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Site Specific Flood Risk Assessment

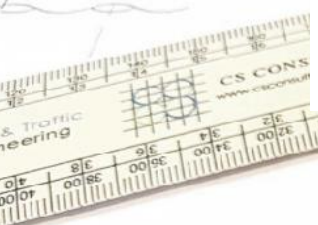
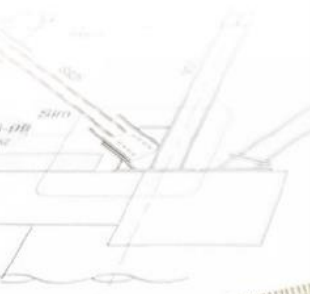
Alterations to Shoreline GA01 Lands at Baldoyle

Stapolin Growth Area 1, Baldoyle, Co. Dublin

Client: The Shoreline Partnership

Job No. R089

May 2021



SITE SPECIFIC FLOOD RISK ASSESSMENT

ALTERATIONS TO SHORELINE GA01 LANDS AT BALDOYLE STAPOLIN GROWTH AREA 1, BALDOYLE, CO. DUBLIN

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1.0 INTRODUCTION

Cronin & Sutton Consulting Engineers (CS Consulting) have been commissioned by The Shoreline Partnership to prepare a Site Specific Flood Risk Assessment to accompany a planning application for a proposed mixed residential development at Baldoyle, Dublin 13.

In preparing this report, CS Consulting has made reference to the following:

- Fingal County Council Development Plan 2017–2023;
(including Strategic Flood Risk Assessment)
- Baldoyle-Stapolin Local Area Plan
- Greater Dublin regional Code of Practice for Works;
- Office of Public Works Flood Maps;
- Department of the Environment Flooding Guidelines;
- Geological Survey of Ireland Maps;
- Local Authority Drainage Records.

The Site Specific Flood Risk Assessment has been carried out in accordance with ‘*Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009)*’ and is to be read in conjunction with the engineering drawings and documents submitted by CS Consulting and with the various additional information submitted by the other members of the design team, which forms part of the Planning Submission.

2.0 SITE LOCATION AND PROPOSED DEVELOPMENT

2.1 Site Location

The proposed development site is located at Stapolin Growth Area 1, Baldoyle, Co. Dublin, in the administrative jurisdiction of Fingal County Council. The site has a total site area of c. 9.1ha and a site development area of c. 8.89ha.

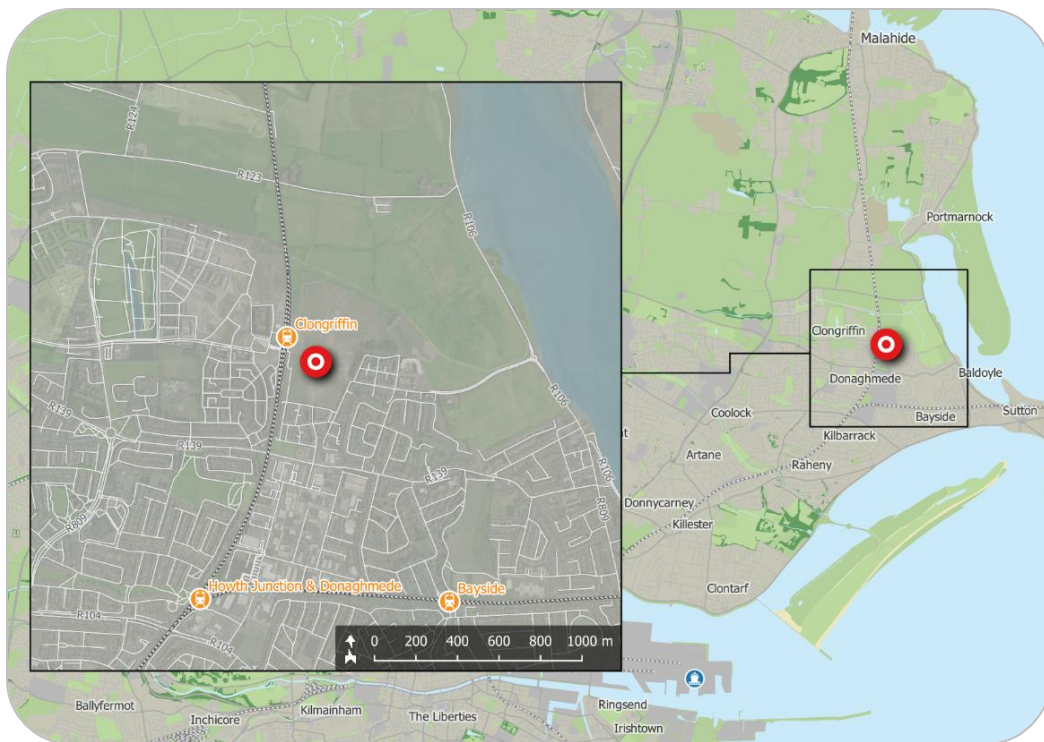


Figure 1 – Location of proposed development site
(map data & imagery: EPA, OSM Contributors, Google)

The location of the proposed development site is shown in Figure 1 above; the indicative extents of the development site, as well as relevant elements of the surrounding road network, are shown in more detail in Figure 2.

The site is bounded to the west by the Dublin-Belfast railway line, with Clongriffin DART Station located just to the north west of the applicant lands, to the east by the Red Arches and Stapolin Lawns residential

developments, to south by the Myrtle residential development. To the north, the applicant site is bounded by future development lands known as Growth Area 3 (GA3).

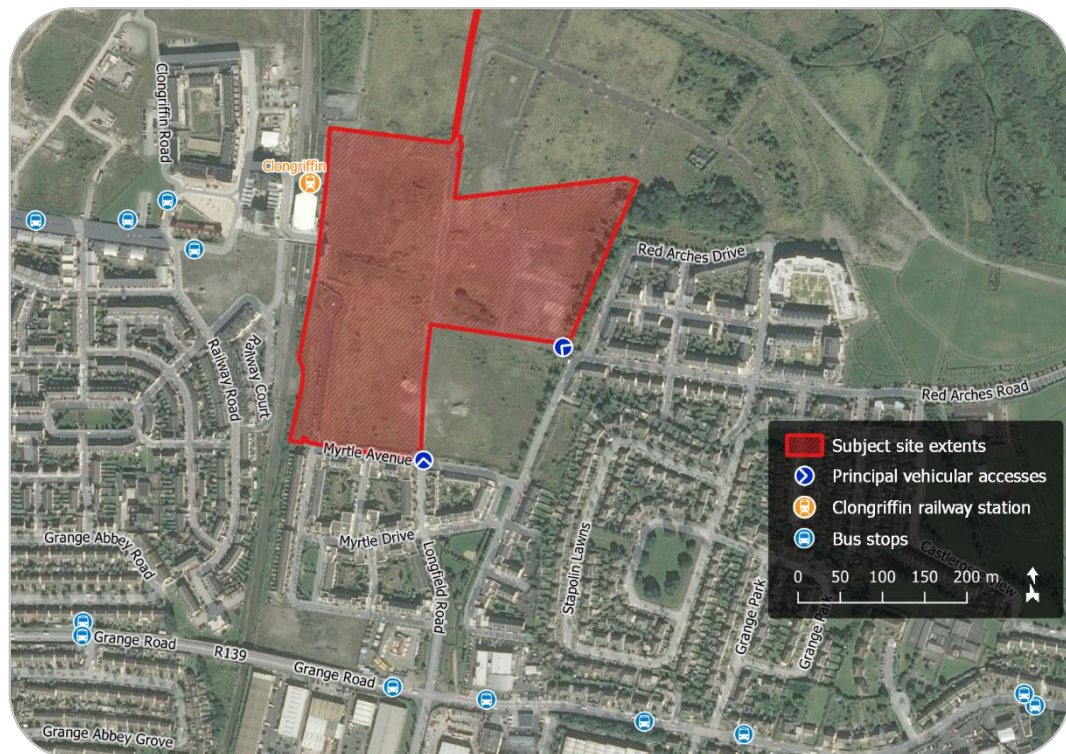


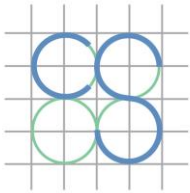
Figure 2 – Site extents and environs
(map data & imagery: NTA, OSi, OSM Contributors, Google)

2.2 Existing Land Use

The subject site is a greenfield and currently undeveloped.

2.3 Proposed Development

The development will consist of alterations to the permitted development, as permitted under FCC Reg. Ref. 16A/0412, ABP Reg. Ref. ABP-248970 (as amended by F20A/0258 and F21A/0046) of 546no. residential units (385no. apartments and 161no. houses), retail and a crèche, to the development of 882no. new residential dwellings (747no. apartments, 135no. houses),



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residential tenant amenity, retail, crèche, parking, and public realm, over a total site area of c. 9.1ha, and site development area of c. 8.89ha.

Landscaping will include extensive communal amenity areas, and significant public open space provision.

3.0 PROCESS FOR SITE SPECIFIC FLOOD RISK ASSESSMENT

The initial stage of the SSFRA comprises an assessment of available flood risk data in order to identify flood risk indicators in the Study Area. If the Site is identified to be at risk of flooding, the SSFRA shall proceed to a detailed assessment.

3.1 POTENTIAL SOURCES OF FLOOD RISK

The Study Area is subject to the three potential flood risk mechanisms described below (as an inland site, the Study Area is not subject to coastal flood risk).

Fluvial: flooding caused by overtopping of Rivers and Streams;

Tidal: flooding caused by coastal sea level rises

Pluvial: flooding caused when the intensity of rainfall events is such that the ground cannot absorb rainfall run-off effectively or urban drainage systems cannot carry the run off generated;

Groundwater: flooding caused by a rise in the level of the water table.

3.2 FLOOD RISK INDICATORS

Indicators of flood risk are identified using available data, most of which is historically derived. Typically, this data is not prescriptive in relation to flood return periods and neither predictive nor inclusive of climate change analysis.

Flood risk indicators include:

- Records available on the OPW's National Flood Risk Website. As part of the National Flood Risk Management Policy, the OPW developed the www.floodmaps.ie web-based data set, which contains



information concerning historical flood data and displays related mapped information and provides tools to search for and display information about selected flood events;

- PFRA & CFRAM mapping produced under the OPW CFRAM programme;
- Geological Survey of Ireland (GSI) mapping - Hydrogeological mapping maintained by the GSI and made available through its website www.gsi.ie;
- Ordnance Survey mapping - Ordnance Survey maps include areas which are marked as being "Liable to Floods". Generally, these areas are only shown identified indicatively and suggest historical flooding, usually recurrent. In addition, the maps indicate areas of wet or hummocky ground, bog, marsh, springs, rises and wells as well as surface water features including rivers, streams, bridges, weirs and dams. Figure 4.1 shows the historic 6" OS mapping for the Study Area;
- Topographical survey information;
- Ground Investigation information;

4.0 LEVEL OF SERVICE

There is an existing inherent risk of any flood event occurring during any given year. Typically, this likelihood of occurrence was traditionally expressed as a 1-in-100 chance of a 100 year storm event happening in any given year.

A less ambiguous expression of probability is the Annual Exceedance Probability (AEP), which may be defined as the probability of a flood event being exceeded in any given year. Therefore a 1-in-100-year event has a return period of 1% AEP flood event, similarly a 100% AEP can be expressed as a 1-in-1-year event.

The Planning System and Flood Risk Management, Guidelines for Planning Authorities set out the best practice standards for flood risk assessment in Ireland. These are summarized in Table 1.

Flooding Source	Drainage	River	Tidal/Coastal
Residential	1% AEP	0.1% AEP	0.1% AEP
Commercial	1% AEP	1% AEP	0.5% AEP
Water-compatible (docks, marinas)	-	>1% AEP	>0.5% AEP

Table 1 – Summary of Level of Service – Flooding Source

Under these guidelines a proposed development site has first to be assessed to determine the flood zone category it falls under.

It is a requirement of both Fingal County Council, Greater Dublin Strategic Drainage Study, (DCC 2005) & the Department of the Environment, community & Local Government flooding guidelines, *The Planning System and Flood Risk Management, Guidelines for Planning Authorities*, that the



predicted effects of climate change are incorporated into any proposed design. Table 2 below indicates the predicted climate change variations.

Design Category	Predicted Impact of Climate Change
Drainage	10% Increase in rainfall
Fluvial (River flows)	10% Increase in flood flow
Tidal / Coastal	Minimum Finished Floor Level 4.0 – 4.15m AOD

Table 2 - The predicted climate change variations.

The flooding guidelines categorize the risks associated with flooding into three areas, Zone A, B & C. This categorisation is indicated below.

- **Zone A** – High Probability of Flooding. Where the average probability of flooding from rivers and sea is highest (greater than 1% annually or 1 in 100 for river flooding or 0.5% annually or 1 in 200 for coastal flooding).
- **Zone B** – Moderate Probability of Flooding. Where the average probability of flooding from rivers and sea is moderate (risk between 0.1% annually or 1 in 1000 years and 1% annually or 1 in 100 years for river flooding, and between 0.1% or 1 in 1000 years and 0.5% annually or 1 in 200 for coastal flooding).
- **Zone C** – Low Probability of Flooding. Where the probability of flooding from rivers and sea is moderate (risk is less than 0.1% annually or 1 in 1000 years for both rivers and coastal flooding).

In accordance with the *Planning Systems and Flood Risk Management Guidelines for Planning Authorities*, dwellings are classified as 'highly vulnerable developments'.

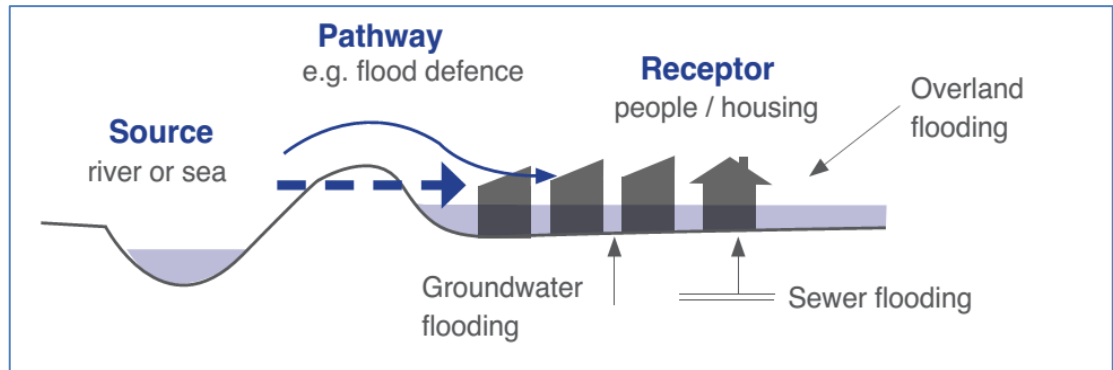


Figure 3 – Source-pathway-receptor model
(imagery: *The Planning System and Flood Risk Management Guidelines*)

The flooding guidelines have developed an ‘appropriateness’ matrix for various developments and their potential risk factor. The table indicates if further analysis is required in the form of a justification test. Table 3 below outlines the conditions that require a justification test.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly Vulnerable Development	Justification Test	Justification Test	Appropriate
Less Vulnerable Development	Justification Test	Appropriate	Appropriate
Water-compatible Development	Appropriate	Appropriate	Appropriate

Table 3 - Flood Zone Vs Justification Test Matrix

5.0 FLOOD RISKS & MITIGATION MEASURES

5.1 Fluvial Flooding

5.1.1 Flood Risk Indicators

The following were interrogated for indicators of fluvial flood risk:

- The OPW maintains the National Flood Hazard Mapping website which contains information about locations that may be at risk from flooding. The source of this information includes Local Authorities and other historic records such as newspaper articles and other documentation about reported floods. There is no evidence of any recorded flood events at the subject Site (a copy of the summary report is included in **Appendix B**).
- The River Mayne is located to the north of the subject site. The Fingal East Meath Flood Risk Assessment and Management Study (FEM FRAMS) 2017, conducted by the OPW, indicates that the subject site is deemed to be located outside of the 0.1% AEP fluvial floodplain, based on the currently available maps, see **Appendix C**. The nearest node point indicates a flood level of 3.46m AOD for the 1000-year flood level. The proposed levels of the development are in excess of 5.0m AOD and therefore the site's location is such that it is not affected by fluvial flooding from the River Mayne.

From the above referenced maps, the flood plain of the River Mayne currently only reaches the northern boundary of the development lands where the existing North Fringe Sewer is located. The existing levels around the North Fringe Sewer are in excess of 4.0m AOD. No development is to take place in and around the area of the sewer (with the exception of a new storm outfall pipe crossing the sewer) and the existing levels are to be retained, therefore there shall be no loss of existing river floodplain in the area, see figure 4

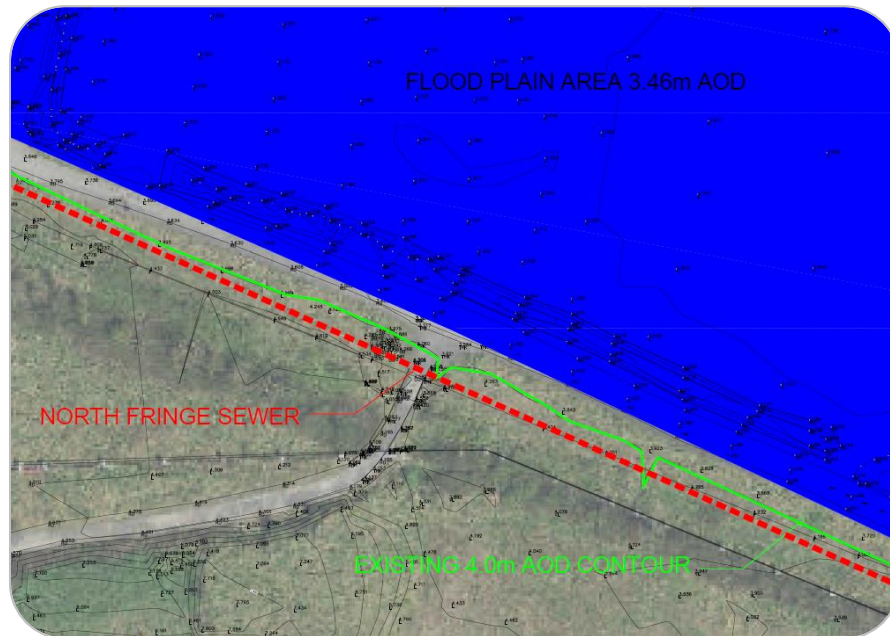


Figure 4 – Floodplain adjacent to North Fringe Sewer

- Historical Ordnance Survey OS maps for the subject site do not show any indicators of flood risk.

5.1.2 Impact of Proposed Development On Fluvial Flood Regime

The proposed development shall change rainfall run-off patterns within the subject site. This has the potential to alter the existing flow regime in watercourses to which run-off from the undeveloped site discharges. In particular, it has the potential to increase the rate of run-off during more extreme rainfall events.

Surface water drainage from the development shall be disposed of using two mechanisms:

- infiltrate run-off to the ground using SuDS measures such as Wetlands, swales, permeable paving, bio-retention areas, green roof etc;



(ii) discharge run-off to a receiving floodplain; it is proposed to utilise the existing floodplain to the north to provide flood storage for the site, and this strategy is in accordance with the requirements of the LAP (Appendix 1, section 4.3). After entering the proposed wetland, this volume shall overflow the weir/spillway into the existing floodplain resulting in a nominal increase across the 40 Ha floodplain of the order of 10mm. The greenfield runoff from the current undeveloped site would result in an approximate contribution of 5mm to the floodplain, hence the increase in depth to the floodplain as a result of the development is of the order of 15mm. This increase is negligible and would not result in any impact on development as it is not permitted within the floodplain. There are also no existing properties or structures at risk within the floodplain.

These mechanisms are consistent with best practice for the sustainable urban drainage and the design has been carried out in accordance with the Greater Dublin Strategic Drainage Study (GDSDS). Compliance with GDSDS ensures surface water run-off from the proposed development shall not affect the flood regime in the receiving watercourse. On this basis, the surface water drainage system shall not cause an increase in fluvial flood risk.

5.1.3 Results of Initial Assessment

The available data described above does not provide any indication of fluvial flood risk in the Study Area. Therefore, in accordance with 'Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009)' a detailed assessment of this flooding mechanism is not required.

5.2 Tidal Flooding

5.2.1 Flood Risk Indicators

- The OPW maintains the National Flood Hazard Mapping website which contains information about locations that may be at risk from flooding. The source of this information includes Local Authorities and other historic records such as newspaper articles and other documentation about reported floods. There is no evidence of any recorded flood events at the subject Site (a copy of the summary report is included in **Appendix B**).
- The subject site proximity to the coast indicates that the potential for on-site flooding due to tidal action needs to be considered. Recent modelling of the area as part of the FEM FRAMS 2016, indicates that the subject site is deemed to be located outside the 0.5% AEP tidal floodplain based on the currently available maps, see **Appendix D**.
- The coast of Ireland has also been modelled by the OPW as part of the Irish Coastal Protection Strategy Study – Phase 3. This study looked at the potential future flooding should climate change have a dramatic effect on sea levels. The study took a 'mid-range' level for sea level rise of 500mm above current levels and a 'high end' level of 1000mm above existing levels and then re-modelled the effects. The effects indicate that the site would be outside of the flooded area. See **Appendix E** for ICPSS Maps.
- Historical Ordnance Survey OS maps for the subject site do not show any indicators of flood risk.

The nearest node point to the development site indicates a flood level of 3.35m AOD. The proposed levels of the development are in excess of 5.0m

AOD and therefore the sites location is such that it is not affected by tidal water flooding.

5.2.2 Results of Initial Assessment

The available data described above does not indicate the risk of tidal flooding on the development site. Therefore, in accordance with 'Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009)' a detailed assessment of this flooding mechanism is not required.

5.3 **Pluvial Flooding**

5.3.1 Flood Risk Indicators

- The OPW maintains the National Flood Hazard Mapping website which contains information about locations that may be at risk from flooding. The source of this information includes Local Authorities and other historic records such as newspaper articles and other documentation about reported floods. There is no evidence of any recorded flood events at the subject Site (a copy of the summary report is included in **Appendix B**).

Pluvial flooding is flooding which has originated from overland flow resulting from high intensity rain fall. The historical and predicted flooding information does not indicate that the subject lands are at risk from pluvial flood events.

5.4 **Surface Water Drainage for The Proposed Development**

The proposed surface water strategy and drainage design for the development are outlined within the Engineering Services Report, that accompanies this planning application. In summary, road drainage is collected by bio-retention areas, swales or gullies and roofs are drained to filter drains located in rear gardens. All surface water then discharges into the new surface water sewer network which outfalls to proposed wetland

(providing water quality treatment) before over-spilling a weir/spillway to the Mayne River Floodplain, note Wetland area granted planning under F16A/0412.

As per the above referenced grant of permission, it is proposed to utilise the existing floodplain to the north to provide flood storage for the site, and this strategy is in accordance with the requirements of the LAP (Appendix 1, section 4.3). The total volume of runoff for the critical 1 in 100-year (6-hour) storm has been calculated as 3600m³. After entering the proposed wetland, this volume shall overspill the weir/spillway into the existing floodplain resulting in a nominal increase across the 40 Ha floodplain of the order of 10mm. The greenfield runoff from the current undeveloped site would result in an approximate contribution of 5mm to the floodplain, hence the increase in depth to the floodplain as a result of the development is of the order of 15mm. This increase is negligible and would not result in any impact on development as it is not permitted within the floodplain. There are also no existing properties or structures at risk within the floodplain. After the tide recedes, this water shall then flow back into the sea on its existing natural path.

The proposed surface water network discharging to the flood plain has an invert level of 3.7m AOD as it crosses into the floodplain backdrops to a level of 2.95m AOD and falls gently to an invert level of circa 2.7m AOD before discharging to the constructed wetland. The maximum flood level of the floodplain is circa 3.46m AOD, therefore an overflow pipe shall be installed at an invert of 3.5m AOD to the floodplain, meaning that in the event of the floodplain is flooded the proposed development shall continue to discharge and not surcharge the upstream network and cause flooding to the proposed residential development.

In regard to flood exceedance, storms less than the 1 in 100-year pluvial event, shall be catered for within the development's drainage network.



However, in the rare occurrence of a higher storm (or a blockage within the system) capacity in the drainage network shall be exceeded and areas with lower road levels shall begin to flood. Proposed road levels are designed to low spots within the proposed site, which are located away from the proposed development structures, any above ground flooding shall therefore gather at these locations. Overland flows generated by any potential flooding of manholes and gullies or from high intensity, short duration storms which might fail to enter the drainage system, shall be routed away from buildings and towards open spaces within the site. Drop kerbs shall be provided at road edges at low spots in order to allow overland flow to enter these areas. (Please note. the drainage network of the development is designed to include for a 10% increase in flows due to climate change)

Please refer to the CS Consulting Engineering Services Report for more details.

5.5 Results of Initial Assessment

Based on the above, there is no indication of pluvial flood risk to the subject site. Therefore, in accordance with 'Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009)' a detailed assessment of this flooding mechanism is not required.

5.6 Groundwater Flooding

5.6.1 Flood Risk Indicators

According to the Geological Survey of Ireland (GSI) interactive maps, the subject site indicates no karst features are in the area, that groundwater vulnerability is low, and the aquifer is poor. The proposed alteration to the existing site shall not increase the potential for groundwater flooding as such

the risk is deemed acceptable. See **Appendix F** for GSI mapping information for background groundwater & geology data for the subject site.

5.6.2 Results of Initial Assessment

Based on the above, there is no indication of groundwater flood risk to the subject site. Therefore, in accordance with 'Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009)' a detailed assessment of this flooding mechanism is not required.



6.0 ITEMS RAISED BY FINGAL COUNTY COUNCIL

Following the initial submission to An Bord Pleanála, Fingal Co Co issued their Opinion Statement in regards to the proposed development. Outlined below are the main items raised in *Section 8.3.8.1 Flood Risk*, of the Fingal Co Co Opinion together with an appropriate response to the points raised.

6.1.1 Flood Exceedance Route

As mentioned in *Section 5.4* above, the surface water network for the development has been designed to cater for a 100 year storm event (plus climate change), meaning no flooding shall occur on site, as all stormwater shall be catered for within the manholes, pipelines etc of the surface water network.

In the rare occurrence of a higher storm (or a blockage within the system) above a 100 year event, capacity in the drainage network shall be exceeded and excess stormwater shall emerge from manholes or gullies.

The proposed road levels across the scheme have been designed and superelevated to ensure excess floodwater is routed away from the proposed development structures, towards open spaces around the development where the excess stormwater can pond and eventually drain to ground or back into the surface water network once the storm event eases.

Please see drawing BD-CSC-ZZ-00-DR-C-0037 that indicates the flood exceed routes across the development site.

6.1.2 1000-year Flood Level against Existing Site Levels

Fingal Co Co requested an exercise be carried out to compare the existing 1000 year flood level against the existing pre-development topographical site levels. Please see drawing BD-CSC-ZZ-00-DR-C-0038 that indicates the existing topographical levels along the northern boundary of the development site superimposed onto the relevant CFRAMS flood map.

The existing contour level of 4.5m AOD is highlighted (Black) which is over 1.0m above the 1000 year flood level of 3.46m AOD (flood area hatched as blue). This drawing confirms the existing site, and its topographical levels are well in excess of the 1000 year flood levels, prior to any development taking place.

6.1.3 Flood Risk due to Tidal Lock

As mentioned previously the 1000 year flood level to the north of the development site in the tidal estuary is 3.46m AOD. Following detailed discussions with Irish Water the proposed surface water network must cross above the existing 9C sewer to the north of the development site. Following consultation with Irish Water the proposed storm pipe shall cross above the 9C sewer above 3.7m AOD (please refer to Engineering Services Report under separate cover). Once over the 9C sewer the drainage network backdrops to a level of 2.95m AOD via a manhole (Manhole S1A on drawing BD-CSC-ZZ-00-DR-C-0004) before discharging to the constructed wetland.

In the event that the wetlands and the outfall to it are submerged due to the level of flood water in the estuary, the hydraulic head of water in Manhole S1A from its upstream network shall force surface water in the network out into the estuary and shall be no affect to the scheme in regards to tidal lock.

7.0 CONCLUSION

7.1.1 Fluvial Flood Risk

There were no indicators of fluvial flood risk associated with the development site and therefore, in accordance with 'Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009)' [the 'FRM Guidelines'] detailed assessment of this flooding mechanism is not required.

7.1.2 Tidal Flood Risk

The available data described above does not indicate the risk of tidal flooding on the development site. Therefore, in accordance with 'Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009)' a detailed assessment of this flooding mechanism is not required.

7.1.3 Pluvial Flood Risk

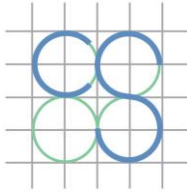
The pluvial flood-risk indicators described in Section 5.3 do not provide any indication of pluvial flooding at the subject site and therefore, in accordance with 'Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009)' [the 'FRM Guidelines'] detailed assessment of this flooding mechanism is not required.

7.1.4 Flood Risk from Ground Water

Geological Survey of Ireland (GSI) interactive maps do not provide any indication of flood risk from groundwater at the subject site and therefore, in accordance with 'Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009)' [the 'FRM Guidelines'] detailed assessment of this flooding mechanism is not required.

8.0 CONCLUSION AND RECOMMENDATIONS

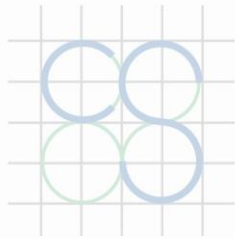
The proposed development was subject to SSFRA in accordance with OPW Flood Risk Management Guidelines. This SSFRA did not find any indicators of the proposed development being at risk from fluvial, pluvial or groundwater flooding; also, the SSFRA did not find any indicators that the proposed development shall give rise to flood risk elsewhere.



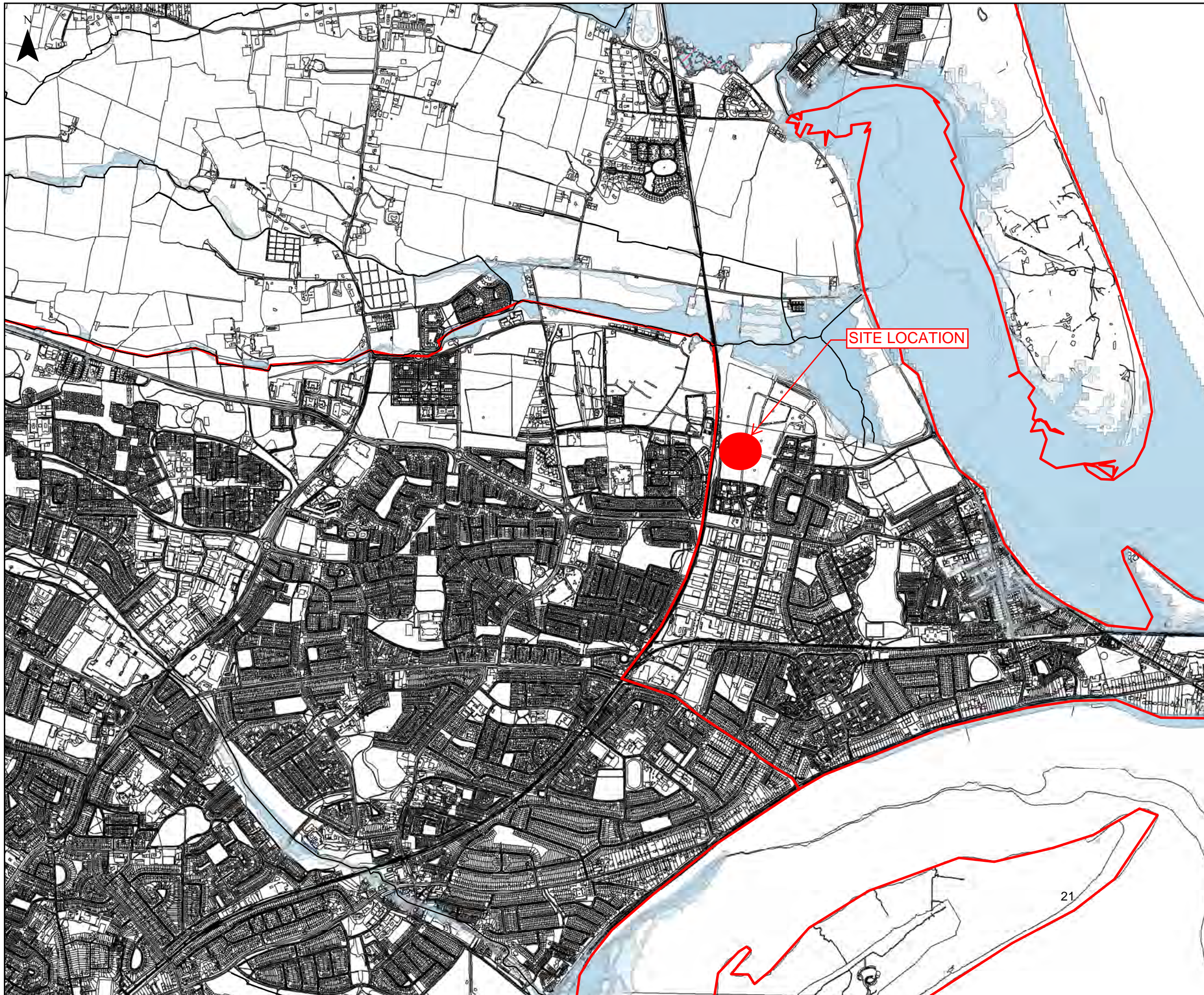
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Appendix A

Fingal County Council Flood Zone Mapping

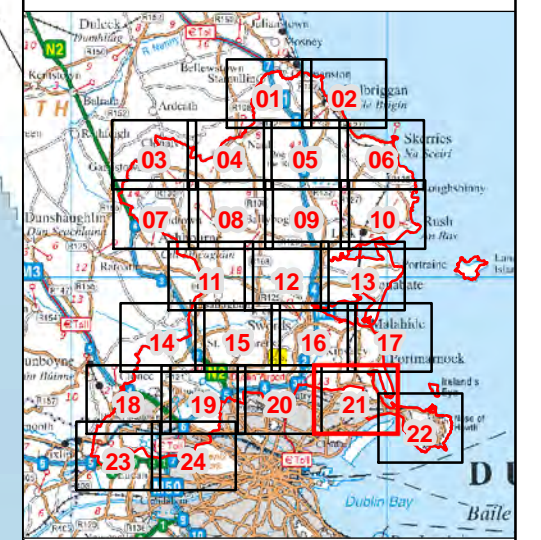


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Legend

- Watercourses
- Fingal County Boundary
- ▨ Defended Area
- Flood Zone A - 1% AEP (Fluvial) or 0.5% AEP (Coastal) Flood Extent (1 in 100 chance in any given year)
- Flood Zone B - 0.1% AEP Flood Extent (1 in 1000 chance in any given year)
- Indicative Flood Extents



Client

 Comhairle Contae Fhine Gall
 Fingal County Council

Project
Strategic Flood Risk Assessment

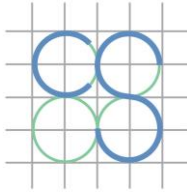
Title
Flood Zone Mapping

Figure
Map 21 of 24

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Issue Details			
Drawn By:	BT	Project No.	MDW0716
Checked By:	BC	File Ref:	MDW0716arc0001D03
Approved By:	PM	Drawing No.	Rev:
Scale:	1: 20,000 @ A3	Arc0001	A01
Date:	08/03/2017		

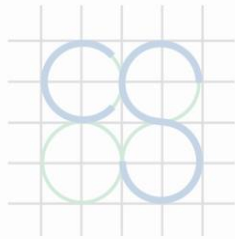
NOTE: 1. This drawing is the property of RPS Group Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
 2. All levels are referred to Ordnance Datum, Malin Head.
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Appendix B

Office of Public Works Historic Flood Report



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Summary Local Area Report

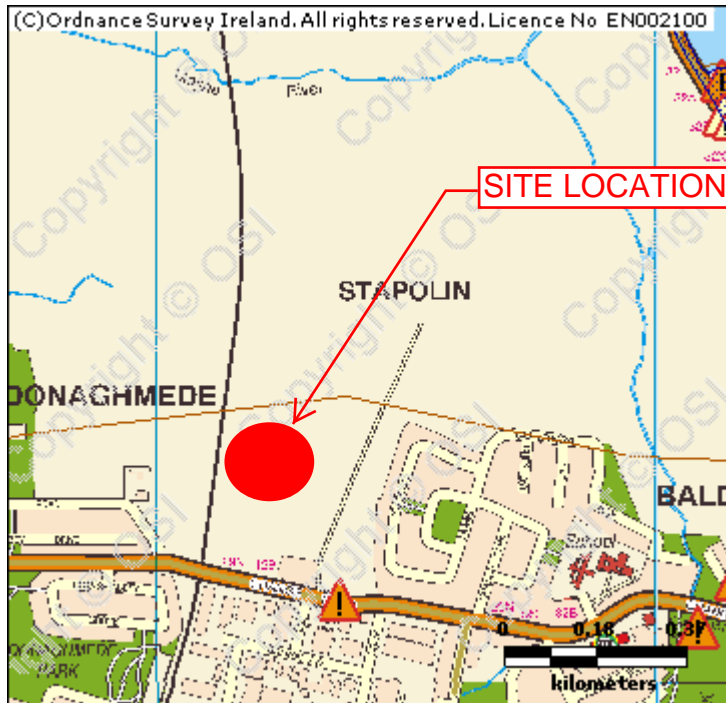
This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Dublin

NGR: O 234 406

This Flood Report has been downloaded from the Web site www.floodmaps.ie. The users should take account of the restrictions and limitations relating to the content and use of this Web site that are explained in the Disclaimer box when entering the site. It is a condition of use of the Web site that you accept the User Declaration and the Disclaimer.



Map Scale 1:15,137

Map Legend	
	Flood Points
	Multiple / Recurring Flood Points
	Areas Flooded
	Hydrometric Stations
	Rivers
	Lakes
	River Catchment Areas
	Land Commission *
	Drainage Districts *
	Benefiting Lands *

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained in the Glossary.

11 Results

	1. Flooding at Coast Road, Baldoyle, Dublin 13 on 24th Oct 2011 County: Dublin Additional Information: Reports (1) More Mapped Information	Start Date: 24/Oct/2011 Flood Quality Code:3
	2. Flooding at Brookstone Road, Baldoyle, Dublin 13 on 24th Oct 2011 County: Dublin Additional Information: Reports (1) More Mapped Information	Start Date: 24/Oct/2011 Flood Quality Code:3
	3. Dublin City Tidal Feb 2002 County: Dublin Additional Information: Photos (32) Reports (10) Press Archive (27) More Mapped Information	Start Date: 01/Feb/2002 Flood Quality Code:1
	4. Grange Stream Baldoyle Dec 1954 County: Dublin Additional Information: Reports (1) More Mapped Information	Start Date: 08/Dec/1954 Flood Quality Code:2
	5. Dublin Road Sutton Feb 2002 County: Dublin Additional Information: Reports (1) More Mapped Information	Start Date: 01/Feb/2002 Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information



6. The Grange Road Baldoyle Oct 2002

County: Dublin

Start Date: 20/Oct/2002

Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information



7. Mayne Balgriffin Park June 1993

County: Dublin

Start Date: 11/Jun/1993

Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information



8. Grange Road Donaghmede Nov 1982

County: Dublin

Start Date: 07/Nov/1982

Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information



9. Mayne River Bridge Baldoyle Recurring

County: Dublin

Start Date:

Flood Quality Code:2

Additional Information: Reports (3) More Mapped Information



10. Sluice River Strand Road Portmarnock Recurring

County: Dublin

Start Date:

Flood Quality Code:3

Additional Information: Reports (4) More Mapped Information



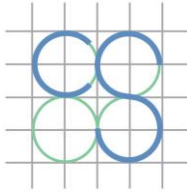
11. Baldoyle Coastal Recurring

County: Dublin

Start Date:

Flood Quality Code:3

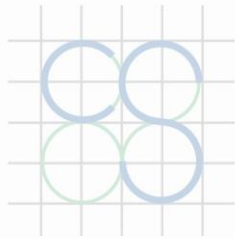
Additional Information: Reports (4) More Mapped Information



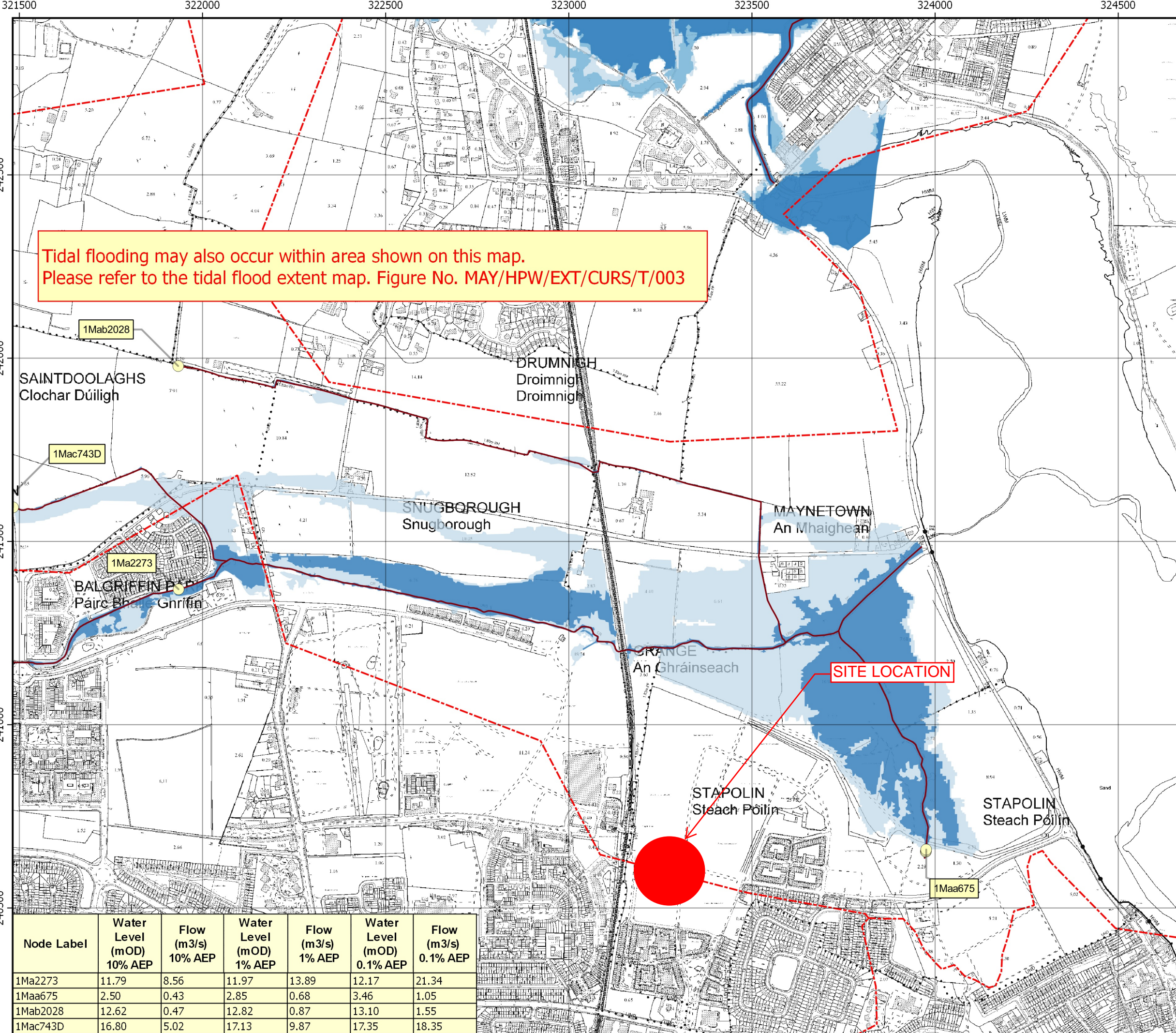
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Appendix C

Fingal East Meath Flood Risk Assessment and Management Mapping – Fluvial Flood Extent Map



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LEGEND

- AFA Boundary
- Defended Area
- Modelled River Centreline
- Node Point
- 10% AEP Fluvial Extent (High Risk)
- 1% AEP Fluvial Extent (Medium Risk)
- 0.1% AEP Fluvial Extent (Low Risk)
- Flood Defence - Embankment
- Flood Defence - Wall
- Gate
- NODE123 Node Label
- Standard of Protection of Flood Defence

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

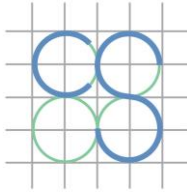
The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath

Project:
FINGAL EAST MEATH FRAM STUDY

Map:
**Mayne Model
FLUVIAL FLOOD EXTENT MAP**

Map Type:	EXTENT		
Source:	FLUVIAL		
Map Area:	HPW		
Scenario:	CURRENT		
Drawn by:	IH	Date:	Nov - 2017
Checked by:	JM	Date:	Nov - 2017
Approved by:	JM	Date:	Nov - 2017
Map No.:	MAY/HPW/EXT/CURS/003		
Revision:	F1		
Map Scale:	1:10,000	Plot Scale:	1:1 @ A3

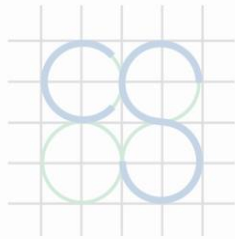
Node Label	Water Level (mOD) 10% AEP	Flow (m3/s) 10% AEP	Water Level (mOD) 1% AEP	Flow (m3/s) 1% AEP	Water Level (mOD) 0.1% AEP	Flow (m3/s) 0.1% AEP
1Ma2273	11.79	8.56	11.97	13.89	12.17	21.34
1Maa675	2.50	0.43	2.85	0.68	3.46	1.05
1Mab2028	12.62	0.47	12.82	0.87	13.10	1.55
1Mac743D	16.80	5.02	17.13	9.87	17.35	18.35



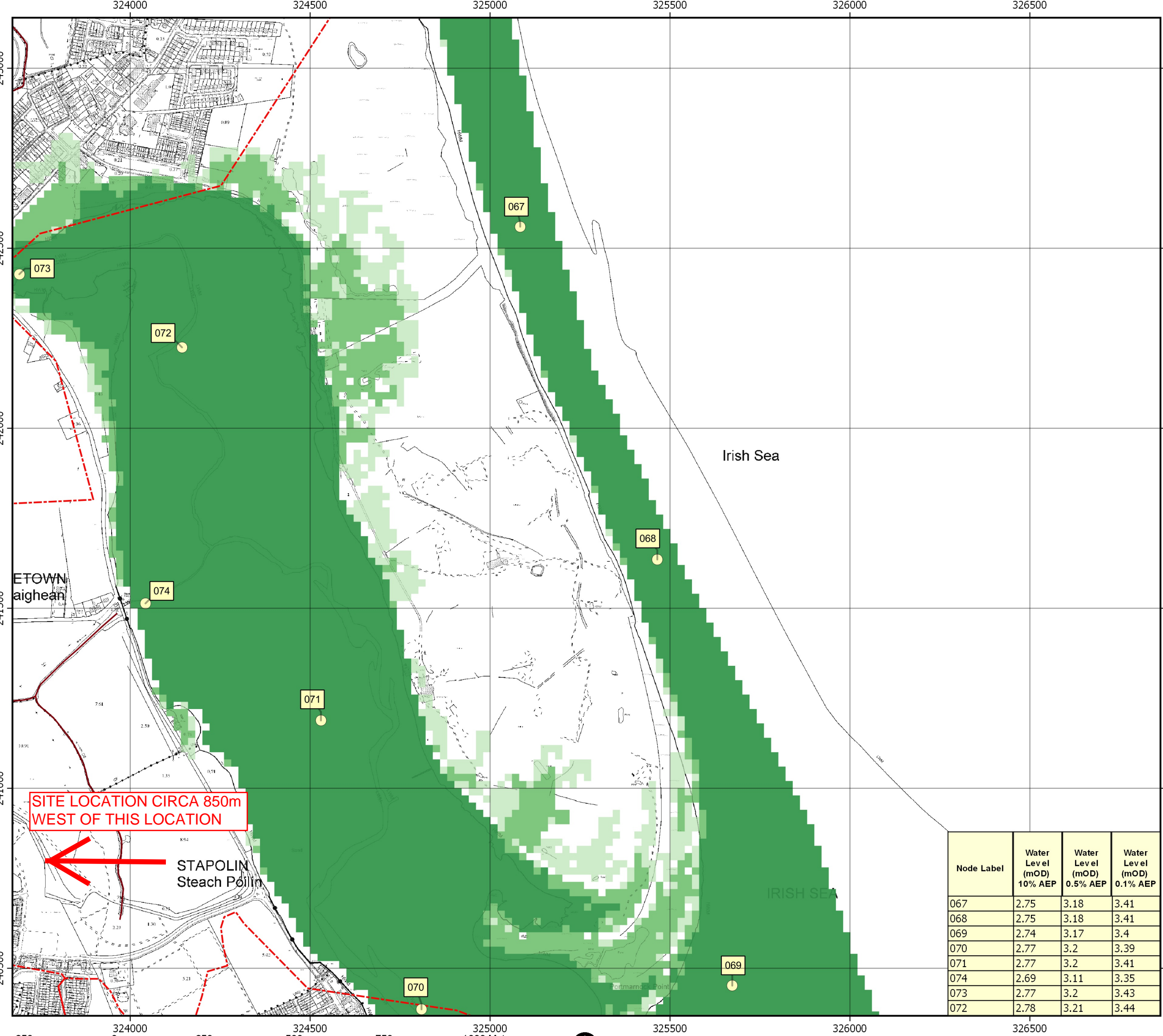
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Appendix D

Fingal East Meath Flood Risk Assessment and Management Mapping – Pluvial Flood Extent Map



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SITE LOCATION CIRCA 850m WEST OF THIS LOCATION

STAPOLIN Steach Póilín

Node Label	Water Level (mOD) 10% AEP	Water Level (mOD) 0.5% AEP	Water Level (mOD) 0.1% AEP
067	2.75	3.18	3.41
068	2.75	3.18	3.41
069	2.74	3.17	3.4
070	2.77	3.2	3.39
071	2.77	3.2	3.41
074	2.69	3.11	3.35
073	2.77	3.2	3.43
072	2.78	3.21	3.44

Location Plan:



LEGEND

- AFA Boundary
- Defended Area
- Modelled River Centreline
- Node Point
- 10% AEP Tidal Extent (High Risk)
- 0.5% AEP Tidal Extent (Medium Risk)
- 0.1% AEP Tidal Extent (Low Risk)
- Flood Defence - Embankment
- Flood Defence - Wall
- Gate
- NODE123 Node Label
- Standard of Protection of Flood Defence

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



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

Project:
FINGAL EAST MEATH FRAM STUDY

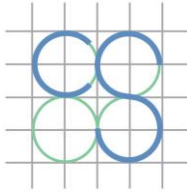
Map: **MALAHIDE TIDAL FLOOD EXTENT MAP**

Map Type:	EXTENT	
Source:	TIDAL	
Map Area:	HPW	
Scenario:	CURRENT	
Drawn by:	IH	Date: Sep - 2016
Checked by:	MC	Date: Sep - 2016
Approved by:	JM	Date: Sep - 2016

Map No.:
E09MAL_EXCCD_F0_44

Revision: F0
Map Scale: 1:10,000 Plot Scale: 1:1 @ A3

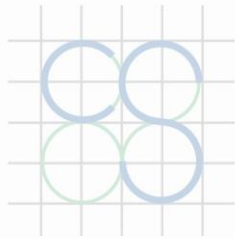




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Appendix E

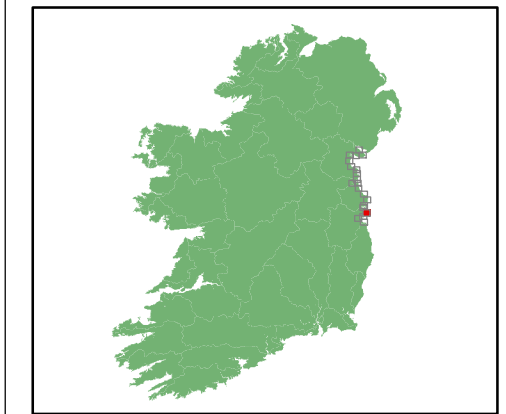
Irish Coastal Protection Strategy Study – Phase III – North East Coast Flood Extent Map



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NOTE: MORE DETAILED MAPS SHOWING COMBINED TIDAL AND FLUVIAL FLOOD HAZARD FOR THIS AREA HAVE BEEN PREPARED UNDER THE FINGAL EAST MEATH FRAM STUDY. PLEASE REFER TO WWW.FINGALEASTMEATHFRAMS.IE FOR MORE INFORMATION

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.



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

Project :
IRISH COASTAL PROTECTION STRATEGY
STUDY - PHASE III

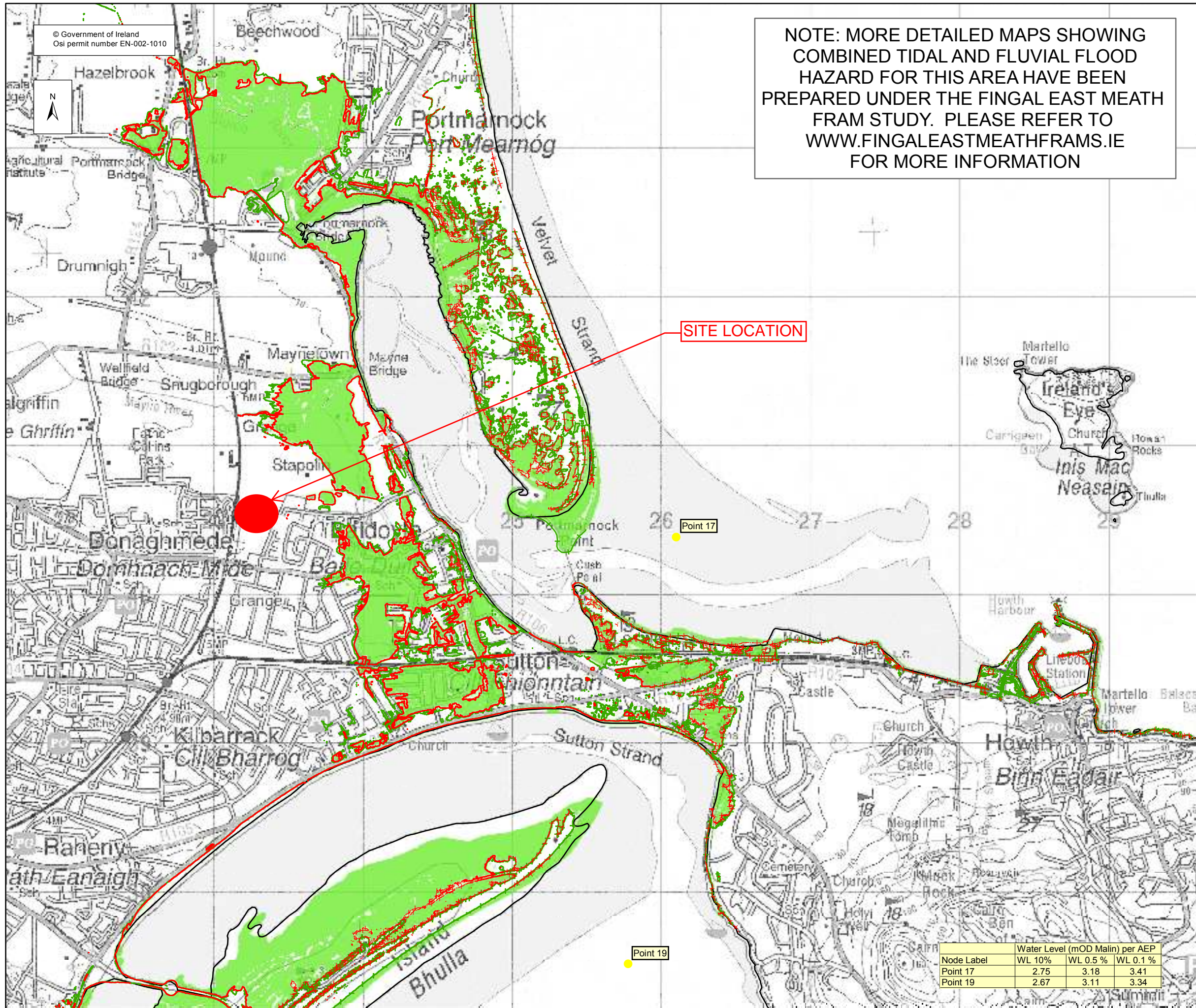
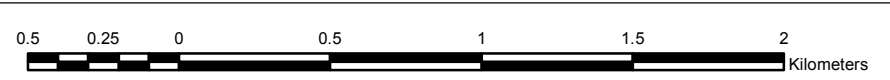
Map :
NORTH EAST COAST FLOOD EXTENT MAP

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 / 17 Revision 1

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

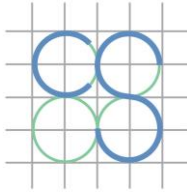
Node Label	Water Level (mOD Malin) per AEP		
	WL 10%	WL 0.5%	WL 0.1%
Point 17	2.75	3.18	3.41
Point 19	2.67	3.11	3.34



SITE LOCATION

Point 17

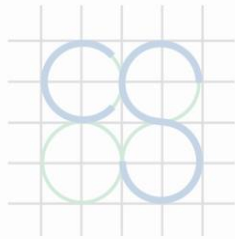
Point 19



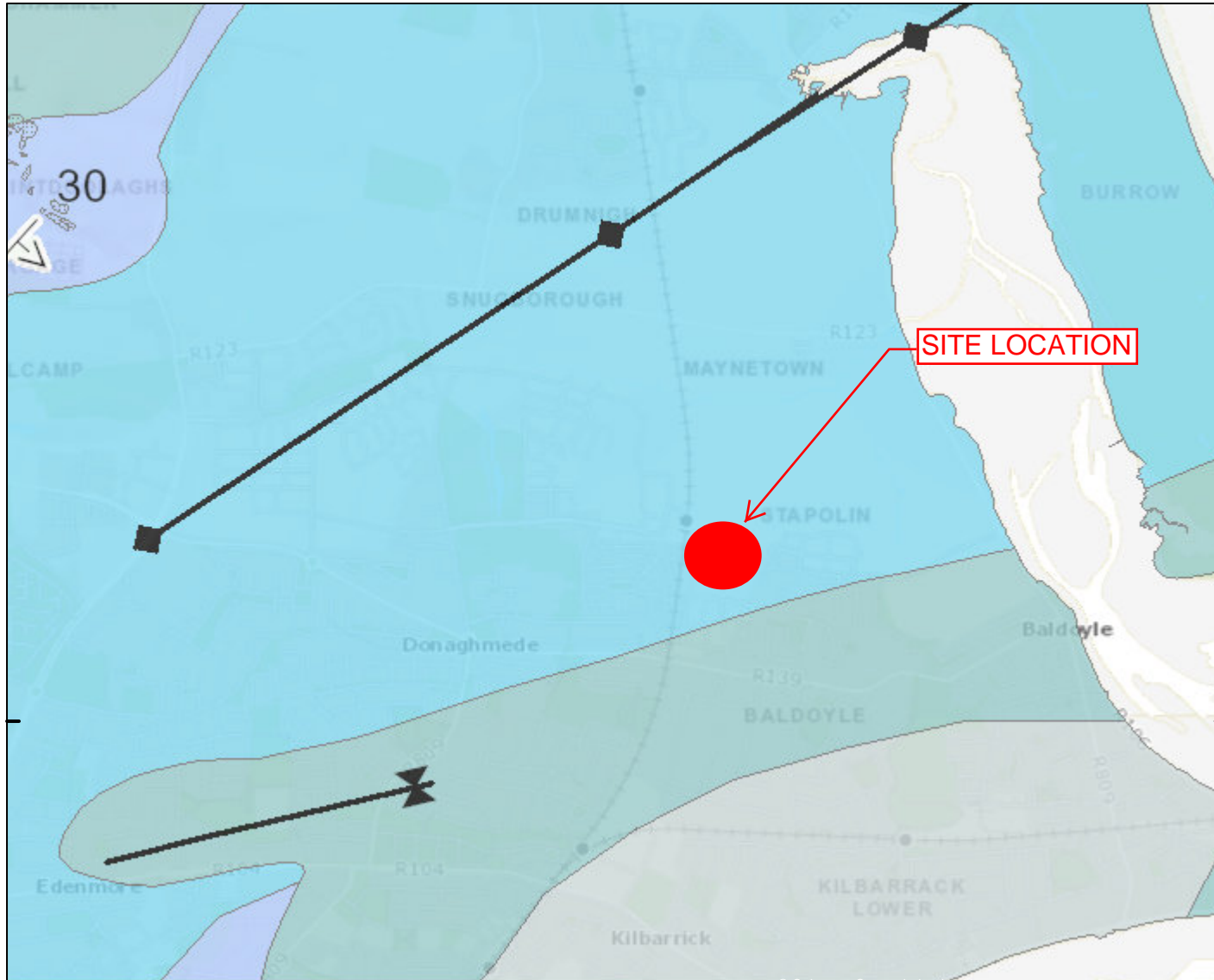
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Appendix F

Geological Survey of Ireland – Hydrogeology & Bedrock Geology Maps



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Legend

Structural Symbols 100K ITM 2018

- <all other values>
- ↑ Dip of bedding or main foliation, old GSI data
- ↔ First foliation parallel to bedding
- ↗ Foliation trend, Thorr and Rosses Granites
- ⊕ Horizontal Bedding
- ↖ Strike and dip of bedding, right way up
- ↗ Strike and dip of bedding, way up
- ↖ Strike and dip of first foliation
- ↗ Strike and dip of overturned bedding
- ↖ Strike and dip of second foliation
- ↗ Strike and dip of third foliation
- ↖ Strike and plunge of first generation fold axis
- ↗ Strike and plunge of second generation fold axis
- ↖ Strike and plunge of third generation fold axis
- ↗ Strike of vertical bedding/foliation
- ↖ Strike of vertical first foliation

- Ghost Line
- Goniatite marine band (R1-R4)
- Lithological boundary offshore
- Metadolerite sheet, mainly sills
- Paleogene/ Tertiary Dyke
- Synclinal Axis
- Synformal axis
- Tectonic Slide, barbs on hanging-wall
- Thin stratigraphical unit, diagrammatic
- Thrust, barbs on hanging-wall side
- Tuff band
- Unconformity, dots on younger side
- X-Section

Bedrock Outcrops 100 ITM 2018

Bedrock Linework 100k ITM 2018

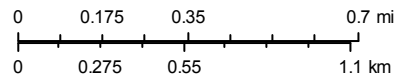
- ◆ Anticlinal Axis
- ◆ Antiformal axis
- Aquifer Boundary
- - Area
- Coal seam
- Dyke
- Fault

Scale: 1:25,000

Geological Survey Ireland

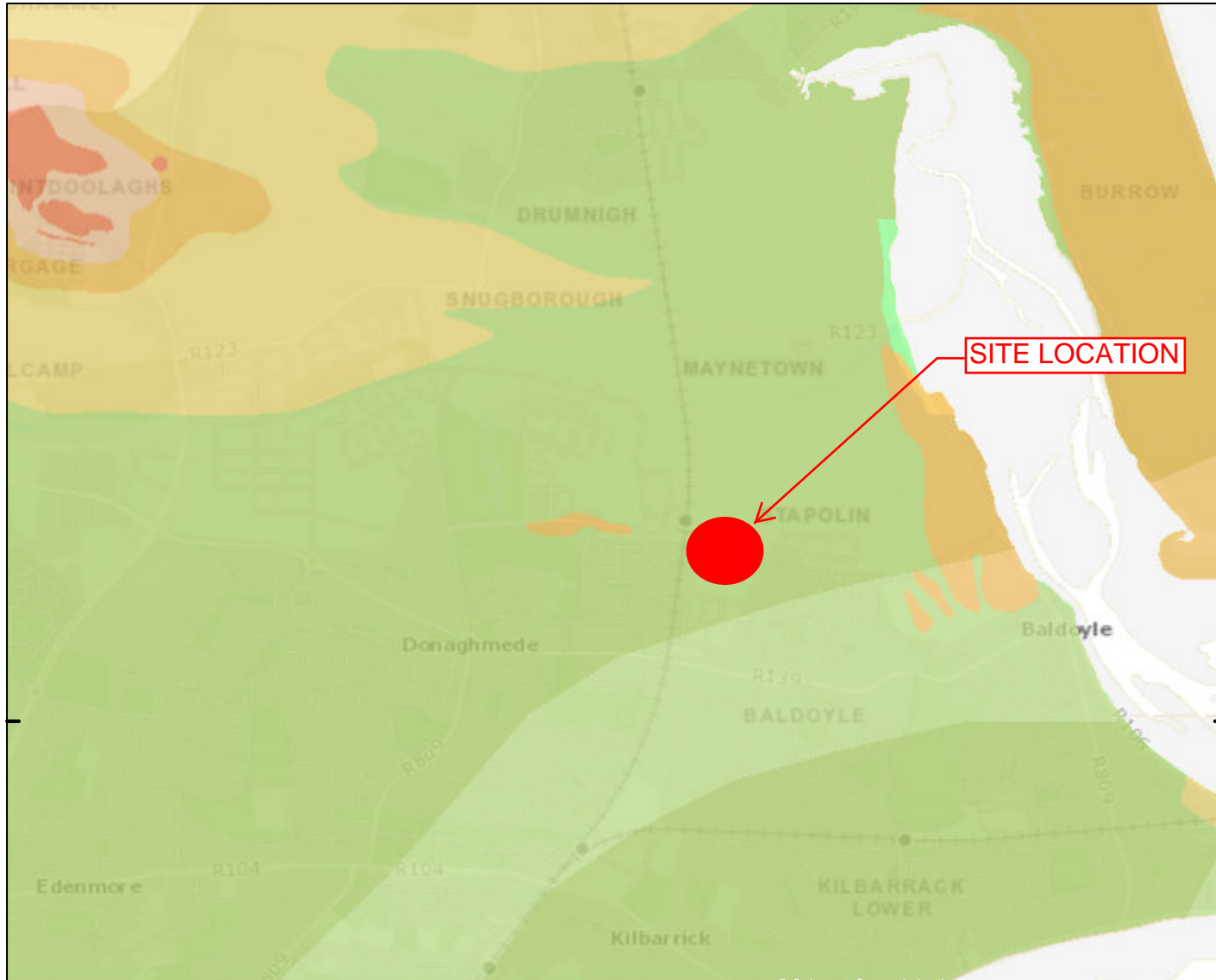
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4/8/2020, 5:09:16 PM

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Legend

- Gravel Aquifer**
- Locally important gravel aquifer
 - Regionally important gravel aquifer
 - Bedrock Aquifer
 - Faults
- Vulnerability**
- Extreme
 - High
 - Moderate
 - Low
 - Water

Bedrock Aquifer

- Rkc - Regionally Important Aquifer - Karstified (conduit)
- Rkd - Regionally Important Aquifer - Karstified (diffuse)
- RK - Regionally Important Aquifer - Karstified
- Rf - Regionally Important Aquifer - Fissured bedrock
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
- Lk - Locally Important Aquifer - Karstified
- LI - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
- PI - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive
- Lake

National Groundwater Vulnerability Ireland

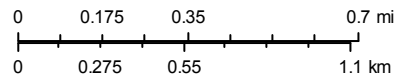
- Rock at or near Surface or Karst

Scale: 1:25,000

Geological Survey Ireland

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