SOCIAL HOUSING DEVELOPMENT

EAST WALL, DUBLIN

Hydrogeological and Flood Risk Assessment Report

SHB3-EAW-CS-RPS-RP-006
Hydrogeological and Flood Risk Assessment Report
P04
03rd March 2022

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
P01	Issue for Review	PT	UM	DK	24/09/2021
P02	Issue for Client Review	PT	UM	DK	09/12/2021
P03	Issue for Review	PT	UM	DK	04/02/2022
P04	Issue for Part 8 Planning	PT	UM	DK	03/03/2022

Approval for issue

DK	3 March 2022

Prepared by:

RPS

Prepared for:

Dublin City Council

Dublin | Cork | Galway | Sligo
rpsgroup.com

RPS Group Limited, registered in Ireland No. 91911
RPS Consulting Engineers Limited, registered in Ireland No. 161581
RPS Planning & Environment Limited, registered in Ireland No. 160191
RPS Engineering Services Limited, registered in Ireland No. 99795
The Registered office of each of the above companies is West Pier Business Campus, Dun Laoghaire, Co. Dublin, A96 N6T7

Contents

Tables

Figures

Appendices

Glossary

Term	Meaning
Annual Exceedance Probability	The probability, typically expressed as a percentage, of a flood event of a given magnitude being equalled or exceeded in any given year. For example, a 1% AEP flood event has a 1%, or 1 in a 100, chance of occurring or being exceeded in any given year.
Flood Zone A	Where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 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% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and
Flood Zone C	Where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.
Return Period	A term that was used to describe the probability of a flood event, expressed as the interval in the number of years that, on average over a long period of time, a certain magnitude of flood would be expected to occur. This term has been replaced by 'Annual Exceedance Probability, as Return Period can be misleading.
The Proposed Development	Social Housing Development on the Ready-Mix Site, East Wall, Dublin 3
Vulnerable Development	Classification of the vulnerability to flooding of different types of development as defined in The Planning System and Flood Risk Management – Guidelines for Planning Authorities" (DOEHLG, 2009). Vulnerable development is classified as High, Less or Water Compatible for differing land uses and types of development.

Acronyms

Term	Meaning
AEP	Annual Exceedance Probability
DHLGH	Department of Housing, Local Government and Heritage
EC	European Commission
EU	European Union
FRA	Flood Risk Assessment
FFL	Finished Floor Level
FRS	Flood Relief Scheme
FSU	Flood Studies Update
ICPSS	Irish Coastal Protection Strategy Study
ICWWS	Irish Coastal Wave and Water Level Modelling Study
NDFA	National Development Finance Agency
OPW	Office of Public Works

Units

Unit	Description
ft	feet
km	Kilometres
km^2	Kilometres squared
m	Metres (length)
m/km	Metres per Kilometre (Slope)
m^2	Square metres (Area)

m^3	Cubic metres (Volume)
m^3/s	Cubic metres per second (Discharge)
mm	Millimetres (length)
mOD	Metres Ordnance Datum
s	Seconds

1 INTRODUCTION

1.1 Background

RPS are the appointed Civil and Structural Engineering advisors to the National Development Finance Agency (NDFA) for the proposed residential development at East Wall, County Dublin. This project will deliver 68 apartments to Dublin City Council Planning Authority. This report focuses on the East Wall site. **Figure 1.1** illustrates the location of the subject site.

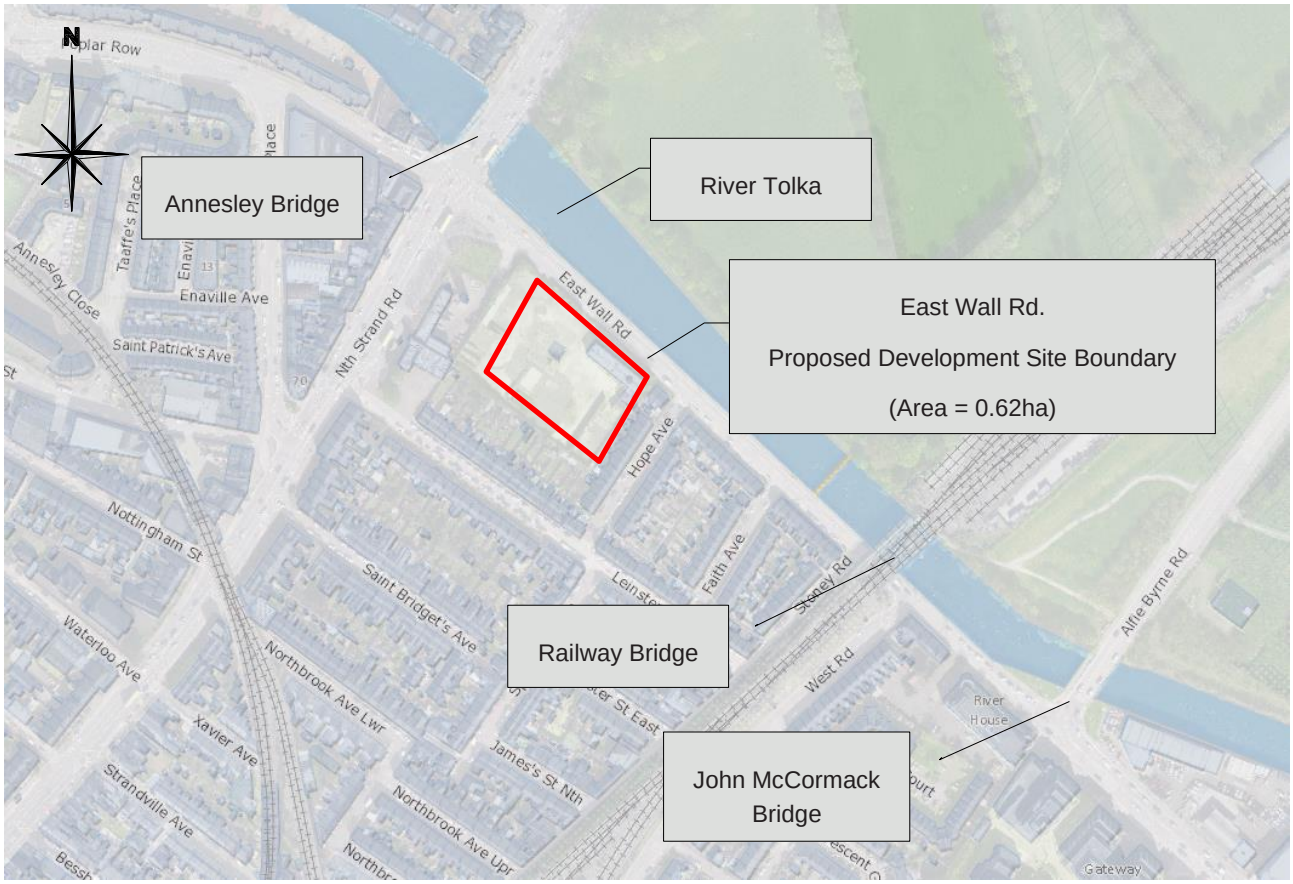


Figure 1-1 : Map of Site Location (Source Ordnance Survey Ireland https://osi.ie/)

1.2 Objective

As part of this development RPS has carried out a hydrological assessment of the proposed site. This assessment is required to address the flooding risk for the proposed housing development project as set out in the Government's 2009 Planning System and Flood Risk Management Regulations (hereafter referred to as the FRM Guidelines). The assessment involved a desk study. The study examines all flooding risks to the proposed site and assesses any impacts of the proposed development on the existing flooding/hydrological regimes of the adjacent watercourses and lands.

2 THE SITE AND PROPOSED DEVELOPMENT

2.1 The Site

The site is located in a highly urbanised area approximately 1.5 km north of Dublin City Centre. The North Strand Fire Station abuts the site to the west. The site's principal frontage to its north is on East Wall Road and faces the Tolka River. The east and south of the site are bounded by the rear gardens of 1&2 storey housing to Hope Avenue and Leinster Avenue respectively. There is an existing entrance via East Wall Road. The principal frontage of the site is facing to the north. The site is approximately 0.63 ha.

2.2 Site Topography and Existing Drainage System

There are no water features within the boundary of the development site (**Figure 2-1**). The existing site is a brownfield site with an existing surface water network draining the site area. It is likely that all surface water generated on site is infiltrating to ground within the site. There is no evidence of stormwater infrastructure out falling to the Tolka River. Surface water generated within the proposed development area will drain to a newly proposed surface water system.

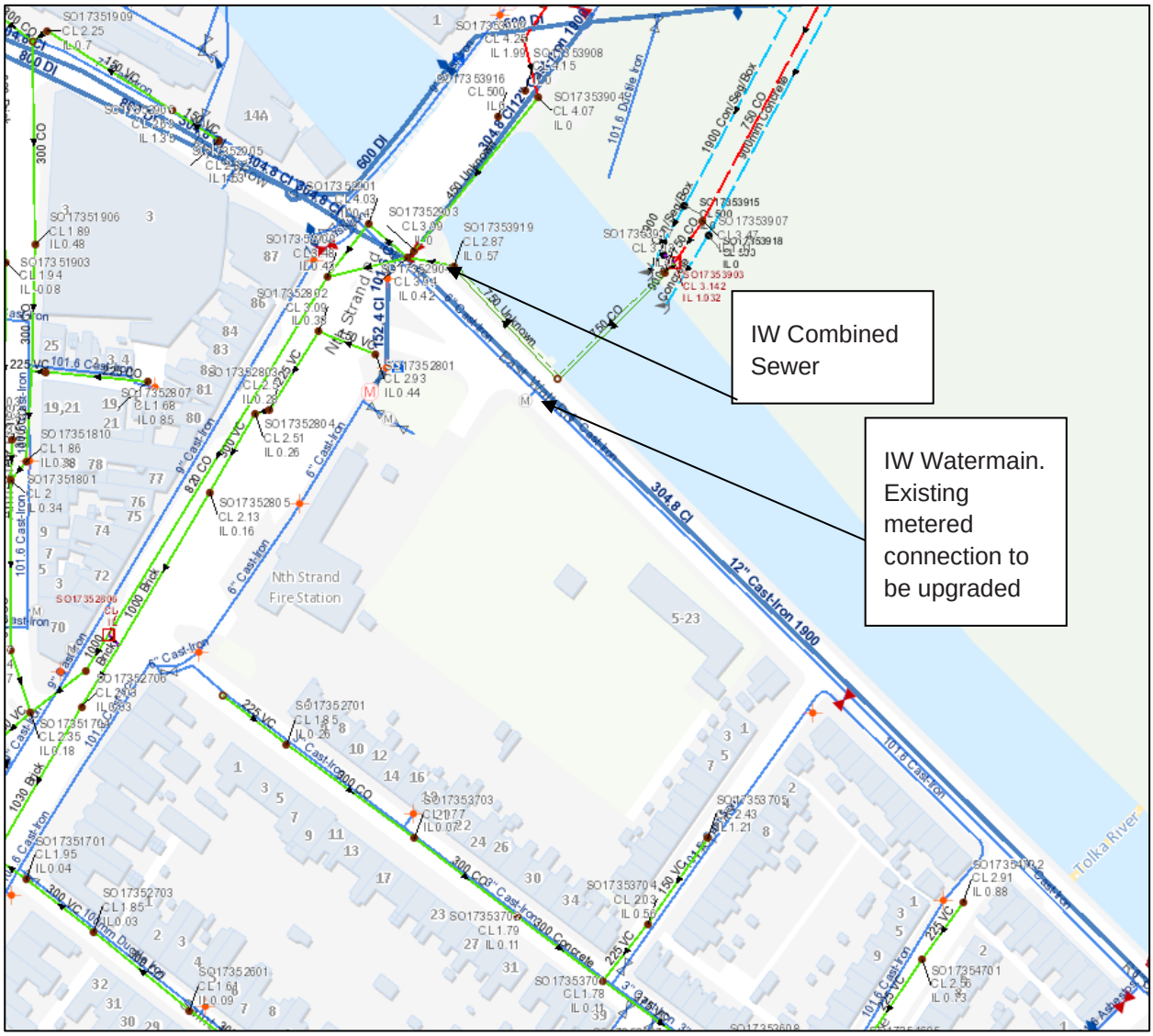


Figure 2-1 : - Extract from IW ArcGIS database

A detailed topographical survey was completed showing that the site is relatively flat with falls from west to east. The levels range from 3.17mOD to 3.78mOD (**Figure 2-2**)

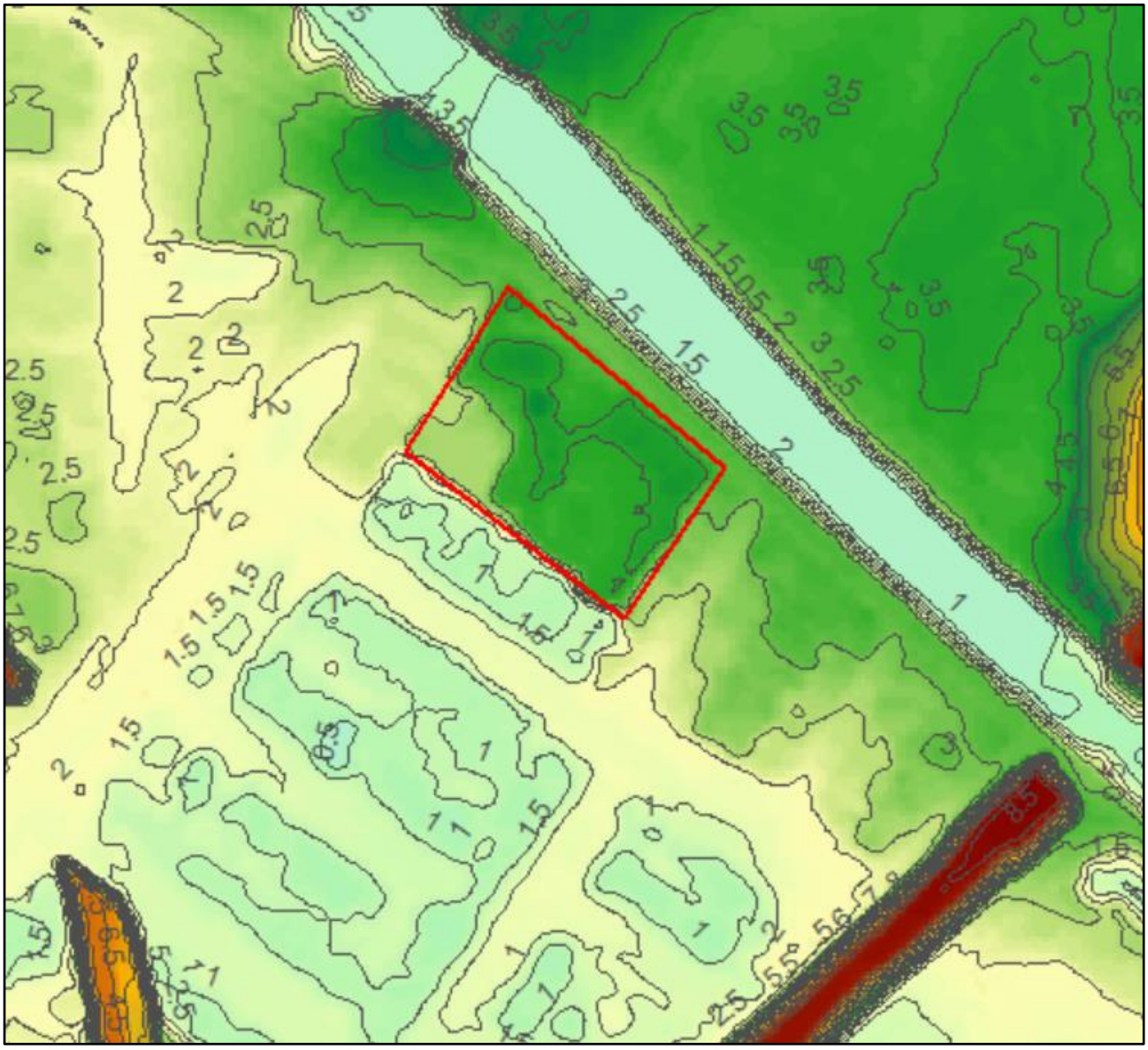


Figure 2-2 : Existing Ground Contours

Ground investigation infiltration tests were undertaken in June 2021 by IGSL and geotechnical specialists to assess the infiltration rate on site. The results indicate that the sub soils in this area are suitable for dispersion of surface water. It is proposed to provide type B (CIRIA C753 SuDS) permeable paving on site to intercept runoff. In a Type B system, the proportion of the rainfall that exceeds the infiltration capacity of the subsoils flows to the receiving drainage system.

2.3 The proposed development

The proposed development (**Figure 2-3**) involves the construction of storey blocks. Ancillary structures will include for a 2m rendered block wall with piers, or concrete post and panel fence. At the south western corner of the site, to the rear of the proposed three-story block, a concrete retaining wall will be required. The existing levels are approximately 2.6mOD. The single storey refuse and plant building will lend itself to a traditional masonry block construction with a cut timer or concrete slab roof.

Figure 2-3 : The Proposed Development

2.4 Land uses

Since the preparation of the Draft Development Plan and the making of the Plan by the Council, there have been a number of significant new sources of information and changes to Government policy. Dublin City Council is reviewing the current Dublin City Development Plan 2016-2022 and preparing a new City Development Plan (the Plan) up to 2028. In the Dublin City Development Plan 2016-2022, the subject site was zoned as 'to provide for and improve mixed services facilities' (**Figure 2-4)**, with the majority of the adjacent uses to be residential.

There are several existing structures on the site which are listed below:

- ESB Substation;
- Building in the north east corner;
- High concrete walls;
- Concrete ground slabs, ramps and plinths.

All structures above ground level will have to be demolished and removed off site.

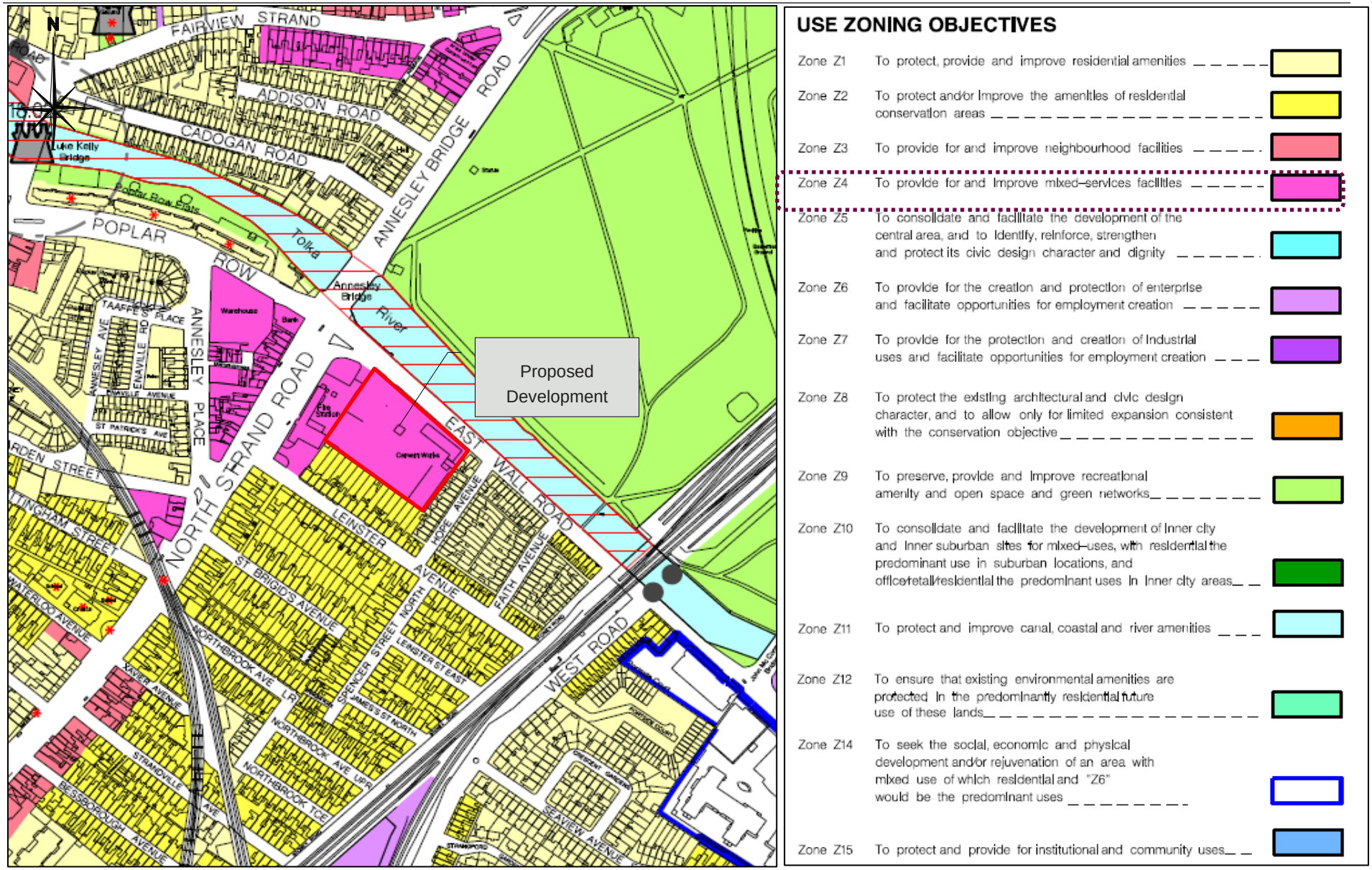


Figure 2-4 : Dublin City Development Plan 2016 – 2022 (Source https://www.dublincity.ie/dublin-city-development-plan-2016-2022)

2.5 Data Collection

Relevant Information was reviewed and collated from the following sources:

- The historic flood data was obtained from the National Flood Hazard Mapping Website (**Appendix A**)

  https://www.floodinfo.ie/
- The Subsoil and vulnerability data was obtained from the Geological Survey of Ireland website https://www.gsi.ie/
- The Preliminary Flood Risk Assessment maps were obtained from the Eastern catchment Flood Risk Assessment and Management Study website http://eastcframstudy.ie/ (**Appendix B**)
- The Strategic Flood Risk Assessment (SFRA) for Dublin City Development Plan 2016-2022 was obtained from the Dublin City Council website https://www.dublincitydevelopmentplan.ie/ (**Appendix C**)
- River Tolka Flooding Study which was commissioned by Dublin City Council, in association with Fingal County Council, Meath County Council and the Office of Public Works in 2002;
- The Flood Studies Update (FSU) Web Portal which is a free-to-use suite of online design rainfall and flood estimation tools for Ireland https://opw.hydronet.com/
- Irish Coastal Protection Strategic Study (ICPSS, 2012) (**Appendix D**) and Irish Coastal Wave and Water Level Study (ICWWS, 2018) predicted tide levels and coastal flood maps for the Dublin City coast areas.
- FloodResilienCity Project, https://www.floodinfo.ie/ (**Appendix E**),
- Site Investigations carried out by IGSL, Ground Investigation & Geotechnical Specialists. (**Appendix F)**

3 EXISTING HYDROLOGICAL ENVIRONMENT

3.1 Salient Hydrological Features

The most immediate hydrological feature in the vicinity of the proposed development is the Tolka River which is adjacent to the site (**Figure 3-1**).

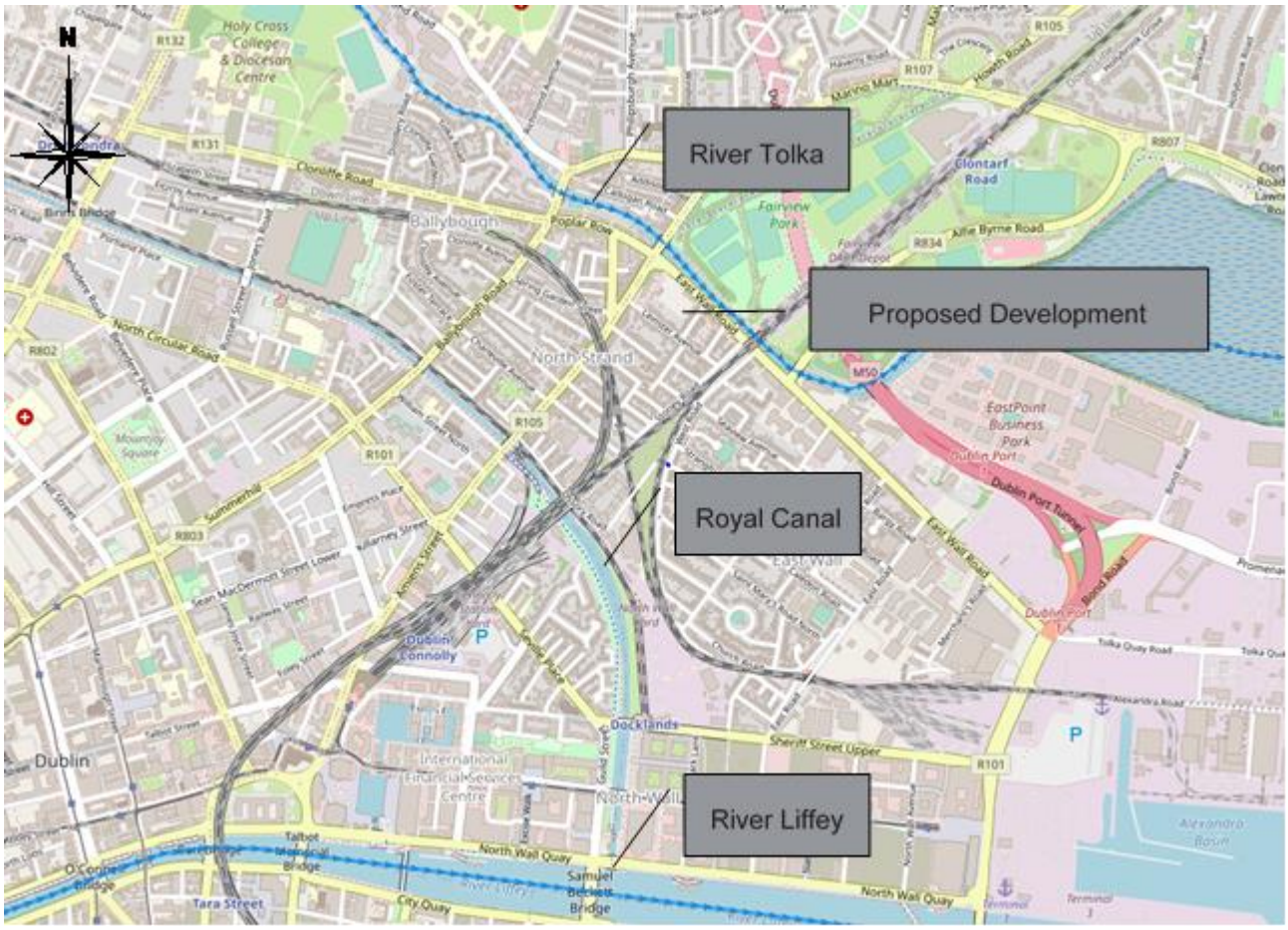


Figure 3-1 : Main Hydrological features in the vicinity of the proposed development (Source EPA Website https://gis.epa.ie/EPAMaps/)

3.2 Existing Geology and Hydrogeology of the Area

3.2.1 Baseline Information

The Geological Survey of Ireland (GSI) website provides information on their public online mapping service regarding the subsoil and aquifer vulnerability. The maps for the proposed development are presented in **Figures 3-2 & 3-3** below. The GSI subsoil mapping indicates that the subsoil within the environs of the proposed development site is made ground, which is described as soil that has been subjected to anthropogenic intervention.

The topography of the site is relatively level with foundations of previous buildings and hardstanding prominent. The online GSI mapping database show the following characteristics:

- Estuarine silts and clays / Till derived from limestone;
- Dark limestone & shale with Alluvium (gravelly) unconsolidated sediments;
- 15 to 20m depth to bedrock.

Site Investigation boreholes and rotary cores showed the following characteristics:

- Made Ground: 0 – 4.5 metres
- Gravel: 4.5 – 7.5 metres
- Fine sand / Silt: 7.5 – 11.0 metres.
- Black Boulder Clay: 11.0 – 27.0 metres
- Limestone Bedrock: 27.0 – 30.0 metres.

Figure 3-2 : GSI Subsoil Mapping (Source Data and maps - Geological Survey Ireland https://www.gsi.ie)

The Groundwater Vulnerability map outlines how susceptible areas are to groundwater contamination. In addition, the map assists to ensure that a groundwater protection scheme is not restrictive on any human economic activity. Lastly, it helps in the decision-making process for preventative measures and enables developments with a potential to contaminate, to be in areas of lower vulnerability.

Dublin Corporation investigations of Fire Station on North Strand Road neighbouring the subject site shows compact gravels / boulder clays and stiff clays at a depth of 10m. Standard penetration tests show medium dense - dense soils with some softer soils closer to the Tolka River.

The GSI Website classifies the aquifer vulnerability in this region as having low vulnerability rating. (**Figure 3-3)**. Observation of **Table 3-1** below shows that the existing hydrogeological conditions possess a low subsoil permeability over a depth greater than 10m. An aquifer with low vulnerability means that the fundamental geological and hydrogeological characteristics which determine the ease at which groundwater may be contaminated by human activities is low. However, the contamination on site is deemed possible due to the previous use of site as a ready-mix plant.

Table 3-1: GSI vulnerability classification criteria (Source Data and maps - Geological Survey Ireland https://www.gsi.ie)

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3.0m	0 - 3.0m	0 - 3.0m	0 - 3.0m	-
High (H)	>3.0m	3.0 - 10.0m	3.0 - 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 - 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

Notes: (1) N/A = not applicable.
(2) Precise permeability values cannot be given at present.
(3) Release point of contaminants is assumed to be 1-2 m below ground surface.

Figure 3-3 : GSI Aquifer Vulnerability Mapping (Source Data and maps - Geological Survey Ireland https://www.gsi.ie)

3.2.2 Site Hydrogeology

Based on the review and analysis of the measured concurrent ground water levels in BH9 & BH4 and tide levels at Dublin Port, there does not appear to be a hydraulic connection between groundwater at/in the vicinity of the proposed development site and the Tolka river. Standpipe monitoring shows that the

groundwater level on site is approx. 3.0 – 3.3m below ground level (bgl). Excel extract (Appendix F) show RPS findings which includes the following comments:

- The observed maximum groundwater levels in BH4 & BH9 are 0.50 and 0.41 mOD respectively, while the maximum tide levels at Dublin port is in the order of 1.4mOD during the recorded period.
- This significant level diff. between the Dublin Port / Tolka River Water level and the borehole groundwater level suggests no active direct hydraulic connection between these.
- Any temporal variations in the groundwater levels during the recorded period can be considered as imperceptible.

GSI data indicates that the area is underlain by a Locally important Bedrock Aquifer (Dark limestone & shale) within an area of low groundwater vulnerability. Shale aquifers generally have poor permeability. GSI data also shows that the area has low subsoil permeability, i.e. surface water does not easily penetrate the soil layer.

Furthermore, Site Investigation logs (attached) show that there is 12.4m – 27.0m deep overburden of soil within the site, and a water table in the gravel layer underlain by typically low permeability silt/clay. BH refusal is met at between 12.4m and 16.5m bgl. Follow on coring has confirmed Limestone bedrock at a depth of 27.0m bgl

The bedrock aquifer has a minimum 27.0m thickness soil over bedrock. This and its relatively low permeability, provides a limited means for surface water and groundwater to interact.

Based on the information set out above, it can be concluded that there does not appear to be a hydraulic connection between groundwater at/in the vicinity of the proposed development site and the Tolka river.

Associated documentation can be seen in Appendix F.

3.3 Existing Flood Regime of the Area

The National Flood Hazard Mapping Website **www.floodmaps.ie** shows evidence of historical flood events in the vicinity of the proposed development site. A Summary Local Area Report (SLAR) (**Figure 3-4**) was generated for the site which identifies all flooding events which occurred within 2.5 km of the proposed development.

Figure 3-4 : Historical Flood Locations in the vicinity of the proposed development site (*Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community***)**

Information from the OPW's website indicate that the River Tolka has a history of flooding following heavy rainfall, which has been well documented after major flood events in 1954. The river has been the subject of several investigations, and of most significance were those carried out in 1955 and 1986.

Severe flooding from the Tolka River and its tributaries occurred in the Dublin City, Meath and Fingal areas in November 2000 and November 2002.

The nearest flood event to the proposed site is summarised as follows:

Flooding at Bessborough Avenue, North Strand, Dublin 3 on 24th Oct 2011, No.26 SLAR

A report of this flood event was prepared by RPS Consulting Engineers and submitted to the Office of Public Works (OPW). The report stated that "The source of the flood waters was surface water after heavy prolonged rainfall. Residents stated that water levels rose from the sewer/drainage system at the rear of their properties. The flood started at 7pm and peaked at approximately 7.30pm. The flood waters were accompanied by a bad smell. It appeared that the source was a combined sewer system, which was overwhelmed by the large amount of rainfall. It is possible that the area may be affected by the tide due to its flat nature and its proximity to the canal and the tidal reaches of the Tolka. Flooding breached the floor levels of the properties (between 20 and 30 residential properties).

Historical Flooding of the River Tolka, Nov 1965, No.7 SLAR

The River Tolka has a long, flat, primarily rural catchment with minimal reaction to short duration pluvial ('monster rain') storm events. Nevertheless, the river does have a significant history of flooding following long steady rainfalls, resulting in lands adjacent to the river been inundated by flood water many times during the last century. The extent of the flooding during the November 2002 flood event, has intensely confirmed the

flood potential of the river under critical rainfall conditions. The extensive flooding history is reflected in the Tolka's Gaelic name 'An Tulca' which means The Flood.

Prior to the 1960s, most of the development in the Tolka catchment was within the Dublin Corporation (now City Council) area. Accordingly, virtually all historical flood records for the River Tolka are derived from Dublin City Council records. These historical records provide evidence of the periodic extreme flood events which were experienced, particularly on the 8th December 1954 and a lesser documented event which occurred on the 28th October 1880. The 1954 and 1880 were the two major flood events on record which preceded the extreme November 2000 flood event. Further significant floods recorded were considerably smaller regarding flood volumes.

Dublin Coastal Flooding Protection Project, Tidal Flood of February 2002, No.15 SLAR

Records focus on the stretch of the River Tolka immediately downstream of Annesley Bridge, which is the upper limit of the study. There were no reports of flooding along this section of the river, except for some very localised flooding around a foot bridge immediately upstream of the railway bridge. However, this was not extensive and did not flood any properties. Based on the records, the river walls are quite high, although it is likely that the February event must have come close to the top.

3.4 Existing Flood Studies

3.4.1 Preliminary Flood Risk Assessment (PFRA) Flood Maps

The Tolka River Flooding Study was underway when the November 2002 flood occurred. The consultants were asked to produce Interim Reports for all three local authorities concerned (Dublin City Council, Fingal County Council and Meath County Council) to identify works that could be undertaken straight away to reduce the risk of flooding in the worst affected areas. The Final Report on the Tolka was completed in November 2003 and this brought together many of the recommendations contained in the Interim Reports and much additional information, which provided the basis for further decisions in relation to the catchment.

The River Tolka is located within the Eastern River Basin District (ERBD) of Ireland. The OPW in partnership with RPS, Local Authorities and other stakeholders delivered the Catchment Flood Risk Assessment and Management (CFRAM) study for the ERBD. The OPW also published in the meantime, the Preliminary Flood Risk Assessment (PFRA) flood maps, in the form of 420 maps covering the country. According to the explanatory leaflet published for public consultation on PFRA stage, the PFRA is only a preliminary assessment, based on available or readily derivable information.

The PFRA map is shown in **Appendix B** and an extract in the following **Figure 3-5** indicating that the proposed development site is located inside the 1% AEP (1 in 100 chance in any given year) and 0.1% AEP (1 in 1000 chance in any given year) fluvial flood extents. Consequently, the proposed development is in Flood Zone A (highest risk of fluvial flooding).

Similarly, the PFRA map also indicates that the proposed development is situated inside the 0.5% AEP (1 in 200 chance in any given year) and the 0.1% AEP (1 in 1000 chance in any given year) coastal flooding extents. Consequently, the proposed development is located within **Flood Zone A (highest risk of coastal flooding).**

The PFRA methodology and outputs revisited in 2012, under Eastern CFRAM Study.

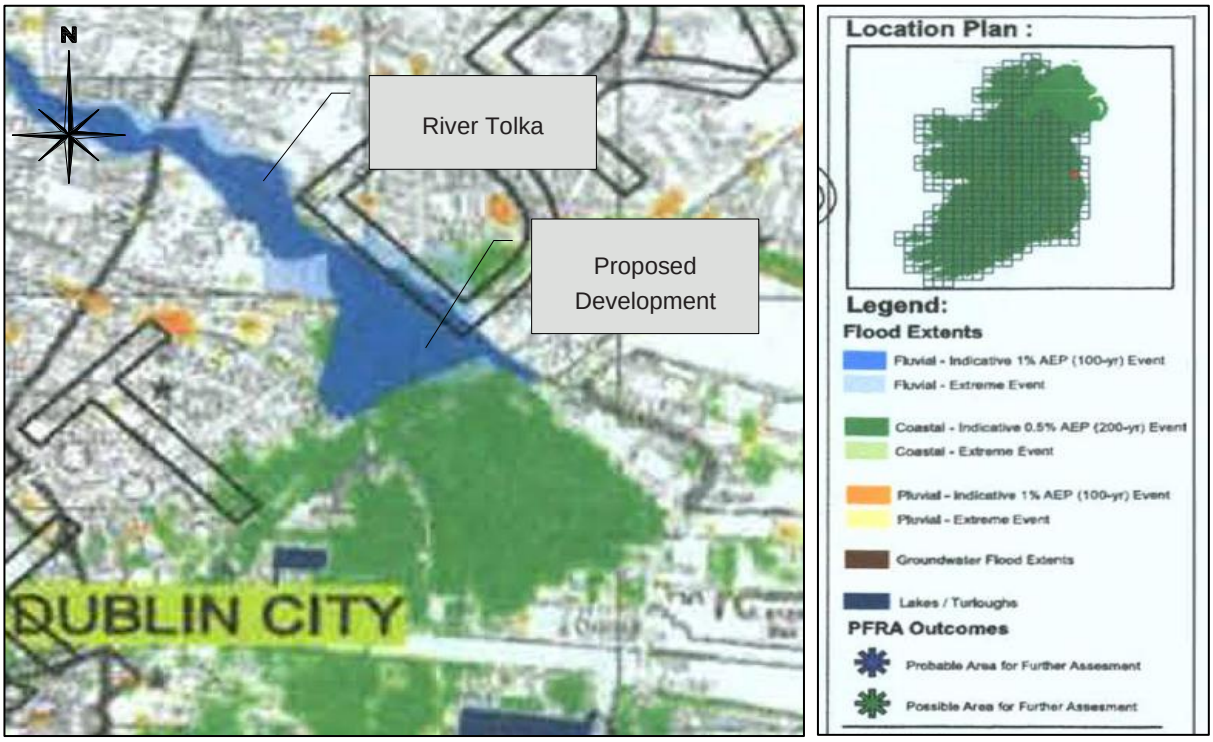


Figure 3-5 : Extract of the PFRA flood map in the vicinity of the proposed Development site (Source https://www.floodinfo.ie/)

3.4.2 Strategic Flood Risk Assessment (SFRA) for Dublin City Development Plan 2016-2022

This SFRA provided an area-wide assessment of all types of flood risk to inform strategic land use planning decisions. The draft SFRA was prepared and informed by the DEHLG Guidelines for Planning Authorities (DEHLG & OPW, 2009) on “The Planning System and Flood Risk Management”.

Due to the number of flood investigation and management studies that have focused on Dublin City there are a number of datasets which record either historical or predicted flood extents.

One of the key outcomes of the SFRA was the production of a Flood Zone Map which, along with other planning considerations, will inform land zoning decisions. The quality of outline may vary across the study area depending on the origin and quality of available data, but the best available or readily derivable information has been used to form the composite map (**Figure 3-6**). In all cases, the outlines have been reviewed against each other, any additional available data and against local engineering knowledge and have been refined where appropriate. In particular, the datasets that have been used are the Dodder, Fingal East Meath and draft Eastern CFRAM flood extents/zones, River Tolka and River Wad Flooding Studies, Irish Coastal Protection Strategy Study (ICPSS) tidal flood outlines, records of historical flood events, walkover survey and consultation with local authority area engineers.

The SFRA Composite Flood Zone Map is shown in **Appendix C** and an extract indicating that the proposed development site is located inside the 1% AEP (1 in 100 chance in any given year) and 0.1% AEP (1 in 1000 chance in any given year) fluvial flood extents. Consequently, the proposed development is in **Flood Zone A (highest risk of fluvial flooding).**

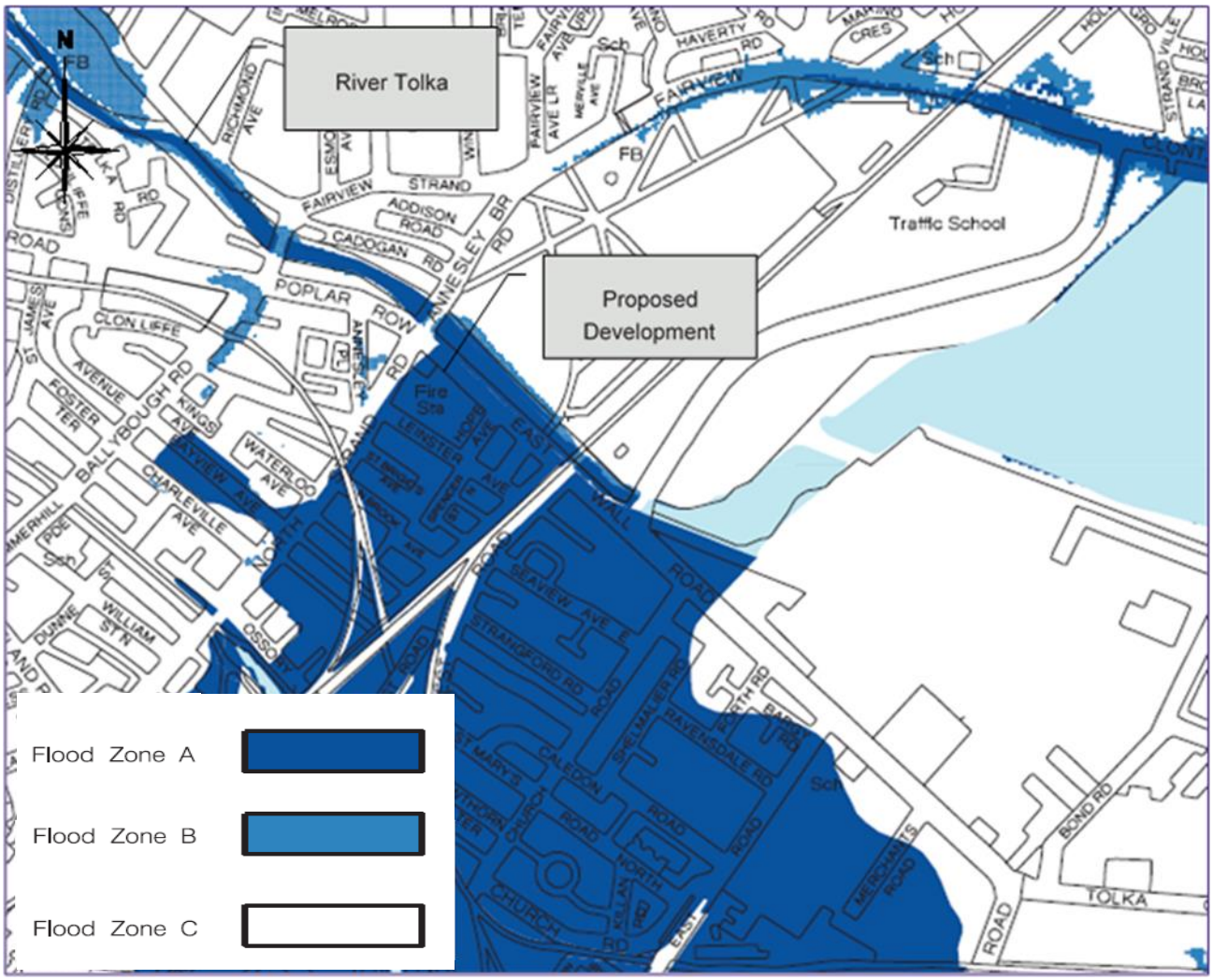


Figure 3-6 : SFRA for DCC Development Plan 2016-2022 Composite Flood Zone Map

3.4.3 Irish Coastal Protection Strategy Study Phase 3 - North East Coast

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 best to manage risks associated with coastal flooding and coastal erosion. The Study was completed in 2013 and provides strategic current scenario and future scenario (up to 2100) coastal flood hazard maps and strategic coastal erosion maps for the national coastline.

This study used numerical modelling of combined storm surges and tide levels to derive extreme water levels along this stretch of coastline. The application of extreme value analysis and joint probability analysis to both historic recorded tide gauge data and data generated by the numerical model allowed an estimation of the extreme water levels of defined exceedance probability to be established along the relevant sections of coastline.

Based on the various simulations of storms, time series of the water surface elevations were extracted at 29 points (**Figure 3.7**). It is observed that the proposed development site is in the vicinity of Point NE_22 (**Figure 3.8**). ICPSS predicted flood level has been further updated under the Irish Coastal Wave and Water Level Study (ICWWS, OPW, 2018).

Design Event (AEP)	Point NE_22
50%	2.70
20%	2.79
10%	2.86
5%	2.93
2%	3.01
1%	3.08
0.5%	3.15
0.1%	3.30

Figure 3-7: Overview of Surge Model Runs, Duration and Meteorological Grid Resolution 23 October 2020– North East Coast – Water Level – Meters to OD Malin (OSGM-15)

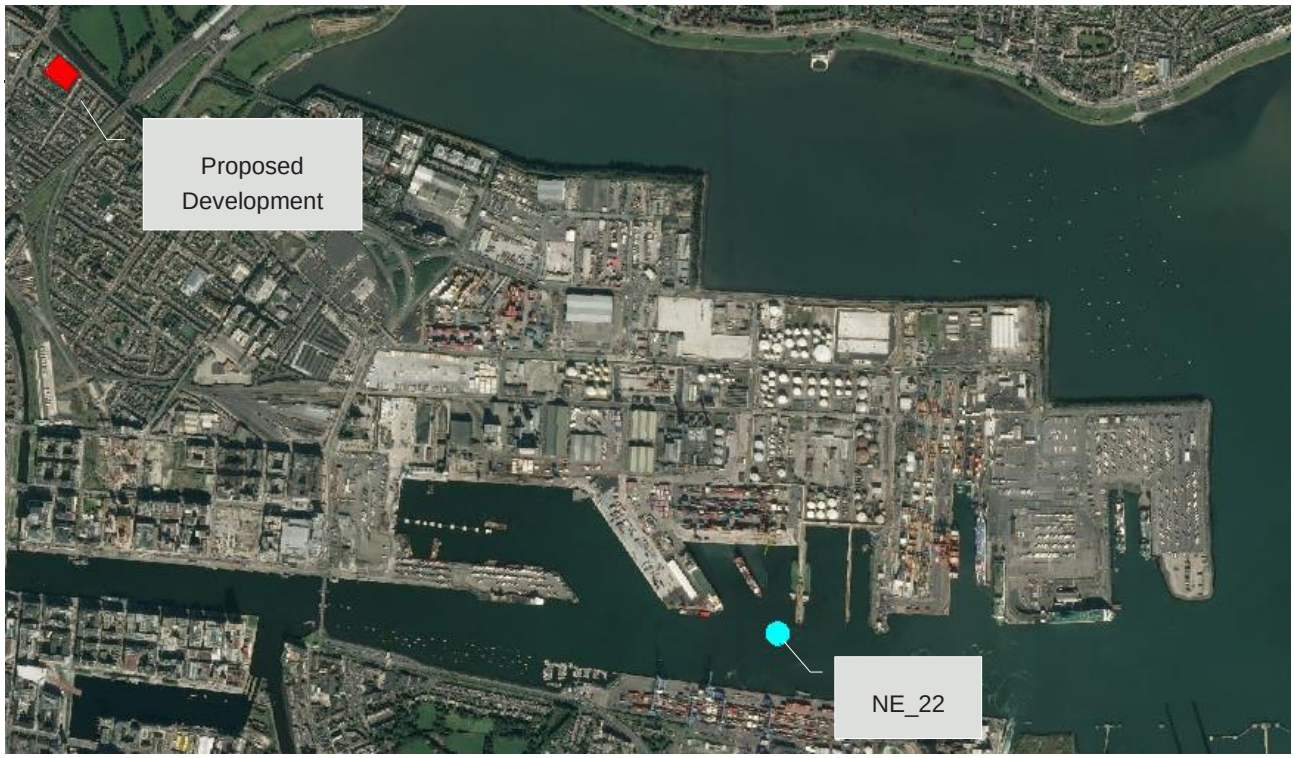


Figure 3-8 : Location of the Proposed Development and NE_22

Current Scenario Coastal Flood Extent Map

The ICPSS current scenario flood maps for the 0.5% AEP Indicative flood extent and 0.1% AEP (extreme flood extent) in the vicinity of the study area are presented in **Appendix D**. The extract from the ICPSS tidal flood extent map (**Figure 3-9**) indicates that all the proposed development site is located within the 0.5% Annual Exceedance Probability (AEP) coastal flood extent (or 1 in 200 Return Period in any given year). Consequently, all the existing site is situated in **Flood Zone A**, where the probability of tidal flooding is

highest. **Figure 3-9** illustrates the tidal flood water levels (mOD Malin) for the 10%, 0.5% and 0.1 % AEP flood events at Node Point NE_22 which were updated by the ICWWS, OPW, 2018 (**Figure 3-7**).

Mid-Range Future Scenario MRFS Coastal Flood Extent Map

Similarly, the ICPSS Mid-Range Future Scenario (MRFS) flood maps for the 0.5% AEP (Indicative flood extent) and 0.1 % AEP (extreme flood extent) in the vicinity of the study area are presented in **Appendix D**. The extract (see **Appendix D** for complete map) from the ICPSS tidal flood extent map (**Figure 3-10**) indicates that the proposed development site is located within the 0.5% Annual Exceedance Probability (AEP) flood extent (or 1 in 200 Return Period In any given year). Consequently, the entire site is situated In Flood Zone A, where the probability of coastal flooding is highest. **Figure 3-10** illustrates the tidal flood water levels (mOD Malin) for the 10%, 0.5% and 0.1% AEP flood events associated with the MRFS at Node Point NE_22.

Current Scenario Coastal Flood Depth Map

Figure 3-11 presents an extract of the ICPSS depth map for the 0.5% AEP (200-year return period) which is currently only available for the current scenario. Depth maps illustrate the estimated flood depths for areas inundated by a flood event of a given probability of occurrence which provides useful information for emergency services and property owners. The map depicts a range of depth bands ranging from 0 - 0.25m to a depth band greater than 2.00m resulting from coastal flooding. The approximate (due to low resolution mapping) depth bands from tidal flooding is predicted to range from 0.25 - 0.50m to 0.50 - 1.00m for the proposed development site.

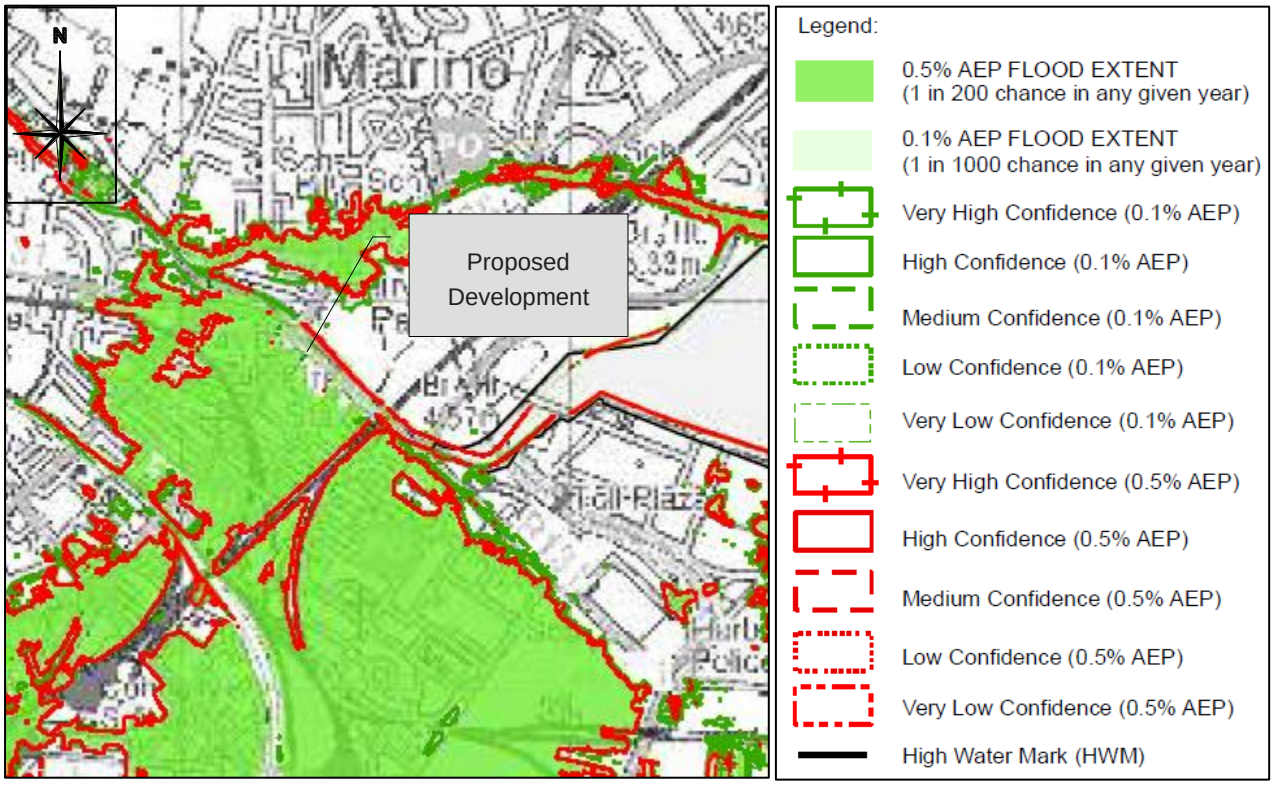


Figure 3-9 : Extract of ICPSS Current Scenario Coastal Flood Extent Map (Source: ICPSS)

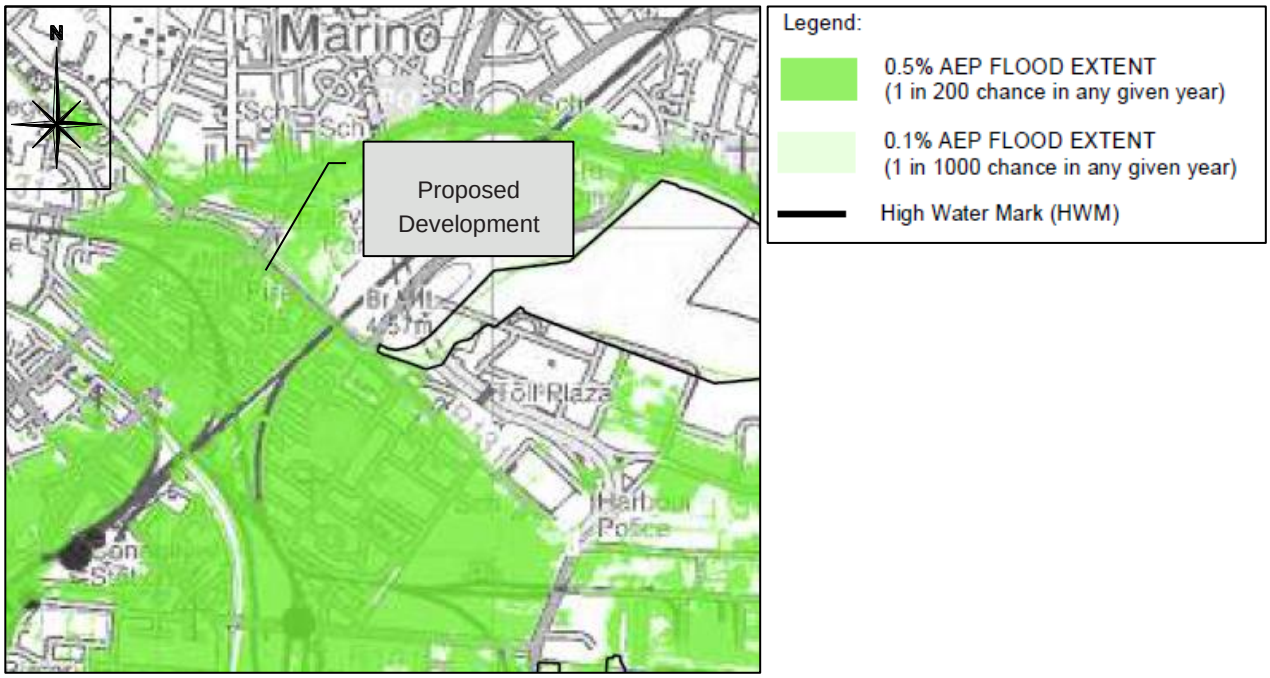


Figure 3-10 : Extract of ICPSS Mid-Range Future Scenario Coastal Flood Extent Map (Source: ICPSS)

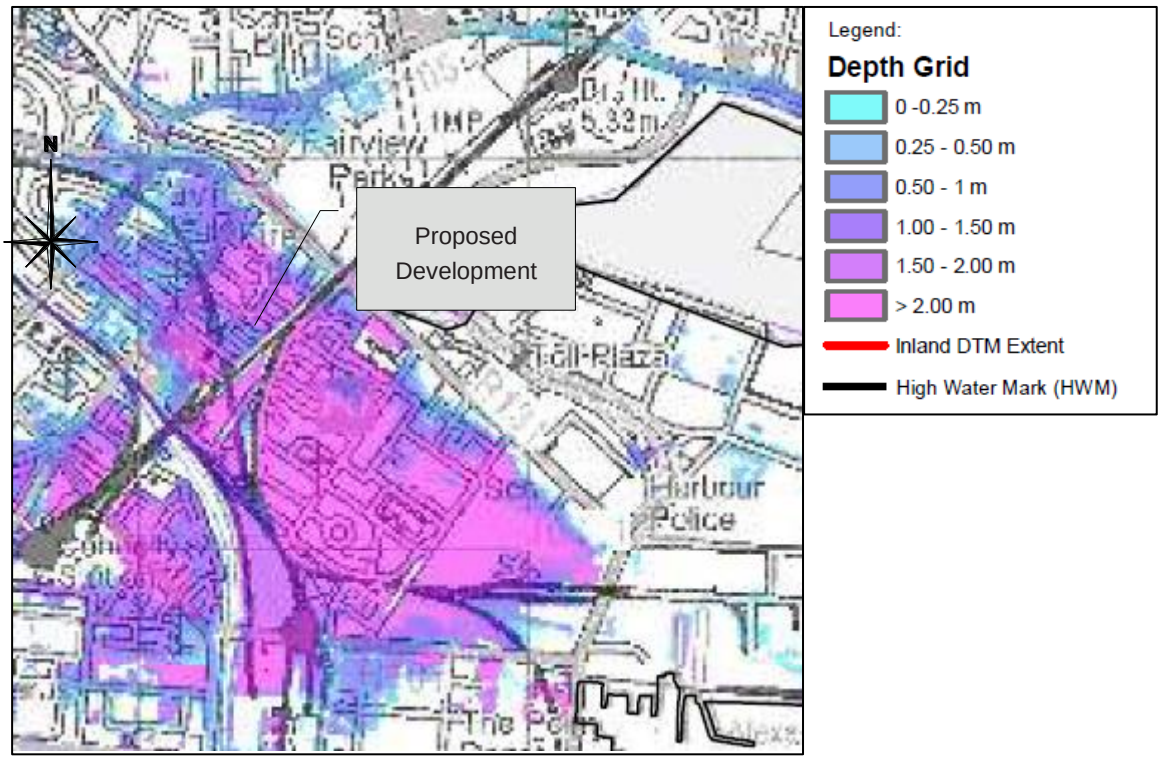


Figure 3-11 : Extract of ICPSS Depth map at 0.5% AEP (1 in 200 chance in any given year) (Source: ICPSS)

3.4.4 River Tolka Flooding Study

As an extension of the Greater Dublin Strategic Drainage study, the River Tolka Flooding Study was commissioned by Dublin City Council, in association with Fingal County Council, Meath County Council and the Office of Public Works in 2002. The study arose from concerns regarding increased flooding risk to properties along the River Tolka following a significant flood in November 2000, when many properties were inundated particularly in parts of Meath and the Dublin City Council area.

A report was produced that defined the history of flooding in the River Tolka. In order to quantify flood risk, this utilised the relevant historic data available to develop a profile of flood risk for the catchment and summarised the outcome of modelling studies related to previous flood data. It summarised options available for flood alleviation in the catchment and identified an integrated series of measures. These were recommended for implementation in order to manage flood risk, based on technical, environmental and economic assessment.

Within the 2004 Tolka Flooding Study, Flood Zone A was identified, and extents mapped. However, Flood Zones B and C had not been identified. In 2010 additional modelling was carried to map the Flood Zone B for the River. The floodplain mapping project assessed the 0.1% AEP floodplain extents by hydraulic modelling using the proposed defences as modelled in the original Tolka Flooding Study, i.e. not using ‘as constructed’ information.

The 2004 and 2010 flood zone mapping for the Tolka area pre-date some major infrastructural changes in the M3 area. Therefore, the OPW are currently reviewing options for updating the flood zone mapping for the River Tolka mapping.

A summary of upgrade work along the length of the river Tolka and in the vicinity of the proposed development is presented below:

- East Point Business Park Bridge to John McCormack Bridge: 200-year tidal flood contained by embankment on the north side & joint bank and retaining wall defence on south side.
- John McCormack Bridge to Railway Bridge: Retaining walls left and right sides looking downstream contain 200-year tidal flood.
- Railway Bridge to Annesley Bridge: Retaining walls left and right contain 200-year tidal flood.
- Annesley Bridge to Luke Kelly Bridge: Retaining walls left and right contain 200-year tidal flood event except for one 50m stretch on the north side.

The top of wall level along the right bank of the River Tolka varies between 5.28 mOD to 4.39 mOD. This indicates that the proposed site is protected from the MRFS.

Locations of the upgrade works listed above are presented in the following **Figure 3-12**

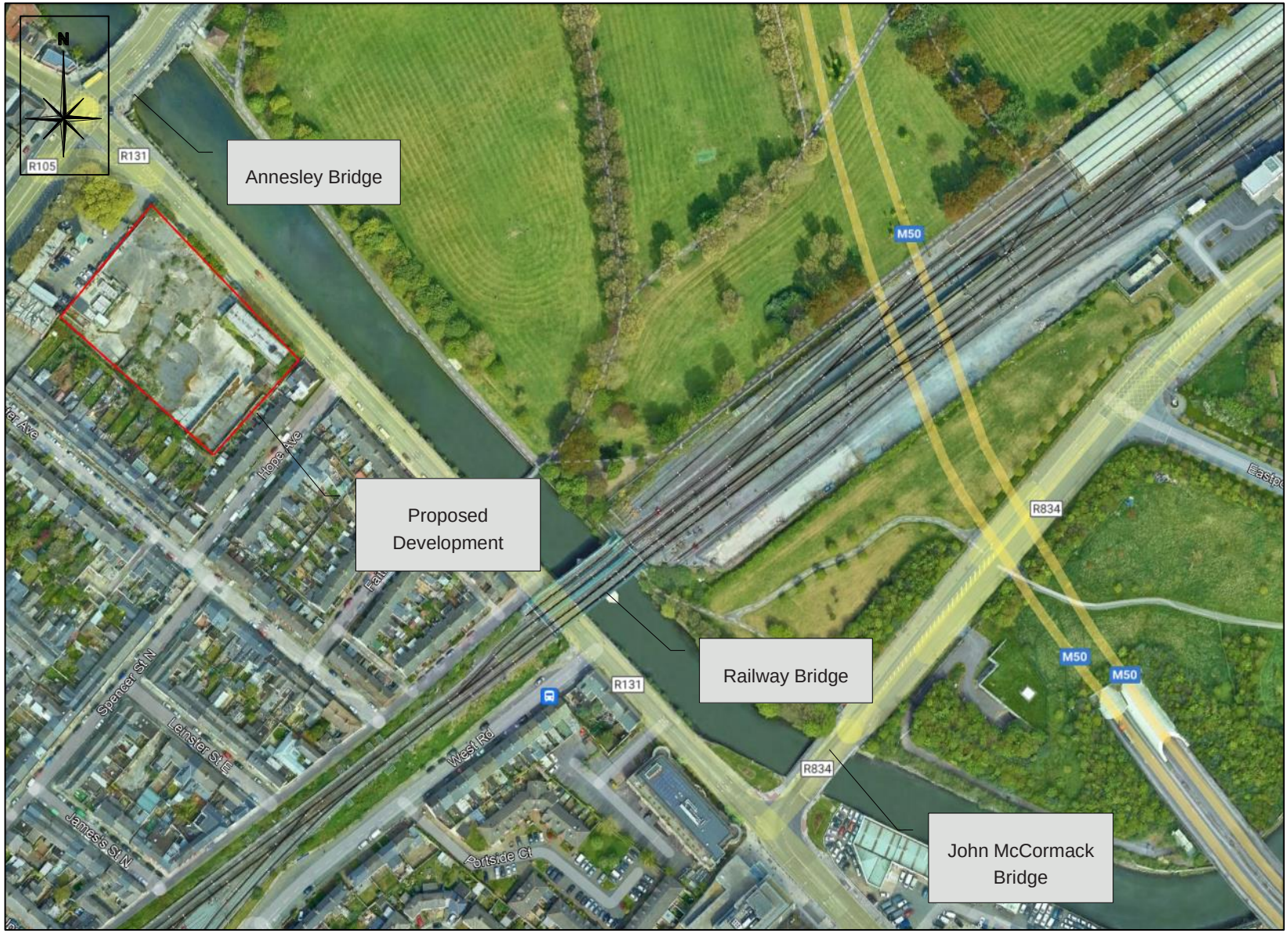


Figure 3-12 : Map Depicting the Bridges Downstream of Annesley Bridge

3.4.5 Dublin North Central Pilot Area Pluvial Flood Hazard and Risk Mapping (EU Interreg IVB FloodResilienCity Project)

Dublin City Council (DCC) is one of eleven partner organisations, drawn from eight European cities, which form the Interreg IVB flood risk management good practice project known as the FloodResilienCity (FRC).

DCC's involvement and interest in the project was impelled by a necessity to develop sustainable flood risk management in the urban environment to deal specifically with Pluvial Flood Risk, pluvial flooding being the key component of surface water flooding.

Figure 3.13 presents a map of the modelled area. The layers show the modelled extent of land that might be directly flooded by rainfall under existing (Do -minimum) conditions. The proposed development is susceptible to pluvial flooding under all probabilities.

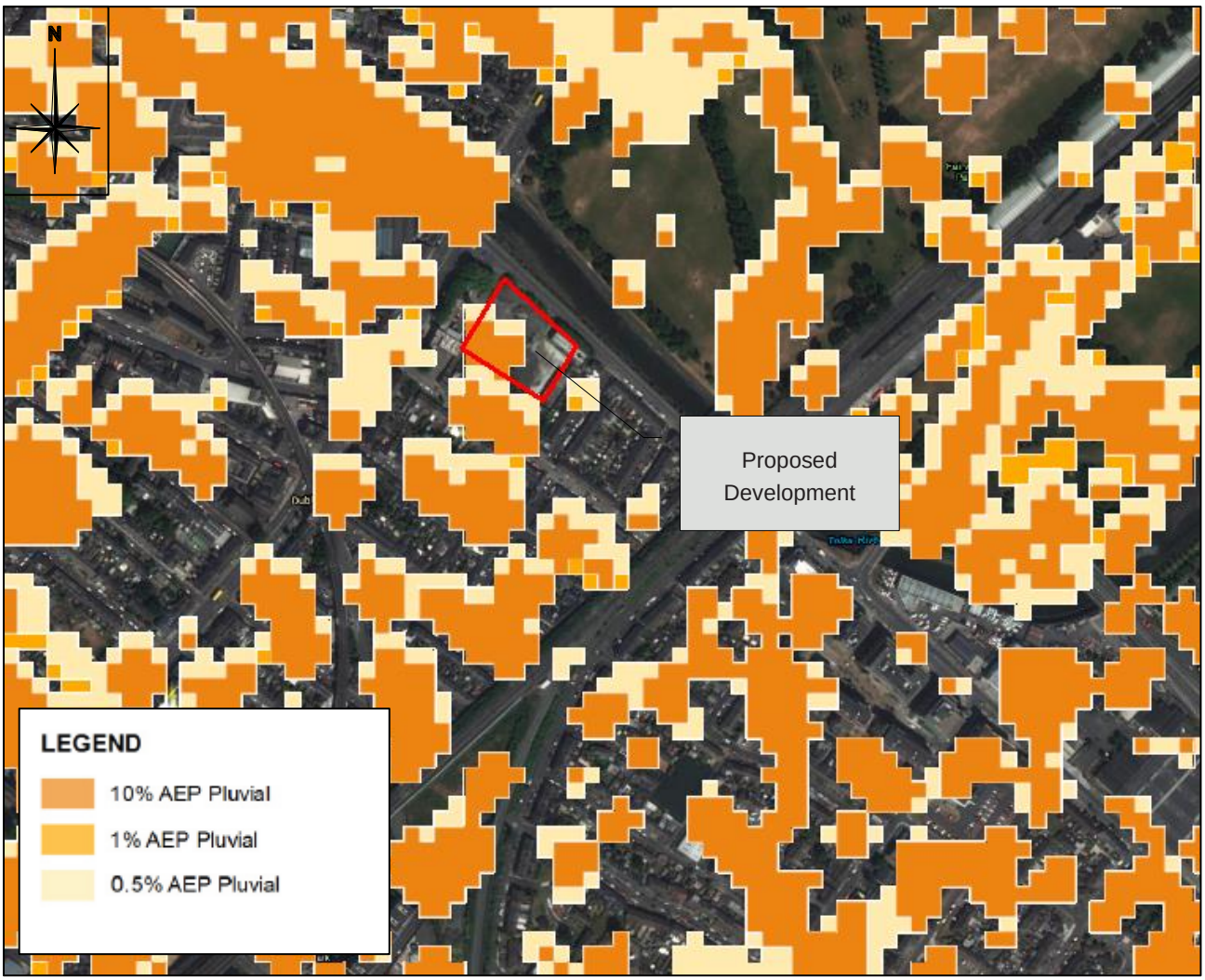


Figure 3-13 : Rainfall Flood Extents – Dublin City Area (Source: https://www.floodinfo.ie/map/floodmaps/)

4 FLOOD RISKS AND FLOOD ZONE MAPPING

The flood zones are defined based on the probability of flooding from rivers and the sea. The different flood zones recommended in the FRM Guidelines are:

Flood Zone A - where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 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% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and

Flood Zone C - where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

As previously noted, and as detailed on the PFRA map (**Appendix B**) and the coastal flood extent maps (**Appendix D**) indicate that;

- The proposed development site is located within the 0.5% AEP coastal flood extent (1 in 200 chance in any given year) i.e., Flood Zone A - Highest risk of flooding.
- The proposed development site is located within the 1 % AEP fluvial flood extent (1 In 100 chance in any given year) i.e., Flood Zone A Highest risk of flooding.

As mentioned above, the most significant source of flooding at the proposed development site is from coastal flooding. The detailed ICPSS (2012) and ICWSS (2018) Hydrology and Hydraulic Analysis which resulted in the development of coastal flood extent maps, illustrate the tidal flood water levels (mOD Malin) for the 10%, 1% and 0.5% AEP flood events at Node Point 22 (in the immediate vicinity of the proposed site are +2.86mOD, +3.08mOD and +3.15mOD respectively).

According to the FRM Guidelines, the minimum floor level for a new development should be set above the 0.5% AEP (1 in 200 year) coastal flood level and should include an allowance for climate change and freeboard.

As such the proposed finished floor level (FFL) for the development shall set at a minimum level of +4.15mOD-Malin. This is based on the ICWWS estimated 0.5% coastal flood level of 3.15mOD plus 0.5m of climate change allowance for the MRFS plus a freeboard allowance of 0.5m. This level is lower than the standard of protection provided by the River Tolka's flood walls. Therefore, the site is protected, given that the walls be maintained at their existing top levels.

Since the proposed developed is located within the flood protected areas, no such impacts on the existing flooding regime to the adjacent properties are expected to be caused by the proposed development. Furthermore, an appropriate surface water drainage system will be implemented as part of the development. Any increase in runoff volume likely to be generated from the development shall be attenuated on site before discharging to the adjacent watercourses/surface water drainage systems.

In the Dublin City Development Plan 2016-2022, the subject site was zoned as 'to provide for and improve mixed services facilities' with the majority of the adjacent uses to be residential. The proposed residential development at the subject can be justified.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

1. Past Flood Events: There are no records of significant flooding of the proposed site. However, the areas in the vicinity of the Tolka River have suffered from extensive flooding before the construction of the flood alleviation measures.
2. Based on the review and analysis of the measured concurrent ground water levels in BH9 & BH4 and tide levels at Dublin Port, there does not appear to be a hydraulic connection between groundwater at/in the vicinity of the proposed development site and the Tolka river.
3. Fluvial Flood Risk: As part of the Eastern CFRAM programme, a review of the River Tolka Flooding Study has been undertaken, however, the flood maps have not been currently made available. Observation of the Preliminary Flood Risk Assessment Map (PFRA) indicates that the proposed development is located within the fluvial - indicative 1 % AEP (100-yr) event. Consequently, the proposed development is in Flood Zone A where the risk of fluvial flooding is highest.
4. Groundwater Flood Risk: The aquifer vulnerability map portrays that the entire site is in a region classified as having 'Low Vulnerability' which indicates a low phreatic surface (water table) and hence the risk of groundwater flooding is low. There is no indication on the PFRA map of any groundwater flooding on this site. Therefore, groundwater flood risk is low.
5. Coastal Flood Risk: The proposed development site is located within the 0.5% AEP coastal flood extent (1 in 200 chance in any given year) i.e., Flood Zone A - Highest risk of flooding.
6. Pluvial Flood Risk: Pluvial flood risk mapping for the proposed development site has been conducted as part of the Dublin North Central Pilot Area Pluvial Flood Hazard and Risk Mapping for the EU Interreg VB Flood Resilient City Project. The pluvial hazard rating map depicts that the proposed development site is located where the hazard is moderate. Consequently, pluvial flood risk is considered to be moderate.
7. Based on ICWWS 2018, the estimated coastal flood level in the vicinity of the proposed site for the MRFS is 3.65 mOD (0.5% AEP coast flood event). Inclusive of a freeboard allowance of 0.5m, the proposed FFL level of the buildings should be set a minimum level of 4.15mOD.
8. The top of wall level along the right bank of the River Tolka downstream of Annesley Bridge varies between 5.28 mOD and 4.39 mOD. This indicates that the proposed site is protected from the risk of future coastal flooding (Medium Range Future Scenario).

5.2 Recommended Flood Risk Mitigation Measures

The site should be defended from flooding by adopting a two-stage mitigation approach namely, flood resistance and flood resilience.

Flood Resistance Measures

Restoration of existing boundary walls up to the recommended minimum flood design level of +4.15mOD (Malin), to provide an effective local flood defence against flood water entering the properties. The restoration of the walls must include detailed engineering design to protect the property against breaching failure. It is important that the boundary walls have a waterproof seal at the interface with adjacent properties.

- The proposed new rendered blockwork wall to divide the subject site from the adjoining property must be constructed up to at least the minimum recommended flood design level i.e., +4.15mOD (Malin).
- 'Air bricks in external masonry leaf below the minimum flood resistance level of +4.15mOD (Malin) are to be sealed using 'SMART' Air bricks.
- Anti-flood valves (Non return valves) to prevent flood water backing up through the sewer/drainage network.
- Lockable external manhole covers capable of resisting reasonable uplift pressures, applied to both foul and surface water sewers (where necessary).
- Seal gaps around pipes and cables.

- Existing flood walls shall be maintained at the level of protection required for the MRFS.

Flood Resilience Measures

- Electrical sockets, fuse boxes, controls and wiring will be raised above +4.15mOD (Malin).
- Boilers will be mounted to the wall above the level the flood water is likely to reach.
- Service meters should be moved to at least one metre above floor level (or well above likely flood level) and placed in plastic housings.
- Washing machines should be moved to the first-floor rooms if the layout of the house is suitable.
- Home entertainment equipment should be mounted to the wall at a position above the likely flood level.
- Kitchen and Bathroom: water-resistant materials such as stainless steel, plastic or solid wood should be used rather than chipboard-based units.
- Where possible appliances should be raised on plinths.

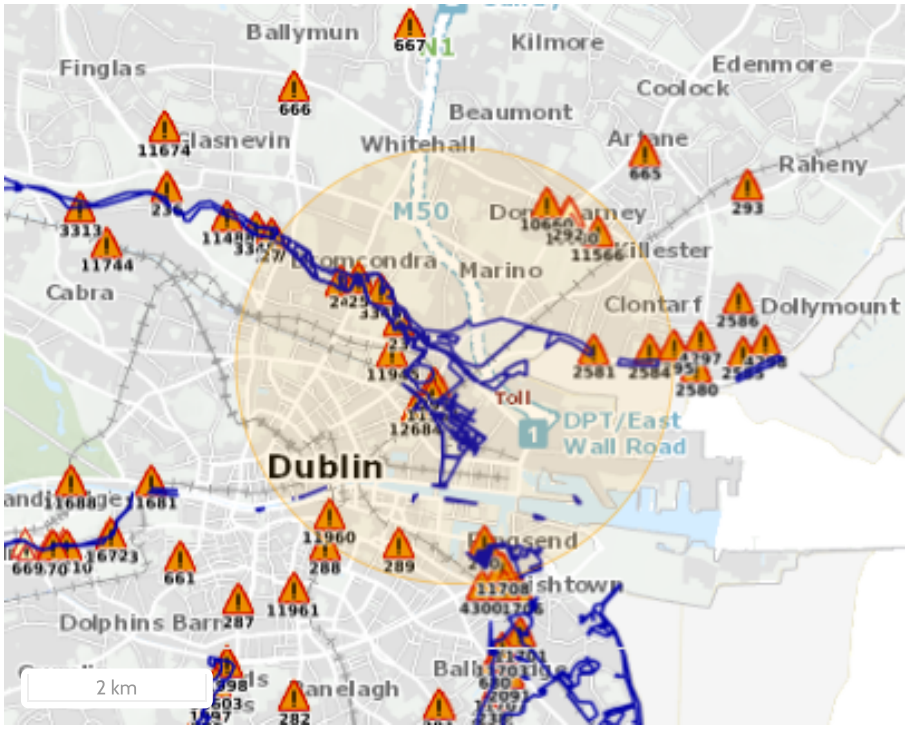
Appendix A
OPW-Past-Flood-Summary-Report

Past Flood Event Local Area Summary Report

OPW Oifig na nOibreacha Poiblí Office of Public Works

Report Produced: **20/9/2021 11:23**

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.



Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

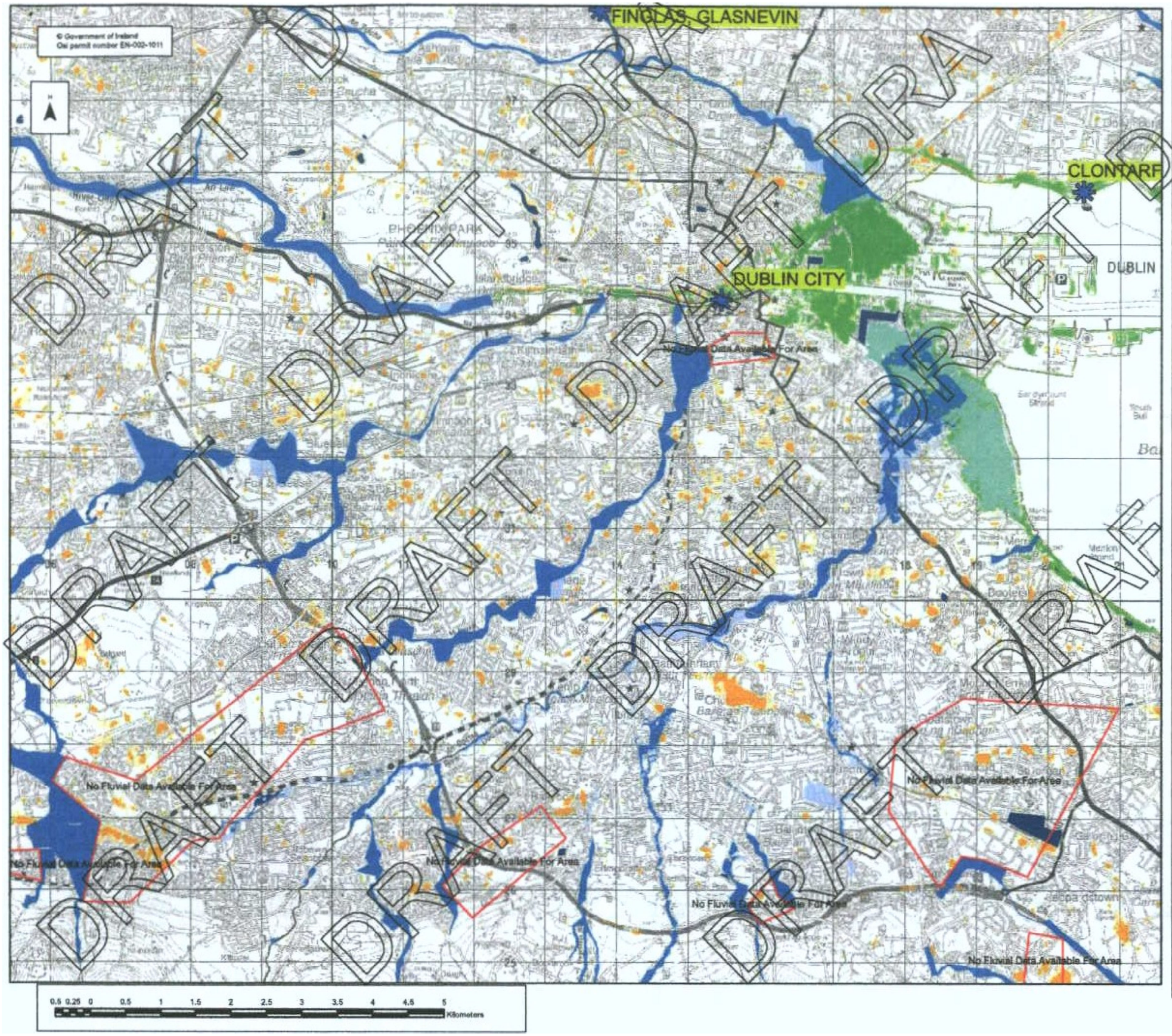
29 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Flood report for Shamrock Cottages on the 24th October 2011 (ID-12684) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Approximate Point
2.	Tolka November 1901 (ID-25) **Additional Information:** Reports (9) Press Archive (0)	12/11/1901	Approximate Point
3.	Tolka September 1931 (ID-26) **Additional Information:** Reports (12) Press Archive (1)	03/09/1931	Approximate Point
4.	Tolka September 1946 (ID-28) **Additional Information:** Reports (11) Press Archive (0)	20/09/1946	Approximate Point
5.	Tolka December 1954 (ID-4) **Additional Information:** Reports (16) Press Archive (9)	08/12/1954	Area
6.	Tolka October 1880 (ID-21) **Additional Information:** Reports (8) Press Archive (0)	28/10/1880	Approximate Point

	Name (Flood_ID)	Start Date	Event Location
7.	Tolka Nov 1965 (ID-23) **Additional Information:** Reports (9) Press Archive (2)	25/11/1965	Approximate Point
8.	Tolka Botanic Ave area August 1986 (ID-24) **Additional Information:** Reports (11) Press Archive (1)	25/08/1986	Approximate Point
9.	Tolka November 1898 (ID-29) **Additional Information:** Reports (10) Press Archive (0)	23/11/1898	Approximate Point
10.	Tolka November 1915 (ID-30) **Additional Information:** Reports (11) Press Archive (0)	12/11/1915	Approximate Point
11.	Tolka April 1909 (ID-31) **Additional Information:** Reports (5) Press Archive (0)	03/04/1909	Approximate Point
12.	Report of flooding at Jones Road, Dublin 3 on 26th July 2013 (ID-11945) **Additional Information:** Reports (1) Press Archive (0)	26/07/2013	Approximate Point
13.	Flooding at Trinity College, Dublin 2, 26th July 2013 (ID-11960) **Additional Information:** Reports (1) Press Archive (0)	26/07/2013	Approximate Point
14.	Tolka November 2002 (ID-5) **Additional Information:** Reports (143) Press Archive (13)	13/11/2002	Area
15.	Dublin City Tidal Feb 2002 (ID-456) **Additional Information:** Reports (45) Press Archive (27)	01/02/2002	Area
16.	Tolka Richmond Road Drumcondra Nov 2000 (ID-20) **Additional Information:** Reports (6) Press Archive (5)	05/11/2000	Approximate Point
17.	Fenian Street June 1963 (ID-289) **Additional Information:** Reports (4) Press Archive (2)	11/06/1963	Exact Point
18.	Ringsend June 1963 (ID-290) **Additional Information:** Reports (4) Press Archive (2)	11/06/1963	Exact Point
19.	North Strand Road June 1963 (ID-291) **Additional Information:** Reports (4) Press Archive (2)	11/06/1963	Exact Point
20.	Donnycarney Wad June 1963 (ID-292) **Additional Information:** Reports (4) Press Archive (2)	11/06/1963	Exact Point
21.	Clontarf Rd Seaview Avenue August 2004 (ID-2581) **Additional Information:** Reports (4) Press Archive (0)	23/08/2004	Exact Point
22.	Clontarf Oulton road area August 2004 (ID-2584) **Additional Information:** Reports (3) Press Archive (0)	23/08/2004	Exact Point
23.	Tolka Richmond Road August 1986 (ID-3346) **Additional Information:** Reports (4) Press Archive (0)	25/08/1986	Approximate Point
24.	Donnycarney Dublin Recurring (ID-10680) **Additional Information:** Reports (4) Press Archive (0)	n/a	Approximate Point

	Name (Flood_ID)	Start Date	Event Location
25.	Dublin Area 020709 (ID-10660) **Additional Information:** Reports (1) Press Archive (0)	02/07/2009	Approximate Point
26.	Flooding at Bessborough Avenue, North Strand, Dublin 3 on 24th Oct 2011 (ID-11561) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Exact Point
27.	Flooding at Clanmoyle Road, Donnycarney, Dublin 5 on 24th Oct 2011 (ID-11566) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Approximate Point
28.	Flooding at Shamrock Place, Cottages and Terrace, Dublin 3 on 24th Oct 2011 (ID-11655) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Exact Point
29.	Flooding at ESB Sportsco, Ringsend, Dublin 4 on 24th Oct 2011 (ID-11708) **Additional Information:** Reports (1) Press Archive (0)	24/10/2011	Exact Point

Appendix B
PFRA Map



Location Plan :

Legend:

Flood Extents

- Fluvial - Indicative 1% AEP (100-yr) Event
- Fluvial - Extreme Event
- Coastal - Indicative 0.5% AEP (200-yr) Event
- Coastal - Extreme Event
- Pluvial - Indicative 1% AEP (100-yr) Event
- Pluvial - Extreme Event
- Groundwater Flood Extents
- Lakes / Turloughs

PFRA Outcomes

- Probable Area for Further Assesment
- Possible Area for Further Assesment

Important User Note:

The flood extents shown on these maps are based on broad-scale simple analysis and may not be accurate for a specific location. Information on the purpose, development and limitations of these maps is available in the relevant reports (see www.cfram.ie). Users should seek professional advice if they intend to rely on the maps in any way.

If you believe that the maps are inaccurate in some way please forward full details by contacting the OPW (refer to PFRA Information leaflets or 'Have Your Say' on www.cfram.ie).

Office of Public Works
Jonathon Swift Street
Trim
Co Meath
Ireland

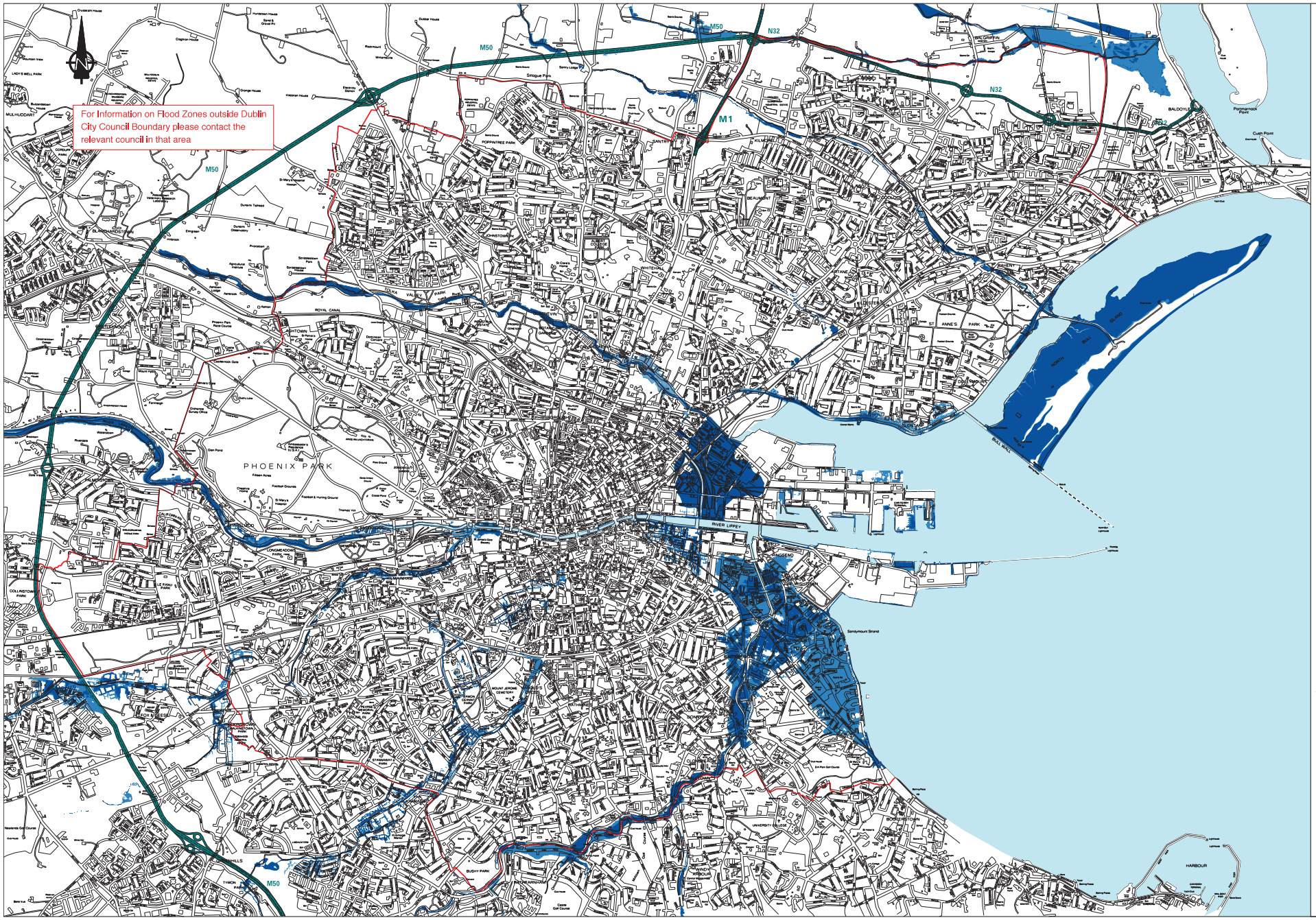
OPW

Project :
PRELIMINARY FLOOD RISK ASSESMENT (PFRA)

Map :
PFRA Indicative extents and outcomes
- Draft for Consultation

Figure By : PJW	Date : July2011
Checked By : MA	Date : July 2011
Figure No. : 2019 / MAP / 238 / A	Revision 0
Drawing Scale : 1:50,000	Plot Scale : 1:1 @ A3

Appendix C
Composite Flood Zone Map Dublin City



Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

Dublin City Development Plan 2016-2022

DRAFT

Dublin City Council

Composite Flood Map

Flood Zone A

Flood Zone B

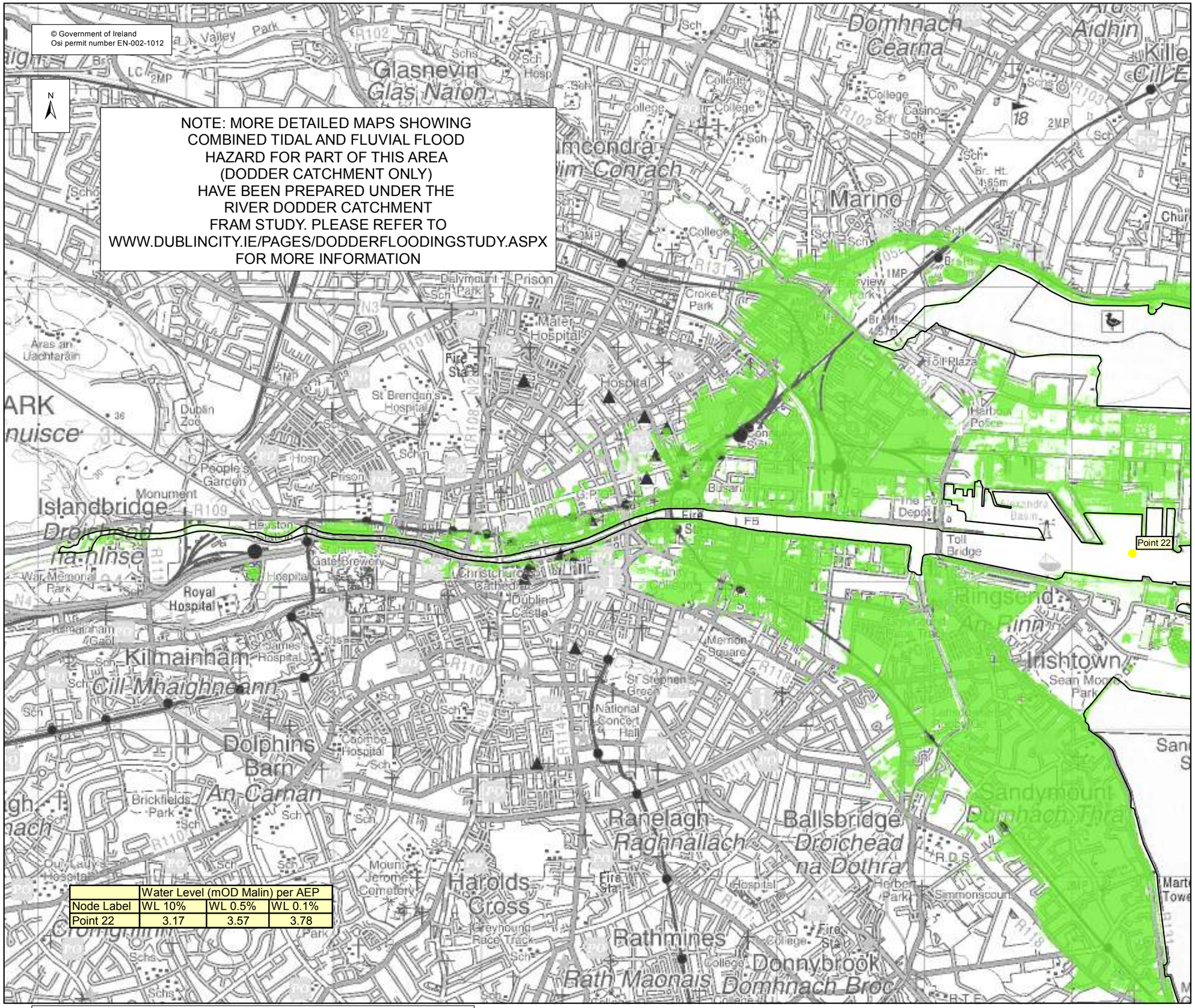
Flood Zone C

City Boundary

See Appendix 3 Strategic Flood Risk Assessment report for details

John O'Hara
Head of Land Use Policy

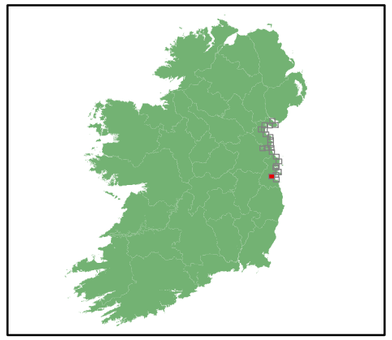
Appendix D
Irish Coastal Protection Strategy Study (ICPSS) Coastal Flood Maps



	Water Level (mOD Malin) per AEP		
Node Label	WL 10%	WL 0.5%	WL 0.1%
Point 22	3.17	3.57	3.78

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)
- 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

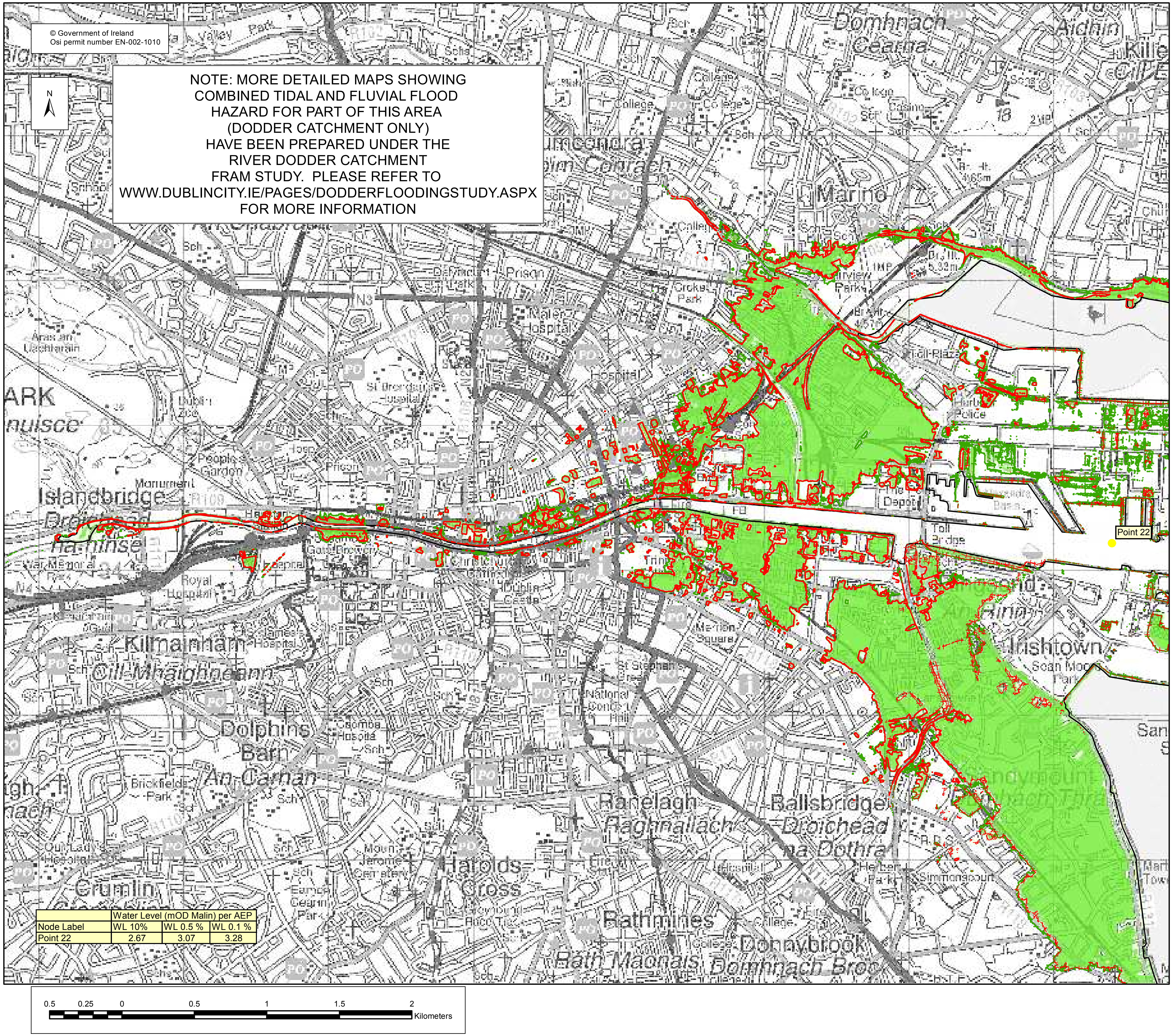
Map :
NORTH EAST COAST FLOOD EXTENT MAP

Map Type :	FLOOD EXTENT		
Source :	TIDAL FLOODING		
Map area :	RURAL AREA		
Scenario :	MID RANGE FUTURE SCENARIO		
Figure By :	PJW	Date :	Aug 2012
Checked By :	JMC & JR	Date :	Aug 2012

Figure No. : NE / RA / EXT / MRFS / 19

Revision 1

Drawing Scale : 1:25,000 Plot Scale : 1:1 @ A3

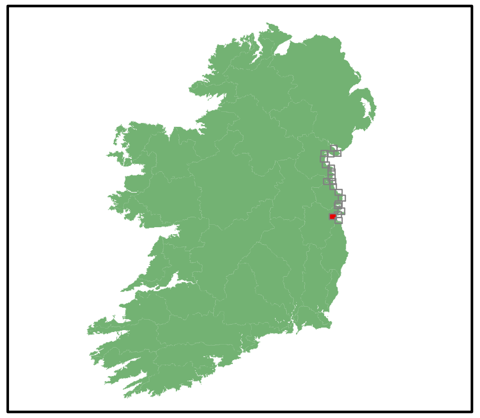


© Government of Ireland
Osi permit number EN-002-1010

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

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

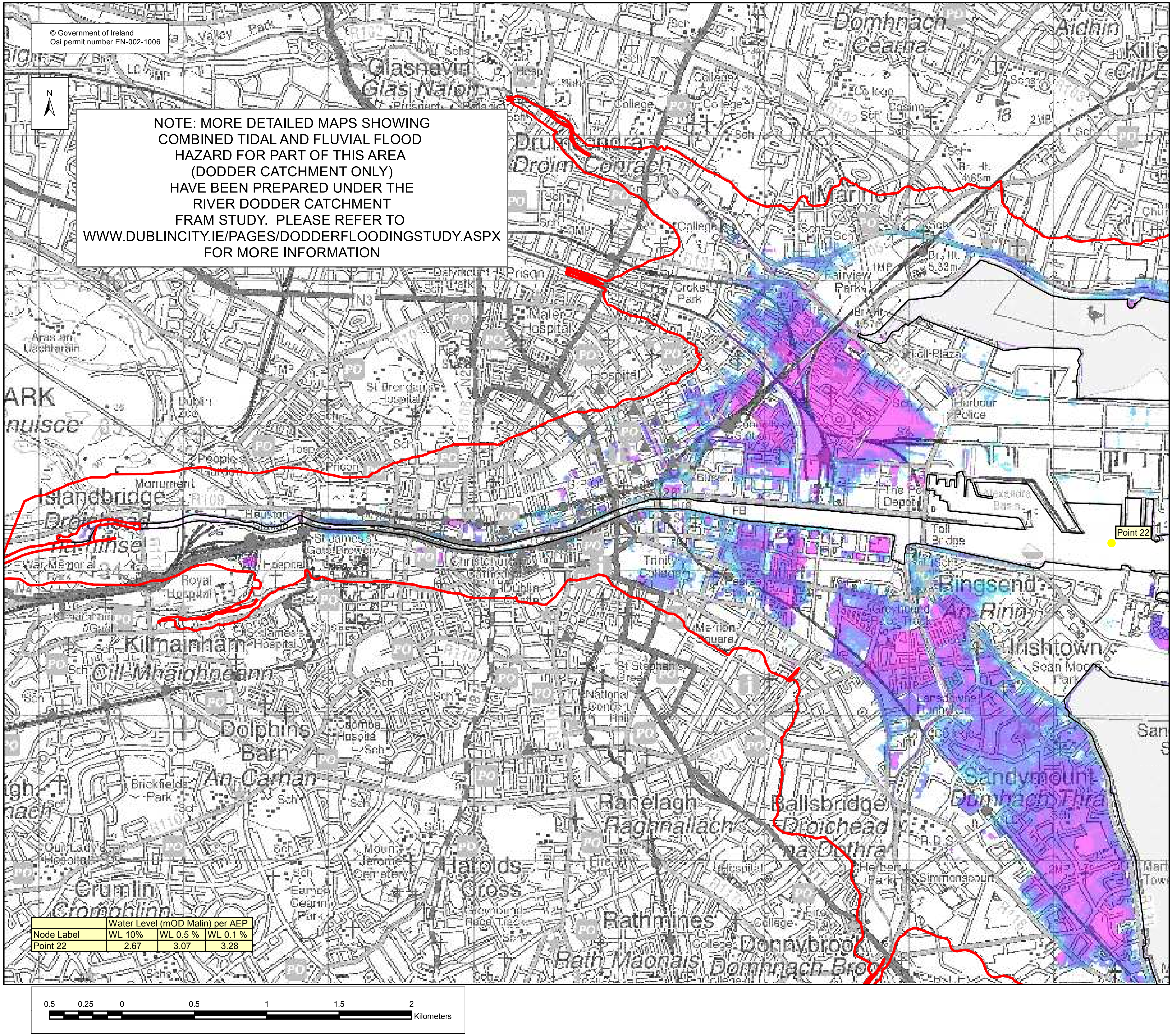
Map :
NORTH EAST COAST FLOOD EXTENT MAP

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

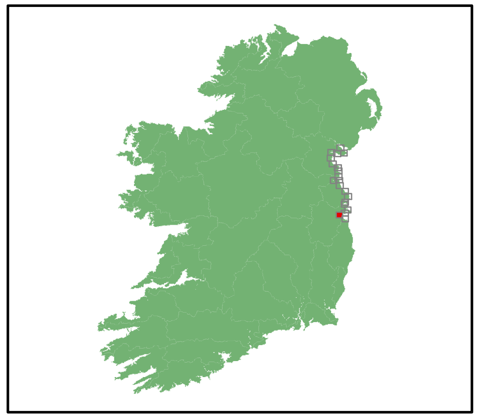
Drawing Scale : 1:25,000
Plot Scale : 1:1 @ A3



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

Location Plan :



DEPTH MAP 0.5%AEP

Legend:

Depth Grid

- 🟦 0 -0.25 m
- 🟦 0.25 - 0.50 m
- 🟦 0.50 - 1 m
- 🟪 1.00 - 1.50 m
- 🟪 1.50 - 2.00 m
- 🟪 > 2.00 m
- — Inland DTM Extent
- — 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

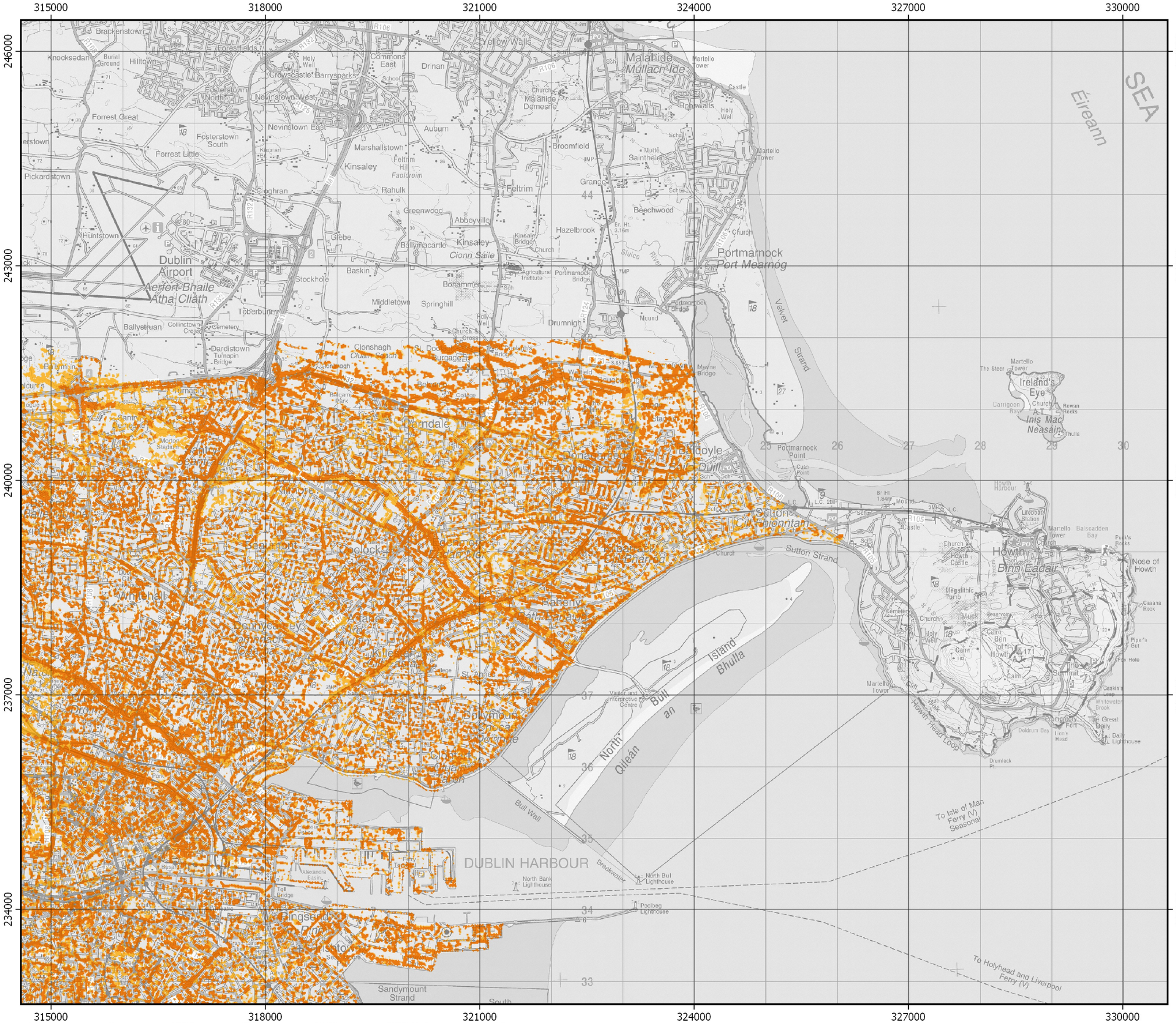
Office of Public Works
17-19 Lower Hatch Street
Dublin 2
Ireland

Project :
IRISH COASTAL PROTECTION STRATEGY STUDY - PHASE III

Map :
NORTH EAST COAST FLOOD DEPTH MAP

Map Type : DEPTH
Return Period 0.5% AEP EVENT
Source : TIDAL FLOODING
Map area : RURAL AREA
Scenario : CURRENT
Figure By : PJW Date : Aug 2009
Checked By : JMC Date : Aug 2009
Figure No. : NE / RA / DEP / 19
Revision 1
Drawing Scale : 1:25,000 Plot Scale : 1:1 @ A3

Appendix E
FloodResilienCity Project Maps



Location Plan:

LEGEND

- 10% AEP Pluvial
- 1% AEP Pluvial
- 0.5% AEP Pluvial

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

OPW
Oifig na nOibreacha Poibli
The Office of Public Works

The Office Of Public Works
Jonathan Swift Street
Trim
Co. Meath

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

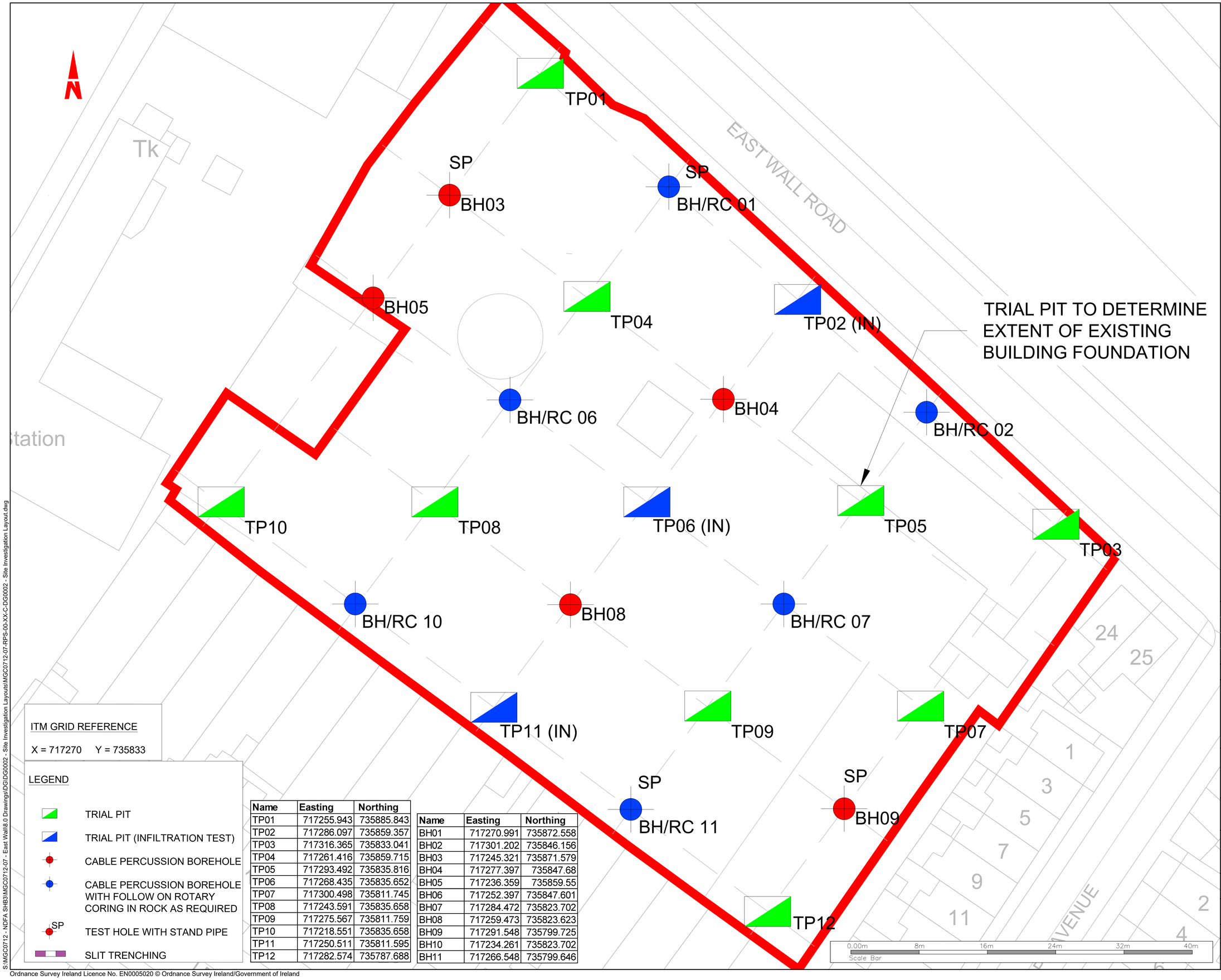
Dublin City Council
Civic Offices
Wood Quay
Dublin 8

Project:

DUBLIN PLUVIAL STUDY (FloodResilienCity)

Map:	DUBLIN CITY - PLUVIAL FLOOD EXTENT MAP		
Map Type:	EXTENT - 180min Rainfall		
Source:	PLUVIAL		
Map Area:	URBAN		
Scenario:	CURRENT		
Drawn by:	IH	Date:	Aug - 2016
Checked by:	MC	Date:	Aug - 2016
Approved by:	JM	Date:	Aug - 2016
Map No.: E09DCC_EXPCD_F0_02			
Revision: F0			
Map Scale: 1:50,000		Plot Scale: 1:1 @ A3	

Appendix F
Site Hydrogeology



ITM GRID REFERENCE

X = 717270 Y = 735833

LEGEND

- TRIAL PIT
- TRIAL PIT (INFILTRATION TEST)
- CABLE PERCUSSION BOREHOLE
- CABLE PERCUSSION BOREHOLE WITH FOLLOW ON ROTARY CORING IN ROCK AS REQUIRED
- SP — TEST HOLE WITH STAND PIPE
- SLIT TRENCHING

Name	Easting	Northing
TP01	717255.943	735885.843
TP02	717286.097	735859.357
TP03	717316.365	735833.041
TP04	717261.416	735859.715
TP05	717293.492	735835.816
TP06	717268.435	735835.652
TP07	717300.498	735811.745
TP08	717243.591	735835.658
TP09	717275.567	735811.759
TP10	717218.551	735835.658
TP11	717250.511	735811.595
TP12	717282.574	735787.688

Name	Easting	Northing
BH01	717270.991	735872.558
BH02	717301.202	735846.156
BH03	717245.321	735871.579
BH04	717277.397	735847.68
BH05	717236.359	735859.55
BH06	717252.397	735847.601
BH07	717284.472	735823.702
BH08	717259.473	735823.623
BH09	717291.548	735799.725
BH10	717234.261	735823.702
BH11	717266.548	735799.646

General Notes

(i) Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipients own risk. RPS will not accept any responsibility for any errors from the use of these files, either by human error by the recipient, listing of the un-dimensioned measurements, compatibility with the recipients software, and any errors arising when these files are used to aid the recipients drawing production, or setting out on site.

(ii) DO NOT SCALE, use figured dimensions only.

(iii) This drawing is the property of RPS, it is a project confidential classified document. It must not be copied used or its contents divulged without prior written consent. The needs and expectations of client and RPS must be considered when working with this drawing.

(iv) Information including topographical survey, geotechnical investigation and utility detail used in the design have been provided by others.

(v) All Levels refer to Ordnance Survey Datum, Malin Head.

Rev	Date	Drn / Chk	Amendment / Issue	App
P02	01/12/20	JO / PMcG	ISSUE FOR INFORMATION	DK
P01	26/11/20	JO / PMcG	ISSUE FOR INFORMATION	DK

Client

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

rps MAKING COMPLEX EASY
Lyrr 2, IDA Business & Technology Park, Mervue, Galway
T +353 91 400200
W www.rpsgroup.com/ireland
E ireland@rpsgroup.com

Project

SHB 3
EAST WALL, CO. DUBLIN

Title

SITE INVESTIGATION LAYOUT

Model File Identifier

MGC0712-07-RPS-00-XX-C-DG0002

File Identifier

MGC0712-07-RPS-00-XX-C-DG0002-01

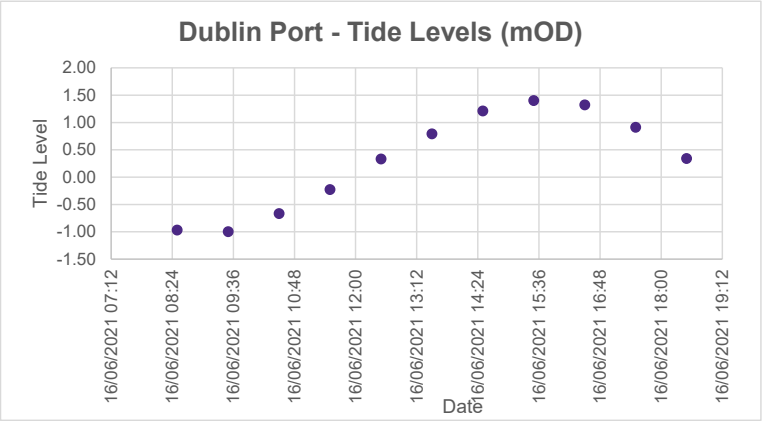
Created on	Sheets	
November 2020	01 OF 01	
Scale	**Status**	**Rev**
1:200 @ A1 1:400 @ A3	D2	P02

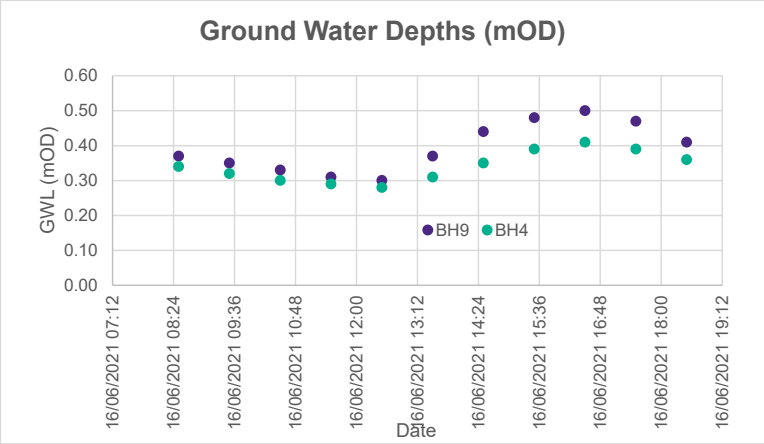
S:\MGC0712 - NDFA SHB3\MGC0712-07 - East Wall\8.0 Drawings\DG\DG0002 - Site Investigation Layouts\MGC0712-07-RPS-00-XX-C-DG0002 - Site Investigation Layout.dwg

	BH9 - 58 m from Talka River		BH4 - 32m from Talka	
Time	BH9 (depth bGL)	GWL(mOD)	BH4 (depth bGL)	GWL(mOD)
16/06/2021 08:30	3.250	0.340	3.14	0.37
16/06/2021 09:30	3.270	0.320	3.16	0.35
16/06/2021 10:30	3.290	0.300	3.18	0.33
16/06/2021 11:30	3.300	0.290	3.2	0.31
16/06/2021 12:30	3.310	0.280	3.21	0.3
16/06/2021 13:30	3.280	0.310	3.14	0.37
16/06/2021 14:30	3.240	0.350	3.07	0.44
16/06/2021 15:30	3.200	0.390	3.03	0.48
16/06/2021 16:30	3.180	0.410	3.01	0.5
16/06/2021 17:30	3.200	0.390	3.04	0.47
16/06/2021 18:30	3.230	0.360	3.1	0.41
Max	**3.31**	**0.41**	**3.21**	**0.50**
Min:	**3.18**	**0.28**	**3.01**	**0.30**
Diff.	**0.13**	**0.13**	**0.20**	**0.20**

	Tide Levels (Dublin Port)		
MSL (mOD)	Time	Level (Chart Datum)	Level (mOD)
-0.10	16/06/2021 08:30	1.540	-0.9700
-0.10	16/06/2021 09:30	1.510	-1.0000
-0.10	16/06/2021 10:30	1.840	-0.6700
-0.10	16/06/2021 11:30	2.280	-0.2300
-0.10	16/06/2021 12:30	2.840	0.3300
-0.10	16/06/2021 13:30	3.300	0.7900
-0.10	16/06/2021 14:30	3.720	1.2100
-0.10	16/06/2021 15:30	3.910	1.4000
-0.10	16/06/2021 16:30	3.830	1.3200
-0.10	16/06/2021 17:30	3.420	0.9100
-0.10	16/06/2021 18:30	2.850	0.3400
	Max	**3.91**	**1.40**
	Min:	**1.51**	**-1.00**
	Diff.	**2.40**	**2.40**

Note:
The observed maximum groundwater levels in BH4 & BH9 are 0.50 and 0.41 mOD respectively, while the maximum tide levels at Dublin port is in the order of 1.4mOD during the recorded period.
This significant level diff. between the Dublin Port / Tolka River Water level and the borehole groundwater level suggests no active direct hydraulic connection between these.
Any temporal variations in the groundwater levels during the recorded period can be considered as imperceptible.





Appendix I Boring Records

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH01**
		SHEET	Sheet 1 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	23/05/2021
	BOREHOLE DIAMETER (mm) 200		
GROUND LEVEL (mOD)	**BOREHOLE DEPTH (m)** 13.90	**DATE COMPLETED**	29/05/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	CONCRETE			0.30						
	MADE GROUND (Comprised of silty/clayey builders fill with rubble and reinforced concrete pieces)									
1					AA15660	B	1.00		N = 33 (2, 4, 9, 6, 8, 10)	
2					AA15661	B	2.00		N = 21 (3, 4, 4, 5, 5, 7)	
3					AA15662	B	3.00		N = 10 (5, 7, 4, 2, 2, 2)	
4					AA15663	B	4.00		N = 34 (1, 3, 5, 9, 10, 10)	
	Dense grey/brown fine to coarse slightly sandy GRAVEL with some cobbles and boulders			4.50						
5					AA15664	B	5.00		N = 49 (5, 9, 11, 11, 12, 15)	
6					AA15665	B	6.00		N = 36 (4, 6, 7, 9, 11, 9)	
	Loose grey/brown fine to coarse silty SAND with occasional gravel			6.70						
7					AA15666	B	7.00		N = 9 (1, 0, 1, 2, 2, 4)	
8					AA15667	B	8.00		N = 9 (1, 0, 1, 1, 3, 4)	
					Fail	U	8.00			
	Soft to firm grey sandy SILT			8.30						
9					AA15668	B	9.00		N = 5 (1, 0, 1, 1, 1, 2)	

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.60	1.90	1	
5.10	5.30	0.75	
12.50	12.80	0.5	
13.70	13.90	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.30	4.30	No	3.30	20	Moderate

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . Concrete precored .CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH01**
		SHEET	Sheet 2 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	23/05/2021
	BOREHOLE DIAMETER (mm) 200		
GROUND LEVEL (mOD)	**BOREHOLE DEPTH (m)** 13.90	**DATE COMPLETED**	29/05/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
10	Soft to firm grey sandy SILT *(continued)*			10.30	AA15669	B	10.00		N = 11 (1, 1, 1, 2, 4, 4)	
	Stiff dark grey sandy gravelly CLAY with occasional cobbles									
11					AA15670	B	11.00		N = 27 (3, 5, 6, 6, 7, 8)	
12				12.30	AA15671	B	12.00		N = 27 (4, 4, 5, 5, 8, 9)	
	Very stiff dark grey/black very gravelly sandy CLAY with some cobbles									
13					AA15672	B	13.00		N = 57 (7, 9, 12, 18, 17, 10)	
				13.90						
14	End of Borehole at 13.90 m								N = 50/75 mm (12, 20, 50)	
15										
16										
17										
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.60	1.90	1	
5.10	5.30	0.75	
12.50	12.80	0.5	
13.70	13.90	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . Concrete precored .CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH04**
		SHEET	Sheet 1 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	02/06/2021
GROUND LEVEL (mOD)	**BOREHOLE DIAMETER (mm)** 200 **BOREHOLE DEPTH (m)** 14.80	**DATE COMPLETED**	08/06/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	CONCRETE			0.30						
	LEAN MIX			0.50						
	MADE GROUND (Comprised of brick,rubble,ash,clinker)									
1					AA156686	B	1.00		N = 10 (2, 2, 4, 2, 2, 2)	
2					AA156687	B	2.00		N = 9 (1, 1, 2, 2, 2, 3)	
3				3.30	AA156688	B	3.00		N = 15 (1, 2, 3, 3, 4, 5)	
	Medium dense grey fine to coarse silty sandy GRAVEL with occasional cobbles									
4					AA156689	B	4.00		N = 33 (4, 5, 5, 7, 9, 12)	
5				5.60	AA156690	B	5.00		N = 30 (2, 4, 6, 6, 8, 10)	
	Loose grey gravelly SAND									
6				6.90	AA156691	B	6.00		N = 11 (3, 3, 4, 3, 2, 2)	
7	Soft very sandy SILT (Possibly silty sand) with occasional fine gravel				AA156692	B	7.00		N = 3 (1, 0, 0, 1, 1, 1)	
8					AA156693	B	8.00		N = 3 (1, 0, 1, 0, 1, 1)	
9				9.40	AA156694	B	9.00		N = 6 (1, 0, 1, 1, 2, 2)	
	Firm grey sandy SILT/CLAY with some gravel									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.60	4.90	1	
14.60	14.80	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
08-06-21	14.80	1.00	14.80	50mm SP

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH04**
		SHEET	Sheet 2 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	02/06/2021
GROUND LEVEL (mOD)	**BOREHOLE DIAMETER (mm)** 200 **BOREHOLE DEPTH (m)** 14.80	**DATE COMPLETED**	08/06/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
10	Firm grey sandy SILT/CLAY with some gravel *(continued)*				AA156695	B	10.00		N = 6 (1, 0, 0, 1, 2, 3)	
					AA156696	U	10.50	100%rec		
11					AA156697	B	11.00		N = 11 (1, 1, 2, 2, 3, 4)	
				11.50						
	Stiff grey gravelly SILT/CLAY with occasional cobbles									
12					AA156698	B	12.00		N = 21 (2, 4, 4, 5, 6, 6)	
13					AA156699	B	13.00		N = 24 (3, 5, 6, 7, 6, 5)	
				14.00						
14	Very stiff black sandy gravelly CLAY with some cobbles				AA156700	B	14.00		N = 53 (7, 12, 12, 12, 14, 15)	
				14.80						
	Obstruction End of Borehole at 14.80 m									
15										
16										
17										
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.60	4.90	1	
14.60	14.80	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
08-06-21	14.80	1.00	14.80	50mm SP

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH06**
		SHEET	Sheet 1 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	10/06/2021
	BOREHOLE DIAMETER (mm) 200		
GROUND LEVEL (mOD)	**BOREHOLE DEPTH (m)** 16.50	**DATE COMPLETED**	11/06/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	CONCRETE			0.20						
	LEAN MIX			0.70						
	MADE GROUND (Comprised of silty/clayey fill with rubble - Strong hydrocarbon smell noted from 3.50m)									
1					AA166666	B	1.00		N = 7 (1, 1, 1, 2, 2, 2)	
2					AA166667	B	2.00		N = 10 (2, 2, 2, 2, 3, 3)	
3					AA166668	B	3.00		N = 5 (1, 0, 1, 1, 1, 2)	
4				4.10	AA166669	B	4.00		N = 50 (4, 6, 7, 9, 16, 18)	
	Medium dense to dense grey fine to coarse GRAVEL with frequent cobbles									
5					AA166670	B	5.00		N = 38 (5, 6, 8, 8, 10, 12)	
6					AA166671	B	6.00		N = 29 (3, 5, 7, 8, 7, 7)	
				7.00						
7	Very soft grey sandy SILT (Possibly loose silty Sand)				AA166672	B	7.00		N = 2 (1, 0, 0, 1, 0, 1)	
8					AA166673	B	8.00		N = 3 (1, 0, 1, 0, 1, 1)	
				9.00						
9	Soft to firm grey sandy SILT/CLAY with occasional finegravel				AA166674	B	9.00		N = 6 (1, 0, 1, 1, 2, 2)	
					AA166675	U	9.50			

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
0.70	0.90	1	
4.50	5.00	1.5	
15.90	16.10	0.75	
16.30	16.50	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.70	3.70	3.80	No	20	Slow
4.20	4.20	No	3.50	20	Moderate

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH06**
		SHEET	Sheet 2 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	10/06/2021
GROUND LEVEL (mOD)	**BOREHOLE DIAMETER (mm)** 200 **BOREHOLE DEPTH (m)** 16.50	**DATE COMPLETED**	11/06/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
10	Soft to firm grey sandy SILT/CLAY with occasional finegravel *(continued)*				AA166676	B	10.00		N = 10 (1, 1, 2, 2, 3, 3)	
11					AA166677	B	11.00		N = 12 (1, 2, 3, 3, 3, 3)	
				11.90						
12	Stiff grey silty gravelly CLAY with occasional cobbles				AA166678	B	12.00		N = 20 (2, 2, 4, 5, 5, 6)	
13					AA166679	B	13.00		N = 24 (3, 5, 5, 6, 6, 7)	
14					AA166680	B	14.00		N = 34 (3, 4, 6, 7, 9, 12)	
				14.30						
	Medium dense to dense black fine to coarse clayey GRAVEL with some cobbles and occasional boulders (Possibly very gravelly Clay(									
15					AA166681	B	15.00		N = 50/225 mm (9, 12, 12, 15, 23)	
16					AA166682	B	16.00		N = 50/150 mm (7, 14, 18, 32)	
				16.50						
	Obstruction End of Borehole at 16.50 m									
17										
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
0.70	0.90	1	
4.50	5.00	1.5	
15.90	16.10	0.75	
16.30	16.50	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH07**
		SHEET	Sheet 1 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	09/06/2021
	BOREHOLE DIAMETER (mm) 200		
GROUND LEVEL (mOD)	**BOREHOLE DEPTH (m)** 15.30	**DATE COMPLETED**	10/06/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	CONCRETE			0.30						
	LEAN MIX			0.60						
	MADE GROUND (Comprised of clayey rubble fill with brick,concrete,ceramics,steel,tyres - Strong hydrocarbon smell noted 3.70m)									
1					AA166651	B	1.00		N = 7 (2, 2, 1, 2, 2, 2)	
2					AA166652	B	2.00		N = 9 (1, 1, 1, 2, 2, 4)	
3					AA166653	B	3.00		N = 4 (1, 0, 0, 1, 1, 2)	
4				4.20	AA166654	B	4.00		N = 23 (3, 3, 5, 5, 5, 8)	
	Medium dense to dense grey fine to coarse silty sandy GRAVEL (Blowing noted in fines 5.50-3.80m)									
5					AA166655	B	5.00		N = 34 (3, 5, 6, 8, 8, 12)	
6					AA166656	B	6.00		N = 25 (2, 3, 4, 6, 6, 9)	
7				7.10	AA166657	B	7.00		N = 5 (1, 0, 1, 0, 1, 3)	
	Loose grey very silty SAND (Possibly sandy Silt)									
8					AA166658	B	8.00		N = 3 (1, 0, 0, 1, 1, 1)	
				8.70	FAIL	U	8.50			
	Firm grey sandy SILT									
9					AA166659	B	9.00		N = 5 (1, 0, 1, 1, 1, 2)	
				9.90						

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.50	4.00	1.5	
14.60	14.80	1	
15.10	15.30	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.70	3.70	4.00	No	20	Seepage
4.40	4.40	No	3.50	20	Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH07**
		SHEET	Sheet 2 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	09/06/2021
GROUND LEVEL (mOD)	**BOREHOLE DIAMETER (mm)** 200 **BOREHOLE DEPTH (m)** 15.30	**DATE COMPLETED**	10/06/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
10	Stiff grey sandy very gravelly CLAY with occasional cobbles *(continued)*				AA166660	B	10.00		N = 23 (2, 3, 5, 5, 6, 7)	
11					AA166661	B	11.00		N = 27 (3, 4, 6, 7, 6, 8)	
12					AA166662	B	12.00		N = 25 (2, 3, 5, 5, 7, 8)	
13				13.20	AA166663	B	13.00		N = 26 (3, 3, 4, 6, 6, 10)	
	Very stiff to hard black gravelly CLAY with occasional cobbles									
14					AA166664	B	14.00		N = 34 (5, 6, 6, 8, 10, 10)	
15				15.30	AA166665	B	15.00		N = 56 (7, 9, 11, 12, 15, 18)	
	End of Borehole at 15.30 m									
16										
17										
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.50	4.00	1.5	
14.60	14.80	1	
15.10	15.30	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH08**
		SHEET	Sheet 1 of 1
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	24/05/2021
	BOREHOLE DIAMETER (mm) 200		
GROUND LEVEL (mOD)	**BOREHOLE DEPTH (m)** 0.70	**DATE COMPLETED**	24/05/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	CONCRETE			0.30						
	MADE GROUND (Comprised of silty/clayey builders fill with rubble and reinforced concrete pieces)			0.70						
	Obstruction End of Borehole at 0.70 m									
1										
2										
3										
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.50	4.50	No	3.10	20	Moderate

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit carried out . Obstruction encountered . Relocated to BH08A and attempted rebore.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH08A**
		SHEET	Sheet 1 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	24/05/2021
	BOREHOLE DIAMETER (mm) 200		
GROUND LEVEL (mOD)	**BOREHOLE DEPTH (m)** 16.50	**DATE COMPLETED**	26/05/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	CONCRETE			0.30						
	MADE GROUND (Comprised of concrete pieces and boulders)			0.80						
1	MADE GROUND (Comprised of clayey/silty fill with rubble , red brick and concrete pieces - Strong hdrocarbon smell noted from 4.00m)				AA139681	B	1.00		N = 10 (2, 3, 2, 3, 2, 3)	
2					AA139682	B	2.00		N = 16 (2, 2, 3, 3, 4, 6)	
3					AA139683	B	3.00		N = 7 (2, 3, 3, 2, 1, 1)	
4					AA139684	B	4.00		N = 42 (4, 5, 9, 9, 12, 12)	
	Grey/brown fine to coarse slightly sandy GRAVEL with cobbles and some boulders - Blowing noted 6.00-5.10m)			4.50						
5					AA139685	B	5.00		N = 41 (3, 6, 8, 9, 10, 14)	
6					AA139686	B	6.00		N = 26 (2, 3, 3, 4, 7, 12)	
7				7.20	AA139687	B	7.00		N = 2 (2, 1, 1, 0, 1, 0)	
	Stiff grey sandy SILT (Possibly very silty Sand)									
8					AA139688	B	8.00		N = 5 (1, 0, 1, 1, 1, 2)	
9					AA139689	B	9.00		N = 5 (1, 1, 1, 1, 2, 1)	
				9.30						
	Stiff grey slightly gravelly sandy SILT/CLAY				AA156658	U	9.50	100%rec		

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.80	4.00	1	
4.40	4.60	1.5	
15.80	16.00	0.75	
16.30	16.50	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS 1hr Erecting Covid 19 Safe Working Area . Concrete precored .CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH08A**
		SHEET	Sheet 2 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	24/05/2021
	BOREHOLE DIAMETER (mm) 200		
GROUND LEVEL (mOD)	**BOREHOLE DEPTH (m)** 16.50	**DATE COMPLETED**	26/05/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
10	Stiff grey slightly gravelly sandy SILT/CLAY *(continued)*				AA139690	B	10.00		N = 14 (1, 1, 2, 3, 4, 5)	
11					AA139691	B	11.00		N = 18 (1, 2, 4, 4, 5, 5)	
12					AA139692	B	12.00		N = 19 (1, 2, 3, 5, 5, 6)	
13					AA139693	B	13.00		N = 21 (2, 2, 4, 5, 6, 6)	
14				14.10	AA139694	B	14.00		N = 41 (3, 5, 8, 9, 10, 14)	
	Coarse silty/clayey GRAVEL/COBBLE layer			14.40						
	Very stiff to hard black sandy gravelly CLAY with some cobbles									
15					AA139695	B	15.00		N = 50/225 mm (9, 14, 16, 19, 15)	
16					AA139696	B	16.00		N = 50/225 mm (11, 14, 19, 22, 9)	
				16.50						
	End of Borehole at 16.50 m									
17										
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.80	4.00	1	
4.40	4.60	1.5	
15.80	16.00	0.75	
16.30	16.50	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS 1hr Erecting Covid 19 Safe Working Area . Concrete precored .CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH09**
		SHEET	Sheet 1 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	26/05/2021
	BOREHOLE DIAMETER (mm) 200		
GROUND LEVEL (mOD)	**BOREHOLE DEPTH (m)** 14.10	**DATE COMPLETED**	28/05/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	CONCRETE			0.25						
	MADE GROUND (Comprised of lean mix)			0.50						
	MADE GROUND (Comprised of silty/clayey granular stone fill)									
1					AA139697	B	1.00		N = 15 (3, 4, 5, 3, 4, 3)	
2					AA139698	B	2.00		N = 8 (1, 2, 2, 2, 2, 2)	
3					AA139699	B	3.00		N = 10 (2, 4, 3, 2, 3, 2)	
4				4.40	AA139700	B	4.00		N = 38 (3, 5, 8, 7, 11, 12)	
	Dense grey fine to coarse sandy GRAVEL									
5				5.90	AA159432	B	5.00		N = 33 (4, 5, 7, 7, 9, 10)	
6	Loose grey very silty SAND with occasional fine gravel (Possibly very sandy Silt)				AA159433	B	6.00		N = 5 (3, 2, 1, 1, 1, 2)	
7					AA159434	B	7.00		N = 3 (1, 0, 0, 1, 1, 1)	
8				8.80	AA159435	B	8.00		N = 8 (1, 0, 1, 1, 2, 4)	
	Firm grey sandy SILT/CLAY									
9					AA159436	B	9.00		N = 10 (1, 0, 1, 2, 3, 4)	
					AA156659	U	9.50	95%rec		

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.50	3.90	1.5	
13.00	13.20	1	
13.30	13.50	0.75	
13.90	14.10	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.60	3.60	3.90	No	20	Seepage
4.30	4.30	No	3.10	20	Moderate

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
28-05-21	14.10	1.00	14.10	50mm SP

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH09**
		SHEET	Sheet 2 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	26/05/2021
GROUND LEVEL (mOD)	**BOREHOLE DIAMETER (mm)** 200 **BOREHOLE DEPTH (m)** 14.10	**DATE COMPLETED**	28/05/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
10	Firm grey sandy SILT/CLAY *(continued)*			10.90	AA159437	B	10.00		N = 11 (1, 2, 3, 2, 2, 4)	
11	Stiff grey sandy gravelly CLAY with occasional cobbles			12.00	AA159438	B	11.00		N = 23 (2, 3, 5, 5, 6, 7)	
12	Very stiff to hard black sandy gravelly CLAY with some cobbles				AA159439	B	12.00		N = 63 (5, 9, 15, 18, 17, 13)	
13					AA159440	B	13.00		N = 60 (7, 12, 17, 21, 12, 10)	
14				14.40	AA159441	B	14.00		N = 50/75 mm (18, 21, 50)	
	End of Borehole at 14.10 m									
15										
16										
17										
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.50	3.90	1.5	
13.00	13.20	1	
13.30	13.50	0.75	
13.90	14.10	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
28-05-21	14.10	1.00	14.10	50mm SP

REMARKS 1hr Erecting Covid 19 Safe Working Area . CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH10**
		SHEET	Sheet 1 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	14/06/2021
	BOREHOLE DIAMETER (mm) 200		
GROUND LEVEL (mOD)	**BOREHOLE DEPTH (m)** 16.30	**DATE COMPLETED**	15/06/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	CONCRETE			0.20						
	MADE GROUND (Comprised of hardcore stone fill)			0.50						
	MADE GROUND (Comprised of clayey rubble fill with brick,concrete- Strong hydrocarbon smell noted 4.00m)									
1					AA166683	B	1.00		N = 8 (3, 2, 2, 1, 2, 3)	
2					AA166684	B	2.00		N = 11 (1, 2, 3, 2, 3, 3)	
3					AA166685	B	3.00		N = 6 (1, 1, 1, 1, 1, 3)	
4				4.20	AA166686	B	4.00		N = 31 (4, 5, 6, 6, 8, 11)	
	Medium dense coarse very sandy GRAVEL with occasional cobbles									
5					AA166687	B	5.00		N = 26 (3, 5, 5, 7, 7, 7)	
6					AA166688	B	6.00		N = 26 (4, 6, 7, 6, 7, 6)	
7				7.20	AA166689	B	7.00		N = 3 (1, 0, 1, 0, 1, 1)	
	Soft grey sandy SILT (Possibly very silty Sand)									
8					AA166690	B	8.00		N = 3 (1, 0, 1, 0, 1, 1)	
9				9.20	AA166691	B	9.00		N = 4 (1, 0, 1, 1, 1, 1)	
	Soft to firm rey slightly gravelly sandy SILT									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.00	4.00	4.20	No	20	Seepage
5.00	5.00	No	3.00	20	Rapid

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . Concrete precored .CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH10**
		SHEET	Sheet 2 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	14/06/2021
	BOREHOLE DIAMETER (mm) 200		
GROUND LEVEL (mOD)	**BOREHOLE DEPTH (m)** 16.30	**DATE COMPLETED**	15/06/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
10	Soft to firm rey slightly gravelly sandy SILT *(continued)*				AA166692	B	10.00		N = 6 (1, 1, 1, 1, 2, 2)	
					AA166693	U	10.50	100%rec		
11					AA166694	B	11.00		N = 8 (1, 1, 1, 2, 2, 3)	
12					AA166695	B	12.00		N = 17 (2, 3, 4, 4, 4, 5)	
13					AA166696	B	13.00		N = 25 (2, 4, 5, 6, 7, 7)	
14				14.20	AA166697	B	14.00		N = 39 (3, 7, 8, 8, 11, 12)	
	Medium dense to dense grey very clayey GRAVEL with cobbles and boulders and some black clayey bands									
15					AA166698	B	15.00		N = 50 (5, 6, 10, 12, 14, 14)	
									N = 50/225 mm (9, 16, 18, 20, 12)	
16				16.30	AA166699	B	16.00			
	Obstruction End of Borehole at 16.30 m									
17										
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . Concrete precored .CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH11**
		SHEET	Sheet 1 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	31/05/2021
GROUND LEVEL (mOD)	**BOREHOLE DIAMETER (mm)** 200 **BOREHOLE DEPTH (m)** 12.40	**DATE COMPLETED**	02/06/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	CONCRETE			0.30						
	LEAN MIX			0.60						
	MADE GROUND (Comprised of hardcore stone fill)			1.00						
1	MADE GROUND (Comprised of clayey rubble fill with brick,concrete - Strong hydrocarbon smell noted 3.500m)				AA156673	B	1.00		N = 9 (1, 1, 1, 2, 2, 4)	
2					AA156674	B	2.00		N = 5 (1, 0, 1, 1, 1, 2)	
3					AA156675	B	3.00		N = 8 (1, 1, 1, 2, 3, 2)	
				3.70						
	Dense grey fine to coarse GRAVEL and cobbles									
4					AA156676	B	4.00		N = 35 (3, 5, 6, 8, 9, 12)	
5					AA156677	B	5.00		N = 50 (6, 9, 10, 12, 16, 12)	
6					AA156678	B	6.00		N = 9 (5, 7, 5, 3, 1, 0)	
				6.30						
	Loose grey slightly gravelly SAND (Blowing noted)									
7					AA156679	B	7.00		N = 2 (1, 0, 0, 1, 0, 1)	
8				8.20	AA156680	B	8.00		N = 7 (1, 0, 1, 1, 2, 3)	
	Soft to firm grey sandy gravelly SILT				AA156681	U	8.50			
9					AA156682	B	9.00		N = 10 (1, 2, 2, 2, 3, 3)	

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.60	3.60	0.80	No	20	Moderate
4.50	4.50	No	3.50	20	Moderate

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . Concrete precored .CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wasll Road, Dublin 3	**BOREHOLE NO.**	**BH11**
		SHEET	Sheet 2 of 2
CO-ORDINATES	**RIG TYPE** DANDO 2000	**DATE COMMENCED**	31/05/2021
	BOREHOLE DIAMETER (mm) 200		
GROUND LEVEL (mOD)	**BOREHOLE DEPTH (m)** 12.40	**DATE COMPLETED**	02/06/2021
CLIENT N.D.F.A	**SPT HAMMER REF. NO.**	**BORED BY**	P.THOMAS
ENGINEER R.P.S	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
10	Soft to firm grey sandy gravelly SILT *(continued)*			10.60	AA156683	B	10.00		N = 14 (1, 1, 2, 2, 4, 6)	
11	Very stiff black sandy gravelly CLAY with occasional cobbles				AA156684	B	11.00		N = 50 (5, 7, 10, 11, 14, 15)	
12				12.40	AA156685	B	12.00		N = 50/150 mm (14, 11, 23, 27)	
	Obstruction End of Borehole at 12.40 m									
13										
14										
15										
16										
17										
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS 1hr Erecting Covid 19 Safe Working Area . Concrete precored .CAT scanned location and hand dug inspection pit carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

Appendix IA Rotary Core Records / Photographs

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC01**
		SHEET	Sheet 1 of 4
CO-ORDINATES		**DATE COMMENCED**	22/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	22/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of concrete)	0.30			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of clayey gravelly cobbles with concrete)	4.50			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/brown fine to coarse slightly sandy GRAVEL with some cobbles and boulders	6.70			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/brown fine to coarse silty SAND with occasional gravel	8.30			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey sandy SILT				

REMARKS

Hole cased 0.00-26.50m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC01**
		SHEET	Sheet 2 of 4
CO-ORDINATES		**DATE COMMENCED**	22/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	22/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10									10.30			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of dark grey sandy gravelly CLAY with occasional cobbles				
11												
12									12.30			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of dark grey/black very gravelly sandy CLAY with some cobbles				
13												
14												
15												N = 34/225 mm (4, 12, 9, 11, 14)
16												N = 35 (2, 9, 7, 8, 9, 11)
17									18.00			
18								SYMMETRIX DRILLING: No recovery, observed by driller as returns of black sandy gravelly CLAY				N = 42 (4, 7, 11, 10, 11, 10)
19									19.50			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES				N = 32 (3, 6, 7, 7, 9, 9)

REMARKS

Hole cased 0.00-26.50m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC01**
		SHEET	Sheet 3 of 4
CO-ORDINATES		**DATE COMMENCED**	22/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	22/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
20								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES *(continued)*				
21												N = 61 (4, 7, 11, 14, 19, 17)
22									22.40			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of black sandy gravelly CLAY				N = 44 (2, 4, 9, 9, 12, 14)
23									24.00			
24								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES				N = 65 (4, 8, 14, 17, 15, 19)
25												N = 52 (2, 6, 11, 14, 15, 12)
26	26.50								26.50			
								See description 28.00-31.50m				
27		67	16	8					27.30			
	28.00							Probable clay-filled fracture - returns of stiff, black slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is angular to subangular, fine to medium of limestone.	28.00			
28		100	23	11								
	29.00											
29		100	44	28								
	30.00											

REMARKS

Hole cased 0.00-26.50m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC01**
		SHEET	Sheet 4 of 4
CO-ORDINATES		**DATE COMMENCED**	22/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	22/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
30								Weak to very locally medium strong, medium to thinly bedded to structurelss, grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone with calci-siltite lenses and subordinate MUDSTONE, local stylolites, pyrite present, commonly brecciated and re-cemented with abundant calcite-veining), slightly weathered to locally moderately weathered. Many incipient fractures throughout.				
31		100	69	35								
	31.50								31.50			
32								Discontinuities are medium to closely spaced, smooth to locally rough, planar to irregular. Apertures are tight to locally moderately open, locally clay-filled (at 29.18-29.33m & 30.66-30.75m), commonly calcite-veined (1-100mm thick). Dips are 10-45° & locally 80° & irregular. *(continued)*				
33								End of Borehole at 31.50 m				
34												
35												
36												
37												
38												
39												

REMARKS

Hole cased 0.00-26.50m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC06**
		SHEET	Sheet 1 of 3
CO-ORDINATES		**DATE COMMENCED**	20/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	20/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of concrete)	0.20			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of dry concrete - lean mix)	0.70			
1								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of silty/clayey gravelly cobbles - Strong hydrocarbon smell noted from 3.50m)				
2												
3												
4									4.10			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey fine to coarse GRAVEL with frequent cobbles				
5												
6									7.00			
7								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey sandy SILT (Possibly loose silty Sand)				
8									9.00			
9								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey sandy SILT/CLAY with occasional fine gravel				

REMARKS

Hole cased 0.00-26.50m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.70	4.70	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC06**
		SHEET	Sheet 2 of 3
CO-ORDINATES		**DATE COMMENCED**	20/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	20/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey sandy SILT/CLAY with occasional fine gravel *(continued)*	11.90			
11								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey silty gravelly CLAY with occasional cobbles	14.30			
12								SYMMETRIX DRILLING: No recovery, observed by driller as returns of black fine to coarse clayey GRAVEL with some cobbles and occasional boulders	16.50			
13								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly GRAVEL				
14												
15												
16												
17												
18												N = 32 (2, 7, 4, 5, 9, 14)
19												N = 60 (4, 8, 19, 11, 14, 16)

REMARKS

Hole cased 0.00-26.50m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.70	4.70	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC06**
		SHEET	Sheet 3 of 3
CO-ORDINATES		**DATE COMMENCED**	20/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	20/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
20								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly GRAVEL *(continued)*	21.00			
21								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey gravelly COBBLES				N = 67 (3, 7, 9, 17, 22, 19)
22												N = 79 (4, 16, 15, 17, 19, 28)
23												
24												N = 70 (5, 9, 15, 16, 21, 18)
25												N = 59 (4, 6, 7, 7, 23, 22)
26	27.00								27.00			
27		100	33	8				Strong to medium strong, medium to thinly bedded, grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone with calci-siltite lenses and subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered to locally moderately weathered. Many incipient fractures throughout.				N = 25/10 mm (25, 25)
28	28.50							Discontinuities are medium to closely spaced, smooth to locally rough, planar to irregular. Apertures are tight to locally moderately open, locally clay-filled (at 29.44-29.53m), locally calcite-veined (1-30mm thick). Dips are 10-45° & locally 80° & irregular.				
29		100	23	14								
	30.00								30.00			

REMARKS

Hole cased 0.00-26.50m. Erect Covid-19 Safe Zone - 1hr.

End of Borehole at 30.00 m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.70	4.70	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
20-09-21	30.00	27.00	3.60	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC07**
		SHEET	Sheet 1 of 3
CO-ORDINATES		**DATE COMMENCED**	13/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	13/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of concrete)	0.30			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of dry concrete - lean mix)	0.60			
1								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of clayey cobbles with brick, concrete, ceramics, steel, tyres - Strong hydrocarbon smell noted 3.70m)				
2												
3												
4									4.20			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey fine to coarse silty sandy GRAVEL				
5												
6												
7									7.10			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey very silty SAND				
8									8.70			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey sandy SILT				
9									9.90			

REMARKS

Hole cased 0.00-24.00m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.30	4.30	N/S			Slow
15.70	15.70	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC07**
		SHEET	Sheet 2 of 3
CO-ORDINATES		**DATE COMMENCED**	13/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	13/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey sandy very gravelly CLAY with occasional cobbles *(continued)*	13.20			
11												
12												
13								SYMMETRIX DRILLING: No recovery, observed by driller as returns of black gravelly CLAY with occasional cobbles	16.50			
14												
15												
16								SYMMETRIX DRILLING: No recovery, observed by driller as returns of CLAY	18.00			N = 30 (1, 4, 6, 8, 8, 8)
17												
18								SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly cobbly CLAY	19.50			N = 27 (2, 5, 6, 6, 7, 8)
19												
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES				N = 73/135 mm (4, 9, 23, 25,

REMARKS

Hole cased 0.00-24.00m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.30	4.30	N/S			Slow
15.70	15.70	N/S			Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC07**
		SHEET	Sheet 3 of 3
CO-ORDINATES		**DATE COMMENCED**	13/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	13/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
20								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy gravelly COBBLES *(continued)*				25)
21												N = 25/10 mm (25, 25)
22												N = 97 (19, 25, 26, 21, 23, 25)
23												
24												
25									25.50			
								End of Borehole at 25.50 m				
26												
27												
28												
29												

REMARKS

Hole cased 0.00-24.00m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.30	4.30	N/S			Slow
15.70	15.70	N/S			Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
13-09-01	25.50	7.40	7.40	Water level recorded 5 mins after end of drilling.

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC10**
		SHEET	Sheet 1 of 3
CO-ORDINATES		**DATE COMMENCED**	15/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	15/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of concrete)	0.20			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of gravel)	0.50			
1								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of clayey cobbles with brick, concrete- Strong hydrocarbon smell noted 4.00m)				
2												
3												
4									4.20			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of coarse very sandy GRAVEL with occasional cobbles				
5												
6												
7									7.20			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey sandy SILT				
8												
9									9.20			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey slightly gravelly sandy SILT				

REMARKS

Hole cased 0.00-25.00m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC10**
		SHEET	Sheet 2 of 3
CO-ORDINATES		**DATE COMMENCED**	15/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	15/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE GEO-405
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm)

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey slightly gravelly sandy SILT *(continued)*				
11												
12												
13												
14									14.20			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey very clayey GRAVEL with cobbles and boulders and some black clayey bands				
15												
16									16.30			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of CLAY	16.50			N = 15 (1, 3, 3, 4, 4, 4)
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly CLAY				
17												
18												N = 20 (2, 4, 5, 5, 5, 5)
19												N = 33 (3, 6, 9, 7, 9, 8)

REMARKS

Hole cased 0.00-25.00m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC10**
		SHEET	Sheet 3 of 3
CO-ORDINATES		**DATE COMMENCED**	15/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	15/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
20								SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly CLAY *(continued)*	21.00			
21								SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly cobbly CLAY				N = 27 (4, 4, 6, 7, 7, 7)
22												N = 30 (2, 5, 5, 7, 9, 9)
23												
24									25.00			N = 45 (4, 7, 9, 11, 11, 14)
25								End of Borehole at 25.00 m				N = 46 (2, 4, 11, 12, 11, 12)
26												
27												
28												
29												

REMARKS

Hole cased 0.00-25.00m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
15-09-21	25.00	25.00	21.10	Water level recorded 5 mins after end of drilling.

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC11**
		SHEET	Sheet 1 of 3
CO-ORDINATES		**DATE COMMENCED**	14/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	14/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of concrete)	0.30			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of dry concrete - lean mix)	0.60			
1								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of gravel)	1.00			
2								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND (Comprised of clayey cobbles with brick, concrete - Strong hydrocarbon smell noted 3.50m)				
3									3.70			
4								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey fine to coarse GRAVEL and cobbles				
5												
6									6.30			
7								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey slightly gravelly SAND (Blowing noted)				
8									8.20			
9								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey sandy gravelly SILT				

REMARKS

Hole cased 0.00-25.00m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC11**
		SHEET	Sheet 2 of 3
CO-ORDINATES		**DATE COMMENCED**	14/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	14/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey sandy gravelly SILT *(continued)*	10.60			
11								SYMMETRIX DRILLING: No recovery, observed by driller as returns of black sandy gravelly CLAY with occasional cobbles				
12												
13												
14												
15												
16									16.50			
17								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey gravelly COBBLES				
18												
19												

REMARKS

Hole cased 0.00-25.00m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 23326A

CONTRACT	NDFA Social Housing - East Wall Road	**DRILLHOLE NO**	**RC11**
		SHEET	Sheet 3 of 3
CO-ORDINATES		**DATE COMMENCED**	14/09/2021
GROUND LEVEL (mOD)		**DATE COMPLETED**	14/09/2021
CLIENT	N.D.F.A	**DRILLED BY**	IGSL
ENGINEER	R.P.S	**LOGGED BY**	D.O'Shea

RIG TYPE	GEO-405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
20								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey gravelly COBBLES *(continued)*	21.00			
21								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey GRAVEL	22.50			
22								SYMMETRIX DRILLING: No recovery, observed by driller as returns of clayey gravelly COBBLES	25.00			
23												
24												
25								End of Borehole at 25.00 m				
26												
27												
28												
29												

REMARKS

Hole cased 0.00-25.00m. Erect Covid-19 Safe Zone - 1hr.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

GROUNDWATER DETAILS

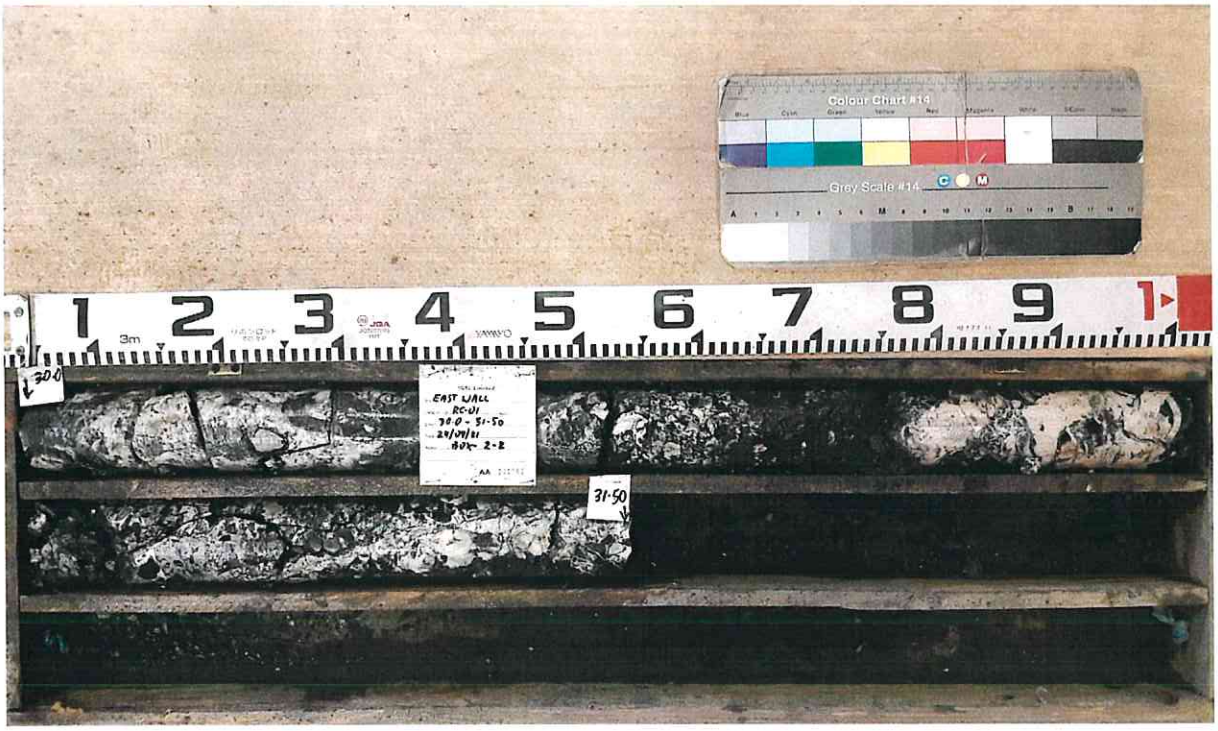
Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

RC01 - Box 1 of 2 – 26.50-30.00m

RC01 - Box 2 of 2 – 30.00-31.50m



RC06 - Box 1 of 1 – 30.00-31.50m