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CONSULTING ENGINEERS



Ballymakaily Data Centre (EDCDUB05)

FLOOD RISK ASSESSMENT

December 2020




P201107

STRUCTURAL · CIVIL · DUE DILIGENCE · ENGINEERING MASTERPLANNING
FLOOD MANAGEMENT · INFRASTRUCTURE DESIGN
PRE-DEVELOPMENT ENGINEERING · BIM · TRANSPORTATION

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	Name	Signature	Position	Date
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Reviewed by	J. Mayer		Director	10/12/2020
Approved by	J. Mayer		Director	11/12/2020

REVISIONS

Revision By	Date	Context

VERSIONS

Number	By	Date	Context
1	S. O'Reilly	15/12/2020	Draft Planning Submission
2	S. O'Reilly	17/02/2021	Planning Submission

SOURCES OF DATA

Office of Public Works (OPW)	
Met Eireann	
Land Survey Services Ltd.	
Google	

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Executive Summary

This report was prepared for South Dublin County Council in connection with the planning application for a data centre development and addresses the potential flood risk and mitigation measures proposed for the subject site, located to the south of the Grand Canal and to the west of the Newcastle Road (R120), Co. Dublin.

EdgeConneX Ireland Limited are applying for permission for development at this site of 22.1hectares that is located within the townland of Ballymakaily to the west of the Newcastle Road (R120), Lucan, Co. Dublin.

The development will consist of the construction of two no. single storey data centres with associated office and service areas; and three no. gas powered generation plant buildings with an overall gross floor area of 24,624sqm that will comprise of the following:

- Demolition of abandoned single storey dwelling, remaining agricultural shed and derelict former farm building;
- Construction of 2 no. single storey data centres (12,797sqm), both with associated plant at roof level; with 24 no. standby diesel generators with associated flues (each 25m high) that will be attached to a single storey goods receiving area / store and single storey office area (2,404sqm) located to the west of the data centres as well as associated water tower and sprinkler tank and other services;
- amendments to the internal access road and omission of access to loading bay permitted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948 that include the relocation of permitted, and new, internal security gates; and new internal access roads to serve the proposed development that will provide access to 39 no. new car parking spaces (including 4 no. electric and 2 no. disabled spaces) and sheltered bicycle parking to serve the new data centres;
- The development will also include the phased development of 3 no. two storey gas powered generation plants (9,286sqm) within three individual buildings and ancillary development to provide power to facilitate the development of the overall site to be located within the south-west part of the overall site. Gas Plant 1 (3,045sqm) will contain 20 no. generator units (18+2) with associated flues (each 25m high) will facilitate, once operational the decommissioning of the temporary Gas Powered Generation Plant within its open compound as granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948. Gas Plant 2 (3,045sqm) will contain 20 no. generator units (18+2) with associated flues (each 25m high); and Gas Plant 3 (3,196sqm) will contain 21 no. generator units (19+2) with associated flues (each 25m high). These Plants will be built to provide power to each data centre, if and, when required. The Gas Plants will be required as back-up power generation once the permanent power connection via the permitted substation is achieved;
- New attenuation pond to the north of the site;
- Green walls are proposed to the southern elevation of each Power plant, as well as to the northern elevation of the generator compound of the data centres, and enclosing the water tower/pump room compound; and a new hedgerow is proposed linking the east and west of the site; and

- Proposed Above Ground Gas Installation compound to contain single storey kiosk (93sqm) and boiler room (44sqm).

The development will also include ancillary site works, connections to existing infrastructural services as well as fencing and signage. The development will include minor modifications to the permitted landscaping to the west of the site as granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948. The site will remain enclosed by landscaping to all boundaries. The development will be accessed off the R120 via the permitted access granted under SDCC Planning Ref. SD19A/0042 / ABP Ref. PL06S.305948.

An EPA-Industrial Emissions (IE) licence will be applied for to facilitate the operation of the Gas Powered Generation Plant. An Environmental Impact Assessment Report (EIAR) has been submitted with this application.

The report should be read in conjunction with our engineering planning drawings, and deals with existing foul, surface water and water mains present within the surrounding area, and the proposals for the site with regards to these services.

The proposed development is bounded to the north by the Grand Canal; the east by the Newcastle Road (R120); the western and southern boundaries are formed by existing greenfield lands.

The document should be read in conjunction with all associated Planning Drawings and Reports.

1 Introduction

The applicant proposes to construct 2 No. data halls and associated office areas adjacent and to the west of the Newcastle Road (R120). It is intended to access the proposed development off the existing Newcastle Road (R120) adjacent to the eastern boundary of the site. The purpose of this report is to address any potential flooding aspects of the proposed data centre development, on lands situated to the west of the Newcastle Road (R120), Co. Dublin.

The total subject site area extends to circa 54.59 acres (22.10 ha) and is currently a greenfield site. The new proposed data halls will result in portions of the western area of the site being developed, circa 53% of the total site area, with associated landscaping elements.

The location of the site is indicated on the map extract below - Figure 1.



FIGURE 1 - Site Location (Source Google Maps)

2 Flood Risk Assessment

The Planning System & Flood Risk Management Guidelines for Planning Authorities, dated November 2009, as published by the OPW, sets out the process to be followed in assessing proposed developments relating to flood risk.

These guidelines introduce comprehensive mechanisms incorporating flood risk identification, assessment and management into the planning process.

Planning authorities, in implementing these guidelines, are to ensure that where relevant, flood risk is a key consideration in the preparation of development and local area plans and also in the assessment of planning applications.

The guidelines will also serve to assist county and local authorities in preparing planning guidelines which should be utilised by developers and the general public in assessing flood risk when submitting development proposals / planning applications. Flood risk is summarised through various levels of the planning system in Figure 1.1. below.

Policy Documents / Instruments	Flood Risk Assessment Technique	Decision-making Tools	Key Chapters
National Spatial Strategy, National Planning Guidelines	Flood Risk Management Guidelines	n/a	1 2
Regional planning guidelines	Regional Flood Risk Appraisal, Catchment Flood Risk Management Plans	Sequential approach, Strategic Environmental Assessment	3 4
City / county development plan	Strategic Flood Risk Assessment, Catchment Flood Risk Management Plans	Sequential approach, dev plan Justification Test, SEA	3 4
Local area plan	Strategic Flood Risk Assessment	Sequential approach, dev plan Justification Test, SEA	3 4
Master plan, non-statutory plan, site brief	Site-specific Flood Risk Assessment	Sequential approach, dev plan Justification Test, SEA / Env Impact Assessment	3 5
Planning application	Site-specific Flood Risk Assessment	Sequential approach, dev management Justification Test, EIA	3 5

Fig. 1.1. Flood risk management and the planning system

Using the sequential approach as described in Chapter 3 of the aforementioned guideline document, including confirmation that the site is classified as "Less Vulnerable" and therefore classified as appropriate and in conjunction with assessing available flood data, i.e. OPW, PFRA & CFRAMS mapping etc., it has been determined that the site has been categorised as falling into Zone C, (see Flood Zone definitions below), from a flooding perspective. It is proposed to apply the Source-Pathway-Receptor Model in providing the necessary mitigating measures.

Flood zones

Flood zones are geographical areas within which the likelihood of flooding is in a particular range and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. There are three types or levels of flood zones defined for the purposes of these Guidelines:

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

Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding) and

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



Fig 2.3 Indicative flood zone map extract

3 Source-Pathway-Receptor Model

In assessing the potential flood risk to the site, the above model, as described in The Planning System & Flood Risk Management Guidelines for Planning Authorities, was used. The following flood sources were considered and necessary mitigating measures proposed, where required:-

- Coastal Flooding
- Fluvial Flooding
- Pluvial Flooding
- Ground Water Flooding

3.1 Coastal Flooding

In considering the risk from coastal flooding, it is necessary to relate the location of the site relative to the coast and the associated height above sea level. The subject site is located circa 16km from the nearest point on the Irish coast (Dublin Bay) and the average elevation of the site above sea level is circa 66m O.D. Malin Head.

Further to the above, coastal flooding is not considered a risk to the subject site.

3.2 Fluvial Flooding

Fluvial flooding is defined as flooding from a river or other watercourse. Further to site inspections and topographical surveys, there are no rivers flowing through the site. The nearest stream in the proximity of the site, is the Griffeen River, circa 500m from the mid-point of the eastern boundary of the site and on the opposite side of the Newcastle Road (R120). The Griffeen River then crosses beneath the Grand Canal to the north-east of the site.

Further to the above, the records of fluvial flooding on the site or environs, i.e. 0.1% AEP Extreme Event (1:1000yr), as indicated on the attached CFRAMS Mapping, i.e. E09BAL_EXFD_F0_10 (refer Appendix B), confirm that there are no locations of Pluvial Flooding indicated on the subject site.

In addition, the 1:1000yr flood level at the above location, is indicated as being at 59.81m OD, which is 6.47m lower than the Finished Floor Level of the nearest proposed data hall facility, i.e. 66.28m, which is located circa 750m to the south-west.

3.3 Pluvial Flooding

This type of flooding is applicable to all sites and is caused by summer thunderstorms or high intensity rainfall during longer duration events. This flooding is then generated by overland flows prior to the run-off entering watercourses / sewers (pipe networks).

As indicated on the attached PFRA Mapping, i.e. 2019 / MAP / 237 / A (refer Appendix C), there are no locations of Pluvial Flooding indicated on the subject site.

Further to the above, any future occurrence of this form of flooding taking place, will be mitigated by the fact that the proposed development has been designed in accordance with the relevant guidelines and specifications of the time, with a surface water attenuation pond / wetland area and below ground attenuation structures being provided, together with a hydrobrake flow control mechanism, limiting the outflow to the Q-bar run-off rate of 24l/s.

These measures have been utilised in the sites overall network drainage system in order to mitigate pluvial flooding and provide for a wholly sustainable development.

3.4 Ground Water Flooding

This form of flooding is not considered to be of any risk to the site. This is borne out by the fact that trial holes had previously been dug on the site and the results gathered from this excavation work have indicated that minimal groundwater was encountered.

Additionally, the OPW Preliminary Flood Risk Assessments Groundwater Flooding Report concludes that ground water flooding is largely confined to the West Coast of Ireland, due to the hydrogeology of the area.

Refer Appendix D for the Groundwater Flood Hazard map, clearly indicating that ground water flooding is not considered a risk in this area of County Dublin.

4 Impact on Downstream Network

There are no impacts on the downstream network based on the following:-

- The site has been sustainably managed in accordance with the relevant guidelines and specifications of the time
- SuDS measures have been incorporated in the form of a surface water attenuation pond / wetland area and permeable paving
- Surface water attenuation has been provided and sized based on a Q-bar run-off rate of 24l/s
- A Hydrobrake mechanism has been installed to restrict the outflow into the existing network accordingly, i.e. 24l/s
- Water quality is maintained as the outflow passes through approved Petrol / Oil Interceptors

The above methods will ensure that all surface water on-site will be sustainably managed and discharged off-site via approved run-off rates into the Local Authority sewer network.

5 Conclusion

In conclusion, the proposed development of the site will be carried out in a wholly sustainable manner, as described and will not pose any flooding issues. This holds true for the developable site itself or for any lands / properties downstream of the proposed development.

The site will be positively drained and surface water will be contained within the overall sites drainage network and managed in a sustainable manner, in accordance with all relevant guidelines and specifications.

Further to the above, based on the indicative flood mapping, the development site is located within Flood Zone C "Low Probability". Additionally, as mentioned, the site is classified as "Less Vulnerable" and therefore the development is classified as appropriate.

Appendix A

OPW - National Flood Hazard Mapping

Summary Local Area Report

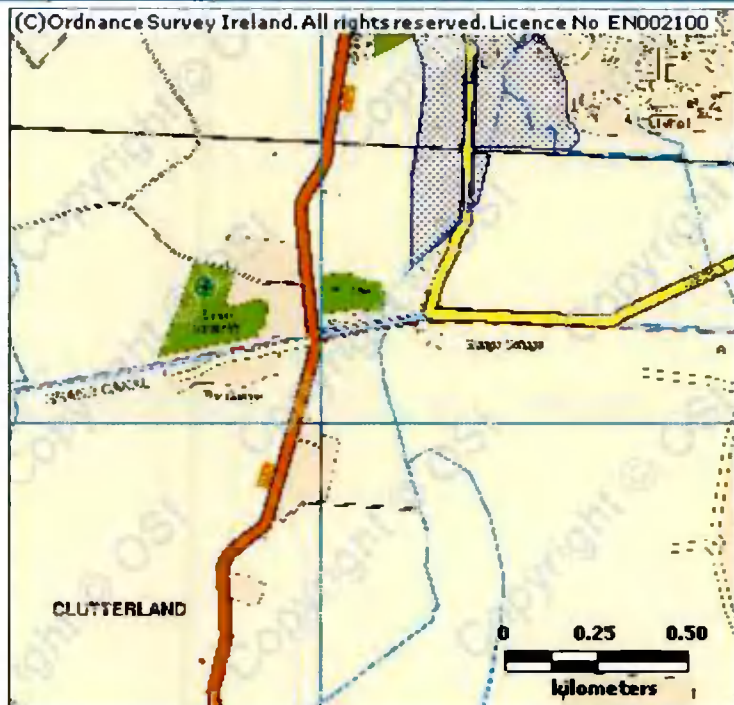
Flood Report summarises all flood events within 2.5 kilometres of the map centre.

Map centre is in:

County: Dublin

Phone: O 031 321

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



Map Scale 1:20,917

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.

Results

1. Griffeen November 2000

Start Date: 05/Nov/2000

County: Dublin

Flood Quality Code: 1

Additional Information: [Photos \(6\)](#) [Reports \(9\)](#) [Press Archive \(6\)](#) [More Mapped Information](#)

2. Peamount R134 R120 junction Nov 2000

Start Date: 05/Nov/2000

County: Dublin

Flood Quality Code: 3

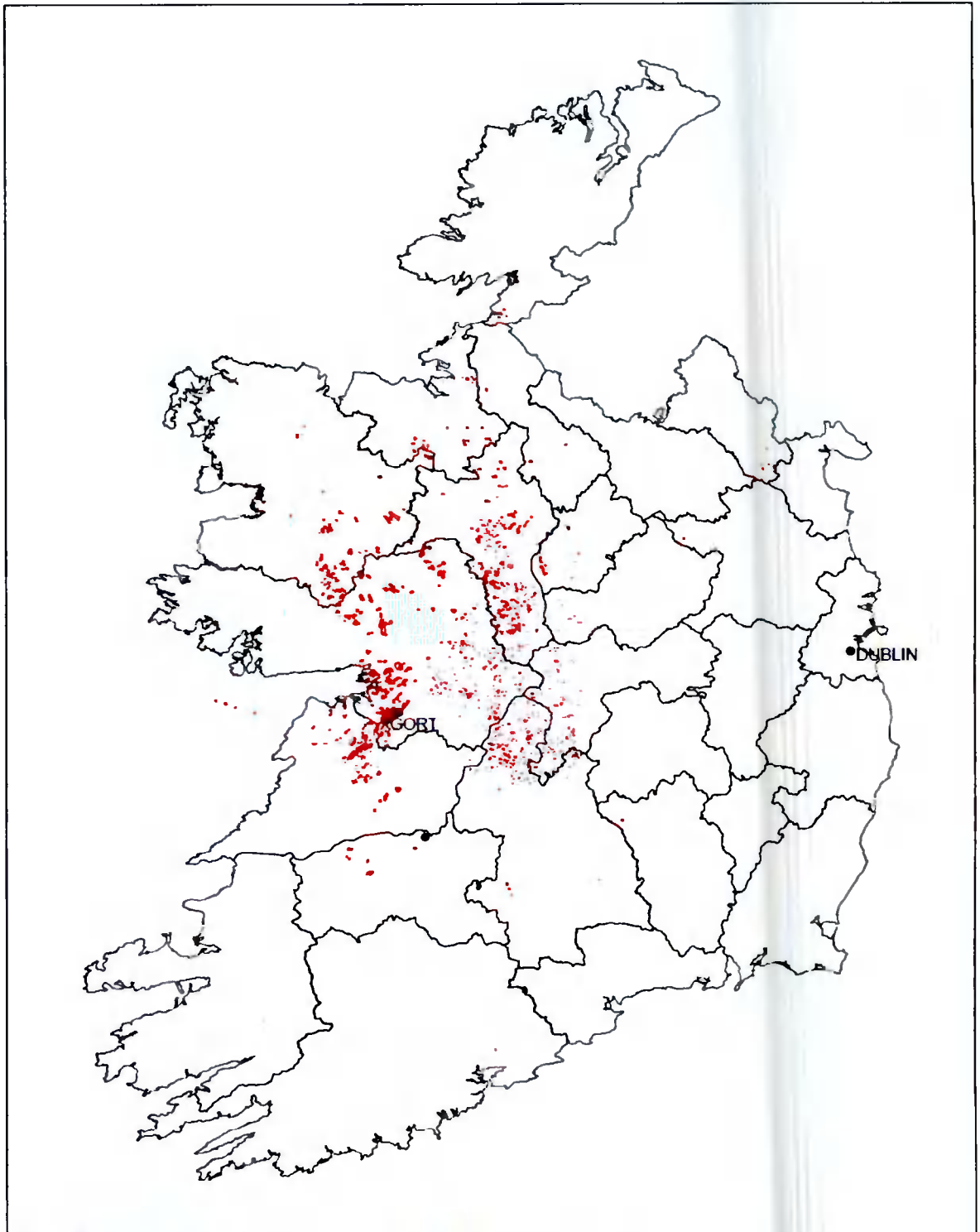
Additional Information: [Reports \(1\)](#) [Press Archive \(1\)](#) [More Mapped Information](#)

Appendix B

OPW - CFRAMS Mapping

Appendix D

OPW – Preliminary Groundwater Flood Hazard Map



Title Preliminary Groundwater Flood Hazard Map			
Figure 6.6	Size A4	Drawn RAH	Checked SB
Drawing No. 262128BA/2.1	Approved SB	Rev No 01	
Date 24/06/2010			


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 Water & Environment
 Demeter House, Station Road
 Cambridge CB1 2RS
 Tel +44 (0) 1223 463500
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Legend

-  County boundary
-  Location
-  Area at risk of groundwater flooding

CH
House
an Way

7 170

ukpinnacle.com

WELWYN GARDEN CITY

Mercury House
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Welwyn Garden City
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BRISTOL

Prudential Buildings
11-19 Wine Street
Bristol
BS1 2PH

PHONE
0117 214 0860

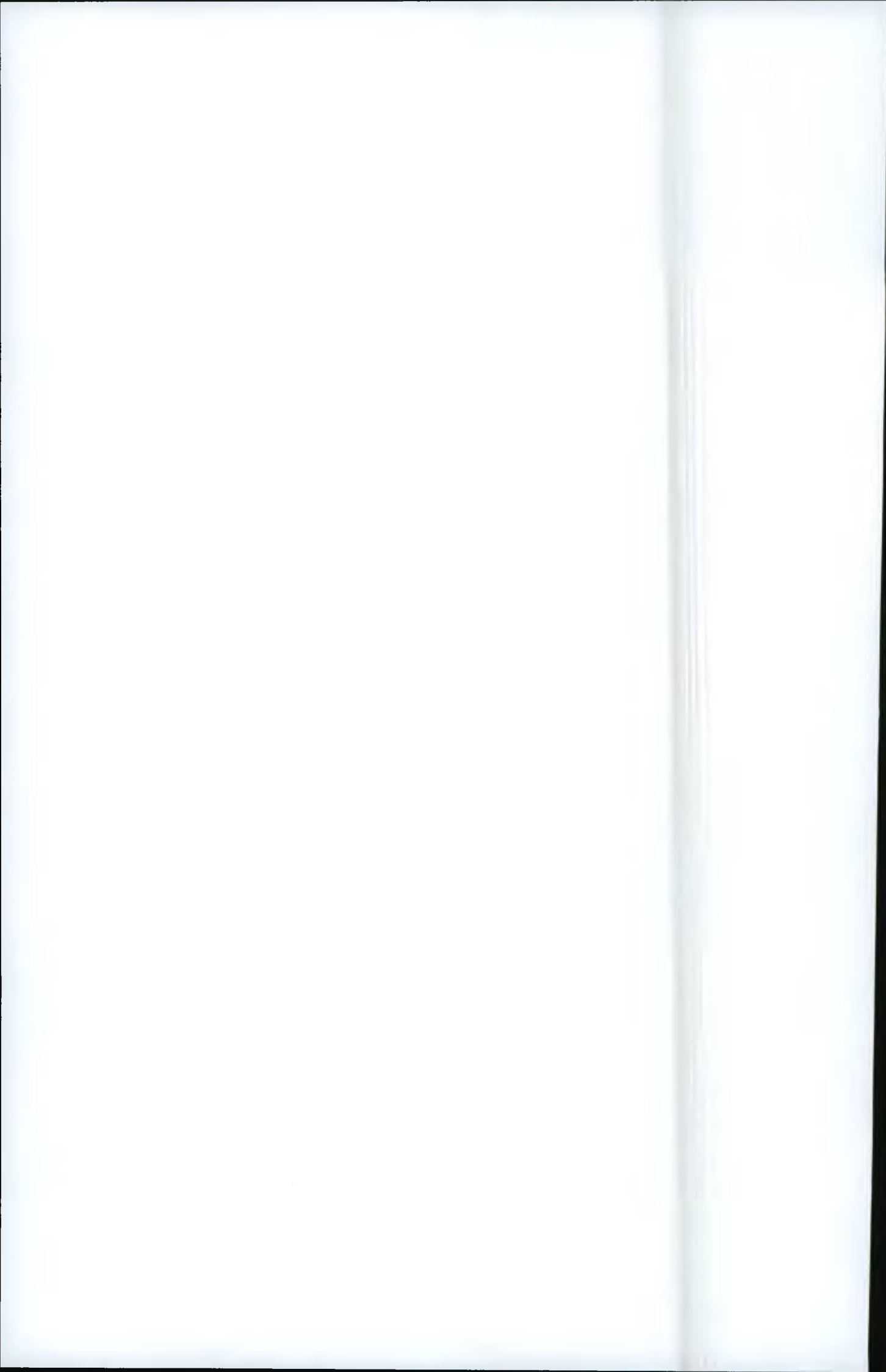
EMAIL
bristol@ukpinnacle.com

DUBLIN

Grosvenor Court
67a Patrick Street
Dun Laoghaire
Co Dublin

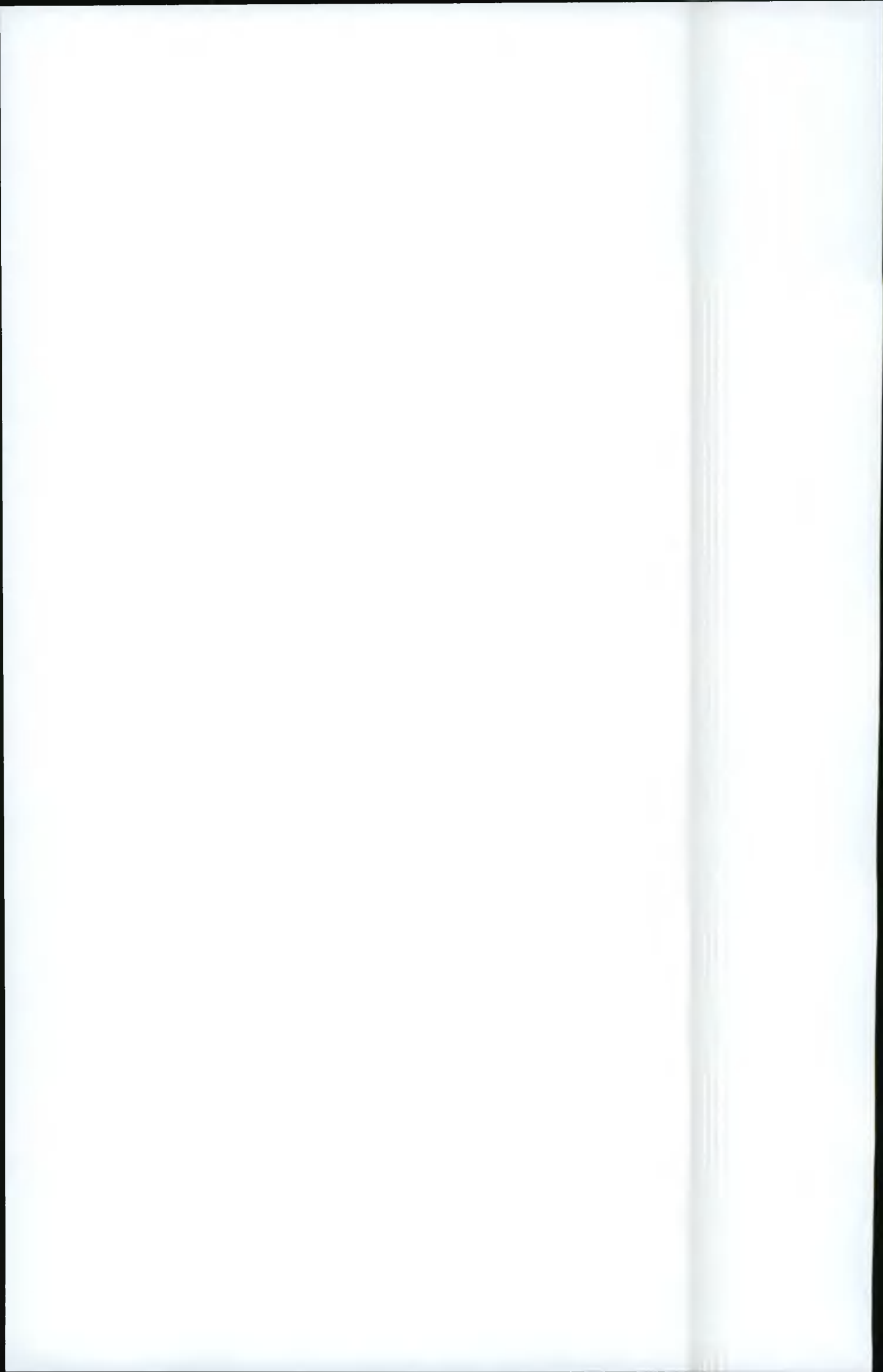
PHONE
+353 1231 1041

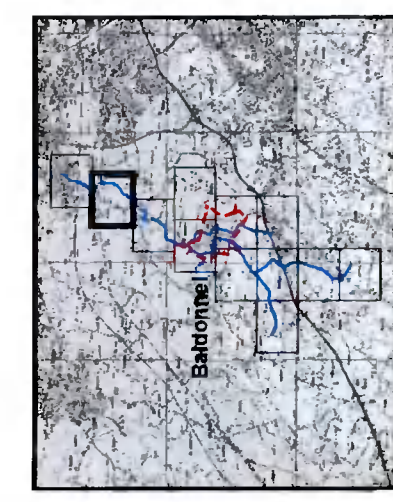
EMAIL
dublin@epinnacle.com



Appendix C

OPW - PFRA Mapping





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

Legend

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

FINAL

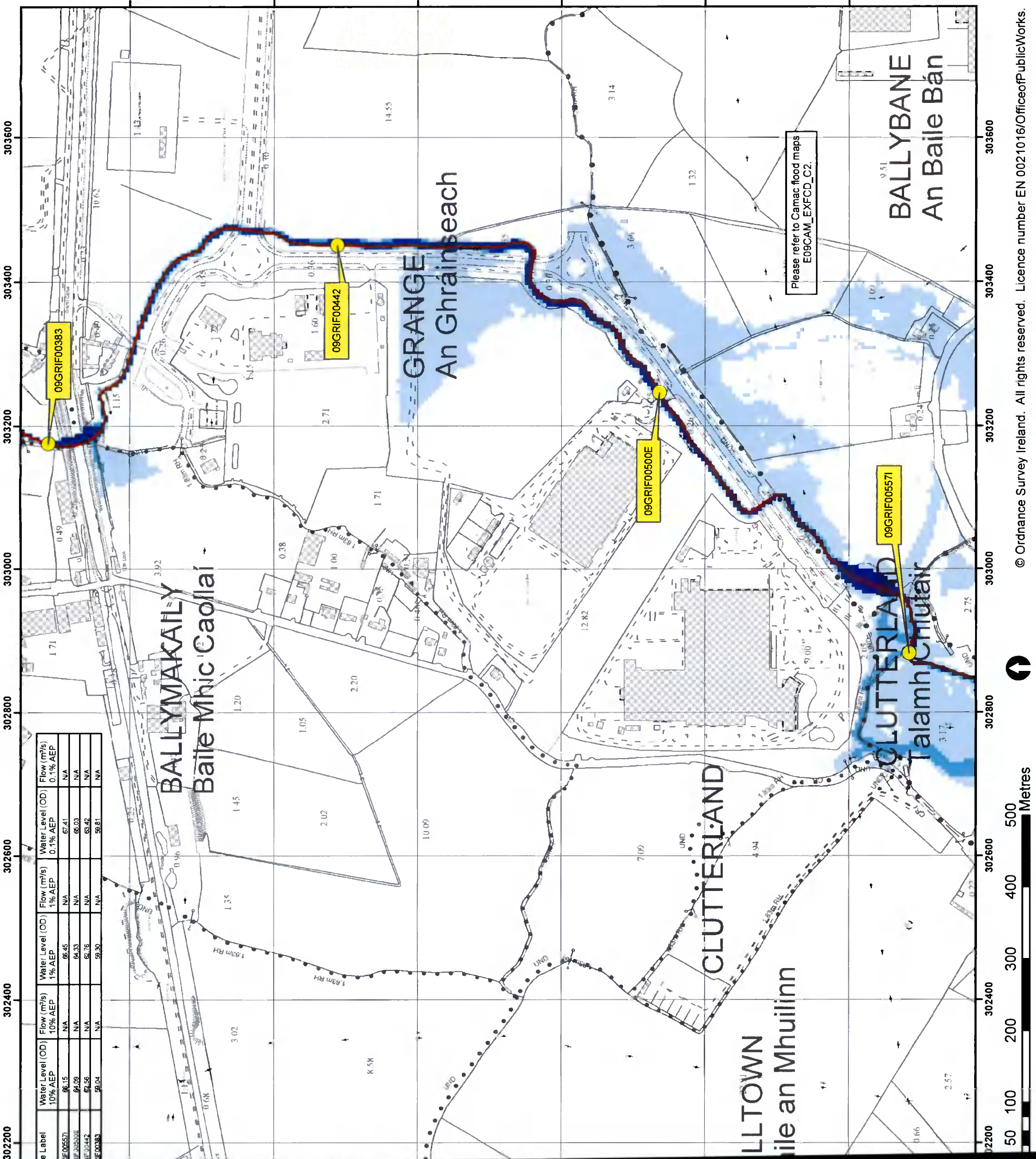
REV:	NOTE:	DATE:



The Office of Public Works
 Jonathan Swift Street
 Tinn
 Co. Meath
 B112 6RZ
 E: rreliard@rpsgroup.com

Map: Baldonnel Fluvial Flood Extents

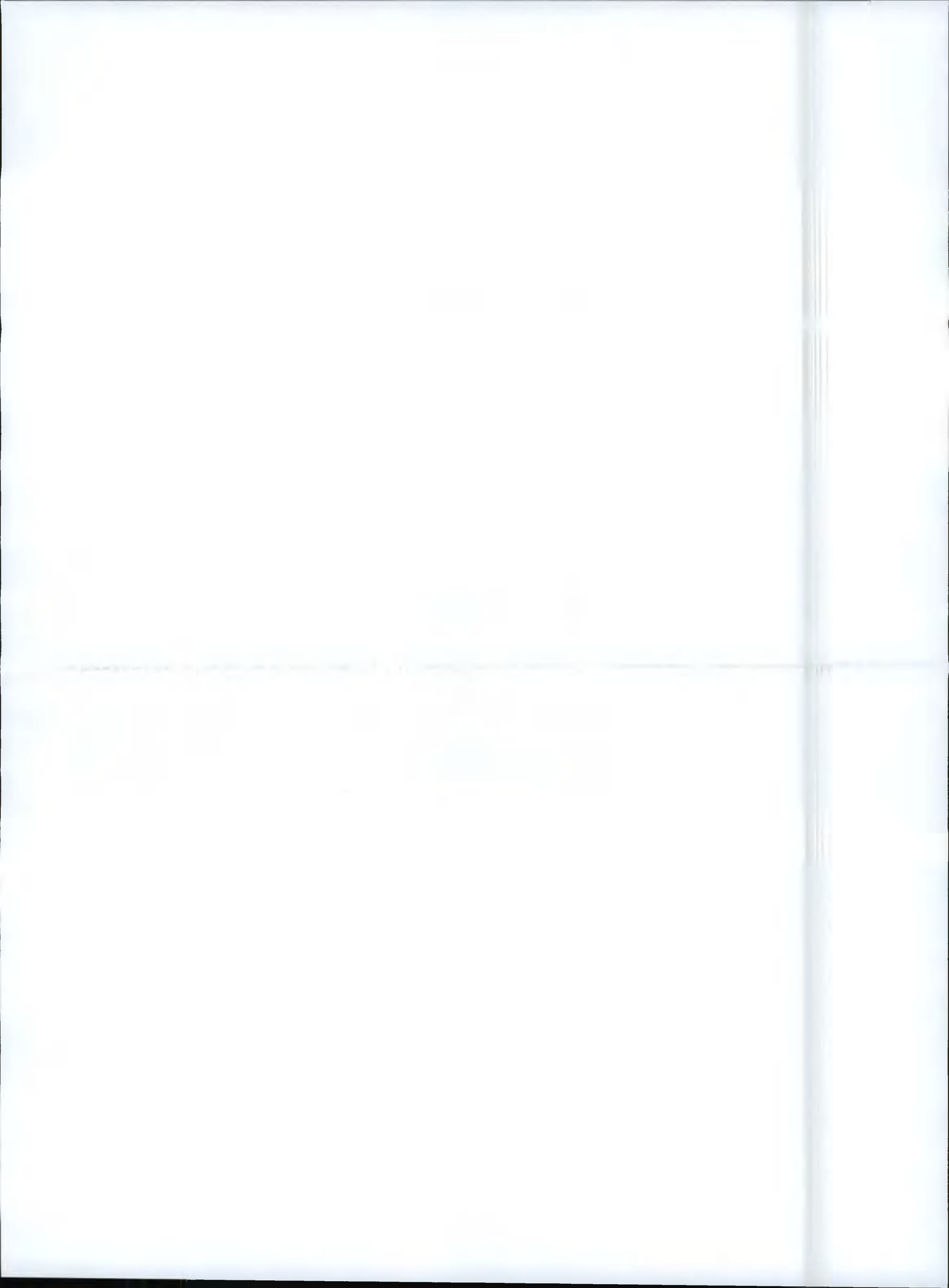
Map Type:	EXTENT		
Source:	FLUVIAL		
Map Area:	HPWAL		
Scenario:	CURRENT		
Drawn By:	C.C.	Date:	21 July 2016
Checked By:	D.J.	Date:	21 July 2016
Approved By:	G.G.	Date:	21 July 2016
Drawing No.:	E09BAL_EXFCD_F0_10		
Map Series:	Page 10 of 12		
Drawing Scale:	1:5,000 @ A3		



Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09GRIF005571	66.15	N/A	66.45	N/A	67.41	N/A
09GRIF005572	64.09	N/A	64.33	N/A	65.03	N/A
09GRIF00442	62.56	N/A	62.76	N/A	63.42	N/A
09GRIF00383	59.04	N/A	59.30	N/A	59.81	N/A

Please refer to Camac flood maps
 E09CAM_EXFCD_C2.





Location Plan :



Legend:

- Flood Extents**
- Fluvial - Indicative 1% AEP (100-yr) Event
 - Fluvial - Extreme Event
 - Coastal - Indicative 0.5% AEP (200-yr) Event
 - Coastal - Extreme Event
 - Pluvial - Indicative 1% AEP (100-yr) Event
 - Pluvial - Extreme Event
 - Groundwater Flood Extents
- Lakes / Turfoughs**
- Lakes / Turfoughs
- PFRA Outcomes**
- Probable Area for Further Assessment
 - Possible Area for Further Assessment

Important User Note

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

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

Office of Public Works
 Jonathon Swift Street
 Trim
 Co Meath
 Ireland



Project
PRELIMINARY FLOOD RISK ASSESSMENT (PFRA)

Map:
PFRA Indicative extents and outcomes - Draft for Consultation

Figure By:	PJW	Date:	July 2011
Checked By:	MA	Date:	July 2011
Figure No:	Revision		
2019 / MAP / 237 / A		0	

Drawing Scale : 1:50,000 Plot Scale : 1:1 @ A3

