

Project

**Proposed Residential Development,  
Parkside 4, Parkside, Dublin 13**

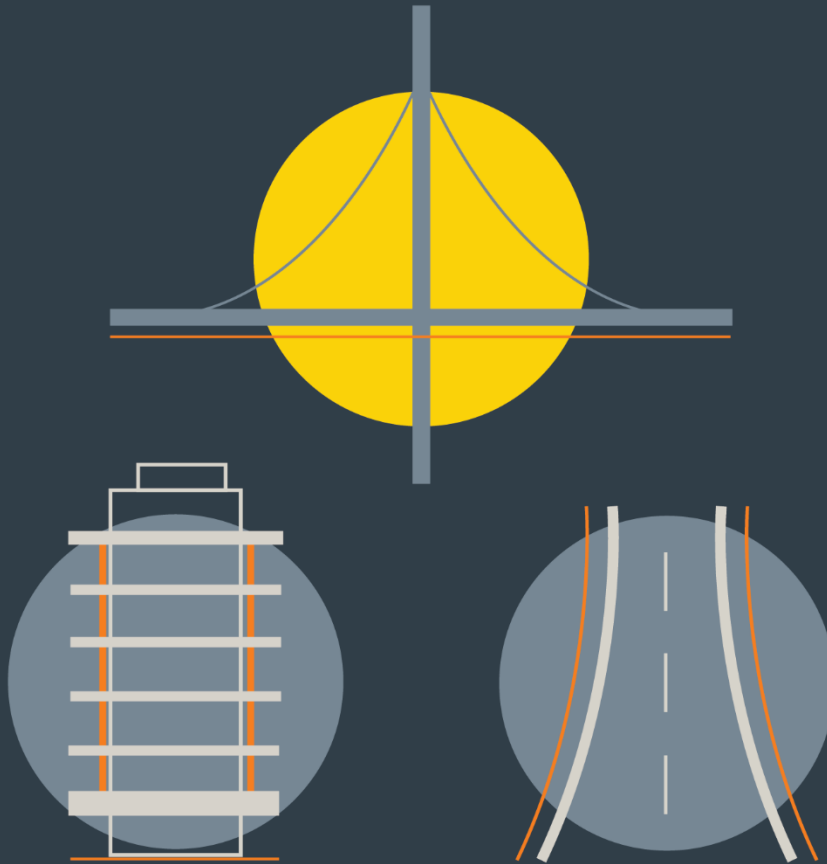
Report Title

**Site Specific Flood Risk Assessment**

Client

**Cairn Homes Properties Ltd.**

INFRASTRUCTURE



OCTOBER 2019



DBFL CONSULTING ENGINEERS

**Job Title:** Parkside 4, Parkside, Dublin 13

**Report Title:** Site Specific Flood Risk Assessment

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## 1.0 INTRODUCTION

### 1.1 Background

DBFL Consulting Engineers were commissioned by the applicant to develop a Site Specific Flood Risk Assessment (SSFRA) for a proposed residential development at Parkside, Dublin 13. The SSFRA was produced for submission to An Bord Pleanála and Dublin City Council as part of the planning application process for the Site in question.

### 1.2 Objectives

The objectives of this report are to inform the planning authority regarding flood risk for the potential development of the lands. The report will assess the site and development proposals in accordance the requirements of “*The Planning System and Flood Risk Management Guidelines for Planning Authorities*”.

The report will provide the following;

- The site’s flood zone category.
- Information to allow an informed decision of the planning application in the context of flood risk.
- Appropriate flood risk mitigation and management measures for any residual flood risk

### 1.3 Flood Risk Assessment Scope

This SSFRA relates only to the proposed development lands at Parkside and its immediate surroundings. This report uses information obtained from various sources, together with an assessment of flood risk for the existing Site and proposed development. The report follows the requirements of ‘*The Planning System & Flood Risk Management – Guidelines for Planning Authorities*’, (referred to as the *Guidelines* for the remainder of this report).

### 1.4 Approach

Chapter 2 of this report considers ‘*The Planning System & Flood Risk Management – Guidelines for Planning Authorities*’ as they relate to the proposed application.

Flood risk identification is presented in Chapter 3 and initial flood risk assessment in Chapter 4. A more detailed assessment of specific flood risk and residual risk relating to the proposed development is presented in Chapter 5.

A justification test where applicable is included in Chapter 6 and conclusions and recommendations are presented in Chapter 7.

## 1.5 Existing Site

The proposed development site is located to the north of Parkside Boulevard and is bounded to the north by the Mayne River. The Balgriffin Park Road is located to the east and parkland is located to the west of the site. The site is approximately 3.17Ha and is a former temporary school site. See figure 1.1 below for site location.



Figure 1.1 – Site Location, Parkside, Dublin 13

Topographical surveys of the area indicate that the lands generally fall in a north-easterly direction.

The Mayne River is a designated EPA water course which discharges to the sea at Belcamp approximately 2.5km east of the site. The Site is within the Eastern River Basin District, the Mayne Santry River Catchment, the Santry-Mayne-Sluice Water Management Unit and the Liffey and Dublin Bay Hydrometric Area.

## 1.6 Proposed Development

The proposed development will comprise a residential scheme of 282 residential units in 4 apartment blocks ranging in height from 3 to 7 storeys in height. Apartments will have north/south/ east/ west facing balconies/ terraces. The proposed development also includes residential amenity facilities (concierge, media centre, and gymnasium), 286 no. car parking, and 423 no. cycle parking throughout the development (in the basement and at surface level). The proposed development provides for the continuation and completion of the Mayne River Linear Park as well as public open space and communal open spaces between the buildings. The proposed development and all other development and associated works are as set out in full in the statutory planning notices.

## 2.0 Planning System & Flood Risk Management Guidelines

### 2.1 General

“The Planning System and Flood Risk Management Guidelines for Planning Authorities”, November 2009 and its Technical Appendices outline the requirements for a site specific flood risk assessment.

Residential development is classified as “highly vulnerable development” according to Table 3.1 of the Guidelines. Table 3.2 of the Guidelines indicates that the Sequential Approach mechanism requires this type of development to be in Flood zone C i.e. outside the 1000 year flood extents. (It may also be compatible within flood zone categories A and B but a Justification Test for development management is then required to determine this.)

### 2.2 Flood Risk Assessment Stages

This site specific flood risk assessment will initially use existing flood risk information to determine the flood zone category of the Site i.e. to check if the Guidelines Sequential Approach has been applied, see Figure 2.1 below for details.

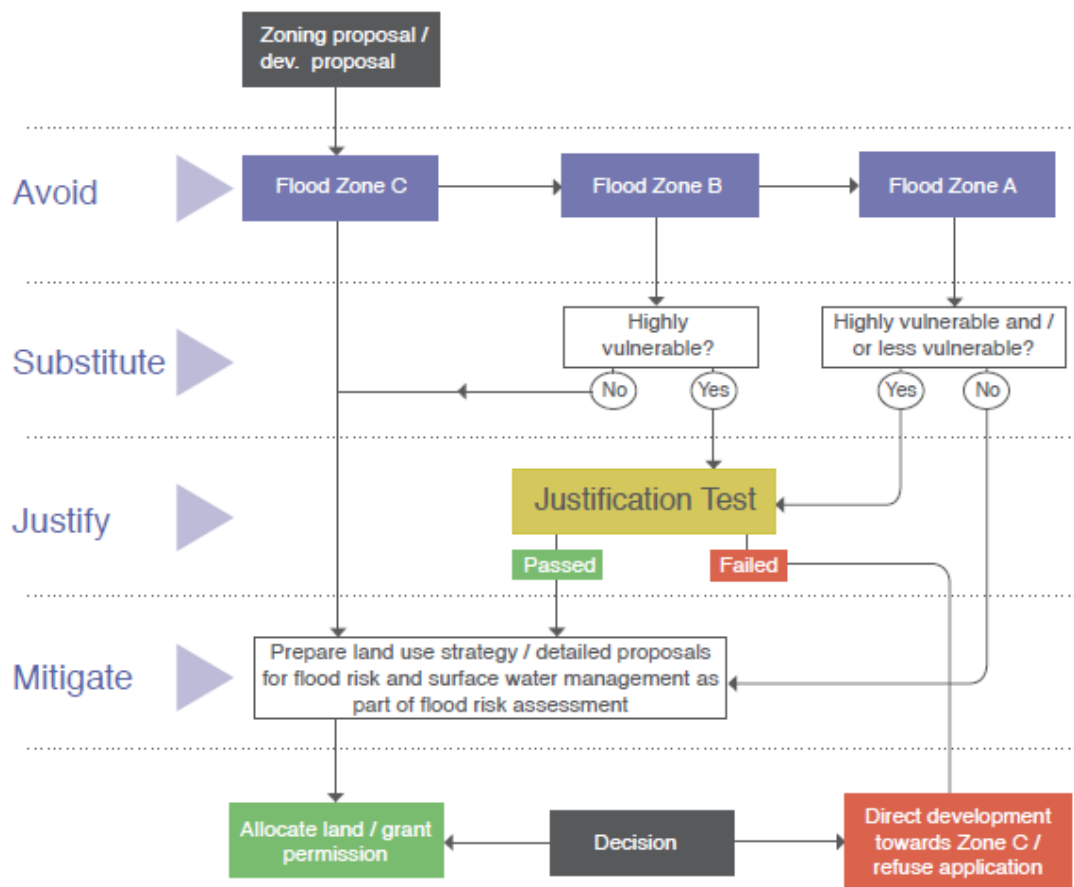


Figure 2.1 – Sequential Approach mechanism in the Planning Process

Flood risk is normally assessed by a flood risk identification stage followed by an initial flood risk assessment. A more detailed flood risk assessment stage then follows which includes an assessment of surface water management, flood risk and mitigation measures to be applied.

The following report sections outline the flood risk assessment stages for the proposed development which follow the requirements of the Guidelines' Technical Appendices.

### 3.0 Flood Risk Identification Stage

#### 3.1 General

The initial flood risk identification stage uses existing information to identify and confirm whether there may be flooding or surface water management issues for the lands that may warrant further investigation.

#### 3.2 Information Sources Consulted

Information sources consulted for the identification exercise are outlined in table 3.1 below.

Information Source	Comments
Predictive and historic flood maps, and Benefiting Lands Maps, such as those at <a href="http://www.floodmaps.ie">http://www.floodmaps.ie</a> ;	OPW <a href="http://www.floodmaps.ie">www.floodmaps.ie</a> website consulted.
Expert advice from OPW who may be able to provide reports containing the results of detailed modelling and flood-mapping studies, including critical drainage areas, and information on historic flood events, including flooding from all sources;	Historic flood hazard maps and info obtained from OPW's <a href="http://www.floodmaps.ie">floodmaps.ie</a> website
HR Wallingford Report on Balgriffin Lands dated 2003	Provided initial information on flood extents and basis for works constructed to date including reprofiled floodplain to Mayne River
Previous Strategic Flood Risk Assessments;	Fingal East Meath CFRAM Study.
Topographical maps, in particular digital elevation models produced by aerial survey or ground survey techniques;	OSI Maps consulted & Site topographic survey undertaken.
Information on flood defence condition and performance;	Assessed by FEMFRAMS.
Alluvial deposit maps of the Geological Survey of Ireland (which would allow the potential for the implementation of source control and infiltration techniques, groundwater and overland flood risk to be assessed). These maps, while not providing full coverage, can indicate areas that have flooded in the past (the source of the alluvium) and may be particularly useful at the early stages of the FRA process where no other information is available;	GSI maps consulted.
Walkover survey to assess potential sources of flooding, likely routes for flood waters and the site's key features, including flood defences; and	Walkover survey conducted.

National, regional & local spatial plans, such as the National Spatial Strategy, regional planning guidelines, development plans & local area plans provide key information on existing and potential future receptors.	Dublin City Council Development Plan and LAP consulted.
Local Information & Local Libraries	Local landowner consulted
'Liable to flood' markings on the old '6 Inch' maps;	Historic OSI maps consulted.

Table 3.1 - Information sources consulted

### 3.2.1 OPW Predictive, Historic & Benefiting Lands Maps & Flood Hazard Information

From consultation of the OPW website [www.floodmaps.ie](http://www.floodmaps.ie) there were no OPW land commission schemes or benefitting lands zones within the development site boundary; see Appendix B for website report. The report also identifies the main rivers for the area which are the Mayne River and Cuckoo Stream.

The OPW floodmaps.ie report for the area highlighted previous flood events relating to the Mayne River including one event in Balgriffin Park in June 1993; however any recorded flooding in the vicinity of the site appears to have been confined within the floodplain embankments.

### 3.2.2 Previous Strategic Flood Risk Assessments & Predictive Flood Maps

The Fingal East Meath CFRAM project produced final detailed flood risk maps and flood risk categories in 2011 for the Balgriffin area and the Mayne River, see Appendix C for extract of fluvial and tidal flood risk maps.

- The extent of the predicted 1% AEP Flood Event is shown within the northern area of the subject site within the Mayne River Floodplain. Also refer to DBFL Drawing 190011-3002 which shows the extent and levels of the 1% and 0.1% AEP event.

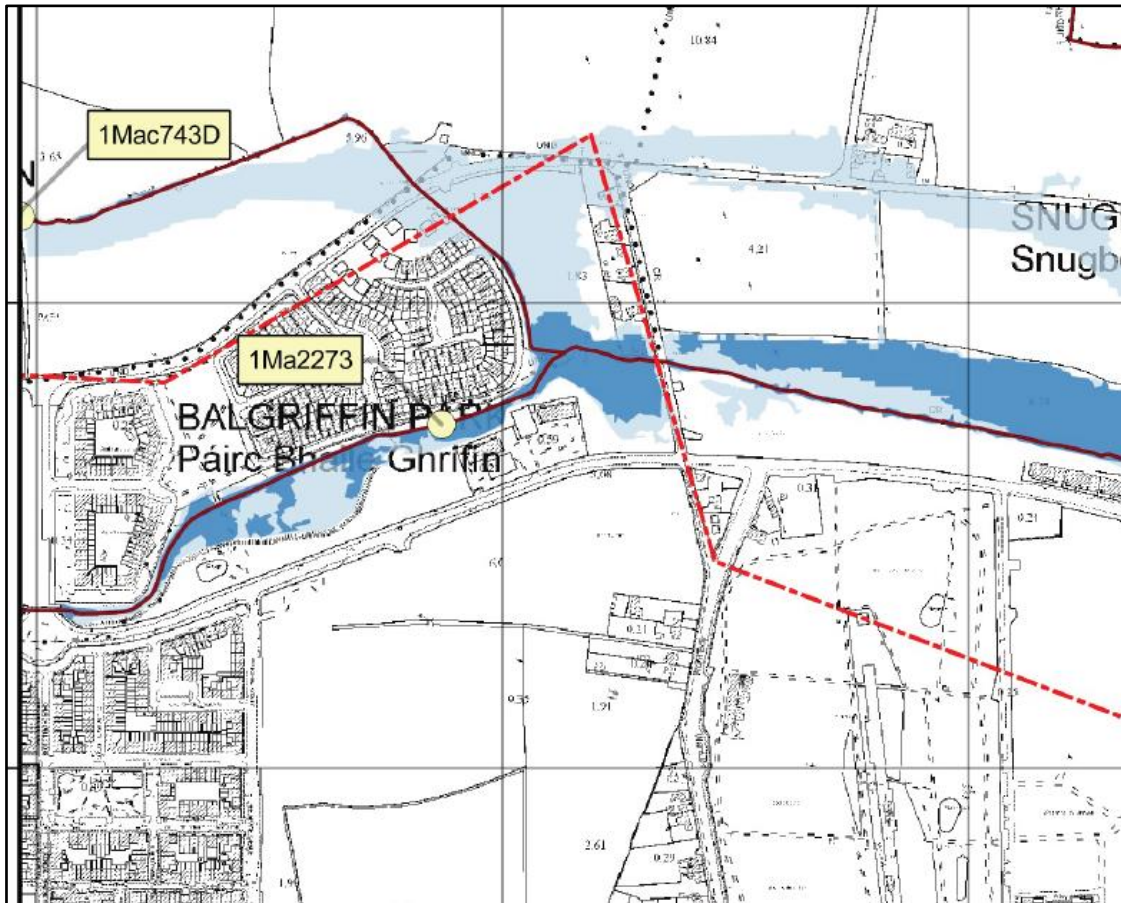


Figure 2.1 – Extract from Femframs Flood Extents Map

### 3.2.3 Tidal Flood Maps

The OPW undertook an Irish Coastal Protection Strategy Study (ICPSS) which produced coastal/tidal flood extents maps for the Irish coastline for a 0.5%AEP tidal flood level, see Appendix D. This map indicates that the Site is outside the extents of the coastal/tidal flood zone which does not extend beyond the Dublin to Belfast railway line.

### 3.2.4 Other Sources

Other information sources were consulted to determine if there was any additional flood risk to the LAP lands, these included;

- Topographical surveys of the area – floodplain embankments and associated floodplain located in northern area of subject site.
- Flood defences Information – the floodplain embankments adjacent to the Mayne River would appear to confine flooding for up to the 1000 year storm event.

- Soil data from EPA and GSI – alluvium indicated along the Mayne River Route but not within the development lands which are mainly tills/podzolics.
- Groundwater information from GSI – no karst features or gravels in area. Area is only a locally important aquifer with Bedrock which is Moderately Productive only in Local Zones. Bedrock is approximately 10m below ground level.
- Walkover survey – floodplain embankment observed in northern area of subject site.
- Development Plan & Local Area plan – land are zoned for residential development.
- Existing Local Authority Drainage Records – existing 1350mm diameter North Fringe Sewer and 225mm diameter surface water sewers along Parkside Boulevard to the south of the site. Existing 450mm surface water sewer outfall to north of development
- Local Information & Local Authority Consultation – no evidence of flood risk outside existing floodplain.
- Historic Maps – no evidence of flooding or marsh areas within the Site.

Review of the 'other sources' of information noted above indicate a level of flood risk consistent with that identified in the FEMFRAMS Study i.e. areas along the site's northern extents (Mayne River Floodplain ) are subject to flood risk during the predicted 1% AEP and 0.1% AEP storm events

### **3.3 Source-Pathway-Receptor Model**

A Source-Pathway-Receptor model was produced to summarize the possible sources of floodwater, the people and assets (receptors) that could be affected by potential flooding (with specific reference to the proposals) and the pathways by which flood water for a 0.1%AEP (Annual Exceedance Probability) and 1% AEP storms could reach the receptors, see table 3.1. It provides the probability and magnitude of the sources, the performance and response of pathways and the consequences to the receptors in the context of the LAP development proposals. These sources, pathways and receptors will be assessed further by the initial flood risk assessment stage.



Source	Pathway	Receptor	Likelihood	Consequence	Risk
Tidal	Tidal flooding from coast, 2.5km away, via Mayne River.	Future development	Low	Medium	Low
Fluvial	Overbank from Mayne River	The proposed development.	Medium	Medium	Medium
Surface Water Drainage (Pluvial)	Flooding from development's surcharging drainage systems	The proposed development.	Possible	Medium	Moderate
Groundwater flooding	Rising GWL on the site	The proposed development.	Low	Medium	Low
Human or Mechanical Error (Pluvial)	New drainage network blocks	Areas of development draining to the surface water network	Possible	Medium	Moderate

Table 3.1 - Source-pathway-receptor analysis

## 4.0 Initial Flood Risk Assessment Stage

Flood risks identified during Stage 1 – Flood Risk Identification, are outlined in Table 3.2 (Source Pathway Receptor Analysis) and noted below. These risks are assessed further in this section of the SSFRA.

- Medium risk of fluvial flooding from the Mayne River;
- Medium risk of pluvial flooding (surface water and human / mechanical error)

### 4.1 Initial Fluvial Flood Risk Assessment

The FEMFRAM flood extents mapping identifies the location of the predicated 1% AEP and 0.1% AEP fluvial flood events associated with the River Mayne (refer to Appendix C). As noted in Section 3.2.3 of this report, the northern area of the subject site is subject to flood risk during the predicted 1% AEP and 0.1% AEP storm events.

DBFL have mapped the flood extents of the Mayne River on the detailed topographical survey for the subject site. The flood water level was provided by the FEMFRAMS project team. See attached DBFL drawing 190011-3002 for existing flood zone extents.

The extent of the predicted 0.1% AEP Flood Event is shown marginally encroaching on the proposed residential development. In order to allow a regularised development to proceed within this minor encroachment, it is proposed to modify the floodplain and provide floodplain compensation on a “level for level” basis as shown on DBFL Drawing No. 190011-3002.

DBFL have calculated the floodplain volume before and after the proposed floodplain modification using Civil 3D software and an excess floodplain volume has been provided as shown on DBFL Drawing No. 190011-3002. The proposed development is outside the extents of the modified floodplain. Detailed cross sections of the floodplain modification at 10m chainages are provided on drawings 190011-3003 and 3004.

The FEMFRAMS 1000 year flood event data is reproduced on DBFL Drawing No. 190011-3002 which shows the 100 year and 1000 year flood level at approximately 20m chainages along the stream alignment. The following table outlines the flood levels adjacent to each apartment block and the corresponding proposed finished floor levels and freeboard.

Block No.	Proposed Building FFL (m)	FEFRAM Section adjacent to Block (DRG 190011-3002)	1% AEP Water Level (m)	0.1% AEP Water Level (m)	Freeboard from 1% AEP Water Level (m)	Freeboard from 0.1% AEP Water Level (m)
A	13.75	1Ma 2306In	12.25	12.43	1.5	1.32
B	13.75	1Ma 2254In	11.79	11.97	1.96	1.78
C	13.3	1Ma 2200In	11.33	11.50	1.97	1.8
D	13.3	1Ma 2164In	11.07	11.24	2.23	2.06

- Min. freeboard from 1% AEP required by GSDSDS – 500mm.
- We note that there is no recommended free board above the 0.1% AEP water level outlined in / required by the OPW's Flood Risk Management Guidelines or the GSDSDS. Notwithstanding this the proposed FFL's are elevated between 1.32m and 2.06m above 0.1% AEP Water Levels.
- The access ramp to the basement, located between Block A and Block B (13.44m AOD), and basement vents (13.3m AOD) are also set above the corresponding FEMFRAMS 1000 year flood levels therefore flood waters will not impact the proposed basement. The basement structure will be adequately waterproofed to withstand infiltration of groundwater.

#### 4.2 Consultation with Dublin City Council

DBFL met with Dublin City Council Flooding Department on the 30th of July 2019 to discuss the proposed development and floodplain modification. The overall surface water drainage and flooding strategy for the development was agreed in principle with Dublin City Council. It was agreed given the minor nature of the floodplain re-profiling, relatively small volumes and the excess compensation storage provided, a hydraulic flood model of the floodplain is not required.

#### 4.3 Initial Pluvial Flood Risk Assessment

The Source-Pathway-Receptor model identified that there could be potential for pluvial flood risk within the development site for storms exceeding the design capacity of the surface water drainage network. Flood exceedance has potential to cause local flooding unless the resulting overland flood flows are designed in accordance with the

regulations (i.e. GDSDS) and that site levels are designed to take account of resulting storm-water run-off.

The Source-Pathway-Receptor model also identified that the proper operation and maintenance of the drainage system is necessary to reduce the risk of human or mechanical error causing pluvial flood risk from blockages etc.

#### **4.4 Flood Zone Category**

On completion of Stage 2 – Initial Flood Risk Assessment, the proposed buildings will be located in Flood Zone C following the slight modification of the floodplain. As noted previously it is proposed to mitigate any loss of flood plain by “level for level” compensation measures.

The green open space to the north east of the proposed buildings is located within Flood Zone A and B but no development is proposed in this area. (0.1% AEP event)

The proposed development is located in Flood Zone C as defined by the requirements of “The Planning System and Flood Risk Management, Guidelines for Planning Authorities” and its Technical Appendices.

On completion of Stage 2 – Initial Flood Risk Assessment and in accordance with the Sequential Approach outlined in Section 2.2 of this report, a Justification Test is required as some of the proposed building is located in the pre-development Flood Zone A and B. It should be noted that following modification of the flood zone, no development will be located in Flood Zone A or B.

A Justification Test for the Proposed Development is outlined in Section 6.0 of this report.

## 5.0 Detailed Flood Risk Assessment Stage

### 5.1 General

The Stage 3 – Detailed Flood Risk Assessment considers pluvial flood risk in relation to the following;

- Proposed Surface Water Management Measures and SuDS
- Flood Exceedance.
- Impact on Adjacent Areas.
- Climate Change.
- Access and Egress for Emergency Services during Flood Events.
- Residual Risks.
- Effectiveness of Flood Mitigation Measures.

### 5.2 Surface Water Management and SuDs

The Mayne River is located along the site's northern boundary and is expected to provide a suitable surface water discharge point for the proposed development (refer to DBFL Drawing No. 190011-3000).

Proposed surface water drainage system has been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS). Surface water discharge rates from the proposed surface water drainage network will be controlled by a Hydrobrake type flow control device and associated underground attenuation tank. The drainage system includes significant 'in curtilage' SuDS measures as follows:

- Discharged flows are reduced to less than existing green-field run-off rates as 'betterment' to GDSDS requirements. (i.e. 2 l/s/ha).
- Attenuation storage is provided in accordance with the GDSDS.
- Proposed attenuation systems will also incorporate a "smart manhole" (with internal weir) to mitigate risk of flood waters from Mayne River entering attenuation tank.
- Significant green roof area proposed.
- Landscaped podiums and terraces to reduce runoff.
- Open bottom geocellular attenuation system.

The Mayne River has a catchment area of approximately 104 Km<sup>2</sup> (10400 ha) while the proposed development catchment area is 1.05 ha therefore a 100 year flood event in the Mayne River and the development's drainage system will not occur simultaneously. The time of concentration for the Mayne River adjacent to the site will be significantly longer than the development site's drainage network therefore the attenuation volume will have discharged to the Mayne River before the river is in flood adjacent to the site.

As part of this application, the applicant has commissioned JBA Consulting to undertake a third-party surface water audit on the proposed surface water drainage and attenuation strategy for the development. The final audit report concludes that the surface water drainage design for the proposed development is acceptable and meets the requirements of the GSDSDS, a copy of the report is included in the Infrastructure Design Report.

### **5.3 Flood Exceedance**

For storms greater than the 1%AEP pluvial event, the development's drainage network design will be exceeded and run-off may appear above ground to the east of block D. Overland flow will then be directed towards the Mayne River to the North East. See overland flow layout in Appendix E.

### **5.4 Impact on Adjacent Areas**

Adjacent areas will not be impacted by the development up to the 1% AEP flood event.

Storms greater than the 1% AEP (exceeding the design capacity of the site's drainage system) may result in overland flow being directed towards open space areas located between the proposed building and the Mayne River. Note, these open space areas are all contained within the subject development site.

### **5.5 Climate Change**

The potential impact of climate change has been allowed for as follows;

- Pluvial flood risk – drainage design allows for a 20% increase in rainfall intensities, as directed by Dublin City Council.
- Provision of min. freeboard (500mm) from 1% AEP as required by GSDSDS (mitigation against impact of climate change).

### **5.6 Access and Egress for Emergency Services During Flood Events**

The development has been designed in accordance with the GSDSDS.

The proposed access and egress arrangements for the development is from Parkside Boulevard. Based on relevant fluvial flood levels from the FEM FRAMS for a 0.1% AEP flood event the development can be safely accessed and exited through the proposed

vehicular entrance from Parkside Boulevard, (ie River Mayne flood levels are below Parkside Boulevard).

## 5.7 Residual Risks

Remaining residual flood risks, following the detailed assessment include the following;

1. Pluvial flooding from the private drainage system related to a pipe blockage or from flood exceedance.
2. Given the critical 100 year and 1000 year storm flood levels in the Mayne River adjacent to the site it is considered prudent that the attenuation storage requires additional protection against any risk of surcharging / backflow from Mayne River flood levels.

## 5.8 Mitigation Measures

Proposed mitigation measures to address residual flood risks are summarized below;

- M1. Proposed drainage system to be maintained on a regular basis to reduce the risk of a blockage. Management company will be required to provide a yearly inspection report to Dublin City Council including maintenance details of the proposed hydrobrake, smart manhole, interceptor and attenuation system.
- M2. The development's attenuation storage will be protected from surcharging from the Mayne River by a 'smart' manhole arrangement which will ensure that a positive head differential will be generated between the proposed attenuation system and the River Mayne.

### 5.8.1 Effectiveness of Mitigation Measures

It is considered that the flood risk mitigation measures if implemented are sufficient to provide a suitable level of protection to the proposed development. A well maintained drainage system will ensure that it remains effective and in good working order should a large pluvial storm occur.

The inclusion of the 'smart' manhole arrangement will negate the risk of backflow during river flood events and ensure the site always has a positive outflow to the River Mayne.

Should extreme pluvial flooding occur that is in excess of the development's attenuation capacity (i.e. greater than 1%AEP), then overland flow routes directed towards open space areas adjacent to the Mayne River are provided in order to protect the proposed development.

## 6.0 JUSTIFICATION TEST

As noted above in Section 4.3, a Justification Test is required as some of the proposed building is located in the pre-development Flood Zone A and B. It should be noted that following modification of the flood zone, no development will be located in Flood Zone A or B.

This Justification Test is outlined below (Table 6.1) and has been carried out in accordance with Section 5.15 of the OPW's Guidelines for Planning Authorities (see extract below).

### Box 5.1 Justification Test for development management (to be submitted by the applicant)

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
  - (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
  - (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
  - (iii) The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
  - (iv) The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Refer to section 5.28 in relation to minor and infill developments.



Justification Test as per Section 5.15 of the OPW's Guidelines for Planning Authorities		
1.	The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.	As per Dublin City Council's development plan, the site has been zoned Z14, to seek the social, economic and physical development and/or rejuvenation of an area with mixed use, of which residential and "Z6" would be the predominant uses.
2(i)	The development has been subject to an appropriate FRA that demonstrates:  <i>The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;</i>	It is proposed to mitigate the minor encroachment into Flood Zone A by "level for level" compensation measures, refer to DBFL drawing, 190011-3002, 3003 & 3004. An additional 430M <sup>3</sup> of flood storage is provided over and above the volume removed. Also refer to <b>Section 4.1 Initial Fluvial Flood Risk Assessment.</b>  A number of SuDS methodologies are also being proposed which include attenuation of surface water runoff to greenfield runoff rates (2.0 l/sec/ha). Also refer to <b>Section 5.2 Surface Water Management and SuDS.</b>
2(ii)	The development has been subject to an appropriate FRA that demonstrates:  <i>The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;</i>	It is proposed to mitigate the minor encroachment into Flood Zone A by "level for level" compensation measures, refer to DBFL drawing 190011-3002.  The GDSDS requires a minimum freeboard of 500mm above the 1% AEP flood level (in order to allow for future climate change).  Basement ramp access levels, basement vent levels and building finished floor levels within the development are elevated between 1.32m to 2.06m above 0.1% AEP flood levels.  Also refer to <b>Section 4.1 Initial Fluvial Flood Risk Assessment.</b>

		<p>Risk of flooding to people, property and the environment is therefore considered to be very low.</p> <p>This level of protection also ensures that future capital expenditure will not be required to alleviate future flooding of buildings within the development</p>
2(iii)	<p>The development has been subject to an appropriate FRA that demonstrates:</p> <p><i>The development proposed includes measures to ensure that residual risks to the area and / or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency access;</i></p>	<p>Residual Risk are identified in <b>Section 5.7</b> of this report (pluvial flooding due to pipe blockage and pluvial flooding from the development's drainage system for storms in excess of the 1% AEP).</p> <p>Proposed Mitigation Measures to address same are outlined in <b>Section 5.8</b> of this report (maintenance of drainage system, smart manhole arrangement and provision of overland flow routes towards open spaces).</p> <p>All proposed site access points are located in Flood Zone C and will provide suitable access / egress for Emergency Services during flood events (also refer to <b>Section 5.6</b> of this Report).</p>
2(iv)	<p>The development has been subject to an appropriate FRA that demonstrates:</p> <p>The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.</p>	<p>Urban Design is addressed in detail in other documents submitted as part of this application.</p> <p>Proposed surface water infrastructure, SuDS Methodologies and flood mitigation measures have been integrated with the overall site layout and as such are considered compatible with the achievement of wider planning objectives in relation to development of good urban design</p>

**Table 6.1 Justification Test**

On completion of the Justification Test outlined above, the proposed development is considered appropriate as each of the criteria from Section 5.15 (Box.5.1) of the OPW's Guidelines for Planning Authorities have been demonstrated.

## 7.0 Conclusions

The Site Specific Flood Risk Assessment for the proposed development at Parkside, Dublin 13 was undertaken in accordance with the requirements of the Planning System and Flood Risk Management Guidelines for Planning Authorities” and its Technical Appendices.

The majority of the development is located in the pre-development Flood Zone C as defined by the requirements of “The Planning System and Flood Risk Management, Guidelines for Planning Authorities” and its Technical Appendices. Following modification of the flood plain as described in Section 4.1 above, no development will be located in Flood Zone A or B.

Following the Flood Risk Assessment Stage 2 (Initial Flood Risk Assessment), it was determined that a Justification Test was required.

On completion of the Justification Test (refer to Section 6.0 of this report) the proposed development (residential development) is considered appropriate.

It is concluded that the;

- The sequential approach outlined in Planning System and Flood Risk Management Guidelines has been adhered to.
- Based on proposed mitigation measures (“level for level” compensation) and following the Justification Test, the proposed residential development is appropriate.

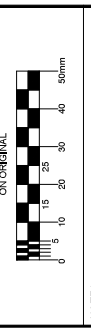
The development was concluded as having a robust level of flood protection up to the 100 year return event and a design complying with the GDSDS design requirements. We note that additional enhancements have been provided in terms of attenuation provisions / volumes, SUDs etc over and above standard GDSDS requirement to provide a robust flood protection regime for the site.

## Appendix A

### PROPOSED SCHEME LAYOUT



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- NOTES:**
1. ALL DRAWINGS TO BE CHECKED BY CONTRACTOR ON SITE AND ENGINEER INFORMED OF DISCREPANCIES BEFORE WORK.
  2. THE CONTRACTOR SHALL VERIFY THE ACCURACY AND LOCATION OF EXISTING DRAINAGE LEVELS AND LOCATION OF MANHOLES AND PIPES ON SITE PRIOR TO COMMENCEMENT OF WORKS ON SITE.
  3. ALL DIMENSIONS AND LEVELS ARE IN METERS AND ARE REFERRED TO THE DATUM CO-ORDINATES RELATE TO IRISH NATIONAL GRID.
  4. ALL FOUL SEWERS, MANHOLES AND CONNECTIONS TO BE INSTALLED TO COMPLY WITH THE DRAINAGE PRACTICE FOR WASTEWATER INFRASTRUCTURE STANDARD DETAILS, 100mm<sup>4</sup> UP TO 6 EN 1401 2002/2012, STRENGTH CLASS B01/M2 IN ACCORDANCE WITH IRISH WATER SPECIFICATIONS, 2009 AND 2012.
  5. ALL SURFACE WATER DRAINAGE TO BE INSTALLED TO COMPLY WITH SECTION 3.1.3 OF IRISH WATER WASTEWATER CODE OF PRACTICE.
  6. ALL SURFACE WATER DRAINAGE TO BE INSTALLED TO COMPLY WITH THE GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE AND ROST WATER WASTEWATER INFRASTRUCTURE STANDARD DETAILS, 100mm<sup>4</sup> UP TO 6 EN 1401 2002/2012, STRENGTH CLASS B01/M2 IN ACCORDANCE WITH IRISH WATER SPECIFICATIONS, 2009 AND 2012.
  7. ALL SURFACE WATER DRAINAGE TO BE INSTALLED TO COMPLY WITH THE GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE AND ROST WATER WASTEWATER INFRASTRUCTURE STANDARD DETAILS, 100mm<sup>4</sup> UP TO 6 EN 1401 2002/2012, STRENGTH CLASS B01/M2 IN ACCORDANCE WITH IRISH WATER SPECIFICATIONS, 2009 AND 2012.
  8. ALL SURFACE WATER DRAINAGE TO BE INSTALLED TO COMPLY WITH THE GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE AND ROST WATER WASTEWATER INFRASTRUCTURE STANDARD DETAILS, 100mm<sup>4</sup> UP TO 6 EN 1401 2002/2012, STRENGTH CLASS B01/M2 IN ACCORDANCE WITH IRISH WATER SPECIFICATIONS, 2009 AND 2012.
  9. LOCATION AND INVERT LEVELS OF EXISTING MANHOLES OR CONNECTIONS TO BE INSTALLED TO COMPLY WITH THE GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE AND ROST WATER WASTEWATER INFRASTRUCTURE STANDARD DETAILS, 100mm<sup>4</sup> UP TO 6 EN 1401 2002/2012, STRENGTH CLASS B01/M2 IN ACCORDANCE WITH IRISH WATER SPECIFICATIONS, 2009 AND 2012.
  10. ALL COVER LEVELS TO MATCH FINISHED GRADE UNLESS OTHERWISE STATED/NOTED ON DRAWING.
  11. CONTRACTOR TO INCLUDE FOR CCTV SURVEY OF ALL SEWERS PRIOR TO COMMENCEMENT OF WORKS.
  12. ALL CONNECTIONS TO BE TESTED IN ACCORDANCE WITH IRISH WATER SPECIFICATIONS, 2009 AND 2012.
  13. ALL SURFACE WATER DRAINAGE TO BE INSTALLED TO COMPLY WITH THE GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE AND ROST WATER WASTEWATER INFRASTRUCTURE STANDARD DETAILS, 100mm<sup>4</sup> UP TO 6 EN 1401 2002/2012, STRENGTH CLASS B01/M2 IN ACCORDANCE WITH IRISH WATER SPECIFICATIONS, 2009 AND 2012.

- LEGEND:**
- SITE BOUNDARY
  - EXISTING MAINS STREAM/RIVER
  - PROPOSED SURFACE WATER DRAINAGE
  - EXISTING SURFACE WATER DRAINAGE
  - PROPOSED FOUL SEWER
  - EXISTING FOUL SEWER
  - FOUL RISING MAIN
  - EXISTING SURFACE WATER
  - EXISTING FOUL SEWER
  - EXISTING DRAINAGE TO BE REMOVED
  - EXISTING WATERMAIN
  - SURFACE WATER ATTENUATION POND
  - PROPOSED BUILDING
  - OUTLINE OF BASEMENT
  - NORTH FENCE SEWER ESCAPEMENT AREA
  - PROPOSED FLOOD ZONE A & B EXTENTS

PLANNING			
NO.	DESCRIPTION	DATE	BY
A	20/05/19 SITE 3 SUBMISSION TO RFP	20/05/19	CON/2
B	REVISION		

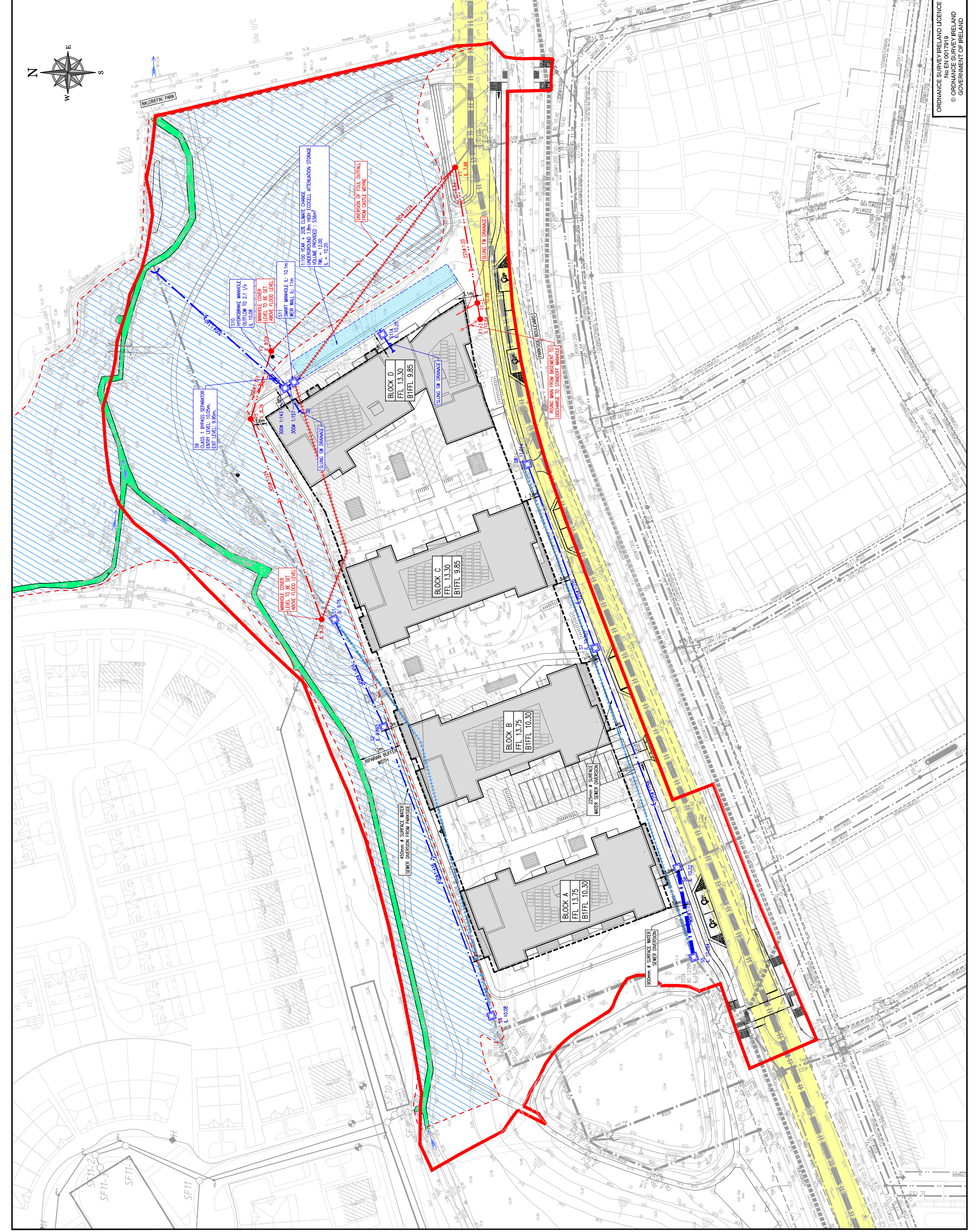
**DBFL**  
 DBFL Consulting Engineers  
 150 West Street, Dublin 7, Ireland  
 Phone: +353 1 400 4000  
 Fax: +353 1 400 4050  
 www.dbfl.ie  
 150 West Street, The Liberties,  
 127 Cross Street, Westport, Ireland.  
 Fax: +353 51 844 913

PROJECT: PARKSIDE 4, PARKSIDE, DUBLIN 13

CLIENT: CAIRN HOMES PROPERTIES LTD.

DRG. TITLE: DRAINAGE LAYOUT

SCALE: 1:500 @A1  
 FILE REF.: 190011-3000  
 DRG. NO.: 190011-3000  
 A



ORDNANCE SURVEY IRELAND LICENCE  
 No EN 0017919  
 © ORDNANCE SURVEY IRELAND  
 GOVERNMENT OF IRELAND



## Appendix B

### OPW FLOOD HAZARD WEBSITE REPORT

## 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 218 410

This Flood Report has been downloaded from the Web site [www.floodmaps.ie](http://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 1:12,076

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. 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
	3. Sluice Kinsaley Hall August 1986 County: Dublin Additional Information: Reports (1) More Mapped Information	Start Date: 25/Aug/1986 Flood Quality Code:3
	4. Kinsealy Lane Area Oct 2002 County: Dublin Additional Information: Reports (3) More Mapped Information	Start Date: 20/Oct/2002 Flood Quality Code:2
	5. The Grange Road Baldoyle Oct 2002 County: Dublin	Start Date: 20/Oct/2002 Flood Quality Code:3



Additional Information: Reports (1) More Mapped Information

---



6. Mayne Balgriffin Park June 1993

County: Dublin

Start Date: 11/Jun/1993

Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information

---



7. Grange Road Donaghmede Nov 1982

County: Dublin

Start Date: 07/Nov/1982

Flood Quality Code:3

Additional Information: Reports (1) More Mapped Information

---



8. Mayne River Bridge Baldoyle Recurring

County: Dublin

Start Date:

Flood Quality Code:2

Additional Information: Reports (3) More Mapped Information

---



9. Sluice River Kinsealy Lane Recurring

County: Dublin

Start Date:

Flood Quality Code:3

Additional Information: Reports (2) More Mapped Information

---



10. Baldoyle Coastal Recurring

County: Dublin

Start Date:

Flood Quality Code:3

Additional Information: Reports (4) More Mapped Information

---



11. Sluice River Strand Road Portmarnock Recurring

County: Dublin

Start Date:

Flood Quality Code:3

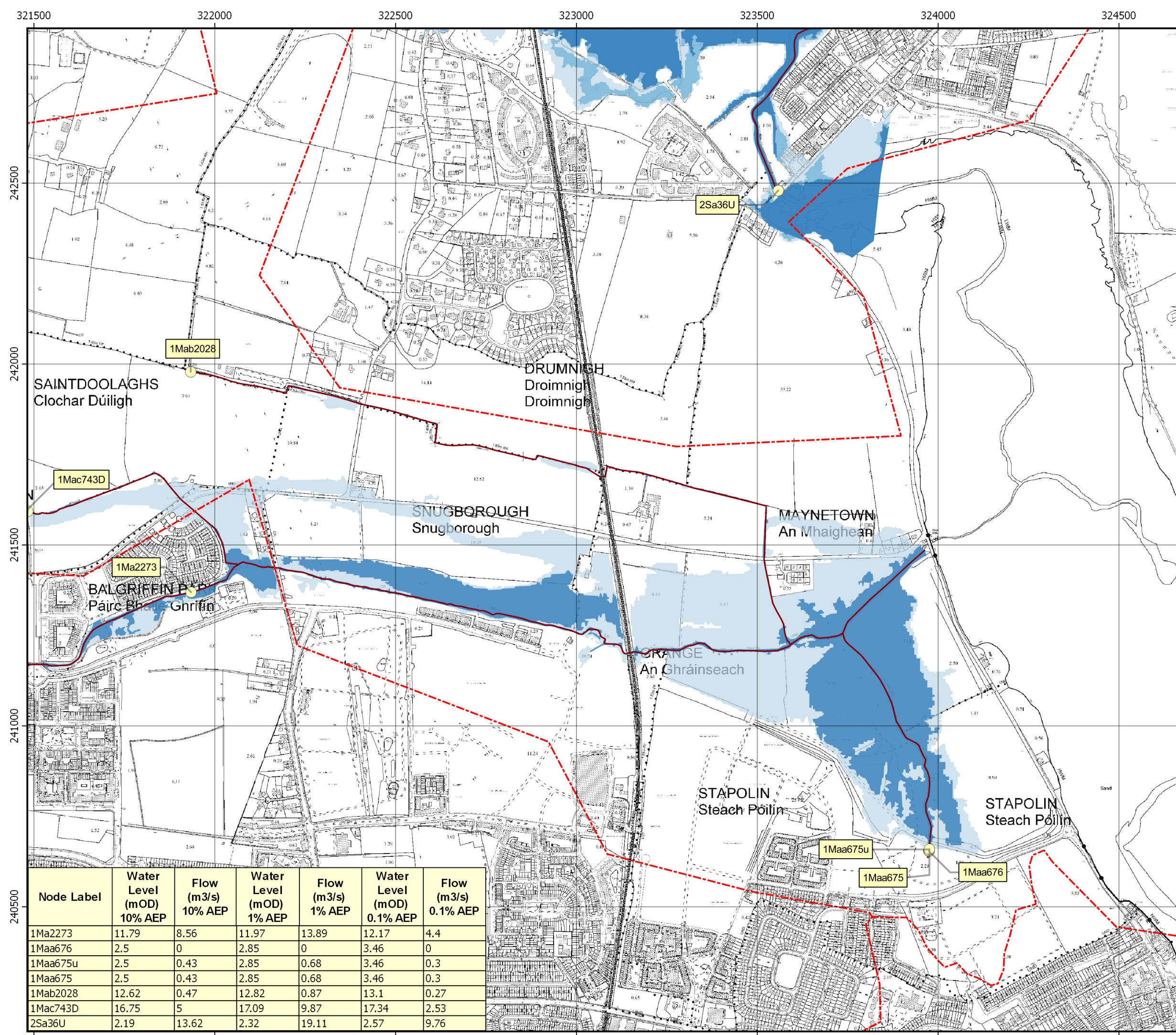
Additional Information: Reports (4) More Mapped Information

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## Appendix C

### FEMFRAMS FLOOD RISK ASSESSMENT MAP EXTRACTS





**Location Plan:**



**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
- x.x% AEP 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: Sep - 2016
Checked by:	MC	Date: Sep - 2016
Approved by:	JM	Date: Sep - 2016

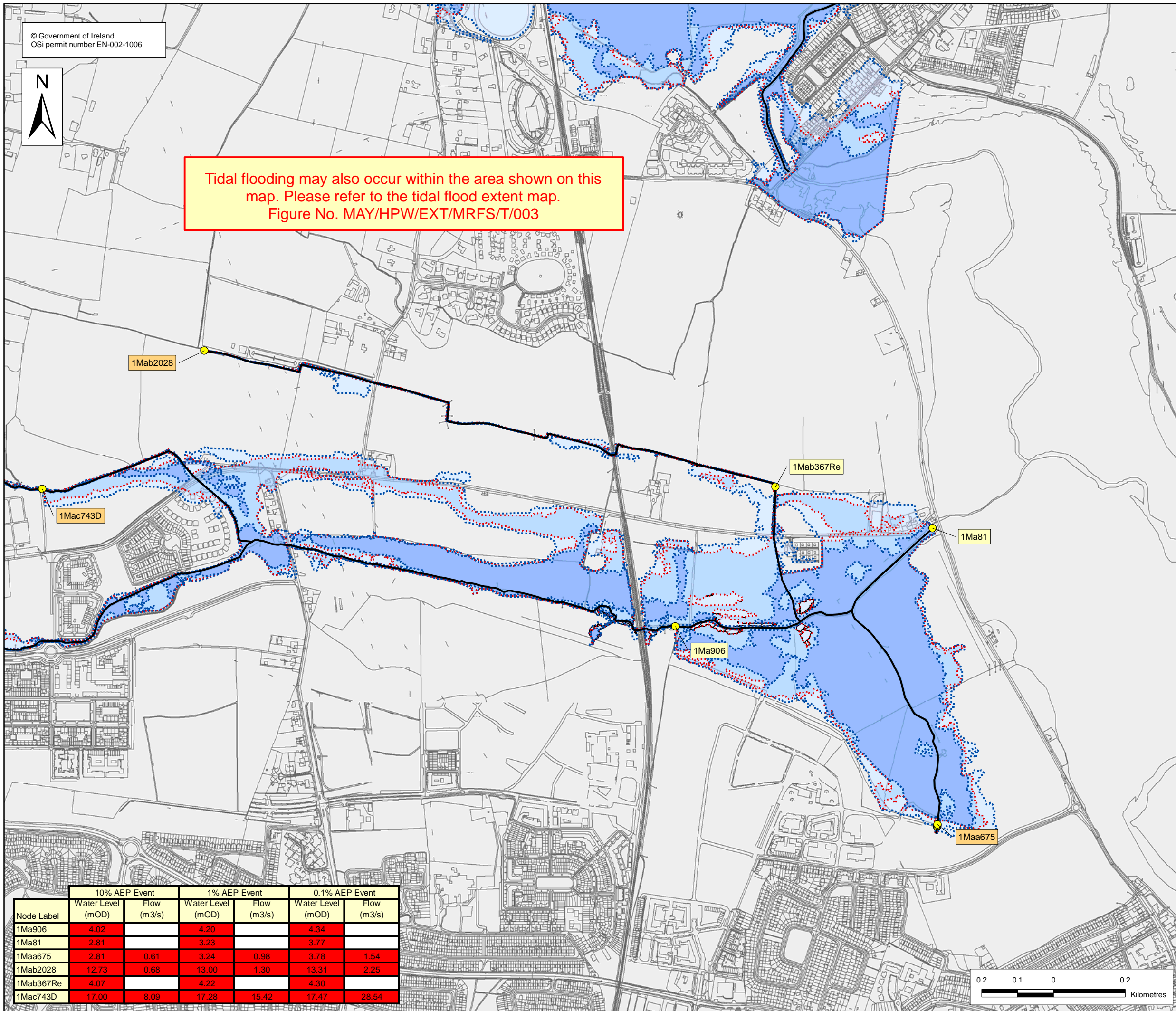
Map No.:  
**MAY/HPW/EXT/CURS/003**  
 Revision: F0  
 Map Scale: 1:10,000 Plot Scale: 1:1 @ A3

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	4.4
1Maa676	2.5	0	2.85	0	3.46	0
1Maa675u	2.5	0.43	2.85	0.68	3.46	0.3
1Maa675	2.5	0.43	2.85	0.68	3.46	0.3
1Mab2028	12.62	0.47	12.82	0.87	13.1	0.27
1Mac743D	16.75	5	17.09	9.87	17.34	2.53
2Sa36U	2.19	13.62	2.32	19.11	2.57	9.76



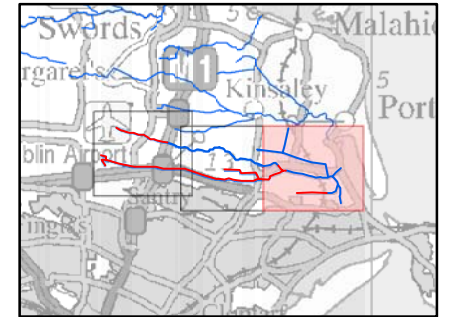


Tidal flooding may also occur within the area shown on this map. Please refer to the tidal flood extent map. Figure No. MAY/HPW/EXT/MRFS/T/003



Node Label	10% AEP Event		1% AEP Event		0.1% AEP Event	
	Water Level (mOD)	Flow (m3/s)	Water Level (mOD)	Flow (m3/s)	Water Level (mOD)	Flow (m3/s)
1Ma906	4.02		4.20		4.34	
1Ma81	2.81		3.23		3.77	
1Maa675	2.81	0.61	3.24	0.98	3.78	1.54
1Mab2028	12.73	0.68	13.00	1.30	13.31	2.25
1Mab367Re	4.07		4.22		4.30	
1Mac743D	17.00	8.09	17.28	15.42	17.47	28.54

Location Plan :



**EXTENT MAP**

Legend:

- 10 % AEP Flood Extent (1 in 10 chance in any given year)
  - 1 % AEP Flood Extent (1 in 100 chance in any given year)
  - 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
  - Defended area
  - High Confidence (<20m) (10% AEP)
  - Medium Confidence (<40m) (10% AEP)
  - Low Confidence (>40m) (10% and 0.1% AEP)
  - High Confidence (<20m) (1% AEP)
  - Medium Confidence (<40m) (1% AEP)
  - Low Confidence (>40m) (1% AEP)
  - Modelled River Centreline
  - Node Point
  - Node label with level data (refer to table)
  - Node level with flow & level data (refer to table)
- High confidence

Medium confidence

Low confidence

} 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.



Tramway House  
32 Dartry Road  
Dublin 6  
Tel: +353-1-4975716

Clients :



Project :

FEM FRAMS

Map :

MAYNE MODEL FLOOD EXTENT MAP

Map Type : FLOOD EXTENT

Source : FLUVIAL FLOODING

Map area : HIGH PRIORITY WATERCOURSE

Scenario : MID RANGE FUTURE SCENARIO

Figure By : Mara Ruiz Date : 3 September 2010

Checked By : Sergio Herbón Date : 3 September 2010

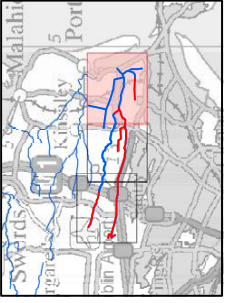
Approved By : Clare Dewar Date : 3 September 2010

Figure No. : MAY/HPW/EXT/MRFS/003 Revision : 0

Drawing Scale : 1:10,000 Plot Scale : 1:1 @ A3



Location Plan:



**EXTENT MAP**

Legend:

- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 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)
- Defended area
- High Confidence (<20m) (10% AEP)
- Medium Confidence (<40m) (10% AEP)
- Low Confidence (<40m) (10% and 0.1% AEP)
- High Confidence (<20m) (0.5% AEP)
- Medium Confidence (<40m) (0.5% AEP)
- Low Confidence (<40m) (0.5% AEP)
- Modelled River Centrelines
- Node Point
- Node label with level data (refer to table)
- Node level with flow & level data (refer to table)

High confidence  
Medium confidence  
Low confidence  
refer to table

USER NOTE: USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND ORIGIN AND THIS MAP SHOULD NOT BE USED FOR ANY PURPOSE.

**HalcrowBarry**

167 Newry House  
32 Derry Road  
Limerick  
Tel: +353 84975716

Clients:



Project: FEM FRAMS

Map: MAYNE MODEL FLOOD EXTENT MAP

Map Type: FLOOD EXTENT

Source: TIDAL FLOODING

Map area: HIGH PRIORITY WATERCOURSE

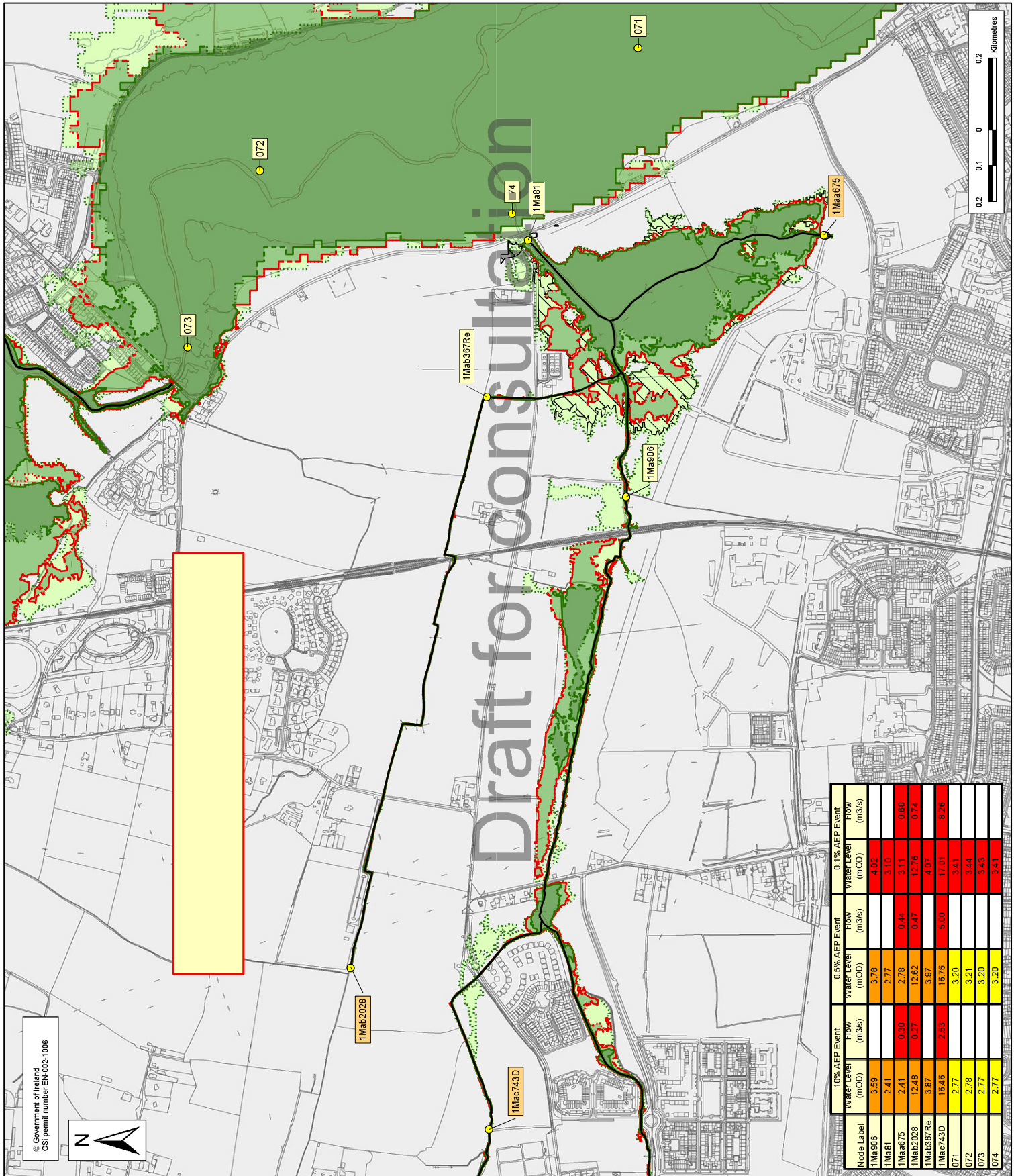
Scenario: CURRENT

Figure By: Maria Ruiz Date: 14 May 2012

Checked By: Sergio Hebrón Date: 14 May 2012

Approved By: Claire Dewar Date: 14 May 2012

Figure No.: MAY/HPWEXT/COURST/003  
Revision: 2  
Drawing Scale: 1:10,000 Plot Scale: 1:1 @ A3



**Draft for consultation**

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OSI permit number EN-002-1006

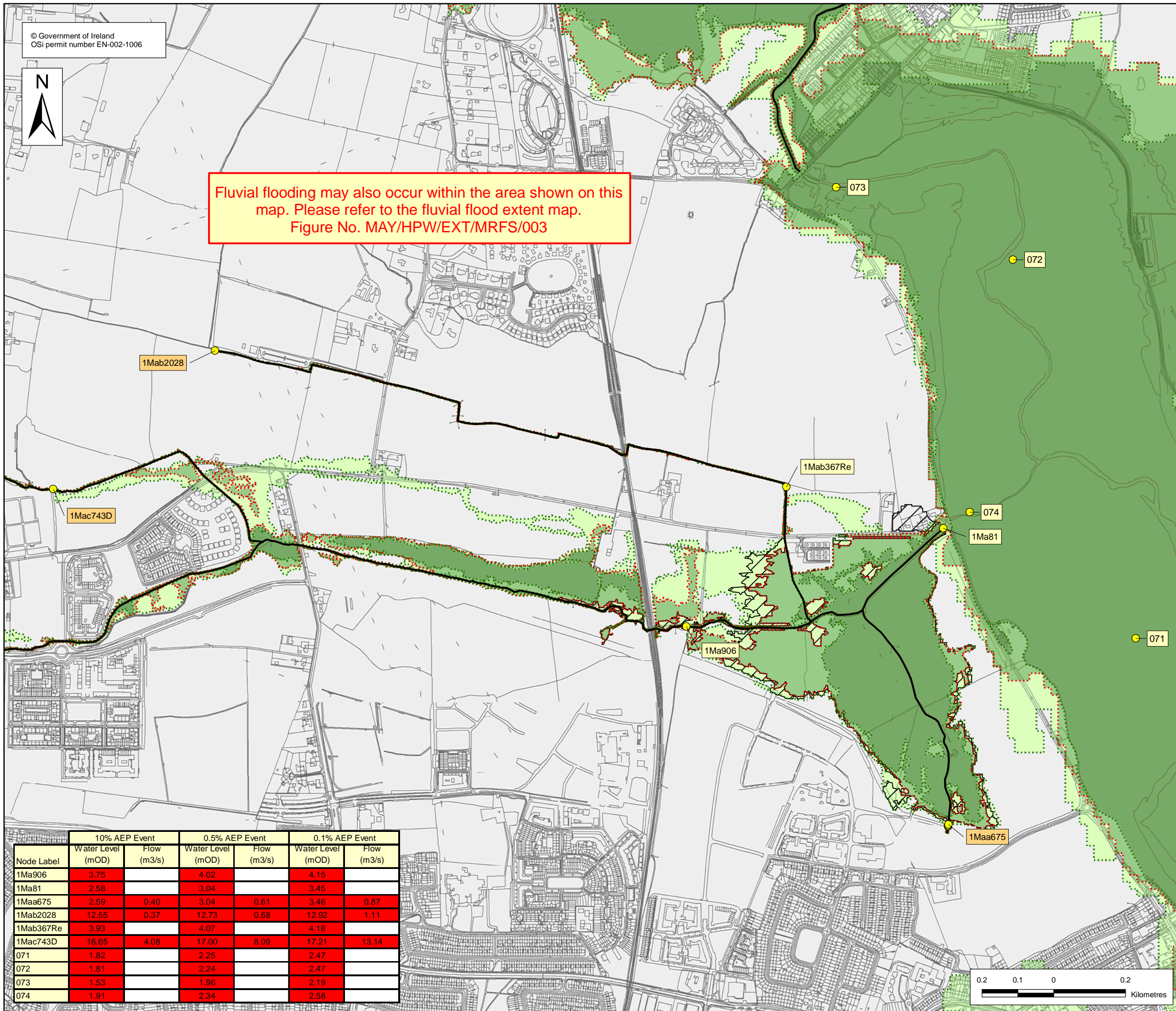


Node Label	10% AEP Event		0.5% AEP Event		0.1% AEP Event	
	Water Level (mOD)	Flow (m³/s)	Water Level (mOD)	Flow (m³/s)	Water Level (mOD)	Flow (m³/s)
1Ma806	3.59	3.78	3.78	3.10	4.02	0.60
1Ma81	2.41	0.50	2.78	0.44	3.11	0.74
1Ma875	12.48	0.27	12.62	0.47	12.76	0.74
1Mac367Re	3.87	3.87	3.87	5.00	4.07	8.29
1Mac743D	18.46	2.53	18.76	3.20	17.01	3.41
071	2.77	2.78	3.20	3.21	3.41	3.44
072	2.77	2.77	3.20	3.20	3.41	3.43
073	2.77	2.77	3.20	3.20	3.41	3.41
074	2.77	2.77	3.20	3.20	3.41	3.41

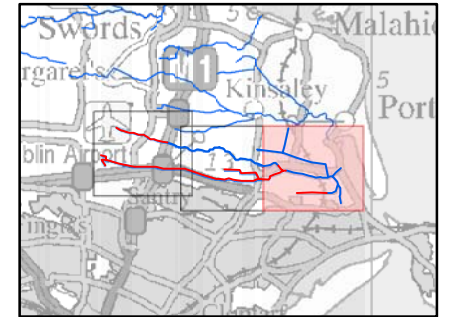




Fluvial flooding may also occur within the area shown on this map. Please refer to the fluvial flood extent map. Figure No. MAY/HPW/EXT/MRFS/003



Location Plan :



EXTENT MAP

Legend:

- 10 % AEP Flood Extent (1 in 10 chance in any given year)
  - 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)
  - Defended area
  - High Confidence (<20m) (10% AEP)
  - Medium Confidence (<40m) (10% AEP)
  - Low Confidence (> 40m) (10% and 0.1% AEP)
  - High Confidence (<20m) (0.5% AEP)
  - Medium Confidence (<40m) (0.5% AEP)
  - Low Confidence (>40m) (0.5% AEP)
  - Modelled River Centreline
  - Node Point
  - Node label with level data (refer to table)
  - Node level with flow & level data (refer to table)
- High confidence

Medium confidence

Low confidence

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.



Tramway House  
32 Dartry Road  
Dublin 6  
Tel: +353-1-4975716

Clients :



Project :

FEM FRAMS

Map :

MAYNE MODEL FLOOD EXTENT MAP

Map Type : FLOOD EXTENT

Source : TIDAL FLOODING

Map area : HIGH PRIORITY WATERCOURSE

Scenario : MID RANGE FUTURE SCENARIO

Figure By : Mara Ruiz Date : 3 September 2010

Checked By : Sergio Herbón Date : 3 September 2010

Approved By : Clare Dewar Date : 3 September 2010

Figure No. : MAY/HPW/EXT/MRFS/T/003 Revision : 0

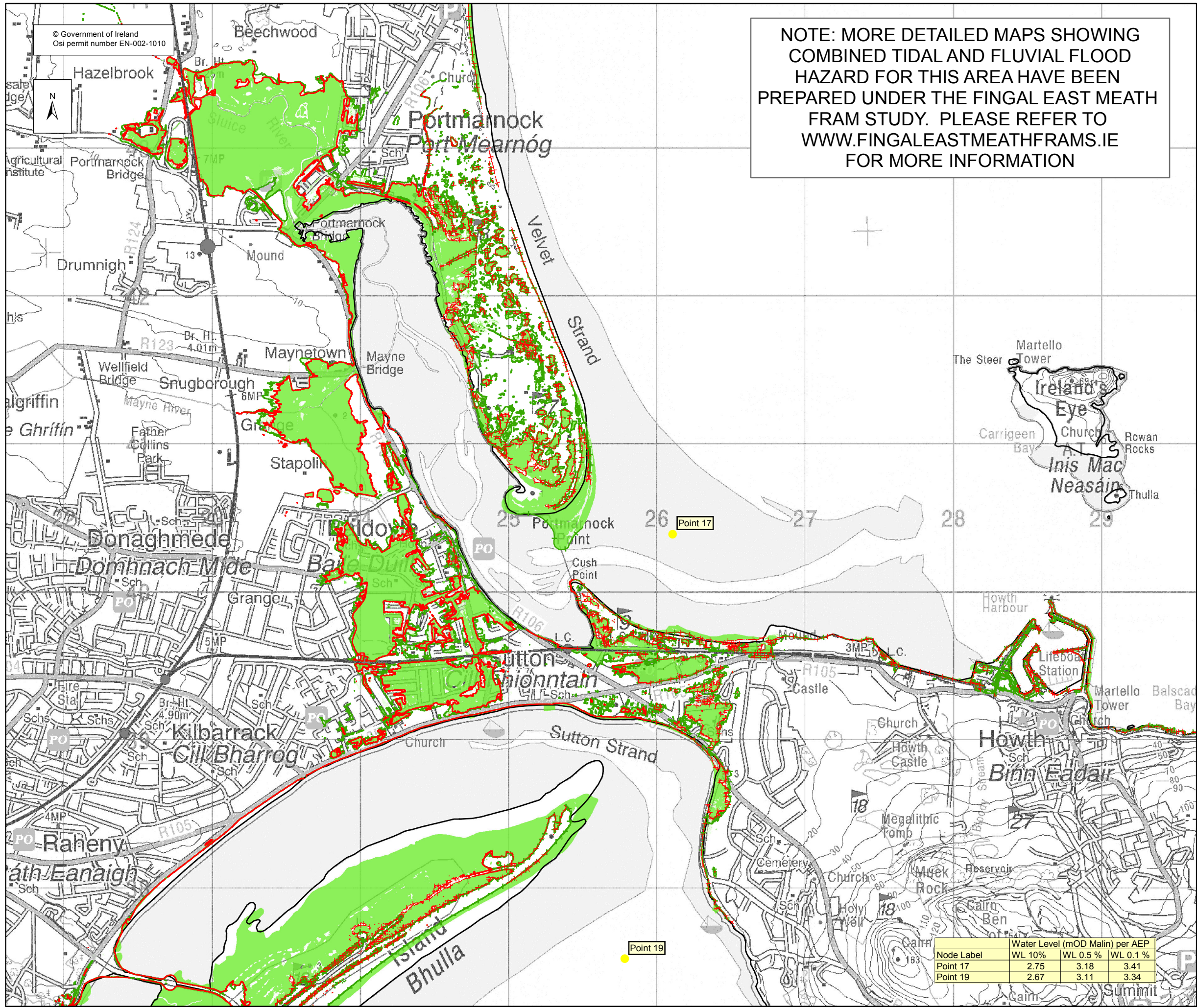
Drawing Scale : 1:10,000 Plot Scale : 1:1 @ A3

Node Label	10% AEP Event		0.5% AEP Event		0.1% AEP Event	
	Water Level (mOD)	Flow (m3/s)	Water Level (mOD)	Flow (m3/s)	Water Level (mOD)	Flow (m3/s)
1Ma906	3.75		4.02		4.15	
1Ma81	2.58		3.04		3.45	
1Maa675	2.59	0.40	3.04	0.61	3.46	0.87
1Mab2028	12.55	0.37	12.73	0.68	12.92	1.11
1Mab367Re	3.93		4.07		4.18	
1Mac743D	16.65	4.08	17.00	8.09	17.21	13.14
071	1.82		2.25		2.47	
072	1.81		2.24		2.47	
073	1.53		1.96		2.19	
074	1.91		2.34		2.58	

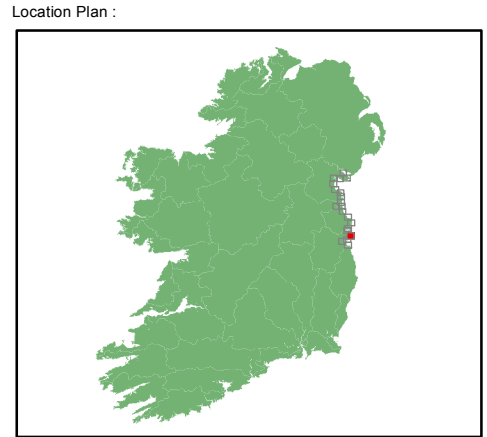
## Appendix D

### IPCSS COASTAL FLOOD RISK MAPPING





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](http://WWW.FINGALEASTMEATHFRAMS.IE) FOR MORE INFORMATION



**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

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

Figure No.: NE / RA / EXT / 17 Revision: 1  
 Drawing Scale: 1:25,000 Plot Scale: 1:1 @ A3



## Appendix E

### FLOOD EXCEEDENCE LAYOUT

# FLOOD EXCEEDENCE LAYOUT

## LEGEND



OVERLAND FLOW ROUTE

