onto Queens Warf
- 6.6 It could be foreseen that the Residential building may also be in construction during the car park construction phase with vehicle access in the same manner as the car park.
- 6.7 Each development plot will have its own site establishment, including loading and unloading and storage facilities. Where site constraints are such that won't allow storage of all needed materials off site storage will be utilised and deliveries schedule on a just in time basis.
- 6.8 The Interpretation / office building will be the last of the buildings to be constructed at the entrance to scheme. As this is by its nature a very constrained site, consideration is being given to modular construction to minimise impact to the entrance of the site and for ease of delivery.
- 6.9 The public realm will be coordinated to be delivered in line with the completion of each building in some areas to prevent damage by construction traffic temporary surfacing may be utilised
- 6.10 With all the buildings complete the final surface treatments of the highways and public realm will be completed.

Construction

- 6.11 The development would be progressed in a number of phases and is likely to be undertaken by a number of different construction contractors. Individual contracts would incorporate relevant requirements in respect of environmental controls, based largely on the standard of 'good working practice' as well as Statutory Requirements
- 6.12 Contractors would be required to work in accordance with the principles contained within an Outline Construction Environmental Management Plan (CEMP), which would be prepared during detailed design development and which would include reference to mitigation measures identified within this ES. Construction contractors would be expected to incorporate the Outline CEMP principles within their own detailed CEMPs for the works that they would be undertaking.
- 6.13 The Principal Contractor would deal with public and other enquiries or complaints. A nominated individual would be named at the site entrance and a contact number provided. Their details would be notified to all interested parties, bodies and community groups, prior to the start of site activities, and shall be updated whenever a change of responsibility occurs. In addition, a notice board would be erected at the site entrance giving details of construction of the development, site management and all relevant contact numbers in the event of an emergency.
- 6.14 Working hours for construction can be conditioned and prior to the commencement of the works. All work outside these agreed hours would be subject to prior agreement, and/or reasonable notice, to the Council.
- 6.15 In the event of unusual activities or significant events that can be anticipated, these would be notified to the interested parties, potentially affected property owners or occupiers and neighbours, in advance. The relevant activities would be determined by agreement with the Council once the detailed programme of construction is defined and would include:
- commencement of site clearance/construction in certain areas;
 - necessary night time, weekend or evening working (outside core hours);
 - road or footpath closures/diversions;
 - movements of wide or exceptional loads; and
 - work on roads affecting traffic.

7 Air Quality

Introduction

- 7.1 An assessment of the likely significant effects from emissions to air from, or associated with, the Proposed Development has been undertaken by Wardell Armstrong LLP.
- 7.2 This chapter of the Environmental Statement (ES) describes the legislative framework applicable to air quality and describes how the effects of the Proposed Development during construction and operational phases have been assessed.
- 7.3 The baseline conditions of the Proposed Development Site (PDS) and adjacent areas that may be affected by the Proposed Development at the time of the assessment are presented. The results of the assessment are also presented, in particular likely significant environmental effects, for the construction and operational phases of the Proposed Development.
- 7.4 Where appropriate, mitigation measures, proposed to reduce or remove any potential impacts, are described. Finally, the likely residual impact of the Proposed Development on air quality is discussed.
- 7.5 With regard to potential impacts associated with the proposed mixed-use development, the following has been considered:
- A qualitative assessment of the potential air quality impacts of dust arising from the construction phase of works; and
 - Air dispersion modelling, using ADMS-Roads, to assess the potential effects of development generated traffic emissions associated with the operational phase of the Proposed Development.
- 7.6 This chapter should be read in conjunction with chapters 4 of the ES, which give details of the PDS location and proposed development works to be undertaken at the PDS respectively.

Legislative Framework

Air Quality Legislation and National Air Quality Strategy

- 7.7 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 sets objectives for eight pollutants, which may potentially occur in the UK at levels that give cause for concern. These pollutants are: nitrogen dioxide (NO₂), sulphur dioxide (SO₂), carbon monoxide (CO), lead (Pb), fine particulate matter (PM₁₀), benzene (C₆H₆), 1, 3-butadiene and ozone (O₃).

- 7.8 The Strategy was reviewed and a Review Report¹ and Consultation Document² were published by the Department of the Environment, Transport and the Regions in 1999. A revised version (The Air Quality Strategy (AQS) 2000), which supersedes the 1997 Strategy, was published in January 2000. The AQS 2000 strengthens the objectives for a number of pollutants with the exception of that for particulates, which was replaced with the less stringent EU limit value.
- 7.9 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, 2000³ and Air Quality (England) (Amendment) Regulations 2002⁴ ('the Regulations').
- 7.10 In 2007 the Air Quality Strategy was revised. This latest strategy⁵ does not remove any of the objectives set out in the previous strategy or its addendum, apart from replacing the provisional 2010 objective for PM₁₀ 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}).
- 7.11 EU Directive 2008/50/EC⁶ 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}.
- 7.12 The current Air Quality Standards and Objectives, as set out in the Air Quality Standards Regulations 2010, are detailed in Table 1.1.

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

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

7.13

Table 1.1: 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 ₆ H 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 ₄ H ₆)	2.25µg/m ³	Running annual mean	All local authorities
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
* Target value for England as local authorities have a flexible role in working towards reducing emissions and concentrations of PM _{2.5} (LAQMTG.16).			

Legislative Requirement for Local Air Quality Management Guidance

- 7.14 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, July 2007, establishes the framework for air quality improvements based on measures agreed at a national and international level.
- 7.15 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.
- 7.16 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.
- 7.17 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 (USA) and
 - Detailed Assessments
- 7.18 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 AQMAs and make action plans for improvements in air quality, in pursuit of the national air quality objectives.
- 7.19 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. This technical guidance was subsequently updated following a consultation process, and in January 2016 the LAQM Technical Guidance document LAQM.TG(16) was published by Defra.
- 7.20 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.

- 7.21 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.
- 7.22 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, updating and screening assessments and detailed assessments.
- 7.23 Local authorities now have the option of a fast track AQMA declaration. 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.
- 7.24 Examples of where the Air Quality Objectives should/should not apply are also detailed in LAQM.TG(16) and in Table 1.2.

7.25

Table 1.2: Examples of Where the Air Quality Objectives Should Apply		
Averaging Period	Objectives Should Apply at:	Objectives Should Generally Not Apply at:
Annual mean	<p>All locations where members of the public might be regularly exposed.</p> <p>Building façades of residential properties, schools, hospitals, care homes, etc.</p>	<p>Building facades of offices or other places of work where members of the public do not have regular access.</p> <p>Hotels, unless people live there as their permanent residence.</p> <p>Gardens of residential properties.</p> <p>Kerbside sites (as opposed to locations at the building façade) or any other location where public exposure is expected to be short term</p>
24-hour mean and 8-hour mean	<p>All locations where the annual mean objectives would apply together with hotels.</p> <p>Gardens of residential properties^a</p>	<p>Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term</p>
1-hour mean	<p>All locations where the annual mean and 24 and 8-hour objectives apply. Kerbside sites (e.g. pavements of busy shopping streets).</p> <p>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.</p> <p>Any outdoor locations to which the public might reasonably be expected to spend one hour or longer</p>	<p>Kerbside sites where public would not be expected to have regular access</p>

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		

National Planning Policy

- 7.26 The National Planning Policy Framework⁸, 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.
- 7.27 On 6th March 2014, the Department for Communities and Local Government (DCLG) launched the Planning Practice Guidance web-based resource. This provides guidance on the approach to air quality.
- 7.28 The Planning Practice Guidance⁹ 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).
- 7.29 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.

Local Planning Policy

- 7.30 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:

⁸ Department for Communities and Local Government, March 2012, National Planning Policy Framework

⁹ Department for Communities and Local Government, March 2014, Planning Practice Guidance: Air Quality

- 7.31 STP2. Sustainable Growth Principles and Managing Environmental Impacts (i): Minimise adverse impacts on, and include measures to improve air quality within the City.
- 7.32 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.
- 7.33 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.
- 7.34 Policy TP1 – Improving Accessibility and Managing Demand for Travel
- 7.35 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. The LCC Air Quality Action Plan indicates that the predominant source of NO_x in Britain is road transport and the highest concentrations of NO₂ are generally found close to busy roads in urban areas. NO₂ 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.

Liverpool City Council Local Air Quality Management Review and Assessment

- 7.36 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 NO₂ 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.
- 7.37 LCC undertook automatic (continuous) monitoring at two sites, and non-automatic (passive diffusion tubes) monitoring of NO₂ 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 NO₂ concentration of 60-67µg/m³ in 2016.

Institute of Air Quality Management Guidance for Air Quality Assessments

- 7.38 To assess the impacts associated with dust and PM₁₀ releases, during the construction phase of the proposed development, an assessment has been undertaken in accordance with Institute of Air Quality Management (IAQM) guidance¹⁰. Guidance has also been prepared by Environmental Protection UK (EPUK) and the IAQM in relation to the assessment of the air quality impacts of proposed developments and their significance¹¹. This guidance has also been considered within the air quality assessment.

Assessment Methodology

The Study Area

- 7.39 The air quality assessment has considered proposed future receptor locations situated within the PDS and existing receptor locations along the following roads:
- Queens Wharf;
 - Keel Wharf;
 - Monarchs Quay;
 - A5036 Wapping;
 - A562 Chaloner Street;
 - A5036 The Strand; and
 - Water Street.
- 7.40 Drawing MC10155-001 shows the location of the receptor locations, both existing and proposed, which have been considered within the road traffic emissions assessment.

Baseline Surveys

Desk-Based Research

Road Traffic Data

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

¹⁰ Institute of Air Quality Management (IAQM) 'Guidance on the Assessment of Dust from Demolition and Construction', February 2014

¹¹ Environmental Protection UK and the Institute of Air Quality Management, Land-Use Planning and Development Control: Planning for Air Quality, 2017

- 7.42 Detailed traffic flow information, for use in the ADMS-Roads air dispersion model, has been obtained from Vectio Consulting, the appointed transport consultant for the project.
- 7.43 Traffic flow information has been provided by the transport consultant as 24-hour Annual Average Daily Traffic (AADT) flows, with HGV percentages, for the links listed in the study area section.

Meteorological Data

- 7.44 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.
- 7.45 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.

Background Air Pollutant Concentrations

- 7.46 The air quality assessment takes into account background pollutant concentrations. 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.
- 7.47 In the absence of representative background NO₂, PM₁₀ and PM_{2.5} monitoring data for the local area, background concentrations have been obtained from the 2013-based Defra default concentration maps, for the appropriate 1km x 1km grid squares, which are available on the Defra website¹².

Roadside Air Pollutant Concentrations

- 7.48 The air quality assessment takes into account roadside pollutant monitoring data, where available. LCC undertook automatic (continuous) monitoring at two sites, and non-automatic (passive diffusion tubes) monitoring of NO₂ at 43 sites during 2016. Three of the diffusion tubes are situated along roads within the considered study area. These three tubes are classified as roadside, and are triplicate located at the junction of Water Street/ Strand Street. Roadside monitoring data from these three tubes has been used within the model verification process.

¹² 2011-Based Background Maps, Defra Local Air Quality Management web pages (<http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>)

Field Surveys

- 7.49 No field surveys were required for the air quality assessment.

Consultations

- 7.50 Consultation was undertaken, between 10th February and 16th February 2017, 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 (NO₂) and fine particulate matter (PM₁₀ 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;
 - Background NO₂, PM₁₀ and PM_{2.5} concentrations will be obtained from the 2013-based Defra default concentration maps. A sensitivity analysis will be undertaken as part of the assessment, where the base year background concentrations will be used for both the baseline year and opening/future year scenarios;
 - There is a representative roadside diffusion tube monitoring location on Water Street, this Nitrogen Dioxide (NO₂) 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.
- 7.51 Since the agreement of the air quality assessment methodology with Mr Farrell, the phasing of the proposed development have been revised. However, it is considered the methodology detailed above still stay relevant and robust.

Method of Assessing Significance

7.52 Construction Phase Assessment: Dust and Fine Particulate Matter Emissions

7.53 To assess the impacts associated with dust and PM₁₀ releases, during the construction phase of the proposed development, an assessment has been undertaken in accordance with Institute of Air Quality Management (IAQM) guidance¹³.

Step 1

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

7.55 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).

7.56 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

7.57 Step 2 of the assessment determines the potential risk of dust 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.

7.58 The risk of dust and PM₁₀ 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:

¹³ Institute of Air Quality Management (IAQM) 'Guidance on the Assessment of Dust from Demolition and Construction', February 2014

- 7.59 **Step 2A** – the scale and nature of the works which determines the potential dust emission magnitude as small, medium or large (based on criteria included within the IAQM guidance); and
- 7.60 **Step 2B** – the sensitivity of the area to dust impacts which is defined as low, medium or high sensitivity (based on criteria included within the IAQM guidance).
- 7.61 These two factors are combined in Step 2C to determine the risk of dust impacts with no mitigation applied.
- 7.62 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

- 7.63 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 BMBC14, the Greater London Authority¹⁵, 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

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

Existing Sensitive Receptors – Human Receptors

- 7.65 The closest sensitive receptor locations to the proposed development are mostly residential in nature, and are detailed in Table 1.3.

¹⁴ Barnsley Metropolitan Borough Council: Demolition and Construction Dust Guidance

¹⁵ Greater London Authority (2006) The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance

Table 1.3: Existing Dust Sensitive Receptors – Human Receptors

Receptor	Direction from the Site	Approximate Distance from the Site Boundary (m)
Existing residential apartments along Keel Wharf	North	117m at the closest point
Existing residential apartments along the A5036 Wapping	North east	70m at the closest point
Hotel Campanile Liverpool Queens Dock	South east	<20m at closest point
The Keel Apartments and associated car park	South	35m at closest point
Exhibition Centre Liverpool	West	29m at closet point

Existing Dust Sensitive Receptors – Ecological Receptors

- 7.66 There are no ecological receptors, or potentially dust sensitive statutory designated habitat sites, within 50m of the site and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s). Ecological effects do not therefore need to be considered within this assessment

Significance Criteria

- 7.67 The IAQM guidance¹⁶ states that the dust emission magnitude should be based on the scale of the anticipated works and classified as low, moderate, or high. Table 1.4 describes the IAQM criteria, for designating the emission magnitude, for demolition, earthworks, construction activities and trackout.

¹⁶ Institute of Air Quality Management 'Guidance on the Assessment of Dust from Demolition and Construction', February 2014

Table 1.4: IAQM Criteria for Defining the Dust Emission Magnitude				
Dust Emission Magnitude	Demolition	Earthworks	Construction	Trackout
High	Total building volume >50,000 m ³ , potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level	Total site area >10,000 m ² , potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes	Total building volume >100,000 m ³ , on site concrete batching, sandblasting	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m
Medium	Total building volume 20,000 m ³ – 50,000 m ³ , potentially dusty construction material, demolition activities 10-20 m above ground level	Total site area 2,500 m ² – 10,000 m ² , moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m - 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes	Total building volume 25,000 m ³ – 100,000 m ³ , potentially dusty construction material (e.g. concrete), on site concrete batching	10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m
Low	Total building volume <20,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months	Total site area <2,500 m ² , soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months	Total building volume <25,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber).	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m

7.68 The guidance details criteria for assessing the sensitivity of an area to dust soiling effects and human health effects of PM₁₀ as summarised in Tables 1.5 to 1.7 below. The guidance then goes on to provide significance criteria for the classification of dust soiling effects and human health effects from demolition, earthworks, construction activities and trackout, as summarised in Tables 1.8 to 1.10.

Sensitivity of the Area – Human Receptors

7.69 The sensitivity categories for different types of receptors, to both dust soiling effects and the health effects of PM₁₀, are described in Table 1.5.

Table 1.5: 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 be 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.

7.70 Based upon the category of receptor sensitivity, the sensitivity of the area to dust soiling effects is determined using the criteria detailed in Table 1.6.

Table 1.6: 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
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7.71 Based upon the category of receptor sensitivity, the sensitivity of the area to the human health effects of PM₁₀ is determined using the criteria detailed in Table 1.7.

Table 1.7: 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
	28-32µg/m ³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28µg/m ³	>10	Low	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

- 7.72 The risk of dust being generated by demolition activities at the site is determined using the criteria in Table 1.8.

Table 1.8: 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

- 7.73 The risk of dust being generated by earthworks and construction activities at the site is determined using the criteria in Table 1.9.

Table 1.9: 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

- 7.74 The risk of dust being generated by trackout from the site is determined using the criteria in Table 1.10.

Table 1.10: 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

7.75 Any impact greater than negligible is considered to be significant.

7.76 ***Operational Phase Assessment: Road Traffic Emissions***

7.77 Guidance has been prepared by Environmental Protection UK (EPUK) and the IAQM in relation to the assessment of the air quality impacts of proposed developments and their significance¹⁷. This guidance has been considered within the air quality assessment.

7.78 The air dispersion model ADMS-Roads (CERC, Version 4.0.1.0) has been used to assess the potential impact of development generated traffic on air quality at existing receptor locations. The air dispersion model has been used to predict NO₂, PM₁₀ and PM_{2.5} concentrations, as these are the pollutants considered most likely to exceed the air quality objectives.

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

- The verification and base year (2016); and
- An opening/future year of the development (2022): This is considered both without the development and with the development in place.

Road Traffic Data

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

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

7.82 Traffic flow information has been provided by the transport consultant as 24-hour Annual Average Daily Traffic (AADT) flows, with HGV percentages.

7.83 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;

¹⁷ Environmental Protection UK and the Institute of Air Quality Management, Land-Use Planning and Development Control: Planning for Air Quality, 2017

- 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

7.84 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).

7.85 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 Verification and Base Year;
- Scenario 2: 2022 Opening/Future Year - Without Development + Committed Developments;
- Scenario 3: 2022 Opening/Future Year - With Development + Committed Developments;

Model Validation

7.86 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.

Model Verification and Adjustment

7.87 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).

7.88 LCC undertake roadside NO₂ monitoring at a representative roadside location, situated at Strand Street/Water Street junction, for which traffic data is also available. Therefore, verification has been carried out for modelled NO₂ concentrations.

7.89 Conversely, as no PM₁₀ or PM_{2.5} monitoring locations are situated along roads where traffic flow data is available verification could not be carried out for modelled PM₁₀ or PM_{2.5} concentrations.

7.90 The monitoring data that has been used in the model verification procedure is detailed in Table 1.11.

Table 1.11: 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/m ³)
		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

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

Significance Criteria

7.92 Guidance has been prepared by Environmental Protection UK (EPUK) and the IAQM in relation to the assessment of the air quality impacts of proposed developments and their significance¹⁸. The air dispersion model ADMS-Roads (CERC, Version 4.0.1.0) has been used to assess the potential impact of development generated traffic on air quality at existing receptor locations.

7.93 The impact of a development is usually assessed at specific sensitive receptors (i.e. where the relevant AQAL applies), and takes into account background pollutant concentration, in relation to the AQAL at these receptors, and the change with the development in place.

7.94 The EPUK and IAQM document provides descriptors for the magnitude of change in pollutant concentration relative to the air quality assessment level (AQAL), as shown in Table 1.12.

Table 1.12: Descriptors for the Magnitude of Change in Pollutant Concentration Relative to the Air Quality Assessment Level (AQAL)	
Percentage Change in Concentration Relative to Air Quality Assessment Level (AQAL)	Definition of Magnitude*
<0.5%	Negligible
1%	Small

¹⁸ Environmental Protection UK and the Institute of Air Quality Management, Land-Use Planning and Development Control: Planning for Air Quality, 2017

2 – 5%	Medium
6 – 10%	High
>10%	Very High
* Based on professional opinion.	

7.95 The EPUK and IAQM document also provides descriptors for the long term average concentration at receptors, as shown in Table 1.13.

Table 1.13: Descriptors for the Long Term Average Concentration at Receptors	
Long Term Average Concentration at Receptor in Assessment Year	Definition of Sensitivity*
75% or less of AQAL	Small
76-94% of AQAL	Medium
95-102% of AQAL	High
103-109% of AQAL	Very High
110% or more of AQAL	Very High
* Based on professional opinion.	

7.96 The EPUK and IAQM impact descriptors for an individual receptor, taking into account the magnitude of change in pollutant concentration relative to the AQAL and the long term average concentration at the receptor, are detailed in Table 1.14.

Table 1.14: Impact Descriptors for Individual Receptors				
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*

7.97 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'. Once the impact of the proposed development has been assessed for the individual receptors, the overall significance is determined using professional judgement in accordance with the EPUK / IAQM guidance. 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.

7.98 Any impact greater than slight adverse is considered to be significant.

Baseline Conditions

Long Term Annual Mean NO₂, PM₁₀ and PM_{2.5} Concentrations

Background Air Pollutant Concentrations

- 7.99 The air quality assessment takes into account background concentrations. 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.
- 7.100 In the absence of representative background NO₂, PM₁₀ and PM_{2.5} monitoring data being available for the local area, background concentrations have been obtained from the 2013-based Defra default concentration maps, for the appropriate 1km x 1km grid squares, which are available on the Defra website¹⁹.
- 7.101 Current evidence suggests that background NO₂ concentrations are not decreasing in accordance with expected reductions. A sensitivity analysis has therefore been undertaken whereby 2016 background concentrations and vehicle emission factors have been applied to the opening and future year scenarios. This is considered to be a conservative approach, as it is likely that there will be some improvement in background air quality, and vehicle emissions, in future years.

¹⁹ 2011-Based Background Maps, Defra Local Air Quality Management web pages (<http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>)

7.102 The background pollutant concentrations used in the assessment are detailed in Table 1.15.

Table 1.15: Background Air Pollutant Concentrations				
Receptor Locations & Grid Reference	Annual Mean Concentrations (µg/m³)			
	NO ₂	NO _x	PM ₁₀	PM _{2.5}
2016 Background Pollutant Concentrations				
Strand Street/ Water Street junction (333500, 390500)	26.80	18.50	N/A	N/A
ESR1 (335500, 389500)	29.68	20.22	14.37	10.11
ESR2 (334500, 388500)	22.37	15.75	12.62	8.95
ESR3 – ESR7, PR1 & PR2 (334500, 389500)	27.80	19.12	13.84	9.71
2022 Background Pollutant Concentrations				
Strand Street/ Water Street junction (333500, 390500)	N/A	N/A	N/A	N/A
ESR1 (335500, 389500)	21.40	15.19	13.80	9.55
ESR2 (334500, 388500)	17.05	12.35	12.14	8.49
ESR3 – ESR7, PR1 & PR2 (334500, 389500)	20.19	14.43	13.29	9.16

Receptor Locations: Existing Sensitive Receptors

7.103 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 for which the annual mean air quality objectives apply and are the most likely to be impacted by the Proposed Development. Details of these are given in Table 1.16, and their locations are shown on drawing MC10155 - 001.

Table 1.16: Existing Human Sensitive Receptor Locations				
Receptor	Address	Grid Reference		Receptor Type
		Easting	Northing	
ESR1	68 Parliament St, Liverpool	335080	389050	Residential
ESR2	X1 The Studios, 15 Caryl St, Liverpool	334837	388999	Residential
ESR3	28 Wapping, Liverpool	334521	389365	Residential (First Floor)

ESR4	2 Hurst St, Liverpool	334497	389512	Residential (First Floor)
ESR5	33A Wapping, Liverpool	334471	389582	Residential (First Floor)
ESR6	16 Monarchs Quay, Liverpool	334328	389313	Residential (First Floor)
ESR7	Keel Apartments, Liverpool	334409	389014	Residential

Modelled Baseline Concentrations

7.104 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 NO₂, PM₁₀ and PM_{2.5} concentrations are detailed in Table 1.17 and Appendix D.

Table 1.17: Predicted NO ₂ , PM ₁₀ and PM _{2.5} concentrations at Existing Sensitive Receptor Locations for 2016 and 2022 'Without Development' Scenarios						
Receptor	Calculated Annual Mean Concentrations (µg/m ³)					
	NO ₂ *† (Adjusted)		PM ₁₀ (Unadjusted)		PM _{2.5} (Unadjusted)	
	2016	2022	2016	2022	2016	2022
ESR1	46.14	30.51	15.94	15.49	11.05	10.48
ESR2	34.22	22.88	13.61	13.20	9.54	9.08
ESR3	36.32	24.20	14.78	14.30	10.27	9.72
ESR4	40.52	26.77	15.08	14.63	10.45	9.90
ESR5	39.65	26.23	15.02	14.56	10.41	9.86
ESR6	23.36	16.70	14.03	13.49	9.83	9.27
ESR7	20.70	15.29	13.91	13.37	9.75	9.20
* NO ₂ concentrations obtained by inputting predicted NO _x concentrations into the NO _x to NO ₂ calculator ²⁰ in accordance with LAQM.TG(16).						
† Predicted concentrations adjusted in accordance with verification process.						

²⁰ NO_x to NO₂ Calculator, Defra Local Air Quality Management web pages (<http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html>)

Scenario 1: 2016 Base Year

- 7.105 The 2016 baseline annual mean NO₂ concentrations (adjusted) are predicted to range from 20.70 to 46.14µg/m³ for the seven existing sensitive receptor locations considered. Exceedance of the annual mean objective concentration for NO₂ (40µg/m³) is predicted to occur at ESR 1 (68 Parliament St) and ESR 4 (2 Hurst St).
- 7.106 ESR 1 is located adjacent to the A562 Parliament Street, and ESR 9 is located next to the A5036 Wapping. Given the proximity to these busy roads, and their location within the existing AQMA, exceedances are therefore considered likely at these locations.
- 7.107 The 2016 baseline annual mean PM₁₀ concentrations (unadjusted) are predicted to range from 13.61 to 15.94µg/m³ for the seven existing sensitive receptor locations considered. Exceedance of the annual mean objective concentration for PM₁₀ (40µg/m³) is not predicted to occur.
- 7.108 The 2016 baseline annual mean PM_{2.5} concentrations (unadjusted) are predicted to range from 9.54 to 11.05µg/m³ for the seven existing sensitive receptor locations considered. Exceedance of the annual mean target value for PM_{2.5} (25µg/m³) is not predicted to occur.

Scenario 2: 2022 Opening/Future Year, Without Development

- 7.109 The 2022 baseline annual mean NO₂ concentrations (adjusted) are predicted to range from 15.29 to 30.51µg/m³ for the seven existing sensitive receptor locations considered. Exceedance of the annual mean objective concentration for NO₂ (40µg/m³) is not predicted to occur.
- 7.110 The 2022 baseline annual mean PM₁₀ concentrations (unadjusted) are predicted to range from 13.20 to 15.49µg/m³ for the seven existing sensitive receptor locations considered. Exceedance of the annual mean objective concentration for PM₁₀ (40µg/m³) is not predicted to occur.
- 7.111 The 2022 baseline annual mean PM_{2.5} concentrations (unadjusted) are predicted to range from 9.08 to 10.48µg/m³ for the seven existing sensitive receptor locations considered. Exceedance of the annual mean target value for PM_{2.5} (25µg/m³) is not predicted to occur.

Assessment of Effects

Effects Scoped Out

Construction Phase: Road Traffic Emissions

7.112 It is not anticipated that either of the following IAQM criteria will be triggered on any road within the local network during the construction phase of the development.

- A change of LDV flows of more than 500 AADT; and / or
- A change of HDV flows of more than 100 AADT.

7.113 Therefore, it is not considered necessary to undertake a road traffic emissions assessment for construction vehicles.

Construction and Operational Phases: Ecological Impacts

7.114 According to the Multi Agency Geographic Information for the Countryside resource, there are no potentially sensitive designated habitat sites within close proximity to the proposed development site (i.e. 2km). Therefore, ecological effects do not need to be considered.

Limitations and Assumptions

7.115 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.

7.116 Construction Phase Assessment: Dust and Fine Particulate Matter Emissions

7.117 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 individual building access roads, the car parking areas and the buildings themselves; 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.

7.118 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

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

Step 2B

7.120 Step 2B of the construction phase dust assessment has defined the sensitivity of the area, taking into account the significance criteria detailed in Tables 11.4 to 11.6, to demolition, earthworks, construction activities and trackout. The sensitivity of the area to each activity is assessed for potential dust soiling and human health.

7.121 For earthworks and construction activities, there are between ten and one hundred long term car parking spaces within 20m of where these activities may take place, and Liverpool Exhibition Centre within 50m of where these activities may take place.

7.122 For trackout, there are between ten and one hundred long term car parking spaces and between ten and one hundred residential properties within 20m of where trackout may occur, for a distance of up to 500m from potential site entrance(s).

Step 2C

7.123 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.

7.124 The risk of dust impacts from each activity, with no mitigation in place, has been assessed in accordance with the criteria detailed in Tables 1.8 to 1.10.

Summary

- 7.125 Table 1.18 details the results of Step 2 of the construction phase assessment, in accordance with current IAQM guidance.

Table 1.18: Construction Phase Dust Assessment (Step 2)				
	Activity			
	Demolition	Earthworks	Construction	Trackout
Step 2A				
Dust Emission Magnitude	N/A	Large ^a	Large ^b	Medium ^c
Step 2B				
Sensitivity of Closest Receptors	N/A	High ^e	High ^e	High ^e
Sensitivity of Area to Dust Soiling Effects	N/A	High	High	High
Sensitivity of Area to Human Health Effects	N/A	Low ^d	Low ^d	Low ^d
Step 2C				
Dust Risk: Dust Soiling	N/A	High	High	Medium
Dust Risk: Human Health	N/A	Low	Low	Low
<p>a. Total site area of more than 10,000m².</p> <p>b. Total building volume estimated to be more than 100,000m³, with potentially dusty construction materials.</p> <p>c. Number of construction phase vehicles estimated to be between 10 and 50 movements per day.</p> <p>e. Receptor sensitivity varied between medium and high. Therefore, an overall sensitivity of high was adopted for this assessment in order to provide a robust approach.</p> <p>d. Background annual mean PM₁₀ concentration is considered to be less than 24µg/m³ (based on data obtained from the Defra default concentration maps).</p>				

Operational Phase Assessment: Road Traffic Emissions

Existing Sensitive Receptor Locations

- 7.126 The impact assessment has been carried out for the seven representative sensitive receptor locations (i.e. ESR 1 to ESR 7). Table 1.19 shows the changes in pollutant concentrations for the 2022 opening/future year, for both the 'Without Development' and 'With Development' scenarios. The PM₁₀, PM_{2.5} and NO₂ concentrations are also included in Appendix D.

Table 1.19: Predicted NO₂, PM₁₀ and PM_{2.5} Concentrations at Existing Sensitive Receptor Locations for 2022 'Without Development' and 'With Development' Scenarios

Receptor	Level of Development	Calculated Annual Mean Concentrations (µg/m ³)		
		NO ₂ *†	PM ₁₀	PM _{2.5}
ESR 1	Without development	30.51	15.49	10.48
	With development	31.14	15.56	10.52
	<i>Percentage Change in relation to AQAL</i>	+1.58%	+0.19%	+0.10%
ESR 2	Without development	22.88	13.20	9.08
	With development	23.35	13.25	9.10
	<i>Percentage Change in relation to AQAL</i>	+1.18%	+0.12%	+0.07%
ESR 3	Without development	24.20	14.30	9.72
	With development	24.45	14.32	9.73
	<i>Percentage Change in relation to AQAL</i>	+0.63%	+0.06%	+0.03%
ESR 4	Without development	26.77	14.63	9.90
	With development	26.94	14.65	9.91
	<i>Percentage Change in relation to AQAL</i>	+0.43%	+0.05%	+0.03%
ESR 5	Without development	26.23	14.56	9.86
	With development	26.37	14.57	9.87
	<i>Percentage Change in relation to AQAL</i>	+0.35%	+0.04%	+0.02%
ESR 6	Without development	16.70	13.49	9.27
	With development	17.34	13.55	9.30
	<i>Percentage Change in relation to AQAL</i>	+1.60%	+0.14%	+0.08%
ESR 7	Without development	15.29	13.37	9.20
	With development	15.40	13.38	9.21
	<i>Percentage Change in relation to AQAL</i>	+0.28%	+0.02%	+0.01%

* NO₂ concentrations obtained by inputting predicted NO_x concentrations into the NO_x to NO₂ calculator²¹ in accordance with LAQM.TG(16).

† Predicted concentrations adjusted in accordance with verification process.

Scenario 3: 2022 Opening/Future Year, With Development

- 7.127 The 2022 'with development' annual mean NO₂ concentrations (adjusted) are predicted to range from 15.40 to 31.14µg/m³ for the seven existing sensitive receptor locations considered. Exceedance of the annual mean objective concentration for NO₂ (40µg/m³) is not predicted to occur.
- 7.128 The 2022 'with development' annual mean PM₁₀ concentrations (unadjusted) are predicted to range from 13.25 to 15.56µg/m³ for the seven existing sensitive receptor locations considered. Exceedance of the annual mean objective concentration for PM₁₀ (40µg/m³) is not predicted to occur.
- 7.129 The 2022 'with development' annual mean PM_{2.5} concentrations (unadjusted) are predicted to range from 9.10 to 10.52µg/m³ for the seven existing sensitive receptor locations considered. Exceedance of the annual mean target value for PM_{2.5} (25µg/m³) is not predicted to occur.

Assessment of Impact

- 7.130 Using the descriptors detailed in Table 1.14, the impact of the Proposed Development can be assessed at each of the sensitive receptors considered.
- 7.131 The impact on NO₂ concentrations in 2022 is detailed in Table 1.20.

Table 1.20: Impact on NO ₂ Concentrations in 2022			
Existing Receptor Location	Percentage Change	Annual Mean Concentration in Relation to AQAL	Impact
ESR 1	2-5%	76-94%	Slight Adverse
ESR 2	1%	<75%	Negligible
ESR 3	1%	<75%	Negligible
ESR 4	<0.5%*	<75%	Negligible
ESR 5	<0.5%*	<75%	Negligible
ESR 6	2-5%	<75%	Negligible

²¹ NO_x to NO₂ Calculator, Defra Local Air Quality Management web pages (<http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html>)

ESR 7	<0.5%*	<75%	Negligible
* Changes of less than 0.5% should be described as negligible			

7.132 The impact on PM₁₀ concentrations in 2022 is detailed in Table 1.21.

Table 1.21: Impact on PM₁₀ Concentrations in 2022			
Existing Receptor Location	Percentage Change	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			

7.133 The impact on PM_{2.5} concentrations in 2022 is detailed in Table 1.22.

Table 1.22: Impact on PM_{2.5} Concentrations in 2022			
Existing Receptor Location	Percentage Change	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 Locations

7.134 Two proposed sensitive receptor locations have been selected within the proposed development site. The locations have been selected to represent the proposed residential area (i.e. the proposed apartment block) closest to the surrounding road network.

7.135 Pollutant concentrations at the proposed receptor locations have been predicted for scenario 3. It is only necessary to consider the 'with development' scenarios for the proposed receptor locations 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 locations.

7.136 Details of the proposed sensitive receptor locations are given in Table 1.23, and the locations are shown on drawing MC10155-001.

Table 1.23: Proposed Human Sensitive Receptor Locations

Receptor Location	Location	Grid Reference	
		Easting	Northing
PR1	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
PR2	Location considered to be representative of the proposed apartment block residential used situated most adjacent to Queens Wharf	334434	389210

- 7.137 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.
- 7.138 Air pollutant concentrations have been modelled for two proposed receptor locations, for the 2022 ‘with development’ scenarios, as detailed in Table 1.24. The PM₁₀, PM_{2.5} and NO₂ concentrations are also included in Appendix D.

Table 1.24: Predicted NO₂, PM₁₀ and PM_{2.5} Concentrations at Proposed Sensitive Receptor Locations for 2022 ‘With Development’ Scenarios

Proposed Receptor Location	Floor Level	Calculated Annual Mean Concentrations (µg/m ³)		
		NO ₂ *†	PM ₁₀	PM _{2.5}
PR 1	First Floor (3.5m above ground level)	19.13	13.71	9.40
	Second Floor (6.5m above ground level)	18.02	13.61	9.34
	Third Floor (9.4m above ground level)	17.24	13.54	9.30
	Fourth Floor (12.3m above ground level)	16.72	13.50	9.28
	Fifth Floor (15.2m above ground level)	16.32	13.46	9.26
	Sixth Floor (19.5m above ground level)	15.85	13.42	9.23
PR 2	First Floor (3.5m above ground level)	19.33	13.71	9.40
	Second Floor (6.5m above ground level)	17.84	13.59	9.33
	Third Floor (9.4m above ground level)	16.94	13.51	9.28

	Fourth Floor (12.3m above ground level)	16.41	13.46	9.26
	Fifth Floor (15.2m above ground level)	16.04	13.43	9.24
	Sixth Floor (19.5m above ground level)	15.65	13.40	9.22
<p>* NO₂ concentrations obtained by inputting predicted NO_x concentrations into the NO_x to NO₂ calculator²² in accordance with LAQM.TG(16).</p> <p>† Predicted concentrations adjusted in accordance with verification process.</p>				

Scenario 3: 2022 Opening/ Future Year, With Development

- 7.139 The 2022 Opening/Future year annual mean NO₂ concentrations are predicted to range from 15.65 to 19.33µg/m³ for the two proposed receptor locations considered. Exceedance of the annual mean objective concentration for NO₂ (40µg/m³) is not predicted to occur at any of the two proposed sensitive receptor locations considered.
- 7.140 The 2022 Opening/Future year annual mean PM₁₀ concentrations are predicted to range from 13.40 to 13.71µg/m³ for the two proposed receptor locations considered. Exceedance of the annual mean objective concentration for PM₁₀ (40µg/m³) is not predicted to occur at any of the two proposed sensitive receptor locations considered.
- 7.141 The 2022 Opening/Future year annual mean PM_{2.5} concentrations are predicted to range from 9.22 to 19.40µg/m³ for the two proposed receptor locations considered. Exceedance of the annual mean target level for PM_{2.5} (25µg/m³) is not predicted to occur at any of the two proposed sensitive receptor locations considered.

Operational Phase Assessment: Road Traffic Emissions (Sensitivity Analysis)

- 7.142 Current evidence suggests that NO₂ background concentrations are not decreasing in accordance with expected reductions. At present, there is uncertainty about how background NO₂ concentrations will change in future years.
- 7.143 To provide a robust assessment, a sensitivity analysis has been undertaken for the 2022 opening/future year scenario. This analysis assumes that there will be no improvement in background air quality between 2016 and 2022. Background pollutant concentrations and vehicle emission factors for 2016 have, therefore, been applied to the 2022 opening/future year scenarios.

²² NO_x to NO₂ Calculator, Defra Local Air Quality Management web pages (<http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html>)

Existing Sensitive Receptor Locations

7.144 The results of the sensitivity analysis, undertaken for the seven sensitive receptor locations, for the 2022 opening/future year scenarios are detailed in Table 1.25 and Appendix E.

Table 1.25: Predicted NO ₂ , PM ₁₀ and PM _{2.5} Concentrations at Existing Sensitive Receptor Locations for 2022 'Without Development' and 'With Development' Scenarios Assuming no Improvement in Background Air Quality or Vehicle Emission Factors				
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	50.89	16.27	11.25
	With development	52.06	16.36	11.30
	<i>Percentage Change in relation to AQAL</i>	+2.93%	+0.21%	+0.13%
ESR 2	Without development	37.82	13.82	9.67
	With development	38.72	13.88	9.70
	<i>Percentage Change in relation to AQAL</i>	+2.25%	+0.14%	+0.08%
ESR 3	Without development	39.66	14.98	10.39
	With development	40.17	15.01	10.41
	<i>Percentage Change in relation to AQAL</i>	+1.28%	+0.07%	+0.04%
ESR 4	Without development	44.54	15.35	10.61
	With development	44.86	15.37	10.62
	<i>Percentage Change in relation to AQAL</i>	+0.80%	+0.05%	+0.03%
ESR 5	Without development	43.53	15.27	10.56
	With development	43.82	15.29	10.57
	<i>Percentage Change in relation to AQAL</i>	+0.72%	+0.05%	+0.03%
ESR 6	Without development	24.15	14.07	9.85
	With development	25.54	14.14	9.89
	<i>Percentage Change in relation to AQAL</i>	+3.48%	+0.16%	+0.10%
ESR 7	Without development	21.04	13.93	9.76

	With development	21.29	13.94	9.77
	Percentage Change in relation to AQAL	+0.63%	+0.03%	+0.02%
* NO ₂ concentrations obtained by inputting predicted NO _x concentrations into the NO _x to NO ₂ calculator ²³ in accordance with LAQM.TG(16).				
† Predicted concentrations adjusted in accordance with verification process.				

Assessment of Impact

7.145 Using the descriptors detailed in Table 1.14, the impact of the Proposed Development can be assessed at each of the sensitive receptors considered.

7.146 The impact on NO₂ concentrations in 2022 is detailed in Table 1.26.

Table 1.26: Impact on NO ₂ Concentrations in 2022 Assuming no Improvement in Background Air Quality or Vehicle Emission Factors			
Existing Receptor Location	Percentage Change	Annual Mean Concentration in Relation to AQAL	Impact
ESR 1	2-5%	>110%	Substantial Adverse
ESR 2	2-5%	95-102%	Moderate Adverse
ESR 3	1%	95-102%	Slight Adverse
ESR 4	1%	>110%	Moderate Adverse
ESR 5	1%	>110%	Moderate Adverse
ESR 6	2-5%	<75%	Negligible
ESR 7	1%	<75%	Negligible
* Changes of less than 0.5% should be described as negligible			

7.147 The impact on PM₁₀ concentrations in 2022 is detailed in Table 1.27.

Table 1.27: Impact on PM ₁₀ Concentrations in 2022 Assuming no Improvement in Background Air Quality or Vehicle Emission Factors			
Existing Receptor Location	Percentage Change	Annual Mean Concentration in Relation to AQAL	Impact
ESR 1 – ESR 7	<0.5%*	<75%	Negligible

²³ NO_x to NO₂ Calculator, Defra Local Air Quality Management web pages (<http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html>)

* Changes of less than 0.5% should be described as negligible

7.148 The impact on PM_{2.5} concentrations in 2022 is detailed in Table 1.28.

Table 1.28: Impact on PM _{2.5} Concentrations in 2019 Assuming no Improvement in Background Air Quality or Vehicle Emission Factors			
Existing Receptor Location	Percentage Change	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			

7.149 Air pollutant concentrations have also been modelled for two proposed receptor locations, for the 2022 'with development' scenarios, as detailed in Table 1.29. The PM₁₀, PM_{2.5} and NO₂ concentrations are also included in Appendix E.

Table 1.29: Predicted NO ₂ , PM ₁₀ and PM _{2.5} Concentrations at Proposed Sensitive Receptor Locations for 2022 'With Development' Scenarios. Assuming no Improvement in Background Air Quality or Vehicle Emission Factors				
Proposed Receptor Location	Floor Level	Calculated Annual Mean Concentrations (µg/m ³)		
		NO ₂ *†	PM ₁₀	PM _{2.5}
PR 1	First Floor (3.5m above ground level)	29.35	14.32	10.00
	Second Floor (6.5m above ground level)	27.01	14.21	9.93
	Third Floor (9.4m above ground level)	25.33	14.13	9.88
	Fourth Floor (12.3m above ground level)	24.19	14.08	9.85
	Fifth Floor (15.2m above ground level)	23.31	14.04	9.83
	Sixth Floor (19.5m above ground level)	22.29	13.99	9.80
PR 2	First Floor (3.5m above ground level)	29.88	14.33	10.00
	Second Floor (6.5m above ground level)	26.68	14.18	9.91
	Third Floor (9.4m above ground level)	24.70	14.09	9.86
	Fourth Floor (12.3m above ground level)	23.53	14.04	9.83
	Fifth Floor (15.2m above ground level)	22.72	14.00	9.81

	Sixth Floor (19.5m above ground level)	21.84	13.96	9.78
<p>* NO₂ concentrations obtained by inputting predicted NO_x concentrations into the NO_x to NO₂ calculator²⁴ in accordance with LAQM.TG(16).</p> <p>† Predicted concentrations adjusted in accordance with verification process.</p>				

Scenario 3: 2022 Opening/Future Year, With Development

- 7.150 The 2022 Opening/Future year annual mean NO₂ concentrations are predicted to range from 21.84 to 29.88µg/m³ for the two proposed receptor locations considered. Exceedance of the annual mean objective concentration for NO₂ (40µg/m³) is not predicted to occur at any of the two proposed sensitive receptor locations considered.
- 7.151 The 2022 Opening/Future year annual mean PM₁₀ concentrations are predicted to range from 13.96 to 14.33µg/m³ for the two proposed receptor locations considered. Exceedance of the annual mean objective concentration for PM₁₀ (40µg/m³) is not predicted to occur at any of the two proposed sensitive receptor locations considered.
- 7.152 The 2022 Opening/Future year annual mean PM_{2.5} concentrations are predicted to range from 9.78 to 10.00µg/m³ for the two proposed receptor locations considered. Exceedance of the annual mean target level for PM_{2.5} (25µg/m³) is not predicted to occur at any of the two proposed sensitive receptor locations considered.

Assessment of Significance

- 7.153 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:

²⁴ NO_x to NO₂ Calculator, Defra Local Air Quality Management web pages (<http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html>)

Table 1.30: Significance of Effect for Operational Phase Road Traffic Emissions Assessment

Factor	Comment
Existing and future air quality in the absence of the development	<p>Existing NO₂ concentrations largely below the annual mean Air Quality Objective (AQO), except for ESR1 (68 Parliament Street) and ESR 4 (2 Hurst Street), which are located next to busy roads. No exceedance of the annual mean AQO for NO₂ is predicted in the 2022 opening/future year scenario without the development in place.</p> <p>When undertaking the sensitivity analysis, exceedance of the annual mean objective concentration for NO₂ (40µg/m³) is predicted to occur at ESR 1 (68 Parliament St), ESR 4 (2 Hurst St) and ESR 5 (33A Wapping) in the 2022 opening/future year scenario without the development in place. The results of the sensitivity analysis are, however, considered to comprise robust predictions as no improvement in background concentrations or vehicle exhaust emissions are taken into consideration.</p> <p>All PM₁₀ and PM_{2.5} concentrations are below the annual mean AQO/target value.</p>
The impact predicted at existing sensitive receptors considered in the assessment	<p>The air quality assessment predicted impacts are mostly negligible, except for ESR 1, which is predicted to have a slight adverse impact.</p> <p>The sensitivity analysis predicts a negligible to substantial adverse impact on NO₂ concentrations at existing sensitive receptor locations, with the development in place, in 2022. It is, however, important to note that the sensitivity analysis has been undertaken based on the assumption of no improvement in vehicle emissions or background pollutant concentrations between 2016 and 2022. In reality, improvement is likely</p> <p>The predicted impacts for PM₁₀ and PM_{2.5} are all negligible.</p>
Air quality impacts within the proposed development site itself	<p>Proposed receptors have been modelled at multiple heights to take account the floors on which residential accommodation will be located.</p> <p>All predicted pollutant concentrations are predicted to be well below the relevant annual mean AQOs</p>

<p>The influence and validity of any assumptions adopted when undertaking the prediction of impacts</p>	<p>The two approaches used in the assessment (i.e. the 'air quality impact assessment' and 'sensitivity analysis' approaches) allow the uncertainty over future air quality to be addressed.</p> <p>It is considered that the true impact lies somewhere between the results of the air quality assessment and the sensitivity analysis</p>
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Significance

- 7.154 The impact of the proposed development on concentrations of PM₁₀ and PM_{2.5} is not considered to be significant, even when a wholly robust approach is adopted which assumes no improvement in background concentrations or vehicle exhaust emissions.
- 7.155 The impact of the proposed development on NO₂ concentrations is considered to lie at a point between the results of air quality assessment and the sensitivity analysis, i.e. an impact between negligible and substantial adverse. On this basis, it is considered that the effect of the Proposed Development on NO₂ concentrations is 'significant'. Mitigation measures will therefore be required.

Assessment of Cumulative Effects

Intra-Project Cumulative Effects

- 7.156 The Proposed Development will generate additional traffic movements within Liverpool. This additional traffic has the potential to worsen air quality, the extent to which has been assessed within this ES Chapter.

Inter-Project Cumulative Effects

Construction Phase Assessment: Dust and Fine Particulate Matter Emissions

- 7.157 As detailed above, the residual effect of dust and fine particulate matter emissions during the construction phase of the Development following the implementation of site-specific mitigation measures will be negligible. Since construction phase emissions are temporary and localised in nature, it is considered unlikely that there will be significant adverse cumulative impacts, when also considering other developments at a distance greater than 500m away from the Development, on sensitive receptor locations within Leyland.
- 7.158 However, other developments within 500m of the Proposed Development do have the potential to generate cumulative construction phase impacts if construction occurs concurrently.

- 7.159 That being said, assuming that appropriate site-specific mitigation is implemented the impact of the construction phase for other developments in the area is likely to be 'not significant' in accordance with the IAQM guidance. Therefore any cumulative effects of developments being constructed concurrently will also likely be 'not significant', particularly if work can be scheduled so as not to occur simultaneously.

Operational Phase Assessment: Road Traffic Emissions

- 7.160 The air quality assessment and sensitivity analysis has taken into consideration 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
- 7.161 In addition, the first phase of the proposed development (i.e. The Contact Company, planning application - 17F/2490) has been taken into consideration in the air quality assessment and sensitivity analysis.

Mitigation of Effects

Construction Phase Assessment: Dust and Fine Particulate Matter Emissions

Step 3

- 7.162 During the construction phase the implementation of effective mitigation measures will substantially reduce the potential for nuisance dust and particulate matter to be generated.

- 7.163 The risk of dust soiling, human health effects and ecological effects is 'significant', therefore site specific mitigation will need to be implemented to ensure dust effects from these activities will be 'not significant'.
- 7.164 Step 2C of the construction phase assessment identified that:
- The risk of dust soiling effects is classed as high for earthworks and construction and medium for trackout; and
 - The risk of human health effects is classed as low for earthworks, construction and trackout.
- 7.165 This assumes that no mitigation measures are applied, except those required by any applicable legislation (for instance the Environmental Protection Act 1990). Site specific mitigation measures do not need to be recommended if the risk category is negligible.
- 7.166 A best practice dust mitigation plan will be written and incorporated into the site's CEMP, which will be implemented prior to any demolition, earthworks or construction activities being carried out. 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 and requirements included within the IAQM guidance, which may include but are not limited to:
- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable (desirable);
 - 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 (highly recommended);
 - 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 (desirable);
 - Avoid dry sweeping of large areas (highly recommended);
 - 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 (highly recommended);
 - Ensure vehicles entering and leaving the sites are covered to prevent escape of materials during transport (highly recommended);
 - Implement a wheel washing system with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable (highly desirable);
 - 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 (highly recommended); and
 - Access gates to be located at least 10m from receptors, where possible (highly recommended).

- 7.167 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.
- 7.168 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.

Operational Phase Assessment: Road Traffic Emissions

Existing Sensitive Receptor Locations

- 7.169 An air quality assessment and sensitivity analysis have been undertaken to consider the potential impact of development-generated vehicles on air quality at seven existing sensitive receptor locations.
- 7.170 The air quality assessment predicts that there will be a negligible impact on concentrations of PM₁₀ and PM_{2.5} at all seven of the existing sensitive receptors considered in 2022, with the development in place. The predicted impacts on NO₂ concentrations range from ‘Negligible to ‘Slight Adverse’ for the seven existing sensitive receptors considered.
- 7.171 The sensitivity analysis predicts that there will be a negligible impact on concentrations of PM₁₀ and PM_{2.5} at all seven of the existing sensitive receptors considered in 2022, with the development in place. The predicted impacts on NO₂ concentrations range from ‘Negligible to ‘Substantial Adverse’ for the seven existing sensitive receptors considered. It is, however, important to note that the sensitivity analysis has been undertaken based on the assumption of no improvement in vehicle emissions or background pollutant concentrations between 2016 and 2022. In reality, improvement is likely.

- 7.172 It is considered that the true impact lies somewhere between the results of the air quality assessment and the sensitivity analysis, and therefore there is potential for a greater than a Negligible impact at some of the receptors considered, as a result of the proposed development in 2022.

Proposed Sensitive Receptor Locations

- 7.173 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.
- 7.174 The air quality assessment and the sensitivity analysis both predict that all on-site pollutant (i.e. NO₂, PM₁₀ and PM_{2.5}) concentrations will be below the relevant air quality objectives for the apartment block.
- 7.175 It is considered that the true NO₂ concentration will lie somewhere between the results of the air quality assessment and the sensitivity analysis. Therefore, the results of the air dispersion modelling suggest that all predicted pollutant concentrations will be below the relevant annual mean air quality objectives/target level. Mitigation measures will not therefore be required for the proposed apartment block.

Recommendations for Mitigation

- 7.176 Based on professional judgement, and a number of factors, the effect of the proposed development on NO₂ concentrations is considered to be 'significant', in accordance with the EPUK/IAQM guidance. Therefore, it is considered that mitigation measures will be required in order to mitigate or reduce these impacts. 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.

Assessment of Residual Effects

Construction Phase Assessment: Dust and Fine Particulate Emissions

Step 4

- 7.177 Step 4 of the construction phase dust assessment has been undertaken to determine the significance of the dust effects arising from earthworks, construction and trackout associated with the Proposed Development.

- 7.178 The implementation of effective mitigation measures during the construction phase, such as those detailed in Step 3, will substantially reduce the potential for nuisance dust and particulate matter to be generated and any residual impact should be 'not significant'.

Operational Phase Assessment: Road Traffic Emissions

- 7.179 The effect of the proposed development on concentrations of PM10 and PM2.5 is not considered to be significant, even when a wholly robust approach is adopted which assumes no improvement in background concentrations or vehicle exhaust emissions. However, the effect of the Proposed Development on concentrations of NO2 is considered to be 'significant'. The implementation of measures, focussing on mitigating elevations in NO2 concentration, should assist in reducing the potential impacts of the Proposed Development.

References

- 7.180 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
- 7.181 Department of the Environment, Transport and the Regions 1999, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. A consultation document
- 7.182 The Air Quality (England) Regulations 2000. SI No 928
- 7.183 The Air Quality (Amendment) Regulations 2002
- 7.184 Department of Environment, Food and Rural Affairs, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. July 2007
- 7.185 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
- 7.186 Statutory Instruments 2010 No. 1001 The Air Quality Standards Regulations 2010
- 7.187 Department for Communities and Local Government, March 2012, National Planning Policy Framework

- 7.188 Department for Communities and Local Government, March 2014, Planning Practice Guidance: Air Quality
- 7.189 Institute of Air Quality Management (IAQM) 'Guidance on the Assessment of Dust from Demolition and Construction', February 2014
- 7.190 Liverpool City Council, 2017 Air Quality Annual Status Report
- 7.191 Liverpool City Council, Liverpool Local Plan (The Draft), September 2016
- 7.192 Liverpool City Council, Air Quality Action Plan for the City-Wide AQMA
- 7.193 Greater London Authority (2006), The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance
- 7.194 Environmental Protection UK and the Institute of Air Quality Management, Land-Use Planning and Development Control: Planning for Air Quality, 2017
- 7.195 Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance, LAQM.TG(16)

8 Archaeology

Introduction

- 8.1 This Chapter of the ES assesses the likely significant effects of the Development with respect to below-ground archaeological remains. This Chapter also describes the methods used to assess the effects; the baseline conditions currently existing at the Site and surrounding area; the mitigation measures required to prevent, reduce or offset any significant negative effects; and the likely residual effects after these measures have been adopted.
- 8.2 The chapter is supported by an Archaeological Desk-based Assessment, contained at Appendix 16.1, which has informed the assessment.

Legislative and Policy Context

National Planning Policy

- 8.3 Section 12 of the National Planning Policy Framework (NPPF), entitled 'Conserving and enhancing the historic environment', provides guidance for planning authorities, property owners, developers and others on the conservation and investigation of heritage assets. Overall, the objectives of Section 12 of the NPPF can be summarised as:
- Seeking the delivery of sustainable development;
 - Understanding the wider social, cultural, economic and environmental benefits brought by the conservation of the historic environment;
 - Conservation of England's heritage assets in a manner appropriate to their significance; and
 - Recognition of the value that heritage makes to our knowledge and understanding of the past.
- 8.4 Section 12 of the NPPF recognises that intelligently managed change may sometimes be necessary if heritage assets are to be maintained for the long term. Paragraph 128 states that planning decisions should be based on the significance of the heritage asset, and that the level of detail supplied by an applicant should be proportionate to the importance of the asset and should be no more than sufficient to review the potential effect of the proposal upon the significance of that asset.
- 8.5 Annexe 2 of the NPPF defines 'Heritage Assets' as a building, monument, site, place, area or landscape positively identified as having a degree of significance meriting consideration in planning decisions. They include designated heritage assets (as defined in the NPPF) and assets identified by the local planning authority during the process of decision-making or through the plan-making process.
- 8.6 Annex 2 also defines 'Archaeological Interest' as a heritage asset that holds or potentially could hold evidence of past human activity worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary sources of evidence about the substance and evolution of places, and of the people and cultures that made them.
- 8.7 The Framework states that, when considering the impact of a proposed development on the significance of a designated heritage asset, considerable importance and weight should be given to its conservation, the more important the asset, the greater the weight should be given (para 132).

Planning Practice Guidance

- 8.8 The Planning Practice Guidance (PPG) was adopted in order to support the NPPF. It reiterates that conservation of heritage assets in a manner appropriate to their significance is a core planning principle. It also states that conservation is an active process of maintenance and managing change, requiring a flexible and thoughtful approach, and highlights that neglect and decay of heritage assets is best addressed through ensuring they remain in active use that is consistent with their conservation. Importantly, the guidance states that if complete or partial loss of a heritage asset is justified, the aim should then be to capture and record the evidence of the asset's significance, and make the interpretation publically available.

Local Planning Policy

- 8.9 The NPPF outlines the need for local planning policies to create local plans and frameworks to implement the NPPF at a local level. The new draft Liverpool Local Plan was approved for public consultation by the City Council's Cabinet on 19th August 2016. The Local Plan will be a single document which sets out both strategic objectives for the development of the City over the next 15-20 years, and more detailed guidance to manage the type, location and scale of this development, including allocation of specific sites. Previously, the City Council had been involved in preparing and consulting upon a Core Strategy, key elements of which will be retained and updated to become the central strategy of the Local Plan. A number of policies in the Draft Local Plan concern archaeology and the historic environment.
- 8.10 Policy STP2 Sustainable Growth Principles and Managing Environmental Impacts states:
- '1. New development should seek to avoid negative impacts on the environment through adoption of best practice. Where a negative effect is identified this should be mitigated by appropriate measures. Specifically, to ensure the sustainable growth of the City, new development should:
- d) Protect and enhance the City's natural environment (including areas/sites/species of ecological importance) and heritage assets including reflecting and enhancing the area's character and environment;
- 8.11 Policy CC8 – Waterfront Design Requirements states:
- 'Development on the Waterfront should be of a high-quality design that respects its sensitive historic surroundings, whilst making adequate provision for access, parking and servicing and not undermining local amenity and operations of businesses. Development proposals should:
- Protect the character, setting, distinctiveness and Outstanding Universal Value of the World Heritage Site by ensuring the siting, scale, form, architectural approach and materials are appropriate and respect the proposal's location;
- Respect the form and mass of the dock estate and its industrial heritage and make provision for the repair, conservation, integration and interpretation of heritage assets;

8.12 Policy CC 9 - Recreational Use of Dock Water Spaces, Quaysides and the Waterfront states:

1. The City Council will support proposals which facilitate greater access and recreational / leisure use of dock water spaces and their quaysides and which contribute towards the creation of an inclusive and usable movement route along Liverpool's Waterfront, specifically:
 - a. floating structures for canal boat mooring, boat hire, water taxis and water buses;
 - b. installation of stepped dockside structures to gain access at water level;
 - c. feature lighting installations that assist in animating dock water spaces and adjacent quaysides;
 - d. proposals which enhance the interpretation of the cultural heritage and archaeology of the historic dockland environment.

8.13 Policy HD1 refers specifically to designated heritage assets (comprising the World Heritage Site, listed buildings, conservation areas, scheduled monuments and registered historic parks and gardens), and stresses that consent or permission will not be granted for:

- a. applications which are not fully justified and accompanied by full information necessary to assess the impact of the proposals on the heritage asset. Proposals that affect heritage assets should be accompanied by a Statement of Significance which may form part of a Design and Access Statement, and/or a Heritage Impact Assessment to demonstrate that the architectural and historic interest of the structure has been understood and accounted for in any proposals;
- b. development or works which are unsympathetic to the heritage asset and/or its setting in terms of its architectural, historic, cultural or artistic significance. In considering any proposals, the quality of the design and layout and materials will be taken into account.

8.14 Policy HD1 also states that 'proposals for development in the World Heritage Site and its buffer zone will protect its Outstanding Universal Value as set out in the Liverpool Maritime Mercantile City World Heritage Site Supplementary Planning Document.'

Policy HD2 refers to non-designated heritage assets of archaeological remains, and states:

1. 'All planning applications likely to affect archaeological remains must be accompanied by an appropriate archaeological assessment;
2. There is a presumption in favour of physical preservation in situ of archaeological remains. Where this is not achievable, mitigation should be undertaken through archaeological fieldwork to investigate and record remains in advance of works. Subsequent analysis, publication and dissemination of the findings should be submitted to the Local Planning Authority and also deposited with the Historic Environment Record.'

- 8.15 An Archaeological Desk-based Assessment (Appendix 16.1) has been prepared to support the planning application and inform the preparation of this chapter, in accordance with the NPPF and local planning policy. The Archaeological Desk-based Assessment was prepared in accordance with the relevant Chartered Institute for Archaeologists (CIfA) and Historic England guidelines (CIfA 2017; English Heritage 2006). The principal sources of information consulted included:
- 8.16 Historic Environment Record Merseyside;
- Merseyside Maritime Museum, Maritime Archives and Library (MMMMAL)
 - The National Heritage List for England;
 - Published and unpublished literature pertaining to the development of the Site Area and Liverpool;

Assessment Methodology and Significance Criteria

- 8.17 The NPPF refers to the consideration of the 'significance' of heritage assets, where it is defined as 'the value of a heritage asset to this and future generations because of its heritage interest, which may be archaeological, architectural, artistic and/or historic'. In the context of an Environmental Impact Assessment, however, the term 'significance' is used to define likely environmental effects and is the relationship of magnitude of impact and sensitivity of receptor. Whilst the NPPF uses the term 'significance', the term 'importance' or 'sensitivity' is used for a receptor in this assessment to align it with EIA terminology.
- 8.18 The determination of the importance of heritage/archaeological assets is based on statutory designation and/or professional judgement including four values:
- Evidential value: The potential of the physical remains to yield evidence of past human activity, which frequently takes into account date, rarity, state of preservation, diversity, and group value;
 - Aesthetic value: This derives from the ways in which people draw sensory and intellectual stimulation from the heritage assets, taking into account what other people have said or written;
 - Historical value: The ways in which past people, events and aspects of life can be connected through heritage assets to the present;
 - Communal value: This derives from the meanings of a heritage asset for the people who know about it, or for whom it figures in their collective experience or memory.
- 8.19 The criteria for establishing the importance of the heritage asset used in this assessment are set out in Table 16.1.

8.20 **Table 16.1: Criteria for Evaluating the Importance of Archaeological Sites**

Importance	Example of Receptor
International (High Sensitivity)	World Heritage Sites (including nominated sites). Sites, buildings or landscapes of acknowledged international importance.
National (High Sensitivity)	Sites of National Importance, Scheduled Monuments, Grade I, II* and II Listed Buildings, designated historic landscapes or those of outstanding interest or well preserved.
Regional (Moderate Sensitivity)	Registered Parks and Gardens, Conservation Areas, Historic or Archaeological sites of Regional or County Importance and locally designated buildings of historical importance, designated special historic landscapes or undesignated landscapes of regional value or of average preservation, areas of Ancient Woodland with demonstrated ecological value.
Local (Low Sensitivity)	Locally Important Historic or Archaeological Sites, Sites with a local value for education or cultural appreciation, Sites that are so badly damaged that too little remains to justify inclusion into a higher grade, robust undesignated historic landscapes.
No Importance	Sites or features with no significant value or interest, Sites that are so badly damaged that too little remains to justify inclusion into a higher grade.

Assessment of Effect on Archaeological Remains

- 8.21 The consideration and forecasting of potential development effects is based upon an assessment of data relating to designated and non-designated heritage assets, undertaken by professionals with appropriate experience in the identification, assessment and mitigation of development-related effects on the historic environment.
- 8.22 The Significance of the effect is dependent upon:
- The importance of the heritage asset (sensitivity of receptor Table 16.1), and;
 - The magnitude of the effect (Table 16.2).
- 8.23 The magnitude of effect is determined as the predicted change to the existing baseline environment during and following the construction of the Development. The effect can either be adverse or beneficial, direct or indirect, and the criterion for assessing the magnitude of the effect is set out in Table 16.2.

8.24 **Table 16.2: Criteria for Assessing the Magnitude of Effect**

Magnitude	Effect
High Adverse	Demolition of built heritage assets Substantially harmful change in the setting of a built heritage asset
Medium Adverse	Harmful alteration (but not demolition) of a built heritage asset Less than substantial harm to the setting of a built heritage asset
Low Adverse	Alterations to a built heritage asset or Conservation Area Minor harm to the setting of a built heritage asset
Negligible/ Neutral	Negligible direct impact to a built heritage asset or Conservation Area Negligible perceptible change to the setting of a designated building or Conservation Area.
Low Beneficial	Positive alterations to a built heritage asset or buildings within a Conservation Area Minor enhancement to the setting of a built heritage asset or Conservation Area.
Medium Beneficial	Alterations to a built heritage asset or within a Conservation Area Improvement of the wider landscape setting of a built heritage asset, Conservation Area
High Beneficial	Arrest of physical damage or decay to a built heritage asset or structure. Alteration to a built heritage asset or Conservation Area resulting in significant beneficial impact Significant enhancement to the setting of a built heritage asset. Conservation Area, its cultural heritage amenity and access or use.

Significance of Effects

8.25 Table 16.3 below show how the interaction of magnitude of effect and importance of asset results in the levels of predicted effect on the significance of heritage assets, and whether that level may (shaded) or may not (unshaded) be 'significant' in the context of the EIA Regulations.

8.26 **Table 16.3: Significance of Effect**

Magnitude of Adverse Effect	Importance of Receptor				
		High (International or National Importance)	Moderate (Regional Importance)	Low (Local Importance)	Not Important
	High	Major	Major	Moderate	Neutral
	Medium	Major	Moderate	Minor	Neutral
	Low	Major	Minor	Minor	Neutral
	Neutral	Neutral	Neutral	Neutral	Neutral

Assumptions and Limitations

- 8.27 The baseline assessment (Appendix 16.1) combines an examination of all available information and professional judgement to establish the known or potential baseline conditions on the Site. Certain assumptions as to the character of the archaeological remains on the Site have been based on a previous archaeological study of adjacent sites. Further investigation of the below-ground archaeological resource will be undertaken, as appropriate, at a later stage in the planning process. In the interim, however, an assessment has been undertaken on the basis of the information available; in the absence of intrusive site investigation, it has been assumed that buried archaeological remains will survive in-situ.

Baseline Conditions

Non Designated Prehistoric Remains

- 8.28 The current understanding of prehistoric human activity in north-west England is limited. This is reflected in the paucity of archaeological evidence from the region. In Liverpool, this has largely been a product of its rapid urbanisation in the last 200 years. In spite of this, there has been survival of archaeological remains on the fringe of the city and Merseyside as a whole. The earliest evidence of activity in Merseyside dates to the Mesolithic, and includes scatters of stone tools and debris. Neolithic and Bronze Age activity is better represented and includes numerous polished stone axes amongst the lithic assemblages. These tools have been taken to signify the beginnings of human settlement and landscape management. To the south-east of Liverpool city centre are substantial megaliths located in Calderstones Park, Allerton. These megaliths formed a tomb and indicate funerary activity. The evidence points towards use of the landscape during this period, although the surviving evidence is sparse and poorly documented.

Non Designated Roman Remains

- 8.29 The conquest of Britain began in AD 43 in the south of England. As the Roman military pushed northwards they encountered a number of different groups inhabiting the area in what now is

Merseyside. By AD 77-79, military consolidation of northern England was complete. This process owed much to the establishment of a network of forts and roads, which enabled fast lines of communication and deployment of troops. The nearest military fort appears to have been at Chester, established in c AD 70. Despite a strong military presence at Chester and the north-west, the extent of Romanisation was highly localised. At Irby in the Wirral, for example, the persistence of Iron Age culture alongside imported pottery implies both continuity of lifestyle and some level of acculturation. Evidence of Roman occupation in Liverpool City centre is sparse and consists of several coin hoards and isolated residual coins. Based on this limited evidence, it may be concluded that sparse rural settlement perhaps comprising isolated farmsteads were spread across Merseyside.

Non Designated Medieval and Post-medieval Remains

- 8.30 The evidence available suggests that settlement during the early medieval period was similarly scattered and that the local economy was founded on agriculture. Some attempts have been made to establish the broader picture of settlement in Merseyside, through the study of place names and it seems likely that Liverpool was founded during this period. It has tentatively been interpreted as one of several villages present at the time of the Domesday Survey of 1086. However, it is only by the 12th century that the town firmly enters the historical records and in the 13th century that it gained significance through its market and port. The archaeological evidence from this period is scant, and consists of a small quantity of datable ceramics.
- 8.31 A castle had been established towards the south end of the town, by the late 13th century, and is thought to have still been existence in the 18th century, when the decayed remnants of the building were swept and away.
- 8.32 The post-medieval period saw the gradual rise of Liverpool, its growing trade and market attracting new inhabitants, notably merchants and tradesmen. The frequency of maritime trade increased with the silting up of the River Dee and obsolescence of Chester's harbour, which made Liverpool a principal west coast port. The focus of the trade during this period was the Irish Sea. The medieval core of the town gradually expanded to incorporate the area of the castle. The development area, however, retained a rural prospect throughout this period and previous archaeological investigation and cartographic evidence show no signs of urban activity until the late 18th century.
- 8.33 The potential for buried archaeological remains from the medieval and post-medieval periods relates to natural riverine deposits and evidence for land reclamation in the late post-medieval period. Any such remains, however, are likely to occur as isolated pockets of stratigraphy.

Non Designated Industrial Period Remains

- 8.34 The urbanisation of Liverpool during the late 18th century and expansion of the docks spread to the Site, initially with the construction of two small basins in the mid-18th century and by the late 18th century the laying out of the King's and Queen's Docks and the erection of a number of buildings. The pace of development in the nearby town was gradual until the turn of the 19th century at which time it accelerated and a number of industrial complexes, public houses, warehouses and houses were built to the east of the Site.
- 8.35 Early 19th-century mapping establishes the early configuration of the docks and entrance basin, which encompass much of the Site. An additional dock, Wapping Dock, was added to the north of the Site in the 1850s, accompanied by a suite of buildings, offices and warehouses to accommodate the increased capacity of trade. All the buildings to the east of the Site, including those around Willacy Place were cleared to enable the dock and warehouse to be built.
- 8.36 The Site was subject to significant reorganisation in the late 1890s, when branch docks were added to Wapping Dock and Queen's Dock. The branch docks were located in the place of the King's Dock and entrance basin (half-tide dock). Following the completion of the branch docks, sheds and warehouses were constructed adjacent to them, and crucially the rail line was extended to the middle of the Site, between the King's and Queen's branch docks.
- 8.37 Ordnance Survey mapping published after 1908 shows the same arrangement of docks within the Site, with no significant changes. Subsequent editions of Ordnance Survey mapping up to 1971 similarly show little change, although the buildings to the north appear to have been scaled down. According to the Ordnance Survey mapping from the 1980-90s, the branch docks was decommissioned and filled-in.

8.38 Table 16.4: Summary Table of the Sensitivity of Known and Potential Archaeological Assets

Archaeological Asset (Receptor)	Value
Remains of 18 th -century basins	High (National Importance)
Remains of 19 th -century dock infrastructure	Moderate (Regional Importance)/Low (Local Importance)
Remains of 19 th -century dock buildings	Moderate (Regional Importance) /Low (Local Importance)
Remains of late 19 th - / 20 th -century warehouses	Low (Local Importance) Low (Local Importance)

Identification and Evaluation of Significant Effects

- 8.39 The criteria listed in Tables 16.1-16.3 have been used to determine the significance of effects of the Development on the potential archaeology identified within the baseline section above, without implementation of mitigation measures.

Construction Phase

- 8.40 Any effect on the archaeological resource will occur during the construction phase of the Development. Works during this phase which could damage and destroy the archaeological resource include demolition works beneath floor slab of existing buildings, installation of new services, sub-surface water drainage and cutting of foundations. These effects will be limited to the Site and will be permanent and irreversible.
- 8.41 Table 16.5 is a summary table of the significance of the effects on the archaeological assets. All effects will be direct, limited to the Site and will be permanent and irreversible. In certain cases, the significance of effect cannot be determined precisely until further investigation is undertaken to establish the value of individual receptors.

- 8.42 **Table 16.5: Significance of Effects during Construction (in the absence of mitigation)**

Receptor	Value	Magnitude of Effect	Likely Significance of Effect
Remains of 18th- and 19th-century basins/docks	Moderate / High	High Adverse	Minor
Remains of late 19th-century branch docks	Low / Moderate	Medium Adverse	Minor / Moderate
Remains of 18th and 19th-century dock buildings and warehouses	Low / Moderate	Medium Adverse	Minor / Moderate

Operational Phase

- 8.43 There will be no direct or indirect effects on non-designated archaeological assets during the Operational Phase. All effects on sub-surface archaeological assets will have taken place during the Construction Phase.

Mitigation Measures

- 8.44 As remains of less than national significance are anticipated, a programme of archaeological mitigation is anticipated in advance of the construction phase. In the first instance, further investigation via evaluation trenching will be undertaken to establish the extent and significance of the below-ground archaeological resource, which will enable the scope of an appropriate mitigation strategy to be formulated.
- 8.45 Pending the results obtained from the initial archaeological investigation, a programme of detailed archaeological excavation may be implemented. This may comprise the full excavation of the archaeological remains to enable a detailed record to be compiled in advance of any damage or destruction of this resource during the construction programme. The excavation would be coupled with an appropriate level of post-excavation analysis, publication and deposition of an ordered project archive. The implementation of these mitigation measures would reduce the likely significance of effect to neutral.

Cumulative Effects

- 8.46 The potential cumulative effects of the Development have been assessed, taking into account the schemes that are being progressed in the vicinity of the Site. However, due to the distance of these other schemes, there will be no significant cumulative effects on archaeology arising from construction or operational phases.

Residual Effects

- 8.47 In accordance with the criteria provided above, implementation of the appropriate mitigation measures would give rise to negligible residual effects on below-ground archaeological remains. The scope and extent of the mitigation strategy will be devised in the light of further investigation of the below-ground archaeological resource. The mitigation strategy that will ultimately be implemented, however, will ensure that an appropriate record of any buried archaeological remains will have been compiled in advance of construction works, reducing the likely significance of effect to minor.

8.48 **Table 16.6 – Summary of residual effects**

Receptor	Mitigation	Residual Effect
Remains of 18th- and 19th-century basins/docks	Evaluation trenching / excavation	Neutral
Remains of late 19th-century branch docks	Evaluation trenching / excavation	Neutral
Remains of 18th and 19th-century dock buildings and warehouses	Evaluation trenching / excavation	Neutral

Non-Technical Summary

- 8.49 The likely significant environmental effects of the Development on buried archaeological remains have been assessed. The assessment has been carried out in accordance with all relevant guidelines. The consideration of heritage assets in the planning process, whether designated or not, is covered by the NPPF at a national level and the Draft Liverpool Local Plan at a local level.
- 8.50 A desk-based study, coupled with a site visit and the results obtained from previous archaeological investigations in the immediate vicinity of the Site, has identified remains of potential archaeological interest. These include evidence of 18th-century basins and docks of probable regional (and potentially national) importance. The buried remains of infrastructure associated with the docks dating to the 19th and 20th centuries are also likely to be present. These non-designated assets are likely to be of local importance, depending on their condition.
- 8.51 Further investigation of the below-ground archaeological resource will be undertaken, as appropriate, at a later stage in the planning process. This will include targeted trial trenching to obtain further information on the extent, condition and significance of buried archaeological remains. Pending the results obtained from the trial trenching, a programme of detailed archaeological excavation may be implemented as a mitigation strategy. Further fieldwork may comprise the full excavation of the archaeological remains to enable a detailed record to be compiled in advance of any damage or destruction of this resource during the construction programme.
- 8.52 The excavation would be coupled with an appropriate level of post-excavation analysis, publication and deposition of an ordered project archive. In the interim, however, an assessment has been undertaken on the basis of the information available.

- 8.53 Following implementation of the scheme of mitigation, it is anticipated that the identified potential effects on buried archaeological remains would be reduced to negligible. In NPPF terms, residual effects upon archaeological assets during both the construction and operation phase will be negligible, causing less than substantial harm to the assets.

9 Ecology and Nature Conservation

Introduction

- 9.1 The purpose of this chapter is to provide detail of the nature conservation interest on the proposed development site, to identify the ecological impacts, and propose the methods that will be used to mitigate the impacts. Further, this section will identify opportunities for ecological enhancement relating to the proposed development. Proposals of 'Phase 1B' are to develop the site including the construction of the 'Interpretation Centre', multi-storey carpark with a supermarket and a residential apartment block. The site is located at Monarchs Quay, Liverpool, Merseyside (hereafter referred to as the 'site'), central grid reference SJ 343 891.
- 9.2 The ecological assessment is based upon ecological survey work carried out by Smeeden Foreman Limited in January 2017.
- 9.3 The following technical Appendices relate to this chapter:
- Appendix 10.1 Technical Ecological Report – Phase 1B (October 2017);

Legislative Framework

- 9.4 The national nature conservation legislation and policies that may be relevant to the proposed development are listed below. A brief explanation of the principle legislation and policies relating to nature conservation, biodiversity and ecology is provided in Appendix 05: Principle Legislation and Policies of the Technical Ecological Report which is included as Appendix 10.1 of this statement.
- Wildlife and Countryside Act 1981 (as amended);
 - EC Habitats Directive (92/43/EEC);
 - EC Birds Directive (79/409/EEC);
 - Countryside and Rights of Way Act 2000;
 - Protection of Badgers Act 1992;
 - United Kingdom Biodiversity Action Plan (BAP);
 - Natural Environment and Rural Communities Act (NERC), 2006 – Biodiversity Duty;
 - Hedgerow Regulations 1997;
 - National Planning Policy Framework (NPPF).

- 9.5 In addition the following local policies and documents have been considered;
- North Merseyside Biodiversity Action Plan – the Local Biodiversity Action Plan (LBAP)
 - Liverpool City Council Unitary Development Plan (UDP)

STUDY AREA

- 9.6 The site is located within the city of Liverpool, and lies along the Liverpool Waterfront. (central grid reference SJ 343 891). The study area is identified by the site boundary shown in Appendix 10.1 (Figure 02: Phase 1 Habitat Map).
- 9.7 The surrounding landscape and habitats within the vicinity of the proposed development were also considered plus any notable features of ecological interest within 2km of the site.

Site Description

- 9.8 The site is located along the Liverpool Waterfront, Monarch's Quay, Liverpool, Merseyside.
- 9.9 The application site occupies an area of approximately 1.57 hectares comprising amenity grassland, hardstanding roads, pavements and car parking areas and a bridge, introduced shrub hedges and tree planting.
- 9.10 The area in which the site is located has seen the development of a number of large venue buildings in the last 10 years, including Liverpool Echo Arena, BT Convention Centre and the Liverpool Exhibition Centre to the north and west of the site boundary. There are also a number of other structures adjacent to these buildings including a high rise car park block, and numerous apartment blocks and hotels.
- 9.11 This area of the Liverpool Waterfront has the River Mersey located to the west, Wapping Dock located to the north east and Queens Dock located to the east and south.

Baseline Conditions

- 9.12 The overall approach to carrying out the ecological assessment was as follows:
- Establish the study area for the purposes of the ecological assessment;
 - Through desk and field studies identify and evaluate the existing ecological features within the study area located within and surrounding the site which may be affected by the proposed development;

- Identify all possible impacts that the development may have on these features. Temporary and permanent, short-term and long-term, positive and negative, covering all phases of the development;
- Assess the significance of these ecological impacts;
- Develop mitigation proposals to ameliorate the impacts of the proposal;
- Identify the potential for enhancement measures which could increase the biodiversity value of the local area; and,
- Evaluate the residual impacts of the development on the ecology of the study area.

Methods

Desk Study

- 9.13 Data obtained was considered with regards to the environmental legislation, National and Regional Planning Guidance Notes and Local Development Plans policies on nature conservation and biodiversity. These include:
- National Planning Policy Framework (NPPF);
 - The Wildlife and Countryside Act 1981 (as amended);
 - The Countryside and Rights of Way Act 2000;
 - Conservation of Species and Habitats Regulations 2010;
 - UK and local BAP;
 - Red Data Books and other non-statutory listings; and
 - Hedgerow Regulations 1997.
- 9.14 Consultations were carried out with relevant organisations regarding protected species, habitats and other ecological interests both within the site and within a 2km radius from the site. Consultees included:
- Merseyside Biobank (existing records data and non-statutory designated sites).
 - Merseyside Environmental Advisory Service (MEAS) – reviewed as part of the additional site assessment for bird species. Refer to Appendix 06 of the Technical Ecological Report which is included as Appendix 10.1 of this statement.
- 9.15 A desk study based on internet data sources was undertaken to identify the locations of statutory designated sites and priority habitats on or within 2km of the site. The following website was consulted:
- MAGIC (The Multi-Agency Geographic Information for the Countryside).

Phase 1 Habitat Survey

- 9.16 A Phase 1 Habitat survey of the site was undertaken on 4th January 2017, and an evening walkover assessment on 10th August 2017. The surveys were undertaken in accordance with standard methodologies set out in the Handbook for Phase 1 Habitat Survey, a technique for environmental audit (JNCC 2010). The potential for the likely presence or absence of protected species was determined by assessing the suitability/quality of the habitats/features present on the site for such species.
- 9.17 The trees on site were also assessed for their potential to support roosting bats according to BCT Guidelines (2016).
- 9.18 The survey report is included as Appendix 10.1 Technical Ecological Report.

Results

Statutory and Non-Statutory Designated Sites

- 9.19 There are no statutory or non-statutory designated sites within the site boundary.
- 9.20 There are two areas with multiple statutory designations within 3km of the site. These sites are Sites of Special Scientific Interest (SSSI), Special Protection Areas (SPA) and Ramsar's.
- 9.21 A proposal has been made to extend the boundary of the existing Liverpool Bay SPA which is to lay within 110m of the site boundary.
- 9.22 There are nine non-statutory designated sites within 2km of the site. These include designations as Liverpool Local Geological Sites (LLGS) and Nature Improvement Areas (NIA).
- 9.23 The details are included within section 4.3 of the Technical Ecological Report which is included as Appendix 10.1 of this statement.

Existing Species Records

- 9.24 Existing records for species within 2km of the site were provided by Merseyside Biobank, and additional bird records from MEAS.
- 9.25 The details of Mersey Biobank records and MEAS bird records are included within section 4.4 and Appendix 06 of the Technical Ecological Report which is included as Appendix 10.1 of this statement.

Habitats

- 9.26 The results of the Phase 1 Habitat survey are provided in section 4.2 and illustrated in Figure 02 of the Technical Ecological Report which is included as Appendix 10.1 of this statement.
- 9.27 In brief the site contained the following habitats:
- Hardstanding;
 - Amenity grassland; and
 - Introduced shrub and ornamental trees.

Bats

- 9.28 Bats
- 9.29 The Phase 1 Habitat Survey of the site determined that ornamental trees and introduced shrub habitats across the site provide very limited habitat for foraging and commuting bats with a small degree of connectivity. The site is well lit overnight due to street lighting set at regular intervals throughout, which is likely to deter bats from using these habitats.
- 9.30 The trees on site were assessed for their potential to support roosting bats. No trees were found to offer any potential for roosting bats, therefore are considered 'negligible' for roosting bats.
- 9.31 The details are included within section 4.2 of the Technical Ecological Report which is included as Appendix 10.1 of this statement.

Birds

- 9.32 During the survey six species of bird were noted at the site; pied wagtail (*Motacilla alba*), herring gull (*Larus argentatus*), mallard (*Anas platyrhynchos*), starling (*Sturnus vulgaris*), feral pigeon (*Columba livia domestica*) and cormorant (*Phalacrocorax carbo*). The remnants of a small nest was noted within a single ornamental tree to the west of the site, however the site generally has very limited nesting opportunities for birds.
- 9.33 The North Merseyside species action plan for 'urban birds' includes 4 species; house martin, swift, house sparrow and starling. A small group of starling (UKBAP and LBAP) were noted foraging on site during the site assessment, however there are no suitable roosting habitats on site for this species (i.e. trees are too small). No other LBAP priority species were detected during the survey, and no suitable habitat for other species was noted within or adjacent to the site.

- 9.34 Evidence of herring gull feeding activity was noted on hard standing areas adjacent to Wapping Quay (i.e. empty and broken mussel shells, and droppings), with some limited evidence also seen within the amenity grassland areas.
- 9.35 A single cormorant was noted on site, which was identified at the site boundary directly adjacent to Wapping Quay. The area comprising the Mersey Narrows & North Wirral Foreshore SSSI, SPA and Ramsar is designated as it supports populations of European importance of migratory bird species including bar-tailed godwit, common tern, knot, and little gull, and in addition to this it is designated for water bird assemblages including cormorant. The use of the site by this species is considered to be minor with a distinct lack of suitable foraging and nesting habitat for this species. Single birds may use the site intermittently, however assemblages of significance are considered unlikely to be present.
- 9.36 Further assessment of the habitat for bird species in relation to qualifying species was undertaken. The survey report is included as Appendix 06 within the Technical Ecological Report which is included as Appendix 10.1 of this statement. The assessment considered the site to be generally unsuitable for the breeding requirements of little ringed plover, black redstart and peregrine falcon and no adverse impacts on these species are therefore anticipated as a result of the development.

Amphibians

- 9.37 With regards to great crested newt (GCN) and other amphibians, there are no ponds on site or within 500m of the site. Consequently the site is not considered to be used by GCN.
- 9.38 There are records for amphibians including common frog and smooth newt within 2km of the site, however there are no ponds on site or within 500m of the site which could be used as breeding habitat, and no suitable terrestrial habitat on or adjacent to the site. It is therefore considered that these species are unlikely to be present. These species have limited protection under UK legislation (sale only), and neither are included on the LBAP.

9.39 Reptiles

- 9.40 Records for reptiles within 2km of the site included common lizard which are partially protected under UK legislation and are priority UK BAP species. This species is also included on the LBAP. Habitat at the site, however, is considered to be of poor quality for reptile species, lacks associated rough grassland habitat to provide invertebrates/foraging habitat, has a high level of disturbance during venue events (i.e. vehicle use and storage), and the presence of road barriers and built up areas are considered to provide a degree of severance between surrounding habitats and the site. It is therefore considered that these species are unlikely to be present.

9.41 Mammals

- 9.42 There are records for hedgehog which is a priority UK BAP species. A small remnant of a hedgehog was found within a hard standing car park area, however it is considered likely that this may have been transported to site on or by a vehicle. The introduced shrub planting has potential to be used as a form of shelter by this species, however it is limited and highly isolated on site. It is therefore considered that this species are unlikely to be present.
- 9.43 There is one record of red squirrel within the local area, however this record is dated 1970, with a limited grid reference to 1km square accuracy. There is no suitable habitat for this species within or adjacent to the site. It is therefore considered that this species are unlikely to be present.
- 9.44 No evidence of badger such as setts, digging, scratching, latrines, pathways, tracks or hairs were detected at the site or within 30 metres from it (where accessible). Habitat at the site is not considered suitable for foraging badger. No local records of badger were found within a 2km radius of the search area, and there is no favourable woodland habitat for badger within 500m of the site. It is therefore considered that this species are unlikely to be present.
- 9.45 There are various records for aquatic species within the local area, with suitable habitat directly adjacent to the site (i.e. River Mersey, Wapping Dock and Queens Dock), and potential for indirect effects on water quality.

Ecological Assessment Methodology

- 9.46 The assessment of the impact of the proposed development on ecological features is based upon the Chartered Institute of Ecology and Environmental Management publication Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (2016).
- 9.47 The baseline condition of the site is established through a combination of desk study and site survey.
- 9.48 This identifies the ecological features present on and within the vicinity of the site. These features are evaluated to establish their level of importance and their potential to be significantly affected by the proposed development. Features which are judged to be important and likely to be significantly affected by the proposed development are assessed.

9.49 The importance of an ecological feature is based upon consideration of the following:-

- Designation: European, national and local designated wildlife sites;
- Listing: Country Biodiversity, Biodiversity Action Plan, Red Listed, Rare and Legally Protected Species;
- Function: e.g. as a buffer, corridor or 'stepping stone' etc.;
- Characteristics: naturalness, rarity, diversity, connectivity, trend, assemblage, typicality, range.

9.50 The guidelines suggest that the importance of the ecological feature is considered within a defined geographical context. The following frame of reference is recommended:

- International and European e.g Ramsar sites;
- National e.g. Sites of Special Scientific Interest;
- Regional e.g. North West England;
- Metropolitan, County vice-county or other local authority wide area e.g. Merseyside;
- Local e.g. Liverpool.

9.51 Table 01 below illustrates how the concept of importance of the ecological features has been applied to assess the impacts of the development.

9.52 **Table 01:**

Level of importance	Description of ecological features
International	<p>Internationally designated sites (Special Protection Area (SPA), Ramsar, Special Area for Conservation (SAC))</p> <p>Habitats listed on Annex 1 of the Habitats Directive.</p> <p>Species listed on Annexes II, IV and V of the Habitats directive.</p> <p>Species listed on Annex 1 of the Birds Directive.</p>
	e.g. A significant population of a European protected species in this geographical region (a population of bird species representative of more than 1% of the international population).

National	<p>Nationally designated sites (Site of Special Scientific Interest (SSSI), National Nature Reserve).</p> <p>Habitats listed as habitats of principle importance under section 41/42 of the NERC Act 2006.</p> <p>Species listed as species of principle importance under section 41/42 of the NERC Act 2006.</p>
	<p>e.g. A significant population of a more common and widespread European protected species in this geographical region (a population of bird species representative of more than 1% of the national population).</p> <p>e.g. A significant population of a protected species under all parts of Schedule 1, 5 or 6 of the Wildlife and Countryside Act 1981 e.g. water vole.</p>
Regional	<p>e.g. A good/typical example of a UK BAP Priority Habitat that satisfies all the criteria in the Priority Habitat definition but is in some way slightly enhanced (e.g. presence of a species that is localised in the region).</p> <p>e.g. A regularly occurring, locally significant population of a species listed as being nationally scarce.</p>
County	<p>Sites of county importance (non-statutory) designated by local authorities to allow their importance to be considered within the planning system. Names vary between authorities including Local Wildlife Sites (LWS), Sites of Interest for Nature Conservation (SINC).</p> <p>Local Biodiversity Action Plan (LBAP) Priority Habitats and Species considered to be exceptional or of significance in the local (county/district) geographical area.</p>

Local	<p>Populations of BAP Priority Species which are not considered to be exceptional or of significance in the local geographical area.</p> <p>Areas of habitat which contribute towards habitat resources at the local level but are not of significant ecological importance e.g. local greenspaces and wildlife corridors within an urban area.</p> <p>Priority habitats and species listed on the LBAP (but not already listed under UK BAP).</p>
Negative	<p>Presence of a legally controlled animal or plant species listed under Schedule 9 of the wildlife and Countryside Act 1981 or other non-native invasive/injurious species that have potential to have a significant impact on the native flora and fauna and could be considered to have an ecological commercial or social adverse effect, usually at the local or site level.</p>

- 9.53 Site level has been used for ecological features of less than local importance such as:-
- species-poor vegetation communities;
 - typical populations of common and widespread mammal, bird, amphibian and/or invertebrate species;
 - habitats common and abundant within the local area, where that within the site does not represent a significant concentration.
- 9.54 Once the important ecological features are identified, consideration is given to the likelihood of change to these features as a result of the development and associated activities i.e. the predicted impacts of the development.
- 9.55 This change may be either positive or negative and includes consideration of the following characteristics of the impact.
- Extent
 - Magnitude
 - Duration
 - Timing

- Frequency
- Reversibility

9.56 Positive and negative effects are defined as follows:-

- Positive impact: a change that improves the quality of the environment e.g. by increasing species diversity, extending habitat or improving water quality; halting or slowing an existing decline.
- Negative impact: a change which reduces the quality of the environment e.g. destruction of habitat, removal of species foraging habitat, habitat fragmentation, pollution.

9.57 The identification of whether these effects are significant is based upon whether the effect supports or undermines biodiversity conservation objectives of the features which have been judged to be 'important' and is considered at the relevant geographical scale.

9.58 The identification of a significant effect then forms the basis for further consideration of the effects on the feature concerned and the potential to reduce effects by employing appropriate mitigation measures or providing compensation.

9.59 The effects with appropriate mitigation and/or compensation incorporated within the project proposals are then discussed as the residual impacts of the proposed development.

9.60 The 'mitigation hierarchy' is applied to reduce identified impacts, and provide enhancements, by avoidance in the first instance, then mitigation and finally compensation.

9.61 It is generally the case that no significant effect can occur to features of less than local importance, other than in exceptional circumstances such as where a feature has high social or economic value, or the magnitude of effect is particularly high.

9.62 Mitigation and compensation recommendations are detailed within Section 10.7. Recommendations are made to reduce any significant effect on ecological receptors. The impact assessment on ecological receptors made within section 10.6 is then reconsidered in light of mitigation and compensation recommendations made to give the residual impact.

Identification of 'Important' Ecological Features

- 9.63 Based on the information provided in Section 10.3 above, ecological features which will or may potentially be impacted upon by the proposed development are as follows:

Nature Conservation Sites

- Statutory Site (collective) - Mersey Narrows & North Wirral Foreshore (SSSI, SPA and Ramsar) – approximately 1.9km to the north west of the site.
- Statutory Site (collective) - New Ferry (SSSI) and Mersey Estuary (SSSI, SPA and Ramsar) - approximately 2.2km to the south of the site.
- Statutory Site (proposed) – Liverpool pSPA – approximately 110m to the south of the site.
- Nine non-statutory designated conservation sites (Liverpool Local Geological Sites and Nature Improvement Areas) within 2km.

Habitats

- Introduced shrub and ornamental trees;
- amenity grassland; and
- hardstanding.

Species

- bats;
- birds; and
- aquatic species - bottle nosed dolphin, common porpoise, grey seal, Atlantic salmon, and bony fish including Atlantic cod, Dover sole, European eel, and whiting.

- 9.64 The following sections provides an assessment of whether the above ecological features are 'important' in relation to the evaluation criteria outlined in section 10.3 and at what geographical scale this applies (summarised in Table 02). Impacts on features assessed as site importance are not considered further, only features important at level of local and above are considered further within the EIA.

9.65 Table 02:

Ecological feature	Assessment	Geographical scale of importance
Designated sites		
Statutory Sites – SSSI/SPA/Ramsar/pSPA	Sites designated under European and UK legislation.	International/national
Liverpool Local Geological Sites	Sites designated by Local Authorities.	County
Nature Improvement Area – Mersey Estuary	Sites designated by Local Authorities.	County
Habitats		
Introduced shrub and ornamental trees	Habitat of low conservation importance, common and abundant within the local area.	Site
Amenity grassland	Habitat of low conservation importance, common and abundant within the local area.	Site
Hardstanding/bare ground	Habitat of no conservation importance, common and abundant within the local area.	N/A
Species		
Bats – foraging	Protected under European and UK legislation, UK and LBAP priority species – low site use.	Site
Birds	Protected under UK legislation when breeding, UK and LBAP priority species, including ‘urban birds’, starling and herring gull.	Site
Aquatic species	Protected under European and UK legislation, UK and LBAP priority species – No suitable habitat on site, but waterbodies directly adjacent to the site.	Local

9.66 Nature Conservation Designated Sites

9.67 The Mersey Narrows & North Wirral Foreshore SSSI, SPA and Ramsar, the New Ferry SSSI and Mersey Estuary SSSI, SPA and Ramsar and the Liverpool Bay pSPA sites are designated under European and UK legislation. These sites are designated as they support populations of European importance of migratory bird species and water bird assemblages. The qualifying features are present at levels which provide these sites with importance at an international/national geographic scale.

9.68 There are 9 non-statutory designated nature conservation sites within 2km of the site boundary which are designated by the relevant local authority for their importance at a **county** scale. This includes 8 '**Liverpool Local Geological Sites**' and 1 '**Nature Improvement Area**'. The non-statutory site in closest proximity to the development site is the 'Mersey Estuary - Nature Improvement Area', which lies approximately 110m to the west of the site boundary. These sites are of **county** importance.

9.69 **Habitats within the Site**

9.70 The introduced **shrub and ornamental trees** on site are of local importance to breeding birds and invertebrate species, and also provide limited habitat for foraging and commuting bats as they have potential to offer a small degree of connectivity across the site. The trees on site do not fall under any category of priority habitat being young introduced ornamental species and not constituting veteran status. The introduced shrub and ornamental trees on site relatively common in the local area such that they are considered to be of **site importance**.

9.71 The site contains **amenity grassland** which is highly managed, is of low conservation interest in terms of plant species composition and provides low value habitat for fauna. This habitat has a widespread occurrence in the local/wider area and is common nationally. The amenity grassland on site relatively common in the local area such that they it is considered to be of **site importance**.

9.72 The site is predominately hard standing which is of no conservation importance, and is abundant within the local area. This habitat is therefore **not considered important** within this assessment; being neither exceptional or of significance in the local area, therefore will not be considered further.

9.73 Species

- 9.74 The introduced shrub and ornamental trees on site may provide very limited habitat **for foraging and commuting bats** as they have potential to offer a small degree of connectivity across the site. The site is well lit overnight due to street lighting set at regular intervals throughout, which is likely to deter bats from using these habitats. Due to the presence and abundance of similar habitats or habitats with greater ecological value within the local area, and because the records of bat species recorded in the local area are not considered exceptional or of significance in the local geographical area it is considered that it is important for foraging and commuting bats at the **site level**.
- 9.75 Habitat at the site provides limited breeding and foraging habitat for a range **of urban and other bird species**, although the quality of the habitat is limited due to the low number of ornamental trees, poor introduced shrub and the amount of hard standing and amenity grassland that dominates the site. Herring gull (UKBAP species) and starling (UKBAP and LBAP species) were present on site in low numbers, however, due to the presence and abundance of similar habitats or habitats with increased ecological value within the local area, and because the bird species recorded at the site are not considered exceptional or of significance in the local geographical area it is considered that it is important for birds at the **site level**.
- 9.76 There are records for **herring gull** within 2km of the site; a priority UK BAP species. A number of herring gull were noted on site, with evidence of feeding activity on hard standing areas adjacent to Wapping Quay, and some limited evidence within the amenity grassland areas. The habitats on site are not considered suitable for breeding herring gull. The site is considered to be of importance at a **site level**.
- 9.77 Records of **aquatic species** including bottle nosed dolphin, common porpoise, grey seal and Atlantic salmon were recorded within 2km of the site. In addition to this UKBAP species for bony fish, including Atlantic cod, Dover sole, European eel, and whiting were also recorded within the search area. The waterbodies adjacent to the site are not to be affected directly as a result of the development, however there may be indirect impacts as a result of discharge and pollution from the development, which could therefore impact aquatic species indirectly via effects on water quality. These waterbody features are considered to be of **local importance**.

Identification of Potential Impacts

Development Proposals

- 9.78 The proposals of the 1B site are to redevelop the site, including an 'Interpretation Centre' building, a multi-storey carpark with ground floor retail and a residential apartment block. The development proposals are shown in Appendix 01 of the Technical Ecological Report which is included as Appendix 10.1 of this statement.

- 9.79 Habitats that will be lost to the development are primarily hard standing, amenity grassland, introduced shrub and ornamental tree planting.

IDENTIFICATION OF POTENTIAL IMPACTS

- 9.80 The potential impacts of development during the construction phase include:

Direct impacts

- Loss/reduction of habitat;
- Pollution
- Changes in water table or drainage;
- Harm/injury to fauna from construction works e.g. excavations, vegetation removal,
- Harm/injury to fauna and flora from contact with site traffic.

- 9.81 *Indirect impacts*

- Loss/reduction of complimentary habitats;
- Fragmentation of habitat;
- Increased disturbance through activity, light and noise levels.

- 9.82 The potential impacts of the development once in operation include:

Direct Impacts

- Pollution – traffic/building emissions/drainage;

- 9.83 *Indirect impacts*

- Increased disturbance through activity, light and noise levels;

- 9.84 The potential impacts related to drainage, air pollution and noise levels are provided in reports from respective disciplines (refer to individual reports for details).

- 9.85 Ecological features which are to be retained on site will be protected during the construction process according to best practice in relation to the prevention of accidental pollution or damage to vegetation as follows, such that the potential impact will not be discussed within the assessment of impacts below (section 10.6):-

- The potential effects on water quality of the adjacent watercourses and surface water drainage will be minimised by the implementation of appropriate pollution control measures such as sediment fencing, bunding of fuel tanks and accident procedures both during the works and the future operation of the site.
- Appropriate working methods to minimise dust will be in place during the construction phase.
- Where areas of vegetation are to be retained it will be protected from accidental damage or encroachment during construction by the erection of temporary protective fencing to BS5837 (2012).

Assessment of Impacts

- 9.86 The potential impacts of the development on the important ecological features (as identified in section 10.4) are discussed in the following sections. Note that measures are not discussed that may be required to ensure protection of ecological features to comply with current wildlife legislation and best practice guidelines. These measures are reported in section 10.7.
- 9.87 The assessment below identifies the potential effects on important ecological features, describes the anticipated change and determines the significance of the effect based on the assessment process described in section 10.3.

ASSESSMENT OF IMPACTS: CONSTRUCTION PHASE

Important ecological features: Nature Conservation Sites

- 9.88 The site is located within 1.9km of the **Mersey Narrows and North Wirral Foreshore SSSI/SPA/Ramsar**, 2.2km of the **New Ferry SSSI and Mersey Estuary SSSI/SPA/Ramsar** and 110m of the **proposed Liverpool Bay SPA extension**. There is a distinct lack of complimentary habitats present within the application site compared to the SSSI/SPA/pSPA/Ramsar sites, therefore it is considered that there will be **no significant/neutral adverse effect** on the statutory sites in the local area. Consequently, as the scoping assessment of the application site identified that the North Wirral Foreshore (SPA/Ramsar) site and Mersey Estuary (SPA/Ramsar) site will not be impacted as a result of the development, it is therefore anticipated that an appropriate assessment under the Habitats Regulations Assessment will not be required, as demonstrated within Appendix 07 of the Technical Ecological Report (refer to section 5.1.1 and Appendix 07 of the Technical Ecological Report which is included as Appendix 10.1 of this statement).
- 9.89 **Liverpool Local Geological Sites** are designated due to their geological interest, and there are built up areas and intervening land uses between these sites and the site boundary, therefore it is considered that there will be **no significant/neutral effect** in terms of ecology on these non-statutory sites as a result of the development.

- 9.90 The **Mersey Estuary Nature Improvement** Area is not a protected site, but is a designated area in which opportunities may lie to establish and improve ecological networks by enlarging, enhancing and connecting existing wildlife sites and creating new sites. Therefore it is considered that there will be no **significant effect/neutral** on this non-statutory site, and ecological enhancements at the development site will be recommended which could contribute to its aims (see section 5.1.2 of the Technical Ecological Report which is included as Appendix 10.1 of this statement).

Important ecological features: Habitats

- 9.91 **The introduced shrub and ornamental trees** on site are considered to be of low ecological importance, however are of some value to breeding birds and invertebrate species, and also provide limited habitat for foraging and commuting bats as they provide a small degree of connectivity across the site. Consequently they are considered to be important at the **site level**. The masterplan indicates that majority of ornamental trees are to be lost, and that the introduced shrub is to be lost during the construction phase. It is therefore anticipated that the effects on the introduced shrub and ornamental trees will be **minor negative** (due to the high magnitude change on a feature of site importance) which would not constitute a significant effect.
- 9.92 **Amenity grassland** on site is considered to be of low ecological importance, however it is of some value to foraging birds. Consequently it is considered to be important at the **site level**. The masterplan indicates that the amenity grassland is to be lost during the construction phase. It is therefore anticipated that the effects on the amenity grassland will be **minor negative** (due to the high magnitude change on a feature of site importance) which would not constitute a significant effect.

Important ecological features: Species

- 9.93 The site is considered to be of **site** importance for **foraging and commuting bats** due to the low quality of the trees and shrubs on site, and the open and exposed nature of the site. The development has the potential to cause loss of minor foraging/commuting habitat. The potential disturbance from increased light levels is minor due to existing site use and lighting. It is therefore anticipated that the effects on bats will be **minor negative** (moderate magnitude impact on a feature of site importance) which would not constitute a significant effect.
- 9.94 The site is considered to be of importance for **birds** at a **site** level. Habitat at the site provides limited breeding and foraging habitat for a range of urban and other bird species due to the low number of ornamental trees, poor introduced shrub and the amount of hard standing and amenity grassland that dominates the site. The loss of habitat during construction will be high magnitude on a site level feature resulting in a **minor negative** impact, however again this is not considered to constitute a significant effect due to the temporary nature of the disturbance and the availability of alternative habitat within the local area.

- 9.95 The site is considered to be of importance for **starling** at a **site** level. The loss of habitat during construction will be high (due to the temporary nature of the disturbance and the availability of alternative habitat within the local area) but this will have a **minor negative** impact, however again this is not considered to constitute a significant effect.
- 9.96 The site is considered to be of importance for feeding **herring gull** at a site level. The loss of habitat during construction will be high (due to the temporary nature of the disturbance and the availability of alternative habitat within the local area) but this will have a **minor negative** impact, however again this is not considered to constitute a significant effect.
- 9.97 Effects on the water quality of waterbodies adjacent to the site are not anticipated, therefore an effect on **aquatic species** as a result of the proposed development may have an impact of **neutral** magnitude, therefore no effect/impact.

ASSESSMENT OF IMPACTS: OPERATIONAL PHASE

Important ecological features: Nature Conservation Sites

- 9.98 The potential for impacts on these sites during the operational phase of the development may occur through increased disturbance through activity, light and noise. Due to the absence of complementing habitat, and lack of suitable habitat for the protected sites qualifying species on site, and the distance between the application site and the designated site, it is anticipated that these impacts are unlikely such that there will be **no significant/neutral effects** (see section 5.1 of the Technical Ecological Report which is included as Appendix 10.1 of this statement).

Important ecological features: Habitats

- 9.99 There are no habitats of importance to be retained.

Important Ecological Receptors: Species

- 9.100 Impacts on bats during the operational phase of the development may occur through increased disturbance from activity, light and noise affecting foraging and commuting, however this increase is anticipated to be minimal compared to the existing activity, light and noise on site. Due to the anticipated low level of use of the site it is considered that the effects on bats will be minor negative, which would not constitute a significant effect.
- 9.101 Impacts on birds during the operational phase of the development may occur through increased disturbance from activity, light and noise affecting foraging and commuting (minor change on site level feature) and breeding. The disturbance is again anticipated to have a minor negative impact which would not constitute a significant effect.

- 9.102 Effects on the water quality of waterbodies adjacent to the site are not anticipated, therefore an effect on aquatic species as a result of the proposed development would have an impact of neutral magnitude, therefore no effect/impact.

SUMMARY OF IMPACTS

- 9.103 Table 03 below provides a summary of potentially significant adverse impacts on Important Ecological Features as discussed above.

9.104 **Table 03: Summary of impacts**

Important Ecological Receptor	Potential Impacts	
	Magnitude	Significance
Construction Phase		
Statutory Sites – SSSI/SPA/Ramsar/pSPA	<i>neutral</i>	<i>No</i>
Local Geological Sites	<i>neutral</i>	<i>No</i>
Nature Improvement Area	<i>neutral</i>	<i>No</i>
Introduced shrub and ornamental trees	<i>major negative</i>	<i>No</i>
Amenity grassland	<i>major negative</i>	<i>No</i>
Bats – foraging and commuting	<i>minor negative</i>	<i>No</i>
Birds	<i>minor negative</i>	<i>No</i>
Aquatic species	<i>neutral</i>	<i>No</i>
Operational Phase		
Statutory Sites – SSSI/SPA/Ramsar/pSPA	<i>neutral</i>	<i>No</i>
Local Geological Sites	<i>neutral</i>	<i>No</i>
Nature Improvement Area	<i>neutral</i>	<i>No</i>
Introduced shrub and ornamental trees	<i>N/A</i>	<i>-</i>

Bats – foraging and commuting	<i>minor negative</i>	No
Birds – urban and others	<i>minor negative</i>	No
Birds - starling	N/A	-
Birds - herring gull (feeding)	N/A	-
Aquatic species	<i>neutral</i>	No

Mitigation, Protection and Enhancement

- 9.105 No potentially significant impacts have been identified. The impacts identified are not potentially significant but can be reduced. This section identifies suitable measures for mitigation and protection.
- 9.106 Additionally, in line with the National Planning Policy Framework (NPPF) this section will also identify opportunities for ecological enhancement at the site through suitable recommendations for landscape design, planting and habitat creation.
- 9.107 More detailed information in relation to the mitigation, protection and enhancement at the site is presented in the following appendices:
- Appendix 10.1 Technical Ecological Report – Phase 1B (October 2017).
 -

MITIGATION, PROTECTION AND ENHANCEMENT: CONSTRUCTION PHASE

- 9.108 The masterplan shows how the development is to include the construction of buildings including the 'Interpretation Centre', a multi-storey carpark with a supermarket and a residential apartment block. It also gives an indication of the extent and potential location of associated soft landscaping. This incorporates a roof garden within the residential apartment block, and temporary landscape (tree nursery) to the north of the multi-storey car park and supermarket.
- 9.109 The habitat creation measures are recommended in order to maintain and enhance habitat connectivity through the site. They provide buffer zones to protect existing features of ecological value and offer opportunities for the incorporation of appropriate native planting (trees and shrubs). The detailed design of these elements will aim to mitigate for habitat losses and create the potential to enhance the sites biodiversity. This will include:
- Replacement and new planting of scrub and trees using appropriate native tree and shrub species, or species known to be of value to wildlife, such as those that promote invertebrate diversity and/or produce flowers/fruit (e.g. hawthorn, crab apple, dog rose and wild cherry).

- Boxes and features suitable for bats and a variety of bird species (including swift, house martin, and starling) to be installed on new buildings. Refer to document “Phase 1B, Monarch’s Quay, King’s Dock, Liverpool, Design and Access Statement, Monarchs Quay Holdings Ltd, October 2017” for bird box specifications and locations.

9.110 To avoid potential impacts on bat and bird species as a result of increased light pollution both during construction and during the operational phase of the development, directional lighting of low level illuminance will be used where possible, with lighting schemes designed to avoid illuminating existing and proposed habitats such as new shrub and tree planting, installed bat and bird roosting/nesting features. For additional information refer to the Bat Conservation Trust publication ‘Interim Guidance: Artificial Lighting and Wildlife’ (2014).

9.111 Irrespective of whether the potential impact is considered to be significant, specific working methods will be required to avoid disturbance, harm or injury when undertaking specific operations in relation to protected species as outlined in the **Table 04** below.

9.112 **Table 04:**

Species	Working methods
Bats	Directional lighting of low level illuminance will be used where possible, with lighting schemes designed to avoid illuminating existing and proposed habitats such as new shrub and tree planting and installed bat roosting features.
Birds	Vegetation clearance of suitable breeding bird habitat will only be conducted outside of the breeding bird season* (March to August inclusive) or subsequent to a checking survey by an appropriately qualified ecologist, to establish that no active nests are present.
Mammals (fox, hedgehog)	Precautionary working methods to be used during construction (covering or providing escape routes from open excavations, capping open ends of pipework).
Other	The removal of any tree/shrub cuttings from site once vegetation is cut so as to avoid the creation of brash piles; these may be attractive to nesting birds and other sheltering wildlife, which could subsequently be harmed if the brash pile is burnt or removed with machinery.

* All wild birds are protected under the Wildlife and Countryside Act 1981 (as amended) during breeding.

MITIGATION, PROTECTION AND ENHANCEMENT: OPERATIONAL PHASE

- 9.113 Potential impacts on completion of the development are anticipated to be from effects on water quality and lighting. With regards to effects on water quality and lighting, proposed mitigation would follow that required during the construction phase discussed above.

RESIDUAL IMPACTS SUMMARY

- 9.114 Tables 05 and 06 provide a summary of the residual impacts of the development on the important ecological features previously identified with the above mitigation, protection and enhancement measures in place both during construction and operation of the site.

Table 05 Summary Impact Table – Construction

Ecological Feature	Identified impacts	Geographic al level of importance	Magnitude Of impact	Duration of impact (reversibility)	Impact significant without mitigation	Mitigation and enhancement proposals	Residual impact.
Construction impacts							
Designated sites							
Statutory Sites – SSSI/SPA/Ramsar/ pSPA	None	International/ national	Neutral	N/A	No	N/A	Neutral – No impact
Local Geological Sites	None	County	Neutral	N/A	No	N/A	Neutral – No impact
Nature Improvement Area	None	County	Neutral	N/A	No	N/A	Neutral – No impact
Habitats							
Introduced shrub and ornamental trees	Direct loss. Accidental damage / injury.	Site	Major negative	Permanent	No	Replacement and additional planting.	Neutral
Amenity grassland	Direct loss.	Site	Major negative	Permanent	No	Replacement planting.	Neutral

Ecological Feature	Identified impacts	Geographic level of importance	Magnitude Of impact	Duration of impact (reversibility)	Impact significant without mitigation	Mitigation and enhancement proposals	Residual impact.
Hardstanding/bare ground	Direct loss.	N/A	N/A	N/A	No	N/A	N/A
Species							
Bats – foraging and commuting	Loss of foraging / commuting habitat and effects of light pollution. Harm/injury/disturbance from construction works / site traffic.	Site	Major negative	Permanent	Minor	Replacement and additional planting of native species. Directional low level lighting.	Neutral

Ecological Feature	Identified impacts	Geographic level of importance	Magnitude Of impact	Duration of impact (reversibility)	Impact significant without mitigation	Mitigation and enhancement proposals	Residual impact.
Construction impacts							
Birds – urban and others	Loss of habitat Harm/injury/disturbance from construction works / site traffic	Site	Major negative	Permanent/temporary	Minor	Vegetation clearance outside the nesting season (or following checks for active nests). Replacement planting and habitat creation measures. Installation of a variety of nest boxes/nesting features.	Neutral – minor beneficial
Birds – herring gull (feeding)	Loss of habitat. Harm/injury/disturbance from construction works / site traffic.	Site	Major negative	Permanent/temporary	Minor	-	Minor adverse
Aquatic species	Indirect impacts due to potential effects on water quality.	Local	Neutral	Permanent	No	Discharge and pollution control must be compliant with attenuation and treatments to minimise pollution to water courses.	Neutral

Table 06 Summary Impact Table – Operational

Ecological Feature	Identified impacts	Geographic level of importance	Magnitude Of impact	Duration of impact (reversibility)	Impact significant without mitigation	Mitigation and enhancement proposals	Residual impact.
Operational impacts							
Designated sites							
Statutory Sites – SSSI/SPA/Ramsar/ pSPA	None	International/ national	Neutral	N/A	No	N/A	Neutral - No impact
Local Geological Sites	None	County	Neutral	N/A	No	N/A	Neutral – No impact
Nature Improvement Area	None	County	Neutral	N/A	No	N/A	Neutral - No impact
Habitats							
Introduced shrub and ornamental trees (new planting)	Accidental/deliberate damage / injury.	-	-	-	-	Ongoing maintenance and replacement planting.	Neutral
Species							

Ecological Feature	Identified impacts	Geographic al level of importance	Magnitude Of impact	Duration of impact (reversibility)	Impact significant without mitigation	Mitigation and enhancement proposals	Residual impact.
Bats – foraging and commuting	Effects on commuting/ foraging habitat from increased light levels and disturbance.	Site	Minor negative	Permanent	Minor	Improved habitat. Directional low level lighting.	Neutral – minor beneficial

Ecological Feature	Identified impacts	Geographic level of importance	Magnitude Of impact	Duration of impact (reversibility)	Impact significant without mitigation	Mitigation and enhancement proposals	Residual impact.
Operational impacts							
Birds – urban and others	Increased disturbance and light levels.	Site	Minor negative	Permanent	Minor	Improved habitat. Directional low level lighting.	Neutral – minor beneficial
Birds - starling	Increased disturbance	Site	Minor	Permanent	Minor	Improved habitat. Directional low level lighting.	Minor adverse
Birds – herring gull (feeding)	Increased disturbance	Site	Minor	Permanent	Minor	Directional low level lighting.	Minor adverse
Aquatic species	Indirect impacts due to potential effects on water quality.	Local	Neutral	Permanent	No	Discharge and pollution control and accident procedures must be compliant with attenuation and treatments to minimise pollution to water courses. Drainage design – regulation of flow/run-off.	Neutral

Incombination Effects

- 9.115 Further information required to comment on effects.

Legislation, Plans and Policy

- 9.116 It is anticipated that all relevant wildlife legislation can be adhered to with potential licensing requirements for alterations to bat roosts being subject to further survey.
- 9.117 The proposals comply with the NPPF. All relevant designated sites and protected species have been included within the assessment with appropriate mitigation incorporated to minimise potential impacts where required and additional measures introduced to enhance overall site biodiversity.
- 9.118 The proposals comply with relevant local planning policies regarding nature conservation. The proposals do not affect any designated sites. The site is of low ecological value and impacts on features with limited ecological importance will be subject to mitigation and enhancement to provide an overall increase in biodiversity. The proposals include mitigation/enhancement for priority species including bats, starlings and house martins.
- 9.119 A brief explanation of the principle legislation and policies relating to nature conservation, biodiversity and ecology is provided in Appendix 03: Principle Legislation and Policies of the Technical Ecological Report which is included as Appendix 10.1 of this statement.

10 Flood Risk and Drainage

HYDROLOGY, FLOOD RISK AND DRAINAGE

INTRODUCTION

- 10.1 The aim of this chapter is to provide an assessment, in terms of hydrology and flood risk, of a development proposal by YPG Developments for Stage 1b of a mixed-use scheme that comprises of a 5-storey interpretation/office centre, multi storey car park for 350-400 car parking spaces with ground floor retail and a ground floor commercial/food hub with 120 apartments. The development area comprises three separate plots, that lie within a development Site boundary ('the Site') which lies within a wider Site, hereafter referred to as the 'wider Site' within this chapter. The development area will hereafter be referred to as 'the Site' within this chapter.

10.2 *Structure of the Chapter*

- Section 12.2 of the chapter describes the methodology and approach taken to the assessment, consultations and policy review.
- Section 12.3 describes the existing hydrology, flood risk, antecedent conditions, drainage and ecological/chemical status of the study area which comprise the baseline situation.
- Section 12.4 describes the potential effects of the proposals, highlighting features or methods of working which have been incorporated to mitigate such effects and enhance the proposals. Cumulative impacts and residual effects have also been included in this section.
- Section 12.5 provides a summary and conclusion.

BACKGROUND

10.3 *The Development*

The development proposals for Phase 1b comprise:

- Building 2 (Plot 2): 5 storey Interpretation/Office Centre with Cafe (NPPF Less Vulnerable use)
- Building 3 (Plot 3): 2500 m2 multi storey car park for 350 – 400 spaces with ground floor retail (NPPF Less Vulnerable use)
- Building 4 (Plot 4): 2300 m2 ground floor commercial/food hub with approximately 120 apartments (NPPF More Vulnerable use).

- 10.4 This chapter should be read in association with the Flood Risk Assessment (FRA) which was completed by Enzygo during October 2017 and provided as Appendix 12.1.

10.5 ***Aims and Objectives***

This chapter describes the policy context, input data, methods used to assess the Site in terms of the baseline hydrology and flood risk and the potential impacts of the proposed development at the Site taking into account the measures which have been adopted to prevent, reduce, mitigate or offset the identified impacts. Potential impacts generally relate primarily to flood risk and management of surface water, which in turn would manage water quality.

10.6 This assessment covers both the development and operational phases of the Site and identifies aspects of the proposals, which have the potential to affect the existing baseline situation. It addresses the following:

- Changes to the natural drainage patterns;
- Effects on baseflows;
- Effects on runoff rates and volumes;
- Effects on erosion and sedimentation;
- Effects on surface water quality;
- Effects on water resources (both private and public water supplies);
- Effects on flooding and impediments to flow; and
- Pollution risk.

METHODOLOGY

10.7 ***Guidance Documents***

As a matter of best practice, this assessment has been undertaken based on the relevant, up to date guidance on hydrology, flood risk, water quality and drainage. This includes:

- National Planning Policy Framework 2012;
- Planning Practice Guidance, 2014;
- Land Drainage Act 1991;
- Water Resources Act 1991;
- Flood and Water Management Act 2010;
- The Water Framework Directive (WFD), 2000/60/EC;
- Freshwater Fish Directive 2003/40/EC;
- Liverpool City Council Level 1 Strategic Flood Risk Assessment (SFRA), January 2008;
- WRC (2012) Sewers for Adoption, 7th Edition;
- Office of the Deputy Prime Minister, The Building Regulations, 2010;

- Office of the Deputy Prime Minister, Nation SuDS Working Group, 2004 – Interim Code of Practice for Sustainable Drainage Systems;
- CIRIA (2004) Report C609, Sustainable Drainage Systems – Hydraulic, Structural and Water Quality Advice;
- CIRIA (2015) Report C753, The SuDS Manual;
- CIRIA (2004) Funders Report CP/102 Development and Flood Risk – Guidance for the Construction Industry; and
- British Water Code of Practice, Flows and Loads – 4, 2013.

10.8 ***Assessment Methodology***

This assessment has involved the following:

- Consultation with the relevant statutory bodies to obtain details on the existing hydrological conditions of the Site and surrounding areas;
- Detailed desk study and site visits to establish the existing baseline conditions;
- Evaluation of the potential effects of the proposals;
- Evaluation of the significance of these effects by consideration of the Site, the potential magnitude of these effects and the probability of these effects occurring; and,
- Identification of possible measures to avoid and mitigate any potential adverse impacts resulting from the proposed Development.

10.9 ***Approach Methodology***

The approach followed during the assessment considered the degree (or the "significance") of the potential impacts upon the hydrological characteristics of the Site.

10.10 The significance has been defined taking into account the sensitivity of the receiving environment and the potential magnitude of the impact.

10.11 The sensitivity of the receiving water environment, i.e. its ability to absorb the impact without perceptible change, is defined in Table 12.1.

10.12

Table 12.1 – Definition of Sensitivity of the Receiving Environment

Sensitivity	Definition
Very High	<p>High quality and rarity, regional or national scale and limited potential for substitution/replacement</p> <ul style="list-style-type: none"> • Site of Special Scientific Interest (SSSI) or Special Area of Conservation (SAC) • Excellent water quality • Large scale industrial agricultural abstractions >1000m³/day within 2 km downstream, or abstractions for public drinking water supply • Designated salmonid fishery and/or salmonid spawning grounds present • Watercourse widely used for recreation, directly related to watercourse quality (e.g. swimming, salmon fishery etc.) within 2km downstream • Conveyance of flow and material, main river >10m wide • Active floodplain area (important in relation to flood defence)
High	<p>Receptor with a high quality and rarity, local scale and limited potential for substitution/replacement or receptor with a medium quality and rarity, regional or national scale and limited potential for substitution/replacement</p> <ul style="list-style-type: none"> • Good water quality • Large scale industrial agricultural abstractions 500-1000m³/day within 2km downstream • Surface water abstractions for private water supply for more than 15 people • Designated salmonid fishery and/or cyprinid fishery • Watercourse used for recreation, directly related to watercourse quality (e.g. swimming, salmon fishery etc.) • Conveyance of flow and material, main river >10m wide • Active floodplain area (important in relation to flood defence)

Moderate	<p>Receptor with a medium quality and rarity, local scale and limited potential for substitution/replacement or receptor with a low quality and rarity, regional or national scale and limited potential for substitution/replacement</p> <ul style="list-style-type: none"> • Fair water quality • Industrial/agricultural abstractions 50-499m³/day within 2km downstream • Designated cyprinid fishery or undesignated for fisheries - Occasional or local recreation (e.g. local angling clubs) • Conveyance of flow and material, main river <10m wide or ordinary watercourse 5m wide • Existing flood defences, may be subject to improvement plans • Groundwater abstractions 50-499m³/day - Private water supplies present • Designated cyprinid²⁵ fishery, salmonid species may be present and catchment locally important for fisheries • Watercourse not widely used for recreation, or recreation use not directly related to watercourse quality
Low	<p>Receptor with a low quality and rarity, local scale and limited potential for substitution/replacement</p> <ul style="list-style-type: none"> • Environmental equilibrium stable and resilient to changes that are greater than natural fluctuations, without detriment to its present character • Polluted/poor water quality • Industrial/agricultural abstractions < 50m³/day within 2 km downstream • Fish sporadically present or restricted, no designated fisheries; not used for recreation • Watercourse < 5m wide

	<ul style="list-style-type: none"> Area does not flood Receptor heavily engineered or artificially modified and may dry up during summer months
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10.13 The magnitude of the effect includes the timing, scale, size and duration of the potential effect. For the purposes of this assessment the magnitude criteria are defined in Table 12.2.

10.14

Table 12.2 – Magnitude of Effect

Magnitude	Criteria	Description and Example
Major	Results in loss of attribute	Fundamental (long term or permanent) changes to the hydrology or water quality <ul style="list-style-type: none"> Loss of EC designated Salmonid fishery Loss of designated species/habitats Change in water quality status of river reach Compromise employment source Loss of flood storage/increased flood risk Pollution of potable source of abstraction
Moderate	Results in effect on integrity of attribute or loss of part of attribute	Material but non-fundamental and short to medium term changes to the hydrology or water quality <ul style="list-style-type: none"> Loss in productivity of a fishery Contribution of a significant proportion of the effluent in the receiving water, but insufficient to change its water quality status Reduction in the economic value of the feature
Minor	Result in minor effect on attribute	Detectable but non-material and transitory changes to the hydrology or water quality <ul style="list-style-type: none"> Measurable change in attribute, but of limited size and/or proportion

Negligible	Results in an effect on attribute but of insufficient magnitude to affect the use / integrity	No perceptible changes to hydrology or water quality <ul style="list-style-type: none"> Discharges to watercourse but no loss in quality, fishery productivity or biodiversity No significant effect on the economic value of the receptor No increase in flood risk
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10.15 The sensitivity of the receiving environment together with the magnitude of the effect defines the significance of the effect prior to application of mitigation measures as outlined in Table 12.3.

10.16 **Table 12.3 – Significance Criteria**

Magnitude	Sensitivity			
	Very High	High	Medium	Low
Major	Major	Major	Moderate	Minor
Moderate	Moderate	Moderate	Moderate	Minor
Minor	Minor	Minor	Minor	Not Significant
Negligible	Not Significant	Not Significant	Not Significant	Not Significant

10.17 Potential effects are therefore concluded to be of major, moderate, minor or not significant. The shaded boxes in Table 12.3 represent effects considered to be significant.

10.18 This assessment concludes whether the residual significance of the resultant impacts of the operation of the Site will be major, moderate, minor, negligible, or there will be no change once appropriate mitigation measures have been implemented. This assessment relies on professional judgment to ensure that the impacts are appropriately assessed. Impacts of moderate significance or greater are considered significant in terms of the EIA regulations and should be taken into account during the decision-making process.

10.19 There are a number of potential impacts that could have a direct or an indirect impact on the local hydrology, flood risk and drainage.

10.20 Identified potential impacts may be transitional but could also be of a more permanent nature.

10.21 ***Consultation***

Consultation has been undertaken with the following organisations:

- Environment Agency (EA);
- Liverpool City Council (LLFA and LPA)
- United Utilities

Environment Agency

10.22 Information regarding the current flood risk at the Site, local watercourses, local flood defences, water levels and water quality has been obtained from the Environment Agency. In addition, the Environment Agency was consulted regarding the methodology for the Flood Risk Assessment (FRA) (see Appendix 12.1), which has been undertaken for the proposed development.

10.23 Environment Agency Standing Advice and NPPF have been consulted and reviewed as part of the FRA. This confirmed the level of FRA required. This information is discussed in the accompanying FRA.

Liverpool City Council

10.24 Liverpool City Council are the Local Planning Authority for the area in which the Site is located. The Liverpool City Council Strategic Flood Risk Assessment (SFRA) was reviewed as part of the FRA (see 'Desk Study' below).

10.25 Liverpool City Council are the Lead Local Flood Authority (LLFA) for the Site area and are the authority governing 'Ordinary Watercourses'. They are also the statutory consultee on proposed drainage schemes for planning applications

United Utilities

10.26 United Utilities is responsible for the disposal of waste water and supply of clean water for the Site. United utilities provided copies of sewer asset plans within the study area.

10.27 Information with regards to sewer and water main flooding contained within the SFRA has been consulted as part of this Environmental Statement. All Water Companies have a statutory obligation to maintain a register of properties/areas which are at risk of flooding from the public sewerage system, and this is shown on the DG5 Flood Register.

10.28 ***Desk Study***

The desk study included the following:

- Collation of hydrological data – including rainfall and flow data;
- Compilation of soils, geological and groundwater information; and
- Compilation of surface water quality data

10.29 General information regarding the Site setting and hydrology of the application site has been obtained from the:

- Ordnance Survey 1:25,000 mapping (Explorer 275: Liverpool, St Helens, Widnes and Runcorn).
- British Geological Survey Map;
- Environment Agency Source Protection Zones, Flood Zone Maps, Abstraction licenses, WFD status information;
- British Oceanographic Data Centre (BODC – Tidal data);
- CEH National River Flow Archive – Flow data;
- Met Office rainfall averages; and
- Liverpool City Council SFRA and PRFA

10.30 ***Flood Risk Assessment***

The FRA (provided as Appendix 12.1) has been undertaken in accordance with the National Planning Policy Framework (NPPF). The key components of the FRA are as follows:

- An assessment of flood risk at the proposed development site;
- Hydrological analysis of the River Mersey estuary;
- A hydrological assessment of the surface water flows for the Site;
- Development of a surface water management strategy for the construction and operation phases of the development;
- The flood risk to the existing and proposed development;
- The Site drainage and any potential impacts of the proposed development on surface water drainage; and

- The risk management and mitigation measures available to reduce and manage the flood risk at the Site.

PLANNING POLICY

10.31 *Introduction*

A detailed review of the relevant planning and development plan documents in relation to the development proposals is provided within this Environmental Statement. This section summarises those policies that are directly relevant to hydrology, flood risk and drainage/water quality issues.

10.32 *National Policy & Legislation*

At a national level, the central government strategy document 'A Better Quality of Life – A Strategy for Sustainable Development for the United Kingdom' recognises the fundamental importance of good water quality to health and the environment and identifies the major challenges to water quality which it states are; growing demand for water supplies, pollution pressures from the new Development, diffuse pollution inputs, changed weather patterns and loss of habitats.

- 10.33 These have been taken into consideration in assessing the hydrological impacts of the proposed Development.

10.34 *National Planning Policy Framework*

The National Planning Policy Framework (NPPF) was adopted in March 2012 and sets out the Government's planning policies and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

10.35 *Planning Practice Guidance (PPG)*

PPG ID: 7 provides additional guidance to local planning authorities to ensure effective implantation of the planning policy set out in the National Planning Policy Framework on Development in areas of flooding. This replaces the Technical Guidance to the NPPF as of March 2014.

10.36 ***Making Space for Water***

In March 2005 the Department for Environment Food and Rural Affairs (DEFRA) published 'Making Space for Water'. The overarching theme of this document is the management of flood risk and the identification of a strategic direction to control it. The document also identifies the influence of the changing coast together with the uncertain impacts of climate change in terms of the management of processes and flood risk. It underlines that planning policy should be designed to minimise flood risk and states that the preparation of Catchment Flood Management Plans (CFMPs) and Shoreline Management Plans (SMPs) should provide a broad management matrix.

10.37 ***The Pitt Review***

In June 2008 Sir Michael Pitt published his final report into the summer 2007 flooding across the UK. The report examined both how to reduce the risk and impact of floods, and the emergency response to the floods in June and July 2007.

10.38 ***Flood and Water Management Act 2010***

The Flood and Water Management Act 2010 provides better, more comprehensive management of flood risk for people, homes and businesses. It gives the Environment Agency an overview of all flood and coastal erosion risk management and unitary and county councils the lead in managing the risk of all local flood and introduce an improved risk based approach to reservoir safety. The Act also encourages the uptake of sustainable drainage systems (SUDS) by removing the automatic right to connect to sewers and providing for unitary and county councils to adopt SUDS for new Developments and redevelopments.

10.39 ***Land Drainage Act and Water Resources Act 1991***

In addition to the national planning policy the application is liable for consideration by the Environment Agency and LLFA under the Land Drainage Act (1991) and the Water Resources Act (1991). Consent from the Environment Agency is required for any proposed discharges to controlled waters. Consent would also be required for any Development within 8m of a designated main river under the Environment Agency's Land Drainage Byelaws.

CIRIA Report C624 – Development and Flood Risk – Guidance for the Construction Industry

10.40 This report provides practical guidance to assist the construction industry meet the challenge of achieving sustainable communities that give proper consideration to flood risk. It recommends a tiered approach to flood risk assessment. Three levels of assessment are defined:

- **Level 1:** Screening study to identify whether there are any flooding issues related to the Site which need further consideration.

- **Level 2:** Scoping study to be undertaken if the Level 1 assessment indicates that the Site may lie within an area which is at risk of flooding or may increase flood risk elsewhere. A level 2 assessment is also used to confirm possible sources of flooding that may affect the Site.
- **Level 3:** Detailed study to be undertaken if the Level 2 assessment concludes that quantitative analysis is required to assess fully the flood risk issues related to the Site.

10.41 Further CIRIA guidance is provided in Environmental Good Practice on Site (C502, 1999), CIRIA Control of Water Pollution from Construction Sites (C532, 2001) and The SuDS Manual (C753, 2015).

10.42 These provide guidance on hydrology, flood risk, water quality and the appropriate use of SuDS in drainage schemes for consultants and contractors.

10.43 **Local Policy**

A Local Development Framework (LDF) is the spatial planning strategy introduced in England and Wales by the Planning and Compulsory Purchase Act 2004 and given detail in Planning Policy Statements 12.

10.44 Local Development Frameworks (LDFs) comprise various local planning policy documents, these include:

- Development Plan Documents that have been subject to independent examination and have the weight of development plan status as defined by Section 38(6) of the Act; and
- Supplementary Planning Documents, which are not subject to independent examination and do not have development plan status.

10.45 In terms of flood risk, the LDF is supported by a Strategic Flood Risk assessment (SFRA), as summarised below.

10.46 The FRA also considers the following policies: from the Liverpool City Council Local Plan, September 2016:

Policy STP2: Sustainable Growth Principles and managing Environmental Impacts; New development should seek to avoid negative impacts on the environment through adoption of best practice.

1(g) Avoid areas at risk of flooding and demonstrate it will not exacerbate potential sources of flood risk;

1(h) Improve and protect water and groundwater quality, including the River Mersey, Leeds & Liverpool Canal, and other inland rivers and watercourses, and where appropriate and feasible the opening up of watercourses to assist in flood risk management

Policy STP2: Sustainable Growth Principles and managing Environmental Impacts; Sensitive areas where development may have an impact, and which would therefore require avoidance or careful assessment and mitigation measures, include:

2(a) Areas at risk from coastal, river and surface water flooding, including small areas along the River Mersey and on the north east and south-east fringes of the City, and North Docks and Garston Docks which provide access to processing and trans-shipment facilities for mineral resources from the Mersey Estuary, Liverpool Bay and other sources

Policy R3: Flood Risk and Water Management; Flood risk will be reduced, water efficiency measures will be promoted, and water quality will be protected and enhanced through the following mechanisms:

R3(1); All proposals for development must follow the sequential approach to determining the suitability of land for development, directing new development to areas at the lowest risk of flooding and where necessary apply the exception test, as outlined in national planning policy.

R3(2); Developers will be required to demonstrate, where necessary, through an appropriate Flood Risk Assessment (FRA) at the planning application stage, that development proposals will not increase flood risk on site or elsewhere, and should seek to reduce the risk of flooding. New development will be required to include or contribute to flood mitigation, compensation and/or protection measures, where necessary, to manage flood risk associated with or caused by the development. Unless appropriate alleviation or mitigation measures are carried out, planning permission will not be granted for development.

Policy R4: The Coast

R4 (1); All proposals for development must follow the sequential approach to determining the suitability of land for development, directing new development to areas at the lowest risk of flooding and where necessary apply the exception test, as outlined in national planning policy.

Increase the risk of tidal flooding or coastal erosion through their impact on coastal processes

Impair the capacity of the coast to form a natural sea defence or adjust to changes in conditions without risk to life or property

- 10.47 Adversely affect the integrity of sites of international nature conservation importance, taking into account appropriate mitigation, or as a last resort, compensation in accordance with Policy GI 5 of the Local Plan.

Liverpool City Council Level 1 Strategic Flood Risk Assessment

- 10.48 The Level 1 SFRA was produced by Liverpool City Council during January 2008 in support of the production of the Local Development Framework.

- 10.49 The guidance provided in this document requires local authorities and those responsible for development decisions to demonstrate that they have applied a risk based, sequential approach in preparing development plans and consideration of planning through the application of a sequential test.
- 10.50 The underlying objective of the risk based sequential allocation of land is to reduce the exposure of new development to flooding and reduce the reliance on long-term maintenance of built flood defences.
- 10.51 The SFRA is essential to enable a strategic and proactive approach to be applied to flood risk management.

BASELINE CONDITIONS

Site Description and Topography

Site Description

- 10.52 The development Site is 1.57 hectares (ha) in area and comprises three separate development plots, located within a 5.5ha wider Site. Areas where constructed development (building footprints), as part of Stage 1b, will be located, amount to approximately 0.62 ha (39% Site area and 11% of the wider Site area).
- 10.53 The wider Site is located within the urban centre of Liverpool, adjacent to the Mersey Estuary, within an area of significant industrial and maritime history.
- 10.54 The wider Site is located on an 'island' between Queens and Wapping docks to the east and the Mersey Estuary to the west. The wider Site is bounded by existing office and commercial buildings and residential apartments to the north and south. The Exhibition Centre Liverpool forms part of the wider Site's south-western boundary.
- 10.55 The wider Site has been developed to a serviced standard which includes un-adopted roadways, pavements, hardstanding, foul and surface water drainage network and utilities. The areas making up 'the Site' are predominantly tarmacked car parking and hardstanding. The existing foul and surface water drainage network has a connection to the public sewer network on Kings Parade and subsequently, the Mersey Estuary.
- 10.56 The main access/egress route to the wider Site is via Queens Wapping bridge, which links the 'island' to Liverpool City Centre. Existing road infrastructure within the wider Site provides access/egress to the development area; namely Queens Wharf, Monarchs Quay and Keel Wharf.

- 10.57 The Site is divided into three separate areas (Plots), located within the eastern and south-eastern areas of the wider Site. Plots 2, 3 and 4 location corresponds to Building 2, 3 and 4 within the development plan, included as Appendix 12.2.
- 10.58 **Plot 2:** is located within the eastern area of the wider Site. The plot comprises a ~0.056 ha hardstanding promontory which originally formed part of the infrastructure when the Queens Wapping bridge operated as a swing bridge. The area is currently used as a recreational area and viewpoint for the docks with stone step access from the Queens Wapping bridge. The Plot is surrounded on its western and southern sides by the Queens Dock. The northern boundary comprises of Queens Wharf and eastern extent of the Queens Wapping road bridge. The Plot is considered to be 100% impermeable and currently drains via uncontrolled, diffuse discharge to the Queens Dock.
- 10.59 **Plot 3:** is located in the southern central area of the wider Site and comprises a 0.48 ha area currently used for car and coach parking. The Plot is bounded on its eastern boundary by Monarchs Quay, on its northern boundary by existing car parking, on its western boundary by the Exhibition centre Liverpool and on its southern boundary by Half Tide Wharf. Plot 4 is considered to be 100% impermeable. The Plot currently drains via an existing surface water drainage network, which outfalls to the Mersey estuary, via the public sewer network located on Kings Parade.
- 10.60 **Plot 4:** is located within the eastern area of the wider Site and at the western extent of the Queens Wapping road bridge. The Plot comprises a 0.35 ha area with tarmacked car parking and grassed areas. Plot 4 is adjacent to a High Voltage (HV) substation, on its south west boundary, which will be retained as part of the wider Site development proposals. The eastern and southern boundaries of Plot 4 adjoin Queens Dock via vertical masonry walls. The northern boundary comprises Queens Wharf, at the western extent of the Queens Wapping road bridge and the western boundary comprises Keel Wharf. Approximately 0.31 ha of Plot 4 is grassed and could be considered permeable. However, grassed areas are likely to be brownfield, made ground and will have limited infiltration and storage capability. Plot 4 currently drains via an existing surface water drainage network, which outfalls to the Mersey estuary, via the public sewer network located on Kings Parade.
- 10.61 The remainder of the Site, amounting to 0.68 ha, will comprise of unaltered, existing highway infrastructure and associated hardstanding.

Topography

- 10.62 A detailed topographic survey was carried out during July 2017 and a copy is included as Appendix 12.3.

- 10.63 **Plot 2:** The topographic survey did not record elevations within Plot 2. However, 0.5m LIDAR (Light Detection and Ranging) data, downloaded from online sources²⁶, shows elevations to be in the region of 5.3 to 4.5 mAOD. Plot 2 is approximately 2.2 to 3.0 metres below the Queens Wapping bridge deck level.
- 10.64 **Plot 3:** Plot 3 ranges between a topographical high of 7.5 mAOD in its northern area and a topographical low of 6.8 in its southern extent where Plot 3 meets Half Tide Wharf. From the topographical high, Plot 3 slopes to its topographical low in the south, and also slopes towards an elevation of 7.2 mAOD on its northern extent. The northern and southern slopes have gradients of 1:90 and 1:112 respectively.
- 10.65 **Plot 4:** Plot 4 ranges from a topographical high of 8.2 mAOD within its north-eastern corner to a topographical low of 7.3 mAOD within the western centre of Plot 4. The Plot 4 slopes towards the existing entrance with gradients ranging between 1:43 and 1:186.
- 10.66 The topographic survey shows the wider Site to have a topographic high of 8.38 mAOD at both the centre of the Queens Wapping bridge deck and roundabout at the junction of Queens Wharf and Monarchs Quay. The wider Site has a topographic low of 4.25 m AOD which is located at the eastern extent of a slipway, which links Queens Dock with the south-eastern area of the Site.
- 10.67 The majority of the wider Site is between 6.6 and 7.5 mAOD with a fall to the south over a distance of approximately 260 metres. This gives a slope gradient of 1:290.
- 10.68 The Queens Wapping bridge, which forms the primary vehicular access to the wider Site, has an elevation of 7.10 mAOD at its eastern extent, 7.88 mAOD at its western extent and 8.38 mAOD within the centre of the bridge Deck.
- 10.69 The River Mersey Estuary frontage (Kings Parade), which partially forms the western boundary of the wider Site has elevations of between 7.5 and 7.6 mAOD.

Hydrology, Surface Water and Drainage

Watercourses

- 10.70 Locally, the Site, and wider Site, lies adjacent to the lower Mersey estuary, approximately 6.5 km upstream of the Mersey mouth.

²⁶ <http://environment.data.gov.uk/ds/survey/#/survey>

- 10.71 The Mersey estuary is 26km in length and is approximately 1.2 km wide adjacent to the Site. Approximately 2 km downstream of the Site, are the Mersey Narrows, where the estuary is restricted to a 1 km width.
- 10.72 The estuary is 4.8 km in width at its widest point, approximately 13 km upstream of the Site at Ellesmere Port.
- 10.73 The Mersey estuary forms the tidal reach and culmination of the River Mersey; a 'Main River' under the authority of the Environment Agency, before the River enters the Irish Sea.
- 10.74 The River Mersey 'Main River' designation terminates at Warrington, approximately 36km upstream of the Site. At this location, the River Mersey has a catchment area of 2036 km² and a total river length of 110km. At the Mersey mouth, the River Mersey, and the estuary, has a total drainage area of 4680 km².
- 10.75 Table 12.4 sets out the descriptors for the study catchment area of the River Mersey to the termination of its Main River designation.
- 10.76 **Table 12.4 – FEH CD-ROM V3 Fluvial Catchment Descriptors of the River Mersey at Westy Gauging Station**

FEH Descriptor	Value
Grid Reference	SJ628883
Area (km ²)	2030 km ²
PROPWET	0.46
BFI HOST	0.441
SAAR (mm)	1077
URBEXT 1990	0.291

- 10.77 The Mersey estuary has a total area of 79.6 km² from Warrington to its outfall to the Irish Sea.
- 10.78 Regionally, the River Mersey and estuary lies within the North-West River Basin District (RBD).

- 10.79 To the east of the wider Site, are a series of hydraulically linked docks, namely; Brunswick Dock, Coburn Dock, Queens Dock, Wapping Dock, Wapping basin, Salthouse Dock, Canning Dock and Canning Half Tide Dock (Appendix 12.4). The docks are linked to the Mersey Estuary, through control structures located at the western extent of Canning Half Tide Dock and southern extent of Brunswick Dock. The control structures maintain water levels within the docks, at approximately 3.5 mAOD, such that levels do not rise and fall with the tide.
- 10.80 The docks have a total combined length of approximately 2.1 km and have a combined approximate area of 28.6 ha.
- 10.81 Historically, the docks were designed for sailing ships and surrounded by warehouses for commodity trading. However, the docks now have a predominantly leisure usage and provide mooring berths for recreational watercraft. The warehouse buildings, surrounding the docks now house apartments, museums and commercial/leisure businesses.
- 10.82 Along with the Mersey estuary, the docks encapsulate the land upon which the proposed development Site, and wider Site, is located. The docks are currently operated by the Canal and River Trust.

Surface Water Drainage

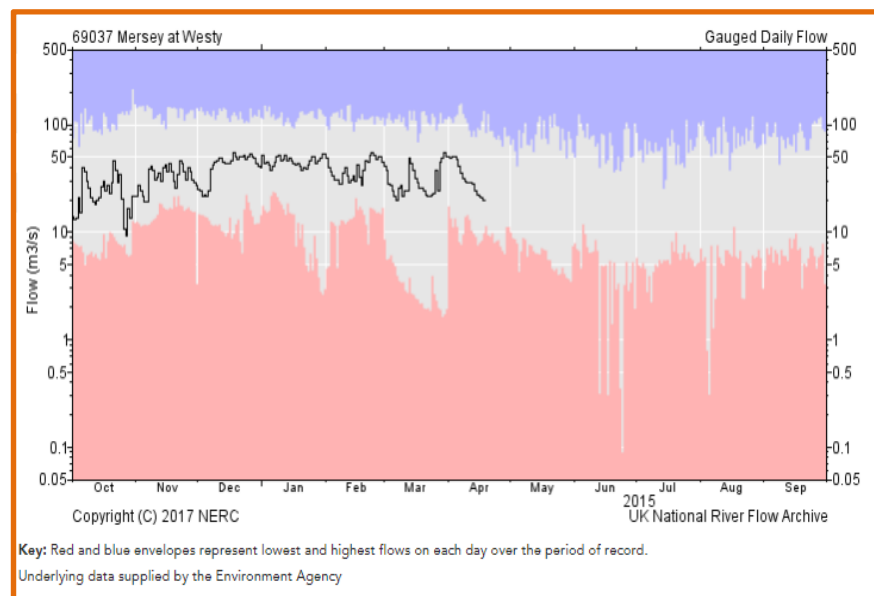
- 10.83 United Utilities has provided a copy of their sewer record plans of public adopted sewers in the vicinity of the Site. These are provided as Appendix 12.5.
- 10.84 United Utilities asset plans show that there are no public foul or surface water sewers located within the Site or wider Site boundary.
- 10.85 A Ø150mm public surface water sewer is located within Kings Parade, along the south-western boundary of the wider Site, and to the east of the River Mersey Estuary
- 10.86 A Ø400mm public foul sewer, is located within Kings Parade, along the southern western boundary of the wider Site, and to the east of the River Mersey Estuary
- 10.87 An un-adopted surface water and foul sewer network is located within the wider Site (Appendix 12.6) which connects to the public sewer network at the junction of Half Tide Wharf and Kings Parade on the south-western boundary of the wider Site. The public surface water sewer then discharges to the Mersey Estuary, through a point source outfall, approximately 45 metres to the south west of the wider Site.

- 10.88 The majority of the Site drains, via surface water gullies, to the existing surface water network with subsequent, unrestricted, discharge to the Mersey estuary.
- 10.89 Plot 2, which is located on the eastern extent of the Queens Wapping bridge, drains diffusely, and informally, into the Queens Dock.

Fluvial Flow Data

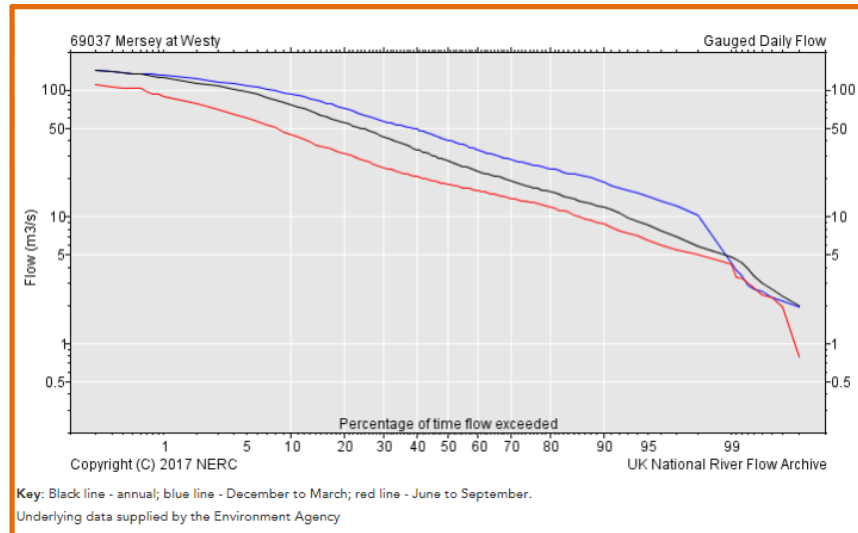
- 10.90 The closest flow gauging station to the Site, on the River Mersey, is at Westy (Station Number 69037), located at NGR SJ628883. This station is located approximately 36 km upstream of the Site and covers a catchment area of approximately 2030 km²
- 10.91 The gauged daily flow from the most recent period available from the CEH National River Flow Archive is shown in Figure 12.1 and the flow duration curve is shown in Figure 12.2.

- 10.92 ***Figure 12.1 – CEH NRFA Gauged Daily flow on River Mersey at Westy***



10.93

Figure 12.2 – CEH NRFA Flow Duration for the River Mersey at Westy



10.94 The 26km estuary between Westy gauging Station and the Mersey mouth accounts for a catchment area increase of 2644 km², which would represent significant increases to the hydrological data presented within Figures 12.1 and 12.2.

10.95 Fluvial flows represent approximately 1% of the tidal flow within the estuary.

Tidal Data

10.96 As previously stated, the Mersey Estuary, adjacent to the Site is tidal in nature and has an open connection to the Irish sea, via the Mersey narrows, which provides an unconstrained, natural tidal environment.

10.97 The Mersey Estuary has the second highest tidal range in the UK, with a range of 4.5 metres during neap tides and 10 metres during spring tides.²⁷

10.98 Tidal volumes, within the estuary, during neap and spring tides, are 190 million m³ and 350 million m³ respectively.²⁸

²⁷ <http://www.ntsrf.org/about-tides/river-mersey>

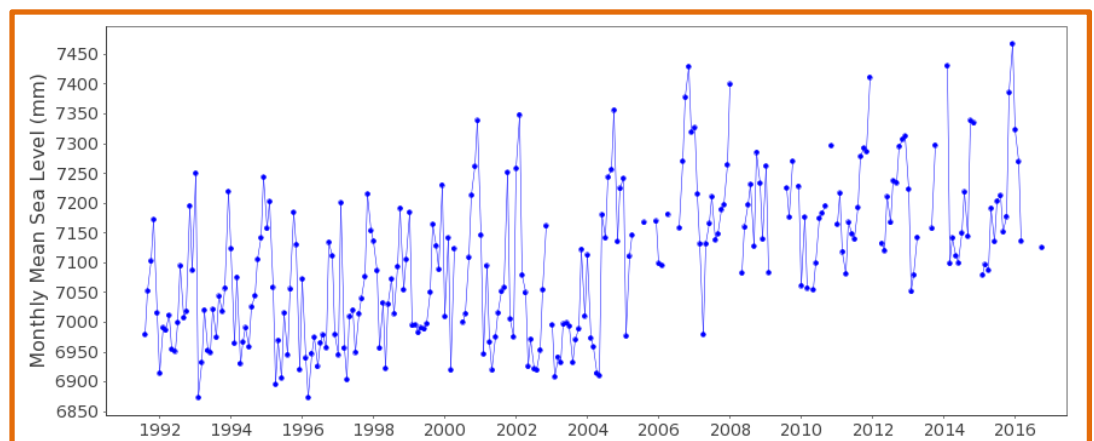
²⁸ <http://www.merseytidalpower.co.uk/content/tidal-resource-estuary>

10.99 The maximum spring tide velocity is 5.2 knots (2.7 m/s)

10.100 The Mersey estuary, on average, has two high and two low tides per 24-hour period.

10.101 A UK Tide Gauge (Station ID 1774) is located at Gladstone Dock, Liverpool, approximately 6.4 km downstream of the Site at NGR SJ32499525. Tidal data, representing mean sea level, is shown within Figure 12.3. It must be noted that the tidal data within Figure 12.3 is shown in 'metres above chart datum'. Chart datum is -4.93 metres at Gladstone Dock.

10.102 **Figure 12.3 – Monthly Mean Sea Level at Gladstone Dock, Liverpool**



Source: Permanent Service for Mean Sea Level (<http://www.psmsl.org/data>)

10.103 **Rainfall**

10.104 There is no published rainfall data for the Site or wider Site. Data is available from the Met Office for Crosby which is the most local station to the Site. Crosby rain gauge is located approximately 24km to the north of the Site.

10.105 Average and annual monthly rainfall data between 1981 and 2010 is shown in Table 12.5. This indicates an annual average of approximately 836.6mm.

10.106

Table 12.5 – Met Office Average Rainfall for Crosby

Month	1981 – 2010
January	74.9
February	54.4
March	63.6
April	54.3
May	54.9
June	66.2
July	59.0
August	68.9
September	71.7
October	97.3
November	82.6
December	88.8
Annual	836.6

10.107 The FEH Webservice Standard Average Annual Rainfall (SAAR) values for the River Fender at Ford Lane (Located at NGR SJ280880) on the southern bank of the Mersey Estuary, opposite the Site, and River Alt at Kirkby (Located at NGR SJ391983) to the east of the Site are provided below for comparison:

- Fender at Ford Lane rainfall (1961 to 1990) - 774mm
- Alt at Kirkby (1961 to 1990) – 860mm

10.108 Based upon the rainfall data presented above, the Site, and wider Site, will have an annual rainfall figure of between 774 and 860mm.

10.109 **Flood Risk**

10.110 A detailed FRA has been carried out by Enzygo during October 2017 (Appendix 12.1). The FRA has been undertaken in accordance with the NPPF and using Environment Agency Standing Advice. This confirmed the level of FRA required and that a surface water drainage assessment is to be undertaken.

Primary Sources

10.111 *Fluvial Flooding*

No fluvial flood sources were identified for the Site or wider Site. Fluvial flood risk to the Site has been demonstrated to be 'low' for the entirety of the Site with the probability of flooding from fluvial (river) sources; outside the 1 in 1000 annual probability of river flooding (<0.1% annual exceedance probability [AEP]).

10.112 Tidal Flooding

The detailed FRA (Appendix 12.1) confirmed that primary flood risk to the Site is from tidal sources.

10.113 Environment Agency Flood Map for Planning shows the wider Site to be inundated during the 1 in 200-year (0.5% AEP) and 1 in 1000-year (0.1% AEP) events within the south-western area. Flooding is shown to occur though overtopping of the Kings Parade from the Mersey Estuary. No flooding is shown within the Site.

10.114 The current Environment Agency flood map does not utilise the most up to date tidal levels, derived as part of the 2016 Mersey Estuary modelling study²⁹. The Environment Agency confirmed that the updated 2016 Mersey estuary study results were suitable for use within an FRA.

10.115 Enzygo utilised the 2016 Mersey Estuary model results and detailed topographic survey to redefine the tidal flood outlines to ensure the most up to date information was used within the assessment. The resultant outlines are included as Appendix 12.7.

10.116 Updated tidal outlines were produced for the 200 year (0.5% AEP) and 1000 year (0.1% AEP) events and also the 200 year event inclusive of climate change allowances for the year 2115. The climate change allowance represents tidal risk for the entirety of the lifetime of development.

10.117 The updated outlines within Appendix 12.7 show that:

10.118 **Plot 2:** Entire inundation of Plot 2 occurs within both the 200 year and 1000 year tidal events and as such, Plot 2 is located within tidal Flood Zones 2 and 3 (Medium and High Risk respectively). Maximum depth is 1.35 and 1.48 metres respectively. Within the 200 year plus Climate Change scenario, inundation occurs to a maximum depth of 1.98 metres.

²⁹ Environment Agency Mersey 2016 modelling study

- 10.119 **Plot 3:** No Inundation of Plot 3 is shown during the 200 yr and 1000yr tidal events and as such, Plot 3 is located within tidal Flood Zone 1 (Low Risk). Within the 200 year plus Climate Change scenario, inundation occurs in the southern area of Plot 3, representing approximately 50% of the area, to a maximum depth of approximately 0.48 metres, based upon a tidal flood level of 7.28 mAOD.
- 10.120 **Plot 4:** No inundation of Plot 4 is shown in all modelled tidal events, including climate change scenarios. As such, the majority of Plot 4 is located within Flood Zone 1 (Low risk). No further inundation is shown for the 200 year plus Climate Change scenario.
- 10.121 Flooding from tidal sources is shown to occur from Queens and Wapping Docks only. No overtopping of Kings Parade from the Mersey Estuary is shown.
- 10.122 The updated tidal outlines are considered a worst-case scenario as they assume the Mersey estuary modelled levels occur within the docks and ignore the presence of the dock water level control structures.
- 10.123 Tidal flood risk within the Site is to be mitigated by ensuring all more vulnerable (residential) elements of the development are sequentially located within Flood Zone 1 (low risk) and finished floor levels are set above the 200 year plus climate change level of 7.28 mAOD.
- 10.124 Plot 2, a less vulnerable development, is inundated to 1.35 and 1.48 metres respectively during the 200 year and 1000 year tidal events respectively and cannot be developed sequentially due to spatial constraints. The development within Plot 2 is classed as less vulnerable, which is acceptable within Flood Zones 2 and 3 (Medium and High Risk). Mitigation is proposed in the form of flood resilient construction and inclusion within the Environment Agency 'Irish Sea and Mersey Estuary from the Head of the Wirral to Runcorn tidal flood warning area', which would provide a 24 to 48 -hour lead time for evacuation ahead of an extreme tidal event. Safe, dry access/egress to Flood Zone 1 (Low Risk) has been demonstrated.
- 10.125 Impacts of displacement of tidal flood water as a result of the proposed building within Plot 2 during the 200 year and 1000 year events and proposed threshold levels for Plots 3 and 4 during the 200 year climate change event are considered negligible. This is due to known tidal levels and almost infinite area (the seas and oceans) into which the displaced volume would be dispersed.
- 10.126 *Surface Water Flooding*
- The FRA (Appendix 12.1) assessed the majority of the Site to be outside areas of surface water flood risk with isolated areas of ponded surface water flooding within the existing road network.

- 10.127 The FRA concluded that surface water flood risk within Plot 2 is negligible.
- 10.128 Appendix 12.8 shows surface water ponding associated with the 1 in 200 and 1000-year events within both Plots 3 and 4.
- 10.129 Surface water ponding is associated with topographical low spots and will be mitigated against through the surface water management strategy and proposed finished floor levels.

Secondary Sources

- 10.130 The FRA (Appendix 12.1) demonstrated that there are two residual sources of flooding to the Site:
- Flooding from rising / high groundwater.
 - Sewer Flooding
- 10.131 Groundwater flood risk within Plot 2 is considered negligible due to the encapsulation of the Site and wider Site within the Mersey Estuary and Docks.
- 10.132 It was concluded that there is limited potential for groundwater flooding to occur within the majority of the wider Site and within the entirety of Plots 3 and 4.
- 10.133 Sewer flooding occurs when urban drainage networks become overwhelmed after heavy or prolonged rainfall due to restrictions or blockage in the sewer network or if the volume of water draining into the system exceeds the sewer design capacity. This will be dealt with by the proposed drainage system and surface water management strategy which will direct flows to the Mersey Estuary and Docks as would occur without the development.

Summary

- 10.134 The development will be designed in accordance with principles of NPPF and PPG whereby it will not increase flood risk either on or off the Site.
- 10.135 The development has been assessed as having no detrimental impact on flood levels upstream or downstream of the development. There will be no negative impact on floodplain storage or conveyance.

Surface Water Quality

Water Framework Directive

Mersey Estuary

- 10.136 The aim of the Water Framework Directive (WFD) is to ensure that all surface water and groundwater bodies are of good chemical and ecological status by 2015. There are, however, certain exemptions as set out in the WFD.
- 10.137 The Mersey Estuary is an operational catchment located within the wider '*North West TraC Management*' catchment, which is in turn, located within the North-West River Basin (RBD).
- 10.138 There is one heavily modified estuarine water body within the Mersey Estuary operational catchment - '*Mersey*'. The '*Mersey*' water body extends from Warrington in the east to Marine Lake in the west.
- 10.139 There is one downstream water body – '*Mersey Mouth*'. The Mersey Mouth water body extends from Marine Lake, on the north-east extent of the Wirral Peninsula, to the Dee estuary to the south, and Fleetwood to the north.
- 10.140 The '*Mersey*' water body is expected to be at moderate potential quality in ecological status and fail in its chemical status by 2016 Cycle 2. It is expected to be of good ecological and chemical status by 2027.
- 10.141 The Reason for Not Achieving Good status (RNAG) are as follows:
- Industry (1)
 - Sector Under Investigation (5)
 - Water Industry (1)
- 10.142 At present, there are no measures within this water body which the predicted improvements in the status of water bodies by 2021 are based upon. Other measures may be taking place, but there is not enough confidence (in location or scale of improvement) to predict specific outcomes based upon them.
- 10.143 The Mersey Mouth water body is expected to be at moderate potential quality in ecological status and moderate in its chemical status by 2016 Cycle 2. It is expected to be of good ecological and chemical status by 2027.

- 10.144 The overall aim for the 'Mersey' water body is to achieve good ecological status by 2027. Good ecological status of a water body will be achieved when a series of criteria, including good chemical status, is achieved. The achievement of good chemical status is dependent on meeting agreed Environmental Quality Standards (EQS), including EQS for Priority Substances defined by the WFD.

Liverpool Docks

- 10.145 No water quality data could be found with regard to any WFD assessments of the Liverpool Docks. As a man-made waterbody, it would be classed as 'heavily modified' under WFD classification.
- 10.146 Liverpool Docks are hydraulically linked to the Mersey Estuary and therefore, as a conservative approach, the expectations for water quality should be similar to that of the Mersey Estuary. The overall aim should be to achieve a good ecological status for the Docks.

Drinking Water Abstractions

- 10.147 The proposed development during construction and operational phases should not affect local ground levels or sources for abstraction in the local area. There is one known abstraction point for drinking water located downstream of the Site approximately 3.7km to the north-east. This is a groundwater abstraction point and details regarding this abstraction are given as follows:
- Licence (2568008021) – No expiry date - after which it is expected the license will be renewed. Used for water bottling at 6,819m³ per day with a maximum annual abstraction of 1,426,248 m³. User is United Utilities Water Ltd
 - Licence (2568008018) – No expiry date - after which it is expected the license will be renewed. Used for water bottling at 12,500m³ per day with a maximum annual abstraction of 3,982,400 m³. User is United Utilities Water Ltd

Surface Water Abstractions

- 10.148 There is one authorised surface water abstraction point within 2km downstream of the Site related to Make-up or Top-up water. The details for these are as follows:
- License NW/068/0008/004 – Expires 31/03/2028 – Industrial Commercial and Public Services at max daily rate of 150 m³ and max annual rate of 32,000 m³. User is UM storage Limited.

Groundwater Abstractions

- 10.149
- There are twenty authorised groundwater abstractions at a single location within river catchments adjacent to the Site. The details for these are as follows:
 - License 2568008038R01 – Expires 31/03/2028 – Industrial/Commercial/Energy/Public Services at max rate of 259 m³ of water per day and 10,000 m³ per annum. User is Wirral Metropolitan Borough Council

- Licence 2568008036 – No Expiry – Industrial, Commercial and Public Services for the purpose of Golf Courses at a max rate of 90.9 m³ per day and 10,000 m³ per annum. User is Phelan.
- Licence 2568008033 – No Expiry – Industrial, Commercial and Public Services for the purpose of Golf Courses at a max rate of 70 m³ per day and 14,000 m³ per annum. User is Prenton Golf Club Ltd.
- Licence 2568008032 – No Expiry – General Agriculture for the purpose of Agriculture at a max rate of 136.38 m³ per day and 13638 m³ per annum. User is McDermott Meols Ltd.
- Licence 2568008030 – No Expiry – Industrial, Commercial and Public Services for the purpose of Golf Courses at a max rate of 454.6 m³ per day and 45,460 m³ per annum. User is The Wallasey Golf Club Ltd.
- Licence 2568008012 – No Expiry – Industrial, Commercial and Public Services for the purpose of Golf Courses at a max rate of 546 m³ per day and 28000 m³ per annum. User is Craig Gilholm.
- Licence 2569030032 – No Expiry – Industrial, Commercial and Public Services for the purpose of Dust Suppression at a max rate of 2,182 m³ per day and 29,9905 m³ per annum. User is WF Doyle & Co Ltd.
- Licence NW/069/0030/016 – Expiry 31/03/2028 – Industrial, Commercial and Public Services for the purpose of Hospitals at a max rate of 2,592 m³ per day and 770,850 m³ per annum. User is Royal Liverpool & Broadgreen University Hospitals NHS Trust.
- Licence NW/069/0030/004 – Expiry 31/03/2028 – Industrial, Commercial and Public Services for the purpose of Breweries/Wine at a max rate of 1133.4 m³ per day and 195,000 m³ per annum. User is RC Brewery Ltd.
- Licence NW/069/0030/003 – Expiry 31/03/2028 – Industrial, Commercial and Public Services for the purpose of Process Water at a max rate of 360 m³ per day and 131,400 m³ per annum. User is Baxter healthcare Ltd.
- Licence 2569030070R01 – Expiry 22/12/2019 – Industrial, Commercial and Public Services for the purpose of Municipal Grounds at a max rate of 1,296 m³ per day and 300,000 m³ per annum. User is Liverpool City Council.
- Licence 2569030068/R01 – Expiry 31/03/2028 – Industrial, Commercial and Public Services for the purpose of Process Water at a max rate of 475 m³ per day and 91,000 m³ per annum. User is Baxter healthcare Ltd.
- Licence 2569030067/R01 – Expiry 31/03/2028 – Industrial, Commercial and Public Services for the purpose of Makeup Top up water at a max rate of 155 m³ per day and 21,128 m³ per annum. User is Liverpool City Council.
- Licence 2569030066/R01 – Expiry 31/03/2028 – Industrial, Commercial and Public Services for the purpose of Heat Pump at a max rate of 1,700 m³ per day and 340,000 m³ per annum. User is ECF (General Partner) Ltd.
- Licence 2569030065/R01 – Expiry 31/03/2028 – Industrial, Commercial and Public Services for the purpose of Heat Pump at a max rate of 6,301 m³ per day and 2,300,000 m³ per annum. User is Trinity Mirror PLC.

- Licence 2569030063 –No Expiry – Industrial, Commercial and Public Services for the purpose of Makeup/Top up Water at a max rate of 960 m³ per day and 3,285 m³ per annum. User is City Quay management (2001) Company Ltd.
- Licence 2569031139/R01 – Expiry 31/03/2028 – Industrial, Commercial and Public Services for the purpose of Municipal Grounds at a max rate of 205 m³ per day and 37,476 m³ per annum. User is Liverpool City Council.
- Licence 2569031132 – No Expiry– Industrial, Commercial and Public Services for the purpose of Makeup Top up water at a max rate of 264 m³ per day and 37,000 m³ per annum. User is Liverpool City Council.
- Licence 2569031109 – No Expiry– Industrial, Commercial and Public Services for the purpose of General Use at a max rate of 90 m³ per day and 20,000 m³ per annum. User is Hanson Quarry Products Europe Ltd.
- Licence 2569031004 – No Expiry– Industrial, Commercial and Public Services for the purpose of other Industrial/Commercial/Public Services at a max rate of 109.1 m³ per day and 32,731.2 m³ per annum. User is Centaur Property Investments Ltd.

Taxa and Fauna

- 10.150 Salmon have now returned to the River Mersey following an improvement in water quality during the 1970's. It is thought Salmon began re-entering the Mersey Estuary during the early 1990's³⁰
- 10.151 Atlantic Grey Seals have been seen within the Mersey estuary along with Bottlenose Dolphin and Harbour Porpoise.³¹
- 10.152 Fish common to the Mersey Estuary include; Cod, Whiting, Dab, Plaice and Flounder, Dogfish, Mackerel and Tope.
- 10.153 The estuary is important to birdlife including; Shelducks, Teal, Redshank, Black Tailed Godwit, Dunlin, Pintail and Turnstone³²

³⁰ **The origins of Atlantic salmon (*Salmo salar* L.) recolonizing the River Mersey in northwest England**
Charles Ikediashi,, Sam Billington,, Jamie R. Stevens. First published: 11 September 2012

³¹ [Atlantic grey seal](#), Cheshire Region Biodiversity Project, retrieved 25 August 2012

³² [Waterbird population trend analysis of the Mersey Estuary SPA, Mersey Narrows & North Wirral Foreshore pSPA and Ribble & Alt Estuaries SPA](#)". *Natural England*. Retrieved 5 March 2016

Nature Conservation

10.154 The following designated sites are located within 5km of the Site:

- Mersey Estuary RAMSAR Site
- New Ferry Site of Special Scientific Interest
- Mersey Estuary Special Protection Area (Marine)
- Mersey Narrows and North Wirral Foreshore Ramsar Site
- Mersey Narrows Site of Special Scientific Interest.
- SSSI Impact Zone
- Mersey Narrows and North Wirral Foreshore Special Protection Area (Marine)
- North Wirral Foreshore Site of Special Scientific Interest.

10.155 In respect of potential impact from the Site during and following development, it is noted that discharge from the Site will be upstream of all the above designated sites. Therefore, the development has the potential to impact upon the identified designated Sites.

10.156 Surface water discharge from the Site will be required to meet standards set out in any discharge license granted by the Environment Agency to permit discharge from the Site.

Sensitivity of Hydrological Receptors

10.157 The baseline assessment has identified two receptors which may be vulnerable to impacts from the proposed Development. A summary of the relative sensitivities of these receptors (according to the criteria listed in Table 12.1) is given in Table 12.8 below.

10.158 **Table 12.8 – Sensitivity of Identified Receptors using the criteria within Table 12.1**

Receptor	Comment	Sensitivity
Mersey Estuary	<ul style="list-style-type: none"> Contains Sites of Special Scientific Interest: <ul style="list-style-type: none"> New Ferry Site of Special Scientific Interest North Wirral Foreshore Site of Special Scientific Interest Mersey Narrows Site of Special Scientific Interest Designated salmonid fishery and/or salmonid spawning grounds present Conveyance of flow and material main river >10m wide. 	Very High
Liverpool Docks	<ul style="list-style-type: none"> Same criteria as above due to hydraulic connectivity. 	Very High

Identification of Key Impacts

Construction Impacts

10.159 During construction, there is the potential for the following impacts without mitigation:

- Sediment/material spillages (as the result of accidents) and deposits from construction activities and traffic being washed into the Mersey Estuary and Liverpool Docks during rainfall events.
- Contaminants from oil/fuel spillage/leaks mobilised within entrained sediment and material becoming waterborne as outlined above.

10.160 Mitigation measures to deal with these impacts are discussed in the following section.

Operational Impacts

10.161 During the Proposed Development's operation, there is the potential for the following impacts without mitigation because of domestic activities within the mixed-use development:

- Sediment/material spillages (as the result of accidents) and deposits from site vehicular traffic being washed into the outfall waterbodies (Mersey Estuary and Liverpool Docks) from access roadways during rainfall events.

- Contaminants from oil/fuel spillage/leaks mobilised within entrained sediment and material becoming waterborne as outlined above.

Magnitude of Impacts

- 10.162 The wider Site currently comprises car parking, hardstanding and services with an existing surface water network. The surface water drainage network currently drains the Site and wider Site, with subsequent discharge to the Mersey estuary, via the public sewer network.
- 10.163 The proposed development will not introduce additional hardstanding/impermeable surfaces to the wider Site. As such, run off volumes will remain unchanged.
- 10.164 The existing wider Site is predominantly used for car and coach parking. The proposal will not result in a traffic volume increase within the Site and as such, associated risk of vehicular fuel/oil spillage is not increased.
- 10.165 Table 12.9 identifies the changes associated with the proposed development when compared to the existing wider Site use.
- 10.166 **Table 12.9 – Magnitude of Identified Impacts using the criteria within Table 12.2**

Receptor	Comment	Magnitude
Mersey Estuary	<ul style="list-style-type: none"> • The development wider Site is already developed with 100% impermeable surfaces. • The Site, and wider Site, currently discharge into an existing, live, surface water network at rates, and quality, associated with 100% impermeable surfaces and vehicular land use respectively. • The proposed development will continue to discharge via the existing outfall to the Mersey Estuary. • The wider Site is currently used for car and coach parking. 	Negligible

	<ul style="list-style-type: none"> • The wider Site, with an area of 5.5ha (55,000m²) area represents 0.0017% of the total catchment draining to the Mersey Mouth. • Brownfield runoff volumes from the wider Site, as discussed within the FRA (Appendix 12.1) have been calculated as 763 l/s, based upon a 50mm per hour run off rate and 5.5 ha wider Site. This runoff volume, equates to 16,482 m³ for a six hour flood tide period, which in turn equates to 0.009% of the tidal volume during a neap tide and 0.005% during a spring tide. 	
Liverpool Docks	<ul style="list-style-type: none"> • Same criteria as above due to hydraulic connectivity. • In addition to the above, Site 2 currently diffusely discharges surface water into the Queens Dock at rates and quality associated with 100% impermeable surfaces with no vehicular access. • The nature of Site 2 and proposed office/café land use will not introduce risk of fuel and oil spillages associated with vehicular activity. 	Negligible

10.167 Based upon a comparison of existing wider Site usage and the proposed development, and also the Site and wider Site area when compared to the Mersey drainage basin area and tidal dynamics, the magnitude of potential impacts associated within the proposed development, above existing, has been classified as negligible.

Mitigation Measures

Construction Impacts

Construction Environmental Management Plan

- 10.168 The maintenance and management of the Site during the construction phase will be essential in preventing surface water flooding of the Site and surrounding areas.
- 10.169 To control environmental issues during the construction process, a Construction Environmental Management Plan (CEMP) will be developed. The CEMP will form part of the project management plan, which will integrate the core arrangements for health and safety, quality and environmental management for the construction phase. This integrated approach ensures that environmental aspects are considered at all stages of the design and construction process.
- 10.170 The construction phase will be undertaken in accordance with the following good practice guidelines:
- CIRIA Environmental Good Practice on Site (C502) (1999);
 - CIRIA Control of Water Pollution from Construction Sites (C532) (2001); and
 - Environment Agency Pollution Prevention Guidelines.
- 10.171 These provide guidance on hydrology, flood risk and water quality for consultants and contractors.

Operational Impacts

SuDS Design

- 10.172 Roof water and surface water from the proposed buildings, associated carparking and existing access roadways will be routed via guttering/contouring of hardstanding to conventional gully pots which will in turn route to the existing surface water drainage network before discharging to the Mersey Estuary.
- 10.173 Through discussions with the Lead Local Flood Authority (LLFA) as part of the FRA, unrestricted discharge has been permitted to the Docks and Mersey Estuary.
- 10.174 Although unrestricted discharge to the Docks and Mersey Estuary is permitted, the existing drainage network will be modelled and enhanced to ensure the system can accommodate the 1 in 100 yr +40% climate change event.
- 10.175 The proposed multi storey car park within Plot 3, will be fitted with interceptors to meet the minimum required treatment train for car parks. This will provide betterment over the existing car park the proposal will replace.

Surface/Foul Water System Maintenance

- 10.176 Appropriate maintenance plans will be developed from that in existence to ensure the functionality of the foul and surface water drainage system is preserved.

Potential Cumulative Impacts

Relevant Proposals

- 10.177 The proposed development of the Site forms one part of a proposed three phased/staged development of the wider Site.
- **Stage 1a:** Full Planning Application for the development of a communication centre within the south-eastern extent of the wider Site.
 - **Stage 1b:** Full Planning Application for the development of Apartments, office buildings, multi-storey car park and retail.
 - **Stage 2:** Outline planning application for the development of other plots within the wider Site.
- 10.178 All of the above phases of development within the wider Site, will comply with DEFRA non-statutory guidance, PPG: 7 and CIRIA C753 guidance on surface water discharge rates, volume control and water quality control to minimise individual impacts on the aquatic environment.
- 10.179 The following projects are other future major applications within the vicinity of the Site, that have been identified for cumulative assessment as surface water from these are likely to discharge to the Mersey Estuary:
- 10.180 The Site, and wider Site, is located within the City Centre parish within the Liverpool Planning Portal. Other significant planning applications within the City Centre parish are as follows:
- Vacant land Princes Dock William Jessop Way Liverpool L3 1QP: To erect a 34-storey residential tower (Use Class C3) comprising 304 private rented sector apartments and 40 car parking spaces
 - The above application forms part of Liverpool Waters, a significant development at Central Docks, located approximately 2 km to the north (Downstream) of the Site, and wider site, on the eastern bank of the Mersey Estuary. Liverpool Waters represents a 2,000,000 sq metre, mixed use development of a 60 ha area over a 30 year period.
 - Wirral Waters is located on the western bank of the Mersey Estuary, approximately 2 km to the north west of the Site, and wider Site, and is a significant development representing the mixed-use development and regeneration of the semi derelict Birkenhead docks over a 120 ha area and 30 year period.

- Both Liverpool and Wirral waters have outline planning permission for the proposed development.

- 10.181 Water to the lower Mersey estuary and may cumulatively increase a potential impact on water quality within the catchment if surface water was managed ineffectively.
- 10.182 All of the above developments will comply with DEFRA non-statutory guidance, PPG: 7 and CIRIA C753 guidance on surface water discharge rates, volume control and water quality control to minimise individual impacts on the aquatic environment.
- 10.183 The proposed development at the Site will comply with the same guidance and drainage principles as stipulated by the LLFA for new planning developments. With an adequate CEMP for the Site, the proposed development will not result in a cumulative impact on the River Rother catchment should the above listed developments be constructed concurrently.

Summary

- 10.184 There are no perceived cumulative impacts from the developments listed above should they be approved.

Do Nothing Approach

- 10.185 The proposed development Site is brownfield in nature and has been developed to a serviced standard, incorporating metalled roadways, pavements, hardstanding and utilities, to aid and facilitate future development
- 10.186 The existing Site is considered to be 100% impermeable, consisting of metalled roads, hardstanding and tarmacked car and coach parks.
- 10.187 The wider Site has an existing surface water and foul drainage network that discharges to the Mersey estuary, via the public sewer network, and public foul network respectively. The development Site currently drains to the existing surface water network at uncontrolled rates.
- 10.188 The proposed development will not increase impermeable area and will utilise the existing drainage network, therefore maintaining current points of outfall into the Mersey estuary.
- 10.189 If the proposed development does not occur, the existing site and wider site will continue to be used for car and coach parking with 100% impermeable surfaces discharging to the Mersey estuary via the existing drainage network.

10.190 Table 12.10 summarises the sensitivity of the receptor, magnitude of impact and significance between the proposed development and do-nothing approach, in which the Site and wider Site remain as existing.

10.191 **Table 12.10 – Summary of do nothing approach**

Receptor	Sensitivity	Magnitude	Significance
Mersey Estuary (Proposed Development)	Very High	Negligible	Not Significant
Liverpool Docks (Proposed Development)	Very High	Negligible	Not Significant
Mersey Estuary (Do Nothing)	Very High	Negligible	Not Significant
Liverpool Docks (Do Nothing)	Very High	Negligible	Not Significant

10.192 **Residual Effects**

10.193 The residual effects associated with the hydrology, flood risk and drainage represent those effects that have not been assessed and mitigated against as part of the development plan.

10.194 Given the nature of the Development and the surface water management strategy with the appropriate design and management of the construction phase, then overall, the Site poses no significant risk to surface water resources within the area.

10.195 It has been concluded that there are no residual effects.

Conclusions

Introduction

- 10.196 This chapter has assessed the existing hydrological characteristics of the Site, the potential impacts of the proposed development, and has recommended mitigation measures to minimise any adverse impacts identified.

Impacts

Construction Phase

- 10.197 During the construction phase of the development, there will be the potential for point source contamination from onsite activities. Entrainment of uncontrolled surface water flows to the Mersey Estuary and Liverpool Docks may result in the flux of contaminants to the named waterbodies.

Operational Phase

- 10.198 Following construction, there is the potential for accidental point source pollution as the result of domestic activities within the mixed-use elements of the Site. Without management, pollution may be entrained within surface water flows to the Mersey Estuary and Liverpool Docks

Mitigation Measures

10.199 Construction Phase

- 10.200 A Construction Environmental Management Plan to ensure the construction phase is carried out in accordance with CIRIA and Environment Agency recommended practice in preventing the conveyance of pollutants to the Mersey Estuary and Liverpool Docks for the protection of the ecological status' of the Mersey Estuary and Mersey Mouth water bodies in light of the progress being made for the WFD aims for 2015 and beyond.

Operational Phase

- 10.201 A surface water management system in line with CIRIA C753 guidance to reduce the possibility of contaminants in suspension being released to the Mersey Estuary and Mersey Mouth water bodies will be introduced and managed to ensure its viability for the lifetime of the development.

Statement of Significance

- 10.202 It is considered that the proposed mitigation measures will reduce the significance of potential impacts of the proposals on the hydrology of the Site to "negligible". These are summarised in Tables 12.11 and 12.12.

Table 12.11 – Significance of Impacts on Hydrology – Construction Phase

Impact	Receptors	Sensitivity (from Table 12.1 and Table 12.6)	Magnitude of Effect before mitigation (Table 12.2)	Magnitude of Effect following Mitigation Measures (Table 12.2)	Significance of Impact (Table 12.3)
<i>Sediment loading of watercourses</i>	Mersey Estuary and Liverpool Docks*	Very High	Negligible	Negligible	Not Significant
<i>Changes to flow rate and water volume</i>	Mersey Estuary and Liverpool Docks*	Very High	Negligible	Negligible	Not Significant
<i>Pollution</i>	Mersey Estuary and Liverpool Docks*	Very High	Negligible	Negligible	Not Significant

Note - *data unavailable for sensitivity of Liverpool Docks. Assumption made on sensitivity based on Mersey Estuary as a conservative approach.

Table 12.12 – Significance of Impacts on Hydrology – Developed/Operational Phase

Impact	Receptors	Sensitivity (from Table 12.1 and Table 12.6)	Magnitude of Effect before mitigation (see Table 12.2)	Magnitude of Effect following Mitigation Measures (see Table 12.2)	Significance of Impact (see Table 12.3)
<i>Sediment loading of watercourses</i>	Mersey Estuary and Liverpool Docks*	Very High	Negligible	Negligible	Not Significant
<i>Changes to flow rate and water volume</i>	Mersey Estuary and Liverpool Docks*	Very High	Negligible	Negligible	Not Significant
<i>Pollution</i>	Mersey Estuary and Liverpool Docks*	Very High	Negligible	Negligible	Not Significant

Note - *data unavailable for sensitivity of *Liverpool Docks*. Assumption made on sensitivity based on *Mersey Estuary* as a conservative approach.

Conclusions

- 10.203 This chapter has assessed the hydrological characteristics of the proposed development as outlined, its surroundings, and the impacts of the proposals on hydrology, flood risk and drainage and accompanying mitigation measures.
- 10.204 The baseline assessment has identified two potential receptors (the Mersey Estuary and Liverpool Docks) which may be vulnerable to impacts from the proposed Development. They are classed as having a Very High sensitivity to environmental impacts based upon the presence of Sites of Special Scientific Interest (SSSI's) and Special Areas of Conservation (SAC's), presence of salmonid species and conveyance width of greater than 10 metres.

- 10.205 Proposed mitigation measures have been incorporated within the design to reduce the potential effects on hydrology, flood risk and surface water runoff both to the Site and to the surrounding environment.
- 10.206 It is considered that the proposed mitigation measures will reduce the significance of potential impacts of the proposals on the hydrology of the Site to negligible.
- 10.207 It is concluded that the proposed mitigation measures will ensure that the proposed development will have no significant impacts on hydrology, flood risk, drainage, water quantity and quality. A series of comprehensive mitigation measures have been integrated into the design of the Development to ensure that impacts on the hydrological environment are minimised.
- 10.208 Mitigation measures at the Site will need to ensure that water quantity and quality is controlled to acceptable levels. Surface water runoff from the Site will be discharged, subject to interceptor and flow controls, to existing outfall locations.
- 10.209 Therefore, this ensures that the development will not increase flood risk and pollution risk elsewhere.
- 10.210 It is proposed that the detailed design of the final scheme would be agreed with the LLFA and LPA prior to works commencing.
- 10.211 No cumulative impacts or residual effects have been assessed to affect areas local to the Site in relation to changes in hydrology on the Site following development.

11 Heritage

Introduction

- 11.1 This chapter has been prepared by Turley Heritage and assesses the likely environmental effects of the proposed development on the above ground historic built environment ('Built Heritage').
- 11.2 The chapter describes the methods used to assess environmental effects, the baseline conditions currently existing at the site and surroundings, the potential direct and indirect effects of the development on Built Heritage, the mitigation measures required to prevent, reduce, or offset the impacts and the residual impacts.
- 11.3 All designated built heritage assets, both within the red line application boundary and within approximately 400m of the site have been identified and the effect of the proposed development on these assets has been assessed for both the construction and operation phases of the development.
- 11.4 The site is close to the southern boundary of the Liverpool Maritime Mercantile World Heritage Site (WHS) and within the World Heritage Site Buffer Zone (BZ). It is also close to the southern boundary of the Albert Dock Conservation Area. The Proposed Development also has the potential to affect the setting, and significance, of a number of other listed buildings, by causing change within their setting.
- 11.5 A separate Heritage Assessment has been prepared which assesses the significance (including setting) of the heritage assets within the identified Study Area and considers the impact of the proposed development upon these assets. A Heritage Assessment has informed this ES chapter. A copy of the Heritage Assessment is included at **Technical Appendix 11 of Volumes Two**.

Legislative Framework

The Planning (Listed Buildings and Conservation Areas) Act 1990

- 11.6 The Act sets out the legislative framework within which works and development affecting listed buildings and conservation areas must be considered. This states that:-

"In considering whether to grant planning permission for development which affects a listed building or its setting, the local planning authority or, as the case may be, the Secretary of State shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses" (s66(1))

The concept of 'preserve' has been interpreted through case law to mean 'to cause no harm'.

The National Planning Policy Framework, 2012

- 11.7 The National Planning Policy Framework (NPPF) was introduced in March 2012 as the full statement of Government planning policies covering all aspects of the planning process.
- 11.8 Chapter 12 outlines the Government's guidance regarding the conservation and enhancement of the historic environment.
- 11.9 Paragraph 128 of the NPPF outlines the information required to support planning applications affecting heritage assets, stating that applicants should provide a description of the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the asset's importance and no more than is sufficient to understand the potential impact of the proposal on their significance.
- 11.10 Paragraph 132 requires when considering the impact of a proposed development on the significance of a designated heritage asset, that great weight should be given to the asset's conservation and the more important the asset, the greater that weight should be. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. As heritage assets are irreplaceable, any harm or loss requires clear and convincing justification. It is noted that substantial harm to or loss of a listed building should be exceptional and substantial harm to or loss of designated heritage assets of the highest significance should be wholly exceptional.
- 11.11 Paragraph 135 confirms that the effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. It also states the following:
- 11.12 "In weighing applications that affect directly or indirectly non designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset."
- 11.13 Paragraph 137 requires that local planning authorities look for opportunities for new development within the setting of heritage assets to better reveal their significance. With respect to setting, the policy notes that proposals that preserve those elements of setting that make a positive contribution to or better reveal the significance of the asset should be treated favourably. The setting of a heritage asset is defined by the NPPF as:

“The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral”.³³

Consideration of ‘Harm’

- 11.14 The statutory duty to have special regard to the desirability of preserving the special interest and setting of a listed building is a matter which should be accorded considerable importance and weight. In the event that harm is perceived to arise from proposals, the NPPF provides a policy framework at paragraphs 133 and 134 within which such harm can then be weighed against public benefits bearing in mind the considerable weight to be attached to the statutory duty.
- 11.15 The NPPF states that what matters in assessing if a proposal causes substantial harm is the impact on the significance of the asset. Significance derives from not only a heritage asset’s physical presence but also its setting.
- 11.16 Whether a proposal causes substantial harm will be a judgement for the decision taker, having regard to the circumstances of the case and the policy in the NPPF. It is the degree of harm to the asset’s significance rather than the scale of the development that is to be addressed. The harm may arise from works to the asset or from development within its setting.

Liverpool local policy

Liverpool Unitary Development Plan (November 2002)

- 11.17 Policy HD5 asserts that planning permission will only be granted for development affecting the setting and important views of a listed building where the setting and important views of the building are preserved. This will include control over the design and siting of new development and control over the use of adjacent land
- 11.18 Policy HD12 states that new development adjacent to a conservation area will only be permitted if it protects the setting of the conservation area and important views into and out of it.

³³ NPPF Annex 2: Glossary

Good Practice Advice Note 3: The Setting of Heritage Assets, Historic England (March 2015)

- 11.19 The document provides Historic England's guidance on managing change within the setting of heritage assets. The guidance makes it clear at paragraph 9 that setting is not a heritage asset, nor a heritage designation, rather its importance lies in what it contributes to the significance of the relevant heritage asset itself. The guidance sets out the need for a systematic and staged approach to assessing the impact of development proposals in the setting of a heritage asset. It confirms that such assessment should be based on an understanding of the significance of the heritage assets affected and then the contribution of setting to that significance. Guidance is provided on what potential attributes of setting may or may not make a contribution to the significance of a heritage asset, noting that in any one instance a limited selection of the attributes will be of particular relevance to an asset. These attributes can comprise:
- the asset's physical surroundings;
 - appreciation of the asset;
 - an asset's associative relationships with other heritage assets.
- 11.20 When assessing the effect of a proposed development on the significance of a heritage asset through effects on setting, matters of location and siting of development; the form and appearance of development; additional effects; and, permanence are highlighted.

National Planning Practice Guidance (2014)

- 11.21 Whilst not planning policy the Planning Practice Guidance provides a clear indication of the Government's approach to the application of national policy contained in the NPPF. Where there is conflict between the guidance in the PPG and previously published documents, the PPG will take precedence.

Historic England: Historic Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision Taking in the Historic Environment (2015)

- 11.22 GPA Note 2 provides information to assist in implementing historic environment policy in the Framework and the related guidance given in the NPPG. These include; assessing the significance of heritage assets, using appropriate expertise, historic environment records, recording and furthering understanding, neglect and unauthorised works, marketing and design and distinctiveness.

Conservation Principles: Policies and Guidance, Historic England (2008)

- 11.23 This guidance document sets out Historic England's approach to making decisions and offering guidance about all aspects of England's historic environment. The contribution of elements of a heritage asset or within its setting to its significance may be assessed in terms of its "heritage values".

Consultation Draft Good Practice Advice Note 3: Settings and Views of Heritage Assets, Historic England (2017)

- 11.24 Historic England has recently consulted on revised guidance relating to the setting and views of heritage assets. The draft document contains general advice on setting and views of heritage assets and like the current guidance suggests a staged approach to taking decisions on the level of the contribution which such setting and views makes to the significance of heritage assets.
- 11.25 The guidance clarifies that there is a distinction between views that contribute to heritage significance and views that might be valued for reasons of landscape character or visual amenity. It states that the extent and importance of setting is often expressed by reference to visual considerations. Although views of or from an asset will play an important part, the way in which we experience an asset in its setting is also influenced by other environmental factors such as noise, dust and vibration from other land uses in the vicinity, and by our understanding of the historic relationship between places.

Assessment Methodology

- 11.26 This assessment has been carried out in accordance with the statutory duties of The Planning (Listed Buildings and Conservation Areas) Act 1990 and the policies of the National Planning Policy Framework (NPPF). The assessment of construction and operational effects is based upon the methodology set out in the 'Design Manual for Roads and Bridges' (Volume 11, Section 2) prepared by the Highways Agency (2008).
- 11.27 The baseline assessment has been undertaken using a combination of desk-based study and fieldwork to identify and assess the heritage significance of the designated heritage asset receptors and to establish the way in which their setting and the Application Site contributes to the heritage significance of the asset.

Study Area

- 11.28 Baseline information has been obtained for the Application Site and the surrounding area within approximately a 400m distance (the 'Study Area'). The Study Area and identified heritage assets are shown on the Heritage Asset Plan included at Appendix 11.

11.29 Survey and Data Sources

- 11.30 Baseline information has been compiled from the following sources:
- The Historic England Archives;
 - National Heritage List for England (Historic England);
 - England's Places, the Architectural Red Box Collection (Historic England);

- Greater Manchester Historic Environment Record;
- Historic Ordnance Survey Mapping;
- Manchester City Council;
- Detailed visual site inspection; and
- Other published sources of information are referred to where relevant.

Assumptions and Limitations

- 11.31 The list of heritage assets within the Study Area has been compiled from information provided by the Merseyside Historic Environment Record, based on its calculation of the assets within a 400m radius of the Proposed Development. This is supplemented by research from the National Heritage List for England and the other sources from Liverpool City Council. These records are therefore relied upon.

Method of assessment significance

- 11.32 In the absence of specific prescribed criteria for establishing the relative value or importance of designated heritage asset receptors, guidance on assessing the value and importance of heritage assets is taken from 'Design Manual for Roads and Bridges' (Volume 11, Section 2) (2008) and also informed by a clear understanding and appreciation of the significance of each of the assets and also the contribution of setting to their particular significance. This has been undertaken in accordance with Historic England's guidance 'Good Practice Advice in Planning Note 3: The Setting of Heritage Assets' from 2015.

- 11.33 **Table 1: Value/Importance of Individual Heritage Assets**

Value / Importance	Definition
Very High	Standing buildings inscribed as of universal importance as World Heritage Sites Other buildings of recognised international importance
High	Scheduled monuments with standing remains Grade I and II* listed buildings Other listed buildings that can be shown to have exceptional qualities in their fabric or historical association not adequately reflected in the listing grade Conservation areas containing very important buildings

Medium	<p>Grade II listed buildings</p> <p>Historic (unlisted) buildings that can be shown to have exceptional qualities in their fabric or historical association</p> <p>Conservation areas containing important buildings</p> <p>Historic townscape or built-up areas with historic integrity in their buildings, or built settings (e.g. including street furniture and other structures)</p>
Low	<p>'Locally listed' buildings</p> <p>Historic (unlisted) buildings of modest quality in their fabric or historical association</p> <p>Historic townscape or built-up areas of limited historic integrity in their buildings, or built settings (e.g. including street furniture and other structures)</p>
Negligible	Buildings of no architectural or historic note; buildings of an intrusive character
Unknown	Buildings with some hidden (i.e. inaccessible) potential for historic significance

11.34 The sensitivity of the heritage assets is defined on the basis of the above table, informed by an understanding of the significance, in terms of the special architectural and historic interest of the listed buildings and the character and appearance of the conservation and the contribution of setting to that significance. This assessment of significance and setting is set out in the Heritage Assessment attached at Appendix 11 at Volume 2.

11.35 The magnitude of the impact of the proposed development on the heritage assets is assessed as outlined in the criteria in Table 7.2, again utilised from a table within the 'Design Manual for Roads and Bridges' (Volume 11, Section 2) (2008).

11.36 **Table 2: The Magnitude of the Impact of Proposals on Heritage Assets**

Magnitude of Cumulative Impact	Definition
Major / Substantial	Change to key historic building elements, such that the asset is totally altered and much of its significance is lost. Substantial change within the setting of an historic building leading to considerable loss of significance of the asset;

Moderate	Change to many key historic building elements, such that the asset is clearly modified and there is some loss of significance. Change within the setting of an historic building leading to some loss of significance of the asset;
Minor	Changes to key historic building elements, such that the asset is slightly altered and there is some loss of significance. Change within the setting of an historic building leading to a slight loss of significance of the asset;
Negligible	Slight changes to historic building elements or within its setting that hardly affect the significance of the asset;
No Change	No substantive change to fabric or within the setting.

11.37 The magnitude of the impact against value on the heritage assets is assessed as outlined in the criteria in Table 7.3, again utilised from a table within the 'Design Manual for Roads and Bridges' (Volume 11, Section 2) (2008).

11.38 **Table 3: Magnitude of Impact against Value (assessing significance)**

Vale / Importance of Asset (receptor sensitivity)	No Change	Negligible	Magnitude of Impact		
			Minor	Moderate	Major
Negligible	Neutral	Neutral	Neutral / Minor	Neutral / Minor	Minor
Low	Neutral	Neutral / Minor	Neutral / Minor	Minor	Minor / Moderate
Medium	Neutral	Neutral / Minor	Minor	Moderate	Moderate / Major
High	Neutral	Minor	Minor / Moderate	Moderate / Major	Major / Substantial
Very High	Neutral	Minor	Moderate / Major	Major / Substantial	Substantial

- 11.39 Where the matrix provides a split in the level of effects, e.g. Minor or Moderate, the assessor has exercised professional judgment in determining which of the levels is more appropriate. It should be noted that 'moderate' to 'major/substantial' effects are defined as significant in the context of the built heritage topic of the ES. It is considered that other effects below 'moderate' are less than significant, or could be neutral overall. Although the purpose of this chapter is to identify likely significant effects on built heritage assets, for the purpose of completeness, effects that are assessed not to be significant are also identified.
- 11.40 An entirely formulaic approach to quantification of effects cannot however be taken. The level of effect to heritage assets is quantified based upon the particular significance and setting of the asset and the nature of the effect. A detailed discussion is set out within the accompanying Heritage Assessment (Appendix 11 of Volume 2)

Baseline Conditions

Designated Heritage Assets within the Study Area

- 11.41 There are no Scheduled Ancient Monuments Registered Parks and Gardens or Registered Battlefields within the Study Area. There are 29 Listed Buildings and 1 Conservation Area within the Study Area. The Liverpool Maritime Mercantile City World Heritage Site is also in the study area. The assets within the study area are as follows:

- 11.42 **Table 4: Listed Buildings within the Study Area**

Name of Asset	Grade
Merseyside Maritime Museum and International Slavery Museum	I
The Pumphouse Public House	II
Original Dock Master's Office	II
Wapping Basin	II
Post Office Pillar Box on corner of Gower Street, Salthouse Quay	II
Scandinavian Seamen's Church (Gustaf Adolfs Kryka)	II*
Dock Traffic Office	I
Swingbridge	II
Gatepiers to Albert Dock	II
Gatekeeper's Lodge at Entrance to Wapping Dock	II
Heap's Rice Mill	II

Hydraulic Tower at Wapping Dock	II
Dock Retaining Walls, South Ferry Basin	II
Grapes Public House and Higsons Brewery	II
45-51 Greenland Street	II
Dock Retaining Walls, Dukes Dock	II
Gatekeepers Hut at Pier Head to North of Dock Entrance	II
Swing Bridge over entrance to Canning Dock	II
Britannia Pavilion and the Colonnades, Albert Dock	I
Edward Pavilion, Albert Dock	I
Sea Wall to west of Marine Parade	II
Workshop	II
Dock retaining walls, Salthouse Dock	II
Atlantic Pavilion, Albert Dock	I
Piermaster's House	II
Gatekeeper's Hut at Pierhead to south of Dock Entrance	II
Canning Dock Retaining Wall	II
Warehouse at Wapping Dock	II*
Baltic Fleet Public House	II

11.43 **Table 5: Conservation Areas within the Study Area**

Conservation Area
Albert Dock Conservation Area

11.44 **Table 6: World Heritage Sites within the Study Area**

Conservation Area
Liverpool Maritime Mercantile City World Heritage Site

Non-Designated Heritage Assets within the Study Area

- 11.45 The 'Good Practice Advice Note 2: Managing Significance in Decision-Taking' produced by Historic England (2015) states that:

“Non-designated heritage assets include those that have been identified in a Historic Environment Record, in a local plan, through local listing or during the process of considering the application.”

- 11.46 Liverpool City Council has not published a list of local heritage assets, however a search of the Merseyside Historic Environment Record (HER) was undertaken and identified the following above-ground heritage assets that are not included on the statutory national list.

11.47 **Table 7: Above-ground Non-designated Heritage Assets located within the Study Area**

Asset No.	HER Asset Name
MME9596	Queen's Dock
MME9684	Coburg Dock, Toxteth Park
MME9688	Sluice gate winding gear, Coburg Dock
MME9680	Queens-Conburg Bridge, Queens Dock, Toxteth Park
MME9691	Brunswick Dock, Toxteth Park

Assessment of Value/Importance of Heritage Assets (Summary)

- 11.48 The Heritage Assessment attached at Appendix 11 (Volume 2) provides a more detailed commentary on the significance and setting of the identified heritage assets and provides an assessment of the impact of the proposed development on those assets closest to the site. The below table provides a summary of the value/importance of the relevant heritage assets. This is based on the methodology set out at Table 3 combined with professional judgement.

11.49 Table 8: Summary of Value/Importance of Heritage Assets

Heritage Assets	Grade	Vale / Importance
Liverpool Maritime Mercantile City World Heritage Site	N/A	High
Albert Dock Conservation Area	N/A	High
Merseyside Maritime Museum and International Slavery Museum	I	High
The Pumphouse Public House	II	Medium
Original Dock Master's Office	II	Medium
Wapping Basin	II	Medium
Post Office Pillar Box on corner of Gower Street, Salthouse Quay	II	Medium
Scandinavian Seamen's Church (Gustaf Adolfs Kryka)	II*	High
Dock Traffic Office	I	High
Swingbridge	II	Medium
Gatepiers to Albert Dock	II	Medium
Gatekeeper's Lodge at Entrance to Wapping Dock	II	Medium
Heap's Rice Mill	II	Medium
Hydraulic Tower at Wapping Dock	II	Medium
Dock Retaining Walls, South Ferry Basin	II	Medium
Grapes Public House and Higsons Brewery	II	Medium
45-51 Greenland Street	II	Medium
Dock Retaining Walls, Dukes Dock	II	Medium
Gatekeepers Hut at Pier Head to North of Dock Entrance	II	Medium
Swing Bridge over entrance to Canning Dock	II	Medium
Britannia Pavilion and the Colonnades, Albert Dock	I	High
Edward Pavilion, Albert Dock	I	High
Sea Wall to west of Marine Parade	II	Medium
Workshop	II	Medium

Dock retaining walls, Salthouse Dock	II	Medium
Atlantic Pavilion, Albert Dock	I	High
Piermaster's House	II	Medium
Gatekeeper's Hut at Pierhead to south of Dock Entrance	II	Medium
Canning Dock Retaining Wall	II	Medium
Warehouse at Wapping Dock	II*	High
Baltic Fleet Public House	II	Medium
Queens Dock	HER asset	Low
Coburg Dock, Toxteth Park	HER asset	Low
Sluice gate winding gear, Coburg Dock	HER asset	Low
Queens-Coburg Bridge, Queens Dock Toxteth Park	HER asset	Low
Brunswick Dock, Toxteth Park	HER asset	Low

Assessment of Effects

- 11.50 Using the guidance set out in Tables 1, 2 and 3, the magnitude of impact during the construction and operation phases of the Proposed Development and the effect of this against the value of the asset has been assessed for each heritage asset.
- 11.51 The application proposals will have no direct impact upon the heritage assets identified proximate to the Proposed Development and the key consideration is therefore the effect of development on the significance of the identified assets, through development within their setting.

Identifying Harm

- 11.52 As well as identifying the likely significant effects the Proposed Development may have on built historic environment assets, it is also important to identify the degree of harm that may be caused to an asset's significance. This can be identified by taking the assets existing significance and applying the magnitude of change that will result from the Proposed Development.

- 11.53 Planning Practice Guidance (2015) states that it is the degree of harm to the asset's significance, rather than the scale of the development, that needs to be assessed. The NPPF identifies that the significance/value of a heritage asset can be harmed or lost by alteration or destruction of the asset or development within its setting. The Framework makes a distinction between 'substantial harm' and 'less than substantial harm' at paragraphs 133 and 134 which only applies to designated heritage assets. Planning Practice Guidance (2015) states that "*substantial harm is a high test, so it may not arise in many cases*".
- 11.54 Generally, if the magnitude of impact to a designated heritage asset is high adverse, this is considered to be the equivalent of 'substantial harm'. If the magnitude of impact to a designated heritage asset is low to medium adverse, this is considered to constitute 'less than substantial harm'; however professional judgement is also applied and this will not always be the case.
- 11.55 The tests of 'substantial harm' and 'less than substantial harm' do not apply to non-designated heritage assets. In determining the scale of any harm or loss and the significance of a non-designated heritage asset, the NPPF states at paragraph 135 that a balanced judgement will be required.

Construction Phase (including demolition of existing buildings)

- 11.56 The effects of the construction phase will be short term and temporary and involve typical construction activities such as traffic movements, noise, vibration, hoardings and cranes. This section assesses the effects of the construction phase and any direct or indirect effects this may have on heritage assets.
- 11.57 The construction phase of the proposed development will have a **no change** magnitude of impact on the majority of designated and non-designated heritage assets identified, resulting in a **neutral** overall effect for the construction phase. This is due to the significance of these heritage assets, the separation distances as evident on the Heritage Asset Plan, the existing character and context of the surroundings and intervening built development.
- 11.58 As illustrated on the Heritage Asset Plan the site is proximate to the Wapping Warehouse group of assets which includes the Warehouse at Wapping Dock (Grade II*), Hydraulic Tower at Wapping Dock Grade II), the Gatekeeper's Lodge at the entrance to Wapping Dock (Grade II) and Wapping Basin (Grade II). There is potential for visual effects arising from the proposed construction on these assets. It is concluded that overall there will a **negligible** magnitude of impact to these heritage assets, resulting in a **minor adverse** magnitude of impact against value during the construction phase for the Warehouse at Wapping Dock (grade II*) (due to its higher grading/significance) and a **neutral/minor adverse** magnitude of impact against value during the construction phase for the Hydraulic Tower at Wapping Dock Grade II), Gatekeeper's Lodge at entrance to Wapping Dock (Grade II) and Wapping Basin (Grade II).

- 11.59 There are no significant effects arising from the construction phase of the proposed development on built heritage assets.
- 11.60 The assessment undertaken in Table 8 takes into consideration the standard construction mitigation measures. The construction phase will be temporary and will only last the duration of construction activity at the Site.

11.61 **Table 9: Summary of Magnitude of Impact against Value – Construction Phase of the Proposed Development**

Heritage Asset	Value (sensitivity)	Magnitude of Impact	Magnitude of Impact against Value (significance of effect)
Liverpool Maritime Mercantile City World Heritage Site	N/A	No Change	Neutral
Albert Dock Conservation Area	High	No Change	Neutral
Merseyside Maritime Museum and International Slavery Museum	High	No Change	Neutral
The Pumphouse Public House	Medium	No Change	Neutral
Original Dock Master's Office	Medium	No Change	Neutral
Wapping Basin	Medium	Minor adverse	Neutral
Post Office Pillar Box on corner of Gower Street, Salthouse Quay	Medium	No Change	Neutral
Scandinavian Seamen's Church (Gustaf Adolfs Kryka)	High	No Change	Neutral
Dock Traffic Office	High	No Change	Neutral
Swingsbridge	Medium	No Change	Neutral
Gatepiers to Albert Dock	Medium	No Change	Neutral
Gatekeeper's Lodge at Entrance to Wapping Dock	Medium	Minor adverse	Minor adverse
Heap's Rice Mill	Medium	No Change	Neutral
Hydraulic Tower at Wapping Dock	Medium	No Change	Neutral
Dock Retaining Walls, South Ferry Basin	Medium	No Change	Neutral
Grapes Public House and Higsons Brewery	Medium	No Change	Neutral
45-51 Greenland Street	Medium	No Change	Neutral

Dock Retaining Walls, Dukes Dock	Medium	No Change	Neutral
Gatekeepers Hut at Pier Head to North of Dock Entrance	Medium	No Change	Neutral
Swing Bridge over entrance to Canning Dock	Medium	No Change	Neutral
Britannia Pavilion and the Colonnades, Albert Dock	High	No Change	Neutral
Edward Pavilion, Albert Dock	High	No Change	Neutral
Sea Wall to west of Marine Parade	Medium	No Change	Neutral
Workshop	Medium	No Change	Neutral
Dock retaining walls, Salthouse, Dock	Medium	No Change	Neutral
Atlantic Pavilion, Albert Dock	High	No Change	Neutral
Piermaster's House	Medium	No Change	Neutral
Gatekeeper's Hut at Pierhead to south of Dock Entrance	Medium	No Change	Neutral
Canning Dock Retaining Wall	Medium	No Change	Neutral
Warehouse at Wapping Dock	High	Minor adverse	Minor / Moderate
Baltic Fleet Public House	Medium	No Change	Neutral
Queens Dock Locally Listed building	Low	No Change	Neutral
Coburg Dock, Toxteth Park	Low	No Change	Neutral
Sluice gate winding gear, Coburg Dock	Low	No Change	Neutral
Queens-Coburg Bridge, Queens Dock Toxteth Park	Low	No Change	Neutral
Brunswick Dock, Toxteth Park	Low	No Change	Neutral

Operation Phase

- 11.62 As set out in the Heritage Assessment it is concluded that there will be no impacts to the significance of the identified listed buildings and HER assets having taken into consideration their significance, the relative distance between them and the site, the extent of intervening development and the nature of the application proposals. The proposed development is therefore concluded to have a **no change** magnitude of impact on the listed buildings and HER assets identified, resulting in a **neutral** overall effect for the operational phase.
- 11.63 As set out within the **Heritage Assessment (Appendix 11 of Volume 2)** there will be a **minor beneficial** magnitude of impact upon the Albert Dock conservation area through the redevelopment of an area of its setting which is presently undeveloped and low quality, with a high quality new building.
- 11.64 Accordingly, there are no significant effects arising from the operational phase of the proposed development on built heritage assets.

11.65 **Table 10: Summary of Magnitude of Impact against Value – Operation Phase of the Proposed Development**

Heritage Asset	Value	Magnitude of Impact	Magnitude of Impact against Value
Albert Dock Conservation Area	High	Minor beneficial	Minor/Moderate Beneficial
Merseyside Maritime Museum and International Slavery Museum	High	No change	Neutral
The Pumphouse Public House	Medium	No change	Neutral
Original Dock Master's Office	Medium	No change	Neutral
Wapping Basin	Medium	No change	Neutral
Post Office Pillar Box on corner of Gower Street, Salthouse Quay	Medium	No change	Neutral
Scandinavian Seamen's Church (Gustaf Adolfs Kryka)	High	No change	Neutral
Dock Traffic Office	High	No change	Neutral
Swingbridge	Medium	No change	Neutral
Gatepiers to Albert Dock	Medium	No change	Neutral
Gatekeeper's Lodge at Entrance to Wapping Dock	Medium	No change	Neutral
Heap's Rice Mill	Medium	No change	Neutral
Hydraulic Tower at Wapping Dock	Medium	No change	Neutral
Dock Retaining Walls, South Ferry Basin	Medium	No change	Neutral
Grapes Public House and Higsons Brewery	Medium	No change	Neutral
45-51 Greenland Street	Medium	No change	Neutral
Dock Retaining Walls, Dukes Dock	Medium	No change	Neutral
Gatekeepers Hut at Pier Head to North of Dock Entrance	Medium	No change	Neutral

Swing Bridge over entrance to Canning Dock	Medium	No change	Neutral
Britannia Pavilion and the Colonnades, Albert Dock	High	No change	Neutral
Edward Pavilion, Albert Dock	High	No change	Neutral
Sea Wall to west of Marine Parade	Medium	No change	Neutral
Workshop	Medium	No change	Neutral
Dock retaining walls, Salthouse Dock	Medium	No change	Neutral
Atlantic Pavilion, Albert Dock	High	No change	Neutral
Piermaster's House	Medium	No change	Neutral
Gatekeeper's Hut at Pierhead to South of Dock Entrance	Medium	No change	Neutral
Canning Dock Retaining Wall	Medium	No change	Neutral
Warehouse at Wapping Dock	High	No change	Neutral
Baltic Fleet Public House	Medium	No change	Neutral
Queens Dock	Low	No change	Neutral
Coburg Dock, Toxteth Park	Low	No change	Neutral
Sluice gate winding gear, Coburg Dock	Low	No change	Neutral
Queens-Coburg Bridge, Queens Dock, Toxteth Park	Low	No change	Neutral
Brunswick Dock, Toxteth park	Low	No change	Neutral

Mitigation measures

- 11.66 Construction mitigation measures in the form a Construction Management Plan and standard construction methods would assist in lowering the scale of impact. As a result of this limited scale of impact, no further mitigation measures are proposed during the construction phase.

Assessment of Cumulative Effects

- 11.67 Cumulative effects are those that may result from the combination of past, present or future actions of existing or planned activities in a project's zone of influence (Zol). While a single activity may itself result in an insignificant impact, it may, when combined with other impacts (significant or insignificant) in the same geographical area and occurring at the same time, result in a cumulative effect that is significant.
- 11.68 No operational effects have been identified for the Proposed Development. There are therefore no cumulative effects that would alter the conclusions for the Proposed Development set out in Table 9 and 10.

Residual Effects

- 11.69 No further mitigation measures are proposed, and there are no cumulative effects that change the conclusions set out in tables 9 and 10.

Monitoring

- 11.70 No monitoring programme is proposed in relation to heritage assets.

List of Abbreviations

- 11.71 National Planning Policy Framework (NPPF)
Unitary Development Plan (UDP)
Development Plan Document (DPD)
Planning Practice Guidance (PPG)

References

- 11.72 The Planning (Listed Buildings and Conservation Areas) Act (1990)
DCLG (2012) 'National Planning Policy Framework' DCLG (2014) 'National Planning Practice Guide'
Historic England (2015) 'Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets'
Historic England (2015) 'Historic Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision-Taking in the Historic Environment'
Historic England (2011) 'Seeing the History in the View'

Historic England (2008) 'Conservation Principles: Policies and Guidance'

Historic England (2017) Consultation Draft 'Good Practice Advice Note 3: Settings and Views of Heritage Assets'

Liverpool City Council (2002) Unitary Development Plan

12 Land Contamination

Introduction

- 12.1 An assessment of the likely effects on ground conditions from or associated with the Proposed Development has been completed by E3P Ltd.
- 12.2 This Chapter of the EIA will identify the existing soil and geological conditions and development constraints (the baseline conditions), evaluate the potential for contamination and assess the potential effects on ground conditions during both the construction and operational phase.
- 12.3 The Chapter will provide details of the baseline conditions and how the assessment has been undertaken and the results of that assessment. Furthermore, appropriate mitigation measures necessary to reduce or remove potential impacts will be described, together with an assessment of residual impact.

Methodology and Scope

- 12.4 The assessment has been guided by the following legislation and good practice:
- Part IIA Environmental Protection Act 1990
 - Environmental Agency (2004) Contaminated Land Report 11 (CLR 11). Model Procedures for the Management of Land Contamination
 - Environment Agency Pollution Prevention Guidelines
 - Environment Agency Groundwater Protection Policy and Practice (GP3) 2008
 - BSI 10175 (Code of Practice for the Investigation of Potentially Contaminated Land
 - CIRIA C665 Assessing risks posed by hazardous ground gases to buildings
 - BS 8485:2015 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings
 - BRE 465 Cover systems for land regeneration - thickness of cover systems for contaminated land
 - CIRIA C733 Asbestos in soil and made ground: a guide to understanding and managing risks
- 12.5 The National Planning Policy Framework (NPPF) paragraph 120 (Ref 13.1) indicates that principal planning objective when considering development on land affected by contamination is to ensure that any unacceptable risks to human health, buildings and other property, and the natural and historical environment from the contaminated condition of land are identified, so that appropriate action can be considered and then taken to address those risks

- 12.6 To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.
- 12.7 The NPPF planning policies and decisions should also ensure that:
- the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;
 - after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.
- 12.8 Part 2A of the Environmental Protection Act (EPA) 1990, introduced by s57 of the Environment Act 1995 (Reference 1), came into force in England on 1 April 2000. The main objective of introducing the Part 2A regime is to provide an improved system for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment given the current use and circumstances of the land.
- 12.9 The main document that set out procedures for the conduct of technical processes or activities which may be relevant or partially relevant to Part 2A includes The Environment Agency / Department of Environment Model Procedures for the Management of Land Contamination (CLR11) and this document recommends a phased or tiered approach to risk assessment.
- 12.10 The Tier I assessment completed by E3P comprises a Phase 1 Ground Conditions Desk Study that includes a review of the available historical and geo-environmental information. The information obtained and considered in the desk study includes historical Ordnance Survey maps, geological maps and memoirs, hydrological and hydrogeological records, environmental databases, coal mining and mineral extraction records and the results of site investigations carried out on the site. The purpose of the studies is:
- to establish the environmental setting of the site, particularly with regards to ground conditions including local geology, hydrology and hydrogeology;
 - to identify historic use or current potential sources of contamination and how these may affect the proposed scheme or indeed the wider environment;
 - to develop a Conceptual Site Model [CSM] of the site. This would be carried out in line with requirements of the Environmental Protection Act Part 2A source-pathway-receptor 'pollutant linkage' methodology;

- to undertake a geotechnical appraisal of the site and identify any site constraints and potential risks; and,
- to characterise, where possible, constraints and development considerations, including recommendations for further investigations, assessments and mitigation.

Consultation

- 12.11 The environmental data obtained as part of the Phase 1 Desk Study contains regulatory information from the following authorities:
- Liverpool City Council – air pollution controls, waste, contaminated land
 - Environment Agency – waste, hydrogeological, hydrological, pollution
 - Merseyside Waste Disposal Authority - waste
 - Coal Authority – coal mining
 - Natural England – sensitive sites, nature reserves
 - Public Health England - radon
 - Health & Safety Executive – COMAH permitted facilities

Limitations and assumptions

- 12.12 The technical reports completed in support of the application and EIA is based on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. Additionally, ground conditions and groundwater conditions can vary spatially and temporally and a degree of professional judgement is required in the interpretation of results.

Baseline Conditions

Desk Study

- 12.13 The subject site is an 'L' shaped parcel of land which is bounded by Queens Dock to the south and Wapping Quay to the north.
- 12.14 The current site mainly comprises of asphalt car park and road with some area of soft landscaping in the west of the site.

- 12.15 The BGS does not record any drift geology within the area of the site due to anticipated deep Made Ground overlying the underlying Chester Pebble Beds. The solid strata are classified as Principal Aquifer. The subject site is not within a Groundwater Source Protection Zone or Drinking Water Safeguard Zone and there are two groundwater / potable abstractions within 1km of the site, the closest of which is Brewery Limited located 675m east of the site where the water is used for drinking, coking, sanitary, watering and processing. The other abstraction is located 645m south east of the site relating to Robert Cain & Co Ltd where the water is utilised for drinking, cooking, sanitary and general cooling. groundwater within the Principal Aquifer is considered to be of high sensitivity.
- 12.16 The site is bounded by Queens Dock to the south with Wapping Quay north and the River Mersey circa 50m to the west. The River Mersey flows in a northerly direction. The River Mersey flows in a northerly direction, surface water is considered to be of high sensitivity.
- 12.17 Localised areas adjacent to River Mersey are indicated by the Environment Agency to be in a Flood Zone 2 and 3, however these do not fall within the subject site. This type of flooding is defined as 'an area that has a chance of flooding of greater than 1 in 30 (3.3%), although this type of flooding can be difficult to predict, much more so than river or sea flooding as it is hard to forecast exactly where or how much rain will fall in any storm.'
- 12.18 Historical mapping suggests that the site has been utilised as Queens Dock since before the mid 1800s. Since then the northern sector of the site has been infilled and is now used as a car park. The site has had a similar layout to the present since the 2000's.
- 12.19 There is a recorded historical landfills on-site that relate to the partial infilling of Queens Dock, with the other nearby landfill relating to the infilling of other nearby docks.

Site Investigation

- 12.20 E3P has not completed an intrusive Ground Investigation at this stage.

Assessment

- 12.21 Construction Phase
- 12.22 The construction process with respect to ground conditions includes two elements:
- site enabling works; and
 - provision of foundation structures.

- 12.23 These construction activities have interaction with the underlying strata and construction processes once above ground level cease to have that interaction and are therefore no longer relevant to this section.
- 12.24 During the enabling works, there is likely to be short-term (<5 years) interaction between construction workers and adjacent properties and controlled waters within the adjacent quays. Therefore, the purposes of this assessment, human health and controlled waters are considered to be of high sensitivity.

Enabling Works

- 12.25 During the enabling works process, there will be a requirement to prepare the ground for subsequent development. This will include the excavation of Made Ground strata to remove concrete obstructions associated with historical development and to remove any geotechnically unsuitable material such as timber or organic soils. Concrete obstructions that are excavated will be processed on-site under a WRAP (Waste Recycling Action Plan) Protocol and turned into construction aggregate for subsequent re-use on-site as part of the development. Any remaining material will likely require off-site disposal. The completion of the enabling works is considered to have **Negligible Impact**.
- 12.26 During the enabling works it is likely that excavators, crushers and tipper trucks will be required to move and process arising and subsequently replace arisings with recycled engineering aggregates. The use of plant is likely to require the storage and use of fuel which could be spilled and impact upon the underlying Principal Aquifer and possibly Prince's Dock. Spillage of fuel could have a short term **Moderate Impact** on baseline conditions.
- 12.27 Exposed soils or stockpiles of material awaiting processing or disposal may be exposed to wind this could generate dust. The dust could be impacted with heavy metals and possibly asbestos containing material. The dust could therefore be blown over adjacent land uses which include residential properties. The generation of dust during enabling works could therefore have a short term **Moderate Impact**. Additionally, stockpiles that are exposed to precipitation could generate run-off which contain a high suspended solids content. Should run-off therefore be uncontained, run-off could wash into the adjacent water courses, affecting water quality. This is therefore likely to have a short term **Moderate Impact**.
- 12.28 Where waste materials are disposed off-site, this will require the removal of soils via road haulage. Impacted soil attached to road vehicles may be spread along adjacent highways. This may pose a short term **Slight Impact**.

Foundation Structures

- 12.29 The geotechnical assessment of the site has identified that the proposed development will likely require the construction of piled foundations onto the underlying Sandstone bedrock. The formation of piles through the Made Ground may result in the creation of preferential pathways. The provision of a piled foundation has the potential to pose a risk to controlled waters and the provision of foundation structures are therefore likely to have a **Moderate Impact**.

Operational Phase

- 12.30 A source of on-site ground gas has been identified; associated with the likely anaerobic degradation of organic material within the Made Ground. The processing of the ground during the enabling works phase may remove this source material but at this stage remaining pockets of gas cannot be entirely ruled out. Where ground gas is present within the sub-surface, it could migrate along service entries and accumulate within indoor areas and pose a risk to future end users. Based on the above, ground gas is likely to have a long term **Moderate Impact**.

Additional Mitigation Measures

- 12.31 It is likely that the construction phase works will be completed in line with a development Construction Environmental Management Plan (CEMP) that will determine appropriate mitigation measures. This is likely to include measures needed to prevent the generation of dust during the enabling works. Such measures will include the setting of speed limits for construction traffic and the damping down of haul roads and stockpiles during dry weather. If asbestos fibres are identified within any Made Ground deposits then additional dust control measures, such as burying impacted soil at depth, may be required to prevent asbestos fibres being generated. These type of control measures as specified within CIRIA 733 Asbestos in soil and made ground: a guide to understanding and managing risks. Additional measures such as boundary dust monitoring may be completed to demonstrate that dust/fibres have not been released or that additional dust suppression is required.
- 12.32 Fuel storage requirement are also likely to be addressed within the CEMP. Furthermore, the storage of fuels is controlled by the Control of Pollution (Oil Storage) (England) Regulations 2001 which requires all fuel storage facilities over 250ltrs to be provided with adequate bunding in order to prevent spillages.
- 12.33 Where site conditions are likely to result in the spreading of soils/dust on the adjacent highway it will be necessary to employ the use of an on-site wheel cleaner or off-site road sweeper to remove debris.

- 12.34 The likely hardcover commercial development will provide sufficient mitigation against direct dermal contact or ingestion of impacted soils without the need for additional mitigation. However, should the scheme have any landscaped areas, then these areas may require a cover system to prevent exposure that is designed in accordance with the requirements of BRE 465 *Cover systems for land regeneration - thickness of cover systems for contaminated land*.
- 12.35 Due to the historical nature of the site it is possible that there will be elevated ground gas levels beneath the site, therefore there is potential that ground gas mitigation measures will be required and these will need to be in accordance with Characteristic Situation 2 as determined using CIRIA publication C665. The design of additional ground gas mitigation to prevent gas migration covers a number of techniques which are specified within BS 8485:2015 *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*.

Cumulative Impacts

Impact Interactions

- 12.36 The enabling works will require the wholesale lifting, sorting and processing of the site Made Ground. If there are any ecologically sensitive areas on the site, then mitigation measures will need to have been initiated prior to these works commencing.
- 12.37 The generation of dust during the construction phase may also impact upon air quality while works will also generate noise and vibration.

In Combination Effect

- 12.38 There is limited potential for the Proposed Development to give rise to likely significant cumulative effects in combination with other committed developments. This is because, following the implementation of the mitigation measures set out below there will no residual effects attributable to the Proposed Development on ground conditions such that a 'contribution' to cumulative effects cannot occur.

Residual Effects

- 12.39 Upon completion of the enabling works and with the implementation of the mitigation measures with respect to ground gas and the provision of a cover system within areas of landscaping, there will be no residual effects with respect to the ground conditions identified at the subject site

Assessment Summary

A tabular summary of the effects and additional mitigation is summarised in the table below.

Summary description of the identified impact	Sensitivity of Receptor	Impact Magnitude	Nature of the impact	Significance	Mitigation	Residual Impact Magnitude	Residual Significance of Effects	Confidence Level
Enabling Works Ground Improvement	High	Negligible	N/A	Neutral	None Required	Negligible	Negligible	High
Fuel Storage & Use	High	Moderate	Short Term Direct	Intermediate	Assessed in CEMP and Fully OSR 2001compliant fuel storage equipment	Negligible	Negligible	High
Dust generation from material stockpiles and haul roads	High	Moderate	Short Term Direct	Intermediate	Assessed in CEMP with construction controls including speed limits and dust suppression	Negligible	Negligible	High
Run-off from stockpiles	High	Moderate	Short Term	Intermediate	Addressed in CEMP.	Negligible	Negligible	High

			Direct		Stockpiles to be carefully located and if necessary banded to prevent run-off of suspended solids			
Spreading of material along adjacent highway	Low	Slight	Short Term Direct	Neutral	Addressed in CEMP. Use of wheel wash on-site and road sweeper off-site	Negligible	Negligible	High
Provision of piled foundations	High	Negligible	NA	Neutral	None Required	Negligible	Negligible	High
Ground Gas	High	Moderate	Long Term Direct	Intermediate	Building will be designed according to CIRIA 665 which will prevent ingress of ground gas	Negligible	Negligible	High

Conclusion

- 12.40 Based on the identified ground conditions, the construction phase will require the implementation of enabling work to improve the ground to permit subsequent development. These activities will likely create a number of moderate impacts to both the underlying Principal Aquifer, adjacent Queen's Dock and adjacent residential properties through generation of dust, highway debris or possible spillages of fuel. Mitigation measures for these potential impacts are well established and will be addressed as part of a Construction Environmental Management Plan (CEMP).
- 12.41 The Site Investigation will be required to complete a detailed assessment of any underlying contaminants and the potential for hazardous ground gas.

References

- 12.42 Phase I Geo-Environmental Site Assessment. Wapping Quay, Liverpool. Reference 11-630r3 dated October 2017
- National Planning Policy Framework 2012
- Part IIA Environmental Protection Act 1990
- Environment Agency Contaminated Land Report 11 (CLR11), Model Procedures for the Management of Land Contamination 2004
- Environment Agency Pollution Prevention Guidelines
- Environment Agency Groundwater Protection: Policy and Practice (GP3) 2008
- BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land) 2011
- Envirocheck Search, Site at Haydock, Ref 90931444_1_1 published by Landmark Information Group July 2016
- Historical Ordnance Survey mapping dated 1848 to 2016 published by Landmark Information Group 2016.
- Radon: Guidance on protective measures for new buildings, BRE Document BR 211, 2007.
- CIRIA C665 Assessing risks posed by hazardous ground gases to buildings. 2007.
- BS 8485:2015 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings
- BRE 465 Cover systems for land regeneration - thickness of cover systems for contaminated land. 2004.
- CIRIA C733 Asbestos in soil and made ground: a guide to understanding and managing risks. 2014

13 Transport

Introduction

Introduction

- 13.1 This chapter has been produced by Vectio Consulting Limited to assess the effects of the proposed development in relation to transport and access. A Transport Assessment (TA) and Framework Travel Plan (FTP) have been prepared to assess this in detail and presents a movement strategy that mitigates the effect of issues arising such as severance and delay to road traffic.
- 13.2 This chapter describes the baseline conditions relevant to the application site and its surroundings, the direct and indirect impacts of the development in terms of highways and transportation, mitigation measures that have been designed as a consequence of the scheme so as to reduce, or offset the negative impacts, along with identifying any residual impacts that will remain after the proposed mitigation measures have been put in place.
- 13.3 The basis of this chapter has considered the effects of traffic impacts reported in the accompanying Transport Assessment as presented in Appendix A of this Environmental Statement.
- 13.4 It is highlighted that the proposed development forms part of a wider development area within Kings Dock and whilst the Transport Assessment considers the accumulation of the overall masterplan site in part, this chapter specifically considers the impacts created by Phase 1b of the proposed masterplan.

Background

- 13.5 Kings Dock is a dockland located on the River Mersey historically forming part of the Port of Liverpool. The dock was located in the southern part of the dock system, connecting Wapping Dock to the north and Queens Dock to the south. The dock was closed in 1972 and has since undergone regeneration.
- 13.6 In 2008 the complete regeneration of the Kings Waterfront part of the Kings Dock was commenced including the adjacent southern land uses to the proposed development, including: 11,000 seat capacity Echo Arena, BT Convention Centre, 1,600 space Waterfront multi-story car park, central public plaza, residential apartments and a 3 star plus hotel.
- 13.7 In 2015 the Exhibition Centre Liverpool was completed, along with the connected Pullman Hotel located to the south of the proposed development.

- 13.8 More recently a partnership between Liverpool Vision, the Home and Communities Agency and Liverpool City Council have worked jointly to establish Kings Dock as a visitor destination of international quality.
- 13.9 A masterplan developed by BDP was created for the remaining Kings Dock area, which part of the development associated with this report sits within. The BDP masterplan considered the alteration of existing routes for various modes through the site. The high level proposals were to not only be ancillary to the existing Arena and Exhibition Centre (ECL), but also create destinations in their own right. Traffic movements and impacts associated with this masterplan were assessed by Mott MacDonald in 2016.
- 13.10 Subsequent to the development of BDPs masterplan, the site was sold to YPG Developments Limited. The former BDP master plan has evolved, based on more defined land uses being proposed within the site, and as such this Transport Assessment has been prepared to both assist in the development of the masterplan, and appraise the development sites impacts and integration with the surrounding road network.

Proposed Development

- 13.11 The site lies approximately 0.75 km south-west of Liverpool City Centre, located on the southern side of Kings Dock, adjoining Queens Wharf, Monarchs Quay and Halftide Wharf.
- 13.12 The composition of the site is detailed in Table 1.

Table 1: Proposed Development Schedule

Land Use	Size	Location in Kings Dock
Plot 2 – Supermarket	2,500 m ² (GFA)	West of Monarchs Quay, north of Halftide Wharf
Plot 2 – Multi-story Car Park	701 Spaces	
Plot 3 – Office	1,000 m ² (GFA)	South of Queens Wharf
Plot 4 – Residential Apartments	102 units	South of Queens Wharf, east of Keel Wharf
Plot 4 – Commercial	2 no. small ground floor units	

Relevant Terminology

- 13.13 In assessing the impacts of the development, the following terminologies have been adopted:

Trip Generation and Mode of Travel:

- 13.14 Trip generation is the number of trips created by the proposed development land uses. For instance, in the case of residential land use, residents trips include any trip associated with the dwelling units, i.e. being created by occupants, visitors, services / delivery vehicles. These trips may be made by any mode of travel, such as walking, cycling, public transport, private car, heavy good vehicles, or as a passenger.

Trip Distribution:


















- 13.15 The distribution of the trips generated by the development is the geographical pattern of origins and destinations of those trips. The distribution of trips created by the proposed development has been based on a spreadsheet gravity model adopting a population over distance squared function.
- 13.16 The extent of the geographic areas adopted within the model included all wards within Liverpool.

Traffic Assignment

- 13.17 Traffic assignment is the process of allocating vehicular trips to the transport network. In the case of the traffic generated by the proposed development, a spreadsheet model was developed which included the assignment of development related vehicular trips, converted into Passenger Car Units (PCU's), distributed on the highway network using the gravity models projections.

Vehicle Classifications:

- 13.18 As part of the data collection stage of the assessment, traffic turning and queue surveys were recorded on Thursday 9th February 2017 from 7:30 to 9:30 and 6:30 to 18:30, and on the 11th February from 12:30 to 14:30.
- 13.19 The vehicle categories captured during the survey, which were converted into passenger car units, are illustrated below (extract from the DMRB Figure 8/1: COBA Vehicle Categories).

CAR	 SALOON  ESTATE  PEOPLE CARRIER  CAR TOWING CARAVAN/TRAILER	OTHER GOODS VEHICLES (OGV 2)	 4 OR MORE AXLES RIGID  3 AXLES ARTIC  4 OR MORE AXLES ARTIC  OTHER GOODS VEHICLE WITH TRAILER
LIGHT GOODS VEHICLE (LGV)	 VAN  ≤3.5 TONNES  PICK-UP		
OTHER GOODS VEHICLES (OGV 1)	 >3.5 TONNES  2 AXLES RIGID  2 AXLES RIGID  3 AXLES RIGID	BUSES & COACHES (PSV)	 DOUBLE DECK BUS  SINGLE DECK BUS OR COACH

Heavy vehicles:

- 13.20 For the avoidance of doubt, the classification of Heavy (Goods) Vehicles referred to by the Environmental Statement comprises goods vehicle classifications OGV1, OGV2 and passenger service vehicles (PSV) defined in DMRB Volume 13 Section 1 Chapter 8 'Vehicle Categories'. This is in place of the less explicit definition provided by the Calculation of Road Traffic Noise.

Highway Safety:

- 13.21 The severity of road traffic accidents is classified in relation to the injuries sustained in each incident, using the Personal Injury Accidents (PIA) records, collected through the standard 'STATS19' police records.
- 13.22 Every road accident on the public highway, which includes human injury or death, is recorded on a 'STATS19' report form by police officers in Great Britain. Within each local area in England, STATS19 data is collated by a central unit referred to as a Local Processing Authority, which can be managed directly either by the police or local authority. The STATS19 system records accident frequencies, locations, descriptions, contributory factors and outcomes in terms of severity of injuries sustained. This information is publicly available through the website: www.crashmap.co.uk.
- 13.23 Accidents and casualties are broken down by the PIA records into three separate levels of severity, being: fatal, serious and slight. A fatal accident is one where a person is killed in an accident on the public highway. A serious accident is where a person incurs a serious injury that results in hospital treatment, usually requiring an overnight stay in hospital. A slight injury is where a member of the public has a slight injury as a result of the accident. This may require medical treatment although not usually an overnight stay in hospital.

- 13.24 Both the accident event and the resulting casualties can therefore be classified as fatal, serious or slight. An accident will be given the classification depending upon the worst personal injury occurring in the accident. The number of casualties will differ from the number of accidents in the records because one accident may result in more than one casualty of different severity. For example, if two cars collide resulting in a road accident with 4 people injured, this will be recorded as 1 accident in PIA records. However, the casualty figures will include all 4 people injured at their respective severity of injury.

Junction Performance Indicators:

- 13.25 These are used by software analysis programmes, (depending upon the junction type being considered) to illustrate the forecast level of operation of each stream of traffic through a junction. Examples of the various indicators used include maximum ratio of flow to capacity / degree of saturation / or minimum practical reserve capacity.
- 13.26 For instance, a degree of saturation of over 100%, or a ratio of flow to capacity of over 1, demonstrates a link which will become overloaded during the period of assessment, i.e. during the peak hours. For traffic signals analysis, programmes such as LINSIG 3, a Practical Reserve Capacity (PRC) figure is quoted for the junction. A figure of below 0% demonstrates that the junction will operate at a level of demand greater than 90% of the absolute maximum capacity, whilst a PRC of less than -10% indicates that the junction will operate with demand greater than the limit of absolute capacity.

Local Junction Modelling

- 13.27 When assessing the operational capacity of junctions directly, key performance thresholds were considered for both priority and signal controlled junctions.
- 13.28 For the assessment of priority junctions the key performance indicator is the ratio of vehicular flow to capacity (RVFC). A threshold RVFC value of 0.85 (85% of the junctions theoretical capacity) is usually considered appropriate. Junction arms exhibiting RVFC values below 0.85 are considered to be operating 'within capacity'; whereas junction arms exhibiting RVFC values above 0.85 are considered to be operating over capacity'.
- 13.29 For signal controlled junctions when considering individual arms, the key performance indicator is the degree of saturation. A threshold degree of saturation value of 0.90 (90% of the junctions theoretical capacity) is usually considered appropriate. Junction arms exhibiting values below 0.90 are considered to be operating 'within capacity'; whereas junction arms exhibiting values above 0.90 are considered to be operating over capacity'.

Derivation of AADT flows, Vehicle Speeds and %age Heavies

- 13.30 AADT flows were calculated from peak hour flow data using the following basic formula taken from IHT document “Transport in the Urban Environment”, Table 7.2:
- Peak Hour Flow (PHF) = $2.825 \times \text{AADT}$ (assuming Inter Urban roads); and, $\text{AADT} = \text{AAHT} \times 24\text{hours}$
 - Therefore, $\text{AADT} = \frac{(\text{PHF} \times 24)}{2.825}$
- 13.31 The AM and PM peak hour flows were calculated based on a rolling peak hour assessment.
- 13.32 The calculated peak hours, being 08:00 to 09:00, 17:00 to 18:00 during a weekday, were adopted and the average of the two peak hour flows were used when calculating the AADT to provide a robust assessment.
- 13.33 With regard to vehicular speeds, posted speed limits were adopted based on the relevant links / junctions located within the study area.
- 13.34 The percentage of Heavy Vehicles on the highway network was calculated based on the percentage of heavy vehicles recorded during the traffic surveys.

Technical Context

- 13.35 Data used to prepare this transport and access chapter has been obtained from the Transport Assessment reference: R5.0, dated 19th October 2017, included in Appendix A of this Environmental Statement.
- 13.36 Guidance on the assessment of the transport implications of development as part of the Environmental Statement process is provided by the Institute of Environmental Assessment (IEA) Guidance Notes No. 1: ‘Guidelines for the Environmental Assessment of Road Traffic’. The guidance was provided by a Working Party comprising representatives from local authorities, universities, consultants and developers.
- 13.37 The IEA guidelines are mainly for the assessment of the environmental impact of road traffic associated with major new developments. The guidelines are only designed to be applied to off-site traffic effects, although on-site effects will also need to be considered as part of the overall assessment.

- 13.38 The IEA guidelines state that an assessment of effects from individual projects cannot be expected to take account of the regional or global environmental effects that arise from the accumulation of many individual projects. Whilst a project-specific environmental assessment should aim to identify potential cumulative effects, it is felt that these can only be considered at a policy or programme level undertaken by central or local government.
- 13.39 The Transport Assessment work that informs this transport and access chapter has been undertaken in consideration of:
- National Planning Policy Framework;
 - DfT “Transport evidence bases in plan making”, dated 10 October 2014;
 - DfT Guidance on Transport Assessments (Archived);
 - Merseyside Local Travel Plan 3 (LTP3) 2011 - 2026;
 - Design Manual for Roads and Bridges (where applicable); and,
 - The Manual for Streets volumes 1 & 2 (where applicable).
- 13.40 The industry standard software adopted to undertaken, the highway operational capacity analysis, as presented in the Transport Assessment, included:
- Linsig V3 – for signal controlled junctions, and small area networks / gyratory; and,
 - The suite of Junctions 9 software packages including: PICADY for priority junctions.
- 13.41 Guidance on the design and implementation of highway improvement works is provided by the DMRB, along with the Department for Transport’s Manual for Streets.
- 13.42 Guidance on the use of Travel Plan measures to mitigate the transport impact of a development is provided by the Department for Transport’s Good Practice Guidelines: Delivering Travel Plans through the Planning Process’. It is noted that the Travel Plan, submitted in support of the planning application, Reference R6.0, dated 20th October 2017, recommended measures to reduce the reliance on single occupancy car borne trips, although these benefits have not been considered when appraising the car borne transport impacts of the development, to enable a worst case assessment to be identified. A copy of the Travel Plan is presented in Appendix B.
- 13.43 Guidance on the practical consideration and assessment of the level of accessibility and requirements for new development is provided by the Institution of Highways and Transportation documents, ‘Providing for Journeys on Foot’ and ‘Providing for Public Transport in Developments’.

Planning Policy Context

- 13.44 This section sets out relevant national and local transportation related planning policies against which the proposed development has been assessed.

National Planning Policy

National Planning Policy Framework (NPPF)

- 13.45 The National Planning Policy Framework (NPPF) replaced PPG13 in March 2012 and covers the current national policy for promoting sustainable transport. Within this document, it is stated that “developments should be located and designed where practical to:
- accommodate the efficient delivery of goods and supplies;
 - give priority to pedestrian and cycle movements, and have access to high quality public transport facilities;
 - create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians, avoiding street clutter and where appropriate establishing home zones;
 - incorporate facilities for charging plug-in and other ultra-low emission vehicles; and,
 - consider the needs of people with disabilities by all modes of transport.”
- 13.46 The Travel Plan is recognised as a key tool in achieving these objectives.
- 13.47 NPPF also states that “Planning policies should aim for a balance of land uses within their area so that people can be encouraged to minimise journey lengths for employment, shopping, leisure, education and other activities.”
- 13.48 On larger scale developments, NPPF recommends that planning policies should promote a mix of uses to provide opportunities for day to day activities to be carried out on foot, e.g. local shops and employment.
- 13.49 While the NPPF is the current policy document, it is recognised that there are some gaps in the guidance provided. In such cases, the information contained within PPG13 is used as a sound basis for assessment.

Planning Policy Guidance Note (PPG) 13: Transport

- 13.50 Planning Policy Guidance Note 13 (PPG13) provided advice on how local planning authorities should integrate transport and land use planning. The key objectives of PPG13 are set out at paragraph 4, which were to integrate planning and transport at the national, regional, strategic and local level to:

- Promote more sustainable transport choices for both people and for moving freight;
- Promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling; and,
- Reduce the need to travel, especially by car.

- 13.51 Another key objective set out in PPG13 at paragraph 19, is to ensure that jobs are accessible by public transport, walking and cycling. Furthermore a development providing jobs should be assessed in terms of how easy it is to get to the site comparing the different modes.
- 13.52 With respect to housing, at paragraphs 13 and 14, PPG13 states that to promote more sustainable patterns of development and make better use of previously developed land, the focus for additional housing should be existing towns and cities.
- 13.53 The proposed development, sits within the Kings Dock area, adjacent to the Balti Triangle and nearby city centre, which include a range of land uses and facilities, including: jobs, retail, shopping, leisure, education institutions and local services that will all be accessible by a realistic choice of alternative modes of transport to the private car.

DfT “Transport evidence bases in plan making”, dated 10 October 2014

- 13.54 In October 2014, the former DfT’s Guidance document, “Guidance on Transport Assessments”, was archived and new guidance provided. Paragraph 32 of the National Planning Policy Framework sets out that all developments that generate significant amounts of transport movement should be supported by a Transport Statement or Transport Assessment.
- 13.55 The guidance considers that Local Planning Authorities must make a judgement as to whether a development proposal would generate significant amounts of movement on a case by case basis.
- 13.56 In determining whether a Transport Assessment or Statement will be needed for a proposed development Local Planning Authorities consider the following:
- Local Plan Policies;
 - the scale of the proposed development;
 - existing intensity of transport use and the availability of public transport;
 - proximity to nearby environmental designations or sensitive areas;
 - impact on other priorities/ strategies; and,
 - the cumulative impacts of multiple developments within a particular area.

DfT Guidance on Transport Assessments (Archived)

13.57 The Department for Transport document “Guidance on Transport Assessments”, published in March 2007, expanded on the scope of the guidance available at that time to include the assessment of the potential implications of development proposals on the entire transport system. This includes the public transport system (buses, rail, and trams), the Strategic Road Network (SRN), local highways and footways. The guidance dictates that the following considerations:

13.58 Encouraging environmental sustainability

- **Reducing the need to travel, especially by car** – reducing the need for travel, reducing the length of trips and promoting multi-purpose or linked trips by promoting more sustainable patterns of development and more sustainable communities that reduce the physical separation of key land uses;
- **Tackling the environmental impact of travel** – by improving sustainable transport choices, and by making it safer and easier for people to access jobs, shopping and leisure facilities and services by public transport, walking and cycling;
- **The accessibility of the location** – the extent to which a site is, or is capable of becoming, accessible by non-car modes, particularly for large developments that involve major generators of travel demand;
- **Other measures which may assist in influencing travel behaviour (ITB)** – achieving reductions in car usage (particularly single occupancy vehicles), by measures such as car sharing/pooling, high occupancy vehicle (HOV) lanes and parking control.

13.59 Managing the existing network

- **Making best possible use of existing transport infrastructure** – for instance by low-cost improvements to the local public transport network and using advanced signal control systems, public transport priority measures (bus lanes), or other forms of Intelligent Transport Systems (ITS) to improve operations on the network;
- **Managing access to the highway network** – taking steps to maximise the extent to which the development can be made to “fit” within available capacity by managing access from developments onto the highway network.

13.60 Mitigating residual impacts

- **Through demand management** – using traffic control measures across a wide network to regulate flows;
- **Through improvements to the local public transport network, and walking and cycling facilities** – for example by extending bus routes and increasing bus frequencies and designing sites to facilitate walking and cycling;

- **Through minor physical improvements to existing roads** – it may be possible in some circumstances, to improve the capacity of existing roads by relatively minor physical adjustments such as improving the geometry of junctions etc. within the existing highway boundary;
- **Through provision of new or expanded roads** – it is considered good transport planning practice to demonstrate that the other opportunities have been fully explored before considering the provision of additional road space, such as new roads and major junction upgrades.

Local Planning Policy

Merseyside Local Travel Plan 3 (LTP3) 2011 - 2026

- 13.61 The Merseyside current Local Travel Plan (LTP3) 2011-2026 outlines the transport related policies covering the 15-year period. It is likely that the detailed planning of this development will fall within this plan period and therefore makes reference to the current local policy documents.
- 13.62 The vision of the Merseyside LTP3 is:
- “A city region committed to a low carbon future, which has a transport network and mobility culture that positively contributes to a thriving economy and the health and wellbeing of its citizens and where sustainable travel is the option of choice”.*
- 13.63 To achieve this the LTP3 has identified 6 goals:
- Help create the right conditions for sustainable economic growth by supporting the priorities of the Liverpool City Region, the Local Enterprise Partnership and the Local Strategic Partnerships.
 - Provide and promote a clean, low emission transport system which is resilient to changes to climate and oil availability.
 - Ensure the transport system promotes and enables improved health and wellbeing and road safety.
 - Ensure equality of travel opportunity for all, through a transport system that allows people to connect easily with employment, education, healthcare, other essential services and leisure and recreational opportunities.
 - Ensure the transport network supports the economic success of the city region by the efficient movement of people and goods.
 - Maintain our assets to a high standard.

Approach

Extent of Highway Network Study Area

- 13.64 The extent of the highway network study area was agreed with Liverpool City Council Highway Authority. The extent of the study area was identified based on the assignment of traffic across the highway network, and the Highway Authorities knowledge of the operational performance of existing nearby junctions.
- 13.65 The list of junctions forming the study area are detailed in Table 2.

13.66 **Table 2: Local Highway Network Study Area (Junctions)**

Junction No.	Junction Form	Junction Description
1	Three arm Priority crossroads	Queens Wharf / Keel Wharf priority junction;
2	Four-arm signal controlled junction	Queens Wharf / Wapping / Blundell Street / Chaloner Street traffic signal controlled junction
3	Three-arm signal controlled junction	Chaloner Street / Parliament Street / Sefton Street traffic signal controlled Junction
4	Four-arm signal controlled junction	Parliament Street / Great George Street / Upper Parliament Street / A561 St James Place traffic signal controlled junction
5	Four-arm signal controlled junction	Kind Edward Street / Leeds Street / Great Howard Street traffic signal controlled junction
6	Four-arm signal controlled junction	Leeds Street / Vauxhall Road traffic signal controlled junction

- 13.67 To predict the assignment of development traffic on the adjacent highway network a spreadsheet gravity model was developed. An increase in traffic of more than 30 two way trips was adopted as a threshold of material impact, so as to identify which junctions detailed in Table 2 would require further detailed assessment.
- 13.68 Junctions forming the detail assessment study area, associated with the impacts create by the proposed development traffic, are listed in Table 3.

13.69 **Table 3: Detail Assessment Network Study Area**

Junction No.	Junction Form
1	Queens Wharf / Keel Wharf priority junction
2	Queens Wharf / Wapping / Blundell Street / Chaloner Street traffic signal controlled junction
3	Chaloner Street / Parliament Street / Sefton Street traffic signal controlled Junction
4	Parliament Street / Great George Street / Upper Parliament Street / A561 St James Place traffic signal controlled junction

13.70 These junctions were then considered in greater detail using the detailed junction modelling software of Junctions 9 and Linsig to ascertain whether their future year impacts would be negative. The findings identified that the junctions detailed in Table 4 would be both materially and negatively impacted by the proposed development traffic. The assessment also identified whether the existing junctions were forecast to operate beyond design capacity thresholds, irrespective of the development site coming forward.

13.71 **Table 4: Individual Junctions Identified to be Materially and Negatively Impacted**

Junction No.	Junction Form	Operational capacity issues irrespective of Development
2	Queens Wharf / Wapping / Chaloner Street traffic signal controlled junction;	Yes
3	Chaloner Street / Sefton Street traffic signal controlled Junction;	Yes
4	Chaloner Street / Upper Parliament Street / A561 St James Place traffic signal controlled junction;	Yes

13.72 The junctions detailed in Table 4 were reviewed as detailed in the TA and mitigation measures were developed where appropriate.

Proposed Scope of Assessment

13.73 With reference to IEA Guidelines, the assessment focus' on the potential effects on local roads and users of those roads; and the potential effects on land uses and environmental resources fronting those roads, including the relevant occupiers and users.

13.74 IEA Guidelines suggest two broad rules-of-thumb described below which could be used as a screening process to delimit the scale and extent of the assessment.

- Rule 1: include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%).
- Rule 2: include any other specifically sensitive areas where traffic flows have increased by 10% or more.

- 13.75 The explanatory text in Para 3.16 to 3.19 of the IEA Guidelines state that ‘...projected changes in traffic of less than 10% create no discernible environmental impact.’ Given that daily variations in background traffic is frequently at least some + or -10% and other environmental impacts (e.g. pollution, ecology, etc.) are less sensitive to traffic flow changes, the guidelines conclude that ‘a 30% change in traffic flow represents a reasonable threshold for including a highway link within the assessment.’
- 13.76 Increases in traffic of less than 10% are generally considered to be significant by the Local Highway Authority and require detailed highway capacity assessment. The threshold for considered changes in daily traffic flows on highway safety is related to the nett daily volumetric change rather than a percentage change.
- 13.77 Changes of less than 1,000 Annual Average Daily Traffic movements are not considered to be sufficiently significant to warrant further detailed analysis, as this is the minimum change that can be considered by the standard assessment methodology provided by the DMRB Volume 13, Section 1.
- 13.78 With regard to Rule 2, Para 2.5 of the IEA Guidelines identify groups, locations and special interests ‘which may be sensitive to changes in traffic conditions.’ Given the site is located between two urban areas, it is considered that the following groups or locations could be sensitive and therefore potentially subject to significant effects as users of the road network or adjacent urban environment:
- People at home;
 - People in work places;
 - Sensitive groups including children, elderly and disabled;
 - Sensitive locations, e.g. hospitals, churches, schools, historical buildings;
 - People walking or cycling;
 - Open spaces, recreational sites, shopping areas; and,
 - Site of ecological / nature conservation value.
- 13.79 The immediate environment within areas adjacent to the site fall within several of the above categories.

Data Gathering and Seasonality Factors

- 13.80 Traffic surveys were collected in January / February 2017 and did not fall within a standard neutral or representative survey month as defined in Web Tag Unit M1-2, although were collected outside of school / public holiday periods.
- 13.81 To ensure that the data adopted was representative of a neutral month, in agreement with the Highway Authority, historic 'in season' traffic surveys were used to enable seasonality factors to be calculated. The calculations undertaken are discussed in the Transport Assessment. The resultant seasonality factors applied to the recorded traffic surveys are as follows:
- Weekday AM Peak hour: – 5.2%;
 - Weekday PM Peak hour: +21.4%; and,
 - Saturday Interpeak hour: +8.06%.

Methodology for Deriving Future Assessment Year Traffic Flows

- 13.82 Based on early discussions with the Highway Authority, the following assessment years were agreed upon:
- 2017: Survey data year;
 - 2017: Year of planning submission; and,
 - 2022: 5-year impact on the Strategic Road Network (SRN) based on an assumed opening year of 2017/18;
- 13.83 It is noted that Phase 1b forms part of an overall masterplan. At the time of undertaking the Transport Assessment it was considered that the latter phases of the masterplan are likely to become operational by 2027.
- 13.84 The method and application of growth factors were discussed with the Highway Authority. The 2017 year of planning submission was considered to be suitable to form a baseline scenario.
- 13.85 The future year of 2022 was adopted considering that the development should be fully operational at this point, and as such would consider the likely full impacts of the proposed development.
- 13.86 In terms of predicting growth, this was led by the National Trip End Model (NTEM), using TEMPRO software.

13.87 In terms of growth factors, the TEMPRO version 7 database was adopted to calculate applicable growth rates. The following criteria was applied when calculating the factors:

- Data Selections: Trip ends by time period;
- Transport Mode: Car Driver; and,
- Trip End Type: Origin / Destination.

13.88 The proposed growth rates adopted within the assessment are detailed in Table 5.

13.89 **Table 5: Growth Rates (Tempo – NTM AF15 Adjustment)**

Year From	Year To	Day	Period	Origin	Destination	Growth Factor
2017	2022	Weekday	AM Peak	1.0623	1.0392	5.1%
			Inter Peak	1.0489	1.0503	5.0%
			PM Peak	1.0416	1.0561	4.9%
		Saturday	All Day	1.0472	1.0473	4.7%

Committed Developments

13.90 With regard to committed developments, the Highway Authority requested traffic generated by the following committed developments were considered as part of the assessments undertaken in the Transport Assessment:

- A. **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;
- B. **16F/0084** – Land bounded by Grafton Street, Hill Street & Brassey Street Liverpool L8;
- C. **13F/2178** – Robert Cain And Co Ltd Stanhope Street Liverpool L8 5XJ;
- D. **16F/2879** – Land east of Brassey Street Liverpool L8 5XP;
- E. **16F/0413** – Land at Hurst Street Liverpool L1 8DN;
- F. **16F/1889** – Land bounded by Blundell Street, Kitchen Street and Simpson Street, Liverpool L1 5HA;
- G. **16F/3032** – 70-90 Pall Mall Liverpool L3 7DB;
- H. **10O/2424** – Liverpool Central & Northern Docks (Bramley Moore, Nelson, Salisbury, Collingwood, Trafalgar, Clarence Graving, West Waterloo, Princes Half Tide & Princes Docks), L3; and,
- I. **16F/0776** – Land adjacent to the Keel Kings Parade/Half Tide Wharf Queens Dock Liverpool L3 4GE.

Traffic Flow Assessment Scenarios

- 13.91 The traffic forecasting approaches taken enabled a base line dataset to be created and the development of the following assessment scenarios:
- Do Nothing 2017 (DN17): Traffic survey data – used for junction validation purposes;
 - Do Minimum 2017 (DM17): Traffic survey data with sensitivity adjustments, plus committed developments flows;
 - Do Minimum 2022 (DM22) [BASELINE ASSESSMENT SCENARIO]: Traffic Survey with sensitivity adjustments data factored to 2022, plus committed developments flows;
 - Do Something Phase 1b 2017 (DS PH1b 2017): Seasonality adjusted traffic survey data, plus committed developments flows, plus Phase 1b development flows; and,
 - Do Something Phase 1b 2022 (DS PH1b 2022): Seasonality adjusted traffic survey data factored to 2022, plus committed developments flows, plus Phase 1b development flows.
- 13.92 **DS PH1b 2022**, the primary focus of this chapter, focussed solely on the proposed development traffic flow assignment on the adjacent highway network although does include trip generations associated with Phase 1a of the masterplan (TCC Office), being the subject of a separate smaller planning application.
- 13.93 The baseline scenario established the reference case traffic flow conditions taking into account all developments within the study area with extant planning consent and committed infrastructure schemes.
- 13.94 The maximum net traffic impact of the development proposals was derived by comparing the baseline reference scenario (DM22), against the **DS PH1b 2022** with development scenario, although this comparison excludes the benefit of the measures detailed in the supporting Travel Plan.
- 13.95 The related forecast traffic flow diagrams are presented in the Transport Assessment.

Significance Evaluation of Potential Impacts

- 13.96 The evaluation of the significance of the potential impacts of the proposed development on highway operation and highway safety grounds is presented in terms of Sensitivity, Magnitude of effects and Types of effects. Tables 6, 7 and 8 summarise the interpretations of the evaluation and list the further explanations.

Table 6: Magnitude of Impacts

Level	Potential Impacts on Highway Operation	Level	Potential Impacts on Highway Safety
High (LHN)	> 10% net increase in traffic flows on the Local Highway Network	High	Greater than +3,000 AADT change in traffic flows arising as a direct consequence of the proposals
High (PRN)	> 5% net increase in traffic flows on the Primary Road Network	Medium	Greater than +1,000 AADT change in traffic flows arising as a direct consequence of the proposals
Medium (LHN)	Between 5% and 10% net increase in traffic flows on the Local Highway Network	Low	Less than +1000 AADT change in traffic flows arising as a direct consequence of the proposals
Medium (PRN)	Between 1% and 5% net increase in traffic flows on the Primary Road Network	Negligible	Less than +500 AADT change in traffic flows arising as a direct consequence of the proposals
Low (LHN)	< 5% net increase in traffic flows on the Local Highway Network		
Low (PRN)	< 1% net increase in traffic flows on the Primary Road Network		
Negligible (LHN)	< 1% net increase in traffic flows on the Local Highway Network		
Further Explanation: <ul style="list-style-type: none">• The IEA Guidelines state that ‘...delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system.’• The sensitivity of the highway network in operation terms to additional traffic demand is related to the existing level of congestion on that network and the available highway capacity. For instance, a large		Further Explanation: <ul style="list-style-type: none">• The IEA guidelines state that ‘from knowing the expected increase in vehicle-kms on different classes of road, it will be possible to make an initial simple statistical assessment of the likely increase or decrease in the number of accidents resulting from changes in traffic flows and composition.’• The above table is derived from The Design Manual for Roads and Bridges (Volume 13) which sets out a predictive formula for estimating accidents at	

percentage increase in traffic on a lightly trafficked road with more than adequate highway capacity is negligible in terms of the operational traffic impact; whereas even a small percentage net increase in traffic flows at a sensitive location on the Primary Road Network that is already at operational capacity may be considered unacceptable.	various types of links and junctions. The accompanying text to the predictive formula notes that it is only sensitive to changes in Annual Average Daily Traffic (AADT) flows of 1,000 vehicles. This threshold has therefore been applied in undertaking the highway safety impact assessments.
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Table 7: Sensitivity of Impacts

Level	Example (s) for Highway Operation	Level	Example (s) for Highway Safety
High	Where the With-Development forecast traffic demand exceeds capacity of the junction due to the additional development traffic (whereas the Planning Baseline scenario would operate within practical reserve capacity)	High	A significant increase due to the development in the annual rate of PIA road traffic accidents at a location that has a significantly higher PIA killed or seriously injured (KSI) accident rate than expected (e.g. where actual PIA exceeds expected PIA by more than +5 PIA per year).
Medium	Where the With-Development reference case traffic demand exceeds practical reserve capacity of the junction due to the additional development traffic (when the Baseline scenario would operate within practical reserve capacity)	Medium	A significant increase due to the development in the annual rate of PIA road traffic accidents at a location that has a significantly higher than expected PIA accident (e.g. where actual PIA exceeds expected PIA by between +2 to +5 PIA per year).
Medium / Low	Where the With-Development forecast or reference case traffic demand exceeds practical reserve capacity of the junction due to the additional development traffic (when the Planning Baseline scenario would operate in excess of practical reserve capacity in any event)	Low	An increase due to the development in the annual rate of PIA road traffic accidents at a location that has a typical PIA accident rate (e.g. where actual PIA exceeds expected PIA by between +0 to +2 PIA per year).
Low	Where the With-Development forecast or reference case traffic demand is within the practical reserve capacity of the junction although a significant increase in traffic flows will arise in comparison to the Planning Baseline.	Very Low	An increase due to the development in the annual rate of PIA road traffic accidents at a location that has a lower than expected PIA accident rate.

Very Low	Where the With-Development forecast or reference case traffic demand is within the practical reserve capacity of the junction and is an insignificant increase in comparison to the Planning Baseline.		
Further Explanation: <ul style="list-style-type: none"> • Key highway operational performance indicators are considered by the highway capacity assessments using the specialist software modelling packages for the various different forms of junction that are present within the Local Highway Network Study Area. • These key performance indicators include the maximum ratio of flow to capacity / degree of saturation / or minimum practical reserve capacity. 		Further Explanation: <ul style="list-style-type: none"> • In addition to the analysis of the existing distribution, contributory factors and accident rates, it is also relevant to consider the outcome of the accidents in terms of severity. • The 'Transport Statistics for Great Britain' establishes the proportion of PIA resulting in slight, serious or fatal injuries. This reference data source can be used to determine whether the PIA record of the existing highway network is worse than, similar to, or better than expected for links and junctions with similar geometric characteristics and traffic flows. 	

Table 8: Types of Impacts

Level	Example (s) for Highway Operation	Level	Example (s) for Highway Safety
Long-Term Permanent Negative	A reduction in the available highway capacity due to the traffic generated by the development. (Available Highway Capacity)	Long-Term Permanent Negative	Changes in long-term accident rates due to the traffic generated by the development
Long-Term Temporary Negative	An increase in the levels of peak hour traffic congestion, delays and traffic queues due to the traffic generated by the development, when the junction operates well within capacity at all other times. (Available Highway Capacity)	Long-Term Permanent Positive	Changes in long-term accident rates that arise due to a reduction in traffic as a direct result of the development.

Long-Term Permanent Positive	An increase in physical highway capacity due to highway mitigation works delivered by the development. (Physical Highway Capacity)	Long-Term Permanent Negative	Changes in long-term accident rates due to the means of access or off-site highway infrastructure being inadequate to serve the development traffic in relation to the appropriate highway design standards.
		Long-Term Permanent Positive	Changes in long-term accident rates due to the means of access or off-site highway infrastructure being improved as a direct result of the proposed development.
Further Explanation: <ul style="list-style-type: none">• The type of impact considers how the development effects highway operational capacity in relation to the temporal nature of the effect and whether the effect is beneficial (positive), or detrimental (negative). Therefore, for clarity it should be noted that an increase in traffic flows is assessed as a negative effect, as this reduces the remaining available highway capacity during peak periods (although adequate spare capacity may still be available).• Additionally, whilst the traffic effects of the development will be long term in nature (i.e. they will occur for the operational lifetime of the development), the impact on highway capacity and hence driver delay is temporary, due to the fact that the traffic generation rises and falls throughout the working day. The effects in driver delay therefore only occur temporarily during the peak weekday AM / PM traffic periods.		Further Explanation: <ul style="list-style-type: none">• The type of impact considers how the development effects highway safety in relation to the temporal nature of the effect and whether the effect is beneficial (positive), or detrimental (negative). Therefore, for clarity it should be noted that an increase in traffic flows is assessed as a negative effect, as this increases the overall level of exposure to the risk of accidents.• The temporal nature of traffic impact on accident rates is described as long-term rather than temporary or permanent, due to the fact that whilst individual accidents occur with relative spatial and temporal unpredictability, the exposure to the hazard of accidents over the long-term increases in proportion to the total vehicle mileage travelled.	



Assumptions / Limitations

- 13.97 It is noted that Phase 1a of the overall masterplan was the subject of a separate plan for a 4,500 m² (gross floor area) Office. At the time of preparing this Chapter the plan was still under determination and as such the Phase 1a related traffic generations are used in the Phase 1b net traffic flows for robustness.
- 13.98 The growth factors adopted did not omit provisions associated with the committed schemes (i.e. a level of double counting will be included associated with the traffic flows for the DM and DS scenarios). As such the assessments are likely to present a more conservative view of the junctions, and volume of traffic created than are likely to be present.
- 13.99 The vehicular trips associated with the existing surface carparks and coach / HGV trips will be lost as part of the development proposals have not been subtracted from the calculations for a true net impact assessment to be considered. Therefore the impacts are likely to be partially over estimated.

Baseline Conditions

Baseline Traffic Flow Conditions

- 13.100 The baseline traffic flows are summarised in Appendix 13 for the estimated 24 hr traffic flows.

Baseline Highway Safety Conditions

- 13.101 In order to undertake a review of highway safety trends on the local highway network, a review was undertaken for historical data against the theoretical number of accidents that would be expected for the various road types and traffic flows. This is calculated using the formulae in the Design Manual for Roads and Bridges (DMRB), Section 13 'The COBA Manual' and 'Valuation of Costs and Benefits,' DfT (May 2004). Table 9 summarises the recorded accident rates, based on information contained in the www.crashmap.co.uk website, along with the theoretical accident rates using the DMRB formula, for Junctions within the Assessment Network Study Area as defined in Table 2. The detailed explanation for the calculation and analysis of Personal Injury Accident trends using COBA Manual contained in the Design Manual for Roads and Bridges, Vol. 13, Section 1.

13.102 **Table 9: Baseline Annual PIA Rates at Junctions³⁴**

Junction	5 year PIA Total	Actual Annual PIA Rate	Theoretical Annual PIA Rate	Difference	Sensitivity
Monarchs Quay / Queens Wharf junction	0	0	0.15	- 0.15 0.15	Very Low
Halftide Wharf / Monarchs Quay junction	0	0	0.41	- 0.41 0.41	Very Low
Queens Wharf / Keel Wharf junction	1	0.2	0.88	- 0.68 0.68	Very Low
Halftide Wharf / Kings Parade junction	0	0	0.49	- 0.49 0.49	Very Low
Queens Wharf / Wapping / Blundell Street / Chaloner Street junction	7	1.4	1.78	- 0.38	Very Low
Chaloner Street / Parliament Street / Sefton Street junction	2	0.4	1.78	- 1.38	Medium
Parliament Street / Great George Street / Upper Parliament Street / St James Place junction	11	2.2	1.78	+ 0.42	Medium
TOTAL	21	4.2	6.8	- 2.59	Very Low

13.103 Across the whole study area assessed there were 4.2 cumulative PIA's recorded per year period at key junctions within the study area. This is compared to a theoretical rate of 6.8 predicted by the methodology for estimating junction accident levels i.e. -2.59 PIA per year less than expected across the 7 junctions. Overall, the sensitivity of links across the study area is assessed as being Very Low.

Accessibility of the Application Site

- 13.104
- Echo Arena;
 - James Street Station;
 - Liverpool One Bus Station;
 - Liverpool John Moores University;
 - Restaurants and shopping facilities in central Liverpool;
 - Liverpool Central Station;
 - Liverpool Lime Street Station; and,
 - Liverpool Cathedral.

³⁴ PIA data range: 2012 to 2016

13.105 As outlined in the planning policy context of the TA, the current national and local policy on transportation states that new developments should promote more sustainable choices for people, particularly accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling, so as to reduce the dependence on private cars. Table 10 briefly summarises the assessment results on the existing accessibility of the site.

Table 10: Assessment of the Accessibility of the Application Site

Accessibility By	Assessment																
Foot	<p>The Chartered Institution of Highways and Transportation (CIHT) in their document ‘Guidelines for Providing for Journeys on Foot, 2000’ state that “walking accounts for over a quarter of all journeys and four fifths of journeys less than one mile”. It is generally considered that people are prepared to walk up to 2km (1.24 miles) to and from work, given suitable walking routes and facilities.</p> <p>When assessing the accessibility of a site for pedestrians, and the proximity of local facilities, an average walking speed of 1.4 m/s can be assumed, which equates to approximately 400 metres in 5 minutes, or 3 mph. This document also contains a table of suggested walking distances for different purposes as replicated below:</p> <table><tr><td></td><td>Town Centre (m)</td><td>Commuting School (m)</td><td>Elsewhere (m)</td></tr><tr><td>Desirable</td><td>200</td><td>500</td><td>400</td></tr><tr><td>Acceptable</td><td>400</td><td>1000</td><td>800</td></tr><tr><td>Maximum</td><td>800</td><td>2000</td><td>1200</td></tr></table> <p>The facilities that lie within 2km (crow flies) of the site are listed below:</p> <ul style="list-style-type: none">• Albert Dock;• James Street Station, Liverpool Central Station & Liverpool Lime Street Station;• Liverpool One Bus Station;• Liverpool John Moores University;• Restaurants and shopping facilities in central Liverpool;• Liverpool Cathedral; and,• Along with a plethora of other facilities, services and destinations associated with a large city centre and outlying areas. <p>It is therefore considered that the site and surrounding facilities will be accessible by foot. This will be significantly enhanced by the further development of the SRVC.</p>		Town Centre (m)	Commuting School (m)	Elsewhere (m)	Desirable	200	500	400	Acceptable	400	1000	800	Maximum	800	2000	1200
	Town Centre (m)	Commuting School (m)	Elsewhere (m)														
Desirable	200	500	400														
Acceptable	400	1000	800														
Maximum	800	2000	1200														
Cycling	<p>It is generally considered that a distance of 5km (3 miles) represents a reasonable cycling distance to and from work, while 8km (5 miles) is a maximum realistic range for cycle trips.</p>																

	<p>Based on the acceptable cycling distances, the following key features lie within 5km of the site:</p> <ul style="list-style-type: none"> • The whole of Liverpool including Vauxhall, Everton, Fairfield, Wavertree, Sefton Park etc.; • Numerous employment areas within the stated villages / towns; • Sustainable transport facilities including Liverpool Train Station and Liverpool One bus station; • Various parks and leisure facilities; and, • Numerous education facilities including primary, secondary and tertiary. <p>The site is located close to National Cycle Route 56, specifically running along Kings Parade to the west. This route runs between Chester Town Hall and Liverpool Town Hall and is approximately 44 miles in length.</p> <p>Various on and off road cycle routes are located adjacent to the site, along with the inclusion of a proposed informal link connecting the proposed publicly accessible secure sheltered cycle store on the ground floor of the proposed supermarket building, and Kings Parade.</p> <p>It is therefore considered that a good level of cycle infrastructure is available, providing direct access to key destinations surrounding the site.</p>
<p>Bus</p>	<p>The prime operator of buses in the Kings Dock area is Mersey Travel, whilst various other operators provide services from Wapping and the surrounding highway network.</p> <p>More recently Services C4 and C5 which used to run through Monarchs Quay have been cut and as such there are no existing bus routes travelling through the site. It is understood from liaising with Mersey Travel the routes were stopped due to lack of custom and funding as the frequency of bus journey demand was irregular associated with the Arenas land use.</p> <p>The C4 and C5 services used to operate a Dingle Mount to City Centre circular route, operating on 30 minute frequency during the week and at weekends.</p> <p>The C5 routes still operates although travels along Kings Parade with only one service per day. It is understood that a separate service '4' also runs along Kings Parade with similar headways to the previous C4 and C5 services on a 30 minute frequency Mondays to Saturdays.</p> <p>Two additional bus stops are within 400 m walk from the site, located on Wapping and Chaloner Street.</p> <p>Given the size of the overall masterplan it is considered that the critical mass for a bus service to be economically viable will be reached, with the mixed use type of</p>

	<p>development reducing the 'irregular' demand created by the Arena leisure land uses alone.</p> <p>As such, given the masterplan layout, bus stops on either side of Monarchs Quay have been proposed so as to become active once the proposed development reaches a critical mass which would enable an existing bus service to be diverted, or for a new service to be provided.</p> <p>It is understood that as a rule of thumb 13 patrons are required per mile to enable a bus service to be economically viable, and that it costs in the order of £120,000 to fund a new bus service for six days a week (usually a short circular route for example between the site, and the city centre).</p> <p>Calculations undertaken in the Transport Assessment include multi modal forecasts, including estimates as to the likely weekday public transport journeys that would be created by both Phase 1 and Phase 2 of the masterplan.</p> <p>Bus travel is forecast to make up 48% of all public transport trips which would equate to 630 weekday trips associated with Phase 1 and 1,425 trips associated with Phase 2, excluding any demand created by the arenas or surrounding land uses such as The Keel.</p> <p>Assuming a circular route from the site and the city centre is approximately 3 miles. Which would mean 39 passengers would need to use the service each frequency of the service. Assuming a 30 minute frequency, operating 12 hours per day (24 daily services) this would imply that there would need to be in the order of 1,000 passengers on a weekday to make the service economically viable.</p> <p>Considering this, the Phase 1b development is still forecast to generate in the order of 630 patrons per weekday, and as such this level of demand is likely to make it viable to extend or divert an existing service through the development site once Phase 1b becomes fully operational. When Phase 2 becomes operational a new bus service may be viable with increased frequencies during peak periods.</p> <p>It is appreciated that the viability of funding a new or diverted bus service initially through the site will not be economical. However, there are existing bus stops within a 400 m walking distance of the site, and therefore it is not necessary to initially re-route a service through the development.</p> <p>As part of the development proposals, new bus stop infrastructure is proposed on either side of Monarchs Quay. This infrastructure is predicted to become operational once a critical demand in public transport patronage is reached.</p> <p>It is therefore considered, that prior to the development being suitably built out, access to local bus stop infrastructure will be further than desirable. However, prior to completion</p>
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	of the development, suitable high level bus service will be directly accessible running through the site.
Rail	The closest railway stations to the site are St James Street and Liverpool Central railway stations, which lie 1.2 km to the north and 1.4 km to the north east respectively. The stations have services provided by East Midlands Trains, Northern, London Midland, TransPennine Express and Virgin Trains, providing routes throughout the UK. These stations are considered to be accessible by occupiers and visitor / customers of the site by combined modes of transport, such as walking, cycling, or the use of motor vehicles. Therefore rail travel is a likely mode of transport.

Potential Impacts

13.106 This section details the potential direct and indirect impacts of the proposed development and their significance (before mitigation) for the:

- Short term (construction phase);
- Medium term (initial operation combined with ongoing construction); and
- Long term (operational phase).

13.107 The potential traffic and access impacts associated with the proposed development relate to the development traffic impact on:

- Highway Operational Capacity;
- Highway Safety; and,
- Accessibility for pedestrians, cyclists and public transport.

13.108 In order to identify the potential impact, criteria have been applied to establish whether significant effects are likely. These criteria take into account the sensitivity of receptors or resources likely to be affected; and any changes in the composition of traffic, specifically if more HGV's are anticipated.

13.109 Table 11 summarises the potential receptors in relation to each potential impacts.

13.110 **Table 11: Potential Receptors and Quantification of Potential Impacts**

Potential Impacts	Receptors	Quantification Method
Highway Operational Capacity	The users of the junctions within the Local Highway	Impacts are assessed in terms of the level of traffic congestion at each of the junctions within the Local Highway Network Study Area. Traffic congestion is measured in relation to key operation

Potential Impacts	Receptors	Quantification Method
	Network Study Area (i.e. drivers, their passengers and other road users), along with adjacent land uses that require access to the public highway	parameters, such as the forecast queue lengths and delay, which is expressed in terms of the average time that each vehicle is delayed at the junction. Additionally, the available spare highway capacity at each junction is considered, as part of the cumulative assessment of the proposals. This cumulative assessment considers the impact of the proposals in combination with other future developments and background traffic growth that will act to take up the highway capacity that is currently available within the Local Highway Network.
Highway Safety	The users of the junctions within the Local Highway Network Study Area (i.e. drivers, their passengers and other road users), along with adjacent land uses that require access to the public highway.	Impacts are assessed in terms of the increase in the Personal Injury Accident rate that is likely to occur at junctions that experience a significant increase in traffic due to the proposed development. Additionally, the safety and adequacy of the proposed means of access is also considered in relation to the relevant geometric design standards. The absolute magnitude of the impact of the proposals on highway safety is expressed in terms of the number of additional injury accident per year, the severity of which can be further classified as slight injuries, serious injuries and fatalities. The significance of the impact has been established from a comparison of the forecast accident rate against the accident rate and severity of accidents that would be expected and a typical highway junction of the same type.

Demolition and Construction

- 13.111 The construction phase of a proposed development will generate a relatively small number of vehicle movements in comparison to the long-term operational traffic generated by a major development.
- 13.112 However, whilst only a temporary phase in the lifespan of a site, construction traffic includes the movement of Heavy Goods Vehicles (HGVs). Therefore, it is important that all potential traffic impacts, particularly HGVs, be identified and measures implemented to manage their effects wherever practicable.
- 13.113 The construction programme is unknown at present. It is expected that Phase 1b of the site will become fully operational within 2 years of commencement of works on site. To manage the impacts of the construction stage a suitable construction traffic management plan should be developed.
- 13.114 In order to minimise the number of construction vehicles using the public highway, the following factors should be considered:

- All excavator spoil to be used on site;
- Maximise the proportion of demolition/ site clearance material to be re-cycled on the site for reuse;
- Prefabrication of construction components off-site to reduce the volumes of material deliveries of smaller components; and,
- Where possible, use of cast units to reduce the requirement for concrete, reinforcement, pumps, formwork, scaffolding, deliveries etc.

13.115 Wherever possible, construction traffic would be routed to avoid existing residential areas.

13.116 Construction operations and impacts should be reduced during and on the lead up to and down from Arena events due to the increased local pedestrian activity;

13.117 Where possible the impact of employee traffic should be minimised by employing local labour, using local business to supply materials and encouraging car sharing to site.

13.118 To further mitigate the impact of the development on the local highway, the following should be undertaken:

- All construction traffic entering and leaving the site would be controlled. Vehicles making deliveries to the site or removing/delivering spoil or construction material etc., would travel via designated routes, as far as possible at times outside the peak traffic hours which would have been previously agreed with the Highway Authority;
- Exceptional loads to be routed outside of peak hours;
- Any temporary road closures to be undertaken outside of peak hours / sensitive periods where possible;
- The construction process would be 'environmentally aware', with focus upon housekeeping, good quality hoardings and landscaping, wheel washers and a clean work place; and,

13.119 The contractors would be required to follow the 'Considerate Constructors' scheme and the Construction Management Plan.

Completed Development

13.120 The proposed development will be completed in sub phases; however, the sequence and timing of those phases although not fixed, are likely to follow those detailed in the Transport Assessment. Table 12 summarises the estimated peak hour vehicular trips generated by the proposed development.

Table 12: Forecast Weekday Traffic Generation

Land use	Size	AM peak			PM peak		
		Arr	Dep	Total	Arr	Dep	Total
Supermarket	2,500 m ² GFA	83	57	139	90	106	196
Office	1,000 m ² GFA	5	1	6	0	6	6
Apartments	120 N°.	12	32	43	24	11	35
Total		100	90	188	114	123	237

13.121 Highway / Road Design and Access

13.122 Alterations to the existing road network are proposed adjacent to the development site including widening of Monarchs Quay and Halftide Wharf, to the south of Queens Wharf.

13.123 The proposed alterations include:

- Widening of Monarchs Quay to 10.2m to facilitate future overall masterplan traffic and potential queuing demand from the proposed multi-story car park;
- Alterations to the committed Keel Phase 2 access arrangements to integrate with the proposed scheme, whilst maintaining a safe road environment and pedestrian facilities;
- Introduction of 20 mph speed roundels to reinforce the speed environment;
- Alterations to the location of existing pedestrian crossing points and widening of key desire line points to facilitate the projected demand, along with the installation of a crossing island;
- Installation of a bus stop with cage pavement markings, shelter with seating, lighting, timetable, pole with flag and level access kerbing on the eastern side of Monarchs Quay;
- Introduction of a half sunken layby bus stop with cage markings, shelter with seating, lighting, timetable, pole with flag and level access kerbing on the western side of Monarchs Quay along with two drop off / pick up points to serve the supermarket;
- Removal of existing car park access points to the east and west of Monarchs Quay;
- Provision of a footway crossover arrangement along the length of Halftide Wharf serving the ACC and multi-story car park vehicular entrance points;
- Provision of an informal shared off carriageway pedestrian / cycle link along the northern footway of Halftide Wharf so as to provide a link from the cycle store access located on the ground floor of the supermarket building, accessed from Halftide Wharf, to Kings Parade; and,
- Alternations to the western arm of the Queens Wharf / Monarchs Quay roundabout, by means of making the western arm informal, with levels raised, kerbing and pavement markings revised to suite so as to give priority to pedestrians.

Highway Operation

- 13.124 Table 13 summarises the potential impacts of the proposed development on highway operations in comparison to the Baseline 2022 scenario. The detailed junction capacity assessment is provided in the appended Transport Assessment.

Table 13: Summary of Potential Impacts on Highway Operation³⁵

Junction	Magnitude	Sensitivity (pre-Mitig'n)	Sensitivity (post-Mitig'n)	Type	
Keel Wharf / Queens Wharf Junction	High (LHN)	Medium	Low *	Long Term Permanent Positive	Reduced Available Highway Capacity
Queens Wharf / Wapping / Blundell Street / Chaloner Street Junction	High (PRN)	Medium	Low *	Long-Term, Permanent Negative / Neutral during peak hours, Positive during off peak hours	Reduced Available Highway Capacity
Chaloner Street / Parliament Street / Sefton Street Junction	Medium (PRN)	Medium	Low *	Long-Term, Permanent Negative / Neutral during peak hours, Positive during off peak hours	Reduced Available Highway Capacity
Parliament Street / Great George Street / Upper Parliament Street / St James Place Junction	Medium (PRN)	Medium	Low *	Long-Term, Permanent Negative / Neutral during peak hours, Positive during off peak hours	Reduced Available Highway Capacity
Kind Edward St / Leeds St / Great Howard St traffic signals Junction	Low (PRN)	Negligible	Negligible	Long-Term, Permanent Neutral	Neutral
Leeds St / Vauxhall Rd traffic signals Junction	Low (PRN)	Negligible	Negligible	Long-Term, Permanent Neutral	Neutral
Sensitivity Notes: * includes mitigation (Physical Highway Improvements) that deliver permanently increased physical highway capacity					

³⁵ Based on forecast AADT data present in Appendix C.

- 13.125 The impacts detail in Table 13 do not consider the benefits of 'at source' reductions of vehicular traffic generation through the implementation of a Travel Plan.
- 13.126 They do highlight the benefits of implementing the identified mitigation measures at the following locations, in the form of highway improvement works to accommodate additional development traffic created by Phase 1b of the proposed development, as part of the modelling assessment:
- Introduction of MOVA on top of the existing SCOOT system at the Queens Wharf / Wapping / Blundell Street / Chaloner Street junction;
 - Introduction of MOVA on top of the existing SCOOT system at the Chaloner Street / Parliament Street / Sefton Street junction;
 - Introduction of MOVA on top of the existing SCOOT system at the Parliament Street / Great George Street / Upper Parliament Street / St James Place junction;
 - Internal alterations to the road network in Kings Dock on Monarchs Quay and Halftide Wharf to ensure the throughflow of traffic is not impacted by vehicles waiting to enter the multi-storey carpark, given the inclusion of a central stacking lane.
 - Installation of MOVA and queue loops within Kings dock to improve event traffics integration with the adjacent Queens Wharf, Wapping, Blundell Street / Chaloner Street junction.
- 13.127 Acknowledging the City Councils proposed strategic infrastructure alterations to The Strand, which are likely to significantly change travel patterns, distributions and behaviour on the adjacent highway network; it has been recommended that the full cost of installing MOVA at each of the junctions is contributed. This will either enable the Highway Authority to install the MOVA systems, or for them to pool the financial contributions toward the strategic Strand scheme, so as to prevent short term infrastructure being lost should they become redundant in the near future.
- 13.128 The Interim Travel Plan provides a strategy to monitor the operational impact of the development over time and modify the mitigation strategy as may be necessary. The strategy in this regard again follows the principle of primary mitigation through Travel Plan measures aimed at reducing reliance on cars to reduce traffic generation, supported by secondary mitigation in the form of physical highway capacity improvements as a measure of last resort.
- 13.129 The preparation of detailed Travel Plans associated with each plot, along with monitoring and mitigation strategies, will be secured by planning obligation through a legal agreement between the relevant parties (e.g. the Owner / Developer, Local Planning Authority and Local Highway Authority).

Highway Safety

- 13.130 Table 14 summarises the scope of highway safety assessment and provides a summary and explanation of the analysis method employed. This includes an identification of the magnitude of the traffic impacts that are forecast for the 'High Traffic Forecast' scenario, as this provides an indication of the locations where further detailed assessment is required.

Table 14: Scope of Highway Safety Assessment

Scope of Highway Safety Assessment				Methodology
Total changes in weekday AADT traffic flows (in PCU's) on Junctions (i.e. from all sources) and net changes above the Planning Baseline:				<p>The accident analysis identifies any areas that are prone to incidents and enables future accident rates to be forecast. Forecast accident rates indicate whether or not a given development compromises the safety of road users on the existing network and in turn, can prompt the need for initiatives that mitigate any detrimental impacts.</p> <p>The accident analysis for the development has been undertaken considering accidents on junctions. The methodology follows the principles of the DMRB, Volume 13, Section 1(2004), which states that:</p> <p><i>'The extent of the safety issue considerations and accident analysis will depend on the scale of the proposed development and its location. The need to minimise conflicts between vehicles and other road user groups should be adequately addressed.'</i></p> <p>The traffic analysis scenarios flows are used to determine the flows on the major junctions surrounding the site. The Annual Average Daily Traffic (AADT) flows have been calculated adopting the method detailed in the IHT document "Transport in the Urban Environment".</p> <p>The AADT have been calculated for 2017 traffic flows, the 2022 DM development Scenario, and the 2022 DS development scenario traffic flows, assuming background traffic growth and 100% completion and operation of all committed and proposed developments considered by the scope of the assessments. The total changes summarised are taken from the 2022 Baseline flow data and include traffic growth from all sources, whereas the net changes are the additional traffic associated with the proposed development over and above the Baseline (DM) scenario.</p>
Junction	Total	Net Increase	Magnitude	
Monarchs Quay / Queens Wf junction	3,795	+ 2,021	Medium	
Halftide Wf / Monarchs Quay junction	3,795	+ 2,021	Medium	
Queens Wf / Keel Wf junction	3,795	+ 2,021	Medium	
Queens Wf / Wapping / Blundell St / Chaloner St junction	41,713	+ 2,021	Medium	
Chaloner St / Parliament St / Sefton St junction	40,813	+1,666	Medium	
Great George St / Upper Parliament St / St James Plc / Parliament St Junction	40,458	+1,488	Medium	
King Edward St / Great Howard St/ Leeds St / Old Hall Street junction	31,053	+ 208	Negligible	

Vauxhall Road / Leeds Street junction	36,364	+ 164	Negligible	<p>The net difference between the DM Baseline and DS figures determines whether accident analysis is required. Only the links and junctions that will experience net increase in traffic greater than 1,000 vehicles AADT require further detailed assessment, as the formulae detailed in the DMRB (2004) are only sensitive to flows greater than this.</p> <p>The impact of the proposals on the rate of accidents, which are commonly expressed in terms of accidents per million vehicle kilometres, can be considered in terms of the total exposure of people on the network to the risk of accidents.</p> <p>This measure is the most relevant because the exposure to the hazard of accidents increases in proportion to the total vehicle mileage travelled.</p>
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13.131 Table 15 lists the number of PIA that are forecast to occur per year for the identified junctions and potential impacts in the Baseline and Do Something scenario based on the theoretical annual rates calculation approach and the change in traffic flow between Baseline 2022 (DM) and DS scenarios.

Table 15: Potential Highway Safety Impacts at Junctions

Junction	Baseline (DM)	DS Scenario	Impact	Potential Impact		
				Magnitude	Sensitivity	Type
Monarchs Quay / Queens Wf junction	0.09	0.13	+ 0.03	Medium	Very Low	Negative / Negligible
Halftide Wf / Monarchs Quay junction	0.36	0.44	+ 0.08	Medium	Very Low	Negative / Negligible
Queens Wf / Keel Wf junction	0.65	0.78	+ 0.13	Medium	Very Low	Negative / Negligible
Queens Wf / Wapping / Blundell St / Chaloner St junction	1.95	2.00	+ 0.05	Medium	Very Low	Negative / Negligible
Chaloner St / Parliament St / Sefton St junction	1.93	1.97	+ 0.04	Medium	Very Low	Negative / Negligible
Great George St / Parliament Street / St James Place junction	1.92	1.96	+ 0.04	Medium	Very Low	Negative / Negligible

13.132 The proposed development is assessed as having an overall negligible highway safety impact on the local highway network.

Mitigation Measures

Demolition and Construction

13.133 Traffic management measures which comply with the requirements of the Local Highway Authority will be implemented as necessary. Nonetheless, some disruption and delay will occur on the local highway network due to the construction activities associated with the proposed development.

- 13.134 The potential for significant environmental effects created by construction traffic will be reduced by ensuring that all vehicles are scheduled using the most efficient delivery routes and minimise the nuisance to residential and sensitive retail and Leisure areas nearby. All delivery vehicles associated with the movements of construction material will be filled to the practical maximum capacity to reduce the quantity of vehicle required. As most of the construction traffic drivers will be sub-contractors they will be encouraged to obtain backloads wherever practicable.
- 13.135 Wheel washing and other environmental management measures will be put in place where necessary to reduce the potential for off-sites effects as a result of construction traffic, such as mud being deposited on the surrounding roads and highways.
- 13.136 Completed Development
- 13.137 The planning policies outlined previously require measures to be implemented at the application site to promote more sustainable travel patterns for the future residents, employees, visitors, etc. To this end, a Travel Plan for the application site is proposed as an integral part of the development. The Travel Plan aims to reduce reliance on private cars for personal trips to and from the application site.
- 13.138 The existing land uses are to be removed, i.e. the existing surface car, coach and HGV parking areas, and the entire application site regenerated. The targets established by the Travel Plan proactively seek to reduce vehicular trip generation and hence provide traffic impact mitigation 'at-source'.
- 13.139 The subsequent detailed Travel Plans associated with each plot will therefore incorporate specific monitoring and review mechanisms to establish the actual level of vehicular trip generation and focus resources at mitigating any unforeseen traffic impacts as they arise.
- 13.140 The targets set by the Interim Travel Plan have the potential to reduce single occupancy car borne trips by approximately 10%. In addition, further to the full occupation of the masterplan site, accessibility will be enhanced, with greater choice of local facilities, services and employment opportunities available to residents, all of which will benefit reducing the need to travel by single occupancy private car, reducing the assessed level of car born trips considered by the Transport Assessment, and in turn, the impacts created on the wider highway network.
- 13.141 Improvement measures are proposed locally, including alterations to Monarchs Quay and Halftide Wharf, widening of existing pedestrian crossing points, and installation of new pedestrian crossing points located to serve key desire lines. The provision of two new bus stops with associated infrastructure so as to serve a diverted / extended bus service once a critical patronage mass is reached is also proposed.

- 13.142 Additionally, the following junction improvement schemes are proposed to be either implemented or contributed toward to mitigate both the residual traffic impacts, and existing negative operational performance occurring on the highway network.
- The installation of MOVA on top of the existing SCOOT system at the Queens Wharf / Wapping / Blundell Street / Chaloner Street junction, which should increase the efficiency of the junction during peak periods;
 - The installation of MOVA on top of the existing SCOOT system at the Chaloner Street / Parliament Street / Sefton Street junction, which should increase the efficiency of the junction during peak periods;
 - The installation of MOVA on top of the existing SCOOT system at the Parliament Street / Great George Street / Upper Parliament Street / A561 St James Place, which should increase the efficiency of the junction during peak periods; and,
 - Through agreement with LCC, installation of queue and MOVA loops in Kings Dock to enable event related traffic to be managed more efficiently when exiting the Docklands, so as to seek to increase movement of traffic, and reduce internal delay. It is considered that this could be activated during key event demand periods, eliminating the need for an engineer to be sited at Liverpool City Councils Urban Traffic Control centre during event peak traffic demand periods.
- 13.143 The improvements described above are considered to be sufficient to seek to mitigate the impact of the additional traffic generated by the development proposals, accompanied by an effective Travel Plan.

Residual Impacts

- 13.144 The identification of residual impacts and any corresponding assessment assumes that the mitigation described in the section above has been successfully implemented.

Demolition and Construction

- 13.145 Although no residual highway operational impacts are envisaged, any major construction programme may give rise to some delays immediately adjacent to the application site due to construction traffic movements and unloading activities.
- 13.146 This will be managed by the main contractor under agreement with the Local Highway Authority. Detailed construction traffic management plans will be required, which will be submitted by the contractor to the Local Highway Authority and agreed in writing prior to the commencement of construction activities.
- 13.147 The detailed construction traffic management plans will also establish mitigation for the removal of any debris on or damage to the public highway that arises due to the construction activities.

Completed Development

- 13.148 Traffic flows on local roads serving the application site will increase due to the development, even where this can be accommodated by the improved local highway network. The Travel Plan provides a strategy that is both proactive in seeking to mitigate any further residual traffic impacts before they arise, but can also respond to any unforeseen residual impacts and implement appropriate mitigation.
- 13.149 The total cumulative traffic growth arising from the development along with general increases in car ownership and other committed developments coming forward will also add to the traffic demand on the A5036, although the independent strategic scheme associated with The Strand, proposed by Liverpool City Council, is likely to have a significant benefit in reducing traffic on the link.
- 13.150 Contributions are proposed toward the full installation of MOVA at three signal controlled junctions on the highway network, so as to seek to mitigate the negative impacts created by development related traffic.
- 13.151 The proposed contributions will be made to enable the recommended mitigation measures to be implemented, or be pooled toward more significant strategic infrastructure, so as to improve the performance of the highway network within the developments area of impact.

Conclusions

- 13.152 This chapter has established the likely changes in traffic flows on the local highway network that will arise due to the construction and operation of the development.
- 13.153 The baseline conditions relevant to the application site and surroundings are described, along with the direct and indirect impacts of the development, mitigation measures that have been designed into the scheme to reduce, or offset the impacts, along with the residual impacts that will remain after mitigation measures have been implemented.
- 13.154 The information and assessment presented within this chapter are based on the assessment of effects upon survey and modelling work undertaken and reported within the accompanying Transport Assessment.
- 13.155 The assessments demonstrate that the application site is appropriately located with respect to the level of accessibility by alternative modes of transport that will be afforded to the proposed development.

- 13.156 The proposed development incorporates appropriate physical design features to mitigate the traffic impact and to promote sustainable modes of transport. The impact of the development on highway operational capacity and highway safety is therefore considered to be acceptable, even where significant changes in the baseline transport conditions will occur.
- 13.157 The development proposals will generate the following benefits:
- Redevelopment of a brownfield site;
 - Conform with the strategic aspirations of Liverpool City Council regarding development within the Kings Dock area;
 - The creation of housing, employment and retail land uses in a sustainable location that will reduce the need to travel.
 - A Travel Plan Framework that covers all of the proposed land uses within Phase 1b of the development, to further support and encourage modal shift toward sustainable forms of transport;
 - Improved connectivity to and quality of the pedestrian and cycle routes and infrastructure within and adjacent to the development site;
 - Integration with the remaining masterplan area to be developed and the neighbouring land uses;
 - On balance improvements to the operational control and flexibility associated with the following junctions by means of installing MOVA:
 - Queens Wharf / Wapping / Blundell Street/ Chaloner Street traffic signal controlled junction;
 - Chaloner Street / Parliament Street / Sefton Street traffic signal controlled junction; and,
 - Parliament Street / Great George Street / Upper Parliament Street / A561 St James Place traffic signal controlled junction.
 - Creation of a critical patronage mass to enable a bus service to be diverted and / or extended through the site;
 - Installation queue and MOVA loops in Kings Dock to enable Arena event related traffic to be managed more efficiently when exiting the Docklands, so as to seek to increase movement of traffic, and reduce internal delay.
- 13.158 Additionally, the mix of uses that are proposed, and integration with the proposed redevelopment of the remaining masterplan will generate a sustainable level of demand for alternative modes of travel to the private car, benefitting from the extension or diversion of a bus route through the site.

Cumulative Impacts

Traffic Growth on the Local Highway Network

- 13.159 Growth in background traffic flows will occur on the local highway network irrespective of the quantum of the Kings Dock development. This background traffic growth will arise from different sources, which have been classified as follows for the purposes of the traffic impact analysis presented within this report.
- 13.160 Changes in background traffic flows will arise from increased car ownership and usage, combined with growth in wider economic activity. The base year (2017) traffic flows have therefore been established from turning count surveys assigned on the adjacent highway network using a spreadsheet gravity model considering population densities across all of Liverpool's wards.
- 13.161 The Do Minimum (DM) development scenario and Do Something (DS) development scenarios included the assessment of committed and strategic developments and infrastructure, such as:
- Development being implemented but not yet occupied; and,
 - Development with extant permission but not yet implemented.
- 13.162 The modelling exercise and mitigation proposed will have a wider benefit in managing traffic flow on the highway network more effectively, seeking to both mitigate the impacts of the proposed development, but also manage background and future committed development traffic given changes to driver behaviour and directional movements of traffic travelling through the junctions to be mitigated.
- 13.163 Specifically considering the impacts to the operations of the adjacent Arenas, measures have been proposed to mitigate everyday local impacts, such as queuing vehicles entering the proposed multi-storey car park, and widening pedestrian crossing points given the expected user demand. This is coupled with Arena related multi modal trips, whereby the installation of queue loops are proposed within Kings Dock to more efficiently manage queueing traffic on Queens Wharf and Keel Wharf and their interaction with the operation of the Queens Wharf / Wapping / Blundell Street / Chaloner Street junction.

14 Wind Microclimate

Introduction

- 14.1 This Chapter of the ES assesses the likely significant effects of the Proposed Development with respect to wind microclimate. This Chapter also describes the methods used to assess the likely effects; the baseline conditions at the Site and surrounding area; the mitigation measures required to prevent, reduce or offset any significant negative effects; and the likely residual effects after these measures have been adopted. This chapter has been prepared by Urban Microclimate Ltd.

Legislative and Policy Context

Legislation

- 14.2 There are no legislative policies relating to the assessment of environmental wind flows in the built environment.

National Planning Policy and Guidelines

- 14.3 There are no national planning policies directly relating to wind microclimate issues. However, the NPPF emphasises the benefits of a high quality built environment. An example of this is presented in paragraph 58:

“...using streetscapes and buildings to create attractive and comfortable places to live, work and visit...”

- 14.4 The NPPG identifies the potential for a building's size and shape (particularly in the case of tall and large buildings) to affect the wind microclimate. Under the section addressing 'Design: How should buildings and the spaces between them be considered?', the NPPG states in Paragraph 025 ('Consider form') that:

“Some forms pose specific design challenges, for example how taller buildings meet the ground and how they affect local wind [...] patterns should be carefully considered.”

- 14.5 The NPPG goes on to state in Paragraph 026 ('Consider scale') that:

“Account should be taken of local climatic condition, including [...] wind”.

Local Planning Policy

- 14.6 Liverpool City Council's Local Plan is currently under development. The draft plan (September 2016) includes Policy UD5 New Buildings, which requires that:

"All new buildings should be designed to the highest design standards, based on a clear rationale, and aesthetic based on the characteristics of the area, and that design proposals for new buildings should demonstrate that:

a. The design has been considered from both a macro and a micro-scale, with adequate responses to issues of skyline impact, scale, relationship to existing structures, function, amenity, and its relationship to the public realm.

...

d. Orientation and micro-climate, overlooking and interface issues that may impact on existing structures or neighbouring plots have been considered."

- 14.7 There are no apparent specific references to wind microclimate in the draft Core Strategy (2012) or the Liverpool Unitary Development Plan (adopted 2002).

Additional Standards and Guidance

- 14.8 The assessment of environmental wind flows lies outside the scope of BS EN 1991-1-4:2005¹, the current European Standard for wind actions on structures, which focuses on wind loading issues.
- 14.9 The impact of environmental wind on pedestrian spaces and the consequent suitability of these spaces for planned usage are described by and compared against the industry standard Lawson criteria², which are recognised by Local Authorities as a suitable benchmark for wind assessments.

Assessment Methodology and Significance Criteria

Methodology

- 14.10 An experience-based desk study has been carried out to provide a qualitative assessment of the likely effects of the Proposed Development on the pedestrian level wind environment. The study considers the Proposed Development massing and exposure in conjunction with long term wind climate statistics applicable to the Site, and draws on extensive experience in the assessment of wind flows, gained from wind tunnel testing of similarly massed schemes within similar urban settings. These detailed studies were based on the aforementioned Lawson criteria for pedestrian comfort and safety.

14.11 The assessment considers the following configurations:

- Existing Site conditions (Existing Baseline);
- Monarchs Quay Phase 1A with existing surrounds (Future Baseline);
- Proposed Development with existing surrounds; and
- Proposed Development with future surrounds.

14.12 The future surrounding developments considered comprise The Keel Phase 2. Further consented future developments in the area lie beyond the extent of potential significant cumulative effects.

14.13 Long-term wind frequency statistics from Liverpool Airport, approximately 11 km to the southeast of the Site, were sourced for the period 2001 to 2012. The data was corrected to apply directly at the Site, taking account of differences in upwind terrain and altitude between the weather centre and the Site, based on the widely accepted Deaves and Harris log law wind model of the atmospheric boundary layer and BS EN 1991-1-4:2005.

14.14 Details of the Lawson criteria for pedestrian safety, or distress, are presented in Table X.1 and are based on the exceedance of the threshold wind speeds, considering mean-hourly and gust-equivalent-mean values, occurring once per annum. These thresholds represent wind speeds with the potential to destabilise the less able or more susceptible members of the public (including elderly, cyclists and children) and able-bodied users.

14.15 **Table 14.1: Lawson Criteria for Pedestrian Safety or Distress**

Threshold mean-hourly wind speed exceeded once a year	Safety Rating		Qualifying Comments
15 m/s	S2	Unsuitable for general public	Less able and cyclists find conditions physically difficult.
20 m/s	S1	Unsuitable for able-bodied	Able-bodied persons find conditions difficult. Physically impossible to remain standing during gusts.

14.16 Details of the Lawson criteria for pedestrian comfort are presented in Table X.2 and are based on the exceedance of threshold wind speeds, considering mean-hourly and gust-equivalent-mean values, occurring less than 5% of the time. The thresholds represent upper bounds of acceptability for a range of common activities. The value of 5% has been established as giving a reasonable allowance for extreme and relatively infrequent winds that are acceptable within each category.

14.17 **Table 14.2: Lawson Criteria for Pedestrian Comfort**

Threshold Mean-hourly Wind Speed Exceeded < 5% of the Time	Comfort Rating / Activity		Qualifying Comments
4 m/s	C4	Long term Sitting	Reading a newspaper and eating and drinking.
6 m/s	C3	Standing or short term Sitting	Appropriate for bus stops, window shopping and building entrances.
8 m/s	C2	Walking and Strolling	General areas of walking and sightseeing.
10 m/s	C1	Business walking	Local areas around tall buildings where people are not likely to linger.

14.18 The pedestrian level wind environment assessment is summarised in terms of suitability for various activities, based on expected seasonal comfort and safety ratings in accordance with the above criteria. The assessment takes full account of seasonal variations in wind conditions and pedestrian activities. Thus conditions for recreational activities focus on summer, but also consider spring and autumn. Recreational activities do not consider winter comfort ratings as it is anticipated that users would not demand suitable conditions 95% of the time in winter, but would instead be satisfied to use the amenity spaces on occasions when conditions, including precipitation and temperature, permit. Conditions for pedestrian thoroughfare, access or waiting (for example at bus stops) consider all seasons, with winter being predominantly the critical season due to generally higher wind speeds in the winter months.

14.19 The activities considered, and their relation to the comfort criteria detailed above, are shown in Table 14.3. The table is ordered in terms of decreasing sensitivity to wind speeds. Conditions considered suitable for the more sensitive activities would also be suitable for the subsequent, less sensitive, uses.

14.20 **Table 14.3: Suitability Assessment**

Suitability		Target Lawson comfort and safety criteria for specified seasons
Outdoor seating	For long periods of sitting, such as for an outdoor café or picnic area.	'Long term sitting' (C4) in at least summer.
Entrances, waiting areas	For pedestrian ingress/egress at entrances, or short periods of sitting or standing such as at a bus stop, taxi rank, meeting point, window shopping, etc.	'Standing or short term sitting' (C3) in all seasons.
General leisure (excluding seating areas)	For leisure uses excluding long periods of outdoor sitting, such as active leisure, general park spaces, children's play area, etc.	'Standing or short term sitting' (C3) from spring to autumn.
Thoroughfare	For pedestrian access to, and passage through, the site and surrounding area.	'Business walking' / 'Walking or strolling' (C1/C2) in all seasons.

Unsuitable	Unsuitable for all activities.	Exceeds comfort criterion for 'Business walking' (C1) or safety criteria (S1/S2).
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Significance Criteria

- 14.21 The significance of any effects is assessed based on the likely suitability of wind conditions in each area against the current or planned pedestrian activities, with the sensitivity of receptors considered high.
- Effects on pedestrian safety are generally considered major. Where the effect is of small spatial extent and is marginal relative to the safety criteria, it is considered moderate.
 - Effects on pedestrian comfort where conditions change from suitable to unsuitable (for adverse impact) or from unsuitable to suitable (for beneficial impact) for current or planned activities are deemed moderate.
 - Where conditions change from marginal (or tolerable) to suitable or unsuitable for current or planned activities the effect is deemed minor. Similarly, a change from suitable or unsuitable to marginal / tolerable is also deemed minor.
 - Any effect that does not alter the suitability of wind conditions with respect to current or planned activities is considered negligible.
- 14.22 As an example, where conditions at a building frontage with no current entrances are suitable only for strolling and a proposed development introduced an entrance in this area, wind conditions would need to improve to be suitable for pedestrian ingress/egress for the effect to be negligible. If wind conditions became marginally windy for an entrance, the effect would be minor adverse even if wind speeds were lower, due to the introduction of a more sensitive activity.
- 14.23 Where existing conditions are calmer than required, an increase in wind speeds could be accommodated without the effect being significant, provided conditions remain suitable for pedestrian activities.

Assumptions and Limitations

- 14.24 The assessment provides an expert qualitative review of expected pedestrian level wind conditions, based on consideration of the massing and exposure of the Proposed Development in conjunction with long-term wind statistics applicable to the Site.

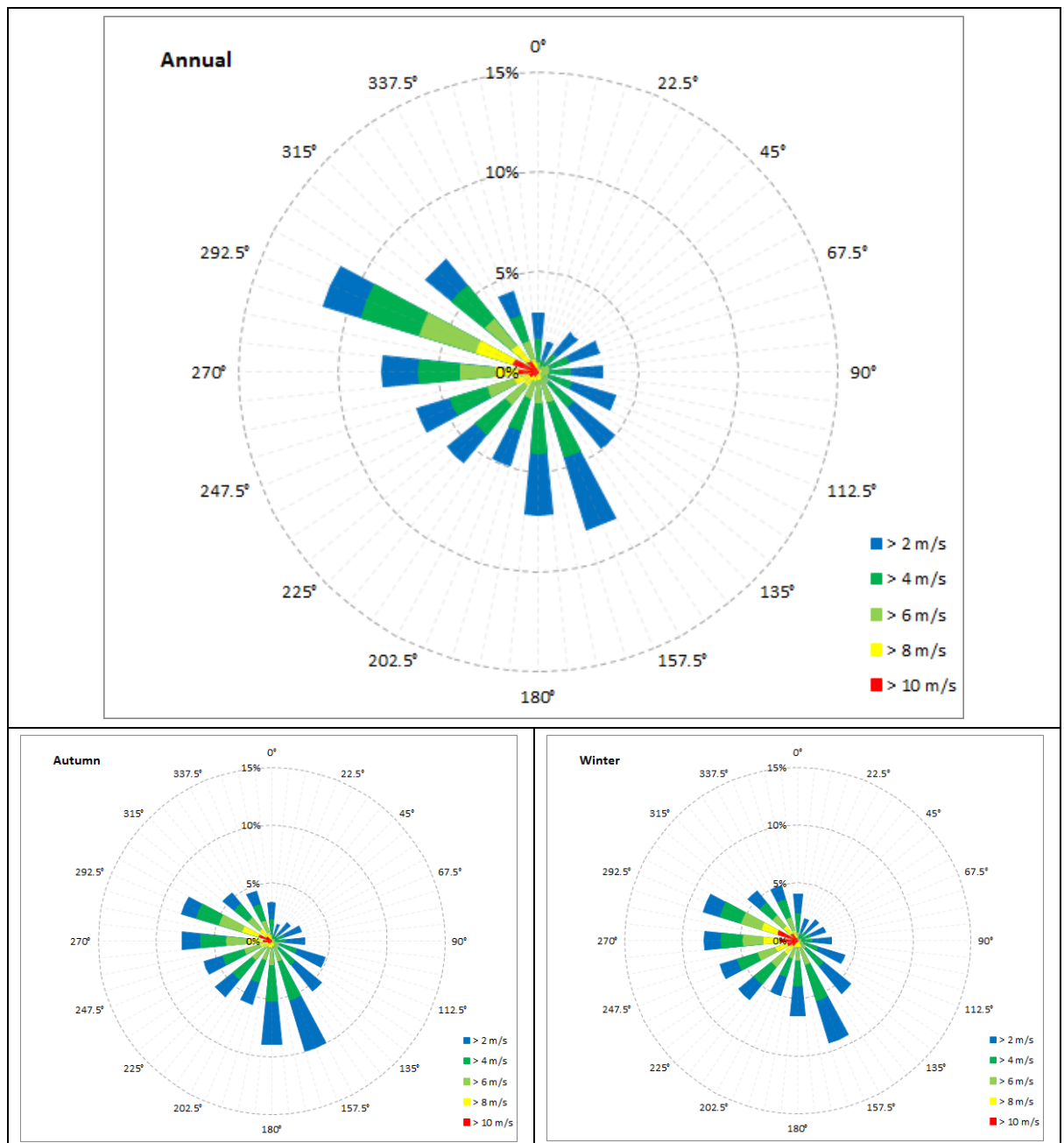
- 14.25 Historical wind statistics are used as standard practice due, in part, to lack of certainty in potential future changes in wind patterns, though any changes are expected to be minor.

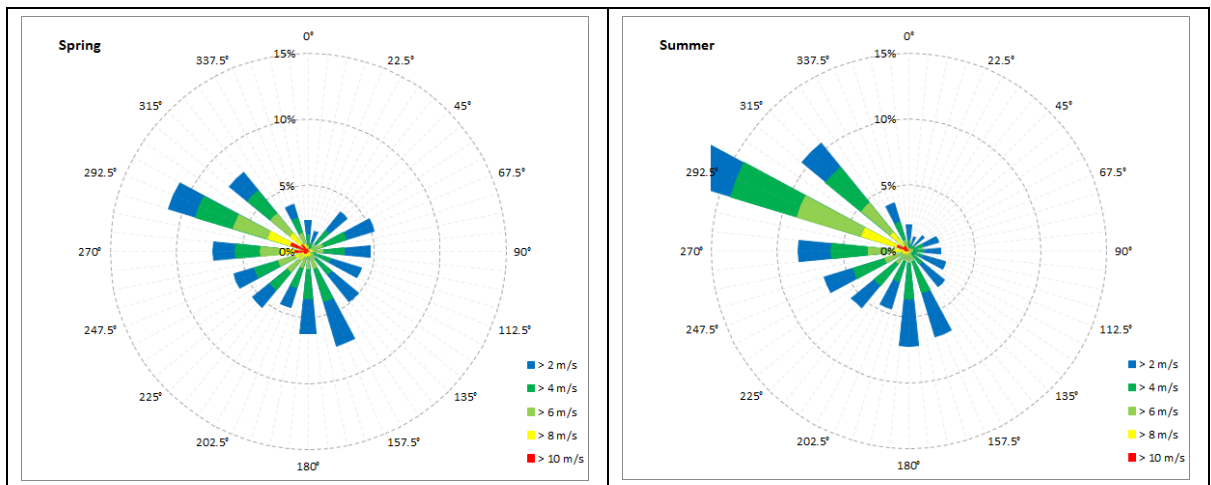
Baseline Conditions

- 14.26 The wind climate expected at the Site is summarised in Figure 3.1 in terms of the annual and seasonal wind speed and direction probability distributions at a reference height of 20 m, corresponding to the approximate maximum roof height of the Proposed Development, relative to local ground level.
- 14.27 Based on the wind climate statistics, the most frequent strong winds blow from the west-north-west and west. Winds from the south-south-east are also common, but these winds are generally light. Northerly winds are generally light and rare, though cold north-easterly winds are common during spring. Wind speeds are generally higher during winter and lower during summer.
- 14.28 Applying these wind statistics at the Site location, an area free from localised building effects (either sheltering or acceleration) would be expected to experience pedestrian level wind conditions rated (in accordance with the Lawson criteria) as comfortable for 'leisurely strolling' during winter and comfortable for 'standing or short term sitting' during summer, with spring and autumn marginal between these ratings.

14.29

Figure 14.1: Wind Climate at Site (at reference height of 20 m)





Existing Baseline

- 14.30 The existing Site comprises open car parks and a waterfront walkway. The Site does benefit from some shelter from the most frequent strong winds from the west-north-west, created by existing surrounding buildings. However, winds passing over the existing buildings are expected to reach pedestrian level within the Site, and the south of the Site is exposed to westerly winds.
- 14.31 However, in the absence of any dominant structures creating accelerated winds, conditions in and immediately around the existing Site are expected to rate as safe for all users, in accordance with the Lawson criteria for pedestrian safety.
- 14.32 In terms of pedestrian comfort, with respect to wind force, conditions in and immediately around the existing Site are expected to be suitable for at least leisurely strolling and access to cars. However, benches along the waterfront area are expected to be suitable, at best, for only short periods of sitting, such as for meeting point or viewing area, from spring to autumn.

Future Baseline

- 14.33 Monarchs Quay Phase 1A represents a modest structure with respect to wind effects. However, this development will be largely exposed to prevailing west-north-westerly and westerly winds and there is potential for channelling of these winds along the development's west elevation and around the building corners. In addition, this development introduces sensitive pedestrian activities, including outdoor seating areas, though the landscaping scheme has been purposely developed to help alleviate wind flows and locally protect key seating areas.
- 14.34 As a result, conditions in and immediately around the Site are expected to rate as safe for all users, in accordance with the Lawson criteria for pedestrian safety.

- 14.35 In terms of pedestrian comfort, thoroughfares in and immediately around the Site are expected to be suitable for at least leisurely strolling and main entrances to Monarchs Quay Phase 1A are expected to have suitable conditions for pedestrian ingress/egress.
- 14.36 Much of the café outdoor seating area on the northeast side of Monarchs Quay Phase 1A is expected to enjoy suitable conditions for long periods of outdoor sitting during summer, though the outer edges of these areas may be slightly windy for such activities and may benefit from additional shelter such as extended hedges or screens.
- 14.37 Within Monarchs Quay Phase 1A, the waterfront area benefits from drops in levels which provide a back to benches and provides some shelter to the seating from prevailing winds. Resulting conditions may be slightly windy for prolonged periods of sitting but are expected to be suitable for short periods of sittings from spring to autumn. These conditions are expected to be considered tolerable for a waterfront area, though the seating areas may again benefit from additional shelter such as tall shrubs on the ledges above the benches.

Identification and Evaluation of Likely Significant Effects

Demolition and Construction

- 14.38 There are no existing buildings to be demolished. In addition, there are no immediate surrounding tall buildings where the partially completed Proposed Development could potentially exacerbate downdraughts. Potential wind effects from the partially completed Proposed Development are therefore expected to be less than from the completed Proposed Development considered below.
- 14.39 Within the Site, pedestrian activities will be different during construction, comprising mainly work activities. Pedestrian perception of conditions both within the Site and in the surrounding area is also likely to be affected by expectations of conditions around a building site, with pedestrians more likely to tolerate adverse conditions as they can appreciate it as a temporary situation.
- 14.40 Overall, the Proposed Development is not expected to have any additional significant effects on wind conditions within the Site or surrounding area during construction and the likely construction related effects are therefore considered **negligible**.

Operation

- 14.41 The completed Proposed Development comprises three modest structures with respect to wind effects. However, the shelter from the most frequent strong winds from the west-north-west, created by existing buildings, is limited and winds passing over the existing buildings are expected to impact at pedestrian level within the Site. The south of the Site is also exposed to westerly winds. There is therefore potential for significant channelling of prevailing winds along the western and northern elevations of Building 3 in particular, and subsequent acceleration of these winds around the southwest, northwest and northeast corners of the Building. The southern parts of Buildings 2 and 4 are more sheltered from prevailing west-north-westerly and westerly winds, but the northwest and northeast corners are expected to be susceptible to these winds channelling around the corners.
- 14.42 Building 3 of the Proposed Development is expected to partially shelter Monarchs Quay Phase 1A, though this development is expected to remain susceptible to prevailing winds channelling around the building's northwest and southwest corners.
- 14.43 In addition, the Proposed Development introduces a communal podium-top courtyard within Building 4.
- 14.44 As a result of these effects, and the general windiness of the waterfront area, the proposed landscaping scheme has been purposely developed to help alleviate potential strong winds and create locally sheltered areas within the Building 4 courtyard. In particular, the landscaping includes:
- substantial tree planting:
 - across the open space to the north of Building 3;
 - along the northeast elevation of Building 3;
 - along the southwest and northwest elevations of Building 4; and
 - 1.2m high hedging extending out from the courtyard elevations of the Building 4.
- 14.45 It is understood that the trees will be a mixture of pines and deciduous species with substantial retained solidity in winter (i.e. lots of branches), and will be planted semi-mature at heights of between 5.5 and 7 m.
- 14.46 The expected pedestrian level wind environment in and around the Site, resulting from the above effects, is discussed below and indicatively presented in terms of suitability for pedestrian activities in Figure 14.2.

Pedestrian Safety

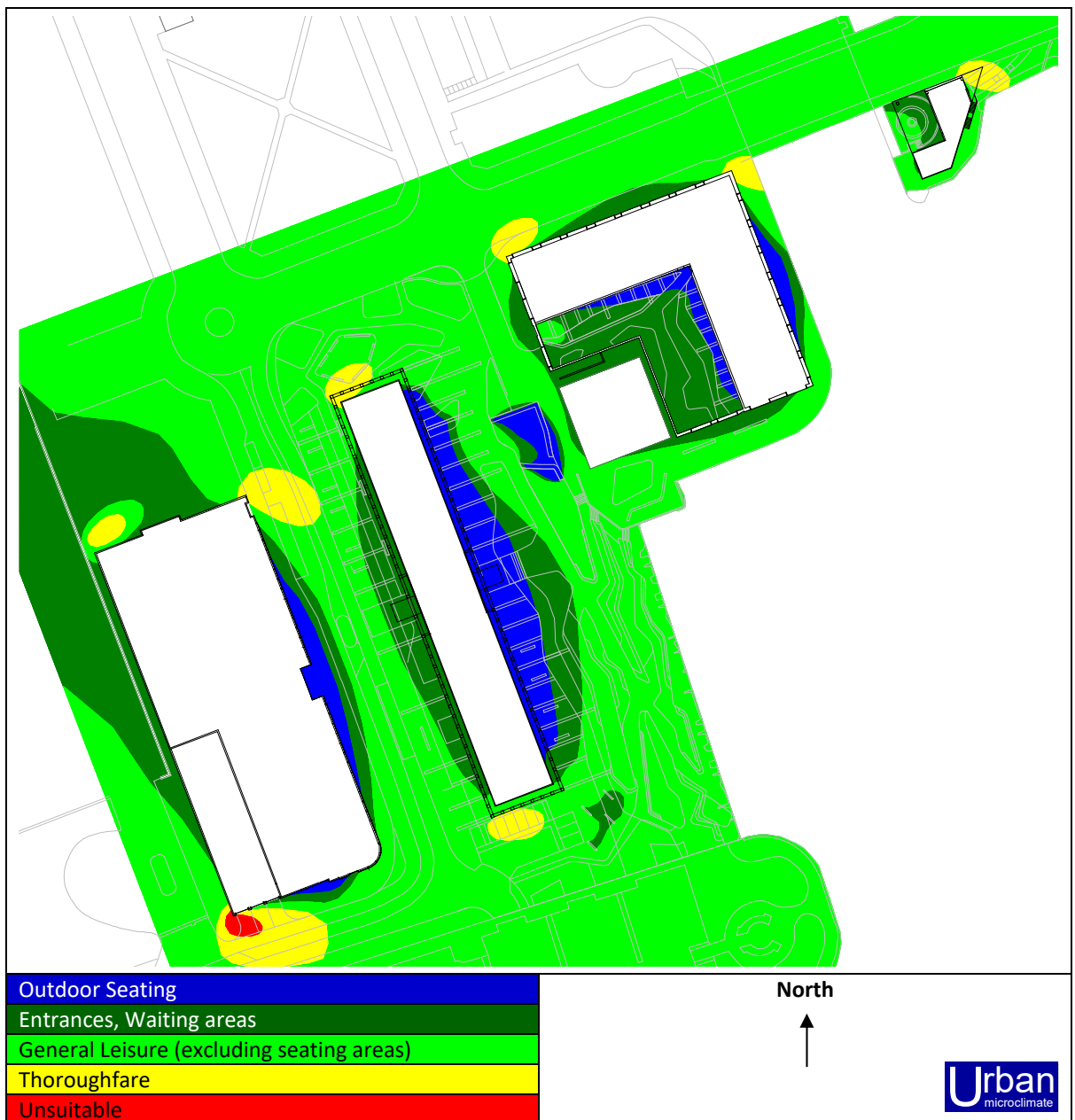
- 14.47 As discussed above, the Proposed Development is modest in scale but is potentially susceptible to prevailing west-north-westerly winds channelling along the west elevation of Building 3 before further accelerating around the Building's southwest corner.
- 14.48 As a result, there is potential for pedestrian level wind conditions to rate as unsuitable, in terms of pedestrian safety, for the general public around the southwest corner of Building 3. However, any exceedance of the Lawson safety criteria threshold is expected to be marginal, at worst, and is expected to affect only a small area of roadway and vehicular access. On this basis, this effect is considered **localised moderate adverse**.
- 14.49 Otherwise, the Proposed Development is expected to have no other significant impacts with respect to pedestrian safety, and the wider effect on pedestrian safety in and around the Site is considered **negligible**.

Pedestrian Comfort

Thoroughfares

- 14.50 In terms of pedestrian comfort, with respect to wind force, conditions have potential to be suitable only for fast walking, normally associated with business activities, during winter and spring around the southwest corner of Building 3. Again, the area affected is expected to be limited to a small area of roadway and vehicular access. Conditions are therefore expected to be at least tolerable for pedestrian passage and this effect is considered no worse than **minor adverse**.
- 14.51 Away from the southwest corner of Building 3, thoroughfares within the Site are expected to be suitable for at least leisurely strolling and are thus likely to be considered suitable for pedestrian access to and passage through the Site. The wider effect on thoroughfares within the Site is therefore considered **negligible**.

14.52 **Figure 14.2: Suitability Assessment**



Building Entrances

- 14.53 The main entrance to Building 2 is expected to be susceptible to west-north-westerly winds channelling around the northeast corner of the Building. Resulting conditions are likely to be suitable for leisurely strolling but too windy for comfortable pedestrian ingress/egress. This effect is considered **localised moderate adverse**.

- 14.54 The main residential entrance to Building 4 from Queens Wharf is located close to the northeast corner of the Building, but is upwind of the main area of accelerated winds around the corner and is partially protect by the proposed tree planting. Similarly, the commercial entrance from Queens Wharf is partially protect by the proposed tree planting and is expected to be downwind of the main area of potential accelerated winds around the corner. Thus, whilst conditions in the immediate vicinity of these entrances may be too windy to linger comfortably, the entrances are expected to have acceptable conditions for pedestrian ingress/egress. The remaining entrances to Building 4 are located in more benign areas and are expected to enjoy suitable conditions for pedestrian ingress/egress. The effect on the Building 4 entrances is therefore considered **negligible**.
- 14.55 Pedestrian entrances to Building 3 are located away from corner areas or are recessed and are expected to enjoy suitable conditions for pedestrian ingress/egress. The effect on the Building 3 entrances is therefore considered **negligible**.

Amenity Spaces

- 14.56 The Building 4 podium-top courtyard benefits from hedging extending out from the façade to create sheltered pockets. Resulting conditions along much of the Building frontage are expected to be suitable for recreational activities including long periods of outdoor sitting during summer. The remainder of the courtyard is expected to be suitable for general recreational activities, such as children's play for example. Overall, these conditions are expected to be considered acceptable for planned recreational uses, and this effect is therefore considered **negligible**.
- 14.57 The waterfront area around Building 4 is expected to be suitable for short periods of sittings, such as for a meeting point or viewing for example, from spring to autumn, but, with the exception of midway along Building's northeast frontage, may be slightly windy for prolonged periods of outdoor sitting. These conditions are expected to be considered tolerable for a waterfront area. As both the wind conditions and likely usage is not expected to significantly change from baseline conditions, this effect is considered **negligible**.

Surrounding Area

- 14.58 The Proposed Development is expected to slightly increase the shelter enjoyed by Monarchs Quay Phase 1A from the prevailing west-north-westerly and westerly winds. However, whilst the extent of accelerated winds around the northwest and southwest corners of this building may be reduced, the suitability of conditions for planned activities within this development are not expected to materially change. Conditions within Monarchs Quay Phase 1A are therefore expected to be as discussed above for the Future Baseline.

- 14.59 The remaining surrounding thoroughfares are expected to remain suitable for at least leisurely strolling and access to cars, and there are no further sensitive building entrances or recreational uses in the immediate vicinity of the Site.
- 14.60 The effect on the surrounding conditions is therefore considered **negligible**.

Cumulative Effects

- 14.61 The introduction of The Keel Phase 2, to the south, is not expected to significantly affect wind conditions within the Site.
- 14.62 The Proposed Development has potential to increase the shelter within The Keel Phase 2 from the prevailing west-north-westerly winds. However, this effect is likely to be only slight and is not expected to materially affect the suitability of conditions within the future development.
- 14.63 Potential cumulative effects are therefore considered **negligible**.

Mitigation Measures

- 14.64 The main entrance to Building 2 would benefit from a side screen extending out from the Building's northeast corner to locally shelter the entrance from winds channelling around the corner, or substantial tree planting along northwest elevation of the Building.

Residual Effects

- 14.65 With the introduction of mitigation measures around the entrance to Building 2, all pedestrian entrances to the Buildings of the Proposed Development would be expected to enjoy suitable conditions for pedestrian ingress/egress, and the residual effect on entrances would be considered **negligible**.
- 14.66 No further mitigation measures are proposed, and the residual effects are therefore as discussed above for the Proposed Development, and range from **negligible** to **localised moderate adverse**.

References

- 14.67 1. BS EN 1991-1-4:2005 Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions

2. Lawson, T.V. (1990), "The Determination of the Wind Environment of a Building Complex before Construction" Department of Aerospace Engineering, University of Bristol, Report Number TVL 9025

Summary / NTS

- 14.68 The wind microclimate assessment has comprised an expert qualitative review of expected pedestrian level wind conditions, based on consideration of the massing and exposure of the Proposed Development in conjunction with long-term wind statistics applicable to the Site.
- 14.69 Based on the wind climate statistics, the most frequent strong winds blow from the west-north-west and west. Winds from the south-south-east are also common, but these winds are generally light. Northerly winds are generally light and rare, though cold north-easterly winds are common during spring. Wind speeds are generally higher during winter and lower during summer.
- 14.70 The Proposed Development comprises modest structures with respect to wind effects. However, the shelter from the most frequent strong winds from the west-north-west, created by existing buildings, is limited and winds passing over the existing buildings are expected to impact at pedestrian level within the Site. In particular, there is potential for significant channelling of prevailing winds along the western and northern elevations of Building 3, with subsequent acceleration of these winds around the Building corners. The southern parts of Buildings 2 and 4 are more sheltered from prevailing winds, but the northwest and northeast corners are expected to be susceptible to these winds channelling around the corners.
- 14.71 As a result of the above effects, there is potential for pedestrian level wind conditions to rate as unsuitable in terms of pedestrian safety around the southwest corner of Building 3. However, the potential exceedance of the safety criteria is expected to be marginal at worst, and is expected to affect only a small area of roadway and vehicular access. On this basis, this effect is considered **localised moderate adverse**. Otherwise, the Proposed Development is expected to have **negligible** effect on pedestrian safety across the remainder of the Site and surrounding area.
- 14.72 In terms of pedestrian comfort, conditions are expected to be tolerable for pedestrian passage around the southwest corner of Building 3. This effect is considered **minor adverse**. Otherwise, thoroughfares within the Site are expected to be suitable for pedestrian access to, and passage through, the Proposed Development, and the wider effect on thoroughfares is considered **negligible**.

- 14.73 The main entrance to Building 4 is expected require localised protected through the introduction of either a side screen at the Building corner or tree planting along the northwest elevation. Subject to this, the main pedestrian entrances to the Proposed Development are expected to have suitable conditions for pedestrian ingress/egress and the residual effect on entrances is therefore expected to be **negligible**.
- 14.74 The Building 4 podium-top courtyard is expected to have acceptable conditions for planned activities, comprising a mix of outdoor seating within the sheltered pockets along the Building front and general recreational uses (such as children's play for example) across the more open space. This effect is therefore considered **negligible**. Conditions along the waterfront area around Building 4 are expected to be at least tolerable for associated recreational uses. As these conditions are unchanged from Baseline Conditions, this effect is considered **negligible**.
- 14.75 The Proposed Development is not expected to have any significant impact on the pedestrian level wind conditions within the surrounding area.
- 14.76 No significant cumulative effects with the future surrounding developments are expected and no significant additional effects, over and above those discussed above for the completed Proposed Development, are expected during the construction phase.

15 Daylight, Sunlight and Overshadowing

Introduction

- 15.1 Delva Patman Redler LLP have been instructed by YPG Developments Limited to prepare a daylight and sunlight study to assess the likely impact of the proposed redevelopment of Application 1 of the Monarchs Quay development site by Falconer Chester Hall Architects on the neighbouring residential amenity adjacent to the site.
- 15.2 This study has been carried out in accordance with the recommendations of the Building Research Establishment Report "Site Layout Planning for Daylight & Sunlight 2011" (BRE209).
- 15.3 The template drawings, which are attached, illustrate the results for the daylight and sunlight assessments and identify the drawings used in these studies.

The Proposal

- 15.4 The Phase 1b development includes the construction of the Interpretation Centre and offices located on site B shown on the property location plan in Appendix A this will be a 5-storey property. On site C will be a multi storey car park at 7-storeys and site D will be a residential building 7-storeys with parking and two commercial units at ground floor level with residential apartments on the floors above.
- 15.5 The development proposals also include the TCC3 Commercial Building on site A as part of Phase 1a, this the construction of a four-storey commercial building with the fourth floor set back from the main building line including the provision of roof plant and associated landscaping works.

Policy / Guidelines

- 15.6 This study has been carried out in accordance with the recommendations of the Building Research Establishment report "Site Layout Planning for Daylight & Sunlight 2011". This is the recognised standard against which daylight and sunlight should be assessed.
- 15.7 The BRE guide is intended for building designers and their clients, consultants and planning officials. The advice given is not mandatory and the report should not be seen as a part of planning policy. Its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly because natural lighting is only one of the many factors in site layout design. In certain circumstances the developer or planning authority may wish to use alternative target values.

- 15.8 Whilst technical analysis can be carried out in accordance with numerical guidelines and reported factually by comparison with those guidelines, the final assessment as to whether affected dwellings are left with acceptable amounts of daylight and sunlight in an inner-city context where the findings are to be interpreted in a flexible manner is a matter of subjective opinion.
- 15.9 Liverpool City Council's Local Plan is currently under development. The draft plan (September 2016) includes Policy UD5 New Buildings, which requires that all new buildings should be designed to the highest design standards, based on a clear rationale and aesthetic based on the characteristics of the area, and that design proposals for new buildings should demonstrate that:
1. The design has been considered from both a macro and a micro-scale, with adequate responses to issues of skyline impact, scale, relationship to existing structures, function, amenity, and its relationship to the public realm.
 2. Orientation and micro-climate, overlooking and interface issues that may impact on existing structures or neighbouring plots have been considered.

Methodology

- 15.10 The Daylight, Sunlight and Overshadowing assessments have been undertaken in accordance with the Building Research Establishment (BRE) guidelines "Site Layout Planning for Daylight & Sunlight. A Guide to Good Practice".
- 15.11 The BRE Report advises that daylight levels should be assessed for the main habitable rooms of neighbouring residential properties. Habitable rooms in residential properties are defined as kitchens, living rooms and dining rooms. Bedrooms are less important as they are mainly occupied at night time. The report also refers to other property types, which may be regarded as 'sensitive receptors' such as schools, hospitals, hotels and hostels, small workshops and most offices.

Daylight

- 15.12 The BRE Guide states in 2.2.4 that:
- "Loss of light to existing windows need not be analysed if the distance from the existing window is three or more times its height above the centre of the existing window."*
- 15.13 The BRE Guide goes onto to state in 2.2.5 that:
- "If, for any part of the new development, the angle from the centre of the lowest affected window to the head of the new development is more than 25°, then a more detailed check is needed to find the loss of skylight to the existing buildings."*

- 15.14 If these primary criteria are not met then the BRE guidelines goes on to propose several methods for calculating daylight and sunlight.
- 15.15 The two main methods predominantly used are those involving the measurement of the total amount of skylight available (the vertical sky component (VSC)) and its distribution within the building (the No-Sky line or daylight distribution).
- 15.16 The VSC calculation is a general test of potential for daylight to a building, measuring the light available on the outside plane of windows.
- 15.17 The “No-Sky” Line divides those areas of the working plane which can receive direct skylight, from those which cannot. It provides an indication of how good the daylight distribution is within a room.
- 15.18 The third recognised method of assessment for daylight is the Average Daylight Factor (ADF) calculation which assesses the quality and distribution of light within a room served by a window and considers the VSC value, the size and number of the windows and room and the use to which the room is put. ADF assesses actual light distribution within a defined room area whereas the VSC considers potential light. British Standard 8206, Code of Practice for Daylighting recommends ADF values of 1% in bedrooms, 1.5% in living rooms and 2% in kitchens. For other uses, where it is expected that supplementary electric lighting will be used throughout the daytime, such as in offices, the ADF value should be 2%. There is no general requirement within the BRE guidelines to assess ADF values, other than for neighbouring residential buildings.
- 15.19 For the purposes of this report all three detailed methods of assessment have been considered where the 25° has been breached.

Sunlight

- 15.20 Sunlight analysis is undertaken by measuring annual probable sunlight hours (APSH) for the main windows of rooms which face within 90o of due south. The maximum number of annual probable sunlight hours for the Manchester orientation is 1,392 hours. The BRE guidelines propose that the appropriate date for undertaking a sunlight assessment is on 21st March, being the spring equinox. Calculations of both summer and winter availability are made with the winter analysis covering the period from the 21st September to 21st March. For residential accommodation, the main requirement for sunlight is in living rooms and it is regarded as less important in bedrooms and kitchens.
- 15.21 Due to orientation and room use not all windows assessed for daylight qualify for sunlight assessment in accordance with BRE Guidance.

- 15.22 All relevant neighbouring residential buildings within the vicinity of the site have been included as part of the daylight and sunlight assessments. For both daylight and where relevant sunlight as illustrated on site plan dwg no': 17049/LOC/DS/800 and window location dwg no's: 17049/LOC/802 – 804 in Appendix A.

Overshadowing

- 15.23 The BRE Guidelines state that it is recommended that for an amenity area to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on March 21st. If as a result of new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21st March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable.
- 15.24 The amenity areas considered in this analysis are the neighbouring amenity areas west of the Liverpool Exhibition Centre (A3 & A4), Wapping Dock (A10) and Queens Dock (A11) along with the proposed amenity areas within the scheme itself A1 ground & first floor level, A2 & A5. The permanent shadow image drawing show areas cast in shadow for more than 2 hours cast by all the buildings in each scenario on March 21st between the hours 7am – 5pm with comparisons for Existing vs Proposed where relevant. The amenity areas considered in this analysis are highlighted in drawing 17049/SHA/507 in Appendix C.
- 15.25 A transient shadow assessment has been undertaken for the proposed sites in context with the neighbouring properties, this shows the shadows cast on the on the Spring Equinox (March 21st) at hourly intervals between 7am - 5pm with a comparison of the existing and proposed scenarios. The study has been produce in perspective plan format shown in drawings 17049/SHA/501- 506 in Appendix D and a 3D perspective aerial view from above Queens dock in drawings 17049/SHA/508 - 513 in Appendix C.

Assumptions Made

- 15.26 • Access has not been sought into any of the neighbouring properties and so we have made reasonable assumptions as to the rooms configurations and layouts of neighbouring properties. Where no information has been available we have adopted a standard 4m deep room for residential premises and 6m deep rooms for commercial premises. Where floor plans have been obtained these have been adopted for analysis purposes. Properties where layouts have been obtained include:

Site	Address	Information Obtained
2	Queens Dock House – The Keel Apartments	Full Floor Plans
3	Queens Dock Phase II North Building	Full Floor Plans

- All layouts adopted are subject to confirmation following access
- Floor levels for the neighbouring properties have been taken from section drawings obtained but otherwise have been assumed using reasonable estimations.

Significance Criteria

15.27 The guidance given by BRE has been used as a basis for the criteria to assess the Development's potential effects.

15.28 In describing the significance criteria as set out below, it should be noted that they have been developed to protect residential properties, which are the most sensitive receptors.

15.29 **Table 1: BRE Daylight Guidance used in the Assessment**

Issue	Criteria
Daylight	A window may be affected if the vertical sky component (VSC) measured at the centre of the window is less than 27% and less than 0.8 times its former value.
	A room may be adversely affected if a significant area of the room is beyond the No-Sky Line and is less than 0.8 times its former value.
	A room may be adversely affected if the average daylight factor (ADF) is less than 1% for a bedroom, 1.5% for a living room or 2% for a kitchen. For offices, a minimum figure of 2% is required.
Sunlight	A window may be adversely affected if a point at the centre of the window receives in the year less than 25% of the annual probable sunlight hours including at least 5% of the annual probable sunlight hours (APSH) during the winter months (21 September to 21 March) and less than 0.8 times its former sunlight hours during either period.
Overshadowing	At least half of the amenity areas should receive at least two hours of sunlight on 21st March, or the area which can receive two hours of sun on 21st March is less than 0.8 times than the baseline figure.

15.30 It is noted that for both sunlight and daylight calculations, total reliance upon numerical values and particularly percentage changes may be misleading particularly when baseline values are already comparatively low, as is often the case in dense urban locations such as Liverpool. A percentage change of more than 20% may well represent only a very small difference in actual light value.

15.31 It should also be noted that the usage of the room should be considered when deciding on whether or not a particular room suffers an adverse loss. For example, the value of light to a room would be more beneficial to a living room rather than a bedroom where the room is occupied at night-time.

- 15.32 Additionally, it should be borne in mind that Page 1 of the BRE guidance suggests that circumstances will exist where an alternative criteria value may be used, for example, in a city centre:

"...where a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings".

- 15.33 In such instances, the BRE guidance advises that the numerical guidelines should be interpreted flexibly, and alternative numerical values may be used.

- 15.34 The likely effects of daylight and sunlight are graded against the significance criteria set out in tables 1.1, 1.2, 1.3 and 1.4 below

TABLE 1.1 – SIGNIFICANCE CRITERIA FOR DAYLIGHT VSC EFFECTS	
Significance Criteria	Description
Major Adverse	The daylight levels for sensitive receptors are over 40% of the existing VSC figure.
Moderate Adverse	The daylight levels for sensitive receptors are within 30% - 39.9% of the existing VSC figure.
Minor Adverse	The daylight levels for sensitive receptors are within 20% - 29.9% of the existing VSC figure.
Negligible	The daylight levels for sensitive receptors are either greater than 27% VSC or within 20% times the existing VSC value.

TABLE 1.2 – SIGNIFICANCE CRITERIA FOR DAYLIGHT NSL EFFECTS	
Significance Criteria	Description
Major Adverse	The daylight levels for sensitive receptors are over 40% of the existing NSL figure.
Moderate Adverse	The daylight levels for sensitive receptors are within 30% - 39.9% of the existing NSL figure.
Minor Adverse	The daylight levels for sensitive receptors are within 20% - 29.9% of the existing NSL figure.
Negligible	The daylight levels for sensitive receptors are either greater than 80% day lit or within 20% times the former value and therefore the BRE guidelines state that

	the amenity area should continue to receive good levels of daylight.
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TABLE 1.3 – SIGNIFICANCE CRITERIA FOR DAYLIGHT ADF EFFECTS

Significance Criteria	Description
Major Adverse	The daylight levels for sensitive receptors are over 66% of their respective room use ADF figure.
Moderate Adverse	The daylight levels for sensitive receptors are within 33-66% of their respective room use ADF figure.
Minor Adverse	The daylight levels for sensitive receptors are within 1 - 33% of their respective room use ADF figure.
Negligible	The daylight levels for sensitive receptors are greater than minimum requirement for their room usage which is 1% for Bedrooms, 1.5% for Living Rooms, 2% for Kitchens.

TABLE 1.4 – SIGNIFICANCE CRITERIA FOR SUNLIGHT APSH EFFECTS

Significance Criteria	Description
Major Adverse	The sunlight levels for sensitive receptors are over 40% of the existing APSH figure.
Moderate Adverse	The sunlight levels for sensitive receptors are within 30% - 39.9% of the existing APSH figure.
Minor Adverse	The sunlight levels for sensitive receptors are within 20% - 29.9% of the existing APSH figure.
Negligible	The sunlight levels for sensitive receptors are either greater than 25% APSH or within 20% times the existing APSH value.

Baseline Conditions

- 15.35 An analysis of the impact of the existing buildings (the baseline conditions) against which to compare any potential impact arising from the development has been undertaken based on Drawing 17049/SPT/801 in Appendix B.

- 15.36 The site is in an urban location in Liverpool at Monarch's Quay, however the current buildings within the vicinity are spread out which is conducive to good sky visibility allowing for excellent levels of natural light reaching the neighbouring fenestrations.
- 15.37 The findings from the technical assessments can be seen from the results, both in graphical and tabular form, in the Technical Appendices B, C & D.
- 15.38 An analysis of the Existing scenarios' daylight, sunlight and overshadowing levels enjoyed by the neighbouring residential amenity has been undertaken to provide a baseline against which the impacts arising from the proposed development can be assessed. The results show that all windows, rooms and amenity areas assessed receive light levels way above the automatic pass rate for all daylight and sunlight assessments.

Results – Completed Development

- 15.39 Due to the proximity of the Phase 1a & 1b development to neighbouring properties only Queens Dock House – The Keel Apartments and Queens Dock Phase II North Building (yet to be implemented) required a full technical analysis. The nearest other receptor is the Hotel Campanile on the opposite side of Queens Dock, a 25° angle assessment was undertaken on this property on its lowest window. The result shows that the development will cause a 13° obstruction as shown on drawing 17049/LOC/802 and therefore this property can be discounted from any further technical assessment as the development is well within the permitted 25° angle.

NEIGHBOURING DAYLIGHT – VERTICAL SKY COMPONENT (VSC) (EXISTING VS PROPOSED SCENARIO)

- 15.40 The full results of the daylight analysis are presented in Appendix B in tabular form. A summary of the results of the Vertical Sky Component (VSC) analysis on the relevant overlooking windows are presented in the Table 2 below. This identifies where habitable rooms are left with adequate light.

15.41 **Table 2: Number of Rooms Experiencing Daylight Impacts as a Result of the Development (VSC Method)**

Address	Total Number of Rooms Tested	Number of Rooms Meeting BRE Guidelines for VSC	Number of Rooms Experiencing Impacts beyond BRE Guidance
Queens Dock House – The Keel Apartments	23	23	0
Queens Dock Phase II North Building	24	24	0
Total	47	47	0

- 15.42 Table 2 shows that all 47 rooms assessed will fully comply with the BRE Guidelines in Vertical Sky Component terms. The full results can be seen in the daylight and sunlight spreadsheet in Appendix B along with a window location drawing for each building 17049/LOC/803 – 804.
- 15.43 Therefore, overall Phase 1a and 1b will have a negligible impact on neighbouring amenity for VSC.

NEIGHBOURING DAYLIGHT – NO SKY LINE (NSL) (EXISTING VS PROPOSED SCENARIO)

- 15.44 The full results of the daylight analysis are presented in Appendix B in tabular form. A summary of the results of the No Sky Line (NSL) analysis on the relevant overlooking windows are presented in the Table 3 below. This identifies where habitable rooms/windows are left with adequate light.

Table 3: Number of Rooms Experiencing Daylight Impacts as a Result of the Development (NSL Method)

Address	Total Number of Rooms Tested	Number of Rooms Meeting BRE Guidelines for NSL	Number of Rooms Experiencing Impacts beyond BRE Guidance
Queens Dock House – The Keel Apartments	23	23	0
Queens Dock Phase II North Building	24	24	0
Total	47	47	0

- 15.45 Table 3 shows that all 47 rooms assessed will fully comply with the BRE Guidelines in No Sky Line terms. The full results can be seen in the daylight and sunlight spreadsheet in Appendix B along with a window location drawing for each building 17049/LOC/803 – 804.
- 15.46 Therefore, overall Phase 1a and 1b will have a negligible impact on neighbouring amenity for NSL.

Neighbouring Daylight – Average Daylight Factor (ADF) (Existing Vs Proposed Scenario)

- 15.47 The full results of the daylight analysis are presented in Appendix B in tabular form. A summary of the results of the Average Daylight Factor (ADF) analysis on the relevant overlooking windows are presented in the Table 4 below. This identifies where habitable rooms/windows are left with adequate light.

15.48 **Table 4: Number of Rooms Experiencing Daylight Impacts as a Result of the Development (ADF Method)**

Address	Total Number of Rooms Tested	Number of Rooms Meeting BRE Guidelines for ADF	Number of Rooms Experiencing Impacts beyond BRE Guidance
Queens Dock House – The Keel Apartments	23	23	0
Queens Dock Phase II North Building	24	24	0
Total	47	47	0

15.49 Table 4 shows that all 47 rooms assessed will fully comply with the BRE Guidelines in Average Daylight Factor terms. The full results can be seen in the daylight and sunlight spreadsheet in Appendix B along with a window location drawing for each building 17049/LOC/803 – 804.

15.50 Therefore, overall Phase 1a and 1b will have a negligible impact on neighbouring amenity for ADF.

Neighbouring Sunlight – APSH (Existing Vs Proposed Scenario)

15.51 The full results of the sunlight analysis are presented in Appendix B in tabular form. A summary of the results of the Annual Probable Sunlight Hours (APSH) analysis on the relevant overlooking windows are presented in the Table 6 below. This identifies where habitable rooms are left with adequate light.

15.52 **Table 6: Number of Windows Experiencing Sunlight Impacts as a Result of the Development (APSH Method)**

Address	Total Number of Windows Tested	Windows Meeting BRE Guidelines for APSH	Number of Windows Experiencing Impacts beyond BRE Guidance
Queens Dock House – The Keel Apartments	0	0	0
Queens Dock Phase II North Building	3	3	0
Total	47	47	0

15.53 Table 6 shows all 3 windows qualifying for assessment will comfortably comply with the BRE Guidelines in APSH.

15.54 All other windows that were assessed for daylight have been discounted due to their northern orientation in line with BRE recommendations.

- 15.55 Therefore, overall Phase 1a and 1b will have a negligible impact on neighbouring amenity for APSH and Winter sunlight.

Overshadowing – Permanent Shadow Assessment (Existing Vs Proposed Scenario)

- 15.56 The drawing 17049/SHA/507 in Appendix C indicates which areas of amenity do not receive at least 2 hours of direct sunlight on March 21st the Existing Vs Proposed scenario.
- 15.57 The shadow analysis for the amenity areas at Liverpool Exhibition Centre (A3 & A4), Wapping Dock (A10) and Queens Dock (A11) show the parts of each amenity area will receive at least 2 hours of direct sunlight. The results show the proposed development will comfortably comply with the guidance outlined in the BRE. Therefore, these amenity areas will remain a pleasantly lit area throughout the summer months and will continue to receive enough sunlight for ecology reasons to for both Wapping and Queens Dock.

Overshadowing – Transient Shadow Assessment (Existing Vs Proposed Scenario)

- 15.58 The drawings 17049/SHA/501 – 506 & 508 - 513 in Appendix C show the areas cast in shadow at hourly intervals on March 21st for the Existing Vs Proposed scenario. This demonstrates times of the day the amenity areas are likely to notice a change in direct sunlight received as result of the development. This is essentially the workings of the permanent shadow analysis which showed that all amenity areas considered will be adequately lit.
- 15.59 **Proposed Residential Building Daylight – ADF (Proposed Only Scenario)**
- 15.60 The full results of the daylight analysis are presented in Appendix D in tabular form. A summary of the results of the Average Daylight Factor (ADF) analysis on the relevant overlooking windows are presented in the Table 7 below. This identifies where habitable rooms/windows are left with adequate light. A sample test of all the first-floor windows have been assessed as the layout repeats as one ascends the building.

15.61 **Table 7: Number of Rooms Experiencing Daylight Impacts as a Result of the Development (ADF Method)**

Address	Total Number of Rooms Tested	Number of Rooms Meeting BRE Guidelines for ADF	Number of Rooms Experiencing Impacts beyond BRE Guidance
Monarchs Quay, Residential Block Phase 1b	47	41	6
Total	47	41	6

- 15.62 Table 7 shows that 41 rooms 47 of the assessed will fully comply with the BRE Guidelines in ADF terms. The results are shown in Appendix D on drawing 17049/LOC/805 with accompanying spreadsheet.
- 15.63 Of the 6 that fall short of BRE criteria all rooms fall into the minor adverse category which is deemed to be acceptable in the urban environment giving a realistic pass of 47 rooms.
- 15.64 On closer inspection of the results the 6 rooms falling short of BRE requirements are only just short of the 1.5% pass rate for a living/dining room. These rooms windows are located beneath second floor balconies which are a constraint to the sky visibility. Therefore, if external amenity is a requirement then there needs to be some flexibility applied to the daylight levels in this scenario. Therefore, taking this into consideration it is fair to say that all rooms are deemed to be adequately lit in this scenario. The results will improve as one ascends the building and the overall pass rate is likely to be more than 97% for the building as a whole.

Internal Overshadowing Adequacy (Proposed Scheme) – Permanent Shadow

- 15.65 The drawing 17049/SHA/507 in Appendix C indicates which areas of proposed amenity do not receive at least 2 hours of direct sunlight on March 21st for areas listed as A1 ground, A1 first, A2 and A5.
- 15.66 The shadow analysis for the proposed amenity areas show the parts of each amenity area in green will receive at least 2 hours of direct sunlight. The results show the proposed development will easily comply with the guidance outlined in the BRE with the worst-case area at 87% area lit. Therefore, these amenity areas will be a pleasantly lit area throughout the summer months.

Conclusions

- 15.67 The site is in an urban location in Liverpool at Monarch's Quay, the neighbouring buildings within the vicinity of the site are spread out which is conducive to good sky visibility allowing for excellent levels of natural light reaching the neighbouring fenestrations.
- 15.68 To assess the potential impact of the Phase 1a and 1b proposed development for daylight, sunlight and overshadowing on neighbouring properties a baseline assessment was undertaken. The methods of assessment used were the Vertical Sky Component (VSC), No Sky Line (NSL) and Average Daylight Factor (ADF) for daylight. Annual Probable Sunlight Hours (APSH) for sunlight and Permanent Shadow analysis for Overshadowing. The baseline assessment for the existing results revealed that all rooms receive excellent levels of natural light.

- 15.69 Overall the neighbouring daylight analysis illustrates that all neighbouring windows and rooms considered in the analysis will continue to receive excellent levels of daylight for all three methods of assessment.
- 15.70 Overall the neighbouring sunlight analysis illustrates that all neighbouring windows and rooms considered in the analysis will continue to receive excellent levels of sunlight for both methods of assessment.
- 15.71 The overshadowing assessment revealed that all neighbouring amenity areas assessed will exceed BRE criteria and continue to be adequately lit.
- 15.72 The internal daylight adequacy analysis illustrates that despite some minor isolated infringements to 6 of the 47 rooms at first floor, the results show that if applied across the whole building the pass rate would exceed 97%.
- 15.73 Therefore, the Phase 1a & Phase 1b scheme proposals by Falconer Chester Hall Architects exceed BRE criteria in the main. Therefore, the Monarchs Quay scheme observes the intentions of Liverpool City Council Planning Policy UD5 and BRE Guidance 209 in daylight, sunlight and overshadowing terms

16 Noise

Introduction

- 16.1 This chapter of the Environmental Statement (ES) has been prepared by Environmental Noise Solutions Ltd (ENS) on behalf of Monarchs Quay Holdings Ltd (the client).
- 16.2 The purpose of an ES noise & vibration assessment is to assess aspects of the existing environment which may be significantly affected by noise and vibration (including human beings and material assets) due to the introduction of the proposed development into that environment. This chapter assesses the development described in Chapter 4 and considers the effect of the development on noise and vibration within and surrounding the site.
- 16.3 Another aspect of noise & vibration impacts is the potential impact of the existing environment (and noise emitting elements of the proposed development) on noise sensitive receptors introduced as part of the development. The proposed development contains noise sensitive elements, including office accommodation and residential use (apartments). Recommendations for the provision of a good standard of amenity for the noise sensitive elements of the proposed development have been undertaken by way of a standalone Noise Impact Assessment (NIA). The NIA forms a technical appendix to the ES and has been used to inform the noise & vibration chapter in relation to baseline conditions etc.
- 16.4 Other than at the construction phase, there are not considered to be any elements of the proposed development with the potential to generate significant ground borne vibration. As such, vibration impacts have not been considered for the operational phase of the proposed development. The potential for ground borne vibration associated with the construction phase will depend on the foundation solution adopted.
- 16.5 Aspects of the environment which may be significantly affected by noise and vibration have been identified as follows:
- Potential impact of the construction phase of the development on local noise and vibration sensitive receptors.
 - Potential impact of the operation of the introduced retail/commercial uses on local noise sensitive receptors.
 - Potential impact of the operation of external fixed services plant associated with the introduced uses on local noise sensitive receptors.
 - Potential impact of road traffic associated with the development on local noise sensitive receptors.

- Potential impact of the noise sensitivity of the introduced residential element of the development on the viability of existing commercial uses.

16.6 The baseline situation is considered before the likely environmental effects of the development are identified, both during the construction and operational phases of the development. Mitigation measures to reduce any negative environmental effects are identified as appropriate, before the residual environmental effects are assessed.

16.7 This chapter is supported by the following technical appendices:

Appendix 15.1: Glossary of acoustic terms.

Appendix 15.2: Noise Impact Assessment ref: NIA/7132/17/7485 v1.0 Phase 1B

Policy Context

16.8 Topic relevant policy, standards etc. are detailed in the following paragraphs and have been used, where appropriate, to assess potentially significant impacts.

16.9 **The National Planning Policy Framework (NPPF)**

16.10 The policy statement specifically in relation to noise is Paragraph 123, which states:

'Planning policies and decisions should aim to:

Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;

Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;

Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established (note: subject to the provisions of the Environmental Protection Act 1990 and other relevant law); and

Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.'

16.11 Whilst the NPPF talks in general terms about 'significant adverse impacts' and the requirement to 'mitigate and reduce to a minimum other adverse impacts' it does not offer specific noise limits, but refers to the Explanatory Note to the Noise Policy Statement for England for further guidance (NPPF footnote on page 29).

Noise Policy Statement for England

- 16.12 The Noise Policy Statement for England (NPSE) and associated Explanatory Note were published by DEFRA in 2010 and set out the Government's noise management strategy to enable noise management decisions to be made within the wider context (i.e. need for sustainable development), in a cost-effective manner and in a timely fashion. Fundamental to this approach is that, *'the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications'*.
- 16.13 The noise policy aims of NPSE are to (i) avoid significant adverse impact on health and quality of life, (ii) mitigate and minimise adverse impacts on health and quality of life, and (iii) where possible, contribute to the improvement of health and quality of life. The policy aims are always to be considered in the context of sustainable development as a whole.
- 16.14 In relation to explaining the 'significant adverse' and 'adverse' effects quoted in the NPPF, NPSE uses the two established concepts from toxicology that are currently being applied to noise impacts, for example by the World Health Organisation (WHO), these are:
- NOEL – No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to noise.
- LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.
- 16.15 The NPSE then extends these concepts to lead to a SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur. No specific SOAEL values are presented in the NPSE. In lieu of specific SOAEL values, reference is made to existing guideline documents, which are summarised in the following paragraphs.

BS 8233: 2014: 'Guidance on sound insulation and noise reduction for buildings' (BS 8233)

- 16.16 This document provides recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations in terms of absolute noise criteria.

WHO Guidelines for Community Noise (1999) (WHO guidelines)

- 16.17 This document sets absolute noise criteria for community noise in various specific environments.

BS 4142: 2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142)

- 16.18 This document sets out a methodology for rating and assessing sound of an industrial and/or commercial nature in a mixed residential and commercial/industrial environment.

BS 5228-1: 2009 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' (BS 5228-1)

- 16.19 This document provides methods and data for predicting the noise levels to be expected from particular construction activity.

BS 5228-2: 2009 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration' (BS 5228-2)

- 16.20 This document provides recommendations for basic methods of vibration control relating to construction and open sites.

Department of Environment Advisory Leaflet 72: Noise Control on Building Sites (1976) (AL 72)

- 16.21 This document sets out absolute construction noise limits for various environments (rural, urban etc.).

BS 7385-2: 1993 'Evaluation and measurement for vibration in buildings – guide to damage levels from groundborne vibration' (BS 7385)

- 16.22 This document considers building damage criteria for transient vibration events.

BS 6472-1: 2008 'Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting' (BS 6472)

- 16.23 This document considers the effects of groundborne vibration on human receptors.

16.24 The Design Manual for Roads and Bridges (DMRB): Vol 11: Environmental Assessment

- 16.25 Section 3 Part 7 of this document is that which is pertinent to noise and was published by the Department of Transport in 1993 with later amendments, the latest of which is November 2011. This document sets out procedures for undertaking the environmental assessment of new road schemes, including the assessment of noise impacts from road traffic. In particular, Section 3 Part 7 describes a method for assessing the severity of a noise impact, in terms of the number of people who will be bothered from any noise increase due to a new road scheme. In undertaking a DMRB assessment, the calculation of traffic noise levels uses the methodology contained within the Calculation of Road Traffic Noise (CRTN) document as described below.

- 16.26 Although the DMRB strictly applies to new road schemes, the principles of the approach contained within the document can also be applied to the assessment of noise from road traffic in general. The development has the potential to affect road traffic noise levels along existing roads, hence the need for this assessment.

16.27 The DMRB assessment suggests that the magnitude of noise changes from a project should be classified into levels of impact. The November 2011 amendment to Section 3 Part 7 gives detailed consideration to how impact magnitude will be affected by whether a noise level change will occur in the short term (e.g. as a result of a sudden opening of a scheme), or whether the noise level change would occur in the long term (e.g. gradually over time, such as that associated with natural traffic growth).

16.28 The two example classification scales are reproduced in Table (short term) and Table (long term) below.

Table: Classification of Magnitude of Noise Impacts in the Short Term

Noise Change, $L_{A10,18hr}$ dB	Magnitude of Impact
0	No Change
0.1 to 0.9	Negligible
1.0 to 2.9	Minor / Low
3.0 to 4.9	Moderate / Medium
5.0+	Major / High

16.29 Table: Classification of Magnitude of Noise Impacts in the Long Term

Noise Change, $L_{A10,18hr}$ dB	Magnitude of Impact
0	No Change
0.1 to 2.9	Negligible
3.0 to 4.9	Minor
5.0 to 9.9	Moderate
10.0+	Major

Calculation of Road Traffic Noise (CRTN) 1988

16.30 This document sets out standard procedures for calculating noise levels from road traffic. The calculation methods use a number of input variables, including traffic flow volume, average vehicle speed, percentage of heavy goods vehicles, type of road surface, site geometry and the presence of noise barriers or acoustically absorbent ground. CRTN predicts the L_{10} (18hour) dB(A) or L_{10} (1hour) dB(A) noise level for any receptor point at a given distance, up to 300 metres, from the road.

ASSESSMENT METHODOLOGY & SIGNIFICANCE CRITERIA

Assessment Methodology

- 16.31 The assessment identifies noise sensitive receptors (NSRs) adjacent to the development site, and considers the noise and vibration that will be generated by the construction and operation of the development and associated potential impacts on the NSRs.
- 16.32 Where impacts are assessed as potentially significant, the impacts are considered with reference to guidelines provided by national standards and good practice guides and mitigation measures recommended to control the degree of impact. Residual impacts are considered with mitigation measures in place.

Significance Criteria

- 16.33 In order to determine whether the potential environmental impacts associated with noise and vibration are significant, and require further consideration, the identified potential impacts have been categorised using the significance criteria contained in Table.

Table: Significance Criteria

Significance	Comment
Substantial beneficial	Substantial – considerable effects (by extent, duration or magnitude) or of more than local significance or breaching standards or policy
Moderate beneficial	Moderate – limited effects which may be considered significant
Minor beneficial	Minor – slight, very short or highly localised effects
Neutral/negligible	
Minor adverse	Minor – slight, very short or highly localised effects
Moderate adverse	Moderate – limited effects which may be considered significant
Substantial adverse	Substantial – considerable effects (by extent, duration or magnitude) or of more than local significance or breaching standards or policy

Consultation

- 16.34 As part of the EIA process, a Scoping Report was submitted to Liverpool City Council (the Council) setting out the proposed methodologies for assessing potential environmental impacts. The Environmental Protection Unit at the Council has confirmed that it is satisfied with the scope of the noise section of the Scoping Report.

BASELINE CONDITIONS

Site Setting

- 16.35 The Monarchs Quay site is located in a mixed use area of Liverpool's redeveloped docks. An annotated aerial image of the site, including an approximate red line boundary, is contained in Appendix 2.1 to the NIA. An indicative annotated masterplan is contained in Appendix 2.2 to the NIA (with the Phase 1B buildings highlighted in the Building Key). The Monarchs Quay site is bound by:
- Wapping Dock and Queens Dock to the east, with various residential/commercial uses and the A5036 beyond.
 - Half Tide Wharf to the south with residential development beyond (The Keel Apartments).
 - The western boundary has a number of adjacent uses, including the ACC Liverpool Echo Arena and Convention Centre and Exhibition Centre Liverpool, hotels, apartments, Keel Wharf and a multi-storey car park. Further west, Kings Parade runs adjacent to the River Mersey.
 - Apartments to the north.
- 16.36 As detailed in Chapter 16, the Phase 1B proposals comprise of the redevelopment of the application site to provide three building with associated infrastructure, consisting of:
- Building 2: Interpretation Centre. Located at the entrance to the site, to the south of Queens Wharf, and comprises of lower and upper ground floor meeting, interpretation and ancillary spaces with office spaces on the upper floors.
- Building 3: Located to the west of the TCC building and comprises a ground floor commercial/retail use overlain by a multi-storey car park (circa 850 spaces).
- Building 4: Located to the south of Queens Wharf, adjacent to an existing sub-station, and comprises a ground floor commercial/food hub and parking, overlain by circa 100 apartments.

Note: A full application (ref: 17F/2490) has been submitted for Phase 1A of the wider development proposals (TCC office building - Building 1). An outline application for Phase 2 of the wider development proposals is to be submitted in the future (including (i) an ice rink and leisure uses (Building 5), (ii) a bowling alley including restaurants and bars (Building 6), (iii) apartment blocks (Building 7) and (iv) an hotel (Building 8)).

Noise Sensitive Receptors (NSRs)

- 16.37 The area in the immediate vicinity of the proposed development site is occupied by residential, commercial and leisure uses. The uses within the vicinity of the site are identified on the annotated aerial image contained in Appendix 2.1 of the NIA. Within the wider site environment, residential and commercial uses are located adjacent to the road network on the approach to Queens Wharf (giving access to Kings Dock). The commercial and leisure uses are considered to be noise tolerant.

- 16.38 On this basis, the nearest NSRs are considered to be the Keel Wharf apartments to the south of the proposed development site and the apartments and hotel accommodation to the west and north.

Baseline Noise Levels

- 16.39 In order to determine the existing ambient noise levels in the vicinity of the proposed development site, a baseline noise survey was undertaken during Tuesday 17th and Wednesday 18th January 2017.
- 16.40 For the purpose of the assessment, the following monitoring positions (MPs) were adopted (the approximate location of the MPs is contained in Appendix 2.1 of the NIA):
- MP1 was located at 1.5 metres above ground level (mAGL), approximately 5 metres from the southern kerb of Queens Wharf at the entrance to the proposed development site (representative of Building 2).
 - MP2 was located at 5.0 mAGL, approximately 5 metres from the southern kerb of Queens Wharf in the eastern area of the proposed development site (representative of Building 4).
 - MP3 was located at 1.5 mAGL, approximately 5 metres from the kerb of the access road to the existing external car parks in the south eastern area of the proposed development site (representative of Building 3). Note: MP3A located at same location at 5.0 mAGL for comparison.
 - MP4 was located at 5.0 mAGL, adjacent to the service yard of the exhibition centre in the south western area of the proposed development site.
 - MP4A was located at 5.0 mAGL, approximately 5 metres from the kerb of Halftide Wharf in the south western area of the proposed development site.
 - MP4B was located at 2.5 mAGL, approximately 12 metres from the kerbs of Kings Parade and Halftide Wharf in the south western area of the proposed development site.
 - MP4C was located at 2.5 mAGL, approximately 5 metres from the kerb of Kings Parade in the south western area of the proposed development site.
 - MP5 was located at 5.0 mAGL, roughly central to the main northern site boundary (representative of the existing Pullman Hotel and The Block apartments).
 - MP6 was located at 5.0 mAGL, off Keel Wharf to the east of The Block apartments (representative of The Block apartments).
 - MP7 was located approximately 5 metres from the kerb of Keel Wharf in the northern area of the proposed development site.
- 16.41 Noise measurements were undertaken in a free field environment using Bruel & Kjaer 2260 Type 1 integrating sound level meters. A windshield was fitted for all measurements. The measurement systems calibration was verified immediately before the commencement of the measurement sessions and again at the end, using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration level was noted. Weather conditions for the noise survey were acceptable, with light winds (< 5 m/s), albeit

road surfaces were wet for part of the survey and there were light fog banks on the Mersey during the late evening period.

16.42 Measurements consisted of logged, A-weighted broadband parameters, together with linear octave band or one-third octave band Leq levels depending on the noise source under consideration. The following table contains a summary of the measurement data for each measurement session, at each measurement position, rounded to the nearest decibel.

16.43 Table : Summary of Noise Measurement Data

Position	Date	Time	L _{Aeq,T} (dB)	L _{AF1,T} (dB)	L _{A10,T} (dB)	L _{A90,T} (dB)	Comment
MP1	17/1/17	18:18-18:38	65	72	68	55	Distant (including A5036) and local Queens Wharf traffic noise. Typical L _{AFmax} of vehicle pass on Queens Wharf ≤ 75 dB.
MP1	18/1/17	13:22-13:41	64	72	67	54	Distant (including A5036) and local Queens Wharf traffic noise. Typical L _{AFmax} of vehicle pass on Queens Wharf ≤ 75 dB. Circa 1800 vehicles/hour on A5036.
MP1	18/1/17	15:06-15:26	64	71	67	55	Distant (including A5036) and local Queens Wharf traffic noise. Typical L _{AFmax} of vehicle pass on Queens Wharf ≤ 75 dB.
MP2	18/1/17	01:59-02:17	48	58	50	43	Distant (including A5036) traffic noise and distant non-specific HVAC plant noise. No significant noise emissions associated with adjacent electricity sub-station.
MP2	18/1/17	06:10-06:27	58	67	61	49	Distant (including A5036) traffic noise and local Queens Wharf traffic noise. 10 vehicle passes on Queens Wharf during measurement. Typical L _{AFmax} of vehicle pass on Queens Wharf ≤ 73 dB. Coaches in HGV car park with engines idling.
MP2	18/1/17	13:08-15:35	62	70	65	54	Distant (including A5036) traffic noise and local Queens Wharf traffic noise. Typical L _{AFmax} of vehicle pass on Queens Wharf ≤ 75 dB. Circa 230 vehicles/hour on Queens Wharf.

MP3	17/1/17	18:54-19:28	53	61	57	48	Noise climate consisting of distant traffic/city noise. Measurement at 1.5 mAGL.
MP3A	17/1/17	19:07-19:27	56	63	59	51	Noise climate consisting of distant traffic/city noise. Measurement at 5.0 mAGL. Circa 2 to 3 dB increase in noise level with height.
MP4	17/1/17	19:55-20:43	58	70	59	51	Noise climate consisting of distant traffic/city noise and HVAC plant associated with louvred southern façade of the exhibition centre (forming background climate).
MP4	18/1/17	03:01-03:32	52	58	52	50	Noise climate consisting of distant traffic/city noise and HVAC plant associated with louvred southern façade of the exhibition centre (forming background climate).
MP4A	18/1/17	15:46-16:53	60	71	62	52	Noise climate consisting of distant traffic/city noise, local traffic on Halftide Wharf and HVAC plant associated with louvred southern façade of the exhibition centre. Typical L_{AFmax} of vehicle pass on Halftide Wharf ≤ 74 dB. Circa 100 vehicles/hour on Halftide Wharf.

16.44 Table cont.....: Summary of Noise Measurement Data

Position	Date	Time	$L_{Aeq,T}$ (dB)	$L_{AF1,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)	Comment
MP4B	17/1/17	20:26-20:35	55	62	58	51	Noise climate consisting of distant traffic/city noise, local traffic on Halftide Wharf , HVAC plant associated with louvred southern façade of the exhibition centre and distant fog horn.
MP4B	17/1/17	20:35-20:55	55	63	57	51	Noise climate consisting of distant traffic/city noise, local traffic on Halftide Wharf , HVAC plant associated with louvred southern façade of the exhibition centre and distant fog horn.
MP4B	18/1/17	02:27-03:22	52	56	54	51	Noise climate consisting of distant traffic/city noise and HVAC plant associated with louvred southern façade of the exhibition centre.

MP4B	18/1/17	03:22-05:50	51	57	53	49	Noise climate consisting of distant traffic/city noise and HVAC plant associated with louvred southern façade of the exhibition centre.
MP4C	18/1/17	16:01-16:43	57	68	60	52	Noise climate consisting of distant traffic/city noise, local traffic on Kings Parade and HVAC plant associated with louvred southern façade of the exhibition centre. Typical L_{AFmax} of vehicle pass on Kings Parade ≤ 73 dB. Circa 90 vehicles/hour on Kings Parade.
MP5	18/1/17	04:23-04:44	48	58	50	43	Noise climate consisting of distant traffic/city noise, distant non-specific HVAC plant and HVAC plant associated with multi-storey car park.
MP5	18/1/17	17:10-17:38	57	65	61	49	Noise climate consisting of distant traffic/city noise, cars exiting the multi-storey car park, distant non-specific HVAC plant and HVAC plant associated with multi-storey car park.
MP6	18/1/17	03:57-04:17	48	56	48	42	Noise climate consisting of distant traffic/city noise and distant non-specific HVAC plant
MP7	18/1/17	14:10-14:47	61	71	64	52	Distant (including A5036) traffic noise and local Keel Wharf traffic noise (including HGVs). Typical L_{AFmax} of vehicle pass on Keel Wharf ≤ 75 dB.
MP7	18/1/17	05:21-05:41	50	57	52	47	Distant (including A5036) traffic noise, distant non-specific HVAC plant and HVAC plant associated with hotel opposite MP.

- 16.45 In summary, the existing ambient noise climate in the vicinity of the proposed development site was noted to consist of general distant road traffic and 'city' noise (including distant HVAC plant), together with localised traffic noise associated with the Kings Dock road network and HVAC plant associated with a number of the adjacent commercial uses. The acoustic horizon associated with distant noise sources was noted to increase with height, with an associated circa 2 to 3 dB increase in ambient noise level.

- 16.46 Whilst specific events were not occurring at the ACC Liverpool venues during the course of the survey, anecdotally, it is understood that there is no specific noise breakout from the buildings associated with events and the main potential noise sources are associated with attendees/customers arriving at and departing from the venues (a combination of increased road and pedestrian traffic) and HGV movements associated with transporting tour equipment and exhibition sets etc. This is consistent with ENS's experience of similar venues.

POTENTIAL EFFECTS

Introduction

- 16.47 The ES considers the aspects of the environment which may be affected by the proposed development. As such, the potential impact of the existing noise environment on the proposed development has only been considered in this chapter in so far as it has the potential to impact on the viability of existing commercial uses. The potential impact of existing noise sources on the noise sensitive elements of the proposed development has been assessed as part of the NIA (Appendix 16).
- 16.48 **During Construction**
- 16.49 Construction works have the potential to cause disturbance through noise and vibration emissions. The disturbance is, however, temporary in nature and localised.
- 16.50 Noise from earthworks and construction activities can be generated from a variety of sources including excavation, use of pumps, generators, delivery vehicles together with other noisy activities. The main construction activities with the potential to generate significant ground borne vibration are piled foundation options or ground improvement techniques. If a piled foundation construction method is required, piles should be jacked or rotary driven.
- 16.51 Although there are techniques available to predict the likely effect of noise from earthwork / construction works, such as those contained within BS 5228: 2009: Part 1, they are necessarily based on detailed information of the type and number of plant being used, their location and the length of time they are in operation. Sufficient detailed information upon which to base detailed construction noise calculations such as construction techniques and equipment is not currently available. Notwithstanding this, with traditional construction techniques, the potential impact of construction noise is considered to be minor adverse.

- 16.52 On this basis, construction noise & vibration impacts are considered amenable to a suitably worded planning condition to restrict working hours and adherence to good working practices to minimize noise & vibration emissions (e.g. through the selection and maintenance of plant, selection of appropriate piling techniques (if piling is required) etc.). As such, it is considered that further scrutiny of the potential noise & vibration impacts of the construction phase through the EIA process is not required.
- 16.53 Good working practices include the following:
- Careful selection of working methods and programme.
 - Selection of the quietest working equipment available, where practicable (e.g. electric/battery powered equipment, which is generally quieter than petrol/diesel powered equipment).
 - Vehicles and mechanical plant used for the purpose of the works should be fitted with effective exhaust silencers, should be maintained in good and efficient working order and operated in a manner as to minimise noise emissions.
 - Where available, equipment should be used which is fitted with white noise or directional reversing alarms.
 - Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum.
 - Plant/machinery known to emit strongly in one direction should, where possible, be oriented such that noise is directed away from noise sensitive areas.
 - Stationary equipment and plant should be placed so as to provide screening to other items of plant and located to provide minimum noise emissions in the direction of the nearest NSRs.
 - Care should be taken when loading and unloading materials to limit impact noise.
 - Vehicles waiting to enter the site in the morning should be switched off.
 - Audits of site activities should be done at regular and frequent intervals during the construction programme to check that noise mitigation is being undertaken.
 - In the event where justified complaints from nearby noise sensitive receptors are being received, a system should be in place to instigate the monitoring of site boundary noise levels and the effectiveness of any attenuation measures reviewed.

After Completion – Operation of the Introduced Retail/Commercial Uses

- 16.54 From experience of similar developments, subject to standard building constructions, breakout noise from the internal operations of the proposed retail and commercial elements of the proposed development will not be significant (neutral/negligible). Servicing of the proposed units (deliveries etc.) is considered amenable to a suitably worded planning condition to restrict delivery hours etc. On this basis, it is considered that further scrutiny of the potential noise impacts of the operation of the introduced retail and commercial elements of the proposed development through the EIA process is not required.

After Completion – External Fixed Services Plant

- 16.55 External fixed plant associated with the proposed development has the potential to generate significant noise impacts and is assessed as moderate adverse. It is considered that this element of the development requires further scrutiny through the EIA process. As part of this assessment, consideration is given to the baseline noise levels and the setting of target criteria for plant to ensure that the noise amenity of existing noise sensitive receptors is not compromised.

After Completion – Development Generated Traffic

- 16.56 Development led traffic has the potential to generate significant noise impacts and is assessed as moderate adverse. It is considered that this element of the development requires further scrutiny through the EIA process. As part of this assessment, consideration is given to the change in the baseline traffic levels associated with the development and consideration of the potential noise impacts on existing noise sensitive receptors.

After Completion – Viability of Existing Commercial Uses

- 16.57 Existing commercial uses on the wider Kings Dock site include the ACC Liverpool arena and convention centre and the Exhibition Centre Liverpool. Whilst specific events were not occurring at the ACC Liverpool venues during the course of the baseline survey, anecdotally, it is understood that there is no specific noise breakout from the buildings associated with events and the main potential noise sources are associated with attendees/customers arriving at and departing from the venues (a combination of increased road and pedestrian traffic) and HGV movements associated with transporting tour equipment and exhibition sets etc. This is consistent with ENS's experience of similar venues.
- 16.58 As part of the NIA, the potential impacts of the existing commercial uses were considered as part of the attenuation scheme proposals for the noise sensitive elements of the proposed development. In the context of the NPPF requirement that '*existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established*', the measures in the NIA recommended to protect the proposed noise sensitive elements of the development from the external ambient noise climate are also considered appropriate to ensure that the development proposals do not represent an unreasonable restriction on the operation of the existing commercial premises on Kings Dock. On this basis, it is considered that further scrutiny through the EIA process is not required.

MITIGATION MEASURES

Introduction

- 16.59 Based on an assessment of the potential effects of the development on the environment, two aspects of the development have been identified as potentially significant and requiring further consideration as follows:
- Potential impact of the operation of external fixed services plant associated with the introduced uses on local noise sensitive receptors.
 - Potential impact of road traffic associated with the development on local noise sensitive receptors.
- 16.60 This section of the chapter considers the mitigation measures, where necessary, required to control the identified potential impacts.

After Completion – External Fixed Services Plant

- 16.61 Details of externally located heating, ventilation & air conditioning (HVAC) plant, or, atmospheric louvres and duct terminations for internal plant servicing the buildings are not currently available. It is, however, assumed that this will include a combination of ventilation, extraction and air conditioning plant.
- 16.62 BS 4142 considers that *‘the lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context’*.
- 16.63 On this basis, it is considered that the control of noise emissions associated with the plant is amenable to a planning condition with the following criteria (based on the baseline noise measurement data and the requirements of BS 4142):
- The cumulative rating level of plant noise emissions for plant operating during the daytime/evening period (07:00 to 23:00 hours) should not exceed 48 dB $L_{A,T}$ when measured as a free field level at the nearest noise sensitive receptor.
 - The cumulative rating level of plant noise emissions for plant operating during the night time period (23:00 to 07:00 hours) should not exceed 42 dB $L_{A,T}$ when measured as a free field level at the nearest noise sensitive receptor.
- 16.64 Given the separation distances involved between the proposed development buildings and the existing NSRs, it is considered that appropriate noise control can be achieved with the judicious selection and siting of plant and/or standard noise mitigation techniques.

After Completion – Development Generated Traffic

- 16.65 The assignment of the likely development trip generation on the local highway network, using a population over distance squared gravity model, has been undertaken by Vectio Consulting. The links that have been assessed as part of the Transport Assessment (TA) include (i) Queens Wharf, (ii) Keel Wharf, (iii) Monarchs Quay, (iv) A5036 Wapping, (v) A562 Charltoner Street, (vi) A5036 The Strand and (vii) Water Street.
- 16.66 The estimated weekday AADT development trip generation has been modelled for the cumulative Phase 1B and Phase 1A developments. Baseline conditions have been established using traffic survey data.
- 16.67 The impact associated with road traffic is considered to be cumulative in nature due to the contribution of existing 'non development led' traffic on the existing road network. Therefore an absolute noise level criterion is not considered applicable.
- 16.68 The potential noise impact has been assessed by making a comparison (in terms of decibel (dB) increase in noise level) between the 2022 'do-minimum' scenario and the 2022 'do something' scenario.
- 16.69 The noise change has been assessed against Table: Classification of Magnitude of Noise Impacts in the Long Term' on the basis that, due to the phasing of the proposed development, the noise change will take place over a relatively long time period and is not akin to the opening of a new road where the change takes place over the short term.
- 16.70 For the assessment, consideration has been given to the road links in the immediate vicinity of the application site as, although an increase in traffic will be experienced across more distant roads, it is considered that the impact will be negligible due to the natural dispersion of traffic.
- 16.71 The assessment is detailed in the Table. With reference to the Table data, the significance of the impact of development generated traffic is assessed as no change/negligible on all roads.

16.72 Table: Impact of Development Generated Road Traffic

Link	Location	Do-minimum 2022 (AADT)	Do-something 2022 (AADT)	Noise Change (dB)	Magnitude of Impact
Queens Wharf	West of Wapping/Blundell	3784	5805	+1.9	Negligible

	St/Chaloner St/Queens Wharf junction				
Keel Wharf	North of Queens Wharf/Keel Wharf junction	548	548	+0.0	No Change
Monarchs Quay	West of Queens Wharf/Keel Wharf junction	3323	5344	+2.1	Negligible
Wapping	North of Wapping/Blundell St/Chaloner St/Queens Wharf junction	38871	39226	+<0.1	No Change
Chaloner St	South of Wapping/Blundell St/Chaloner St/Queens Wharf junction	37107	38773	+0.2	Negligible
The Strand	Limited data available. Assumed to be similar to Wapping	refer to Wapping data			No Change
Water St	Toward Pier Head (one way section)	4768	4855	+0.1	Negligible

RESIDUAL EFFECTS

Introduction

- 16.73 This section of the ES considers the residual environmental effects remaining after mitigation measures have been put in place.

During construction

- 16.74 With the implementation of good practice control measures, there are considered to be no significant residual effects associated with the construction phase of the development.

After Completion – External Fixed Services Plant

- 16.75 With adherence to the proposed target criteria for plant noise emissions at the NSRs, there are considered to be no significant residual effects associated with the operation of fixed plant servicing the proposed development.

After Completion – Development Generated Traffic

- 16.76 There are considered to be no significant residual effects associated with development generated traffic.

SUMMARY & CONCLUSIONS

- 16.77 In order to develop this chapter of the ES, an assessment has been undertaken with regard to the potential noise and vibration impacts of the development.
- 16.78 This chapter of the ES is informed by a Noise Impact Assessment, which is appended, and includes noise monitoring to categorise the baseline noise climate in and around the development site.
- 16.79 Aspects of the environment which may be significantly affected by noise and vibration include human beings and material assets as follows:
- Potential impact of the construction phase of the development on local noise and vibration sensitive receptors.
 - Potential impact of the operation of the introduced retail/commercial uses on local noise sensitive receptors.
 - Potential impact of the operation of external fixed services plant associated with the introduced uses on local noise sensitive receptors.
 - Potential impact of road traffic associated with the development on local noise sensitive receptors.
 - Potential impact of the noise sensitivity of the introduced residential element of the development on the viability of existing commercial uses.
- 16.80 On the basis of a screening assessment using significance criteria, a number of impacts were identified as potentially significant and requiring further scrutiny using recognised acoustic guidance, standards and target criteria.
- 16.81 Mitigation measures have been identified to control potentially significant impacts.
- 16.82 On the basis of the mitigation measures identified, there are considered to be no significant residual noise and vibration impacts associated with the development proposals.

ABBREVIATIONS & DEFINITIONS

- 16.83 AADT – Annual average daily traffic.
- CRTN – Calculation of Road Traffic Noise.
- DMRB – Design Manual for Roads and Bridges.
- HVAC – Heating, ventilation & air conditioning.
- LOAEL – Lowest Observed Adverse Effect Level.

NIA – Noise Impact Assessment.

NOEL – No Observed Effect Level.

NSR – Noise Sensitive Receptor.

SOAEL – Significant Observed Adverse Effect Level.

17 Landscape and Visual Impact

Introduction

- 17.1 This document assesses the effects of the proposed development on Townscape and Visual amenity. In particular, it considers the potential effects on townscape character, for both the site and the surrounding area, and the potential visual effects on a number of selected viewpoints that are considered to represent the principal views of the proposed development.
- 17.2 The document describes the methods used to assess the impacts, the baseline conditions currently existing at the site and surroundings, the potential direct and indirect impacts of the development arising from potential townscape and visual effects, the mitigation measures required to prevent, reduce, or offset the impacts and the residual impacts. This document has been written by Layer Landscape Architecture who are a registered practice of the Landscape Institute and the report has been authored and checked by Chartered Members of the Landscape Institute (CMLI).
- 17.3 For a full description of the Phase Two Monarch's Quay development proposals reference should be made to the architectural supporting statement and design and access statement submitted with the planning application. Phase One has already been submitted but such is its close integrity with this phase, the assessment for both townscape and visual amenity has been based on assessing them as a single entity.

Legislative and Planning Policy Context

Legislation

- 17.4 The European Landscape Convention (ELC, 2000) provides a foundation for closer co-operation on landscape issues across Europe and was ratified in the UK on the 21 November 2006, and became binding on 1 March 2007. The convention identifies the need to recognise landscape in law, to develop and promote landscape policies dedicated to the protection, management and creation of landscapes, and to establish procedures for the participation of the general public and other stakeholders in the evolution and implementation of landscape policies. It also encourages the integration of landscape into all relevant areas of policy, including cultural, economic and social policies.
- 17.5 The ELC defines landscape as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'. It recognises that landscape has important cultural, ecological, environmental and social dimensions and is a key element of achieving sustainable development. In this context, the use of the word 'landscape' is more appropriately termed 'townscape' though the constituent factors remain consistent.

National Planning Policy Framework

- 17.6 The National Planning Policy Framework (NPPF) was published in March 2012 and consolidates the previously adopted Planning Policy Statements and Planning Policy Guidance Notes for use in England. It contains a number of criteria relating to the importance of good design and sustaining and enhancing the significance of heritage assets.
- 17.7 Section 7 of the NPPF deals with the requirements of good design. The overarching statement can be found at paragraph 57, which states: *'It is important to plan positively for the achievement of high quality and inclusive design for all development, including individual buildings, public and private spaces and wider area development schemes.'*
- 17.8 Key aspects of the NPPF which apply to the Townscape and Heritage Assessment are given in the paragraphs below:
- 17.9 Paragraph 56: The Government attaches great importance to the design of the built environment. Good design is a key aspect of sustainable development, is indivisible from good planning, and should contribute positively to making places better for people.
- 17.10 Paragraph 61: Although visual appearance and the architecture of individual buildings are very important factors, securing high quality and inclusive design goes beyond aesthetic considerations. Therefore, planning policies and decisions should address the connections between people and places and the integration of new development into the natural, built and historic environment.
- 17.11 Paragraph 128: In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the relevant historic environment record should have been consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation.

Local Planning Policy

Liverpool Development Update (September 2016)

- 17.12 This document provides an overview of recently completed, on site and anticipated schemes. The site lies within the Waterfront area south of the development 5, Pullman Hotel at Kings Dock and north of development 108 The Keel Phase 2.
- 17.13 **Appendix B - Figure 1** provides an extract from the document and the Waterfront boundary and other Liverpool Development Update character areas within the study area have been identified within **Appendix B - Figure 12**.
- 17.14 The ELC defines landscape as *‘an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors’*. It recognises that landscape has important cultural, ecological, environmental and social dimensions and is a key element of achieving sustainable development. In this context, the use of the word ‘landscape’ is more appropriately termed ‘townscape’ though the constituent factors remain consistent.

Emerging Local Plan

- 17.15 A Local Plan is currently being prepared by Liverpool City Council, which means until it has been adopted, the Unitary Development Plan (UDP) forms the statutory development plan for the city. The site lies within the Waterfront Character Area, see **Appendix B - Figure 12** and the draft Local Plan states that the Waterfront is *‘a major asset of significant architectural and historic importance’* and that it has *‘the largest and most complete system of historic docks anywhere in the world’*. It also recognises that the area has been transformed over the last decade focusing on Kings Dock through the creation of ACC Liverpool and supporting hotels and leisure uses as well as developments at Pier Head including the Museum of Liverpool, Mann Island, the canal link and various public realm improvements.
- 17.16 King and Queens Docks are identified as a key area within the Waterfront character area, Monarch Quay lies within the Kings Dock. Key planning issues identified for the area are:
- Delivering the Liverpool Waters scheme.*
- Improving connectivity with other parts of the City Centre*
- Enhancing the use of the waterspaces for recreational uses*
- Ensuring opportunities for further investment are maximised.*
- 17.17 Strategic priorities specific to the Waterfront are stated as being as follows:

To create a world-class, high-quality, mixed-use Waterfront Quarter with a focus on the tourism offer and leisure economy by supporting and enhancing existing visitor and tourist attractions, and supporting the regeneration of historic docklands.

To support the delivery of a commercial and residential led mixed-use development at Liverpool Waters including a cultural hub leisure destination and privately operated cruise liner terminal

To support a leisure-led mixed-use redevelopment at Kings Dock

To ensure more efficient use of existing properties.

To support further use of water spaces for both formal and informal recreation to enhance the Waterfront's role as a significant leisure and visitor destination

To enhance walking and cycling routes along the Waterfront and central dockside walk, including green infrastructure

To improve connectivity between the Waterfront Area and with other parts of the City Centre, including improved crossing points to ensure integration with the commercial and retail areas.

17.18 Policy CC8 Waterfront Design Requirements

17.19 This is a specific policy approach for the waterfront area and is reproduced in full below;

“Development on the Waterfront should be of a high-quality design that respects its sensitive historic surroundings, whilst making adequate provision for access, parking and servicing and not undermining local amenity and operations of businesses. Development proposals should:

- a. Protect the character, setting, distinctiveness and Outstanding Universal Value of the World Heritage Site by ensuring the siting, scale, form, architectural approach and materials are appropriate and respect the proposal's location;*
- b. Respect the form and mass of the dock estate and its industrial heritage and make provision for the repair, conservation, integration and interpretation of heritage assets;*
- c. Ensure high-quality, sustainable design;*
- d. Reinforce the historic grain of buildings, water spaces and other spaces.*
- e. Contribute towards enhanced pedestrian connectivity across ‘The Strand’, and making the riverfront more accessible to the public*
- f. Provide enhanced pedestrian / cycle movement routes including provision for secure, covered and well surveyed cycle storage*
- g. Ensure inclusive and usable public realm;*
- h. Incorporate appropriate landscaping and green infrastructure;*
- i. Include appropriate street furniture, public art and feature lighting, which enhances the waterfront;*

j. Ensure greater access to, interaction with and recreational use of dock water spaces and their quaysides; and

k. Ensure a safe, vibrant, inclusive, accessible and welcoming environment.”

17.20 The policy context and justification for CC 8 identifies that the Waterfront is Liverpool's major asset and the City Centre SIF recognises that it will be one of the main opportunities to attract further investment into the City. A key aspect of the policy is to ensure that development proposals are of 'high quality design and respect the historic and cultural value of the area'.

17.21 Policy CC 9 Recreational Use of Dock Water Spaces, Quaysides and the Waterfront

17.22 Reproduced in full below:

“1. The City Council will support proposals which facilitate greater access and recreational / leisure use of dock water spaces and their quaysides and which contribute towards the creation of an inclusive and usable movement route along Liverpool's Waterfront, specifically:

- a. floating structures for canal boat mooring, boat hire, water taxis and water buses;*
- b. installation of stepped dockside structures to gain access at water level;*
- c. feature lighting installations that assist in animating dock water spaces and adjacent quaysides;*
- d. proposals which enhance the interpretation of the cultural heritage and archaeology of the historic dockland environment;*
- e. floating pontoons for dining, entertainment, performance and other leisure uses providing there is no adverse impact on residential amenity;*
- f. water sports activities, including extreme water sports;*
- g. expansion of Queens Dock water-sports centre;*
- h. expansion/redevelopment of Brunswick Dock Marina with enhanced leisure and visitor facilities*
- i. proposals which contribute towards the provision of a continuous and unimpeded pedestrian and cyclist route stretching from Princes Half Tide Dock in the North to Brunswick Dock in the south*

2. New development proposals should comply with the criteria in Policy GI 4.”

17.23 The policy is directed at using an underutilised asset and supports proposals which 'facilitate greater access and recreational uses of the dock water spaces and their quaysides' whilst ensuring that the 'historic character, distinctiveness and the outstanding universal value of the dockland and World Heritage Site is protected and enhanced'.

Policy GI 4 Water Spaces

- 17.24 This policy covers the dockland waterspaces but also other areas such as the River Mersey
- “1. The City Council will support proposals for increasing opportunities to allow for greater access to, interaction with, and recreational use of water spaces in the City, whilst ensuring the spaces and their settings are protected and enhanced.*
- 2. Proposals for new development adjacent to a water space should demonstrate that account has been taken of its setting and should ensure that:*
- a. The design, detailing, materials, scale and massing of the development complements its location;*
 - b. the site layout takes account of the relationship between the siting of buildings, parking and landscaping areas and the water space, to maximise the benefits of a waterside setting;*
 - c. public access is maintained or enhanced where possible;*
 - d. opportunities are taken to create or enhance green infrastructure provision which contributes to enhancing visual amenity, biodiversity, and increased use of water spaces and their environs;*
 - e. any historical or industrial archaeological features relating to the water space are retained and restored; and*
 - f. there are no negative consequences for, and where possible the development should enhance, the nature conservation value and water quality of the water space and surrounding environment.*
- 3. For proposals involving dock spaces, in addition to the criteria set out above, development:*
- a. will not be permitted to infill dock water spaces or reduce the depth of dock water spaces to an extent that would limit the range of water vessels that could utilise these dock water spaces;*
 - b. should avoid dominating the water spaces and maintain their fundamental integrity as open water spaces that provide spacing between dockland buildings;*
 - c. should demonstrate that there will be no adverse impact on residential amenity or existing businesses; and*
 - d. should make appropriate provision for the future management and maintenance of public realm, movement routes, dock water spaces and adjacent quaysides.*
- 4. Proposals in the City Centre should also refer to Policy CC 5.”*

- 17.25 The policy recognises the importance that the network of waterspaces makes to Liverpool's green infrastructure resource and it seeks to ensure that proposals *'do not undermine their fundamental openness, the contribution they make to the character, distinctiveness and outstanding universal value of the World Heritage Site'*.

Urban Design

- 17.26 Section 10 of the draft Local Plan contains the following policies but it is not intended to reproduce them in detail in this part of the appraisal but reference will be made where appropriate.

Policy UD1 Local Character and Distinctiveness

Policy UD2 Development Layout and Form

Policy UD3 Public Realm

Policy UD4 Inclusive Design

Policy UD5 New Buildings

Policy UD6 Alterations and Extensions to Existing Buildings

Policy UD7 Public Art

Policy UD8 Accessible Housing

Policy UD9 New Housing

Policy UD10 Advertising

Heritage – Policy HD1 Designated Heritage Assets

- 17.27 Protection and enhancement of Liverpool's heritage assets responds to the requirements of NPPF for local planning authorities to set out a positive strategy for the conservation and enjoyment of the historic environment. HD1/4 states that *'Proposals for development in the World Heritage Site and its buffer zone will protect its Outstanding Universal Value as set out in the Liverpool Maritime Mercantile City World Heritage Site Supplementary Planning Document'*.

17.28 Liverpool Maritime Mercantile City World Heritage Site SPD (October 2009)

- 17.29 This SPD has been prepared to guide development, conservation and investment in the World Heritage Site (WHS) and its Buffer Zone with the aim of protecting the WHS's Outstanding Universal Value as well as ensuring that it continues to play an important role in the regeneration of the City and wider sub-region. The site lies adjacent to the southern end of the WHS formed by Character Area 2 Albert Dock and Wapping Dock but is within the Buffer Zone see **Appendix B - Figure 2**.

- 17.30 In section 3 paragraph 3.2 it is stated that ‘the principle of new development and the conservation of significant historic buildings in the Buffer is positively encouraged in order to repair the fractured urban landscape and to contribute to the social and economic life of the city’ and the ‘*setting of the WHS is a material consideration in determining planning applications*’.
- 17.31 Key statements concerning the Buffer zone are made in paragraph 4.2.8 and 4.2.9, which are reproduced below, where text is highlighted this is from the original document and is used to emphasise the most important elements of the guidance:
- 4.2.8 All developments in the Buffer Zone, whether in an area of surviving historic character or not, will, in accordance with HD18, need to respond to and reflect the characteristics of the area around them. The design and scale of developments will need to respond to, and respect, their context proportionately to their potential impact on the setting of a conservation area and the WHS. Major schemes adjacent to conservation areas and the WHS will be considered more carefully for their*
- impact on the OUV of the WHS and character of conservation areas than minor developments further away from the WHS and conservation areas
- 4.2.9 Where a proposal in the Buffer Zone is for: 1) a tall building, 2) a building with a mass that significantly exceeds that of surrounding buildings, 3) a development that is immediately adjacent to the WHS, 4) a building which has a significant impact upon key views or key landmark buildings, 5) a building of architectural or historic interest (whether listed or not), or 6) a development that affects a site of archaeological interest: special consideration should be given to the relationship between the development and the WHS and the impact of development on the historic character of its locality and any buildings that contribute to that character. (Refer to Urban Design Considerations in table after 4.2.15). Developments in these circumstances should seek to protect and enhance the setting of the WHS, and the conservation areas that encompass it, through the conservation of the historic character and buildings in and around the proposed development site. Information, which demonstrates how this will be achieved, will need to be outlined in the Design and Access Statement that will accompany the application.*
- 17.32 Architectural excellence is an important consideration within the SPD, paragraph 4.2.11 states that ‘*New developments in the WHS therefore need to achieve high standards in terms of the design, materials, overall architectural quality and, ideally, innovation*’ and in para. 4.2.12 ‘*The architectural quality of a proposal within the WHS and Buffer Zone must be of the highest quality of contemporary design but respect, respond to and enhance its highly sensitive and important historic context.*’
- 17.33 A wide range of urban design considerations are also covered in the SPD which apply to the WHS and the Buffer Zone. Relevant extracts are provided in **Appendix B - Figures 3 & 4** and cover issues such as character, enclosure, movement, legibility, urban grain and materials.

- 17.34 The SPD also contains a section concerning ‘*Key Visual Landmark Buildings with the WHS and Buffer Zone*’. These provide visual reference points across the cityscape and form major components of key views to, from and within the WHS. Views to and from these buildings are material considerations in planning applications and have been used to inform the viewpoint locations discussed later in this appraisal. Of relevance to this appraisal are the views west to east between West Quay of Wapping Dock and the Anglican Cathedral.
- 17.35 Distant views to the WHS are also considered important for the wide panoramas that they provide. Relevant to this appraisal is location identified in the SPD as Viewpoint 3 View to Liverpool City Centre from Woodside Ferry Terminal.
- 17.36 The SPG states in paragraph 4.4.13 that ‘*it is important that new development is brought forward in a manner that respects the network of views to, from and within the WHS*’ and in paragraph 4.4.14 that developments ‘*should not have a significant adverse impact on the key views to, from and within the WHS...*’.
- 17.37 Consideration of High Rise buildings in the Buffer Zone is given in the SPD. Following detailed analysis locations are identified, the most relevant to the appraisal being an area termed ‘*Opportunity for secondary cluster of high-rise buildings – The Southern Gateway*’ around the junction of Parliament and Chaloner Street which lies to the west of the site. Within paragraph 6.3.9 it is stated that future proposals for development within the Buffer Zone around Albert Dock area should follow the general guidance in section 4 of the SPD.

Liverpool City Centre Strategic Investment

Framework (2012)

- 17.38 The Strategic Investment Framework (SIF) was prepared to build on the success of the Strategic Regeneration Framework published in 2001 and is intended to provide a strategy, which will guide investment across the City for the next 15 years. The SIF is a high level aspirational document but does not represent material consideration in planning policy terms. The site falls within an area identified as the Waterfront, which is recognised as the City’s major asset. It is one of the areas identified in the SIF for continuing to increase visitor numbers to the city with a focus on new world class visitor attractions being developed.
- 17.39 Issues identified as hampering development are: movement, especially along the mid north-south axis; a lack of active ground floor uses to encourage users and visitors along the length of the waterfront; creating ‘all season’ routes with enhanced lighting; underutilised water spaces for improving visitor experience, berthing, open water swimming and a programme of uses are cited as examples of opportunities. A number of projects are identified in the SIF to transform the waterfront into a world-class visitor destination, of key relevance to the application site is the desire to create a destination leisure facility.

- 17.40 The SIF also identifies the on going need to improve connectivity for walking and cycling across the City. Measures include: improved signposting; improved lighting; consistent use of high quality surfacing; prioritising pedestrian and cycling; and the promotion of these routes. Of particular relevance to the application site is the identification of a new connection between the waterfront (across the Strand which is highlighted as one of three 'Great Streets' for improvements) and Lime Street/Hope Street via the Baltic Triangle, see **Appendix B - Figure 5**.

Kings Dock Masterplan Report (May 2016)

- 17.41 This masterplan was produced to build upon the very successful developments that had occurred since the publication of the SIF in 2012, notably the Arena and Convention Centre Liverpool (ACCL) and the Exhibition Centre Liverpool (ECL). The site forms the southern half of the masterplan area, see **Appendix B - Figure 6**.
- 17.42 The vision is for King's Dock to be *'an important destination within Liverpool's waterfront' and will 'improve the connectivity of the waterfront with the wider city'*. Under the heading 'Access and Movement' the masterplan states that development should *'assist in extending pedestrian flows along the core waterfront area from the Pier Head to the marina'* and that east-west pedestrian links to the rest of the city are crucial, particularly to the Baltic Triangle, Ropewalks, Chinatown and the Knowledge Quarter, see **Appendix B - Figure 7**.
- 17.43 The masterplan also identifies high quality public realm and landscape design of paramount importance to creating an attractive destination. An open space and public realm structure is indicated, see **Appendix B - Figure 8** and in developing this further suggests that attention to the hierarchy, role and function of streets and spaces is given as well as to the relationship with neighbouring developments, see **Appendix B - Figure 9**. A list of heritage assets with the masterplan are shown and these are shown in **Appendix B - Figure 10**
- 17.44 The masterplan divides the area into three distinctive character areas and these are shown on **Appendix B - Figure 11**. The application site covers some of Area 2, Queens Dock and Area 3 Kings Dock, which have been used to identify a range of development plots within each character area.
- 17.45 Key considerations relevant to the Kings Dock Square character area that are relevant to this appraisal are:
- Transition space (square) between the ACCL, ECL and Wapping Dock;
 - Main pedestrian entrance to the leisure anchor on Monarch's Quay;
 - High quality façade to new multi-storey car park;

Square to be high quality public realm treatment connecting Monarch's Quay and the Queen's Dock waterfront as well as linking with the public space of Albert Dock and the ACC and Pullman Hotel ECL opening it up to the water of Wapping Dock and Queen's Dock;

Materials should be sympathetic to the surrounding heritage context and a continuous building line will be expected.

- 17.46 Key considerations relevant to the Queens Dock Square character area that are relevant to this appraisal are:

Leisure/destination focus to development in order to engage with the waterfront and Queen's Dock;

The public realm should be structured around two key pedestrian spaces: Keel Wharf and an extension to King's Dock Square and an opening into Queen's Dock;

Development to screen the existing sub-station.

- 17.47 The masterplan also refers to the general guidance for development of the WHS which has been referred to above with respect to architectural quality and the need for developments to deliver contemporary designs which will be harmonious with the inherited townscape, see **Appendix B - Figure 12.**

Liverpool Unitary Development Plan (Liverpool City Council, 2002)

- 17.48 A number of policies contained within the UDP relate to the conservation of the existing landscape, character, and views within the UDP area. Full details of these policies are contained within the Liverpool Unitary Development Plan key extracts are included below. The site largely lies within an area that the UDP identifies as site M17 Queens Dock/Kings Dock under policy E6 as a '*site for various types of development*'. for Industrial and Business Development. In summary, these policies are:
- 17.49 GEN3 Heritage and Design in the Built Environment: This policy aims to protect and enhance the built environment of the City, including by '*preserving and enhancing historically and architecturally important buildings...*' and '*encouraging a high standard of design and landscaping in developments...*'

HD5 Development Affecting the Setting of a Listed Building: The policy states that '*planning permission will only be granted for developments affecting the setting of a listed building, which preserves the setting and important views of the building*'.

HD18 General Design Requirements: The policy sets out a number of criteria for planning applications to ensure a high quality of design including: *'the scale, density and massing of the proposed development relate well to its locality'*; the building lines and layout of the development relate to those of the locality; the development has regard to and does not detract from the city's skyline, roofscape and local views within the city; 'the satisfactory development or redevelopment of adjoining land is not prejudiced; and *'there is no severe loss of amenity or privacy to adjacent residents'*.

HD23 New Trees and Landscaping: All new development is required to make proper provision for the planting and successful growth of new trees and landscaping and should *'provide high quality landscaping and boundary treatment' and 'promote nature conservation through the use of native species and the creation of wildlife habitats where appropriate'*.

HD28 Light Spillage: The policy requires that development: *'light spillage and potential glare is minimised...'* including to 'residential and commercial areas'.

Liverpool Urban Design Guide, Liverpool City Council 2003

- 17.50 The Liverpool Urban Design Guide has two overriding objectives in guiding development within Liverpool. These objectives are used as a planning tool to guide general development within the city.
- To guide the physical development of the city; and,
- To assist in the implementation of statutory planning control.
- 17.51 This document is used as general planning guidance within the planning system and it can be used to refine the baseline townscape character.

New Residential Development SPG Note 10 Liverpool City Council, Liverpool City Council 2006

- 17.52 This document sets out requirements for new residential development throughout the city as a supplement to Policy H5 (New Residential Development). The main objective of the policy is to 'ensure that new developments are well integrated into their surroundings and offer a good standard of amenity to future occupants whilst protecting the amenity of existing occupiers'.

Methodology and Scope

- 17.53 The effects of the proposed development have been examined in terms of;
- Effects on Townscape character:** For the purposes of this study the area immediately around the Proposed Development is examined on a character area basis shown on Appendix B - Figure 13;
- Effects on visual amenity:** This is examined through the Representative Viewpoint Approach in which the impact of the Proposed Development is assessed in short, medium and long distance views at key locations; and

Effects on people: This will examine the effects on people who are sensitive to changes in the view.

- 17.54 The assessment has been based on the key accepted methodologies for landscape/townscape character and visual impact assessment contained in:
- Guidelines for Landscape and Visual Impact Assessment, third edition*, Landscape Institute and the Institute for Environmental Management and assessment, 2013. This document is subsequently referred to as GLVIA3;
- 17.55 In addition, the following guidance documents have been also been consulted:
- Guidance on tall buildings, CABI, 2007.
- Tall Buildings Advice Note, English Heritage and Design Council, 2014.
- History in the View, English Heritage (now Historic England), 2011.
- 17.56 The assessment provides a series of tables and criteria setting out the criteria and definitions used to assist in assessing the townscape and visual effects and to make the process as transparent as possible. Ultimately, however, the assessment relies on professional judgement and the tables and matrices utilised are a tool to assist in this process.

Townscape Assessment

- 17.57 There are a range of factors which need to be considered in undertaking a townscape assessment which include:
- Context or setting in relation to the urban area and the wider landscape;
- Topography in relation to urban form;
- Urban grain, built form and its relationship to historic patterns;
- Heritage assets and their settings;
- Layout and scale of buildings, the density of development and building types;
- Land use patterns both past and present;
- Water bodies and their contribution to the landscape;
- Local vegetation including the nature of green space and tree cover and their relationship to buildings and streets;
- Open space typology and the character and qualities of the public realm; and
- Access and connectivity including streets and footways.

- 17.58 An assessment of townscape value and susceptibility of townscape to change enables the overall sensitivity of townscape receptors to be determined. This forms the baseline from which the impact of the proposed development can be assessed.

Townscape Value

- 17.59 Townscapes may be valued at community, local, national level or above. Existing Townscape designations have been taken as the starting point for this assessment, as shown in **Appendix A - Table 1.1**. The value attached to undesignated townscapes, however, also needs to be assessed. The criteria used for this assessment is set out in **Appendix A - Table 1.2**.
- 17.60 **Appendix A - Table 1.1** sets out the relative importance of generic townscape designations and descriptions, identifying those designations applicable to the study area in the third column.
- 17.61 Whilst the assessment of value is partly based on the Planning Policy importance of the townscape, other criteria used to assess townscape value in more detail, including that of undesignated townscape, are set out in **Appendix A - Table 1.2**. The criteria are taken from the Planning Practice Guidance, which supports the National Planning Policy Framework.
- 17.62 An overall assessment of value has been made for each townscape receptor based on an evaluation of each of the aforementioned criteria in **Appendix A - Tables 1.1 and 1.2**, in terms of high, medium and low value.

Townscape Sensitivity

- 17.63 Susceptibility of townscape receptors to change has been assessed using the criteria identified in **Appendix A - Table 1.3**. The assessment of receptor sensitivity combines judgements on the susceptibility of the receptor to the specific type of development proposed and the value attributed to that receptor.

Visual Assessment

- 17.64 A series of viewpoint locations have been agreed with Liverpool City Council and these are shown on **Appendix B - Figure 19**. The viewpoints selected are from a range of proximities from/to the proposed development covering the immediate local environment adjacent to the site and the wider perspective of the local environment including the city centre and adjacent areas. More distant views are also included from the Wirral side of the River Mersey. The viewpoints have been selected for a range of 'representative' viewpoints to cover different visual receptors as well as 'specific' viewpoints to which the public have access to as well as responding to the key landmark buildings, key vistas and distant views identified in the WHS SPD.

Photography

- 17.65 The photography for the Monarchs Quay site was undertaken during August and September 2017. The photography was undertaken by Infinite 3D Ltd. who employ a full-time professional architectural photographer, with the source photography for the montage images being undertaken in-house. The image locations are based upon the viewpoints identified by Turley's.
- 17.66 Images are captured using a 30.4 megapixel (6,720 x 4,480) Canon EOS 5D MkIV digital SLR with a full-frame sensor size of 36 x 24 mm (equivalent to a 35 mm film still image frame). A 24mm lens was chosen as the most appropriate to allow ample existing context to be viewable in each photograph - and is adopted for all of the images to provide consistency across most viewpoints with the exception of VP11. Due to the closer proximity of the camera to the site, a 17mm lens is used in this location to allow for capturing the whole development within a single frame.
- 17.67 On suitably sized printed output, this system is capable of resolving all the detail in a scene observable by a person with average vision if they were standing at the camera.
- 17.68 The camera is mounted on a tripod at eye level, which is around 1.65m. The orientation of the camera is adjusted so that the horizontal axis of the sensor is aligned with the horizon. Images are captured using the native camera RAW format to ensure maximum tonal and colour information is retained for use in the image processing stage. Choices for aperture and focus distance are designed to render all parts of the scene 'in focus'. Supplementary photographs are taken to record the camera position.

Image Processing

- 17.69 The camera files are imported into Capture One, a proprietary image processing application that converts the RAW camera data into lossless RGB format files suitable for use in 2D image editing and 3D modelling applications. At this stage there are also minor tonal and colour adjustments which aim to replicate the scene as honestly as possible as it was perceived by the photographer at the time of capture. Camera, lens and technical parameters that help with the alignment of the virtual cameras are included in the 'metadata' text layer of each photograph - including lens focal length, aperture, exposure, and time and date of photograph.

3D Model

- 17.70 A new 3D architectural massing model of the proposals was constructed by Infinite 3D based upon CAD information provided by FCH Architects. This represents a complete model of the scheme whose overall dimensions are accurate, with more simple indicative forms representing smaller details such as windows and balustrades where necessary. A 3D computer model of parts of Liverpool from provides a modelled context of the city that contains the locations from which the source photography was taken, and the site itself. The massing model of the scheme is introduced into the contextual model in the correct position to provide a 3D model of Liverpool that includes all of

the areas required to position the required 'virtual' cameras, and associated reference data of existing buildings.

Camera Matching and Rendering

- 17.71 Visualisation software allows for setting up 'virtual' cameras that accurately replicate the parameters of real world cameras with a variety of lenses. 'Virtual' cameras are setup in the 3D model with the same physical properties as the 'real' camera. New cameras are introduced into the modelling application for each of the viewpoints in the same relative locations within the 'virtual' 3D context as the 'real' photography was taken from in real life.
- 17.72 This provides 21No. cameras within the modelling software that match the location and settings of the source photograph for each anticipated montage. The 'virtual markers' provided by the contextual Liverpool City model allow for the targeting of each of the virtual cameras. Distant, taller buildings provide ideal reference points to 'aim' the virtual cameras with reference to the 3D site model. These visible markers are aligned upon the under-laid photograph to match the 3D overlay, bringing synchrony between the 'real' and 'virtual' cameras. With the settings from the camera lens replicated accurately within the parameters visualisation software, this provides 3d representation of the real world photography positioning. Once the process of camera matching is complete, each of the viewpoints is rendered out using the V-Ray rendering engine.

Post production Compositing

- 17.73 The render of the three-dimensional model is superimposed on the existing still views in Adobe Photoshop. The photomontages are then compiled within Photoshop, utilising the existing photograph and the 3d rendering. Any elements from the built environment that should sit in front of the proposed development are cropped and superimposed over the 3d rendering to represent what the proposal would look like once completed. No physical correction or distortion is made to the base photography or 3d rendered image. The images are prepared in this manner to provide a representation of the mass and scale of the development.

Type of View and Number of Viewers

- 17.74 In terms of assessing the baseline visual sensitivity, key factors to consider are the type of view and the likely numbers of viewers (the visual receptors). The type of view and the number of viewers are described in the following terms:
- i) Glimpsed (i.e. in passing)/Filtered/Oblique/Framed/Open Views; and
 - ii) Few/Moderate/Many Viewers

Value of Views

- 17.75 The value attached to views has regard to a number of factors, including: recognition through planning designations or heritage assets; and the popularity of the viewpoint, its appearance in guidebooks, literature or art, on tourist maps and the facilities provided for its enjoyment.
- 17.76 The assessment of the value of views is summarised in **Appendix A - Table 1.4** in terms of High, Medium and Low value. These criteria are provided for guidance only and are not intended to be absolute.

Visual Sensitivity

- 17.77 The susceptibility of different types of visual receptor to changes in views is mainly a result of:
The occupation or activity of the viewer at a given location; and
The extent to which a person's attention or interest may therefore be focused on a view and the visual amenity experienced at a given view.
- 17.78 The assessment of a visual receptor to change is specific to the proposed development. GLVIA3 offers the generic guidance identified in **Appendix A - Table 1.5** as a basis for the assessment.
- 17.79 GLVIA3 qualifies the above examples as follows:
'This division is not black and white and in reality there will be a gradation in susceptibility to change. Each project needs to consider the nature of the groups of people who will be affected and the extent to which their attention is likely to be focused on views and visual amenity.' (page 114, paragraph 6.35).
- 17.80 The assessment of receptor sensitivity combines judgements on the susceptibility of the receptor to the specific type of development proposed and the value attributed to that receptor.

Predicted Townscape and Visual Effects

- 17.81 The predicted townscape and visual effects of the proposed development are examined in Section 3.0 and are summarised in **Appendix A - Tables 3.2.1 and 3.2.2**.
- 17.82 The assessment of receptor sensitivity combines judgements on the susceptibility of the receptor to the specific type of development proposed and the value attributed to that receptor.

Size and Scale of Effects

- 17.83 The size and/or scale of effects relates to the scale of changes in the townscape, such as the loss or addition of features and the scale of the change in views.

Geographical Extent of Effects

- 17.84 The geographical extent of effects relates to: the area over which townscape effects are likely to be experienced, i.e. this could be;
- at the site level;
 - the immediate setting of the site, or townscape character type / area;
 - the area over which visual effects are likely to be visible; and
 - the duration of these effects.

- 17.85 Effects may be temporary, permanent or reversible over time. For example, visual effects arising from construction activities may be limited solely to the construction period and, therefore, only temporary. They may also be permanent, however, where for example construction necessitates clearance of existing vegetation.

Reversibility

- 17.86 Effects may be reversible, for example, restoration of a quarry following mineral extraction. The assessment considers the practicality of effects being reversed with an approximate timeframe for reversibility.

Significance of Townscape Effects

- 17.87 The magnitude of a townscape or visual effect is assessed in terms of its size or scale, the geographical extent of the area influenced by that effect, and its duration and degree of reversibility.
- 17.88 The size and/or scale of change in the townscape takes into consideration the following factors: the extent/proportion of townscape elements lost or added; the contribution of that element to townscape character and the degree to which aesthetic/perceptual aspects are altered; and whether the effect is likely to change the key characteristics of the townscape, which are critical to its distinctive character.

- 17.89 The criteria used to assess the size and scale of townscape effects are based upon the magnitude of change that will occur as a result of the proposals, as described in **Appendix A - Table 1.6**. The potential significance of townscape effects is determined by combining the sensitivity and magnitude of effect. **Appendix A - Table 1.8** shows how these two variables are correlated in a matrix to arrive at the significance of effect. It should be noted, however, that the matrix is used as a guide and does not supplant professional judgement.

Significance of Visual Effects

- 17.90 The magnitude of a visual effect is assessed in terms of its size or scale, the geographical extent of the area influenced and its duration and degree of reversibility.
- 17.91 The size or scale of change in the view relates to the degree of contrast or integration likely to result from the proposed development and is influenced by the relative time over which a view is experienced and whether it is a full, partial or glimpsed view.
- 17.92 The criteria identified in **Appendix A - Table 1.7** are used to assess the magnitude of visual effects, based on the degree of change to the view or composition. **Appendix A - Table 1.8** shows how the two variables of sensitivity and magnitude are also correlated in a matrix to assist in arriving at the significance of effect.

Nature of Effects

- 17.93 Determination of the nature of effects i.e. whether they are beneficial, adverse or neutral can be very subjective and varies according to an individual's responses to a particular development. Effects may also be direct or indirect, temporary or permanent. For a development of this nature the effects are considered direct and permanent.

Significance

- 17.94 For the purposes of this Townscape and Visual Impact Assessment, Moderately Significant effects and below are not considered to be Significant in the meaning of the Town and Country Planning (EIA) Regulations 2011 unless otherwise stated and explained.

Confidence

- 17.95 The predicted impact is assessed against the criteria set out below in order to attribute a level of confidence to the visual assessment.
- High - The predicted impact is either certain, or very likely to occur, based on reliable information or previous experience.
- Medium – The predicted impact and its level are best estimates, based on on-site and desktop study.

Low – The predicted impact and its level are best estimates, based on given knowledge and experience. More information may be needed to improve the level of confidence.

Consultation

- 17.96 An initial viewpoints plan was issued to Liverpool City Council and then refined following further pre-application consultation with Liverpool City Council and other stakeholders.

Limitations and assumptions

- 17.97 This townscape and visual assessment has made assumptions based on the modelling information available at this time. The contextual modelling utilises ordnance survey and topographical information, proposed information is based on modelling supplied by Falconer Chester Hall architects and Infinite 3D. Any discrepancies, which may occur between these models, have been rectified where possible, any outstanding issues, which may occur, are a result of the differences in timescales and mixed media of the modelling information. We have assumed that the comprehensive model used in the production of the verified views, is as accurate as can be given the limitations outlined above.

Townscape and Visual Baseline

Townscape Baseline

Site location

- 17.98 The site is located within Liverpool's iconic waterfront at Kings Dock with its principal access being Queens Wharf which is accessed off Chaloner Street. The site is bounded by Exhibition Centre Liverpool (ECL) to the west, The Keel to the south, to the east Wapping Dock and Queens Dock and to the north, The Block apartment building and multi-storey car park. A number of existing roads bound and run directly through the site, Kings Parade, Halftide Wharf, Monarchs Quay, Keel Wharf and Queens Wharf. There is one Grade II* listed building and three Grade II listed structures within close proximity of the site:

Wapping Dock Warehouse (Grade II*);

Gatekeepers Lodge;

Hydraulic Tower, and

Listed Walls of Wapping Basin.

- 17.99 This site forms Phase Two of development proposals for a wider area, Phase One proposals have already been submitted. The **Design and Access Statement - Appendix B - Figure 3.2** shows the combined Phase One and Two proposals and its context with the adjacent development.

Historic and Current Development

- 17.100 A more detailed history of the Kings Dock is provided in the Design and Access Statement being submitted for this application. Constructed in 1785 they provided purpose built moorings for tobacco and timber, Queens Dock housed Liverpool's whaling fleet. By 1865 Queen's Dock had expanded and shipbuilding was occurring in the western quays but in 1972 Kings Dock closed and was filled-in and became a car park. Queen's Dock was unsuitable for river traffic by the early 1970s. The site experienced major regeneration with the Area and Convention Centre opening in 2008 together with a hotel, apartments, bars and restaurants, the Exhibition Centre opened in 2015.

Townscape Character Areas

- 17.101 The following descriptions utilise the three character areas identified in the Kings Dock Masterplan (2016) which are shown in **Appendix B - Figure 13**.

Queens Dock CA

- 17.102 Formed predominantly by the open water and walls of Queen's Dock, the character area is dominated and framed by the large and more recent developments of The Keel, which is approximately 6 storeys high and the ECL equivalent to between four to five storeys, located to the west and south of the of the character area. The existing substation is brick and timber clad and is situated in close to the centre of the character area. The substation is a tall single storey bloc surrounded a car park. To the immediate south of the substation the site is currently used as a lorry park up to edge of the Keel Phase 2 site, which is currently covered with trees and shrubs.
- 17.103 The centre line of Queens Wharf forms a somewhat subtle division between the Queens Dock character area and the adjacent Wapping Dock area to the north, but this reflects the bridging point between the two docks. The eastern boundary of the site is formed by relatively recent developments on land sandwiched between Queen's Dock and Chaloner Street comprising of the Hotel Campanile and Grosvenor Casino, The Dolby Hotel lies just beyond the southern line of this character area. The Hotel Campanile is a brick clad 4 storey building whilst the Grosvenor Casino is of a similar height and is clad in white steel with an outward sloping glazed elevation facing the dock.

Kings Dock CA

- 17.104 This area is bounded to the west by the plain façade of the ECL and the taller Pullman Hotel which lies further west. 7 storey high residential units, The Block and the entrance to the multi-storey carp park form the northern boundary, the units are based on a distinctive light rendered cladding design with glazing and blue tinted coloured panels. The existing substation lies somewhat incongruously in the middle of the character area (there is a smaller substation near the Block development), which is in the main formed by areas of parking and grass with access roads and lighting infrastructure being the main features.

Wapping Dock CA

- 17.105 The Phase Two scheme does not lie within this character area but it is useful to provide the appropriate townscape context bearing in mind that the dividing line between character areas is in part, one of convenience to assist analysing a space.
- 17.106 The listed structures of the Hydraulic Tower and Gatekeepers lodge dominate the entrance of Queens Wharf at its junction with Chaloner Street. The most dominating feature, which forms the eastern boundary to this character area, is the Grade II* listed Wapping Dock Warehouse, which is approximately 5 storeys high and built in brick with majestic cast iron column supports.
- 17.107 The northern boundary is formed by modern white clad residential units of approximately 7 storeys high, which includes curved profiled steel roofing with areas of high glazing and balconies.
- 17.108 The western boundary is in reality, formed by modern residential units which run parallel with Keel Wharfe comprising of contrasting blocks with the 8 storey Jurys Inn hotel, faced with brick cladding and glazing, with the more southern blocks which wrap around the ACCL multi-storey car park. Keel Wharf forms part of the central dock access route, which is lined with maturing street trees. Ground floor levels lack active frontages but water based activities take place on the open water of the dock.

Urban Grain

- 17.109 The existing urban grain of the site and surrounding area is established by the existing dock, dockside buildings and features as well as more recent and significant developments, see **Appendix B - Figure 14**. The docks form the footprint around which the site is based with existing developments forming the more visible and vertical boundaries. These buildings and the aspirations of the Kings Dock Masterplan Report provide a framework for future development in terms of scale, massing and access.
- 17.110 The existing road infrastructure also exerts a strong influence on the grain of the site with Queens Wharf providing the main access, Keel Wharf and Monarchs Quay forming existing and important vehicular routes to the existing adjacent lands uses including servicing and car parking for the ACCL and ECL as well as residential and hotel developments. The opportunity lies in the development proposals responding to the masterplan in terms of creating and enhancing desired pedestrian movement and public spaces throughout the site and into adjacent areas including to the waterfront.

Land Use

- 17.111 **Appendix B - Figure 15** illustrates the existing land uses. There exists a mix of land uses around the site and the Masterplan Report is explicit in the potential future uses of the site itself including destination leisure led development with retail, residential and car parking.

Building Heights

- 17.112 **Appendix B - Figure 16** illustrates building heights in the local and wider context. The majority around the site are in the order of 3-6 or 7-10 storeys high with the general scale decreasing towards the south-west of the site.

Movement and Linkages

- 17.113 The surrounding movement and access is illustrated in Appendix B - Figure 17. Vehicle access into the site is currently provided off Chaloner Street and along Queens Wharf with Halftide Wharf and Monarch Wharf providing access to The Keel, The Block and Jurys Inn hotel as well as to the major destinations of the ECL and ACCL, including articulated HGV access. Vehicle and pedestrian routes also connect with Kings Parade which runs north-south along the Mersey waterfront and the Masterplan Report provides guidance on how future connections could be facilitated with new development.
- 17.114 Keel Wharf provides an important north-south axis within the waterfront between the core areas from Pier Head to the marina. Existing streets have footpaths on either side and a tree avenue has been established along Keel Wharf. Planning guidance also recognises the potential for strengthening east-west linkages to the Baltic Triangle and beyond.
- 17.115 The site is served by public transport, with a bus route along the Chaloner Street and Wapping Street. The nearest station is Albert Dock (adj) Bus Stop, Wapping approximately 60 metres from the site. Car parking is located within and around the site, part of which is currently used as a lorry park.

Environmental Designations and Public Open Space

- 17.116 The surrounding public open spaces have been illustrated in Appendix B - Figure 18. The site lies in a predominantly urban area with green public open space generally outside of the waterfront zone with the exception of small urban squares near the Keel and ECL. Most public realm within the waterfront is hard surfaced and urban reflecting the dockland location of the area.
- 17.117 With respect to environmental designations the site is not located within a Ramsar Site, Site of Special Scientific Interest (SSSI), Area of Special Conservation, National or Local Nature Reserve or a Green Belt. However, the site is located within a SSSI Impact Risk Zone due to the proximity of the site to the Mersey Narrows SSSI located approximately 2.15km away on the opposite side of the River Mersey.

Heritage Designations

- 17.118 **Appendix B - Figure 2** indicates the site in relation to the World Heritage Site and Buffer Zone plus listed buildings.

Visual Baseline

Principal Viewpoints

- 17.119 A total of 21 viewpoints have been identified, 12 of which have been agreed by Turley's with Liverpool City Council, see **Appendix C – Figure 1**. The location of the key viewpoints is illustrated in **Appendix B - Figure 19**. The corresponding photography for Photoviewpoints 1 – 21 can be found at **Appendix B - Figure 20**.
- 17.120 Viewpoints have been selected on the basis of being representative of the effect upon views from a variety of locations varying from near, local and more distant. They have also been selected to demonstrate the effect upon key views and important vistas that are fundamental to the WHS and the wider city's visual structure.

Viewpoint 1 Wallasey Town Hall

- 17.121 NGR: SJ 32162 91548, Distance to Development: 3.20km, Visual Receptor: Road users, pedestrians and water users.
- 17.122 From this viewpoint on the waterfront opposite the town hall the wide expanse of the River Mersey forms the near and middle ground with the city skyline forming an impressive backdrop. The ferry terminal at Pier Head is visible in the centre with the Royal Liver Building visible behind the liner that is moored. The Mersey Dock and Harbour Board building is also visible further to the south.
- 17.123 Panning further south is the Museum of Liverpool with the original and refurbished Albert Dock buildings, beyond which are the ACCL and ECL. With the exception of the twin towers to the Royal Liver Building, it is the northern city skyline with the high rise buildings of the commercial district which are the most prominent and includes: the Alexandra Tower, Beetham West Tower and Unity Residential. The site is not visible from this location.

Viewpoint 2 Woodside Ferry Terminal

- 17.124 NGR: SJ 33014 89207, Distance to Development: 1.35km, Visual Receptor: Pedestrians and water users.

- 17.125 The terminal dominates the left foreground with the broad expanse of the River Mersey forming the middle ground but it is the majestic Liverpool Anglican Cathedral which dominates the centre skyline with the Metropolitan Cathedral skylined to the centre left. The Liverpool Big Wheel is visible in foreground on the waterfront. Buildings along the waterfront are also prominent but are not skylined include Albert Docks, the ACCL, ECL and The Keel further to the south. The Pullman Hotel is visible immediately to the right of the Cathedral and new tall building development is visible behind The Keel. The site is not visible from this location.

Viewpoint 3 Holt Hill

- 17.126 NGR: SJ 32054 88023, Distance to Development: 2.5km, Visual Receptor: Residents, road users, and pedestrians.
- 17.127 Taken from the B5147, the rear of residential properties along Hinderton Road form the foreground with mature trees to the north screening much of the middle and background although this will likely only be filtered when the trees are out of leaf. Liverpool Cathedral is the main focal point, which is skylined in the centre of the view with the Royal Liver Building. The tall buildings of the City's commercial district are visible to the north.
- 17.128 The light coloured facade to the Cammell Laird buildings along the Birkenhead waterfront are visible in the lower middle ground with residential areas of Toxteth and Dingle visible on the other side of the River Mersey. More expansive views of the city skyline are visible from residential properties just to the west on the more elevated Holt Hill Terrace, but even from this location the tree growth screens the Liverpool waterfront. The site is not visible from this location.

Viewpoint 4 Liverpool Anglican Cathedral

- 17.129 NGR: SJ 35392 89497, Distance to Development: 850m, Visual Receptor: Pedestrians and access road users.
- 17.130 The view is taken from the western elevation of the Cathedral with the fore and middle ground of the Cathedral and its immediate environs, including car parking areas, occupying the majority of the view. The top of the Royal Liver Building is visible on the right skyline with the upper elevations of buildings to the south towards the River Mersey being virtually indistinguishable from each other. The western, Birkenhead side of the River is just visible on the horizon. The waterfront is not visible from this location and the site is not visible from this location.

Viewpoint 5 Bridge between Queens Dock and Coburg Dock

- 17.131 NGR: SJ 34637 88840, Distance to Development: 285m, Visual Receptor: Road users, pedestrians, water users.

- 17.132 The view is north towards the city centre and northern area of the WHS. Water in Queens Dock occupies the majority of the fore and right middle ground with the floating building of the white and steel Liverpool Watersports Centre occupying the left middle ground. The upper floors of The Keel residential building is visible above the Watersports Centre, the latter which also hides the southern end of the ECL and the Liverpool Big Wheel. The upper floors of the Pullman Hotel form the centre skyline together with The Block residential units. The twin towers of the Royal Liver Building are skylined in the centre ground above residential units at the head of the Wapping Dock.
- 17.133 The upper storeys to the commercial centre and Liverpool One are visible through the gap in buildings provided by the open water of the docks north of Wapping Dock. Wapping Dock buildings and the listed Hydraulic Tower are noticeable features of the right centre ground, with the smaller building of the Hotel Campanile overlooking the northern end of Queen's Dock next to Queens Wharf being visible to the edge of the view. The substation can be seen in the middle ground and the site is spread across the majority of this area of the view.

Viewpoint 6 Junction of Blundell Street and St James Street

- 17.134 NGR: SJ 34849 89484, Distance to Development: 325m Visual Receptor: Road users and pedestrians
- 17.135 Viewed west and towards the waterfront, the site occupies the centre of the background of the view with the existing substation and car parking just visible. The ECL forms the backdrop to the right of centre, buildings along Blundell Street restrict views across a wider panorama of the waterfront area. The western, Birkenhead side of the River Mersey forms the centre horizon.

Viewpoint 7 Pedestrian footbridge across Dukes Dock

- 17.136 NGR: SJ 34269 89617, Distance to Development: 420m, Visual Receptor: Pedestrians and occasional access road users.
- 17.137 View southwards from near Albert Dock and along Keel Wharf, the view is framed by the residential block at the head of Queen's Dock, and Jurys Inn Hotel. The Block residential development, which frames the ACCL multi-storey car park is visible to the south of the hotel. These developments, combined with the maturing street trees along Keel Wharf currently screen the site.

Viewpoint 8 Wapping from central reservation, junction with Queens Wharf

- 17.138 NGR: SJ 34614 89312, Distance to Development: 60m, Visual Receptor: Road Users, pedestrians and adjacent, residential block, hotel occupants and fast food outlet visi-tors.

- 17.139 Wapping is a major road and experiences a high level of traffic. Queens Wharf is the main access to the site and developments around Wapping and Queens Dock. The entrance to Queens Wharf is 'gated' but the Hotel Campanile and the listed features of the Hydraulic Tower and Gate Keepers Lodge. The backdrop of the view consists of the ECL with The Keel and the substation partially hidden by trees and perimeter security fencing around the hotel. The view, however, is currently dominated by the road and associated infrastructure. The site forms the centre middle ground with the ECL and the Block residential units visible to the right of the view.

Viewpoint 9 Gower Street

- 17.140 NGR: SJ 34377 89680, Distance to Development: 470m, Visual Receptor: Road users, pedestrians, water users
- 17.141 Wapping Basin forms the near ground, which is framed by the dominant residential blocks to the west that overlook the Basin and the adjacent Wapping Dock further south. The listed residential block of Wapping Dock Warehouse is visible to the east. The view towards the southern end of the waterfront is relatively unimpeded due to the lack of significant development height. Queens Wharfe Bridge is visible in the centre background and the street trees lining it are noticeable, which defines the area of the site when viewed from this location.

Viewpoint 10 Echo Area/ACCL from Kings Parade

- 17.142 NGR: SJ 34156 89249, Distance to Development: 210m, Visual Receptor: Road users, pedestrians
- 17.143 View eastwards the Anglican Cathedral is framed by the glazed pedestrian footbridge linking the Arena with the Pullman Hotel. Wapping Dock Warehouse forms the main view backstop from views directly east between the two buildings and the substation is also visible. The site is not visible from this location.

Viewpoint 11 Echo Arena/ACCL Monarch Quay

- 17.144 NGR: SJ 34324 89338, Distance to Development: 140m, Visual Receptor: Road Users and pedestrians
- 17.145 Located at the entrance to the ACCL multi-storey car park, Monarch Quay and a smaller substation form the fore and middle ground. The edge of Wapping Dock Warehouse is visible beyond, which the Anglican Cathedral is skylined. Maturing trees within the existing area of open space and lining Queens Wharf filter views to the Hydraulic Tower and industrial/business premises on Chaloner Street. The Hotel Campanile is partially visible in the middle background. Both portions of Phase One and this application are visible from this viewpoint.

Viewpoint 12 Monarchs Quay

- 17.146 NGR: SJ 34355 89227, Distance to Development: 60m, Visual Receptor: Road Users and pedestrians.
- 17.147 The foreground is dominated by the roundabout at the junction of Monarch Quay with Queens Wharf, including associated infrastructure such as lighting columns and highway signage. The Hotel Campanile is visible in the background and the existing substation is partially obscured by street trees and coach parking. New high-rise development on Sefton Street is visible including buildings under construction. The site extends across the centre ground.

Viewpoint 13 Kings Parade

- 17.148 NGR: SJ 34103 89428, Distance to Development: 310m, Visual Receptor:
- 17.149 The view is south along Kings Parade with the western elevations of the ACCL and ECL dominating the road, which experiences uninterrupted views west and across the River Mersey. The site is not visible from this location.

Viewpoint 14 Keel Wharf

- 17.150 NGR: SJ 34259 89534, Distance to Development: 260m, Visual Receptor: Road users and pedestrians.
- 17.151 The view is south and towards the site and is framed by residential units, Jurys Inn Hotel and The Block apartments. The substation is visible within the background of the view towards the left hand side and the maturing tree avenue along the road is evident when trees are in leaf. The site is visible in the centre background.

Viewpoint 15 Strand/Salthouse Dock

- 17.152 NGR: SJ 34307 89923, Distance to Development: 730m, Visual Receptor: Road users, pedestrians and water users.
- 17.153 The view is south-westerly towards Albert Dock. The wide and busy road of the Strand and associated wide pedestrian footway forms the foreground. The middle ground is formed by Wapping Dock Warehouse and the centre ground is formed by the refurbished Albert Dock Warehouses. The centre of the background consists of the residential units and the Jurys Inn Hotel along Keel Wharf, with the Liverpool Big Wheel forming a central focal point, which partially obscures the ACCL. The site lies between Wapping Dock Warehouse and residential units but at ground level and at this distance, it is barely visible.

Viewpoint 16 Queen's Dock

- 17.154 NGR: SJ 34683 88960, Distance to Development: 70m, Visual Receptor: Pedestrians and water users.
- 17.155 The open water of Queens Dock occupies the majority of the fore and middle ground and stretches under the Queens Wharf bridge into Wapping Dock. The existing new developments of The Keel, the ECL with the Pullman Hotel and residential units including The Block and Jurys Inn hotel frame view. The twin towers of the Royal Liver Building are visible in the skyline as is the top of the Liverpool Big Wheel. The lower building of the substation is visible in the centre of the view and marks the area of the site.

Viewpoint 17 Kings Parade / The Keel

- 17.156 NGR: SJ 34276 88965, Distance to Development: 80m, Visual Receptor: Road users and Pedestrians.
- 17.157 View northwesterly towards the southern elevation of the ECL across secured car parking areas associated with The Keel. Half tide Wharf runs eastwards between the two buildings. The site lies beyond the car park and ground level, therefore, is not visible.

Viewpoint 18 Kings Parade / Queen's Branch Dock 01

- 17.158 NGR: SJ 34331 88836, Distance to Development: 280m, Visual Receptor: Road users and pedestrians.
- 17.159 The viewpoint is located south of viewpoint 17 along Kings Parade and overlooks Queen's Dock. The Keel residential development dominates the centre ground with the ECL visible further to the north. The site is not visible from this location.

Viewpoint 19 Sefton Street / Mariners Wharf

- 17.160 NGR: SJ 34764 88860, Distance to Development: 400m, Visual Receptor: Road users and pedestrians
- 17.161 Road infrastructure occupies the foreground with the Dolby Hotel obscured by trees in the centre ground. The view across the hotel car park is westerly and The Keel forms the backdrop to the view, the open water of Queen's Dock is not visible from this location and neither is the site, although it likely will be from residential properties to the south of Mariners Wharf.

Viewpoint 20 Parliament Street / Grafton Street

- 17.162 NGR: SJ 34750 89002, Distance to Development: 340m, Visual Receptor: Road Users and pedestrians
- 17.163 The wide and busy roads of Sefton Street and Parliament Street form the foreground with the Dolby Hotel visible but partially obscured by trees occupying the centre middle ground behind security fencing which runs along the road. Beyond the hotel and forming the backdrop, the ECL is partially visible. Mature trees, when in leaf obscure the Grosvenor Casino. The rooftop to the Hotel Campanile is visible behind which is Wapping Dock Warehouse. A small portion of the site lies in front of the ECL but ground level is not visible from this location.

Viewpoint 21 Parliament Street / Jamaica Street

- 17.164 NGR: SJ 34973 89027, Distance to Development: 535m, Visual Receptor: Road users, pedestrians, future residents
- 17.165 The view is westwards and down Parliament Street towards Queen's Dock. The road junction and buildings on the street dominate the middle ground with new residential development occurring on the southern side of the street. The southern elevation of the Dolby Hotel is just visible, and The Keel forms the centre background. The site lies to the north of it but ground level is not visible from this elevated location.

Townscape and Visual Assessment

Townscape and Visual Assessment

- 17.166 This section identifies the likely significant townscape and visual effects (adverse or beneficial) resulting from the proposed development. Construction and operational effects are considered separately. All assessments are considered to have a High level of confidence due to the modelling of the development undertaken and the urban nature of the setting, which does not require seasonal adjustments to be made.

Operational Phase Impacts

- 17.167 The design proposals have been formulated through a lengthy iterative process involving environmental assessment and consultation. This process has allowed site constraints and opportunities to directly influence the evolution of the building and the public realm proposals. As a result, mitigation measures are embedded within the proposals as part of the detailed design of the landscape and surrounding built form. Consideration has been given to alternative designs, and a number of iterations have been amended in order to take account of feedback within the professional team and that received through the stakeholder engagement process.

- 17.168 A summary of mitigation measures which have been ‘designed in’ to the proposals in order to reduce or where possible, avoid townscape and visual impacts is provided below, and is described further within the Design and Access Statements that accompanies this application.

The development proposals have been prepared in accordance with good urban design principles, which avoids, reduces or offsets potential impacts on the townscape and views. The key design principles incorporated into the design are outlined below, and are described in full within the Design and Access Statements which accompanies the applications:

Destination leisure uses included in keeping with planning policy and the Kings Dock Masterplan Report

Scale, massing and height of building responds to surrounding context and naturally synergising with Application 1 development.

Block arrangement to integrate with existing development and to create new enclosure and controlled vistas.

The buildings address and helps to improve the frontage along the dock edge as well as more active edges.

Design of pedestrian movement corridors based on the Kings Dock Masterplan Report. Vehicular access and servicing retained and controlled to minimise impact.

Creation of a series of open space and public realm to knit with the existing and create new linkages between the water and dock fronts.

Appropriate application of materials, which contribute to the character of the area.

Mitigation Measures

- 17.169 Mitigation measures for a development of this nature are essentially integral to the design and are termed ‘primary measures’. They are, therefore, embedded in the evolution of the design. This includes measures such as the design of the public realm and landscape, which for a development of this nature is more relevant to the setting of the site and its immediate surroundings as well as the effects at street level.
- 17.170 Street tree planting within the site boundary of Phase 2 will follow on from Phase 1 in comprising of species, which are wind tolerant in order to reduce the effects of the windy conditions of the docks on the users of the site as well as helping to soften the edge of the proposed buildings from receptors within the Kings Dock area.
- 17.171 A temporary wildflower landscape area will be introduced to the north of the site, adjacent to the existing ECL. The tree species grown within this temporary landscape will provide visual interest during the construction phases and once the trees have matured they can be moved to other areas of the site or additional phases of Kings Dock which will be able to provide additional screening / softening of the proposed buildings within the development.

Construction Phase Effects

- 17.172 The proposed development is at a relatively early stage in the design and construction programme. It is therefore difficult to predict with certainty the precise methodology that will be adopted for construction and site management. It is possible, however, to identify some broad impacts that may arise during the construction phase:
- 17.173 The summary of potential construction phase effects for the application site only, and their significance prior to any supplementary mitigation is provided in the Table 3.2.3
- 17.174 The precise methodology that will be adopted in order to mitigate against potential construction phase impacts will be formulated as part of the on-going design development. It is anticipated, however, that measures to control construction impacts as outlined below, will be incorporated into a Construction Environmental Management Plan (CEMP), including:
- Site compounds to be positioned close to the proposed access points and as remote from existing developed areas as feasible;
 - Directional lighting to be used across the site.
 - Where possible, hoarding lines will also utilise existing areas of woodland and scrub cover to help visually break up the extent of the fencing.
 - Stockpiles will be located on site to limit visual impacts where possible.
- 17.175 Through the adoption of a Code of Construction Practice (CoCP), good site management shall be achieved through the following measures:
- Protection of existing vegetation to be retained where practicable;
 - Strict adherence to the self-storage areas and construction access roads;
 - Use of site hoarding where appropriate; and
 - A phased planting programme.
- 17.176 The implementation of good site management, maintenance and housekeeping would ensure that temporary deterioration to landscape resources, character and visual amenity will be kept to a practicable minimum. Despite these better practice measures, there would still remain inevitable adverse effects during construction works. In overall terms, however, the residual effects upon townscape features, character and the visual envelope are not anticipated to be significant and the majority of which short term, temporary and local.

Operational Phase

- 17.177 A Public Realm and Landscape Management Plan may be employed to provide further mitigation once the site is operational. The Plan would ensure the longevity of planting, and promote the appropriate upkeep of the public realm covering hard and soft landscape materials as well as street furniture and signage.

Townscape Effects

- 17.178 The assessment assumes that all mitigation described in the section above has been implemented. The predicted townscape effects are summarised in Table 3.2.1 and are described below. The assessment considers the factors contributing to townscape character and the value of the townscape under consideration. The susceptibility of the townscape to change and the magnitude of the townscape effects is then combined to arrive at an overall level of significance.



Initiation	Overall Sensitivity of Receptor	Size/Scale of Effect	Geographical Extent of Effect	Duration/ Reversibility	Overall Magnitude of Effect	Nature of Effect
heights integrate ting; scale and reflecting dockland; s with planning	High	Major	Low	Permanent	Major	Beneficial
road layout dock layout d; new gateway existing building ained.	Medium	Major	Medium	Permanent	Moderate/Major	Beneficial
ing with planning tegration with ghbours.	Low	Low	Low	Permanent	Minor	Beneficial
ing with planning tegration with ghbours; y with existing development.	High	Low	Low	Permanent	Moderate	Beneficial
ing with planning potential for new retained for later	Medium	Low	Low	Permanent	Minor/Moderate	Beneficial

Environmental Designations and Public Space	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Townscape Character	Vacant plots developed with associated public realm.	Building heights integrate with existing; scale and massing reflecting existing dockland; conforms with planning policies; existing road layout retained; dock layout reinforced; new gateway created; existing building lines retained.	Medium	Major	Medium	Permanent	Major	Beneficial

TABLE 3.2.1 SUMMARY OF TOWNSCAPE EFFECTS

Townscape Character

Urban Grain

- 17.179 The existing site represents development opportunity which has been identified in planning policy and the Kings Dock Masterplan Report. The existing road infrastructure is established and has been retained in the proposals and the dock form is respected. The proposals retain the existing grain and extend and reinforce it through building massing and movement linkages. In summary:

- 17.180 A contemporarily designed Interpretation Centre and office (building 2) will balance with the listed heritage buildings on the other, north side of the road to create a new gateway entrance into the waterfront along Queens Wharf and to the waterside.

- 17.181 The existing substation is wrapped around its northern and eastern elevations by a residential block (building 4), which will also create a strong dockside feature to Queen's Dock with active frontages of commercial and retail uses.

- 17.182 Monarchs Quay is reinforced through the construction of a multi-storey car park (building 3 MSCP) with ground floor retail to provide a more active frontage at street level and dynamic cladding above.

- 17.183 Space for a new diagonal link and green zone between the waterfront and dock is retained for future development phases.

Land Use

- 17.184 The areas are currently vacant building plots and the development proposals incorporate land uses consistent with planning policy. The proposed development will see the creation of welcoming environments through the implementation of the proposed roof garden and temporary wildflower landscape. These areas will incorporate / produce tree and shrub vegetation that will be able to withstand the strong winds of the dockside. The trees within the temporary landscape can then be used to line the street creating a more inviting street scene for pedestrian and road users whilst creating a uniformity to the Dock area integrating the existing and proposed built form.

- 17.185 The proposed POS areas and the enhanced street scenes along with the proposals for Phase 1 will create a more appealing and varied locations for user groups to access and interact with ensuring users will make use of the spaces rather than seeing the area as a car park / through route on the way to a different location.

Building Heights

- 17.186 The site as exists is undeveloped. The Design and Access Statement provides a detailed commentary of the building heights that have been established for the proposals. All buildings are respectful of the existing heights established through original dock warehouses and more recent developments (including the submitted Phase One development) within a range of 24 metres to 40 metres, the latter being the Pullman Hotel, the majority being in the mid-20 metres.

Movement and Linkages

- 17.187 By retaining the existing street layout, existing movement and linkages are largely unaffected by the development. Key north - south routes are retained and east-west routes will be enhanced. The proposals incorporate measures to improve linkages between the water and dock fronts in later phases. Vehicle arrival points will utilise the existing road layout.

Environmental Designations and Public Open Space

- 17.188 The proposed development in combination with Phase One, incorporates elevated landscaped garden decks that are private and public, the latter which will provide a valuable enhancement over what currently exists. The proposed open space provision in the form of a roof garden within the residential block (building 4) will mirror the proposed planting of the Phase 1 development, which the roof garden overlooks, therefore providing a sense of uniformity between the different phases on the site. This sense of uniformity will be continued through the creation of a temporary wildflower landscape area, which will produce a number of tree species that will be, once matured, repositioned elsewhere within the various phases of the Kings Dock Area. This proposed temporary landscape will, along with the roof garden within the site and the existing POS provisions along Chaloner Street, begin to form a Green Link between these spaces that can be used to encourage a continuation of POS provision through any additional phase undertaken within the Kings Dock Area.

Effect on Townscape Character

- 17.189 The site lies within the Waterfront Character area and the Queens Dock and Monarch Quay Character Areas, the latter identified in the Kings Dock Masterplan Report. From the discussion of the planning context in Section 1 and the townscape baseline, the existing character of the area is anticipated to change and reflect the policies directed at regenerating the area. The site does not have a designated value, but it lies within the Buffer Zone of the WHS, the southern boundary of which extends to Wapping Dock. For the purpose of this assessment it is deemed to be of High value. Its sensitivity to change, however, is considered Medium due to the site being vacant for development but where change could be harmful to townscape character. The magnitude of change is considered significant from the baseline conditions and this is, therefore, assessed as Major.

- 17.190 The proposed development is considered broadly consistent with planning policy aims and it is appropriate to measure the impact of the development against the existing and desired future character of the area. Accordingly, it is assessed as having a Moderate/Major Beneficial effect upon Townscape Character.

Visual Effects

- 17.191 The assessment assumes that all mitigation described above has been implemented. The predicted townscape effects are summarised in Table 3.2.2 and are described below. For the visual montages it should be noted that the 3D model includes the proposed buildings from previously approved Phase 1 development. These buildings were included in order to show how the proposed development will integrate not only with the existing built form but also with the proposed built form that will be introduced in the not too distant future.

TABLE 3.2.2 SUMMARY OF VISUAL EFFECTS.



Mitigation	Size/Scale of Effect	Geographic Extent of Effect	Duration/ Reversibility	Overall Sensitivity Rating	Overall Magnitude of Effect	Nature of Effect
	N/A	N/A	N/A	High	N/A	No change
	N/A	N/A	N/A	High	N/A	No change
	N/A	N/A	N/A	High	N/A	No change
	N/A	N/A	N/A	High	N/A	No change
heights, scale and keeping with policy and existing environment.	Medium, clearly visible and form a new focal point.	Low, limited effect from this distance, presence of larger buildings and waterbody	Permanent	High to Low	Moderate	Moderate/ Minor Beneficial
by contemporary entry feature; with existing development.	Low, distance and limited amount of development in view	Low, due to limited visibility.	Permanent	High to Medium	Moderate	Moderate/ Major Beneficial
heights, scale and keeping with policy and existing environment, building line	Low due to distance and very limited visibility	Low due to limited visibility	Permanent	High to Medium	Minor	Minor Beneficial
heights, scale and keeping with policy and existing environment; high quality	High due to visual presence changing streetscape at key entry point	Medium as the effect extends along the visible road corridor.	Permanent	High to Medium	Major	Major Beneficial

9	Buildings forming new background focal points around dock.	Building heights, scale and massing in keeping with planning policy and existing development, building line retained.	Medium, as it creates a new focal point to the dock but at a distance.	Low due to distance and the presence of existing similar sized developments.	Permanent	High to Low	Moderate	Moderate Beneficial
10	None	N/A	N/A	N/A	N/A	High	N/A	No change
11	Building forming new middle ground backdrop and reinforcing existing road layout	Building heights, scale and massing in keeping with planning policy and existing development, building line retained.	Moderate, the new buildings will be highly visible creating new areas of enclosure	Moderate due to the high visibility and spread across the panorama of the viewpoint.	Permanent	High to Medium	Moderate	Moderate Beneficial
12	Buildings dominating the streetscape where currently there little	Building heights, scale and massing in keeping with planning policy and existing development, building line retained; substation screened; new public realm and potential for future linkages retained.	High due to the dominance of new buildings.	Medium as the effect is focused on the adjacent streetscape.	Permanent	High to Medium	Substantial	Substantial Beneficial
13	None	N/A	N/A	N/A	Permanent	High to Medium	N/A	No change
14	Buildings at end of street vista	Building heights, scale and massing in keeping with planning policy and existing development, building line retained.	Low, due to the limited visibility	Low, due to the limited visibility.	Permanent	High to Medium	Minor	Moderate Beneficial
15	Building forming new background focal point around dock	Building heights, scale and massing in keeping with planning policy and existing development, building line retained.	Low, due to the limited visibility and distance.	Low, due to the limited visibility and context of other similar sized developments.	Permanent	High to Medium	Minor	Moderate Beneficial

16	Buildings forming new background focal points around dock.	Building heights, scale and massing in keeping with planning policy and existing development, building line retained.	High due to the high visibility of much of the development.	Medium, due to the wider context of existing developments and larger waterbody.	Permanent	High	Major	Major Beneficial
17	Building forming new middle ground backdrop and reinforcing existing road layout	Building heights, scale and massing in keeping with planning policy and existing development, building line retained.	Moderate, as the development is visible but does not notably screen distant features.	Medium, as the view is framed by existing large development.	Permanent	High to Medium	Moderate	Moderate/Major Beneficial
18	None	N/A	N/A	N/A	Permanent	High to Medium	N/A	No change
19	None	N/A	N/A	N/A	Permanent	High to Medium	N/A	No change
20	End elevations of new buildings visible through gap in existing development	Building heights, scale and massing in keeping with planning policy and existing development.	Low due to limited visibility and existing adjacent developments.	Low, as visibility is limited.	Permanent	High to Medium	Minor	Moderate Beneficial
21	Visibility of end elevation of a new building	Building heights, scale and massing in keeping with planning policy and existing development.	Low, due to the limited visibility and distance.	Low, due to the limited visibility.	Permanent	High to Medium	Negligible	Minor Beneficial



Viewpoint 1 Wallasey Town Hall

17.192 Value of view: **High** Sensitivity of Receptor: **High**

The view is from a popular waterfront location affording panoramic views across the City skyline. From this distance the light colour of the Museum of Liverpool is more visible than the darker brick of the Albert Dock Warehouses but the ACCL and ECL are quite distant and are not skylined. The site is not visible from this location and is recorded as **No Change**.

Viewpoint 2 Woodside Ferry Terminal

17.193 Value of view: **High** Sensitivity of Receptor: **High**

Viewpoint 3 Holt Hill

17.194 Value of view: **Low** Sensitivity of Receptor: **High to Medium**

17.195 The site is not visible from this location and is recorded as **No Change**. It is also not visible from the more elevated properties in Holt Hill Terrace with the possible exception of the first storey windows, but distance will mean the site would occupy a very small area of the view.

Viewpoint 4 Liverpool Anglican Cathedral

17.196 Value of view: **High** Sensitivity of Receptor: **High**

17.197 A viewpoint from one of the most iconic buildings in the City which has a high volume of visitors. The site is not visible from this location and therefore is recorded as **No Change**.

Viewpoint 5 Bridge between Queen's Dock and Coburg Dock

17.198 Value of view: **Low** of Receptor: **High to Low**

17.199 The view is valued as medium due its setting within the WHS area of the docks. The view from High (residents and pedestrians) to Low (users of the water intent on an active development) is clearly in view across the middle ground with buildings of Phase One (Two) application, forming new features in the view but of a scale in keeping with existing development. Building 4 is of sufficient height to almost screen the Royal Liver building, the tops of the two towers are just visible and it is not a significant increase to the screening already occurs. The magnitude of change is, therefore, recorded as **Moderate** to **Minor** and **Beneficial**.

Viewpoint 6 Junction of Blundell Street and St James Street

17.200 Value of view: **Low** Sensitivity of Receptor: **High to Medium**

17.201 Buildings 2 and 4 of the development will be visible and will form a new focal point to the view west and down Blundell Street. Building 2 will form a contemporary feature with building 4 screening the rather bland façade to the ECL, as a consequence it will appear more interesting and articulated. The majority of receptors will be in transit so views will be glimpsed. The magnitude of change is recorded as **Moderate** as it forms a small but important part of the view resulting in an effect assessed as **Moderate/Major to Minor and Beneficial**.

Viewpoint 7 Pedestrian footbridge across Dukes Dock

17.202 Value of view: **Low** Sensitivity of Receptor: **High**

17.203 The end elevation of building 4 is visible although partially filtered by trees in leaf along a key route within the waterfront area. The building line of Keel Wharf is maintained, and development frames the view with most receptors likely to be in transit. The magnitude of change is recorded as **Minor** resulting in an effect assessed as **Minor and Beneficial**.

Viewpoint 8 Wapping from central reservation, junction with Queens Wharf

17.204 Value of view: **Low** Sensitivity of Receptor: **High to Medium**

17.205 An important and busy access point for pedestrians and vehicles. The development will be clearly visible to the southern side of Queens Wharf. Building 2 will form a highly noticeable and contemporary counter point to the existing listed features and building 4 forms a new and closer backdrop to the view. Building 1 of the Phase One development is also visible, although from this viewpoint it is largely screened by trees in leaf, the majority of receptors will be in transit with views likely to be glimpsed. The magnitude of change is recorded as **Major** resulting in a **Major** effect which is **Beneficial**.

Viewpoint 9 Gower Street

17.206 Value of view: **Low** Sensitivity of Receptor: **High to Low**

17.207 Building 2 will be visible behind Wapping Dock Warehouse and building 3 will form a new focal point to the centre backdrop. Building 1 of Phase One will also be visible providing enclosure and strengthening the form of the docks. The majority of receptors will be in transit and views will mainly be glimpsed. The magnitude of change is assessed as **Moderate** resulting in an effect recorded as **Moderate and Beneficial**.

Viewpoint 10 Echo Arena / ACCL from Kings Parade

17.208 Value of view: **High** Sensitivity of Receptor: **High to Medium**

17.209 The development is not visible from this location and is recorded as No Change.

Viewpoint 11 Echo Arena / ACCL from Monarch Quay

17.210 Value of view: **Low** Sensitivity of Receptor: **High to Medium**

17.211 The existing substation screens building 4 but building 2 at the entrance to Queens Wharf is visible, with building 3 also visible to the western side of Monarchs Quay. Building 1 of the Phase One development is also shown and forms the centre middle ground focal point. The majority of receptors will be in transit although this may change with the development of open space in this area in subsequent phases. Happy with this statement? The magnitude of change is recorded as **Moderate** and the effect is assessed as **Moderate** and **Beneficial**

Viewpoint 12 Monarchs Quay

17.212 Value of view: **Low** Sensitivity of Receptor: **High to Medium**

17.213 New development will reinforce the streetscape and define the edges of the docks. Building 1 of Phase One is shown in the centre ground, which will include active frontages facing the dock to the east as well as significant public realm and landscaped areas, which will provide a future link with the waterfront. Building 4 and 2 also provide a more defined and legible streetscape to Queens Wharf, which is the main access road into this area of the waterfront docks. The majority of receptors will be in transit with views glimpsed adjacent residential receptors will still benefit from a degree of physical separation. The magnitude of change is recorded as **Substantial** and the effect is assessed as **Substantial** and **Beneficial**.

Viewpoint 13 Kings Parade

17.214 Value of view: **High** Sensitivity of Receptor: **High to Medium**

17.215 The site is not visible from this location so is recorded as **No Change**.

Viewpoint 14 Keel Wharf

17.216 Value of view: **Low** Sensitivity of Receptor: **High to Medium**

- 17.217 Buildings 4 and 1 (Phase One) are visible in the background and continue the building line established by developments in the foreground. They will provide further definition and orientation to the area as well as open space and connectivity with the wider area and dockside. The magnitude of change is recorded as **Minor** and the effect is assessed as **Moderate** and **Beneficial**

Viewpoint 15 Strand / Salthouse Dock

- 17.218 Value of view: **Medium** Sensitivity of Receptor: **High to Medium**

- 17.219 From this location, the majority of the development is screened by existing buildings. Building 4 is visible and picks up the rhythm of buildings around the dock edge, by reflecting the height and scale of the existing buildings it will integrate with them. The majority of receptors will be in transit and views will, therefore, be glimpsed. The magnitude of change is recorded as **Minor** and the effect is assessed as **Moderate** and **Beneficial**.

Viewpoint 16 Queen's Dock

- 17.220 Value of view: **Low** Sensitivity of Receptor: **High**

- 17.221 The proposed development, including building 1 of Phase One, are clearly visible across the centre ground and establish a new rhythm of buildings across the existing docks, demarcating Queens Wharf and the separation between Queen's Dock and Wapping Dock. Whilst building 3 will screen views to the ECL, the proposed façade is more articulated than the former and establishes the line of Monarchs Quay. Building 1 will provide an active frontage and extensive public realm towards the dock frontage, building 4 will increase the sense of separation between the docks whilst retaining glimpses of the Royal Liver building on the northern skyline. Building 2 will be a contemporary focal point defining the entrance to Queens Wharf. All new buildings reflect the height and scale of the existing ones, which aids with their integration. The magnitude of change is recorded as **Major** and the effect is assessed as **Major** and **Beneficial**.

Viewpoint 17 Kings Parade / The Keel

- 17.222 Value of view: **High** Sensitivity of Receptor: **High to Medium**

- 17.223 Building 3 will create a new focal point to the view with building 1 of Phase One only partially visible to the east. The southern elevations to both buildings delineate the line of Halftide Wharf. Radio City Tower is still visible on the skyline from this location and building 3 will provide a more articulated and contrasting elevation to the ECL whilst retaining the outlook for residents of the Keel. The majority of receptors will be in transit from this location, residents of the Keel may experience some negative effects due to the proximity of the development, but reasonable physical separation is retained. The magnitude of change is recorded as **Moderate** and the effect is assessed as **Moderate / Major** and **Beneficial**

Viewpoint 18 Kings Parade

- 17.224 Value of view: **High** Sensitivity of Receptor: **High to Medium**

- 17.225 The site is not visible from this location so is recorded as No Change.

Viewpoint 19 Sefton Street / Mariners Wharf

- 17.226 Value of view: **Low** Sensitivity of Receptor: **High to Medium**

- 17.227 The development is not visible from this location and is screened by the Dolby Hotel. The development is therefore recorded as **No Change**

Viewpoint 20 Parliament Street / Grafton Street

- 17.228 Value of view: **Low** Sensitivity of Receptor: **High to Medium**

- 17.229 The majority of the development is screened by existing buildings along Chaloner Street with only the southern end elevations of building 3 and Phase One's building 1 visible. The majority of receptors will be in transit with views glimpsed. Residents in the Dolby Hotel will still retain views over the dock and water and should not be overshadowed. The magnitude of change is recorded as **Minor** and the effect is assessed as **Moderate** and **Beneficial**.

Viewpoint 21 Parliament Street / Jamaica Street

- 17.230 Value of view: **Low** Sensitivity of Receptor: **High to Medium**

- 17.231 The majority of the development is screened by existing buildings and only the end elevation of building 3 is visible opposite the Keel. The majority of receptors will be in transit and will only glimpse the view. New residential apartments have been and are in the process of being erected, many of which will have views towards the city and will enjoy a wide panorama, which will not be disrupted by the development. The magnitude of change is recorded as **Negligible** and the effect is assessed as **Minor** and **Beneficial**.

Summary and Conclusions

Monarchs Quay

- 17.232 This report has assessed the townscape and visual effects of the proposed development. The site is currently vacant for development and planning policy is directed at supporting the major regeneration of this area and to this end major change is desired and anticipated. The assessment is made on this basis but where adverse effects are likely to occur these have been described.
- 17.233 The development would introduce a notable change into the immediate and local townscape but in view of the condition of the existing area, the retention of the existing street layout and the consistency of the development with current planning policy, it is assessed that the effects will be beneficial. The existing movement and access corridors are visually strengthened and is arranged to ensure future improved connectivity between the docks and waterfront. Building heights and scale are in keeping with existing historical and more modern ones and the development will be a positive sign of regeneration. The development respects the fact that it is within the WHS buffer zone and will provide improved activity and articulation to the dockside.
- 17.234 With respect to visual effects, the assessment considers them to be beneficial or of no change where no visibility remains following development. Key vistas and views to landmark buildings have been retained, and the development will provide new focal points, which will increase the legibility of the layout of the existing docks around which the development is arranged.

18 Conclusion

- 18.1 Knight Frank LLP have been instructed by Monarchs Quay Holdings Ltd to coordinate a formal Environmental Impact Assessment (EIA), including the preparation of an Environmental Statement (ES) and Non-Technical Summary (NTS), to support the submission of a full planning application for a *‘mixed use redevelopment of the site to include Interpretation Centre, offices, residential, car park and retail with associated landscaping and works at Monarchs Quay, Liverpool.’*
- 18.2 The site is located within the administrative boundary of the city of Liverpool, more specifically to the South of Liverpool City Centre. The site forms part of Liverpool’s waterfront and is one of the remaining key sites to be developed along the former docks.
- 18.3 Monarchs Quay Holdings Ltd a specialist regeneration company which provides property development, construction and management solutions, delivering both economic and social value to its partners, investors and the communities in which it operates.
- 18.4 The following environmental disciplines have been assessed with regard to the development proposals and are presented as separate chapters in this ES:
- Air Quality;
 - Archaeology
 - Daylight, Sunlight and Overshadowing;
 - Ecology;
 - Flooding and Drainage;
 - Heritage;
 - Highways;
 - Landscaping;
 - Noise;
 - Contamination;
 - Wind; and
 - Visual Impact.

18.5 The conclusion of each chapter can be summarised as:

- Air Quality - 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. 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 high for earthworks and construction and medium for trackout. The risk for human health effects is considered to be low for earthworks, construction and trackout. 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.
- Archaeology - A desk-based study, coupled with a site visit and the results obtained from previous archaeological investigations in the immediate vicinity of the Site, has identified remains of potential archaeological interest. Further investigation of the below-ground archaeological resource will be undertaken, as appropriate, at a later stage in the planning process. Following implementation of the scheme of mitigation, it is anticipated that the identified potential effects on buried archaeological remains would be reduced to negligible. In NPPF terms, residual effects upon archaeological assets during both the construction and operation phase will be negligible, causing less than substantial harm to the assets.
- Daylight, Sunlight and Overshadowing - The impact on neighbouring properties has been assessed, based on a range of residential properties and sensitive receptors in the surrounding area. Of rooms assessed will meet the BRE criteria for the daylight assessments. The majority of rooms assessed will meet BRE criteria for all three daylight assessments. The ASPH sunlight analysis on neighbouring properties indicates that all relevant rooms assessed will continue to receive levels of sunlight akin to a sub-urban setting. Therefore, the impact on all neighbouring amenity is considered to have a range of negligible impacts. In respect of the proposed residential units, the assessment indicates that all of the windows assessed will be adequately daylighted for their intended use, it has been demonstrated that all rooms will meet the BRE criteria for all three daylight assessments. The majority of rooms assessed will meet BRE criteria for all three daylight assessments. Therefore, the BRE criteria is met for all windows. The ASPH sunlight analysis on neighbouring properties indicates that all relevant rooms assessed will receive levels of sunlight akin to a sub-urban setting.
- Ecology - The site contains no statutorily designated nature conservation sites, There are 9 non-statutory designated nature conservation sites within 2km of the site boundary including 8 'Liverpool Local Geological Sites' and 1 'Nature Improvement Area'. Habitats on site comprise areas of hardstanding, amenity grassland, introduced shrub and ornamental tree planting. Generally the site is classified as having a low conservation value. None of the habitats within the site are of significant interest in terms of the plant species composition, nor do they have characteristics of semi-natural habitats. No rare or locally uncommon plant species or invasive species as listed under the Wildlife and Countryside Act 1981 (as amended) were detected at the site.

- Flooding and Drainage - The Environment Agency online flood map shows the Site to be located entirely within Flood Zone 1; outside the 1 in 1000-year probability of tidal flooding (0.1% AEP) and as being at 'low' risk of tidal flooding. Most of the wider Site is located within Flood Zone 1; outside the 1 in 1000-year probability of fluvial (river) and tidal flooding (0.1% Annual Exceedance Probability [AEP]). A small area in the south west of the wider Site is shown to be located within Flood Zones 2 and 3. Environment Agency flood zones are representative of tidal flooding within the wider Site. Subject to mitigation measures, the Sequential Test will be passed and the Exception Test would not be required. A drainage scheme is proposed to connect to an existing surface water network within the wider Site, with subsequent connection to the public surface water network and the River Mersey Estuary. It is proposed to maintain the current surface water discharge for areas that currently diffusely discharge to the Docks.
- Heritage - The Application Site is within the buffer zone (BZ) of the Liverpool Maritime Mercantile History World Heritage Site and the World Heritage Site itself is within the wider Study Area. With the exception of the BZ there are no designated or non-designated heritage assets within the Application Site. The Albert Dock Conservation Area is to the north of the Application Site within the Study Area and a number of listed buildings are located within the Study Area. A search of the Merseyside Historic Environment Record was also undertaken. The assessment concludes that the operational phase will have a minor beneficial magnitude of impact on the Albert Dock Conservation Area resulting in a minor/moderate magnitude of impact against value. This is due to the redevelopment of an area of its setting which is presently undeveloped and low quality with a high quality new building.
- Highways - The existing transport conditions have been audited and discussed within the assessment. A MASA assessment has been undertaken concluding that excellent pedestrian infrastructure and public transport provision is available, along with the need for existing infrastructure to be enhanced within Kings Dock. Local to the site, alterations to the road network in Kings Dock have been proposed so as to facilitate the demands of the development for all modes of transport, and integrate well with existing traffic patterns. The assessment scenarios considered cumulative impacts of committed and strategic developments and infrastructure. The mitigation has been forecast to create a wider benefit in managing traffic flow on the highway network more effectively, seeking to both mitigate the impacts of the proposed development, but also manage background and future committed development traffic given changes to driver behaviour and directional movements of traffic travelling through the junctions recommended to be mitigated.

- Noise - In respect of the proposed residential units, the assessment indicates that all of the windows assessed will be adequately daylighted for their intended use, it has been demonstrated that all rooms will meet the BRE criteria for all three daylight assessments. The majority of rooms assessed will meet BRE criteria for all three daylight assessments. Therefore, the BRE criteria is met for all windows. The ASPH sunlight analysis on neighbouring properties indicates that all relevant rooms assessed will receive levels of sunlight akin to a sub-urban setting. The potentially significant aspects of the proposed development were initially assessed using significance criteria. Through this process, it was determined that further consideration was required for two aspects of the development, namely, the potential impact of the operation of external fixed services plant associated with the introduced uses on local noise sensitive receptors and the potential impact of road traffic associated with the development on local noise sensitive receptors. On the basis of the mitigation measures identified, there are considered to be no significant residual noise and vibration impacts associated with the proposed development.
- Contamination - Based on the identified ground conditions, the construction phase will require the implementation of enabling work to improve the ground to permit subsequent development. These activities will likely create a number of moderate impacts to both the underlying Principal Aquifer, adjacent Queen's Dock and adjacent residential properties through generation of dust, highway debris or possible spillages of fuel. Mitigation measures for these potential impacts are well established and will be addressed as part of a Construction Environmental Management Plan (CEMP). The Site Investigation will be required to complete a detailed assessment of any underlying contaminants and the potential for hazardous ground gas.
- Wind - Based on the wind climate statistics, the most frequent strong winds blow from the west-north-west and west. Winds from the south-south-east are also common, but these winds are generally light. Northerly winds are generally light and rare, though cold north-easterly winds are common during spring. Wind speeds are generally higher during winter and lower during summer. As a result of the above effects, there is potential for pedestrian level wind conditions to rate as unsuitable in terms of pedestrian safety around the southwest corner of Building 3. However, the potential exceedance of the safety criteria is expected to be marginal at worst, and is expected to affect only a small area of roadway and vehicular access. On this basis, this effect is considered localised moderate adverse. Otherwise, the Proposed Development is expected to have negligible effect on pedestrian safety across the remainder of the Site and surrounding area.
- Visual Impact - The development would introduce a notable change into the immediate and local townscape but in view of the condition of the existing area, the retention of the existing street layout and the consistency of the development with current planning policy, it is assessed that the effects will be beneficial. The existing movement and access corridors are visually strengthened and is arranged to ensure future improved connectivity between the docks and waterfront. Building heights and scale are in keeping with existing historical and more modern ones and the development will be a positive sign of regeneration. The development respects the fact that it is within the WHS buffer zone and will provide improved activity and articulation to the dockside. With respect to visual effects, the assessment considers them to be beneficial or of no change where no visibility remains following development. Key vistas and views to landmark buildings have been retained, and the development will provide new focal points, which will increase the legibility of the layout of the existing docks around which the development is arranged.

- 18.6 In summary this ES has demonstrated that the proposed development, when assessed during construction, operation and cumulatively, should not, with mitigation, create any significant adverse environmental impacts which could justify the refusal of outline planning permission.