Appendix 12A

Flood Risk Assessment

Flood Risk Assessment

Revision 3

Liverpool Waters

Plot CO2

West Waterloo Dock

26th October 2019

Ref: 4/6679

Prepared For:

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FLOOD RISK ASSESSMENT
Liverpool Waters, Plot CO2

Report Reference: 4/6679

Version 3

Date originated: 23rd November 2018

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Revision List

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1	Updated to suit comments	30th November 2018
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APPENDICES

1.0 INTRODUCTION

1.1 General

1.1.1 This report has been prepared on instructions received from Romal Capital Group Ltd and relates to the proposed development works at West Waterloo Dock as part of Liverpool Waters Project. The development is currently referred to as Plot CO2.

1.1.2 The development comprises of the formation of a new dock wall with the area behind infilled to provide the platform to erect four new apartment blocks (A-D) of 10 storeys. A total of 538 apartments (one – three bedrooms) will be provided across the development along with associated commercial space, car parking, landscaping, servicing and access.

1.1.3 This report sets out the results of a Flood Risk Assessment (FRA) required by the Local Planning Authority in support of the planning application for this development. The assessment has been carried out in accordance with the general principals set out in National Planning Policy Framework (February 2019) and Technical Guidance to the National Planning Policy Framework (October 2018).

1.1.4 This report is prepared solely for the benefit of the Client. This report may not be assigned without prior written permission from Clancy Consulting.

1.2 Background Information

1.2.1 In 2001 the Department for Transport Local Government Regions (DTLR) published Planning Policy Guidance Note 25 (PPG25), which explains how flood risk should be taken into consideration during the planning and development process.

1.2.2 PPG25 was replaced by Planning Policy Statement 25: Development and Flood Risk published in March 2010. This Policy Statement was introduced to place more emphasis on the increased flood risk from climate change.

1.2.3 PPS25 specified a sequential test which local planning authorities should apply to all future proposed development sites. An exception test may also be applied to provide a method of managing flood risk while still allowing necessary development to occur.

1.2.4 In February 2019, the Government released the updated National Planning Policy Framework (NPPF).

1.2.5 NPPF supersedes PPS25 although the principles set out in the new publication remain similar in terms of the flood risk aspect.

1.2.6 The NPPF has now been supplemented with a Planning Practice Guide which is available online.

1.2.7 The following zones define the levels of flood risk:

Zone 1: Low Probability

This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year. (<0.1%)

Zone 2: Medium Probability

This zone comprises land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.

Zone 3a: High Probability

This zone comprises land assessed as having between 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

Zone 3b: Functional Flood Plain

This zone comprises land where water has to flow or be stored in times of flood. Strategic Flood Risk Assessments should identify this zone.

1.2.8 As part of its general obligations under the Water Resources Act 1991, The Environment Agency has carried out surveys of its existing defences against flooding and has published a series of nationwide 'Indicative Floodplain Maps' based upon information from historic flood events and basic hydraulic modelling.

1.2.9 In general terms, these maps give a good indication of the areas likely to be affected by flooding. More recently the Environment Agency have published the 'Flood Map' on their website which is based on improved hydraulic modelling and detailed local data. The map indicates Zones 2 and 3 with Flood Zone 1 being all the land falling outside the Zones 2 and 3.

1.2.10 The EA Flood Map for the area of the proposed development indicates that the development is predominantly in Flood Zone 1. There is approximately less than 4% of the development which could be said to be within Flood Zone 3 and within the Flood Risk Assessment, further justification as to why this site should be considered Flood Zone 1 will be presented.

1.2.11 During this assessment, Merseyside Environmental Advisory Service (MEAS) have been contacted and as per their correspondence dated 4th October 2018. Item 35 indicates a Flood Risk Assessment is required as part of the Environmental Impact Assessment.

1.2.12 This report sits as part of the planning application and Flood Risk and Drainage have been considered as part of the EIA process in Chapter 12 of the Environment Statement which supports the application.

Likelihood of flooding in this area

This location is in an area with a low probability of flooding

FLOOD ZONE 1

Land and property in flood zone 1 have a low probability of flooding

More information about flood zones

1 You don't need to do a flood risk assessment if your development is in flood zone 1 and:

- smaller than one hectare
- is not affected by sources of flooding other than rivers and the sea, for example surface water drains

2 If your development is in flood zone 1 and:

- larger than one hectare
- is affected by sources of flooding other than rivers and the sea, for example surface water drains

you can learn more about flood risk assessment in flood zone 1

3 You can also read more about flood risk assessments for planning applications

Learn more about the potential sources of flood risk in this area

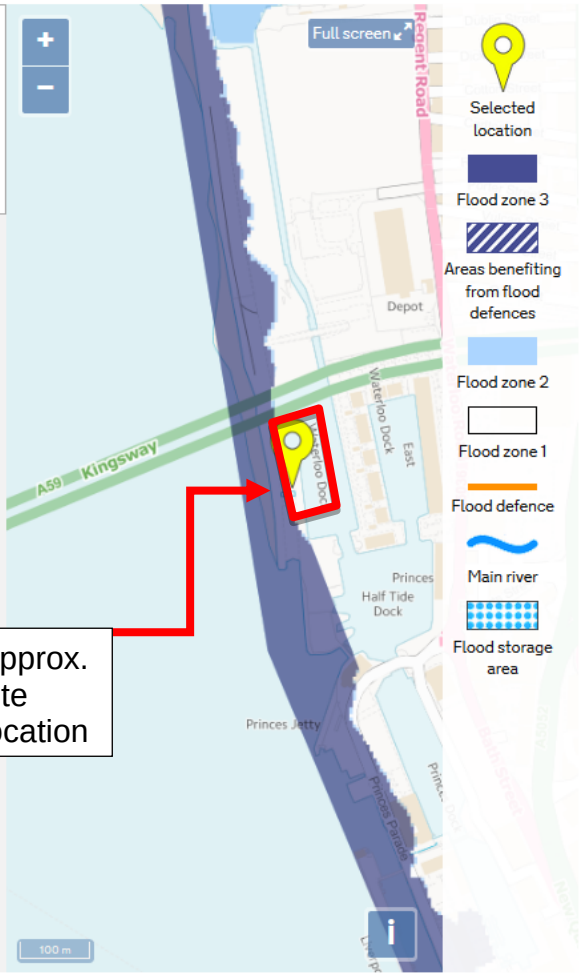


Figure 1 - Flood Risk Mapping for Rivers and Seas (https://flood-map-for-planning.service.gov.uk)

2.0 STRUCTURE OF THE REPORT

2.1 The report has been structured to follow the general principals set out in the Web based Practice Guidance.

2.2 The methodology for this FRA has comprised of a desktop study.

2.3 Sources of information have included, but not limited to the following;

- Environment Agency/ UK Government flood maps for rivers and sea flooding.
- Flood Risk Assessment by Detailed flood levels and mapping direct from the Environment Agency.
- UK Government Flood Warning Information Service maps for surface water flooding and reservoir flooding.
- Lead Local Flood Authority – Liverpool City Council – Surface Water Policy
- Flood Risk Resilience Strategy (Condition 21): Neighbourhood C by Curtins (June 2018) – referred to as Curtins Condition 21 Report within this document.
- United Utilities Public Sewer Records
- Ground Investigation Report by CC Geotechnical (October 2018).
- Non-statutory technical standards for sustainable drainage systems.
- Merseyside Environmental Advisory Service Discretionary Advice
- Natural England Discretionary Advice
- Canal & River Trust

3.0 SITE CATCHMENT CHARACTERISTICS

3.1 History and Current Use

3.1.1 The development is located as detailed as below.

OS X (Eastings)	333455
OS Y (Northings)	391242
Nearest Post Code	L3 0BT
Lat (WGS84)	N53:24:50 (53.413770)
Long (WGS84)	W3:00:09 (-3.002624)
LR	SJ334912
mX	-334250
mY	7025569

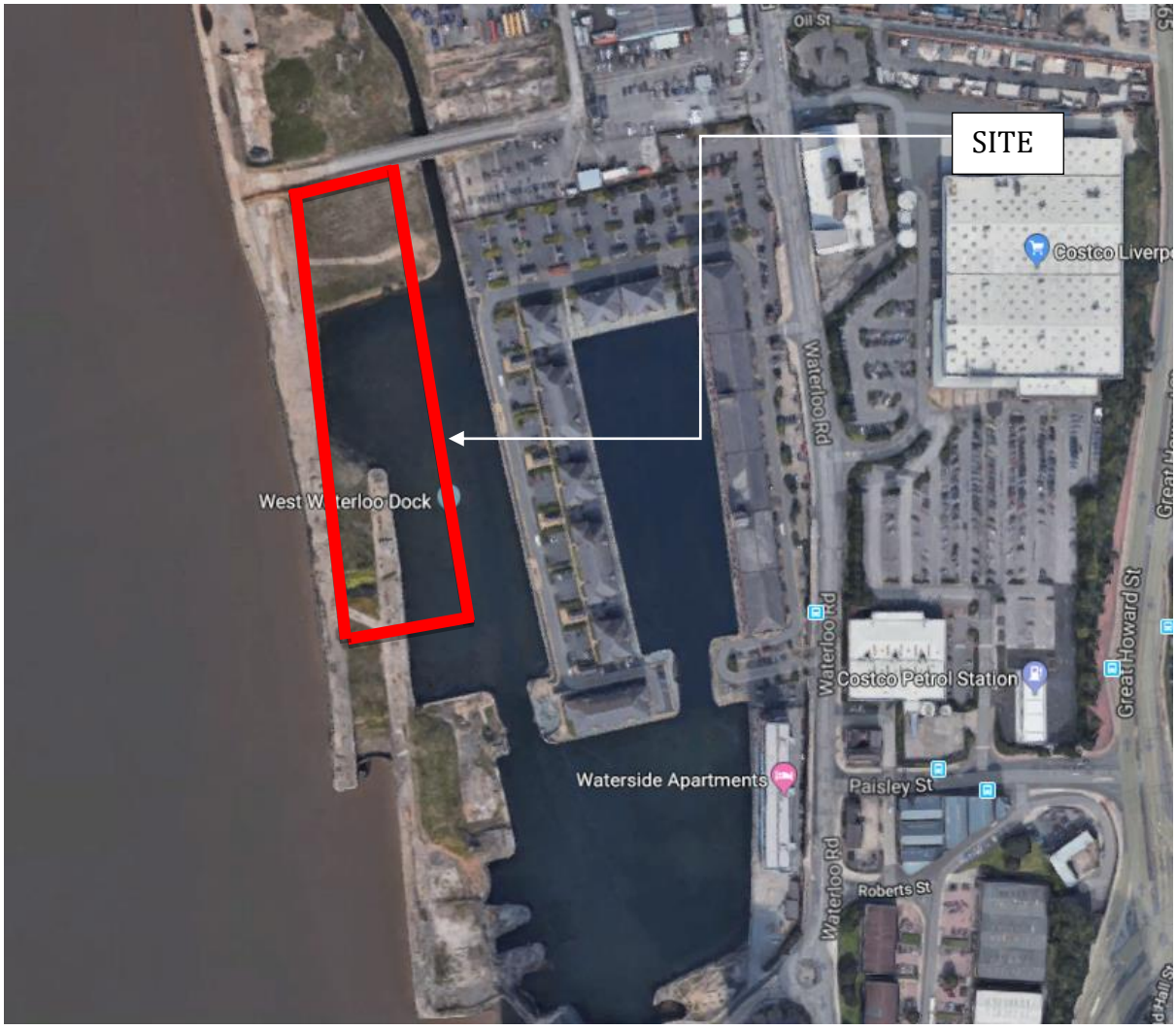


Figure 2 – Location Plan (Google Maps)

3.1.2 The development is located North of Liverpool City Centre within West Waterloo Dock on the waterfront. The development is bordered by the Liverpool Canal Link to the West, Princes Half Tide Dock to the South, The River Mersey (and river wall) to the East and undeveloped land to the North.

3.1.3 The area proposed for development was historically West Waterloo Docks and warehouses. Over time, the warehouses have been demolished and the dock itself has been partially infilled along with Waterloo Lock system, whilst other areas remain as the dock.

3.1.4 The development falls within the wider Liverpool Waters masterplan – covering the re-development of up to 60 hectares of former dock land along Liverpool Waterfront providing mixed use developments and an extension from Liverpool City Centre northwards.

3.1.5 Outline planning was granted by Liverpool City Council in June 2013 (Application no. 10O/2424) for a mixed-use development across 60 hectares of derelict dockland.

3.1.6 The overall area proposed for development is approximately 1.12 hectares

3.1.7 Site ground levels along the dock sides are generally flat at a level of approximately 8.000m AOD. The canal level is generally kept at approximately 4.770m AOD.

3.2.1 Development Proposals

1.2.13 The development comprises of the formation of a new dock wall with the area behind infilled to provide the platform to erect four new apartment blocks (A-D) of 10 to . A total of 538 apartments (one – three bedrooms) will be provided across the development along with associated commercial space, car parking, landscaping, servicing and access.

3.2.2 The ground floors of Blocks B and D are set at 8.400m AOD and the ground floors of Blocks A and C are set at 8.050m AOD. Across all the blocks, these contain commercial units, reception areas, plant rooms and storage for bicycles.

3.2.3 At Blocks C and D, the ground floor also contains residential dwellings facing onto the River Mersey.

3.2.4 A canal side walkway/ boardwalk will be provided at canal level with Blocks A and B projecting over into the canal to create a colonnade.

3.2.5 The lowest accessible level is set at 6.600m AOD (canalside/ colonnade) to provide a transition and access point between the blocks and the canal side.

3.2.6 A plan showing the proposed site layout is included within Appendix A.

4.0 FLOOD POTENTIAL

4.1 Development Proposal

4.1.1 As the site is proposed for mixed use development, Table 2 of the NPPF flood risk vulnerability classification indicates;

- Residential areas are classified as '*More Vulnerable*' developments.
- Retail and Commercial areas are classified as '*Less Vulnerable'* developments.

4.1.2 As Table 3 of the NPPF, Flood risk vulnerability and flood zone 'compatibility' indicates the site is predominantly in Flood Zone 1, with an estimation of less than 4% of the site being considered to be in Flood Zone 3.

4.1.3 Therefore, all forms of development are acceptable, and no exception tests are required to be undertaken.

4.2 Potential for Flooding

4.2.1 There are seven potential sources of flooding at the site which will be addressed in more detail in this report, i.e.

(i) Flooding from The River Mersey - Fluvial.

(ii) Flooding from The River Mersey - Tidal.

(iii) Flooding from Surface Water run-off

(iv) Flooding from the surcharging of drains or sewers on or around the development.

(v) Flooding due to high groundwater levels.

(vi) Flooding from Reservoirs.

(vii) Flooding from canals

(viii) Wave Action

4.3 Existing Historical Flooding Information

4.3.1 No historical flood records have been identified within or in the vicinity of the development.

4.4 Existing Structures Likely to Affect Local Hydraulics

4.4.1 There are no obstructions on the River Mersey within the immediate vicinity likely to result in flooding. The width and depth of the River Mersey reduce around Warrington where obstructions such as bridges can become a problem, but this is some 20km away.

4.4.2 The level of the canal is retained at 4.770m AOD and has a series of isolation structures primarily used to regulate water levels and contain any contamination should spills occur, along with a lock flight which is not believed to vary the water level significantly.

4.5 Flood Risk Probabilities

(i) Flooding from the River Mersey (Fluvial)

4.5.1 Flooding to the development from Rivers or the Sea is indicated in Figure 3. It can be seen that the development is at very low risk from fluvial flooding, although it is immediately adjacent to an area which is at high risk from fluvial flooding.

4.5.1.1 Although the Environment Agency note that there are no designated flood defences along the River Mersey adjacent to the development, there is a riverside dock wall.

The risk of fluvial flooding at this development is very low.

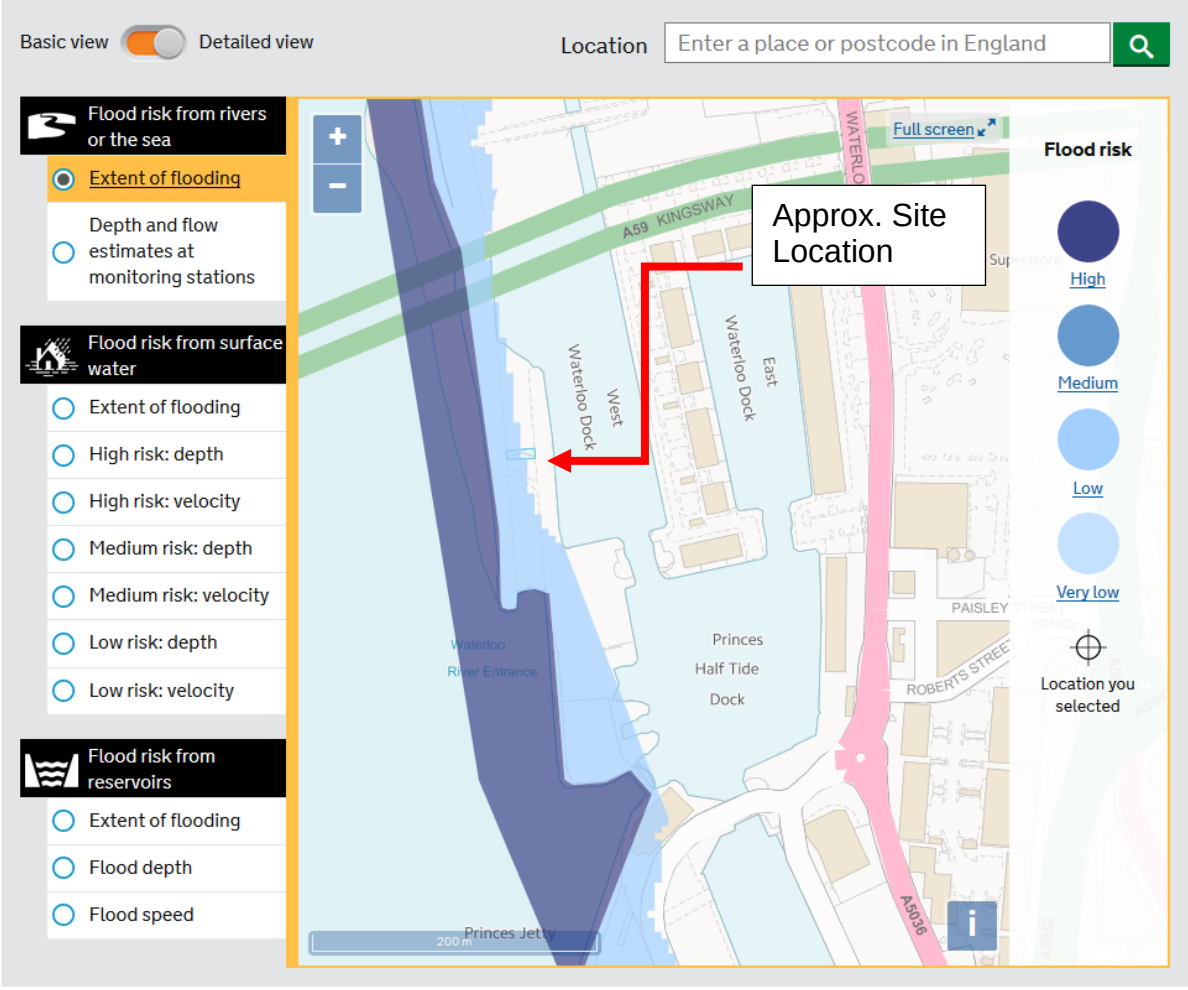


Figure 3 – Extent of Flood Risk from Rivers or the Sea (Environment Agency)

(ii) Flooding from the River Mersey (Tidal)

4.5.2 Liverpool Waters 2016 Extreme Sea Level Study indicates that for the 1 in 200-year extreme sea level up to the year 2115 has been estimated to be 6.830 m AOD. The

existing site is generally above this and the new development will predominantly by above this also.

4.5.3 All levels of the four Blocks are set higher than this level (minimum 8.050m AOD)

4.5.4 The modelled levels (2016) provided are as below;

Model node	Max Water level		
	1 in 10	1 in 100	1 in 200
Ea013_90001	5.69	6.03	6.13
	1 in 1000	1 in 200 + CC 2065	1 in 200 + CC 2115
	6.33	6.42	6.83

4.5.5 Although the Environment Agency note that there are no designated flood defences along the River Mersey adjacent to the development, there is a riverside dock wall. The lowest level surveyed on top of the wall adjacent to the site is 6.930m AOD which is just above the 1 in 200 + 2115 event.

4.5.6 Due to the topography of the development, any potential wave overtopping is likely to run straight across the site and into the dock which is considerably lower than the rest of the development.

The risk of tidal flooding at this development is generally low for habitable areas of the development but the commercial, plant and storage areas of the developments due to the lower ground level canal side access are at medium risk.

(iii) Flooding from Surface Water run-off

4.5.7 During periods of heavy rainfall, the capacity of sewers and drainage systems can be exceeded, surcharging of manholes and gullies can occur and surface water 'over-land' flood flows can occur.

4.5.8 The Environment Agency flood maps for surface water have been consulted and an extract for this area is included below (Figure 4). The mapping indicates that there is generally a medium risk of surface flooding within the dock with a small area of high risk identified adjacent to the infilled lock.

4.5.9 The actual area of existing land which forms part of the development is at low risk and should remain at low risk as the proposed levels are higher than existing.

The risk of flooding from Surface Water Run-off at this development is low.

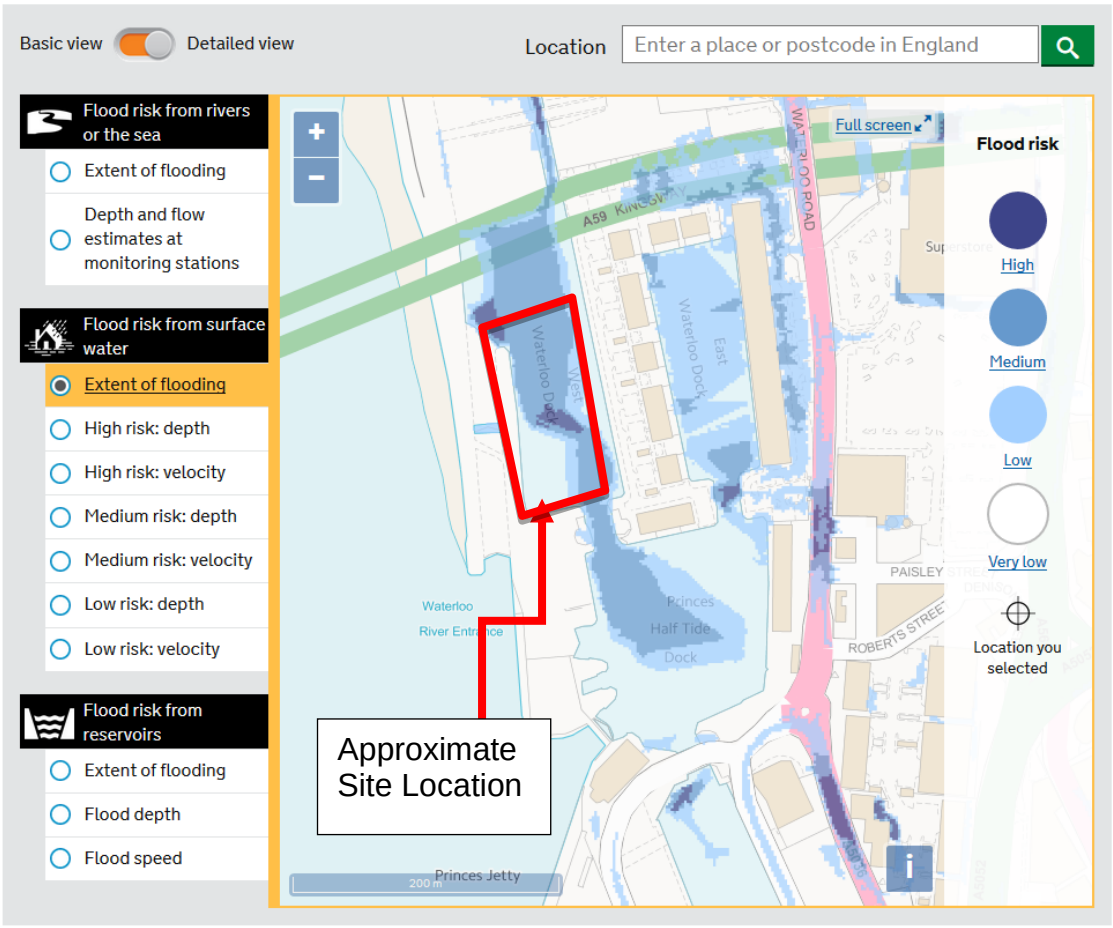


Figure 4 – Surface Water Flood Map (Environment Agency)

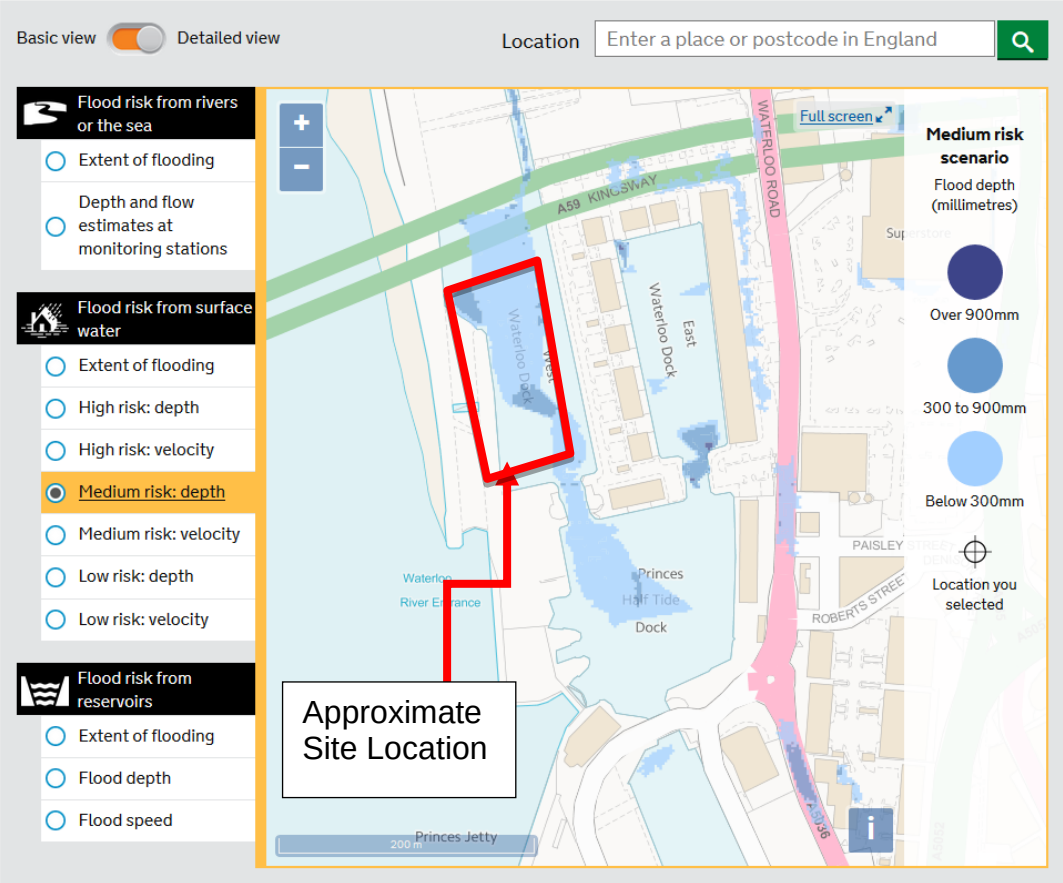


Figure 5 – Surface Water Flood Map Depths (Environment Agency)

(iv) Flooding from the surcharging of drains or sewers on or around the site.

4.5.10 The approximate depths of surface water flooding have been estimated by the Environment Agency to be generally below 300mm within the dock, with those peak areas increasing to between 300 – 900mm.

4.5.11 There are currently no drainage systems situated along the existing dock access road which runs adjacent to the development.

4.5.12 However, the adjacent site is to be developed for the Isle of Man Ferry Terminal and a new road – referred to as the Northern Link Road - is proposed to run along the perimeter of the site.

4.5.13 The Flood Risk Assessment for the Northern Link Road indicates the storm sewerage for the site has been designed in accordance with DMRB Volume 4 (HD 33/16 and HA 102/00) for a 1 in 100 year storm event with checks against 1 a in 30 year storm event. The drainage system has also been assessed for the consequences of exceedance for return periods in excess of 1 in 100 years to ensure any surcharge levels do not exceed the levels of chamber covers.

4.5.14 The South to North link road which runs parallel to the West boundary of the development has a lowest proposed level of 6.849m AOD – lifting, on average, the existing ground level by approximately 300mm and similar to this development.

4.5.15 The Flood Risk Assessment for the Northern Link Road states that the lowest level remains higher than the minimum ground level of 6.70m AOD as set out within Liverpool Waters Environmental Statement.

4.5.16 Review of the Northern Link Road levels against proposed site ground floor levels show the development has been set to remain above the road level – further reducing the risk of flooding from the Northern Link Road.

4.5.17 The Flood Risk Assessment for the Northern Link Road indicates that stormwater run-off will be adequately managed by inclusion of road gullies and designated carrier networks, with discharge into the canal and locks – as existing drainage is believed to do.

4.5.18 No calculations or mitigations measures have been presented within the Flood Risk Assessment for review of the proposals and flood risk management.

4.5.19 The proposed development will be designed to ensure the flood risk does not increase on site and elsewhere.

4.5.20 There is potential to increase flood risk due to the increased impermeable areas and changes in proposed levels.

4.5.21 The Curtins Condition 21 report requires that the proposed surface water drainage network shall be designed to not surcharge any pipes for the critical 1 in 2 year storm event.

4.5.22 The Curtins Condition 21 report also states that the attenuation requirements for the critical 1 in 30 year and 1 in 100 year (plus climate change) storm events can be satisfied by allowing the water level of the dock to rise temporarily during these storm events.

4.5.23 Further consideration of the drainage systems is included in Chapter 5.0.

The risk of surface water flooding at this site is low.

(v) Groundwater Flooding

4.5.24 The Site Investigation Report for the development undertaken by CC Geotechnical indicates that the site is underlain by loose Made Ground deposits comprising silty sands, gravel and what could be described as construction waste materials over the natural sandstone strata at depths ranging between 8m to 21m below ground level (-0.600m to -13.000m AOD).

4.5.25 Groundwater encountered in each of the boreholes was recorded to around 4.900m AOD – consistent with the dock level.

4.5.26 Based upon the above desk study evidence, the ground water level is below the proposed levels of the development and so, the proposed development is at a very low risk of flooding from Groundwater. Precautions may be required for the construction of foundations, but this would be part of the standard procedures for a construction project of this scale.

The risk of groundwater flooding at this site is low.

(vi) Flooding from Reservoirs

4.5.27 Artificial sources of flooding are potentially from man-made structures and infrastructure. The Environment Agency have modelled the potential effect of flooding from failures in retaining structures containing reservoirs and this is shown in Figure 5.

4.5.28 It should be noted that reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs are inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency ensure that reservoirs are inspected regularly, and essential safety work is carried out.

The risk of flooding from reservoirs at this site is low.

(vii) Flooding from Canals

4.5.29 The Liverpool Canal Link runs along the Eastern boundary of the development and the risk of flooding from the canal is considered low as the canal is interlinked between a series of docks with isolation structures in place to minimise water level change between adjacent docks.

The risk of flooding from reservoirs at this site is low.

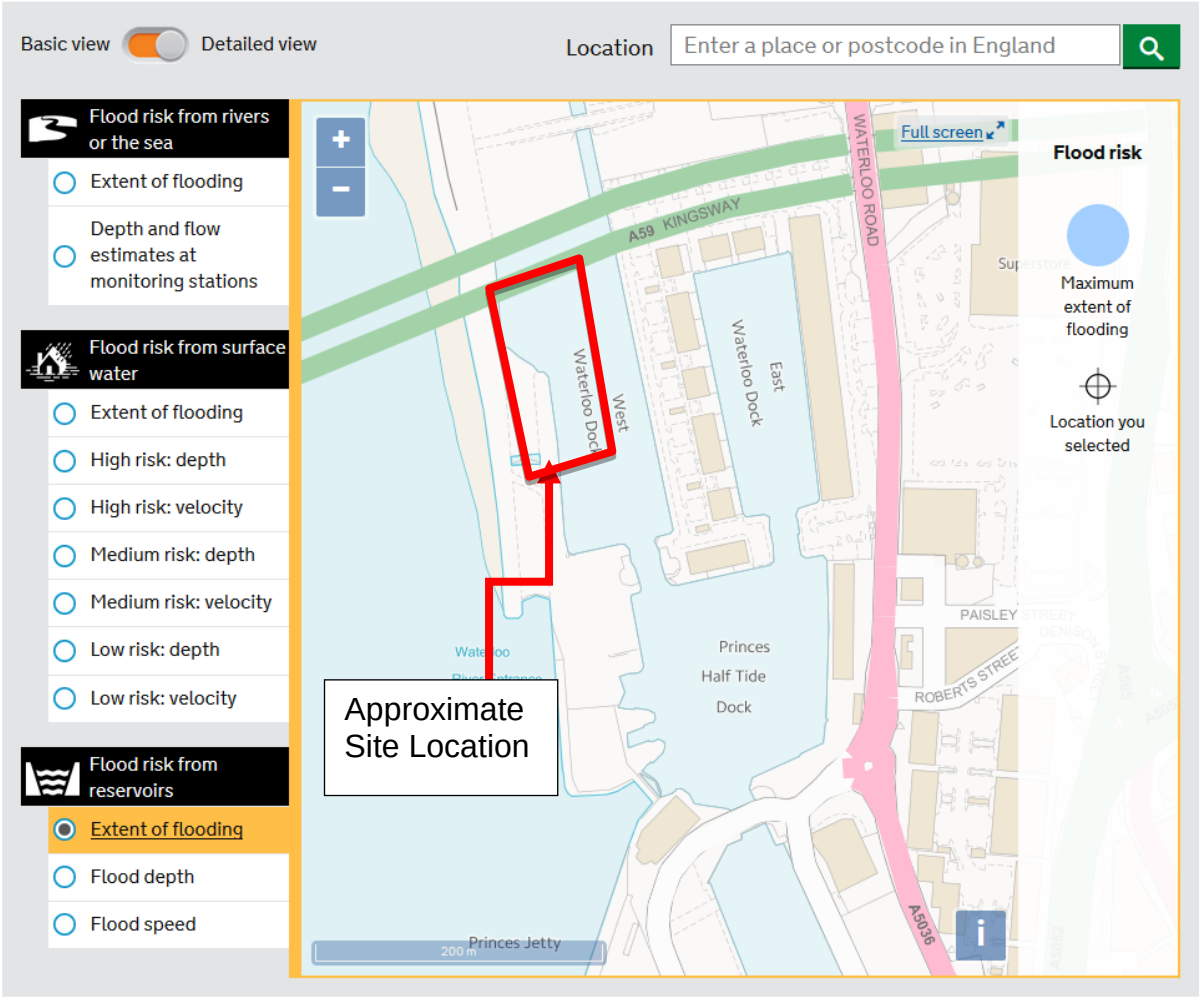


Figure 6 – Flood Risk from Reservoirs (Environment Agency)

(viii) Wave Action

4.5.30 The Met Office have calculated a range of theoretical wave heights for the new Northern Link Road which separates this development with the River Mersey. These estimates are understood to be highly conservative and are noted below;

- Hs (significant wave) = 1.7m
- H(mean) = 1.088m
- H1/10 (10% highest waves) = 2.159m
- H1/100 (1% highest waves) = 2.839m
- H (most probable) = 1.0m
- Hmax = 3.4m

Figure 7 – Meteorological Office Predicted Wave Heights

4.5.31 The maximum wave level depicted in Figures 11 and 12 (taken from Curtins Condition Report 21) is shown as 5.160m AOD. Considering a maximum wave height of 3.4m, this increases the peak wave height to 8.560m AOD.

4.5.32 Review of the proposed ground floor levels of the development indicate the ground floor ranges in level from 8.050m AOD up to 8.400m AOD – both below the peak wave height.

4.5.33 However, there are mitigating factors which reduce the risk of flooding due to wave action.

4.5.34 The river wall has a lowest level recorded on the topographic survey of 6.930m AOD. This will dissipate some of the energy of the waves when they crash against the river wall.

4.5.35 The development is in excess of 20m away from the river – and therefore the source of the source of the waves. The means the remaining energy from the waves after it crashes over the wall has to travel this 20m distance to come into contact with the development.

The risk of flooding from reservoirs at this site is low.

4.6 Impact of Development on Fluvial Morphology

4.6.1 The development will not alter any flow regimes which will have an adverse effect on the fluvial morphology of the area.

5.0 DRAINAGE

5.1 Existing Drainage

5.1.1 Asset drawings provided by United Utilities have shown no existing sewer infrastructure on or in the vicinity of the development.

5.1.2 It is likely that the vast majority – if not all - of the existing surface water drains freely into the dock.

5.1.3 However, the future development of the area will see a new road constructed to service the Isle of Man Ferry Terminal and Plot C02".

5.1.4 Figures 7 and 8 show the proposed drainage below this road which borders the development. A Surface Water sewer is proposed ranging in diameter from 150mm up to 300mm but this appears to be solely for the road drainage as there are numerous gullies connected to it with no provisions for a connection for the development.

5.1.5 There is also a Foul Water sewer proposed below the road with a number of branches along the length coming onto the development for connection of the foul water system.

5.1.6 Following further consultation, it has been established although these branches are shown to come onto site, no foul water drainage has been accounted for this development a new pumping station and rising main will be installed to connect to the wider foul sewer system. Details are contained on the drawing included in Appendix F).

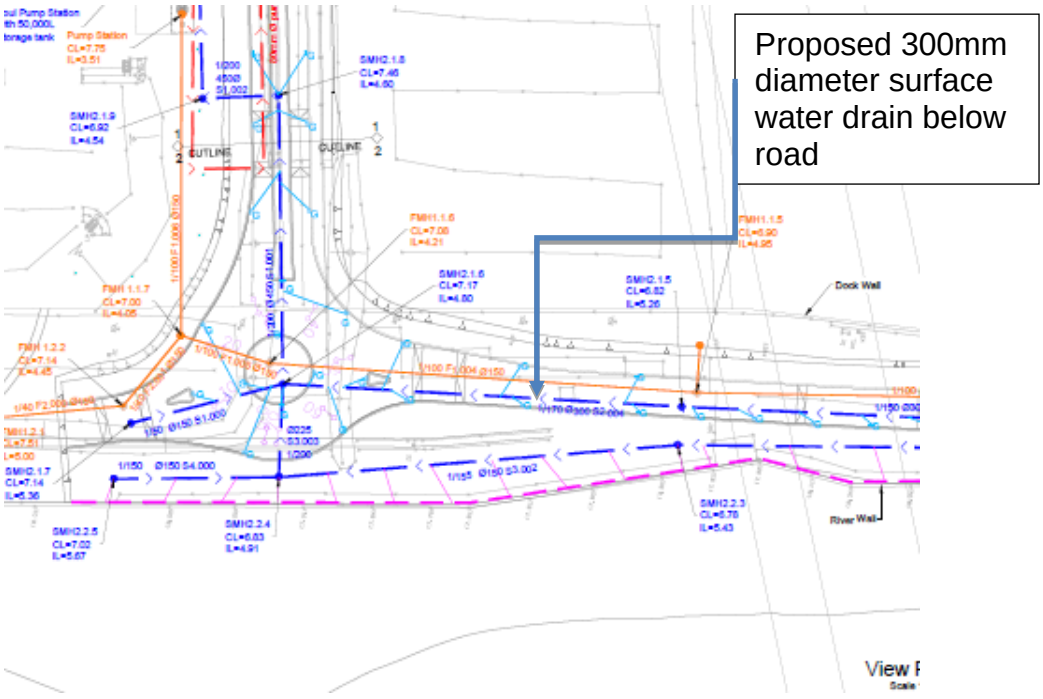


Figure 8 – Road Drainage Extract One (Amey Consulting Drawing CO00205341-H-D-NLR-500)

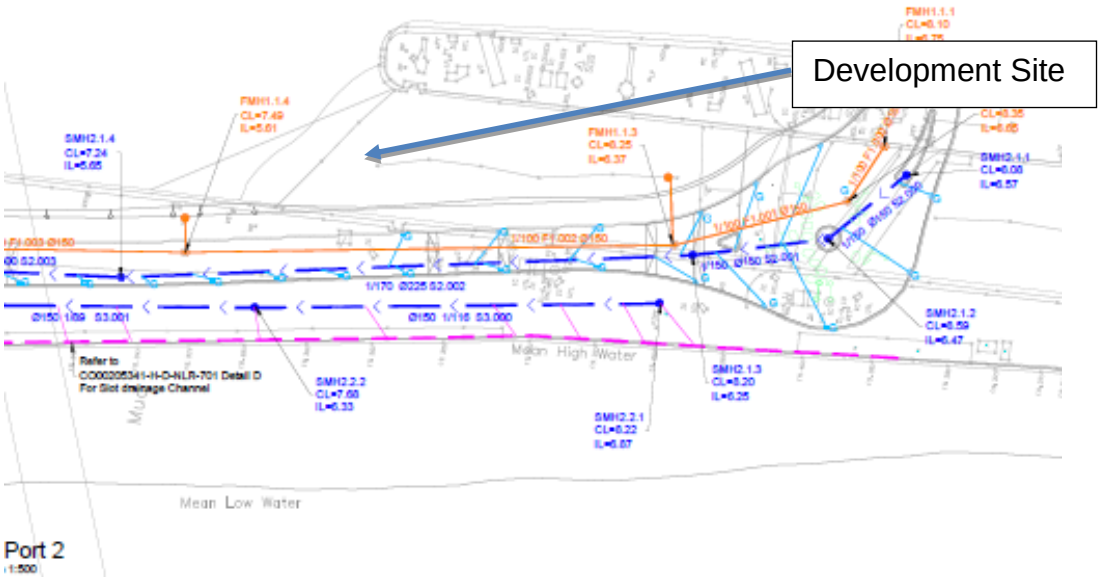


Figure 9 – Road Drainage Extract Two (Amey Consulting Drawing CO00205341-H-D-NLR-500)

5.1.7 The impermeable areas on the existing site are the dockside wharf, with the rest either being dock (open, partial infill or full infill.

5.1.8 The total impermeable area of the existing site is 800m^2. Based on a 1 in 2 year 15 minute storm the existing run-off from the site is approximately 8 litres/second.

5.2 Proposed Sustainable Drainage Systems (SuDS.)

5.2.1 Any new drainage for the development should be designed in accordance with the non-statutory technical guidance for the design of sustainable drainage systems.

5.3 Surface Water Disposal Hierarchy

5.3.1 The disposal of surface water should be considered in the following order of priority;

1. Infiltration into the subsoil via soakaways or permeable paving.
2. Discharge to a water course or the sea.
3. Discharge to a surface water sewer.
4. Discharge to a combined sewer.

5.3.2 If it is not possible to discharge to a soakaway, then surface water should be controlled with the use of Sustainable Drainage Systems (SuDS) and considered using the SuDS Hierarchy.

	SUDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
Most Sustainable	Living roofs	✔	✔	✔
	Basins and ponds - Constructed wetlands - Balancing ponds - Detention basins - Retention ponds	✔	✔	✔
	Filter strips and swales	✔	✔	✔
	Infiltration devices - soakaways - infiltration trenches and basins	✔	✔	✔
	Permeable surfaces and filter drains - gravelled areas - solid paving blocks - porous paviors	✔	✔	
Least Sustainable	Tanked systems - over-sized pipes/tanks - storms cells	✔		

Figure 10 – SUDS Hierarchy

5.4 Disposal Strategy for Plot CO2, Liverpool Waters

5.4.1 Infiltration

All soakaways must be situated at least 5m away from the building footprint as per building regulations which may limit the location of such soakaways.

In addition, although there are areas on this development subject to dock infill and this is likely to be by imported aggregates, the permeability at the base of the fill is likely to be minimal with its previous history as a water retaining dock.

5.4.2 Water Couse

The nearest water course is the River Mersey located approximately 20m to the west of the site. While this would be a potential discharge point for the surface water, it is unlikely that this would be acceptable to Environment Agency and would also mean crossing third party land to do so.

A feasible option is to discharge directly into West Waterloo Dock. From initial discussions with both The Canal and Rivers Trust and Peel Land and Property Group Management Limited (Dock Operators), there have been no objections to this proposal. The only consideration Peel have advised is with regard to achieving a flow velocity into the dock of 0.5m/s. However, this is outside the limit advised for best practice construction and within Sewers for Adoption in order to achieve self-cleansing within the surface water drainage network.

To achieve this, the energy generated within the flow of water along the surface water network must be disrupted to dissipate the energy and subsequently its velocity. This can be achieved in a number of ways such as including orifice plates or flow controls with the effective volume of water behind this stored in storage in order to remain within the design requirements. This will require conversations with all relevant parties to achieve an amicable solution.

The outfall of the drainage into the dock should be located at a level above the maximum canal level to ensure surface water can discharge from the development but not too high to minimise any potential for turbulence in the water.

5.4.3 Surface Water Sewer

The nearest surface water drainage system will be below the new access road to the Isle of Man Ferry Terminal. The proposed drawings show no branches onto this development and it appears it may have been designed for the road drainage only. This drainage run does ultimately discharge into West Waterloo Dock.

5.4.4 Combined Sewer

No combined sewer exists as part of the new road development – foul and surface water drainage systems are kept separate.

6.0 FLOOD MITIGATION MEASURES

6.1 Fluvial/ Tidal Flood Mitigation

6.1.1 The Curtins Condition 21 Report has specified that residential threshold levels should be set at a minimum 7.850m AOD to provide a 600mm above the 1 in 200 year extreme sea level up to the year 2115. This has been estimated at 7.250m AOD.

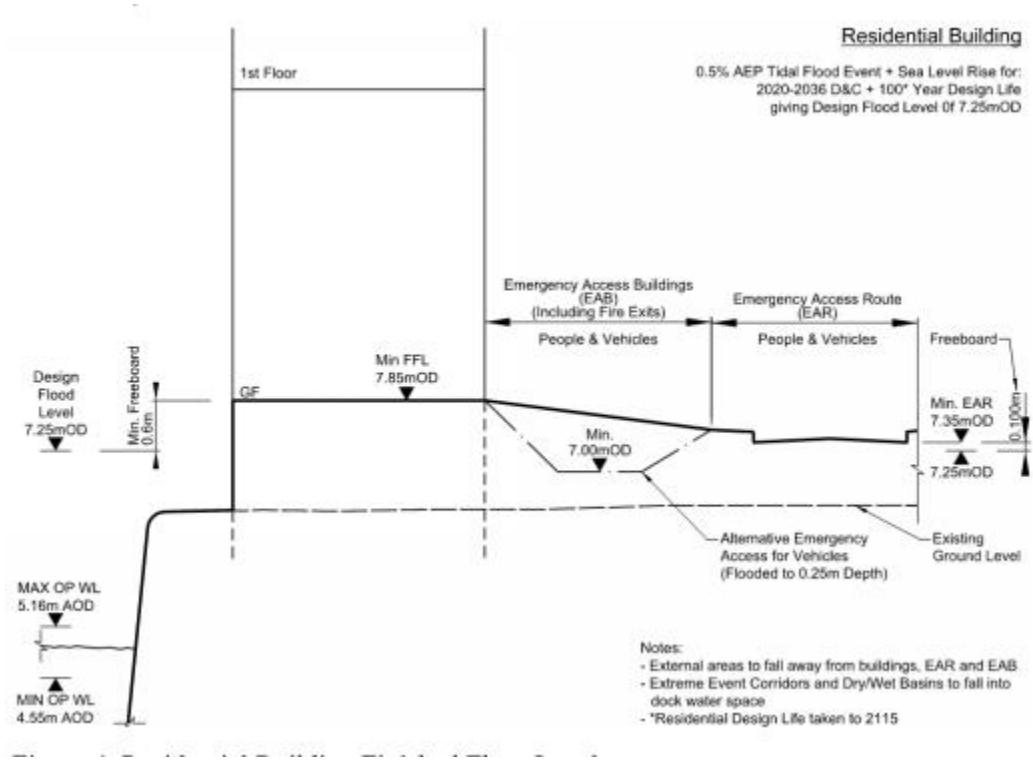


Figure 11 – Curtins Condition 21 Report Residential Building Floor Levels

6.1.2 The Curtins Condition 21 Report has specified that commercial threshold levels should be set at a minimum 7.850m AOD to provide a 600mm freeboard above the 1 in 200 year extreme sea level up to the year 2115. This has been estimated at 7.250m AOD.

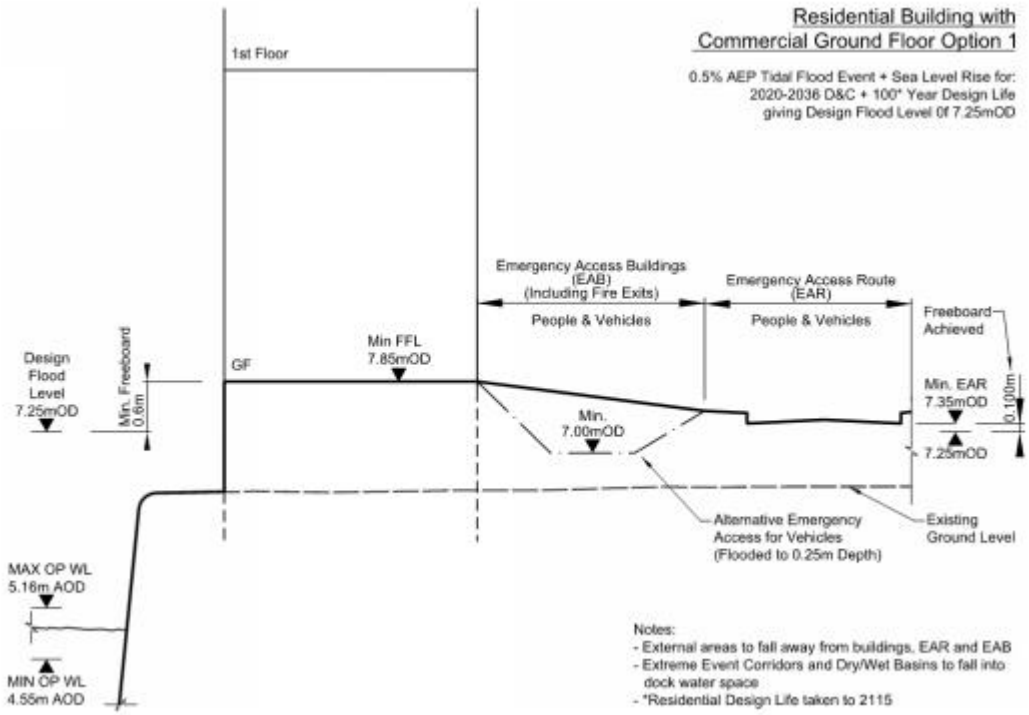


Figure 12 – Curtins Condition 21 Report Residential Building with Commercial Floor Levels

6.1.3 The Curtins Condition 21 Report specifies that levels of the emergency access route (EAR) should be set at a minimum 7.35m AOD.

6.1.4 The proposed ground floor levels of the buildings range from 8.050m AOD at the North end of the development up to 8.400m AOD at the South end of the development.

6.1.5 The external areas have a minimum level of 7.735m AOD near the buildings falling to 6.600m AOD along the canal side walkway/ boardwalk.

6.1.6 The risk from tidal flooding following mitigation can be considered generally low for the habitable areas of the development as the ground floor levels are set above or at the minimum required levels.

6.2 Wave Action Mitigation

6.2.1 The 600mm freeboard allowance noted in Section 6.1 is traditionally considered as a suitable allowance to counter the effects of extreme wave action.

6.2.2 There a mitigating factors which need to be considered alongside the assumed peak wave height and the implications this has on the development.

6.2.3 The river wall has a lowest level recorded on the topographic survey of 6.930m AOD. This will dissipate some of the energy of the waves when they crash against the river wall.

6.2.4 The development is in excess of 20m away from the river – and therefore the source of the source of the waves. The means the remaining energy from the waves after it crashes over the wall has to travel this 20m distance to come into contact with the development.

6.3 Groundwater Flood Mitigation

6.3.1 Groundwater flooding tends to last over a number of weeks or months rather than hours or days. Groundwater flooding does not generally pose a significant risk to life due to the slow rate at which the water level rises. However, it can cause significant risk to property.

6.3.2 The development is considered to be at a low risk of groundwater flooding, ground water levels have been recorded comparable to the canal water level.

6.3.3 Finished floor levels are set above ground water levels.

6.3.4 External ground levels across the development fall away from the proposed buildings and ensure that the creation of low points are avoided (other than those used intentionally for drainage features) in order that in the unlikely event of groundwater flooding, the flood water is safely routed away from the buildings.

6.3.5 Providing the above mitigation measures are imposed, the risk from groundwater flooding would therefore be considered to be low post development.

6.4 Surface Water Flooding to the Site Mitigation

6.4.1 It is recommended that proposed external ground levels across the development should fall away from the proposed buildings in a manner which does not create low points where water may pond unintentionally. This will ensure the any surface water will not flow towards the proposed buildings.

6.4.2 Upon implementation of the proposed drainage network, it is proposed to accommodate the necessary flows generated from the site and therefore limit future surface flood risk from the development.

6.4.3 Providing the above measures are implemented on the development, flooding risk from surface water is therefore considered low post development.

6.5 Surface Water Flood from the Site Mitigation

6.5.1 All new development drainage will be designed in accordance with the FRA, Lead Local Flood Authority requirements and best practice.

6.5.2 The Curtins Condition 21 Report requirements are that proposed surface water drainage network shall be designed to not surcharge any access chambers/ manholes for the critical 1 in 2 year storm event.

6.5.3 The Curtins Condition 21 Report has also stated that the attenuation requirements for the critical 1 in 30 year and the 1 in 100 year (plus climate change allowance) storm event can be satisfied by allowing the water level in the dock waters to temporarily rise during these storm events.

6.5.4 Based on the nature of the development, a lifespan in excess of 60 years is anticipated. Therefore, the potential climate change allowance for 2070-2115 ranges between 20% for the central allowance and 40% for the upper end allowance. As such, an average allowance of 30% for climate change on peak rainfall intensity will be included for within calculations.

6.5.5 The Curtins Condition 21 Report also indicates that the 40% allowance should be considered to understand the implications.

6.5.6 In following the hierarchy of drainage solutions, consideration has been given firstly to the discharge of surface water runoff by sustainable method of infiltration, through to discharge into a sewer. These options are discussed in Sections 5.3 and 5.4.

6.5.7 To minimise localised flooding within the development, the drainage design should ensure that gullies, drainage channels and drains are all suitably sized to accommodate peak storm flows. Additionally, all inlet features should include suitably sized sumps to catch silts and should be subject to documented maintenance and cleansing regime.

6.5.8 The invert level of the outfall into the dock should also be set at a level above the maximum level of the dock to ensure that the invert is never fully submerged and preventing discharge from the site. The canal level is generally kept to 4.770m AOD and therefore the invert of the outfall should be set above this level.

6.6 Flood Mitigation Generally

6.6.1 Flood water exceedance routes should be identified, both on and off site.

6.6.2 For any sustainable drainage systems employed in the development, an appropriate management and maintenance plan for the sustainable drainage system for the lifetime of the development should be submitted and should include;

- Any arrangements for adoption by an appropriate public body or statutory undertake, management and maintenance by a Resident's Management Company.
- Arrangements concerning appropriate funding mechanisms for its ongoing maintenance of all elements of the sustainable drainage systems (i.e. inspections, regular maintenance).
- Means of access for maintenance and easements where applicable.

6.6.3 The site is in an Environment Agency Floodline Warnings Direct which is a free service that provides warnings by phone, text or email. Property owners and commercial unit managers can register to receive notifications. This will enable people to prepare for flooding and evacuate the building if necessary.

6.6.4 The development should be designed in accordance with guidance given in BS 85500:2015 - Flood resistant and resilient construction. Guide to improving the flood performance of buildings. This document can be used to help improve the resistance and resilience of buildings against flooding with the use of suitable materials and construction techniques.

6.6.5 For example, materials that are to be used up to first floor could be resilient to water.

6.6.6 The proposed ground floor level has been set between 8.050m AOD and 8.400m AOD and are both above the 600mm freeboard figure above the determined sea levels.

6.6.7 External levels will be locally ‘ramped’ upwards adjacent to the entrance doors from the surrounding external levels.

6.6.8 The introduction of thresholds drains are proposed to each of the entrance doors to the buildings residential and commercial doors.

6.6.9 To mitigate damage to the substation and internal plant rooms accessed from street level, an internally raised plinth can be introduced to raise equipment above the average external levels providing additional protection from residual flood risks.

6.6.10 Additionally, services entries to the plant rooms would be at high level.

6.6.11 Assuming that the proposed drainage system is designed to provide adequate capacity, and that the private and adopted sewers will be maintained by their adopted authority, it can be assumed risk of flood from blockage or overloading is minimal.

6.6.12 The final design of the drainage networks shall be in accordance with the legislation set by the Environment Agency, Liverpool City Council and United Utilities.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 This report gives details of the Flood Risk Assessment, which has been carried out in relation to the proposed redevelopment of Plot CO2 at Liverpool Waters for Residential use.

7.2 The development is predominantly within Flood Zone 1 as defined by the Environment Agency, with an area of less than 4% just within Flood Zone 3. The risk of flooding from rivers, seas and surface water is generally low subject to suitable design and maintenance of the proposed drainage systems.

7.3 The proposed development has been designed to take flood risk into account where possible.

7.4 All more vulnerable residential properties are located above the required minimum levels for residential use as defined in Curtins Condition 21 Report.

7.5 Less vulnerable uses, such as commercial and storage are also located above the required minimum levels for residential use as defined in Curtins Condition 21 Report.

7.6 The Emergency Access Route level of a minimum 7.350m AOD level is not infringed with this development.

7.7 This Flood Risk Assessment has demonstrated that the development is generally at low risk from all forms of flooding applicable to this development and would not increase the risk of flooding elsewhere.

7.8 A flood management plan is recommended for the proposed development and general advice is given in Section 8.0. This can be developed at the detailed design stage and following completion with the buildings managers and residents.

7.9 The development provides the opportunity to reduce flood risk overall with the use of sustainable drainage systems to attenuate surface water run-off from the site.

7.10 The Drainage Strategy for the development is a separate document which can be read alongside this Flood Risk Assessment.

8.0 FLOOD MANAGEMENT PLAN ADVICE

8.1 The Health and Safety File which will be required under the Construction, Design and Management Regulations, will contain a section on flood management. This document will have all operation and maintenance manuals for any drainage systems.

8.2 The Development managers will need to be made aware of flood warning procedures. A flood management plan should be developed. This chapter provides guidance on the contents for the management plan. Reference can also be made with the EA advice at http://apps.environment-agency.gov.uk/flood/151256.aspx

8.3 The property is within an area covered by the Environment Agency's Flood Line Warnings Direct. This is a free service and provides flood warnings by telephone, mobile, email, text and fax. The managers can sign up on-line https://www.gov.uk/sign-up-for-flood-warnings

8.4 Flood advice will be provided at different levels:-

FLOOD WATCH
Flooding of low-lying land and roads is expected.
What to do:
- Monitor local news and weather forecasts.
- Be aware of water levels near you.
- Be prepared to act on your flood plan.
- Charge mobile phones.

FLOOD WARNING
Act Now! Flooding is expected.
What to do:
- Move students, staff, valuables and important documents to safety.
- Turn off gas, electricity and water supplies if safe to do so.
- Be prepared to evacuate.
- Act on your flood plan.

SEVERE FLOOD WARNING
Act Now! Severe flooding is expected with extreme danger to life and property.
What to do:
- Collect things you need for evacuation.
- Turn off gas, electricity and water supplies if safe to do so.
- Stay in a high place with a means of escape.
- Avoid electricity sources.
- Avoid walking or driving through flood water.
- If in danger, call 999 immediately.
- Listen to emergency services.
- Act on your flood plan.

ALL CLEAR
No further flooding is expected. Water levels will start to go down.

What to do:

- Keep listening to weather reports.
- Only return to evacuated buildings if you are told it is safe.
- Beware sharp objects and pollution in flood water.
- If your property or belongings are damaged, contact your insurance company. Ask their advice before starting to clean up.

8.5 All managers / residents should be made aware of the health risk associated with contaminated flood water. Water should not be waded through or touched if at all possible.

8.6 Prepare a flood kit of essential items.
First aid kit and supplies
Details of all important contact numbers
Water proof clothing for use by key staff

8.7 Ensure that there are clear instructions on how to turn off electric, water mains and gas supplies if appropriate.

8.8 A plan is also required for the return to the site after a flood.

A safety inspection should be carried out by park managers to ensure that there is no dangerous debris or displaced manhole covers etc.

Structures should be inspected to ensure that there is no structural damage.

Power should only reinstated by professional electricians.

Flood water clean-up operations should only be undertaken with suitable personal protective equipment to avoid contact with sewerage and contamination.

APPENDIX A

Development Proposal

Cont. edge of batter

2248mm

A

B

C

D

Terrace for outdoor seating

Extent of 'Cultural Square'

COMMERCIAL | GYM | CYCLE STORE | FFL + 8.650 | BIN STORE | PLANT | SUB STATION

UNDERCROFT

PLANT | BIN STORE | FFL + 8.400 | CYCLE STORE | COMMERCIAL

SUB STATION | CLN | PLANT | FFL + 8.050 | RECEPTION | CYCLE STORE | BIN STORE

SUB STATION | PLANT | BIN STORE | FFL + 8.400 | RECEPTION | CYCLE STORE | COMMUNAL SPACE

1863mm

RIVER MERSEY

Mean High Water

Mud

BUS STOP

- cores/ reception/ circulation
- one bed - 38sqm
- two bed - 57sqm
- three bed - 97sqm
- penthouse - varies
- duplex - 79sqm
- ancillary

C02 SITE
GROUND FLOOR PLAN

scale 1:250 0 10m

rev.	date	drn	aud
-	00.00.00 -	-	-

drawing status: DRAFT

Second Floor
40 King Street
Manchester
M2 6BA
0161 833 0838
info@olliersmurthwaite.com
www.olliersmurthwaite.com

OLLIER SMURTHWAITE ARCHITECTS

Client	ROMAL CAPITAL	Scale	Drawn	Checked	Date	Issue
Job title	PLOTS C02 CENTRAL DOCKS, LIVERPOOL	1:500@A3	YM	YM	20.09.19	-
Drawing title	PROPOSED GROUND FLOOR PLAN	Job number	Drawing number			
		A476	A476_P_101			

APPENDIX B

Environment Agency Data

Likelihood of flooding in this area

This location is in an area with a low probability of flooding

FLOOD ZONE 1

Land and property in flood zone 1 have a low probability of flooding

More information about flood zones

1 You don't need to do a flood risk assessment if your development is in flood zone 1 and:

- smaller than one hectare
- is not affected by sources of flooding other than rivers and the sea, for example surface water drains

2 If your development is in flood zone 1 and:

- larger than one hectare
- is affected by sources of flooding other than rivers and the sea, for example surface water drains

you can learn more about flood risk assessment in flood zone 1

3 You can also read more about flood risk assessments for planning applications

Learn more about the potential sources of flood risk in this area

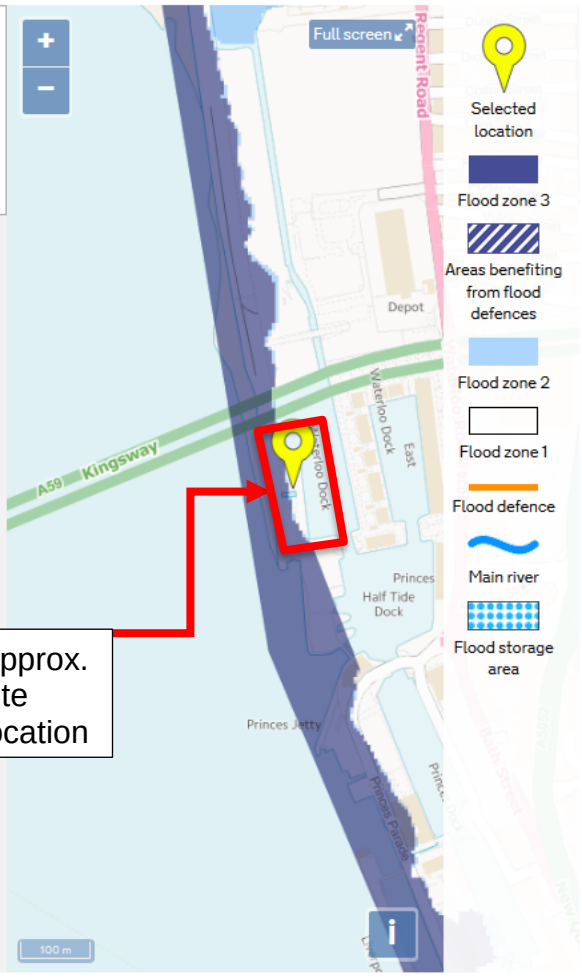


Figure 1 - Flood Risk Mapping for Rivers and Seas (https://flood-map-for-planning.service.gov.uk)

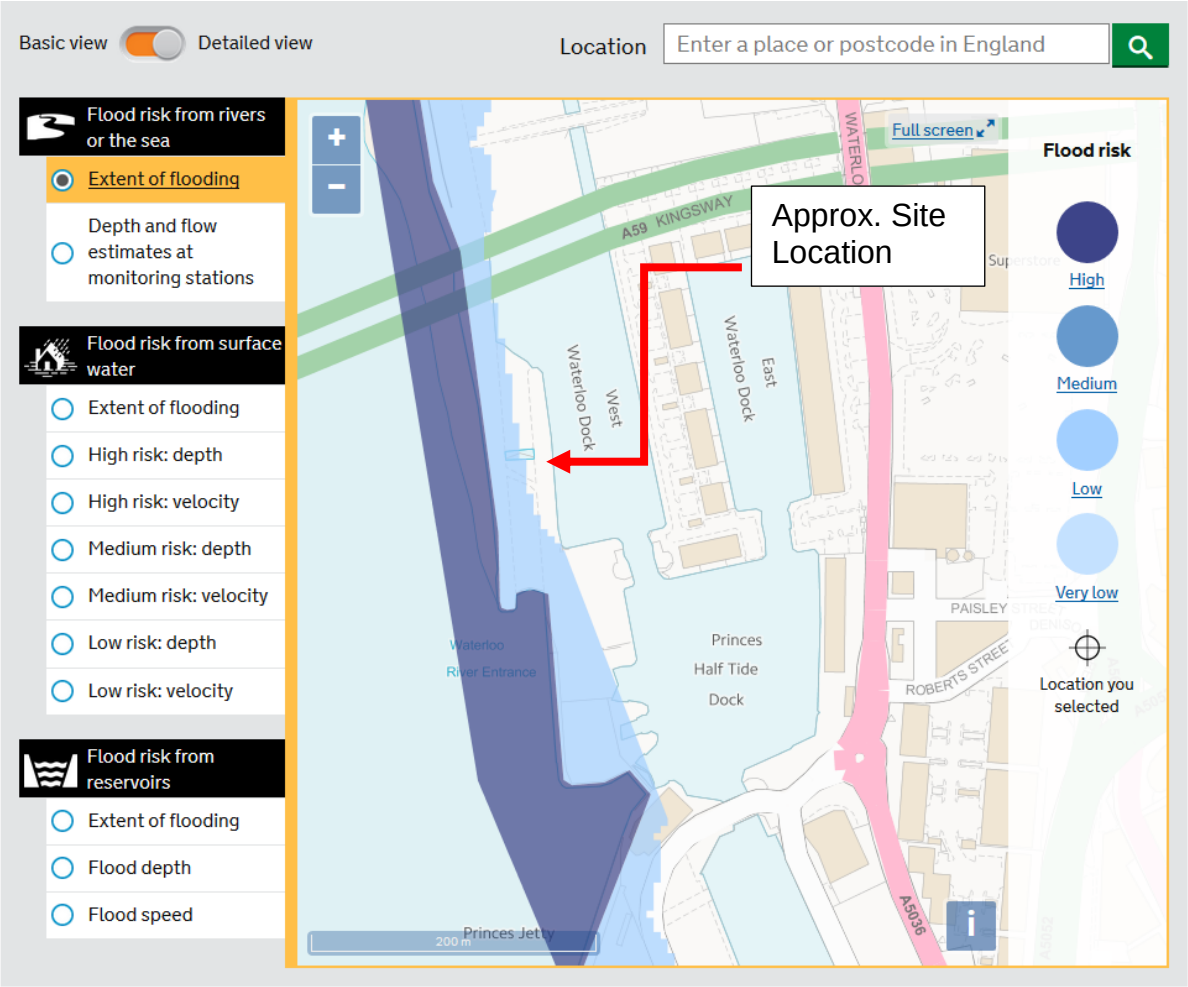


Figure 2 – Extent of Flood Risk from Rivers or the Sea (Environment Agency)

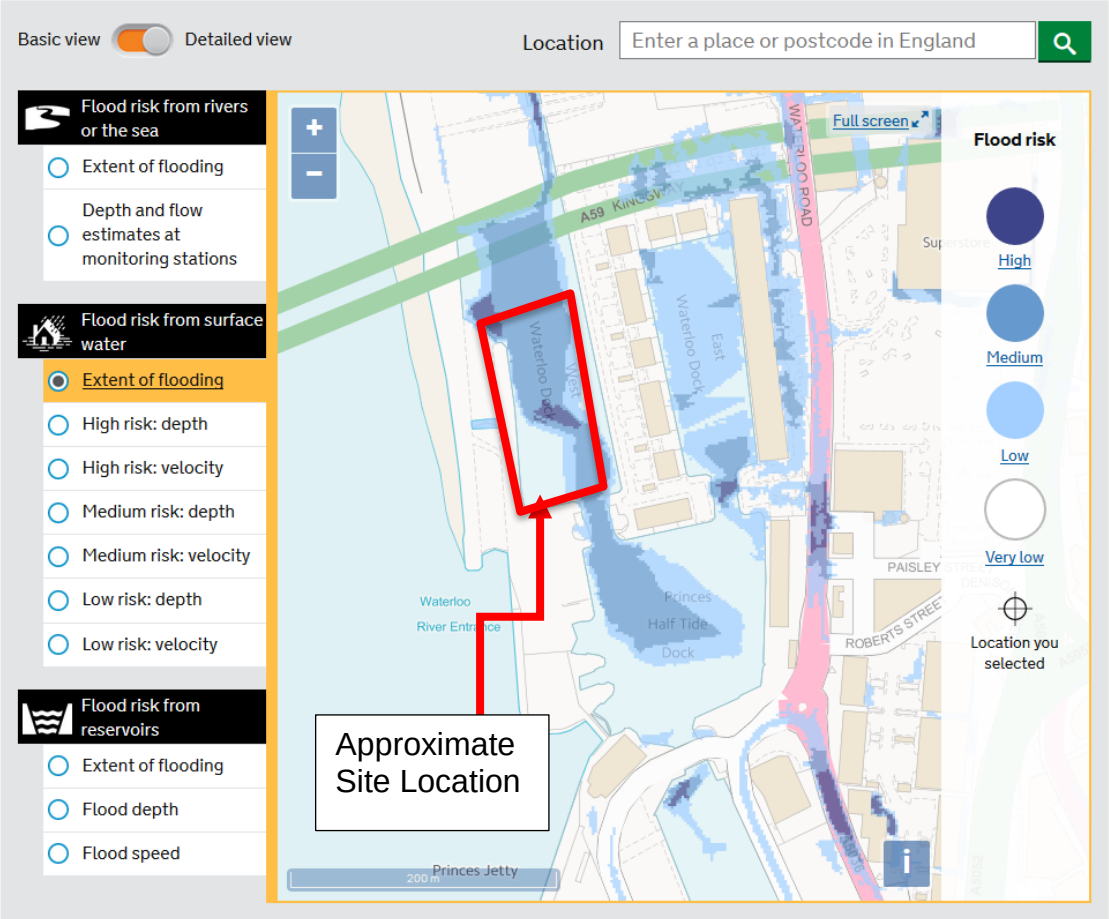


Figure 3 – Surface Water Flood Map (Environment Agency)

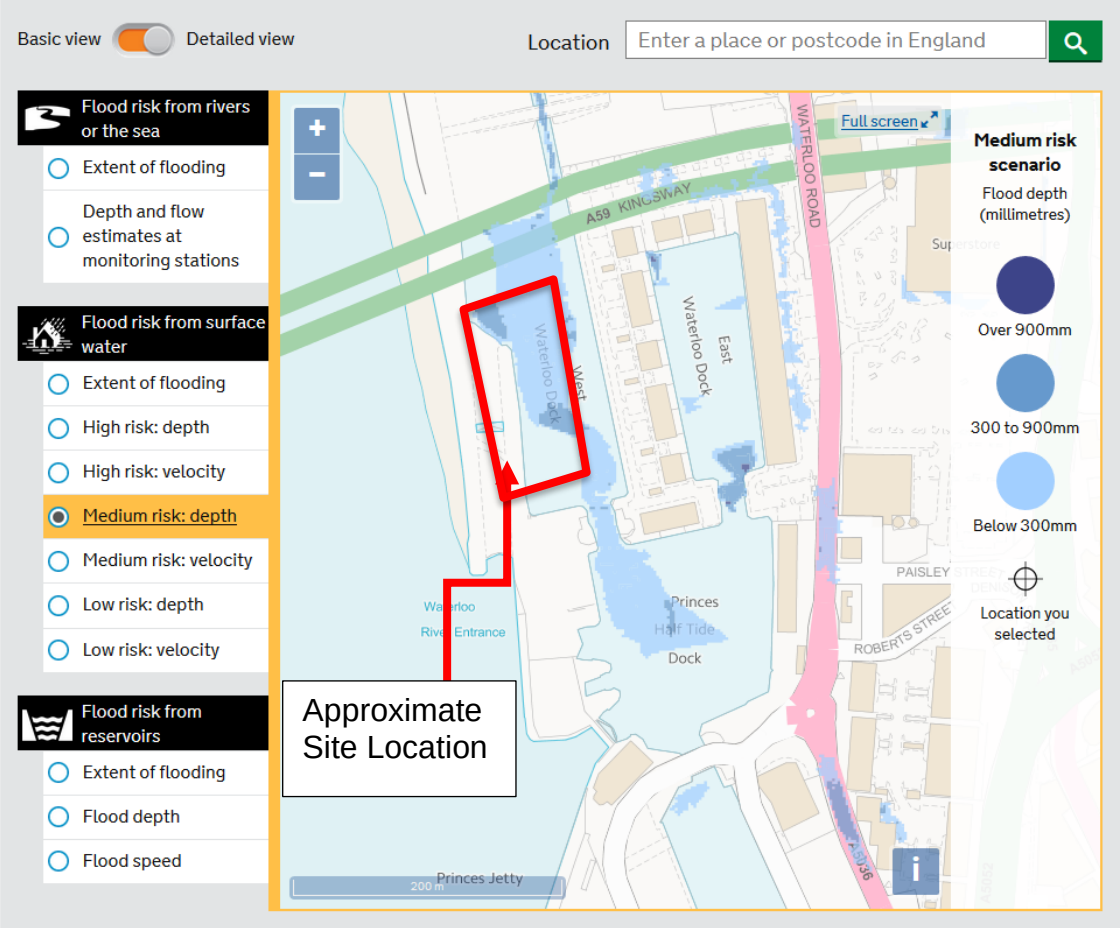


Figure 4 – Surface Water Flood Map Depths (Environment Agency)

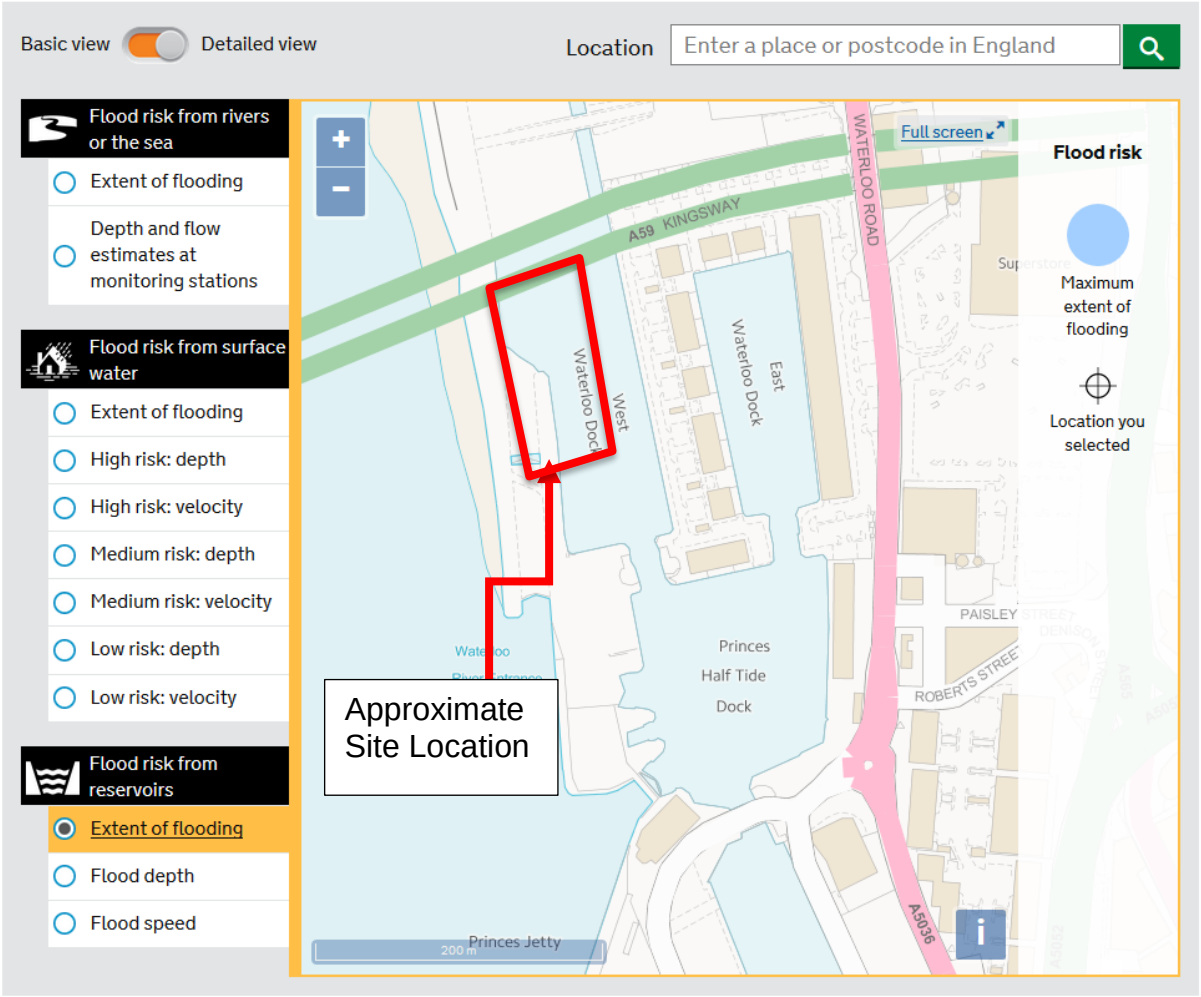


Figure 5 – Flood Risk from Reservoirs (Environment Agency)

APPENDIX C

Topographical Survey

By Powers and Tiltman

Legend

AV	Air valve
BH	Borehole
BOL	Bollard
BT	British Telecom cover
CATV	Cable television cover
CL	Cover level
DPC	Damp proof coarsing level
Earth/ER	Earthing rod
ELEC	Electric cover
EP	Electricity pole
Fence I/R	Iron railing fence
Fence C/B	Closeboard fence
Fence C/P&P	Concrete post & panel fence
Fence Pa	Palisade fence
Fence P/W	Post and wire fence
Fence P/R	Post and rail fence
Fence P/P	Post and panel fence
FFL	Finished floor level
F/B	Flower bed
FH	Fire Hydrant
G	Gulley
GAS	Gas cover
IC	Inspection chamber
IL	Invert level
INV	Invert level
LP	Lamp post
LT	Light
MH	Manhole
Nynex	Telecommunications cover
OSBM	Ordnance Survey Bench Mark
PTM	Parking ticket machine
RE	Rodding eye
RS	Road sign
R/t wall	Retaining wall
SBX	Switch box
SP	Sign post
SPS	Safety playing surface
ST	Stop tap
SV	Service valve
TBM	Temporary Bench Mark
TP	Telegraph pole
TRP	Trial pit
TRL	Traffic light
W	Water cover
WL	Water level
WO	Wash out

SURVEY STATIONS

Name	Easting	Northing	Height
R2	333653.535	391525.741	6.836
R2A	333693.141	391525.640	7.305
R3	333644.837	391586.368	6.606
R4	333654.675	391476.294	6.979
R5	333641.658	391476.776	7.293
R5A	333643.363	391467.240	6.804
R6	333590.974	391489.812	6.247
R6A	333626.502	391498.480	6.306
R6B	333634.024	391501.988	6.473
R6C	333641.990	391504.171	6.632
R6D	333649.459	391511.252	6.805
R7	333559.098	391470.805	6.457
R7A	333583.204	391450.593	6.680
R7B	333588.556	391437.243	6.537
R8	333475.343	391458.802	8.948
R9	333382.371	391417.580	6.509
R10	333442.798	391272.558	8.059
R11	333489.152	391072.800	10.099
C1	333684.127	391477.926	7.078
KH1	333675.929	391458.191	7.121

KEY DIMENSIONS SHOULD BE CHECKED ON SITE BEFORE COMMENCEMENT OF ANY WORKS

NOTE

Grid related to OS using GPS active network

Amendments

	Date	Surveyor	Description of work
A	18/05/16	MP	River wall heights added

Powers & Tiltman Ltd
Land Surveyors

Meridian House
58/60 Hillside Road, Frodsham, Cheshire WA6 6AG
Tel: 01928 734473 Fax: 01928 735573
Email: mail@powerstiltman.co.uk
www.powerstiltman.co.uk

Central Docks
Liverpool
Topographical Survey

Client : Planit IE

Surveyed By : RM	Date : 29/03/16	A0 @ 1:500
Drawn By : RM	Drawing No : 7473/01	
Checked By : MP	Amendment : A	

APPENDIX D

United Utilities Public Sewer Records

Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
6001	7	CO							
6002	6.94	CO	4.06	450		CI	VC	8.98	
6003	7.63	CO	0	150		CI	VC	8.23	
6009		FO	0	2440		CI	CO	170.33	
6101	6.6	CO	2.77	1500	920	EG	CO	96.62	
6102		CO		900	570	EG	BR	6.04	
6103	6.67	CO	3.43	890	510	EG	BR	7.13	
6104	6.71	CO	3.39	930	580	EG	BR	3	2
6200		FO	0	2440		CI	CO	278.2	
6201	6.95	CO	2.35	1560	930	EG	CO	75.06	
6202	6.76	CO							
6203	6.95	CO							
6301		CO	0	1560	930	EG	CO	42.58	
6302		CO							
6401	7.03	CO	1.54	1400	930	EG	CO	29.58	269
6405		FO	0	2440		CI	CO	251.64	
7001	8.66	CO	4.35	450		CI	CO	13.04	93
7002	9.51	CO	5.22	950	550	EG	BR	12.21	28
7003	12.01	CO	7.97	930	520	EG	BR	50.22	19
7004	9.08	CO							
7101		CO		700	500	EG		7.21	
7102	10.84	CO	6.64	700		CI		10	3
7103	11.22	CO	7.4	675		CI	VC	13	
7104	11.26	CO	6.96	900	600	EG		6.32	
7105	10.65	CO							
7106	8.49	CO	4.43	960	560	EG	BR	6	
7108		CO		900	570	EG	BR	28.86	
7120		CO							
7201	7.02	CO	4.42	1500	1020	EG	CO	13.61	
7202	8.7	CO	0	1500	1020	EG	CO	49.03	
7203	11.57	CO	5.26	1500	1000	EG	BR	22.36	
7204	6.79	CO							
7205	8.44	CO	5.7	225		CI	VC	32.02	11
7206	11.76	CO	8.4	225		CI	VC	33.96	6
7301	8.86	CO	5.17	375		CI	VC	59.41	40
8001	15.42	CO	11.07	1200	740	EG	CO	42	67
8002	17.11	CO	12.72	600		SQ	VC	39.05	15
8004		CO	0	225		CI	VC	18.03	
8005	13.84	CO							
8008	16.71	CO							
8009	16.67	CO	13.94	300		CI	VC	9.9	76
8010	16.46	CO	14.05	300		CI	VC	12.21	122
8101	14.16	CO	9.59	100		CI	VC	6.32	
8102	13.68	CO	10.03	900	600	EG	VC	39.02	16
8103	14.6	SW	11.03	300		CI	VC	16.55	2
8104	13.5	CO	9.33	900	600	EG		45	8
8105	14.57	CO	9.81	1200	800	EG	BR	18.11	181
8108	13.78	CO	9.84	920			BR	53.78	9
8201	12.93	CO	5.46	1370	930	EG	BR	31.78	167
8202		CO		300		CI	VC	17.26	
8203	14.13	CO							
8205	13.79	CO	9.56	1150	970	EG	BR	41.22	
8210		CO	0	1219	762	EG	CO	26.31	
8211	13.99	CO	11.35	300		CI	VC	12.37	7
8302	13.99	CO	10.19	950	960	EG	BR	33.54	224
8304	14.03	CO							
8306	13.95	CO							
8401	12.25	CO	8.3	1130	750	EG	BR	22.2	22
8402		CO							
8403		CO	0	1090		CI	CO	32.06	
9005	16.1	CO	14.39	300		CI	VC	9.85	
9007	16.39	CO	14.18	300		CI	VC	12.08	93
9008		CO							
9009	15.96	SW							
9101	15.2	SW	11.69	300		CI	VC	82.38	10
9102	15.02	SW	11.89	300		CI	VC	24.74	2
9103	15.68	SW	13.95	300		CI	VC	39.62	3
9104	15.66	SW	12.21	450		CI	VC	73.35	159
9105	16.13	SW							
9401	16.15	CO	12.74	940	550	EG	BR	56.6	
9402	14.38	CO							
9403		CO	0	940		CI	CO	23.09	
9404		CO	0	375		CI	CO	14.1	
0401	16.14	CO	0	940	550	EG	BR	1	
9800		CO	0	1050		CI	VC	35.71	
6006		CO							
6110		CO							
6111		CO							
6305		CO							
6400		CO	0	450		CI	CO	34.54	
6403		CO							
6404		CO							
7000		CO	0	300		CI	VC	8.65	
7006		CO							
7007		CO							
7008		CO	0	300		CI	VC	21.56	
7107		CO							
7114		CO		900	600	EG		36.17	
7121		CO	0	920	530	EG	BR	6.71	
7122		CO							
7123		CO							
7124		CO							
7125		CO							
7207		CO							
7208		CO							
8000		CO	0	1150		CI	CO	8.29	
8006		CO	0	300		CI	VC	17.43	
8107		CO							
8109		CO	0	1549	940	EG	BR	16.28	
8110		CO							
8204		CO							
8209		CO							
8212		CO							
8300		CO	0	700	600	EG	CO	33.05	
8405		CO							
9010		CO							
9200		CO	0	1200		CI	CO	11.9	
9408		CO							
9411		CO	0	1010		CI	BR	13.89	
9412		CO							
9512		CO							
6004		CO							
6005		CO							
6007		CO							
6008		FO							
6105		CO							
6107		CO							
6109		CO							
6204		CO	0	1500	920	EG	CO	33.92	
6205		CO							
6303		CO							
6402		CO							
7011		CO	0	300		CI	VC	23.14	
7109		CO							
7111		CO							
7112		CO	0	800	550	EG	BR	8	
7113		CO							
7116		CO							
7117		CO							
8106		CO							
8207		CO							
8307		CO							
8404		CO							
9405		CO							
9407		CO							
9409		CO							
8003		CO							
8007		CO							
9001		CO							
9002		CO							
9003		CO							
9004		CO							
9006		CO							
9011		CO							
6207		FO	5.7			CI	DI	84.76	45

Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad

WASTE WATER SYMBOLOGY

LEGEND

MANHOLE FUNCTION

- FO Foul
- SW Surface Water
- CO Combined
- OV Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded. United Utilities will not accept any liability for any damage caused by the actual positions being different from those shown.

OS Sheet No: SJ3391SE

Scale: 1: 1250 Date: 20/07/2016

145 Nodes

Sheet 1 of 1

United Utilities

helping life flow smoothly

SEWER RECORDS

OS Sheet No: SJ3391SE

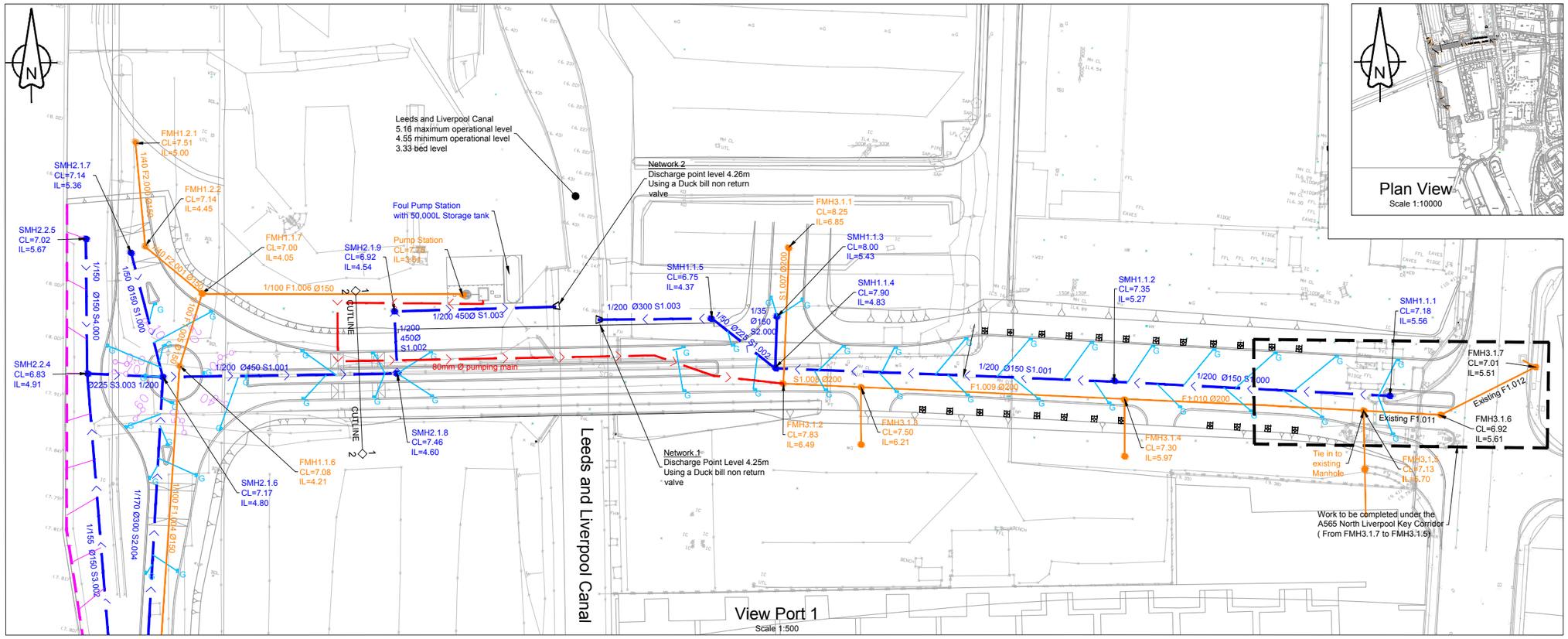
Scale: 1: 1250 Date: 20/07/2016

Printed By: Property Searches

APPENDIX E

Proposed Link Road by Amey Consulting

File ref - g:\1 active\gb schemes\liverpool\enterprise zone link road\07 cad\g. work area\1. live drgs\tender nlr\co00205341-h-d-nlr-500 proposed storm and foul drainage.dwg



RESIDUAL DESIGN HAZARDS

(The following information has been collected from Preconstruction Information and the Amey CDM Hazard Management Process.)

1. Asbestos
2. Working Near Water
3. Unexpected void shafts in existing ground
4. Working on unstable ground
5. Working at heights

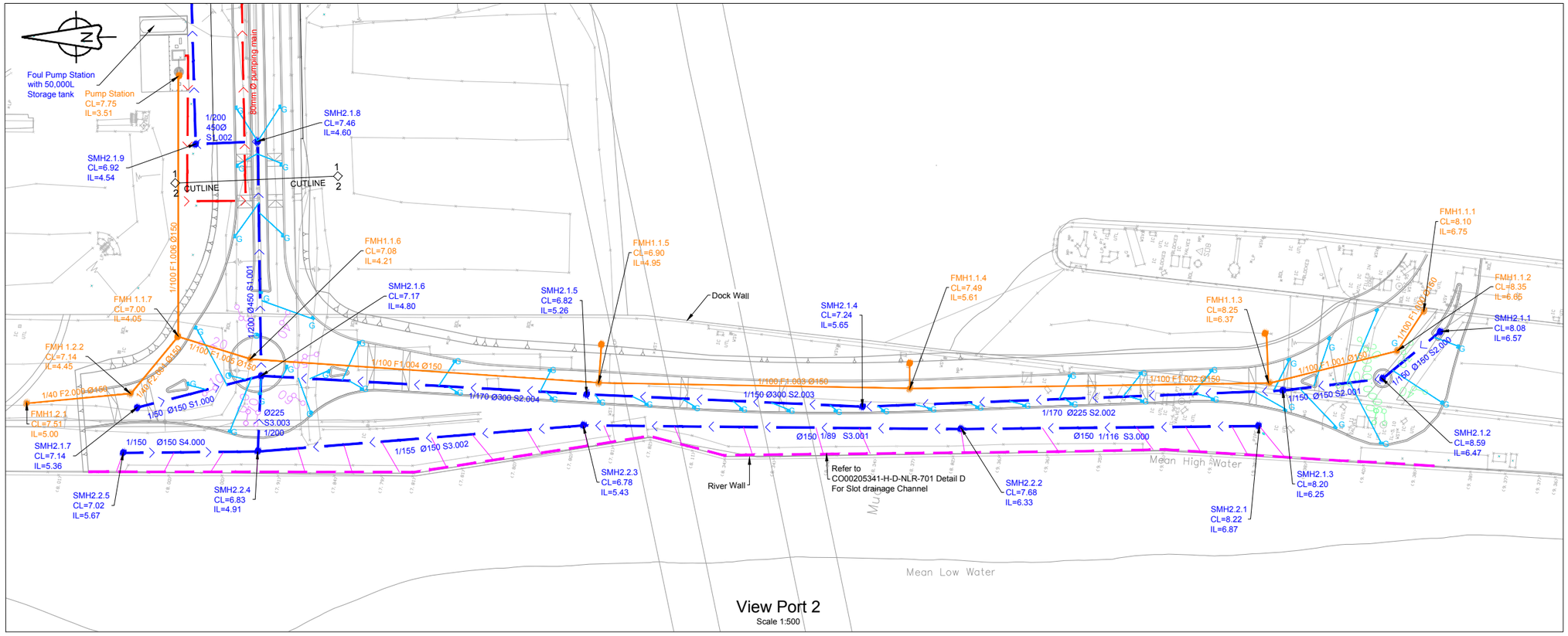
NOTES

1. All levels are in metres above Ordnance Datum.
2. All Dimensions are in metres unless stated otherwise.
3. The Specification clauses referred to in this drawing, unless stated otherwise are from the Manual of Contract Documents for Highway Works (MCHW) - Volume 1 Specification for Highway Works.
4. Any discrepancies to be brought to the attention of Amey.
5. This drawing is to be read in conjunction with;

   -CO00205341-H-D-NLR-501-503 Proposed Drainage Long-Sections
   -CO00205341-H-D-NLR -700-701 Proposed Construction Details
6. FMH 3.15, 3.16 and 3.17 constructed under A565 Liverpool (NLKC). Refer to drawing CO0020216-PH3-DR-506 included in site information.
7. For gully and manhole detail please refer to LCC standard drainage detail SD-D-05 Type G1 gully and SD-D-16 Type 1 Manhole respectively.
8. Outfall pipes should be turned in the direction of flow
9. Precast concrete headwall to be constructed for road drainage outfalls shall be to spec. cl. 1710 and to comply with BS EN206-1:2000.
10. Adequate protection measures should be constructed at each outfall to prevent bank erosion or scouring of the channel bed.
11. Carrier drain to be solid wall pipe with Type S bedding.

KEY

- Pumping Main
- Foul Drainage
- Storm Drainage
- Gully & Connection
- Slot Drainage Channel
- Channel Drainage Connection
- SMH = Storm Manhole (Network no. / Pipe Branch no. / Trunk no.)
- FMH = Foul Drainage Manhole (Network no. / Pipe Branch no. / Trunk no.)



TENDER

Rev	Revision details	Drwn	Chkd	Appd	Date

Designed:	CM	Date:	June 18
Drawn:	CB	Date:	June 18
Checked:	GML	Date:	June 18
Approved:	GML	Date:	June 18

amey consulting
www.amey.co.uk

Client
Liverpool City Council

Project Name
Liverpool City Centre Connectivity Phase 2

Drawing Title
Northern Link
Proposed Storm and Foul Drainage

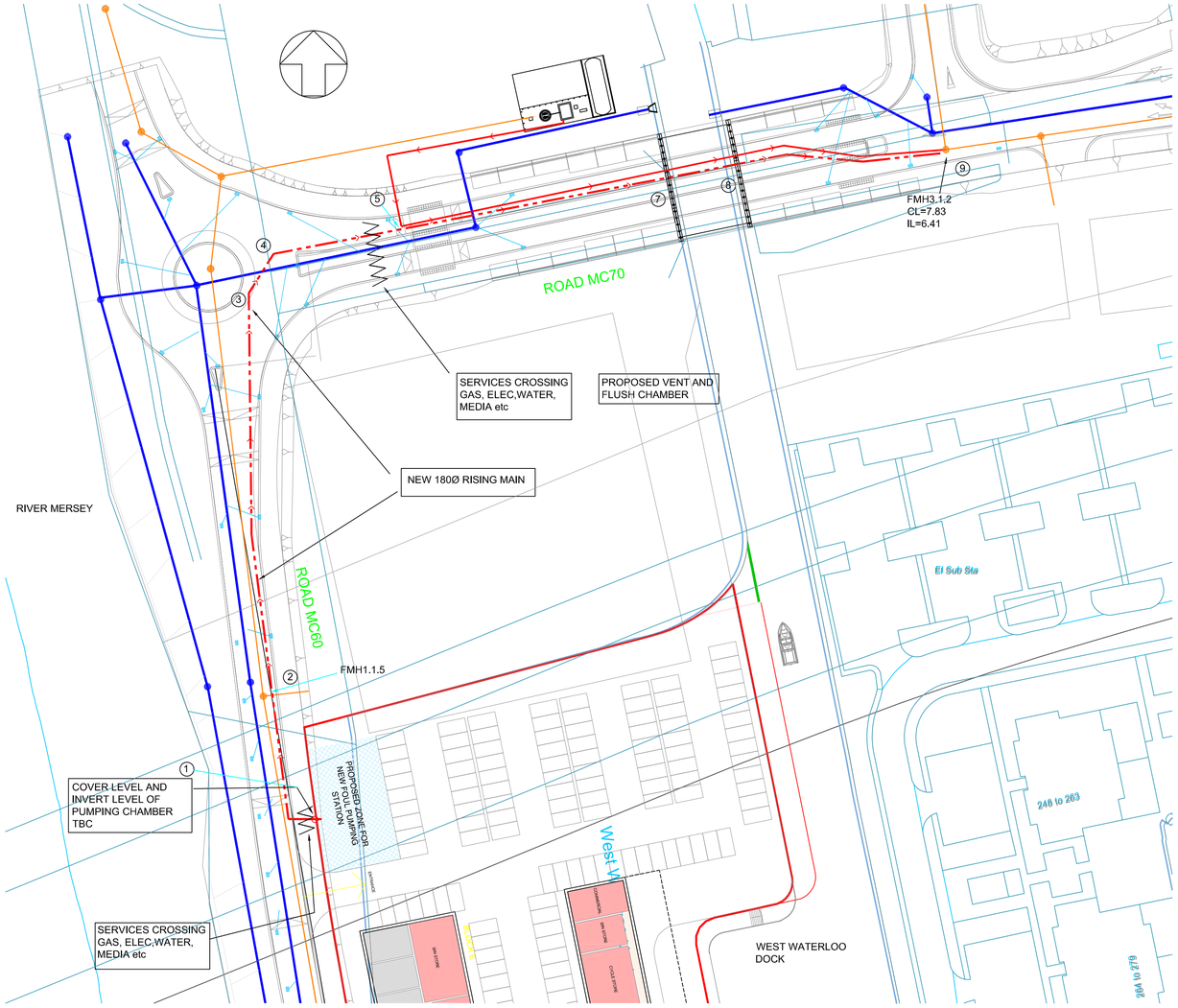
Original Drawing Size : A1	Scale : As Shown
Dimensions : m	

Drawing Status: PUBLISHED
Suitability: D2

Drawing No: CO00205341-H-D-NLR-500
Rev: -

APPENDIX F

Clancy Consulting Rising Main General Arrangement Drawing



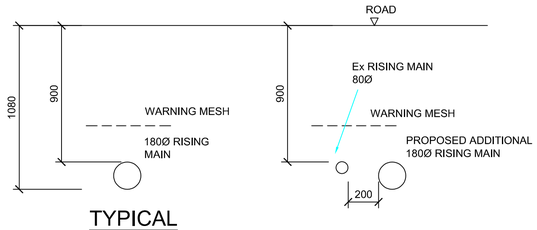
NEW/ PROPOSED FOUL RISING MAIN

Ex/ NEW FOUL RISING MAIN

Ex/ NEW FOUL WATER SEWER

Ex/ NEW SURFACE WATER SEWER

G Ex GULLY POSITIONS



GENERAL NOTES

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT CLANCY CONSULTING, ARCHITECTURAL AMEY CONSULTING AND OTHER ENGINEERS DRAWINGS AND SPECIFICATIONS.

DO NOT SCALE THIS DRAWING.

EXISTING DRAINAGE AND LEVELS SHOWN ON THIS DRAWING TO BE CONFIRMED BY THE CONTRACTOR ON SITE PRIOR TO COMMENCEMENT OF THE DRAINAGE WORKS. THE ENGINEER IS TO BE NOTIFIED OF ANY DISCREPANCIES.

COVER LEVELS TO BE CHECKED AGAINST ARCHITECTS PROPOSED EXTERNAL WORKS LEVEL / DETAIL DRAWINGS

EXISTING MANHOLES, LEVELS & PIPE SIZES TO BE CHECKED ON SITE

ALL OUTGOING AND INCOMING PIPES AT MANHOLE JUNCTIONS TO BE CONNECTED SOFFIT TO SOFFIT UNLESS SPECIFIED OTHERWISE.

PRELIMINARY COVER LEVEL AND INVERT LEVEL INTO THE PUMPING STATION ON CO2 SITE IS SUBJECT TO CONFIRMATION BY THE LANDSCAPE ARHCHITECT

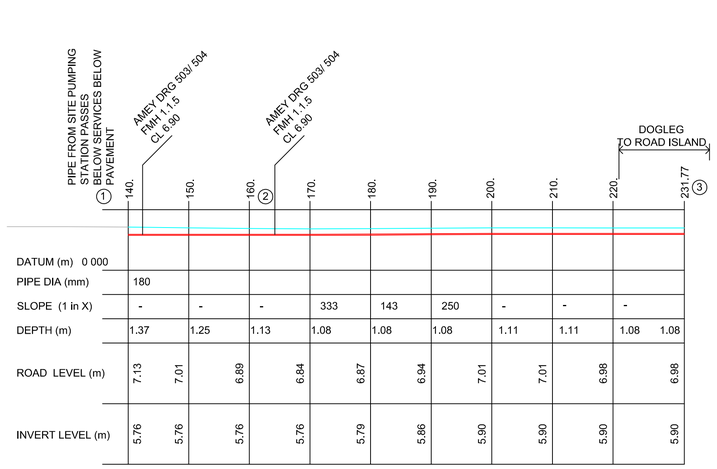
PROPOSED NEW RISING MAIN - LOCATED ADJACENT TO EX/ NEW 80Ø RISING MAIN PIPE TO HAVE A min 200mm GAP TO PREVENT UNDERMINING PIPE.

180mm RISING MAIN FROM CO2 SITE SET 900mm BELOW ROAD LEVEL AND 2m OFF THE KERB LINE AS PER AMEY CONSULTING EMAIL DATED 23 AUG 2019.

THE NEW 180mm RISING MAIN FROM CO2 SITE IS TO FOLLOW THE LINE OF THE OTHER 80mm RISING MAIN AT THE POINT IT RUNS PARALLEL ACROSS THE BRIDGE AND CONNECTION INTO THE EXISTING COMBINED SEWER. DATED 23 AUG 2019.

POSITION, DEPTH, QUANTITY OF WASH OUT CHAMBERS AND AIR VALVES SUBJECT TO CONFIRMATION BY PUMP PROVIDERS

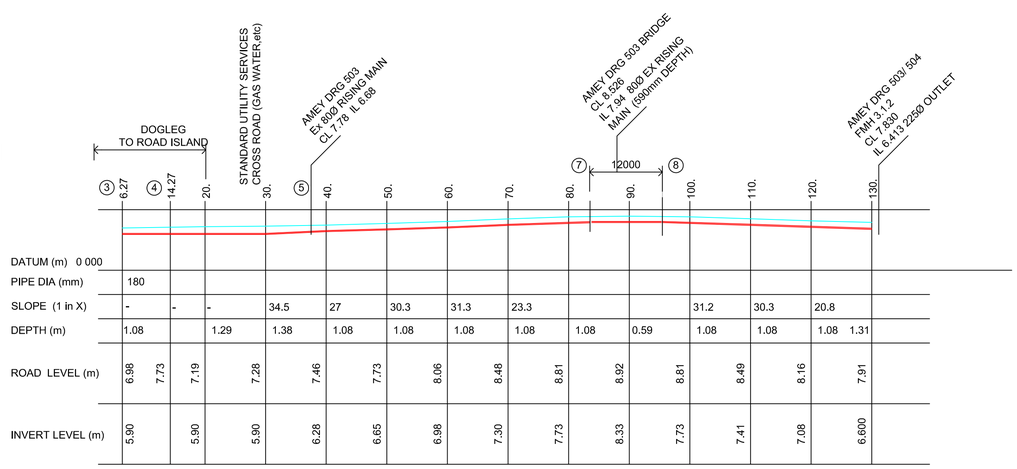
THE DRAWING IS CONCEPT AND SUBJECT TO CHANGE FOLLOWING COMMENTS. DO NOT CONSTRUCT FROM THIS DRAWING.



LONGITUDINAL ROAD SECTION

(USING AMEY CONSULTING DRG CO00205341-H-D-NLR-714 CO3 MC60 LONG SECTION AS REFERENCE)

SCALE 1-500



LONGITUDINAL ROAD SECTION

(USING AMEY CONSULTING DRG CO00205341-H-D-NLR-715 CO2 MC70 LONG SECTION AS REFERENCE)

SCALE 1-500

Rev	Date	Description	By	Check	App.
01	03/09/19	ISSUED FOR INFORMATION	RJM	MD	BRH

Client: ROMAL CAPITAL GROUP LTD

Project: PLOT CO2 LIVERPOOL WATERS

Office: LIVERPOOL

Discipline: CIVIL

Title: PROPOSED RISING MAIN

Scale @ A1: 1:500

Status: INFORMATION

clancy consulting
www.clancy.co.uk
Birmingham 0121 289 7600, Glasgow 0141 222 7720, Liverpool 0151 227 5500, London 020 3077 0970, Manchester 0161 613 6000, Newcastle 0191 221 2702, Norwich 01603 306100, Prestwich 01204 478375, Reading 0118 941 7888

Job Number	Originator	Building/Zone	Level
4/6679	CCL	CO2	DRN
Type	Discipline	Drawing No.	Revision
GA	C	100	01