Client:

Dublin City Council and Irish Water

Project:

Grand Canal Storm Water Outfall Extension

Report:

Flood Risk Assessment Report

BARRY & PARTNERS

Document Control Sheet

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SECTION 1: Introduction

1.1 General

J. B. Barry and Partners Limited was commissioned by Irish Water / Dublin City Council to undertake a site-specific Flood Risk Assessment (FRA) for Planning Permission the proposed Grand Canal Storm Water Outfall extension at Grand Canal Dock, Dublin 2, Co. Dublin. The aim of the FRA is to identify, quantify and communicate to decision makers and other stakeholders the risk of flooding associated with the proposed development.

The FRA has been carried out in accordance with 'The Planning System and Flood Risk Management Guidelines' (hereafter referred to as the FRM Guidelines) published in November 2009 jointly by the then Department of the Environment, Heritage and Local Government, DEHLG, (now the Department of the Environment, Community and Local Government, DECLG) and the Office of Public Works (OPW).

The development is located in the Grand Canal Docks, Dublin, Ireland. This area is a hub of modern apartment buildings and office and retail spaces which has been zoned as a Strategic Development Regeneration Area (SDRA) in the Dublin City Council Development Plan, 2016 – 2022, see Figure 1.1.

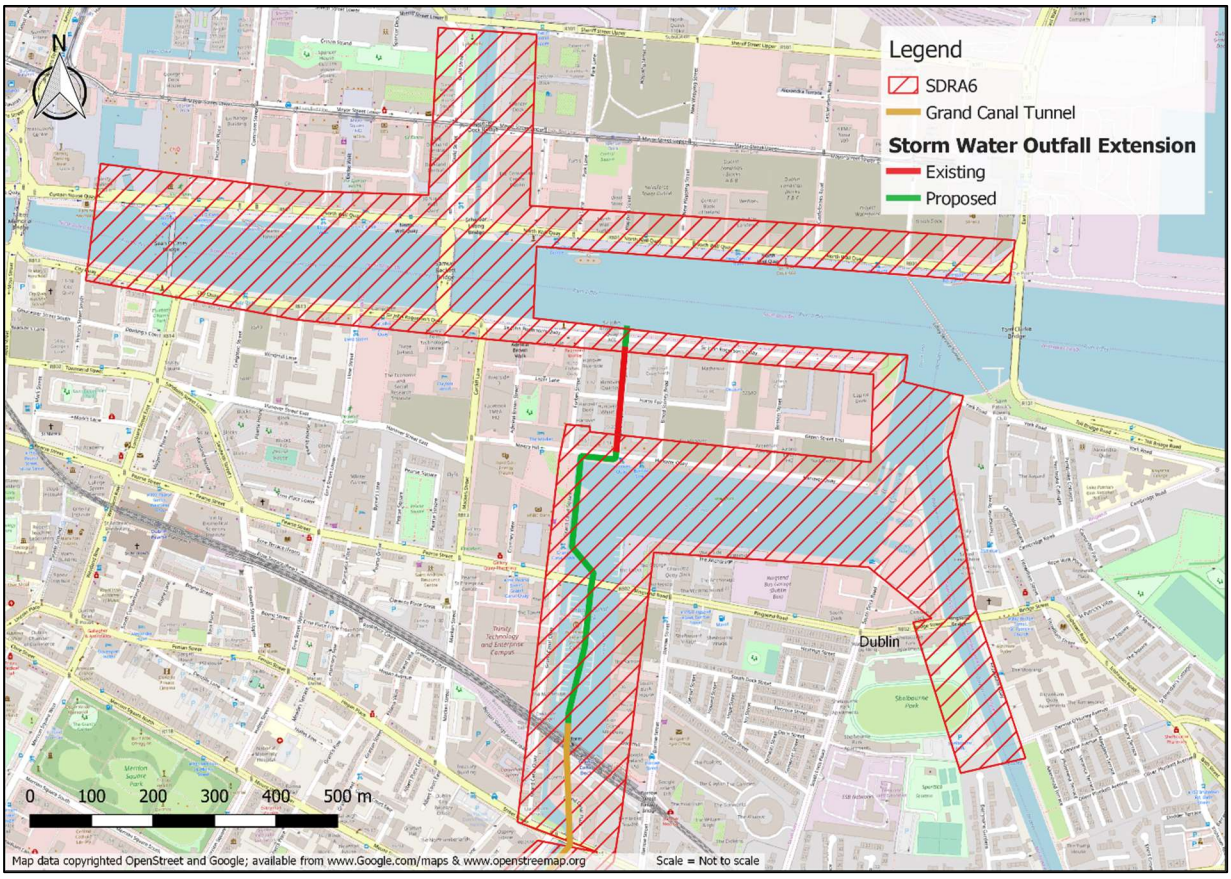


Figure 1.1: Site Location in context of the Strategic Development Regeneration Area (Dublin City Council Development Plan, 2016)

1.2 Proposed Development

The project will begin at its most southern point in the Grand Canal Basin at the Grand Canal Tunnel Outfall. The works will involve constructing a pipeline from the Grand Canal Tunnel Outfall, near the Grand Canal Dock Dart Station, north through the Basin where it will pass through a section of Hanover

Quay. It will then link up with an existing culvert on Asgard Road, built in 2002 as part of the phase 1 works for this project. At the northern end of this existing culvert, a pipeline will be constructed underneath Sir John Rogerson's Quay together with an outfall to the River Liffey. The storm water will therefore have bypassed its previous outfall within the Basin and will discharge into the River Liffey/ Lower Liffey Estuary.

As the pipeline will be constructed underground it will not be vulnerable to flooding, however there could be some flood risk associated with the construction of the pipeline. 3 No. construction compounds will be required throughout the construction phase of this project. All construction compounds are temporary during the construction phase. The first construction compound will be erected on the quayside of the Inner Basin, near the Waterways Ireland Visitor centre, and last for the duration of the works in the Inner Basin. When the pipeline reaches the Outer Basin, the first compound will be taken down. The second (and main) construction compound will be located on Hanover Quay. The third construction compound will be built on Sir John Rogerson's Quay and will only be there for the duration of the works for the outfall structure. Refer to Figure 1.2 below.

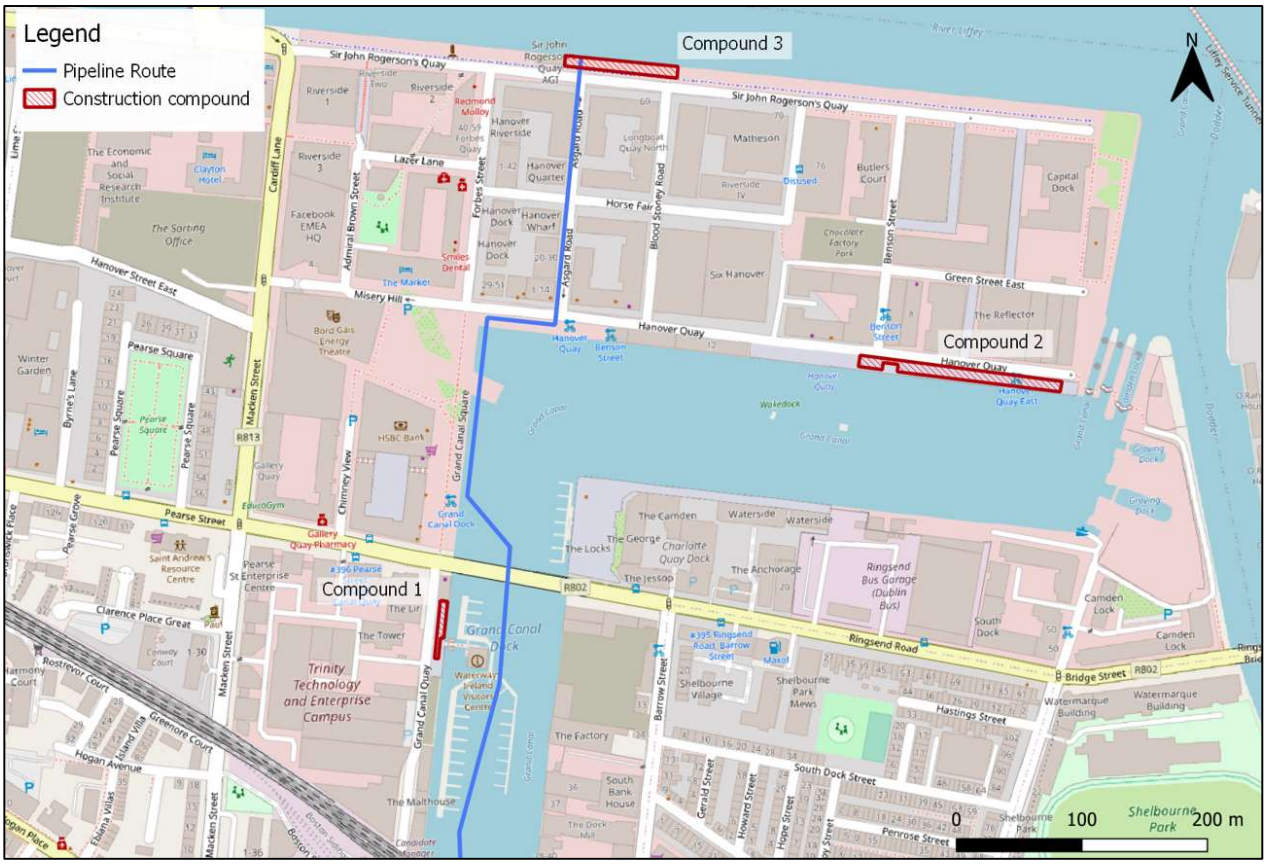


Figure 1.2: Location of Construction Compounds

SECTION 2: Flood Risk Assessment Methodology

2.1 Methodology

The methodology used for the flood risk assessment for the proposed development is based on 'The Planning System and Flood Risk Management, Guidelines for Planning Authorities' (2009)'. The FRM Guidelines require the planning system at national, regional and local levels to:

- Avoid development in areas at risk of flooding, particularly floodplains, unless there are proven wider sustainability grounds that justify appropriate development;
- Adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction and then mitigation of flood risk; and
- Incorporate flood risk assessment into the process of making decisions on planning applications and planning appeals.

The sequential approach, Figure 2.1 (see Figure 3.1 of the FRM Guidelines below) in flood risk management requires the following three steps to identify the necessity for the justification test for a development:

- Step 1: Identification of the Flood Zone at the proposed development site (Section 2.23 of the FRM Guidelines);
- Step 2: Identification of the vulnerability of the type of the proposed development (Table 3.1 of the FRM Guidelines); and
- Step 3: Using the matrix of vulnerability versus Flood Zone (Table 3.2 of the FRM Guidelines), identify the necessity for the justification test for the proposed development.

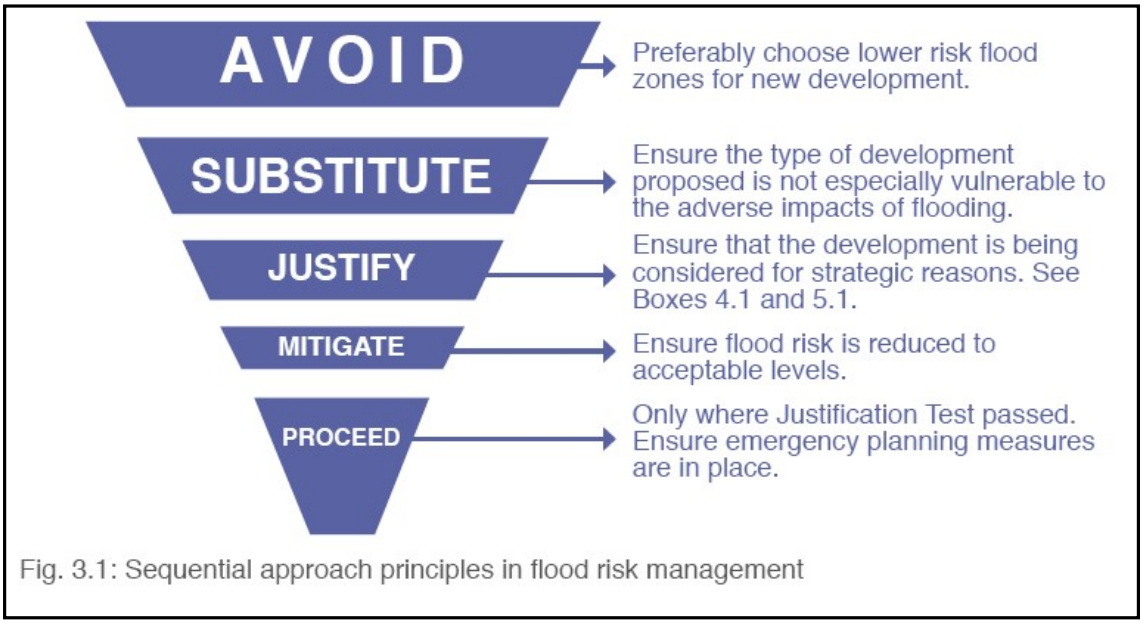


Figure 2.1 Sequential approach principles in flood risk management, extract from Figure 3.1 of the FRM guidelines

While Figure 3.1 of The FRM Guidelines sets out the broad philosophy underpinning the sequential approach in the flood risk management, Figure 3.2 of the Guidelines (Figure 2.2, shown below) describes the mechanism of the sequential approach for use in the planning process.

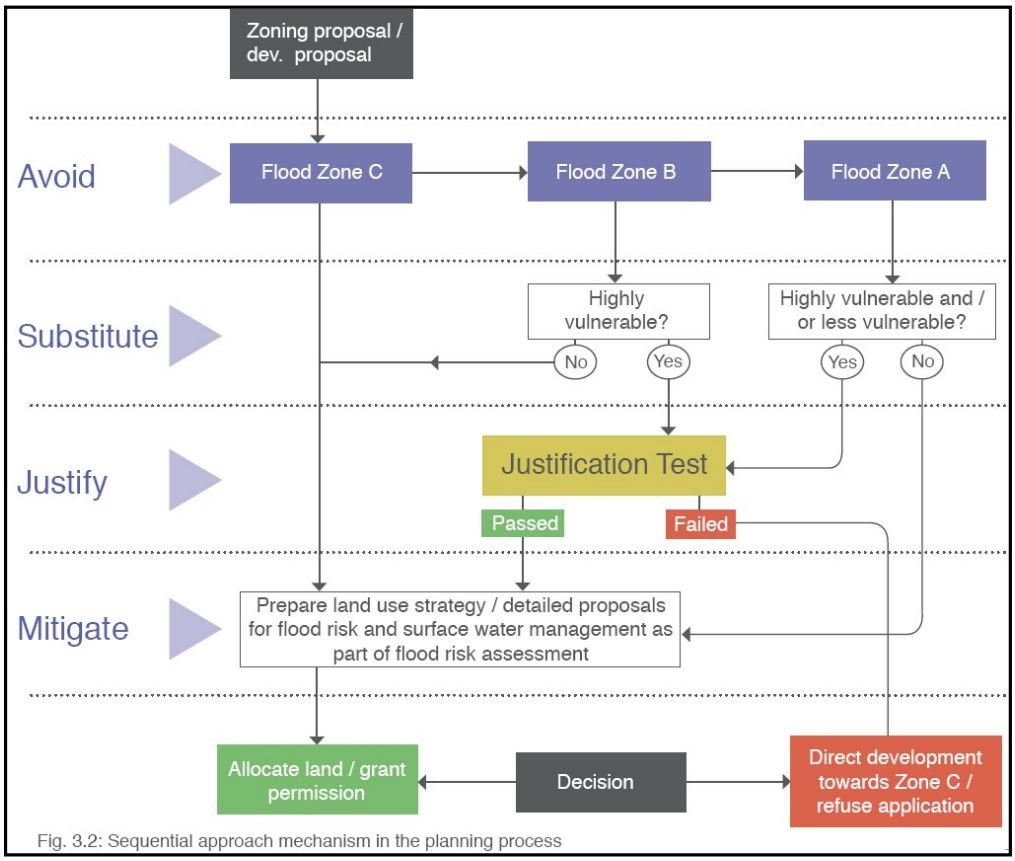


Figure 2.2 Sequential approach mechanism in the planning process, extract from Figure 3.2 of the FRM guidelines

According to the FRM Guidelines, Flood Zones are graphical areas within which the likelihood of flooding is in a particular range. They are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. There are three Flood Zones, namely,

- **Flood Zone A** – where the probability of flooding from rivers and the sea is highest (greater than 1% AEP or 1 in 100 year for river flooding or 0.5% or 1 in 200 for coastal flooding);
- **Flood Zone B** – where the probability of flooding from rivers and the sea is moderate (between 0.1% AEP or 1 in 1000 year and 1% AEP or 1 in 100 year for river flooding and between 0.1% AEP or 1 in 1000 year and 0.5% AEP or 1 in 200 year for coastal flooding); and
- **Flood Zone C** – where the probability of flooding from rivers and the sea is low (less than 0.1% AEP or 1 in 1000 for both river and coastal flooding).

Flood Zones A, B and C are based on the current assessment of the 1% AEP and the 0.1% AEP fluvial events and the 0.5% AEP and 0.1% AEP tidal events, without the inclusion of climate change factors. Table 3.1 of the FRM Guidelines (see below) shows the classification of the vulnerability to flooding of different types of development.

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).

*Uses not listed here should be considered on their own merits

Table 3.1 Classification of vulnerability of different types of development

Table 3.2 of the FRM Guidelines (shown below) identifies the types of development that would be appropriate for each Flood Zone and those that would be required to meet the Justification Test. The proposed pipeline will be constructed underground and as such is considered to be water compatible/less vulnerable to flood risk as these are located below ground level and therefore will not be susceptible to flooding. However, there could be some flood risk associated with the construction of the pipeline which will be addressed throughout the remainder of this report. Table 3.2 presents the required actions for each flood zone.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

The FRM Guidelines (Chapter 2) outlines the following three stages of flood risk assessment:

Stage 1: Flood risk identification – to identify whether there may be any flooding or surface water management issues relating to the proposed development site that may warrant further investigations.

Stage 2: Initial flood risk assessment – to confirm sources of flooding that may affect the proposed development site, to appraise the adequacy of existing information and to determine what surveys and modelling approach is appropriate to match the spatial resolution required and complexity of the flood risk issues. This stage involves the review of existing studies and hydraulic modelling to assess flood risk and to assist with the development of FRM measures.

Stage 3: Detailed flood risk assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development, of its potential impacts on flood risk elsewhere and of the effectiveness of any proposed mitigation measures. This will typically involve use of an existing or construction of a hydraulic model across a wide enough area to appreciate the catchment wide impacts and hydrological process involved.

2.2 Data Collection

Data required for the flood risk assessment was obtained from various sources, as described below.

- The historic flood data was obtained from the National Flood Hazard Mapping website www.floodmaps.ie;
- The Subsoil and Aquifer vulnerability data was obtained from the Geological Survey of Ireland website www.gsi.ie;
- National CFRAM Study;
- The Tidal flood extent map was obtained from the Irish Coastal Protection Strategy Study (ICPSS);
- Dublin Strategic Development Plan 2016 – 2022, Strategic Flood Risk Assessment

SECTION 3: Existing Hydrological Environment

3.1 Salient Hydrological Features

The main hydrological feature of the area are the River Liffey, the River Dodder, the Grand Canal and Dublin Bay. The River Dodder flows in a north easterly direction to the east of the site and discharges to the River Liffey to the northwest of the site. The Grand Canal flows through the Grand Canal Dock at the site and discharges to the River Liffey at the confluence with the Dodder. The River Liffey flows in an easterly direction to the north of the site and discharges to Dublin Bay just downstream from the site. Dur to it proximity to Dublin Bay, the River Liffey is tidally influenced at the proposed development site. Figure 3.1 below illustrates the main hydrological features associated with the site.

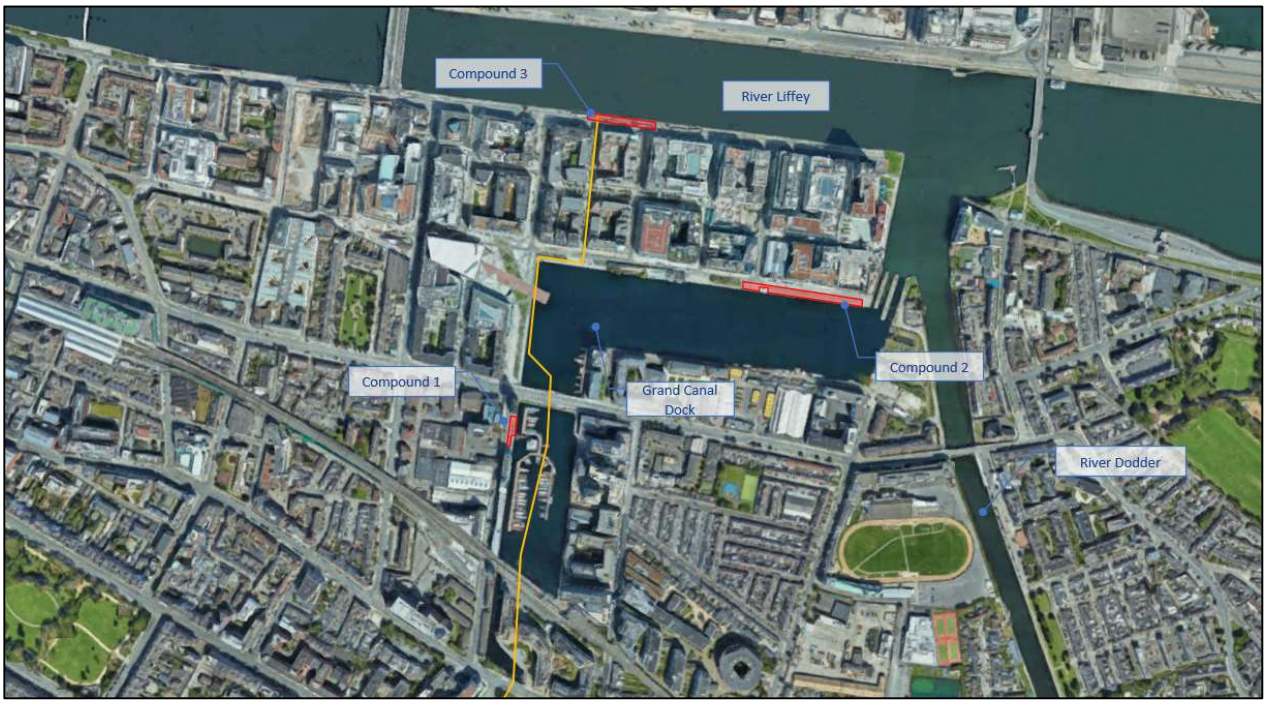


Figure 3.1: Hydrological Features of the Area (Source: FSU Web Portal, annotation by J.B. Barry & Partners)

3.2 Existing Geology and Hydrogeology of the Area

The Geological Survey of Ireland (GSI) website provides information on their public online mapping service at www.gsi.ie on subsoil type and aquifer vulnerability. The maps presented in Figure 3.2 and Figure 3.3 depict the subsoil type and aquifer vulnerability for the proposed development site. The GSI subsoil mapping (Figure 3.2) indicates that made ground, due to the vast urban extent of the area, is the dominant ground condition within the environs of the development site.

Figure 3.2: GSI Subsoil Mapping (Source: www.gsi.ie, annotation by J.B. Barry & Partners)

Furthermore, the interactive web-mapping site classifies the aquifer vulnerability in this region as having a low vulnerability rating (Figure 3.3*)*. The GSI state that "Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities". The GSI further describes that the vulnerability of groundwater depends on:

- The time of travel of infiltrating water (and contaminants);
- The relative quantity of contaminants that can reach the groundwater; and
- The contaminant attenuation capacity of the geological materials through which the water and contaminants infiltrate

Figure 3.3: GSI Aquifer Vulnerability Mapping (Source: www.gsi.ie, annotation by J.B. Barry & Partners)

3.3 Flood Regime of the Area

The National Flood Hazard Mapping Website does not show any records of historic floods occurring at the proposed development site, however it does show records of historic flooding which are within the vicinity of the proposed development site (Figure 3.4). The most recent of these floods occurred at the ESB Sportsco facility in October 2011 and was caused by heavy rainfall. Other floods in Ringsend and Fenian Street occurred in 1963.

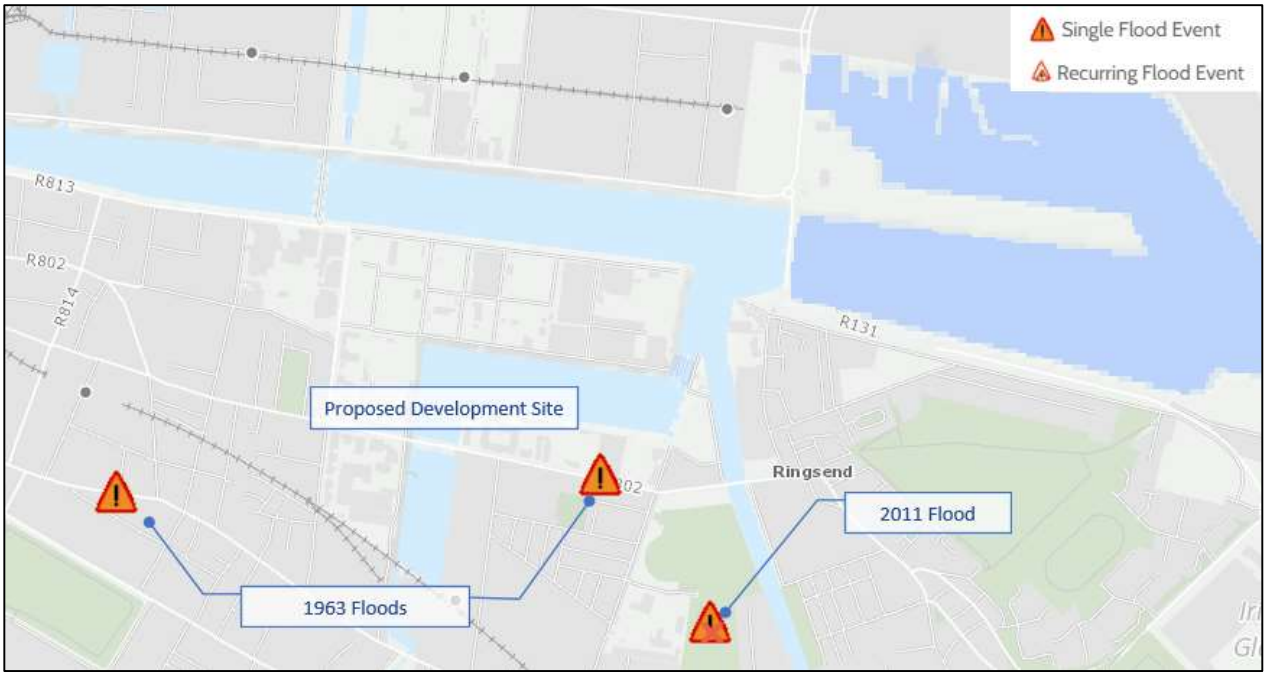


Figure 3.4: Location of historic flooding in the vicinity of the proposed site *(Source: www.floodinfo.ie annotation by J.B. Barry & Partners)*

3.4 Existing Flood Studies

3.4.1 Irish Coastal Protection Strategy Study

The Irish Coastal Protection Strategy Study (ICPSS) is a national study that was commissioned in 2003 with the objective of providing information to support decision making about how to best manage risks associated with coastal flooding and coastal erosion. The Study was completed in 2013 and provides strategic coastal flood hazard maps for the national coastline. The study involved modelling of combined storm surges and tide levels, which estimated extreme water levels and coastal flood extent for various design AEP's along the coastline.

The ICPSS current scenario flood maps for the 0.5% AEP and 0.1% AEP flood extents in the vicinity of the study area are presented in Appendix A. An extract from the ICPSS tidal flood extent map is shown in Figure 3.5 and indicates that the portions of Compound 3 is located within the 0.5% and 0.1% AEP coastal flood extents.

Figure 3.5: Extract of the ICPSS Flood Map (Source: www.opw.ie, annotation by J.B. Barry & Partners)

3.4.2 CFRAM Study

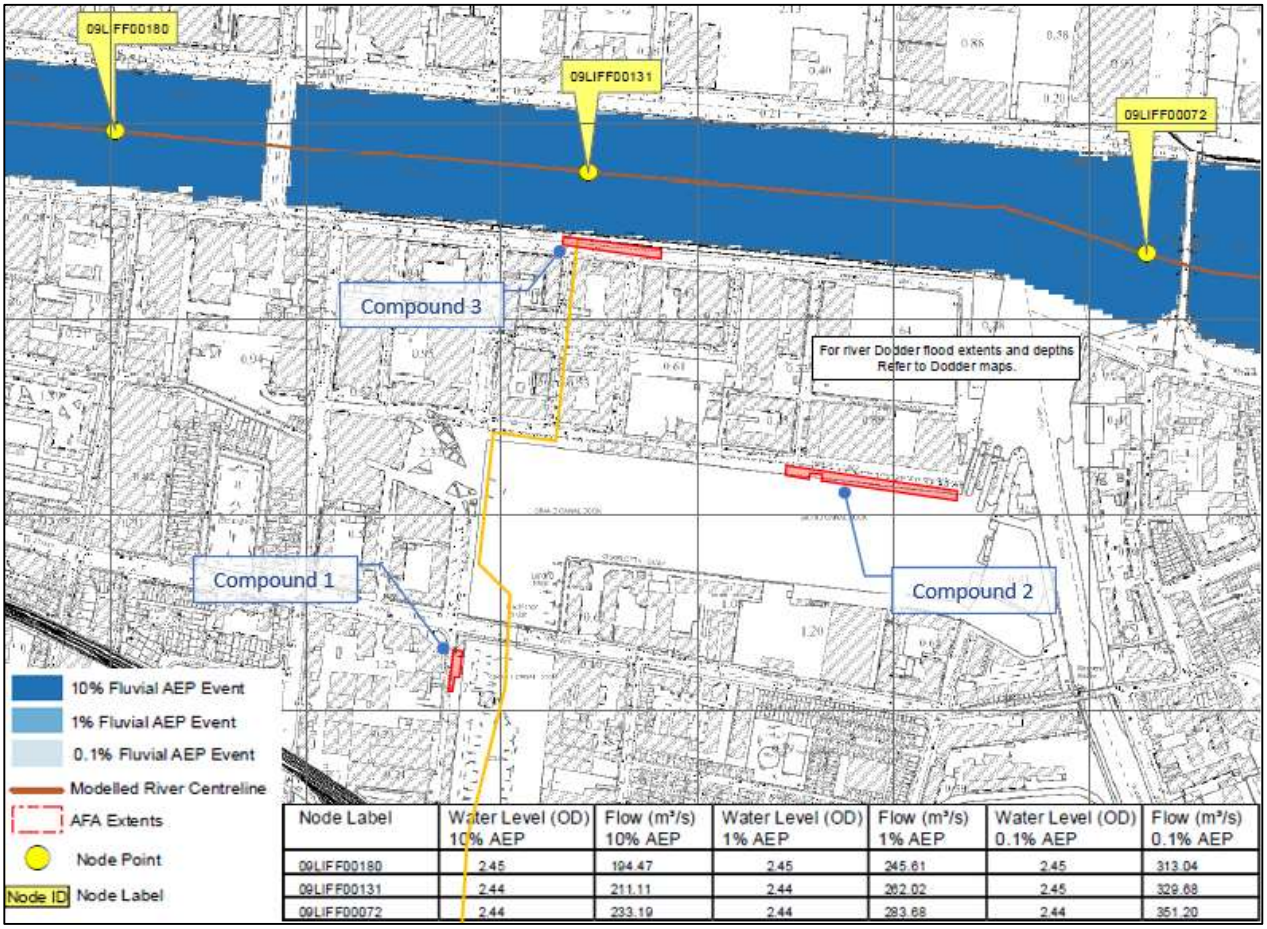
The OPW, as lead agency for flood risk management in Ireland, is producing Flood Risk Management Plans (FRMP), in line with National Flood Policy and the requirements of the EU Floods Directive. Draft FRMP's are currently being produced by the OPW under the CFRAM Study. The Draft FRMP's make use of the information provided through the flood maps that have previously been produced under the CFRAM Programme and previous parallel projects. The Draft FRMP's set out a range of proposed measures and actions to manage and reduce flood risk within the catchments and coastal reaches covered by each Draft Plan, focusing on the 300 areas of potentially significant flood risk around Ireland that were identified under the PFRA. The Flood Maps associated with the FRMP's are currently being finalised and are made available online to view when the Draft Plans are published for consultation.

Figure 3.6 below is an extract from the River Liffey Fluvial Flood Extent Map concerning the proposed development site. This map is included in Appendix B. Observation of Figure 3.6 demonstrates that all development lies outside of the 0.1% fluvial flood extent. Figure 3.7 below is an extract from the River Dodder Fluvial Flood Extent Map concerning the proposed development site. This map is included in Appendix B. Observation of Figure 3.7 demonstrates that all development lies outside of the 0.1% fluvial flood extent.

Figure 3.8 below is an extract from the Coastal Flood Extent Map concerning the proposed development site. This map is included in Appendix B. It can be seen that this map demonstrates that Compound 3 is located within the 0.5% and 0.1% AEP coastal flood extents. No other proposed development is located within the coastal flood extent. This is consistent with the ICPSS flood maps.

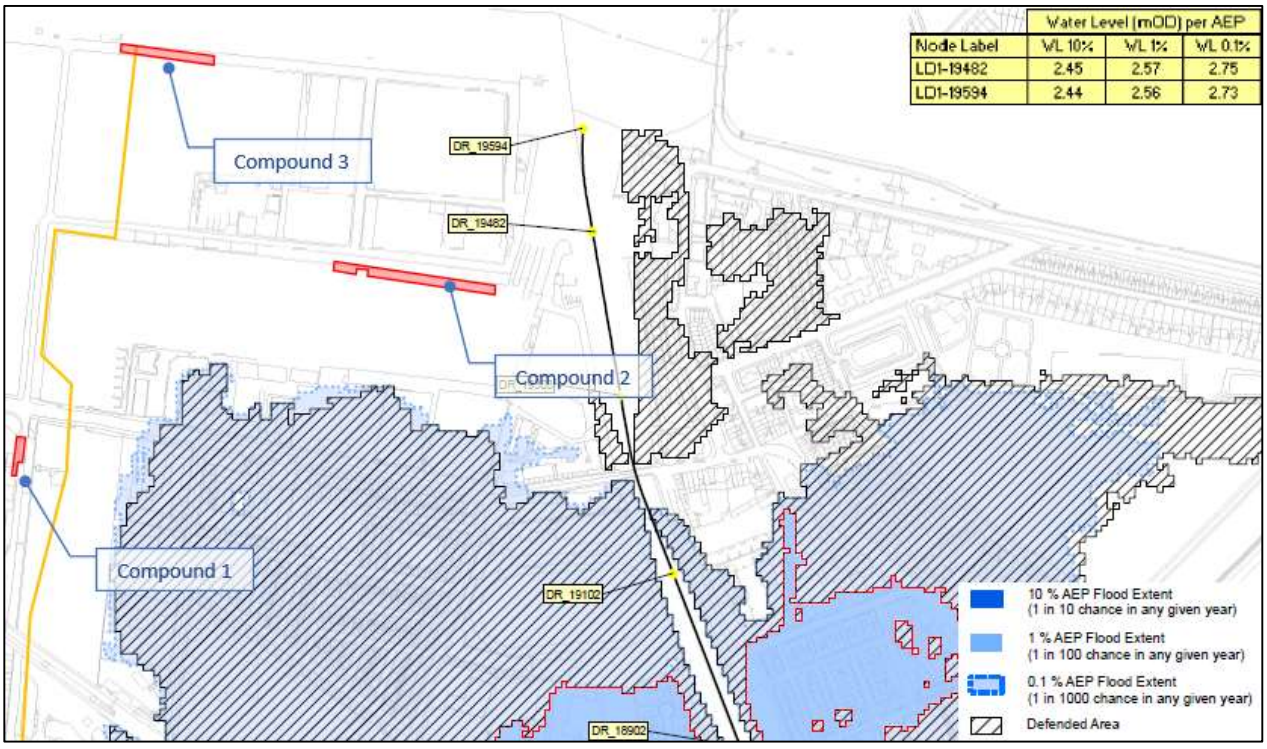
These extracts also provide the flood levels near to the proposed development site during various flood events. At Node 09LIFF00131, approximately 60m to the north of Compound 3, water levels in the River Liffey during the 1% and 0.1% AEP fluvial flood event are +2.44mOD and +2.45mOD respectively. Water levels at this node are +3.11mOD and +3.34mOD for the 0.5% and 0.1% AEP coastal flood events respectively.

At Node DR_19482, approximately 100m to the north-east of Compound 2, water levels in the River Dodder during the 1% and 0.1% AEP flood event are +2.57mOD and +2.75mOD respectively.



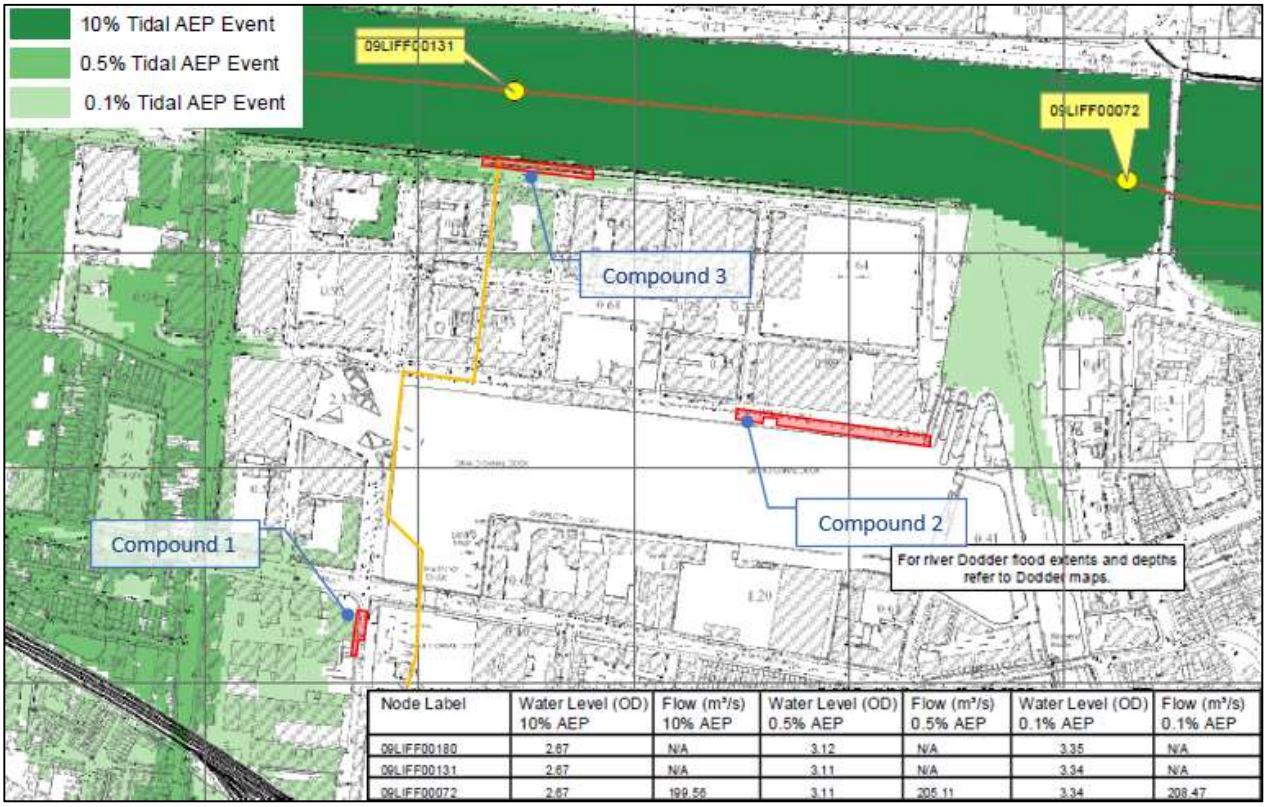
Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09LIFF00180	2.45	194.47	2.45	245.61	2.45	313.04
09LIFF00131	2.44	211.11	2.44	262.02	2.45	329.68
09LIFF00072	2.44	233.19	2.44	283.68	2.44	351.20

Figure 3.6: Extract from the Liffey CFRAMS Current Scenario Fluvial Flood Extent Map



Node Label	Water Level (mOD) per AEP		
	WL 10%	WL 1%	WL 0.1%
LD1-19482	2.45	2.57	2.75
LD1-19594	2.44	2.56	2.73

Figure 3.7: Extract from the Dodder CFRAMS Current Scenario Fluvial Flood Extent Map



Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 0.5% AEP	Flow (m³/s) 0.5% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09LIFF00180	2.67	N/A	3.12	N/A	3.35	N/A
09LIFF00131	2.67	N/A	3.11	N/A	3.34	N/A
09LIFF00072	2.67	199.56	3.11	205.11	3.34	208.47

Figure 3.8: Extract from the CFRAMS Current Scenario Coastal Flood Extent Map

3.4.3 Dublin City Council Strategic Flood Risk Assessment 2016-2022

The Dublin City Council (DCC) Strategic Flood Risk Assessment (SFRA) was developed as part of the Dublin City Council Development Plan 2016 – 2022. The SFRA provides an area-wide assessment of all types of significant flood risk to inform strategic land use planning decisions. The SFRA enables DCC to allocate appropriate sites for development and identify how flood risk can be reduced as part of the development plan process.

As part of the SFRA, flood zone maps were generated for Dublin City. Figure 3.9 below shows an extract from the Flood Zone Map in the vicinity of the proposed development. From this figure it can be seen that the Dublin SFRA considers that Compound 3 lies within a Flood Zone and all other development lies outside of flood zones. This is consistent with both the ICPSS flood maps and CFRAMS flood maps.

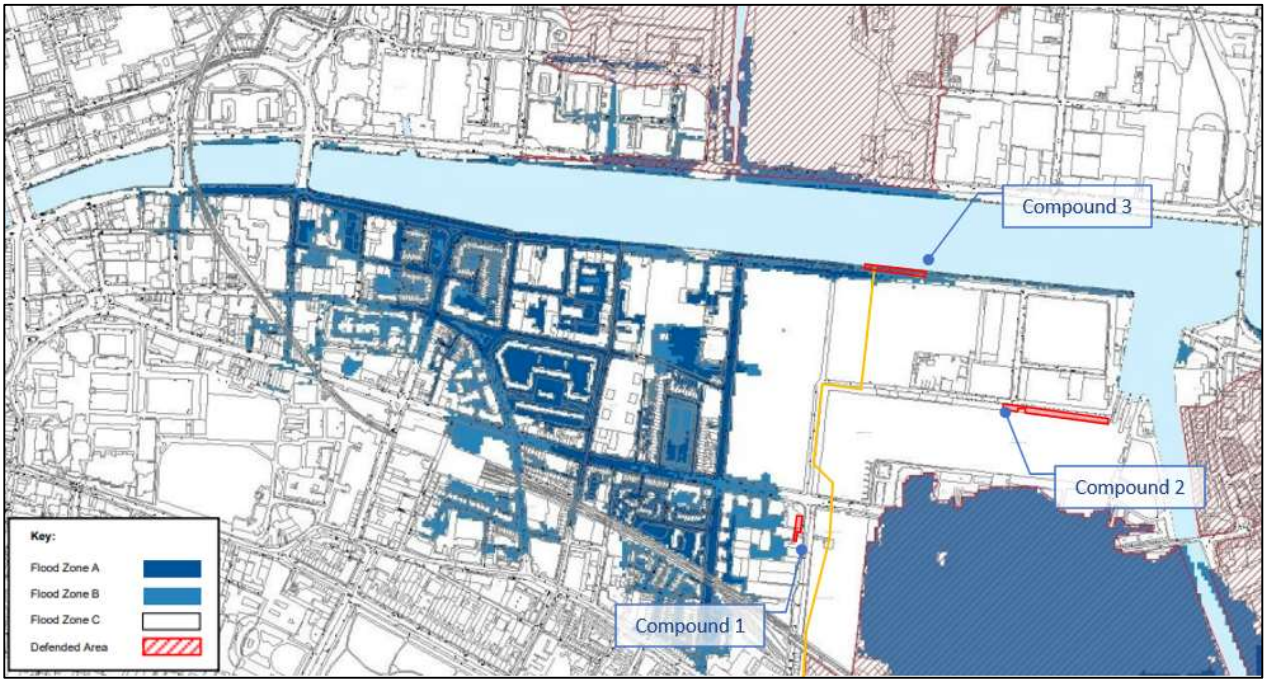


Figure 3.9: Extract from the Dublin City Council SFRA Flood Zone Map

SECTION 4: Flood Risk Assessment

4.1 Introduction

As outlined in Section 2 of this report the FRM guidelines identifies three stages of Flood Risk Assessment namely;

- Stage 1: Flood Risk Identification
- Stage 2: Initial Flood Risk Assessment
- Stage 3: Detailed Flood Risk Assessment

4.2 Flood Risk Identification

According to the FRM Guidelines, flood risk identification is the process for deciding whether a plan or project requires further investigation. This is a desk based exercise based on existing information. All the existing information is described in Section 3 and the identification of flood risk from each of the five sources of flooding (coastal, fluvial (river), groundwater, pluvial (rainfall) and from artificial drainage systems) is considered.

Coastal Flood Risk

The CFRAMS map in Appendix B shows that none of the proposed development is situated within the coastal flood extent. However, Compound 3 which is required for the construction of the development is located in Coastal Flood Zone A as identified in the ICPSS flood map, CFRAMS Coastal flood map and DCC SFRA flood map.

Fluvial Flood Risk

The CFRAMS map in Appendix B and DCC SFRA flood extent map, in Appendix C, both indicate that the proposed development site and construction compounds are located outside the fluvial flood extents and hence are located in fluvial Flood Zone C, where the risk of flooding is lowest. The OPW Summary Local Area Report shows no indication of previous fluvial related flooding at the proposed site.

Groundwater Flood Risk

The aquifer vulnerability map (refer toFigure 3.3) classifies the site as having 'low vulnerability' which indicates a low water table and hence a low risk of groundwater related flooding. There is no historical evidence of groundwater flooding at the site. There is no indication on the maps of any springs or wells on this site. Groundwater risk is therefore not considered to be significant.

Pluvial Flood Risk

The proposed development site is well drained, hence surface water flooding is unlikely to be a significant issue. The OPW Summary Local Area Report also shows no indication of previous pluvial related flooding at the site. The Dublin SFRA indicates that the proposed development site has a low pluvial flood hazard. Pluvial flood risk is therefore not considered to be significant.

Artificial Drainage Systems Flood Risk

No artificial drainage systems have been identified at the proposed site, and consequently artificial drainage systems flood risk is not relevant.

4.3 Initial Flood Risk Assessment

The Flood Risk Assessment has identified that there is no flood risk to the proposed development, as it will be constructed underground. However, a flood risk has been identified with the construction of the pipeline, as compound 3 has been identified to be located in coastal Flood Zone A. The compound will be

temporary during the construction phase of the project and will be used for site offices and storage of equipment and materials. As a significant number of people will be located at the compound during the construction phase, a number of measures shall be put in place to minimise flood risk. It is recommended that the finished floor level of the compound be constructed at a level greater than the 0.5% AEP flood level at the site. As discussed in Section 3.4.2 the 0.5% AEP coastal flood level nearest to Compound 3 is +3.11mOD, therefore the FFL of the compound shall be set above this level. Any materials stored shall be carefully stored to prevent spillage in the event of an extreme flood.

As the compound is located in the coastal flood plain, there will be no increase in coastal flood levels as a result of the compound. Therefore, there will be no increase in flood risk to adjacent areas as a result of the compounds construction.

4.4 Detailed Flood Risk Assessment

With the proposed recommendations and mitigation measures in place, there will be minimal flood risk to the site and project. Therefore, there is no requirement to undertake a detailed flood risk assessment.

SECTION 5: Conclusions

5.1 Summary of Results

A flood risk assessment for the proposed Grand Canal Storm Water Outfall extension at Grand Canal Dock, Dublin 2, Co. Dublin has been undertaken in accordance with the methodology recommended in the FRM Guidelines. The following is a summary of the flood risk assessment:

- The proposed development consists of constructing a pipeline from the Grand Canal Tunnel Outfall to a new outfall at the River Liffey. As the pipeline will be constructed underground it will not be vulnerable to flooding, however there could be some flood risk associated with the construction of the pipeline.

- The CFRAMS fluvial flood extent maps of the River Liffey and the River Dodder demonstrate that the fluvial flood extents of the rivers do not extend to the proposed development site. However, the coastal CFRAMS map shows that Compound 3 is located within the coastal flood extent.

- The ICPSS flood extent map indicates that Compound 3 will be located in coastal Flood Zone A. All other development associated with the project is not located in any flood plain. Th Dublin City Council Strategic Flood Risk Assessment 2016 – 2022 also demonstrates this.

- A number of recommendations are made to minimise flood risk at compound 3. It is recommended that the finished floor level of the compound be constructed at a level greater than the 0.5% AEP flood level at the site and to carefully store any materials at the compound to prevent spillage in the event of an extreme flood.

- As the compound is located in the coastal flood plain, there will be no increase in coastal flood levels as a result of the compound.

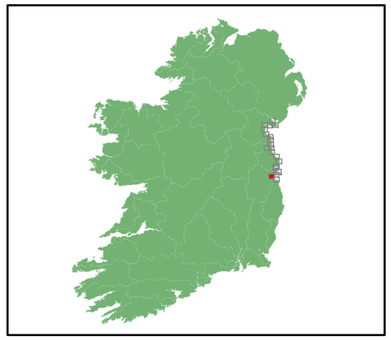
Appendix A: ICPSS Flood Map

NOTE: MORE DETAILED MAPS SHOWING COMBINED TIDAL AND FLUVIAL FLOOD HAZARD FOR PART OF THIS AREA (DODDER CATCHMENT ONLY) HAVE BEEN PREPARED UNDER THE RIVER DODDER CATCHMENT FRAM STUDY. PLEASE REFER TO WWW.DUBLINCITY.IE/PAGES/DODDERFLOODINGSTUDY.ASPX FOR MORE INFORMATION

	Water Level (mOD Malin) per AEP		
Node Label	WL 10%	WL 0.5 %	WL 0.1 %
Point 22	2.67	3.07	3.28

0.5 0.25 0 0.5 1 1.5 2 Kilometers

Location Plan :



EXTENT MAP

Legend:

- 0.5% AEP FLOOD EXTENT (1 in 200 chance in any given year)
- 0.1% AEP FLOOD EXTENT (1 in 1000 chance in any given year)
- Very High Confidence (0.1% AEP)
- High Confidence (0.1% AEP)
- Medium Confidence (0.1% AEP)
- Low Confidence (0.1% AEP)
- Very Low Confidence (0.1% AEP)
- Very High Confidence (0.5% AEP)
- High Confidence (0.5% AEP)
- Medium Confidence (0.5% AEP)
- Low Confidence (0.5% AEP)
- Very Low Confidence (0.5% AEP)
- High Water Mark (HWM)
- Node Point
- Point 34 Node Label (refer to table)

USER NOTE :

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF A BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.

RPS
Elmwood House
74 Boucher Road
Belfast
BT 12 6RZ
Northern Ireland

OPW
Office of Public Works
17-19 Lower Hatch Street
Dublin 2
Ireland

Project :
IRISH COASTAL PROTECTION STRATEGY STUDY - PHASE III

Map :
NORTH EAST COAST FLOOD EXTENT MAP

Map Type :	FLOOD EXTENT		
Source :	TIDAL FLOODING		
Map area :	RURAL AREA		
Scenario :	CURRENT		
Figure By :	PJW	Date :	Jan 2010
Checked By :	JMC	Date :	Jan 2010

Figure No. : NE / RA / EXT / 19

Revision 1

Drawing Scale : 1:25,000

Plot Scale : 1:1 @ A3

Appendix B: CFRAMS Flood Maps

316600 316800 317000 317200 317400 317600 317800 318000

234800 234600 234400 234200 234000 233800 233600

09LIFF00180

09LIFF00131

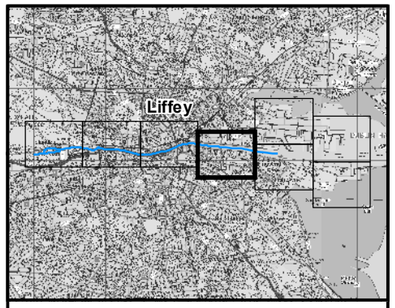
09LIFF00072

For river Dodder flood extents and depths
Refer to Dodder maps.

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09LIFF00180	2.45	194.47	2.45	245.61	2.45	313.04
09LIFF00131	2.44	211.11	2.44	262.02	2.45	329.68
09LIFF00072	2.44	233.19	2.44	283.68	2.44	351.20

316600 316800 317000 317200 317400 317600 317800 318000

0 50 100 200 300 400 500 Metres



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

FINAL

REV:	NOTE:	DATE:
01	Amendments to Flood Extents.	05/12/16

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW Oifig na nOibreacha Poiblí The Office of Public Works

RPS

The Office of Public Works
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E ireland@rpsgroup.com

Map:
Liffey Fluvial Flood Extents

Map Type:	**EXTENT**	
Source:	**FLUVIAL**	
Map Area:	**HPW**	
Scenario:	**CURRENT**	
Drawn By :	**C.C.**	**Date : 9 May 2017**
Checked By :	**A.S.**	**Date : 9 May 2017**
Approved By :	**S.P.**	**Date : 9 May 2017**

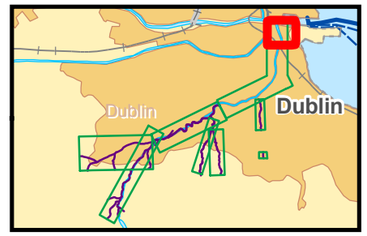
Drawing No. :
E09LIF_EXFCD_F1_04

Map Series : Page 4 of 8

Drawing Scale : 1:5,000 @A3

Node Label	Water Level (mOD) per AEP		
	WL 10%	WL 1%	WL 0.1%
LD1-18492	2.79	3.11	4.79
LD1-18602	2.70	3.00	4.75
LD1-18729	2.61	2.86	4.07
LD1-18752	2.60	2.84	3.94
LD1-18902	2.52	2.69	3.33
LD1-19102	2.46	2.58	2.98
LD1-19303	2.45	2.58	2.84
LD1-19482	2.45	2.57	2.75
LD1-19594	2.44	2.56	2.73

Location Plan:



Legend:

- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- Defended Area
- High Confidence (<20m) (10% AEP)
- Medium Confidence (<40m) (10% AEP)
- Low Confidence (>40m) (10% and 0.1% AEP)
- High Confidence (<20m) (1% AEP)
- Medium Confidence (<40m) (1% AEP)
- Low Confidence (>40m) (1% AEP)
- River Centreline
- Node Point
- OS_2975 — Node Label (refer to table)
- Flow reporting location
- 10% Flow = 1.20 / 1% Flow = 1.56 / 0.1% Flow = 2.17 — Peak flow during design flood extent

USER NOTE:

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.

Client:

Dublin City Baile Átha Cliath | South Dublin County Council | Dún Laoghaire-Rathdown County Council Comhairle Contae Dhún Laoghaire-Ráth an Dúin | OPW

Project:

DODDER CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT STUDY

Map:

PRESENT DAY DODDER

Map Type: FLOOD EXTENT

Source: FLUVIAL FLOODING

Map Area: URBAN AREA

Scenario: CURRENT

Drawn By :	A.A.B	**Date :**	26 November 2010
Checked By :	A.J.	**Date :**	26 November 2010
Approved By :	A.G.B	**Date :**	26 November 2010

Figure No. :

DR/EXT/UA/CURS/101

Map Series : Page 10 of 12

Drawing Scale : 1: 5,000 **Plot Scale : 1:1 @ A3**

0 0.1 0.2
Kilometers

RPS Consulting Engineers
ELMWOOD HOUSE
74 BOUCHER ROAD
BELFAST BT12 6RZ
TEL : 028 9066 7914
FAX : 028 9066 8286
www.rpsgroup.com/Ireland

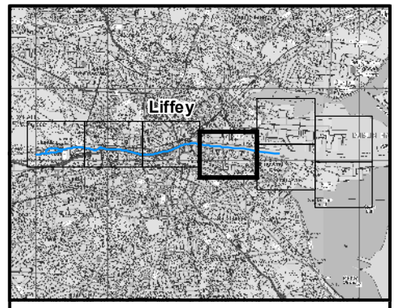
Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 0.5% AEP	Flow (m³/s) 0.5% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09LIFF00180	2.67	N/A	3.12	N/A	3.35	N/A
09LIFF00131	2.67	N/A	3.11	N/A	3.34	N/A
09LIFF00072	2.67	199.56	3.11	205.11	3.34	208.47

09LIFF00180

09LIFF00131

09LIFF00072

For river Dodder flood extents and depths refer to Dodder maps.



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Tidal AEP Event
- 0.5% Tidal AEP Event
- 0.1% Tidal AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

FINAL

REV:	NOTE:	DATE:
01	Amendments to Flood Extents.	05/12/16

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

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Map:
Liffey Tidal Flood Extents

Map Type:	EXTENT
Source:	TIDAL
Map Area:	COASTAL
Scenario:	CURRENT
Drawn By : C.C.	Date : 9 May 2017
Checked By : A.S.	Date : 9 May 2017
Approved By : S.P.	Date : 9 May 2017

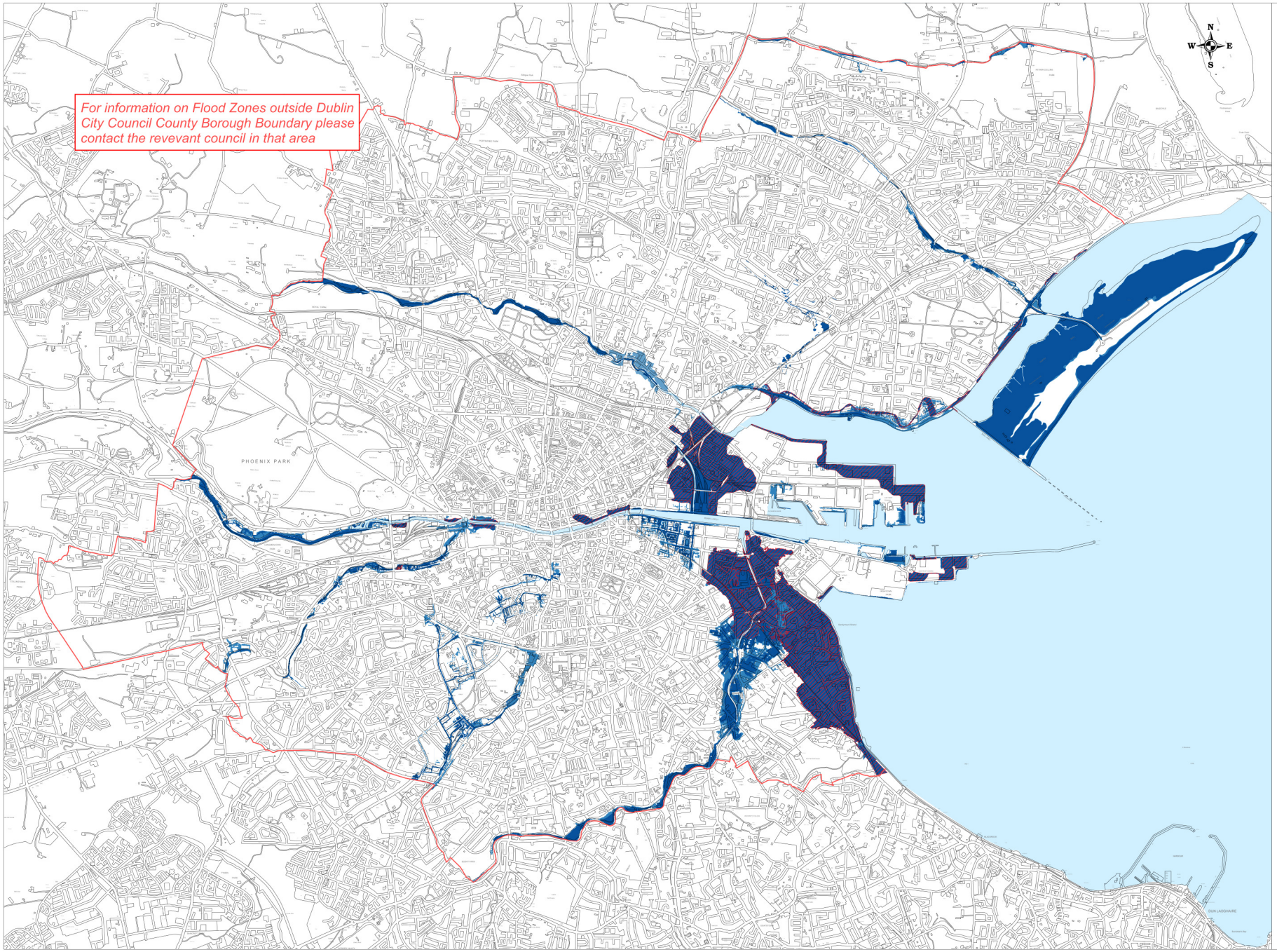
Drawing No. :
E09LIF_EXCCD_F1_04

Map Series : Page 4 of 8

Drawing Scale : 1:5,000 @A3

0 50 100 200 300 400 500 Metres

Appendix C: Dublin City Council SFRA Flood Map



No Window

Dublin City Development Plan 2016-2022

Dublin City Council

Composite Flood Map

Flood Zone A

Flood Zone B

Flood Zone C

Defended Area

County Borough Boundary

See Appendix 3 Strategic Flood Risk Assessment report for details

John O'Hara

Head of Land Use Policy