11. WATER RESOURCES & FLOOD RISK

11.1 INTRODUCTION

11.1.1 Company

Buro Happold Engineering

11.1.2 Author

Sara Moslemi Zadeh, PhD CEng

Sara is Chartered Civil Engineer and a member of ICE. She has over 5 years' experience undertaking sustainable water resource strategy and management, and flood risk assessments including drainage strategy and hydraulic modelling from master-planning projects at district and city levels as well as concept designs for various sites in the UK and abroad.

Paul Brenton, MEng CEng

Paul has 20 years' of experience of planning, designing, and supervising maritime works. He has led the redevelopment of several historic UK harbours, including the securing planning and licensing for construction works, and planned and supervised dredging and reclamation works worldwide. Paul is a Chartered Civil engineer and member of PIANC.

Mark Crowther, CEnv, MIEMA

Chartered Environmentalist (CEnv) and Full Member of IEMA (MIEMA). MSc in River Hydrology. Authored water resource and flood risk EIA chapters on over multiple (more than 60) schemes across the UK, with just under 10 years' experience of authoring and reviewing water resource and flood risk EIA chapters.

11.1.3 Chapter Purpose

This chapter of the ES assesses the likely significant effects of the proposed development on the environment in terms of Water Resources and Flood Risk. The chapter and supporting appendices describe the planning policy context, the assessment methodology; the baseline conditions at the application site and surroundings; the likely significant effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; the likely residual effects after these measures have been employed; and the cumulative effects. In summary, the objectives of the chapter are to:

- Define the baseline conditions;
- Identify the likely significant effects;
- Identify any further required mitigation measures;
- Identify the likely residual effects; and
- Identify the cumulative effects.

11.1.4 Chapter Updates for Revised 2020 Submission

In accordance with the methodology outlined in Chapter 2, a Level 2 update has been undertaken. Due to the relevance and scale of the proposed development amendments (including amendments to the construction methodology), limited technical assessment has been undertaken to confirm the validity of the previous conclusions.

This Water Resources & Flood Risk ES chapter has also been reviewed against the following aspects and for each it has been confirmed that there are no amendments required to the content of the chapter:

- Baseline data validity: there are no relevant changes to the baseline data, the data from surveys described in Table 11.3 remain valid;
- Legislation/policy revisions: there have been no related updates to legislation/policy that have affected either the methodology or findings of this assessment;

There were limited statutory consultee comments received in relation to this topic that required a response. Where relevant, clarification responses have already been agreed with the relevant consultees and details are provided in Table 11.2 within this chapter.

As a consequence of the above factors, it is considered that the previously reported mitigation measures remain valid and the residual effects previously identified have remained the same.

The sections that have been updated are detailed below:

- Section 11.2.6
- Section 11.4
- Section 11.5
- Section 11.6

11.1.5 Appendices

- Appendix 11.1: Baseline Assessment
- Appendix 11.2: Future Assessment
- Appendix 11.3: Flood Risk Assessment (FRA)
- Appendix 11.4: Drainage Strategy
- Appendix 11.5: Utilities Status Report
- Appendix 11.6: Meeting minutes
- Appendix 11.7: Water Framework Directive Assessment
- Appendix 11.8: Design Note – Dock Deposit Disturbance
- Appendix 11.9: Planning Consultation Responses

The appendices that have been updated as a result of the revised submission include Appendix 11.3, 11.4 and 11.7.

11.2 METHODOLOGY

The methodology adopted in this assessment is as follows:

- Review of international, national and local legislation, policies and guidance in relation to water resources, water quality and flood risk;
- Establishment of baseline conditions on and around the site through literature review and analysis of existing data obtained from the Environment Agency (EA) and United Utilities (UU);
- Identification of sensitive receptors through desk study and consultations with the EA as reported within the FRA for the development, and with UU as reported in the drainage strategy for this development;
- Identification of risks to water quality, water resources and flooding from development and hence the likely effects, magnitude of change and significance of environmental effects during both the demolition/construction and operational phases;
- Development of mitigation strategies through consultation with the design team;
- Identification of opportunities for enhancement of surface water quality and surface water management through design and mitigation; and
- Identification of residual effects and identification of cumulative effects.

11.2.1 Guidance

- EA Pollution Prevention Guideline (PPG) 1: Understanding your environmental responsibilities - good environmental practices (Environment Agency, 2013a);
- EA Guidance for Pollution Prevention (GPP) 2: Above Ground Oil Storage Tanks (Environment Agency, 2011a);
- EA PPG3: Use and Design of Oil Separators in Surface Water Drainage Systems (Environment Agency, 2006a);
- EA PPG4: Treatment and disposal of wastewater where there is no connection to the public foul sewer (Environment Agency, 2006b);
- EA PPG5: Works and maintenance in or near water (Environment Agency, 2007);
- EA PPG6: Working at Construction or Demolition sites (Environment Agency, 2012);
- EA PPG7: Safe storage - The safe operation of refuelling facilities (Environment Agency, 2011b);
- EA PPG21: Pollution Incident Response Planning (Environment Agency, 2009);
- EA Water Stressed Areas – Final Classification (Environment Agency, 2013b);
- Construction Industry Research and Information Association (CIRIA) Guidance C532 – Control of Water Pollution from Construction Sites [1];
- CIRIA Guidance C753 – The SuDS Manual [2];
- Non-Statutory Technical Standards for Sustainable Drainage Systems (TSSuDS) (Defra 2015) [3]; and

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- Local Authority SuDS Officer Organisation (LASOO) Non-Statutory Technical Standards for Sustainable Drainage – Practice Guidance [4]; and
- Marine Management Organisation, Marine Licensing: sediment analysis and sample plans (Cefas action levels) https://www.gov.uk/guidance/marine-licensing-sediment-analysis-and-sample-plans, accessed November 2019).

11.2.2 Legislation and Policy

11.2.2.1. Legislation

- The Environmental Protection Act (1990) [5];
- The Water Resources Act (1991) [6];
- The Environment Act (1995) [7];
- The Anti-Pollution Works Regulations (1999) [8];
- The Control of Pollution (Oil Storage) (England) Regulations (2001) [9];
- The Water Environment (Water Framework Directive) (England and Wales) Regulations (2017) [10];
- The Water Resource Act 1991 [11];
- The Environmental Damage Regulations (2009) [12];
- The Flood and Water Management Act (2010) [13];
- The Water Act (2014) [14];
- The Water Supply (Water Quality) Regulations (2016) [15]; and
- The Environmental Permitting (England and Wales) Regulations (2016) [16].

11.2.2.2. National Policy and Guidance

- National Planning Policy Framework (NPPF) (MHCLG, 2019) [17];
- National Planning Practice Guidance – Water Supply, Wastewater and Water Quality (MHCLG, 2015) [18];
- National Planning Practice Guidance – Flood Risk and Coastal Change (MHCLG, 2014) [19];
- EA and Department for Environment, Food and Rural Affairs (Defra) 'Flood risk assessment in flood zone 1 and critical drainage areas' (2017) [20];
- EA and Defra 'Flood risk assessment in flood zones 2 and 3' (2017) [21];
- EA 'Flood Risk Assessments: Climate Change Allowances' (2017) [22];
- Future Water (2011) [23]; and
- Water for Life (white paper) (2011) [24].

11.2.3 Regional Policy and Guidance

- EA River Basin Management Plan: North West River Basin District (2015) [25].

11.2.4 Local Policy and Guidance

- The adopted (saved) Liverpool Unitary Development Plan [26] and emerging Local Plan [27];
- Strategic Flood Risk Assessment, Liverpool City Council (LCC) (January 2008) [28];
- Preliminary Flood Risk Assessment Report, LCC (June 2011) [29]; and
- LCC Greenfield/ Brownfield sites surface water management guidance for planning applications: Version 3 – May 2018 [30].

11.2.5 Consultees

- The EA:
  - Pre-application enquiry submitted 23rd August 2017;
  - Initial meeting on 19th May 2017;
  - Follow up meeting on 19th February 2019.
- LCC – Lead Local Flood Authority (LLFA):
  - Initial meeting on 19th May 2017;
  - Follow up meeting on 19th February 2019.
- UU:
  - Initial application submitted on 26th May 2017;
  - Follow up meeting on 30th June 2017.
- Peel Ports – The Mersey Docks and Harbour Company (MDHC) (Harbour/Port Authority):
  - Meeting on 16th May 2019;
  - Follow up meeting on 7th October 2019.
- Canal & River Trust:
  - Email enquiry 23rd September 2019.

The minutes of these meetings are provided in Appendix 11.6.

11.2.6 Consultees & Scoping

11.2.6.1. Scoping Consultation

A formal request for an EIA scoping opinion was submitted to LCC and the MMO on 15th May 2017 and a scoping opinion was received on 8th November 2017. A summary of the water related comments and how these have been addressed is provided in Table 11.1.

Table 11.1

Consultee scoping opinion responses and where they are addressed

CONSULTEE	COMMENTS	DATED	HOW COMMENTS HAVE BEEN ADDRESSED
EA	States an understanding that an FRA will be carried out LLFA should be consulted regarding surface water and groundwater	22nd June 2017	An FRA has been produced and accompanies the ES as Appendix 11.3
MMO	Impact of building out into the River Mersey should be assessed within the ES, with consideration of impact on marine environment ES should consider storm surges and sea level rise Impacts of dock sediments and harmful contaminants which may be released into River Mersey should be assessed in the ES.	3rd Nov 2017	The proposed development is not being built out into the River Mersey, only Bradley Moore Dock. A wave overtopping assessment has been undertaken as part of the FRA, included in Appendix 11.3. Ground contamination, mobilisation of ground contaminants and hydrogeology are addressed in Chapter 10 Ground Conditions & Contamination
Merseyside Environmental Advisory Service (MEAS)	The ES should consider climate change impacts, the impact of the proposed development on the baseline and the vulnerability of the baseline to changes.	23rd June 2017	This has been assessed in the ES chapter, and within the FRA included in Appendix 11.3 and Drainage Strategy included in Appendix 11.4
Natural England	ES should include an assessment of the short – long term impact of the development on water (and other environmental elements) There are several Sites of Special Scientific Interest in the area which should be considered.	7th June 2017	This is included in this ES chapter, with a consideration of temporary impacts and effects (during demolition and construction) and long term impacts and effects (during operation). Further information regarding ecology can be found in Chapter 12 & 13.

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11.2.6.2. Planning Application Consultation

Table 11.2 sets out the stakeholder consultation comments received in response to the planning application.

Table 11.2

Consultee planning application comments and responses where they are addressed

CONSULTEE	COMMENTS	HOW COMMENTS HAVE BEEN ADDRESSED
EA	States that there is no objection in principle to the proposed development. Condition: The development should be carried out as per the submitted Flood Risk Assessment.	Noted
LLFA	There is no reference in the Operation Phase of any assessment of effect on UU WWTW (Sandon)	Reference added
	Comments on the FRA included in Appendix 11.3	Information/clarifications added within the Appendix
	Comments on the Drainage Strategy included in Appendix 11.4	Information/clarifications added within the Appendix

For planning comments and conditions received from other relevant consultees including Environment Agency, United Utilities, Merseyside Environmental Advisory Service and Natural England refer to Appendixes 11.9.

11.2.7 Consideration of Climate Change

Over the operational period, UKCP18 climate forecasts show that as a result of climate change, England would experience a greater chance of hotter, drier summers and warmer, wetter winters, as well as higher sea levels.

For the proposed development the 2115 epoch (95 years) climate change assumptions were agreed with the EA. The FRA outlines a number of mitigation measures.

For surface water drainage additional peak rainfall intensity of 40% allowance has been added for climate change in accordance with the EA guidance on impact of climate change on rainfall and surface water run-off.

For the wave overtopping assessment, extreme water level and wave data from the EA, Coastal Channel Observatory and other sources were used to analyse a joint probability of scenarios for combined water level and wave height return period events ranging from a 1 in 1 year event to a 1 in 200 year event for present day and future climate change conditions.

11.2.8 Consideration of Human Health

The specific management of water quality issues are addressed under several pieces of legislation and guidance as previously listed but predominantly through The Water Environment (Water Framework Directive) (England and Wales) Regulations (2003) [10] which seek to ensure that water quality throughout the UK's water bodies improves and/or maintains an appropriate level for ecological and human health requirements.

Poor water quality, in addition to having ecological impacts can directly affect human health such as through impacts on ground water aquifers or bathing waters.

Floods are one of the most common environmental emergencies and have significant health impacts. Short term health impacts are usually due to injuries, infections, exposure to chemical hazards and disruption to health services; the longer term effects are less well understood and may arise from the impact of damage to homes, loss of domestic utilities, having to move out until the home is habitable, and delayed recovery [31].

As this assessment focuses on water quality, and, flood risk impacts and effects during demolition/construction and operation, the assessment indirectly considers aspects that are fundamental to human health.

11.2.9 Consideration of Risk of Major Accidents and/or Disasters

The assessment looks at the potential for flood risk impacts and effects during construction and operation.

11.2.10 Alternatives

A comprehensive alternative sites assessment has been undertaken and is addressed within Chapter 5 Alternatives and Design Evolution. An alternative future baseline scenario has been included within the assessment for comparison purposes as stated in Chapter 2 EIA Methodology.

11.2.11 Assessment of Baseline Conditions & Receptor Sensitivity

The baseline assessment covers the application site and surrounding areas which may impact the proposed development or be susceptible to impact as a result of the proposed development; this includes major water bodies (i.e. the River Mersey) which are likely to be impacted. The baseline review will take into account the following baseline scenarios:

- Existing baseline, or the assessment baseline (conditions in 2017, 2018, and 2019 – when relevant surveys were undertaken and which remain valid as they are not subject to rapid variation) assuming no change to the current application site and adjacent site uses; and
- Future baseline (the anticipated changes to the baseline should the Liverpool Waters consent, as per permission ref. 19NM/1121 – variation of original 10O/2424 be built out, including on the Bramley-Moore Dock application site).

The current baseline for the assessment is 2019. Effects are to be considered both during demolition, construction and operational phase of the proposed development.

11.2.12 Surveys

Table 11.3 sets out the surveys that have been undertaken at the application site to inform the understanding of the baseline conditions.

Table 11.3

Surveys completed

SURVEY TYPE	UNDERTAKEN BY	DATE
Utilities Search (Desktop)	Murphy Surveys	June 2017
Utilities Ground Penetrating Radar (GPR)	Murphy Surveys	September 2019
Topographic Survey	Murphy Surveys	June 2017-July 2020
Topographic Survey - Hydraulic Tower Elevations	Murphy Surveys	June 2017
Topographic Survey - Manhole Sheets	Murphy Surveys	June 2017 – June 2017
Bathymetric Survey (Bed Levels)	Peel Ports (GAT)	December 2016
Bathymetric Survey (Bed Levels)	Shoreline Surveys Ltd	June 2017
Water Level Survey, Dock and River Level	Shoreline Surveys Ltd	July – September 2017
Groundwater Investigation - Phase 1	Geotechnical Engineering Ltd	June 2017 – December 2017
Groundwater Investigation - Phase 2	Structural Soils Ltd	January 2018 – July 2018
Existing Dock Wall and Dock Gate Condition Survey - Above water	BuroHappold	July 2017 -August 2020
Existing Dock Wall and Dock Gate Condition Survey - Below water	Pebble Engineering (Kaymac)	July 2017
River Wall Condition Survey (by drone) at Low Tide	Tecbug Drone Services Ltd	July 2017
Utilities GPR/CCTV/Laser Scan Surveys	Murphy/ Laser/ Sumo	June 2019-April 2020
Dock Wall Penetrations/Openings	Murphy/ Redbox/ Geoterra	October 2019
Hydraulic Tower Condition Survey	Murphy Surveys-Curtins	October 2019-June 2020
Dock Lock Gates Surveys	Hughes Subsea services limited	July 2020
CCTV and Photographic surveys	Murphy Surveys	July 2020

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SURVEY TYPE	UNDERTAKEN BY	DATE
Intrusive survey of southern sluice and sill survey	Hughes Subsea services limited	May 2020
UXO survey inside dock	Brimstone	June 2020
Water Level Survey, BMD and Nelson Dock	Structural Soils	November-December 2020

11.2.13 Assessment of Baseline Sensitivity

Table 11.4 sets out the scale of sensitivity that has been applied to receptors identified and considered within this assessment.

Table 11.4
Scale of receptor sensitivity used in the assessment

SENSITIVITY	DESCRIPTION
High	■ Water body of high amenity value, including areas of bathing and where water sports are regularly practiced. ■ Water bodies of good or high chemical or ecological status. Includes designated bathing waters, Sites of Special Scientific Interest (SSSI), Special Protection Area (SPA)/Special Area of Conversation (SAC), Ramsar site or highly sensitive aquatic ecosystem. ■ Water bodies currently failing water quality objectives. ■ Areas which are highly vulnerable with reference to flood risk. These can include essential infrastructure, emergency services and basement dwellings.
Medium	■ Water body of moderate amenity value including public parks, boating, non-contact sports, popular footpaths adjacent to water courses, or watercourses running through housing developments/town centres. ■ Water body of moderate ecological status and/or non-public water supply or cyprinid fishery. Water body of nature conservation importance at the regional level or a moderately sensitive aquatic ecosystem e.g. Site of Nature Conservation Interest (SNCI). ■ Areas which are more vulnerable with reference to flood risk, these can include hospitals, hotels, and residential institutions, drinking establishments, nightclubs and hotels. Non–residential uses for health services, nurseries and educational establishments.
Low	■ Water body of poor ecological status. A source in close proximity to a source protection zone or abstraction point. ■ Water body of particular local social/cultural/educational interest. Water body of low amenity value with only casual access, e.g. along a road or bridge in a rural area. ■ Areas which are less vulnerable with reference to flood risk, these can include retail, commercial and general industrial units, agricultural/forestry sites and water/sewage treatment plants.
Negligible	■ Low sensitivity aquatic ecosystem. ■ Water of poor ecological status. ■ Water body of no amenity value, seldom used for amenity purposes, in a remote or inaccessible area. ■ Areas which are considered to be water-compatible with reference to flood risk, these can include flood control infrastructure, docks/marines, pumping stations and recreation/landscape areas.

11.2.14 Assessment of Magnitude

The assessment was undertaken based on the description of development contained in Chapter 3 of this volume of the ES. Table 11.5 indicates the scale of impact magnitude that has been used in undertaking the assessment.

Table 11.5
Scale of magnitude for Water Resources and Flood Risk impacts used in the assessment

MAGNITUDE	DESCRIPTION
Large	■ Wholesale changes to a watercourse channel, route or hydrology (for example the complete re-canalisation of the water course or conversely the restoration of previously canalised water course). Significant changes to soil erosion or sedimentation patterns. Major changes to the water chemistry of surface run-off and groundwater. ■ Changes to site resulting in an increase in discharge/run-off with flood/sewage exceedance potential. A large increase to flood risk of water bodies and areas downstream. A large risk of flooding to site infrastructure and users, as determined by an on-site FRA in accordance with NPPF. ■ Surface water run-off from large areas of the site with a high pollution hazard level (as defined by the CIRIA SuDS Manual) entering the watercourses.
Medium	■ Some fundamental changes to the watercourse and hydrology. Moderate (partial) changes to soil erosion or sedimentation patterns. Moderate changes to the water chemistry of surface run-off and groundwater. ■ Changes to site resulting in an increase in discharge/run-off within system capacity. A medium increase to flood risk of water bodies and areas downstream. A medium risk of flooding to site infrastructure and users, as determined by an onsite FRA in accordance with NPPF. ■ Surface water run-off from small to medium areas of the site with a medium pollution hazard level (as defined by the CIRIA SuDS Manual) entering the watercourses.
Small	■ Minor changes to the watercourse. Minor changes to soil erosion or sedimentation patterns. Minor changes to the water chemistry of surface run-off and groundwater. ■ Changes to site resulting in slight increase in discharge/run-off well within drainage system capacity. A small increase to flood risk of water bodies and areas downstream. A small risk of flooding to site infrastructure and users, as determined by an onsite FRA in accordance with NPPF. ■ Surface water run-off from small areas of the site with a small pollution hazard level (as defined by the CIRIA SuDS Manual) entering the watercourses.
Negligible	■ No change to the watercourse, run-off and soil erosion and sedimentation patterns and water chemistry. ■ Very minor to no change in discharge run-off and increased pressure on sewer capacity. ■ No increased flood risk to water bodies and areas downstream. No risk of flooding to site infrastructure and users, as determined by an onsite FRA in accordance with NPPF. ■ Surface water run-off from negligible areas of the site with a very low pollution hazard level (as defined by the CIRIA SuDS Manual) entering the watercourses

11.2.15 Assessment of Significance

The assessment of significance within this chapter is based on the matrix presented in Table 11.6.

Table 11.6
Significance Matrix

MAGNITUDE OF EFFECT	SENSITIVITY OF RECEPTOR			
	High	**Medium**	**Low**	**Negligible**
Large	Major	Moderate	Moderate/ Minor	Negligible
Medium	Moderate	Moderate	Minor	Negligible
Small	Moderate/ Minor	Minor	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Effects are also described as to whether they are:

- Permanent or Temporary
- Direct or Indirect
- Effect nature: beneficial or adverse
- Reversible or Irreversible
- Short (0-5 years), medium (5-10 years), or long term (10+ years).

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11.2.16 Relevant Associated Development

Not relevant.

11.2.17 Assumptions/Limitations

- The understanding with regard to flood risk, foul water drainage and surface water drainage has been informed though a number of best practice modelling techniques, to produce the most accurately available baseline and future scenarios.
- Ground contamination, mobilisation of ground contaminants and hydrogeology are not addressed in this Chapter and are covered in Chapter 10 Ground Conditions & Contamination, which should be referred to for assessment details.
- There are no known records of groundwater flood risk in Liverpool. This could be attributed to the recording mechanism and the fact that it is unlikely such an event would have been correctly diagnosed.
- The EA surface water flood map shows pockets of low to high risk areas within the dock basin. Areas identified within the dock basin are anomalies and should be ignored.
- The assessment considering Liverpool Waters references the Liverpool Waters Environmental Assessment issued November 2011 (informed original outline planning permission ref. 10O/2424). Whilst the assessment is over 10 years old, the conclusions are assumed to be still applicable.
- The bathymetric data used is from 2017, and although some small changes to bed levels may have occurred since then due to natural processes, it is not anticipated these are significant enough to have affected this assessment.
- There is a free hydraulic connection between BMD and Sandon Half-tide Dock (SHTD) to the north, and Nelson Dock (ND) to the south. The connection to the south is via 8no 600mm diameter culverts, with sluice gates that enable temporary closure of the connection. This connection will need to be severed during the construction period for operational reasons. At present this effect has not been quantified, however, it is expected that flows are small and water quality impacts on the connected dock system minimal. This will be monitored during the construction period with mitigation measures proposed, as outlined later in this chapter.
- Where design proposals are indicated on the planning drawings they are treated as 'Design Interventions'. For the purpose of this assessment some additional design decisions and strategies are also treated as 'Design Interventions' despite not being shown in the planning drawings. This working basis is considered appropriate as such design decisions and strategies are supported by significant technical work, for example the key elements of the drainage and utilities strategies.

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11.3 BASELINE CONDITIONS

11.3.1 Existing Baseline

KEY RECEPTORS	DESCRIPTION	SENSITIVITY	FURTHER INFORMATION
Mersey Estuary	■ The Mersey Estuary stretches for a distance of approximately 30 miles from the upper tidal limit of Howley Weir in Warrington to the sea. At its widest point, between Hale Head on the north shore and Ince Bank on the south, it is approximately five kilometres across. ■ The River Mersey, BMD, Nelson Dock, and SHTD all fall within the Mersey Estuary, which is an operational catchment of the North West River Basin District. ■ Under the national system of classifying river pollution, which ranges from 1 (good) to 4 (heavily polluted) the Mersey estuary is rated as Class 3 which means it is too polluted to have any large fish populations and the water can only be used by industry and not for drinking. The Mersey Estuary is widely regarded as one of the most polluted estuaries in Europe. ■ The overall water body of the Mersey Estuary is classified as 'moderate'. With ecological status classified as 'moderate' and the chemical status classified as 'fail'. Currently failing to meet the quality standards (ecological and chemical status) of the Water Framework Directive (WFD). ■ The Mersey Estuary is classified as heavily modified under the WFD (see Appendix 11.1 for further information) and has an obligation to achieve 'Good ecological potential'. By definition, artificial and heavily modified water bodies are not able to achieve natural conditions. Instead the classification and objectives for these water bodies, and the biology and habitat structure they provide an environment for, are measured against ecological potential rather than status. ■ The Estuary is important in terms of leisure and recreational pursuits, as well as a large area being classified as a SSSI, Special Protection Area (SPA) and Ramsar site.	High	WFD classification of the Mersey Estuary (EA Catchment Data Explorer, accessed 03/10/2019) North West River Basin (© Crown Copyright and database rights 2018, from River basin management plant issued 2015, accessed: 03/10/2019)
Bramley Moore Dock (BMD)	■ BMD is part of the Liverpool dock system. It is the northernmost dock in Liverpool Waters, lies north of Nelson Dock, south of Wellington Dock (which has been infilled and houses the United Utilities Waste Water Treatment Works (UU WwTW)) and south of SHTD. ■ There is a free hydraulic connection between BMD and SHTD to the north, and Nelson Dock to the south. The connection to the south is via 8no 600mm diameter culverts, with sluice gates that enable temporary closure of the connection. ■ It was historically home to the Liverpool docks coal export, and was previously used for aggregate storage and distribution, operated by Mersey Sands. Most recently it has been occupied by Svitzer, which operated their tug boat services, and Cataclean. The respective parties leases were due to expire in 2020 but have both had their leases renewed up to June 2021 with the option for the leases to be terminated at two months' notice (but not before January 2021). ■ BMD comprises hard-standing to the perimeter of the dock water body and existing surface water drainage discharges into Nelson Dock and the River Mersey. Small areas of vegetation are present, predominantly on the western wharf close to the lock entrances. Existing ground levels within the application site typically range between 6.6m AOD (top of dock wall level) and 6.8m AOD. Along the eastern edge of the site, ground levels rise gradually to meet the Regent Road level of 7.1m AOD to 7.2m AOD. The western boundary of the site is the elevated River Mersey wall, which forms an informal flood defence to the site. ■ From the site specific survey and the Liverpool Waters FRA, the water levels in BMD are understood to be maintained within an operational range of 3.8m AOD to 4.6m AOD. ■ The contaminant levels in 15 bed samples (results, December 2019) were assessed and compared against the current Cefas action levels. Exceedances of Cefas Action Level 1 were reported for the determinants analysed, however, no exceedances were reported of Action Level 2. Further details are provided in Appendix 11.8.	Medium	■ Groundwater Investigation Phase 1 – Geotechnical Engineering Ltd – June 2017 – December 2017 ■ Groundwater Investigation Phase 2 – Structural Soils Ltd – January 2018 – July 2018 ■ Dock and River Level Survey – Shoreline Surveys – July – September 2017
Nelson Dock	■ Immediately south of the application site, lies Nelson Dock. Whilst a crossing separates BMD from Nelson Dock, hydraulic connectivity is maintained via 8no 600mm diameter culverts that pass through the structure. Sluice gates are installed within the culverts; when closed there is no hydraulic connection between the two docks. There is an open connection to Salisbury Dock and then to the dock complex further south.	Medium	N/A
Sandon Half-tide Dock (SHTD)	■ Immediately north of the application site, lies Sandon Half Tide Dock. There is an open hydraulic connection from BMD. SHTD lock gates are now sealed from the River Mersey. Connection to the River Mersey is now further north in the dock complex through Langton Lock.	Medium	Appendix 11.1 for further details regarding WFD status
River Mersey	■ The River Mersey flows from the Peak District in the North West of England, through Manchester and out to sea at Liverpool. The Mersey is a tidal river with the second highest tidal range in the UK of about 10 m. Water quality in the River Mersey has been severely affected by industrialisation in the region. ■ The River Mersey is to the west of the application site but does not immediately abut the site being separated by the River Mersey Wall and the concrete crown wall that is immediately to the east of the Mersey River Wall. ■ As classified under the WFD, the Overall Water Body Status (2015 assessment) is 'Moderate'. The Ecological Status is also 'Moderate'. The Chemical Status is 'Fail'. The Target Status is 'Good by 2027'.	High	Appendix 11.1 for further details regarding WFD status. Chapter 12 &13 Ecology of this ES for further details on statutory designations.

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KEY RECEPTORS	DESCRIPTION	SENSITIVITY	FURTHER INFORMATION
Water services infrastructure (supply)	■ The application site is served by UU for potable water, there is an existing 280mm diameter main in Regent Road adjacent the application site. There are a series of abandoned water mains in the docks which are approximately shown in Appendix 11.5. There is an existing private main that runs from Regent Road which serves the dock sheds on the Southern Wharf and fire hydrants along the Southern Wharf. ■ The existing daily water demand of the application site will have been limited during its occupation. The site has been occupied by Svitzer, which operated their tug boats and Cataclean from the Southern Wharf till their respective leases expired in December 2019. There is a small welfare area for the tug boat company facilities. ■ The EA 2013 Water Stressed Areas policy paper classified the UU region as 'moderate stress', which was classed as 'not serious'. ■ UU's current Water Resource Management Plan (WRMP) for 2020-2045 (published in 2019, also referred to as FWRMP19) identifies a surplus of water available to meet the projected demand over the next 20 years to 2040, with a deficit occurring from 2041 to 2045. ■ The WRMP has reported surplus in 25 year plan however with anticipated future uncertainties the risk remains medium.	Medium	Refer to Appendix 11.5 Existing Services Drawing
Water services infrastructure (surface water capacity)	■ Private - The existing situation at the application site is considered to have very little in the way of formal surface water drainage infrastructure. The majority of rainwater falling onto the site flows across the paved areas to drop directly over the dock edge and into the dock waters. A number of historic gullies have been observed and surveyed on the western boundary of the site alongside the River Mersey. These gullies provide drainage to the rear of the existing crown wall and connect back to Nelson Dock via a large culvert opening in the dock wall, identified during a dive survey of the wall. The line of this connection is defined by the line of historic gullies leading from the crown wall to Nelson Dock. All flows will ultimately connect through to the River Mersey via the wider dock water system. ■ Public - There is no dedicated public surface water network in proximity to the application site.	Low	A full description and drawings of the existing drainage infrastructure is provided in the drainage strategies, Appendix 11.4
Water services infrastructure (foul water capacity)	■ Private Network - Very little existing foul water drainage is present on site and pipework that was identified is no longer functioning and completely blocked. No connections off site were identified during the survey. Disused toilets within the Hydraulic Tower were noted to discharge directly into the dock waters via an outfall in the listed dock wall.	Medium	A full description and drawings of the existing drainage infrastructure is provided in the drainage strategies, Appendix 11.4
Water services infrastructure (foul water capacity)	■ Public Network – The UU Waste Water Treatment Works (WWTW) is located immediately north of the site with an extension to the works situated on Wellington Dock which was formally opened in 2016. The works serve the majority of the city, including the existing Goodison Park stadium. Two existing combined public sewers run down Regent Road, adjacent to the application site, and discharge to the UU WWTW: ■ The Mersey Estuary Pollution Alleviation Scheme (MEPAS) tunnel. This was constructed in the 1990's to intercept combined outfalls to the Mersey and direct flows to the treatment works. It is c2.5m in diameter and approximately 10m below ground next to the application site. The system is used for storage of effluent generated during heavy rainfall and flows are controlled by a series of gates along its run. ■ A Combined sewer serving a more local catchment, c5m deep to invert and 675/920mm in dia.	Low	A full description and drawings of the existing drainage infrastructure is provided in the drainage strategies, Appendix 11.4
Fluvial and Coastal Flood Risk	■ The River Mersey has the second highest tidal range in the UK, varying from 4m at neaps to 10m at spring tides. The river flow is about 1% of the tidal flow. The most severe flood risk is likely due to high tidal levels, however, the EA flood maps for planning do not differentiate between fluvial and tidal flooding. While the EA flood maps for planning put the site in Flood Zones 1, 2 and 3, inspection of the site topography in conjunction with flood level information put the site in Flood Zone 1. This has been formally agreed by the EA at a pre-application scoping meeting on November 2019. ■ The Mersey Estuary 2018 Study Flood Levels showed the flood levels for the site for both the defended and undefended scenarios are similar (6.15m AOD for 1 in 100 year and 6.48m AOD for 1 in 1000 year). The flood levels are still water levels within the River Mersey. ■ The EA has no records of flooding affecting the application site. ■ EA provided predicted flood levels for 2065 and 2115 to account for climate change and sea level rise (SLR). With existing site levels generally below 6.8m AOD, the vast majority of the site would move into Flood Zone 3 by 2115 (6.97m AOD) (i.e. high risk of flooding), assuming no benefit from existing or proposed defences. At approximately 7.1m AOD Regent Road would remain free from flooding in 2115.	Medium	Detailed assessment of existing flood risk to the application site and a full summary of consultations with the EA is provided in the FRA Appendix 11.3.

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KEY RECEPTORS	DESCRIPTION	SENSITIVITY	FURTHER INFORMATION
	■ Wave overtopping can occur due to a combination of a high still water level and waves meeting a structure such as the river wall or lock entrance isolation structures. At the application site these may be swell waves penetrating from the Irish Sea or locally generated wind waves within the River Mersey estuary. The areas that have the potential to be affected during a storm event are the at grade car park, and broadcasting area that are located immediately behind the River Mersey wall as part of the proposed development. From the wave overtopping analysis, it has been found that for present day conditions the Mersey River wall protects the west part of the site up to and including a 1 in 100 year and 1 in 2-year event for vehicles and pedestrians respectively under present day conditions. The level of protection decreases to a 1 in 5 year event for vehicles under the climate change condition. Areas along the western boundary are not considered safe for pedestrians during any storm, under climate change conditions.		
Surface water and Sewer Flood Risk	■ The Liverpool Integrated Model surface water flood map (Appendix 12.3) shows that there is a low flood risk from surface water within or at the vicinity of the application site. ■ The EA flood map shows that there are areas adjacent to the site shown to be at low risk from surface water flooding (1 in 1000 year event). These areas include Regent Road immediately outside the site with depths predicted to be less than 300mm. Considering the low flood levels, it is anticipated that access to and from the site can be attained safely via Regent Road during up to the 1 in 1000 year surface water flood event. ■ UU have been consulted on incidences of sewer and infrastructure flooding in the local area. The sewer networks surrounding the site are generally combined systems, where both rain water and foul effluent drain to the same pipes. This means rain water runoff becomes contaminated and needs to be treated prior to disposal. ■ A large upgrade of the sewer systems in the area was completed in 1989, including construction of the UU WwTW and the MEPAS tunnel that runs beneath Regent Road. The latter provides a large volume of storage to retain the runoff from large rainfall events and allow its treatment at the Sandon Dock works prior to discharge to the Mersey. ■ Flooding due to sewer failure since the upgrade works have only occurred during very heavy intense storm conditions coinciding with a high tide. ■ The large storage capacity of the MEPAS tunnel and its gated systems of outfalls make flooding rare and United Utilities have no recorded incidents or knowledge of any flooding in the vicinity of the application site. ■ A trunk water main is present beneath Regent Road to the north-west of the site and smaller distribution mains run north-south along the road. A failure of these mains could lead to flooding within Regent Road.	Low	Detailed assessment of existing flood risk to the application site and a full summary of consultations with the EA is provided in the FRA Appendix 11.3.
Other Flood Risk	<u>Groundwater</u> ■ According to the LCC Preliminary Flood Risk Assessment (PFRA, 2011), there are no known records of groundwater flood risk in Liverpool. ■ This could be attributed to the recording mechanism and the fact that it is unlikely such an event will have been correctly diagnosed. ■ Groundwater level within Made Ground has been found to be relatively consistent, except for a peak in early January 2018 (likely in response to rainfall) followed by a decline back to approximate average levels by mid- January 2018. ■ There are differences in levels of groundwater in Made Ground on each of the four wharves, suggesting the water bodies are not in hydraulic continuity and that they relate to levels of impermeable materials on each of the wharves. <u>Reservoirs, Canals and Other Artificial Sources</u> ■ The EA map shows that there are no reservoirs located within the vicinity of the application site and that the site does not lie within a breach flood flow path of a reservoir. According to the PFRA, there are no LCC records of canal flooding and British Waterways' records show no canal breaches within Liverpool since a breach in 1940 caused by bombing.	Low	Detailed assessment of existing flood risk to the application site and a full summary of consultations with the EA is provided in the FRA Appendix 11.3.
Site Neighbours occupying adjacent land (Flood Risk)	■ There are resident neighbours who live in Houses in Multiple Occupation (HMOs) on the east side of Regents Road adjacent to the site, as well as workers / site visitors to nearby commercial/ industrial sites. At present, the application site currently does not significantly reduce flood risk to any site neighbours.	Low	N/A

11.3.2 Future Baseline

KEY RECEPTORS	DESCRIPTION	SENSITIVITY	FURTHER INFORMATION
Mersey Estuary	■ According to the EA Catchment Management tool, the Mersey Estuary is expected to reach its objective of 'Good' by the year 2027. ■ The overall water body of the Mersey Estuary is classified as 'moderate'. With ecological status classified as 'moderate' and the chemical status is classified as 'fail'. The Mersey Estuary was expected to maintain this status at the end of the previous WFD planning cycle. The potential Chemical Status by 2027 is to achieve 'Good Chemical Status'. ■ Environmental impact assessment of Liverpool Waters scheme (LPA ref. 100/2424) highlighted the potential pollution risk to the Mersey due to general construction activities and during operation. The residual significance of these effects were identified as minor adverse.	High	Further information in Appendix 11.8 for Liverpool Waters ES Water chapter

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KEY RECEPTORS	DESCRIPTION	SENSITIVITY	FURTHER INFORMATION
BMD	■ The dock would be influenced by the build out of the Liverpool Waters scheme (LPA ref. 100/2424). ■ Impacts on water quality due to construction activities (which would be temporary) and operation of Liverpool Waters, specifically by creating floating pontoons in BMD, in addition to the surrounding residential-led development on the wharves, would have an identified minor adverse residual significance of effect	Medium	Further information in Appendix 11.8 for Liverpool Waters ES Water chapter
Nelson Dock	■ The dock would be influenced by the build out of the Liverpool Waters scheme. ■ Impacts on the water quality due to construction activities (which would be temporary) and operation of Liverpool Waters, specifically by permanent floating structures in Nelson Dock (outline permission), in addition to the surrounding residential-led development on the wharves, would have an identified minor adverse residual significance of effect.	Medium	Further information in Appendix 11.8 for Liverpool Waters ES Water chapter
SHTD	■ No residual effects are identified within the Liverpool Waters ES. Note, although the ES only refers only to the 'Northern Docks', it is assumed this includes SHTD.	Medium	Further information in Appendix 11.8 for Liverpool Waters ES Water chapter
River Mersey	■ The residual significance of effects on the water quality of the River Mersey due to construction activities (which would be temporary) of Liverpool Waters are identified are as minor adverse in the scheme's ES. ■ The residual significance of effects on the water quality of the River Mersey due to operational activities of the Liverpool Waters scheme are identified as neutral, in its respective ES.	High	Further information in Appendix 11.8 for Liverpool Waters ES Water chapter
Water services infrastructure (supply)	■ Impact on water availability due to increased water demand at Liverpool Waters as a consequence of full build out, has been identified as minor adverse in the Liverpool Waters ES. Considering the amount of development that is planned in the area, the future sensitivity of potable water supply has been classified as high.	Medium	Refer to Appendix 11.5 Existing Services Dwg And Liverpool Waters ES Water Chapter
Water services infrastructure (surface water capacity)	■ Impacts upon flood risk due to an increase in peak flow run off rates as a result of the Liverpool Waters' scheme. The LW scheme would reduce the relevant receiving dock waterbody area by circa 21% (due to infilling of the west side of West Waterloo Dock in the Central Docks Neighbourhood, section 8.5.58 of the Liverpool Waters ES Water Chapter). A high level assessment included within the Liverpool Waters ES Water Chapter estimates that the water level within the dock would increase by less than 30mm, which is identified as a minor adverse effect in the Liverpool Water ES. ■ Additional impacts upon docks due to Liverpool Waters construction site include water disposal increasing run off rates (and therefore flood risk) throughout all phases. The residual significance of this effect is identified as neutral within the Liverpool Waters ES.	Medium	N/A
Water services infrastructure (foul water capacity)	■ Upgrade work to UU WwTW has been completed to ensure adequate foul provision for the area in the future. It should be noted that the works do not solely facilitate Liverpool Waters but provides for future city population growth. However, due to the amount of development that is planned in the area, the future sensitivity of this receptor for future baseline is identified as medium.	Medium	N/A
Fluvial and Coastal Flood Risk	■ The Liverpool Water ES concludes that there will be neutral (non-significant) effects due to the permanent loss of floodplain as a result of the Liverpool Waters scheme. ■ From the wave overtopping analysis for the project site it was found through a new assessment that the river wall protects the west part of the site up to and including a 1 in 100 year and 1 in 2-year event for vehicles and pedestrians respectively under present day conditions. The level of protection decreases to a 1 in 5 year event for vehicles under the climate change condition. Areas along the western boundary are not considered safe for pedestrians during any storm, under climate change conditions. was safe for use up to and including a 1 in 5 year and 1 in 100 year event for the climate change condition for pedestrian and vehicles respectively, along the entire length of the river wall. This risk was not explicitly addressed in the LW ES and so that it is assumed it would be the same for the baseline condition.	Medium	Detailed assessment of existing flood risk to the application site and a full summary of consultations with the EA is provided in the FRA Appendix 11.3.
Surface Water and Sewers Flood Risk	■ Impacts upon flood risk due to an increase in peak flow run off rates as a result of Liverpool Waters scheme - the LW scheme would reduce the relevant receiving dock waterbody area by circa 21% (due to infilling, page 46 section 8.5.58)). A high level assessment highlighted the water level within the dock increased by less than 30mm, which is identified as a minor adverse effect in the Liverpool Waters' ES.	Low	Detailed assessment of existing flood risk to the application site and a full summary of consultations with the EA is provided in the FRA Appendix 11.3.
Other Sources of Flooding	■ There is no specific commentary on groundwater flood risk in the Liverpool Waters' ES, however, it is unlikely to be altered significantly by the Liverpool Waters scheme. ■ There is no specific commentary on Reservoirs, Canals and Other Artificial Sources flood risk in the Liverpool Waters' ES, however, it is unlikely to be altered significantly by the Liverpool Waters scheme.	Low	Detailed assessment of existing flood risk to the application site and a full summary of consultations with the EA is provided in the FRA Appendix 11.3.
Site Neighbours (Flood Risk)	■ The Liverpool waters scheme will introduce a new population, including residential uses. The occupants of these uses are considered to have a high sensitivity. The Liverpool Waters' ES does not assess flood risk impact to 'Site Neighbours'. The overall residual flood risk of Liverpool Waters was identified as Minor Adverse.	Medium	N/A

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11.3.3 Potential Significant Impacts

PHASE	DESCRIPTION	ADVERSE/BENEFICIAL
Demolition/Construction	Increased water demand from construction site uses relative to low level current uses	Adverse
Demolition/Construction	Increase in sediment loads caused by site run-off containing elevated suspended sediment levels. This risk is most significant during the raking of the bed, and the infilling works, where there is a hydraulic pathway for the transmission of sediments to the wider dock network. The disturbed sediments from raking could be contaminated, but testing has shown this to be at low concentrations (Cefas level 1 exceedance). There will be some residual risk during stadium construction from site activities, including run-off from stockpiles, and wheel washing.	Adverse
Demolition/Construction	The increased risk of the release of hydrocarbons and oils into the on-site drainage system due to a large number of vehicles accessing the site, leakage from oil/fuel storage tanks and accidental spillages	Adverse
Demolition/Construction	The risk of accidental leaks and use of hazardous materials, particularly concrete and cement products, which can be contained in uncontrolled wash-down water and surface water run-off	Adverse
Demolition/Construction	Elevated dust levels resulting from demolition and construction activities on the site	Adverse
Demolition/Construction	Increase in number of people exposed to flood risk (surface water, tidal and fluvial) due to introduction of construction work force to application site	Adverse
Demolition/Construction	Disturbance of potentially contaminated sediments and water displacement from removal of dock basin sediment. Contamination levels are confirmed as low.	Adverse
Demolition/Construction	Disconnection of north/south hydraulic connection between Sandon Half-Tide Dock, BMD, and Nelson Dock during construction phase, potentially affecting salinity levels and water quality in wider dock complex	Adverse
Demolition/Construction	Risk of spilling of sediments and loss of fuel (both accidental) in River Mersey due to dredger mooing alongside river wall during infilling	Adverse
Operation	Increased demand on potable water service infrastructure as a result of the proposed development during match day, non-match day and other event uses	Adverse
Operation	Increased demand on foul water service infrastructure as a result of the proposed development during match day, non-match day and other event uses	Adverse
Operation	Changes in the surface water drainage network on site and subsequent implications onto the drainage regime to surface water bodies including the River Mersey and Nelson Dock (e.g. potential for changes in sediment load)	Adverse

11.4 DESIGN INTERVENTIONS

DESIGN INTERVENTION	DESCRIPTION	REASON FOR INTERVENTION	FURTHER INFORMATION
Flood Risk Assessment Requirements	In order to protect the proposed development from tidal flood risk, the following measures have been incorporated within the proposed development's design: ■ Football stadium is raised to 7.3m AOD, more than 300mm above the DFL (Design Flood Level) (1 in 200 year still water level with climate change allowance; 6.97m AOD). ■ The road along the north of the stadium is also raised above the DFL to a minimum of 7.1m AOD to allow dry access and egress. ■ The switchroom, transformer equipment and sensitive equipment of electric vehicle charging points, will be raised 300mm above DFL.	To reduce the flood risk to the site and surrounding areas for a 1 in 200 year flood event for the design life of the proposed development, taking into account the effects of climate change.	Flood Risk Assessment Report in Appendix 11.3
Surface Water Drainage and Pollution Control	The surface water drainage network has been developed to a significant degree of detail. The key outcomes are listed here. The network is split into four catchments: ■ The Northern portion of stadium and access road: run-off is collected by a network that runs around to the north of the site, under the access road, heading west, before passing through an advanced hydrodynamic vortex separator that removes sediment, gross pollutants, liquid hydrocarbons, sediment bound hydrocarbons and sediment bound heavy metals and nutrients. Flows then discharge via a new outfall, under the proposed northern isolation structure. ■ The stadium, and fan zone: run-off is collected by a network that runs under the pitch itself before passing through an advanced hydrodynamic vortex separator and discharging, via a new outfall, through the new wall forming the water channel. ■ A section to the south of the stadium that will drain south through a new outfall into Nelson Dock. ■ West of the site: Flows will then be collected in a below ground network and combined at a single manhole, prior to passing through an advanced hydrodynamic vortex separator and discharging via a new outfall, under the proposed northern isolation structure. Two areas are deemed a medium pollution hazard level as defined by the CIRIA SuDS Manual [2]: ■ The pitch – This has its own pumped drainage system and will contain fertilisers in the run-off. As such this will be discharged to the foul water network, and ■ Service/Delivery area – This zone will have HGV's parked up and manoeuvring. The area is covered and therefore, run-off will be limited to wash-down and small volumes of wind driven rain. This increases the possibility of run-off becoming contaminated and therefore it is intended this zone is drained to the foul water network.	Protect against flooding on the application site for the following critical storms, in accordance with the 'Non-statutory technical standards for sustainable drainage systems' (DEFRA, 2015): ■ 1 in 30yr = no surface flooding of the system, ■ 1 in 100yr (+Climate Change) = temporary ponding in non-critical areas, ■ Collect and convey surface water away from developed areas in a safe and controlled manner, for the critical 1 in 30yr and 1 in 100yr (+climate change) events, ■ Provide measures to improve the quality of run-off, where contamination could occur, prior to discharge, ■ Be sustainable and maintainable, ■ Be appropriate for and compliment a developed, landmark urban space,	Drainage Strategy in Appendix 11.4

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DESIGN INTERVENTION	DESCRIPTION	REASON FOR INTERVENTION	FURTHER INFORMATION
		■ Ensure structural integrity over the duration of the design life.	
Permanent channel connecting ND and SHTD	Design of channel giving full hydraulic connectivity (via pipes) from north-south in the dock complex. Due to the reduction in volume relative to present day BMD, current flows through the channel should be higher than at present (although still small) to assist with maintaining water quality and stabilising salinity levels.	To maintain the current continuous hydraulic connection throughout the whole dock system	

11.5 ASSESSMENT PRE-MITIGATION (INCLUDING DESIGN INTERVENTIONS)

11.5.1 Proposed Development Scenario

PHASE	RECEPTOR(S) AFFECTED	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Demolition/Construction – Raking of Dock Deposits	Nelson Dock	Disturbance of potentially contaminated sediments: ■ It is necessary to rake the dock deposits in advance of the dock infilling. The raking procedure will aim to recover metallic objects or obstructions that would otherwise disrupt the piling operations. Dock deposit and sediment disturbance as a result of racking activity can result in potential mobilisation of existing contamination that been identified within the BMD. Dock deposits will be disturbed with potential for mobilisation of contamination with impact to water quality and consequently marine flora and fauna. However, contamination levels are small - less than Cefas Action Level 2. Mitigation is therefore not considered necessary.	Small	Minor Adverse	No	
	SHTD	Disturbance of potentially contaminated sediments: ■ It is necessary to rake the dock deposits in advance of the dock infilling. The raking procedure will aim to recover metallic objects or obstructions that would otherwise disrupt the piling operations. Dock deposits will be disturbed with potential for mobilisation of contamination with impact to water quality and consequently marine flora and fauna. However, contamination levels are small - less than Cefas Action Level 2. Mitigation is therefore not considered necessary.	Small	Minor Adverse	Yes	
Demolition/Construction – BMD Wall Remedial Works & Demolition	Nelson Dock	■ The increased risk of the release of hydrocarbons and oils into the on-site drainage system due to a large number of vehicles accessing the site, leakage from oil/fuel storage tanks and accidental spillages ■ Vehicles trafficking along edge of Nelson Dock during BMD Wall Remedial Works ■ Elevated dust levels resulting from demolition and construction activities on the site	Small	Minor Adverse	Yes	
	SHTD	■ Accidental leaks and spillages of significant amounts of hazardous materials migrating into the on-site drainage system or directly to the SHTD ■ Dust and debris blowing into the Dock	Small	Minor Adverse	Yes	
Demolition/Construction – Dock Isolation Structure (north and south)	Nelson Dock	■ Disconnection of north/south hydraulic connection during construction phase could impact on the salinity and other water quality parameters within Nelson Dock and the southerly dock network. It is not considered possible to quantify this impact, it is therefore assumed to be large. ■ Baseline monitoring has established that there is an existing natural variation in salinity and dissolved oxygen levels to this water body, which is impacted to a large degree by activity in the southern dock system. Although there is likely to be a gradual trend toward freshwater conditions within Nelson Dock during construction, the existing species assemblage is likely to comprise a more freshwater dominated community given the current flow conditions and existing isolation structure.	Large	Minor Adverse	No	
	SHTD	■ Disconnection of north/south hydraulic connection during construction phase could impact on the salinity and other water quality parameters within SHTD and the northerly dock network. Salinity within the northern dock network may increase due to the disconnection of flow from the south. The impact is expected to be minor given that the majority of inflow/outflow to/from the northern dock network is direct with the Mersey. It is not considered possible to quantify this impact, it is therefore assumed to be large.	Large	Minor Adverse	No	
Demolition/Construction – Dock Infill	Nelson Dock	■ Possible migration of infilling material by wind or run-off into Nelson Dock	Small	Minor Adverse	Yes	

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PHASE	RECEPTOR(S) AFFECTED	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
	SHTD	■ Overspill of water into SHTD during in the infilling of BMD. Potential for suspended sediments within the overspill water resulting in sedimentation within SHTD and the northerly dock network. Overspill rate has been estimated at 56,000m^3 per day.	Small	Minor Adverse	Yes	Information provided within 'Dock Infill Methodology for Planning Documentation'
	River Mersey	■ The infilling operation, although not directly hydraulically connected, has some potential to lead to some depositing of dredged material within the river. This would chiefly be from two sources; (1) overspill from the dredger, or breakage of the floating pipeline, when moored in the river, or (2) conveyance of suspended sediment through the dock complex from the positive flow created by discharge of the spent water into SHTD. (1) is not an intended action by the dredging contractor and so would be an accidental event, and would be limited in its volume, and is unlikely to occur. (2) given the extremely low current speeds in the northern dock system, the distance such suspended sediments would need to travel and the locking system, it is likely that any suspended sediments would simply deposit within SHTD adjacent to BMD.	Negligible	Negligible	No	
Demolition/Construction – Stadium Construction	Nelson Dock	■ It is identified that during stadium construction in particular during piling installation there is a potential risk of accidental release of hydrocarbons release in shallow made ground and oils into the on-site drainage system or directly to adjacent waterbodies including Nelson Dock. ■ Accidental leaks and spillages of significant amounts of hazardous materials, migrating into the on-site drainage system or directly to the Mersey Estuary, Docks and Surface Water Features. ■ The water used to clean concrete wagon discharge chutes carry two issues: high pH and high suspended solids content. ■ Dust and debris blowing into the Dock Increased dust levels in water bodies may reduce the levels of light reaching aquatic plant and animal species. Effects will however be temporary; water quality within the affected water body will improve over time as dust and debris settle or are trapped by vegetation.	Small	Minor Adverse	Yes	
	SHTD	■ Accidental leaks and spillages of significant amounts of hazardous materials migrating into the on-site drainage system or directly to the SHTD. ■ Dust and debris blowing into the Dock. Increased dust levels in water bodies may reduce the levels of light reaching aquatic plant and animal species. Effects will however be temporary; water quality within the affected water body will improve over time as dust and debris settle or are trapped by vegetation.	Small	Minor Adverse	Yes	
	River Mersey	■ Dust and debris blowing into the Mersey Estuary. Increased dust levels in water bodies may reduce the levels of light reaching aquatic plant and animal species. Effects will however be temporary; water quality within the affected water body will improve over time as dust and debris settle or are trapped by vegetation.	Small	Minor Adverse	Yes	
Demolition/Construction	Water services infrastructure: Supply	Increased water demand. Processes during the site preparation, excavation and construction phase of the development which may require significant volumes of water supply including sanitary facilities for site staff, and water supply for wheel washing and washing down of construction areas. The magnitude of change on strategic water supplies will be small. This results in a likely moderate adverse temporary/short term effect on strategic water supplies.	Small	Moderate Adverse	Yes	N/A
Demolition/Construction	Water services infrastructure: Surface Water Capacity	Increased sediment loads. Sediment loads could block and clog the existing public drainage network within close proximity to the site. Due to the connection of existing surface water runoff into docks and River Mersey in the absence of mitigation, the magnitude of change is potentially large and the effect significance major adverse. Dewatering of excavations. The dewatering of excavations may need to be discharged to the combined sewer or to the Mersey Estuary under formal agreement with the sewerage undertaker or the EA. The latter is preferred if permission can be secured. In the case of the former, discharge into the combined sewer, the volume will minimise the flow capacity temporarily.	Moderate	Moderate Adverse	Yes	N/A
Demolition/Construction	Water services infrastructure: Foul Water Capacity	Increased foul water drainage demand. During pre-application consultation on 30/06/2017, UU were consulted regarding the proposed development and connections of the foul sewer to the existing UU infrastructure. UU confirmed that there is sufficient capacity to accept the flows from the proposed development and therefore, an unrestricted flow would be appropriate. The magnitude of impact is therefore, negligible.	Negligible	Negligible	No	N/A

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PHASE	RECEPTOR(S) AFFECTED	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Demolition/Construction	Site users	Flood risk to site workers (from groundwater, surface water, and tidal flooding from Mersey Estuary). In the absence of measures to protect construction workers from surface water flooding and the residual tidal and fluvial flood risks to the site, in addition to risks of water ingress from any excavations on site, the potential magnitude of change on the construction workers and plant is likely to be small and the significance of effect is considered to be moderate in significance, without further mitigation. Wave Overtopping: In extreme and rare storm events there is a possibility of wave overtopping occurring at the existing River Mersey wall to the west of the site, affecting a zone running parallel with the wall and approximately extending 15m back from the Riverside face. During such an event there would be a hazard to people (injury) and equipment which would need to be managed on site by creating an exclusion zone.	Small	Minor Adverse	Yes	N/A
Demolition/Construction	Site Neighbours	Flood risk to site neighbours via change in overflow path or increase in hard standing area	Negligible	Negligible	No	N/A
Operation	Neighbouring water bodies	Formalised drainage network to capture and manage the surface water run-off on site. Two areas are deemed a medium pollution hazard level as defined by the CIRIA SuDS Manual [2] are to be discharged to the foul network. For the majority of the remaining areas, the surface water run-off will be collected and passed through an advanced hydrodynamic vortex separator.	Small	Minor Adverse	Yes	N/A
Operation	Water services infrastructure: Supply	Increased potable water demand. Due to the scale of the proposed development, the water demand once complete and operational will increase from the baseline (although some offsetting by the closing of Goodison Park stadium). The peak water load has been based on a refill time of 4 hours for a 270,000 litre potable water tank. For firefighting, a flow of 25l/s is required assuming only 1 hydrant will be used at any given time. See Appendix 12.5 for further details. The level of water stress for the UU region was identified as 'moderate stress' in the final classifications of the 2013 Water Stressed Areas policy paper issued by the EA, under the current and future scenarios. This was classed as 'not serious', and is classed a medium sensitivity receptor, the increase in water demand from the proposed development is likely to be moderate adverse without mitigation.	Small	Moderate Adverse	Yes	N/A
Operation	Water services infrastructure: Surface Water Capacity (Private)	Change in runoff rates. ■ Formalised drainage network to be constructed to manage surface water on site and discharged into the docks. Levels have been designed to allow temporary ponding of surface water runoff for the 1 in 100 year + 40% climate change. ■ The maximum depth of surface water flooding that can occur during the 1 in 100 year + 40% climate change is 80mm.This occurs in the fan zone and reaches a maximum level of 6.63mAOD, this is over 670mm below the finished floor level of the building, which is set at 7.30mAOD. As a result, the east entrance stairwells and lift lobbies are exposed to ponding of less than 10mm. This would not affect safe emergency access or egress. This depth of water is considered a low hazard risk based on guidance from 'Flood Risk Assessment Guidance for New Development' (FD2320 and FD2321). ■ The maximum depth of surface water flooding that can occur in the at grade car park (West Quay) 1 in 100 year + 40% climate change is 40mm. This depth of water is considered a low hazard risk based on guidance from 'Flood Risk Assessment Guidance for New Development' (FD2320 and FD2321). ■ It is considered that the risk of surface water flooding to the site is medium. The risk is adequately mitigated within the site to allocated ponding areas. ■ In an exceedance event, water would pond temporarily within the at grade car park in the low areas around channel drains and gullies before reaching a maximum depth of circa 100mm. Water would then flow over the harbour wall edges into the new water channel. ■ In an exceedance event, water would pond temporarily within the fan zone in the low areas around channel drains and gullies before reaching a maximum depth of 250mm. Water would then flow over the harbour wall edges into Nelson Dock) Information on safe access and egress and evacuation during extreme flood events can be found in FRA in Appendix 12.3.	Small	Moderate/ Minor Adverse	Yes	N/A
Operation	Water services infrastructure: Foul Water Capacity	Increased foul water drainage demand. During pre-application consultation on 30/06/2017, UU were consulted regarding the proposed development and connections of the foul sewer to their existing infrastructure. UU confirmed that there is sufficient capacity to accept the flows from the proposed development and therefore, an unrestricted flow would be appropriate. UU were formally consulted again during the original planning application and have confirmed (15th May 2020 correspondence) that they have no objection to the principles of the drainage strategy. UU have recommended planning conditions are imposed to ensure the drainage is implemented as proposed and the long-term maintenance of the system is agreed.. The effect is, therefore, negligible.	Negligible	Negligible	Yes	N/A
Operation	Site users: Flood Risk & Wave Overtopping	Flood risk to site users.	Small	Moderate Adverse	Yes	■ N/A

WATER RESOURCES & FLOOD RISK

PHASE	RECEPTOR(S) AFFECTED	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
		■ Finished Floor Levels of the stadium are proposed to be set at a minimum of 7.3mAOD based on the 2115 1 in 200 year with 300mm freeboard allowance. ■ The East Stand turnstiles and lift lobbies are set at lower levels to tie in with the existing levels of the exposed Grade II listed BMD walls. At approximately 7.1m AOD Regent Road would remain free from flooding in 2115. ■ The at-grade car parking, Fan Zone, the SE and NE stairwells and lift lobbies of the East Stand of the stadium, and parts of the western terrace, are proposed at levels under the Design Flood Level (DFL). This is chosen to maintain existing levels for heritage reasons. The expected depth of flooding within this area is approximately 350mm. The proposed uses in these areas are in majority less vulnerable, or compatible with flooding. Flood resilient measures will be incorporated where needed. Safe access and egress for vehicles and pedestrians is provided via the raised access road along the northern boundary of the site. ■ The maximum depth of surface water flooding that can occur during the 1 in 100 year + 40% climate change is 80mm.This occurs in the fan zone and reaches a maximum level of 6.63mAOD, this is over 670mm below the finished floor level of the building, which is set at 7.30mAOD. As a result, the east entrance stairwells and lift lobbies are exposed to ponding of less than 10mm. This would not affect safe emergency access or egress. This depth of water is considered a low hazard risk based on guidance from 'Flood Risk Assessment Guidance for New Development' (FD2320 and FD2321). ■ The maximum depth of surface water flooding that can occur in the at grade car park 1 in 100 year + 40% climate change is 40mm. This depth of water is considered a low hazard risk based on guidance from 'Flood Risk Assessment Guidance for New Development' (FD2320 and FD2321). ■ In an exceedance event, water would pond temporarily within the at-grade car park in the low areas around channel drains and gullies before reaching a maximum depth of circa 100mm. Water would then flow over the harbour wall edges into the new water channel. ■ In an exceedance event, water would pond temporarily within the fan zone in the low areas around channel drains and gullies before reaching a maximum depth of 250mm. Water would then flow over the harbour wall edges into Nelson Dock). Information on safe access and egress and evacuation during extreme flood events can be found in FRA in Appendix 12.3. This depth of water is considered a danger to some risk based on guidance from 'Flood Risk Assessment Guidance for New Development' (FD2320 and FD2321). Wave overtopping. In extreme events there is a possibility of wave overtopping occurring over the existing River Mersey wall to the west of the application site, affecting a zone running parallel with the wall and extending 15m back from the Riverside face. The impact of wave overtopping is limited to the at grade car park; wave overtopping is not anticipated to affect the rest of the application site. The existing crown wall along the western boundary of the site will provide some protection.				
Operation	Site neighbours	Flood risk to site neighbours on Regent Road. The risk is identified to be negligible as a result of design interventions proposed for the development in the management of surface water drainage on BMD site. The risk from other sources of flooding is unchanged. Flood risk to the UU WWTP (adjacent to the application site to the north). The risk is identified to be negligible as a result of a design intervention proposed for the development on BMD site (boundary upstand wall along the northern boundary of the site). The risk from other sources of flooding is unchanged.	Negligible	Negligible	No	N/A

11.5.2 Proposed Development + Liverpool Waters Scenario

There are identified to be no additional detrimental effects of the LW project (LPA ref. 19NM/1121 – variation of original outline ref. 10O/2424) being developed alongside the development of BMD. Whilst each project will have its own effects to be mitigated, it is not considered that any of these respective effects in combination elevate the risk level. Water and power demands for the respective developments will be subject to further consultation on agreement with the service providers.

11.6 MITIGATION & ENHANCEMENT MEASURES

The contractor will develop a Construction Environmental Management Plan (CEMP) to cover both the demolition and construction site works. It will include mitigation measures to protect the water environment. This will set out how construction activities will be undertaken in accordance with good practice guidance, including the Pollution Prevention Guidelines (PPG) formerly published by the EA (and now available in the National Archives), particularly 'PPG1 General guide to the prevention of water pollution', 'GPP2 Above ground oil storage tanks', 'GPP5 Works and maintenance in or near water ', and 'PPG6 Working at construction and demolition sites', and other good construction guidance such as CIRIA 'Guidance C532 - Control of water pollution from construction sites'.

A summary of the mitigation measures proposed to reduce adverse effects of construction and operation on the water and flood risk at site can be found in the table below

WATER RESOURCES & FLOOD RISK

PHASE	POSSIBLE EFFECT BEING MITIGATED	MITIGATION MEASURE	HOW SECURED / TRIGGER	MAGNITUDE POST-MITIGATION	ADVERSE/BENEFICIAL	FURTHER INFORMATION
Demolition/Construction-Dock Infill	Migration of sediments into adjacent water bodies	Development and implementation of a Construction Environment Management Plan (CEMP) that considers the following measures: ■ Discharging water during the dock infilling from BMD to SHTD has been agreed by Peel Ports. The dredged material/water mix will be pumped into BMD via a floating pipeline from a dredger moored in the Mersey. The spent water will be cleared of suspended material via stilling ponds within BMD, and finally through a temporary weir over which excess water will spill into SHTD. Whilst the vast majority of the suspended sediment will be captured in BMD to maximise the efficiency of the operation, some residual suspended material may be taken into SHTD. The following considerations have been made to prevent pollution during the infilling works: ■ The vessels used will be sea certified; ■ Method statements and plans will be in place by the appointed contractor to prevent a pollution incident from occurring. The method statement will need to contain full details of all pollution control measures and will be required in order to obtain the necessary consents and licences from the relevant stakeholders. ■ The pipeline will be secure to ensure there are no spillages during pumping.	CEMP to be secured through planning condition and implemented by contractor.	Negligible	Negligible	
Demolition/Construction-Stadium Construction	Elevated sediment loads in surface water and dewatering of excavations	Development and implementation of a Construction Environment Management Plan (CEMP) that considers the following measures: ■ Soil gradients should be kept as shallow as possible to prevent large amounts of earth being washed away during periods of heavy rainfall. Areas which are exposed should be surfaced as soon as practicable. ■ Enforce tight control of site boundaries including minimal land clearance and restrictions on the use of machinery adjacent to water bodies. Bunding of stockpiles within 10 m of water bodies or drainage lines. ■ Wheel washing facilities should be provided at all entry and exits points. Water from wheel wash facilities must be contained and filtered in an appropriate manner to remove suspended solids before discharge into the on-site surface water sewerage network. ■ Capture runoff from site in perimeter cut off ditches and/or settlement tanks where possible. Any dewatering required from site excavations should be pumped into a settlement tank or lagoon and not discharge direct to a water body or the on-site surface water sewerage network. ■ Sediment should be removed from water pumped during any extractions required. Sediment should be removed prior to discharges to the surface water network through the use of a baffle tank system or equivalent. ■ Sediment/soils encountered during construction activities such as earthworks could be contaminated. This has an associated risk of mobilising pollutants, which could be released to surface waterbodies. The working practices that should be put in place to prevent and manage this issue are described in Chapter 18 Ground Conditions. ■ CEMP to include dust suppression measures such as dampening and wheel washing.	CEMP to be secured through planning condition and implemented by contractor.	Negligible	Negligible	See Chapter 8 Air Quality for further details on dust suppression. See Chapter 10 Ground Conditions for further details on working practices to minimise mobilisation of pollutants, during activities such as earthworks.
Demolition/Construction	Accidental release of hydrocarbons and oils into the on-site drainage system or directly to the neighbouring Docks	Development and implementation of a CEMP that considers the following measures: ■ Incorporation of interceptors where appropriate into the site drainage system at high risk areas, such as parking, unloading and refuelling areas, to remove hydrocarbons and oils from surface water prior to discharge.	CEMP to be secured through planning condition and implemented by contractor	Negligible	Beneficial	

WATER RESOURCES & FLOOD RISK

PHASE	POSSIBLE EFFECT BEING MITIGATED	MITIGATION MEASURE	HOW SECURED / TRIGGER	MAGNITUDE POST-MITIGATION	ADVERSE/BENEFICIAL	FURTHER INFORMATION
		■ Other measures including drip trays under equipment such as generators, and wheel washing facilities should also be implemented to minimise the risk of pollutants infiltrating groundwater or the surface water drainage network. ■ Emergency Response Plan to be prepared and implemented in the event of a spill. Measures such as spill containment kit to be strategically located around site particularly at high risk locations such as fuelling points and car parks.				
Demolition/Construction	Accidental leaks and spillages of significant amounts of hazardous materials migrating into the on-site drainage system or directly to the neighbouring Docks and Surface Water Features	Development and implementation of a CEMP that considers the following measures: ■ Provision of storage facilities and tanks; conduct refuelling of machinery within bunded areas, which should not be located within 10m of water bodies or drainage lines. ■ Storage and bunded areas to be constructed of impervious floors and walls with the capacity for the contents of the storage tank and an additional ten per cent safety margin. ■ As a remedial measure, spill containment equipment such as absorbent materials to be stored on site. ■ Mixing of construction materials, such as cement, will be conducted in designated areas located away from water bodies and drainage lines.	CEMP to be secured through planning condition and implemented by contractor	Negligible	Beneficial	
Demolition/Construction	Dust and debris blowing into the Mersey Estuary, Docks and Surface Water Features	Apply dust management procedures typically implemented for air quality management issues, such as: ■ Damping down to suppress the creation of dust. Mitigation measures typically used for dust management are discussed in Chapter 8 Air Quality. ■ Implement good site practice, perimeter fences and tight control of materials and waste to minimise the risk of debris entering water bodies.	CEMP to be secured through planning condition and implemented by contractor	Negligible	Beneficial	Mitigation measures typically used for dust management are discussed in Chapter 8 Air Quality.
Demolition/Construction	Increased water demand during construction	All relevant contractors should investigate opportunities to minimise and reduce the use of water, such as: ■ Selection and specification of equipment; ■ Implementation of staff-based initiatives such as turning off taps, plant and equipment when not in use both onsite and within site offices; ■ Use of recycling water systems such as wheel washes, site toilets' handwash; and ■ Use of a rainwater harvesting system for use in equipment and vehicle washing.	CEMP to be secured through planning condition and implemented by contractor	Negligible	Beneficial	
Demolition/Construction	Flood risk to site workers during construction	■ Contractor to prepare a flood emergency and contingency plan including arrangements to make safe any static plant, move any mobile plant, and to evacuate site operatives in a flood risk emergency. ■ Construction workers should be made aware of risks associated with excess surface water caused by overland flows and standing water. For example, risks to excavations and damage to plant. ■ To minimise any risk from groundwater flooding during excavation of the site, cut levels should be limited to at least 0.5m above the groundwater level. Where this is not possible, dewatering and other groundwater control measures should be employed. Any such groundwater control measures will also require pollution control measures in accordance with EA guidance.	CEMP to be secured through planning condition and implemented by contractor	Negligible	Beneficial	
Operation	Increased pressure on water service infrastructure: Supply	On -site potable water network will be provided for the site as part of the proposed development. This will be connected to the existing United Utilities network in Regents Road. Water efficiency measures that will reduce potable peak demand and subsequent foul flows including the following: ■ Cold water storage tanks provided to smooth out peak flow rates from the public main Low flow fittings: low flush toilets, spray taps, low flow showers and waterless urinals; ■ Efficient water supply: Leak detection, smart meters and pressure reduction	Through the development of potable water and foul water strategy between now and construction of the development	Negligible	Beneficial	

WATER RESOURCES & FLOOD RISK

PHASE	POSSIBLE EFFECT BEING MITIGATED	MITIGATION MEASURE	HOW SECURED / TRIGGER	MAGNITUDE POST-MITIGATION	ADVERSE/BENEFICIAL	FURTHER INFORMATION
		The advantage of demand management is not only for reducing supply but also for minimising the volume of the foul drainage element to the combined sewer.				
Operation	Flood risk to site users	Flood warning: For areas of car parking, and public realm below the Design Flood Level (DFL), due to heritage value of dock walls, and for a 15m wide strip of land adjacent to the River Mersey wall, there remains a residual risk of flooding despite the design interventions. Non-match day operations may continue within the Stadium which is protected from flooding, but events involving large number of visitors would be cancelled. A flood warning and emergency plan shall be prepared prior to occupation for the application site. The plan will include trigger points aligned with recorded live flood levels and/or rainfall predictions and the actions taken following the trigger points. The plan will include for the safe isolation of these specific areas. Flood resilient measures will be incorporated within the ground level of the stadium east stairwells and lift lobbies, hydraulic tower and at-grade car park located on the western quay, e.g. raising of sensitive equipment such as vehicle charging points. The DNO compound and the OB kiosk are located outside the 15m wave risk zone and the transformers, switchroom, sensitive equipment of electric vehicle charging points, and the OB kiosk have been raised above 7.3m AOD to protect from water associated with wave overtopping that may penetrate the compound walls. Drainage is provided within the DNO compound to convey penetrated water volumes.	Flood Risk Assessment and preparation and acceptance of flood warning management plan	Small	Beneficial	Flood Risk Assessment

11.7 ASSESSMENT POST-MITIGATION

11.7.11 Proposed Development Scenario

PHASE	RECEPTOR(S) AFFECTED	RESIDUAL IMPACT	RESIDUAL EFFECT SIGNIFICANCE	BENEFICIAL/ADVERSE
Demolition/Construction – Raking of Dock Deposits	Nelson Dock	Disturbance of sediments, possibly contaminated at a low level (less than CEFAS Level 2), due to raking of BMD bed.	Minor	Adverse
	SHTD	Disturbance of sediments, possibly contaminated at a low level (less than CEFAS Level 2), due to raking of BMD bed.	Minor	Adverse
Demolition/Construction – BMD Wall Remedial Works	Nelson Dock	Migration of hazardous material or debris from BMD to ND	Negligible	N/A
	SHTD	Migration of hazardous material or debris from BMD to SHTD	Negligible	N/A
Demolition/Construction – Dock Isolation Structure (north and south)	Nelson Dock	Disconnection of north/south hydraulic connection BMD Dock	Minor	Adverse
	SHTD	Disconnection of north/south hydraulic connection SHTD Dock	Minor	Adverse
Demolition/Construction – Dock Infill	Nelson Dock	Possible migration of infilling material by wind or run-off into Nelson dock	Negligible	N/A
	SHTD	Migration of fines suspended sediment in excess water pumped into SHTD	Minor	Adverse
	River Mersey	Possible migration of infilling material by wind or run-off into Mersey	Negligible	N/A
Demolition/Construction – Stadium Construction	Nelson Dock	Migration of hazardous material or debris from BMD to ND	Negligible	N/A
	SHTD	Migration of hazardous material or debris from BMD to ND	Negligible	N/A
	River Mersey	Migration of hazardous material or debris from BMD to Mersey	Negligible	N/A
Demolition/Construction	Water services infrastructure: Supply	Increased water demand	Negligible	N/A
Demolition/Construction	Water services infrastructure: Surface Water Capacity	Increased sediment loads. Could block and clog the existing public drainage network Dewatering of excavations.	Negligible	N/A
Demolition/Construction	Site user	Flood risk to site workers	Negligible	N/A

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PHASE	RECEPTOR(S) AFFECTED	RESIDUAL IMPACT	RESIDUAL EFFECT SIGNIFICANCE	BENEFICIAL/ADVERSE
Demolition/Construction	Site Neighbours	Flood risk to site neighbours	Negligible	N/A
Operation	Neighbouring water bodies	Pollutants contained in surface water runoff contaminating water bodies	Negligible	N/A
Operation	Water services infrastructure: Supply	Increased potable water demand	Negligible	N/A
Operation	Water services infrastructure: Foul Water Capacity	Increased foul water drainage demand	Negligible	N/A
Operation	Site users: Flood Risk & Wave Overtopping	Flood risk to site users.	Negligible	N/A
Operation	Site neighbours	Flood risk to site neighbours on Regents Road.	Negligible	N/A

11.8 WATER RESOURCES AND FLOOD RISK: INTER-DEVELOPMENT CUMULATIVE SCHEME EFFECTS

Chapter 2 EIA Methodology of this ES lists all of the schemes to be considered for cumulative effects. After review, it is considered that no effects are applicable, apart from a general impact on water infrastructure: potable and foul, which is a specific concern for United Utilities as part of their forward planning and will be subject to further consultation with United Utilities.

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