



Aungierstown 110Kv Sub-Station Grange Castle South FLOOD RISK ASSESSMENT

December 2020

P200401

CONTACT DETAILS

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APPROVALS

	Name	Signature	Position	Date
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Reviewed by	J. Mayer		Director	27/08/2020
Approved by	J. Mayer		Director	28/08/2020

REVISIONS

Revision By	Date	Context

VERSIONS

Number	By	Date	Context
1	S. O'Reilly	08/12/2020	Planning Submission

SOURCES OF DATA

Office of Public Works (OPW)	Marston Planning Consultancy
Met Eireann	
Murphy Surveys Ltd.	
Google	

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REPORT CONTENTS

Executive Summary	4
1. Introduction.....	6
2. Flood Risk Assessment.....	7
3. Source-Pathway-Receptor Model	8
3.1 Coastal Flooding.....	9
3.2 Fluvial Flooding.....	9
3.3 Pluvial Flooding.....	10
3.4 Ground Water Flooding.....	10
4. Impact on Downstream Network	11
5. Conclusion	12
Appendix A – OPW – Hydraulic Modelling Map – Fig. 4.1.40	13
Appendix B – OPW – National Flood Hazard Mapping.....	14
Appendix C – OPW – PFRA &CFRAM Mapping.....	15
Appendix D – OPW – Preliminary Groundwater Flood Hazard Map	16
Appendix E – 1:1000yr Flood Extent (Griffeen River) @ Level 69.49m.....	17

Executive Summary

This report was prepared for An Bord Pleanála in connection with the planning application for a 110kV GIS Sub-station development and addresses the existing and proposed civil infrastructure, for the proposed development, located in Grange Castle Business Park South, near to the junction of Baldonnell Road and Grange Castle South Access Road, Co. Dublin.

The proposed development primarily comprises the provision of two no. 110kV transmission lines and a 110kV Gas Insulated Switchgear (GIS) substation compound along with associated and ancillary works and is described as follows:

The proposed 110kV GIS Substation Compound is to be located on lands to the north-east of the two storey data centre facility and associated three storey office block that was permitted under SDCC Reg. Ref. SD18A/0134 / An Bord Pleanála Ref. ABP-302813-18, and within an overall landholding bound to the north by the Grange Castle South Business Park access road; to the west by the Baldonnell Road and to the south by 3 no. residential properties and the Baldonnell Road; and to the east by the Google data centre facility within Baldonnell, Dublin 22. The site of the proposed development has an area of c. 0.9163 hectares.

The proposed 110kV Gas Insulated Switchgear (GIS) Substation Compound includes the provision of a two storey GIS Substation building (with a gross floor area of 1,307.2sqm) (known as the Aungierstown Substation), two transformers, lighting and lightning masts, car parking, associated underground services and roads within a 2.6m high fenced compound and all associated construction and ancillary works.

Two proposed underground single circuit 110kV transmission lines will connect the proposed Aungierstown 110kV GIS Substation to the existing 220kV / 110kV Castlebaggot Substation to the immediate north-east. The proposed transmission lines cover a distance of approximately 120m and 140m within the townlands of Ballybane, and Aungierstown and Ballybane.

The development includes the connections to the two substations (existing and proposed), changes to landscaping permitted under SDCC Reg. Ref. SD18A/0134 / An Bord Pleanála Ref. ABP-302813-18 and all associated construction and ancillary works.

An Environmental Impact Assessment Report has been prepared in respect of this application.

The Report should be read in conjunction with all associated Planning Drawings, and deals with the potential flood risk and mitigation measures proposed for the subject site.

1 Introduction

The applicant proposes to construct a 110Kv GIS Sub-Station, which will be accessed through Grange Castle Business Park South. It is intended to access the proposed development off Grange Castle South Access Road, which connects to Baldonnell Road. The purpose of this report is to address any potential flooding elements of the proposed data centre development, on lands as indicated on the site location map below.

The total subject site area extends to circa 2.262 acres (0.916 ha), with the majority of the site being greenfield.

The location of the site is indicated indicatively 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 as set out 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.

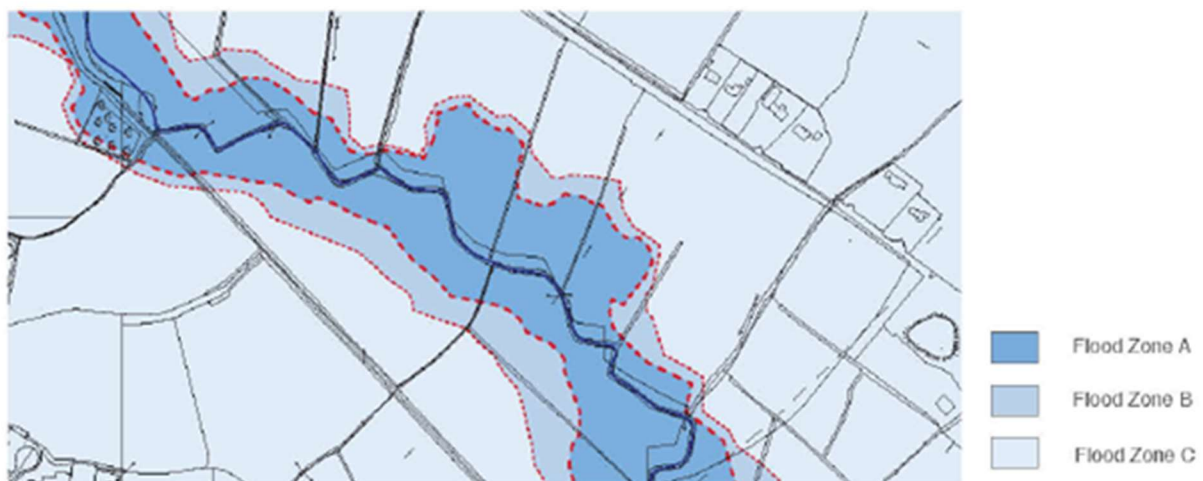


Fig. 2.3: Indicative flood zone map extract

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 74.50m 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 river in the proximity of the site, is the Griffeen River, which is located circa 470m to the west of the site.

Further to the above, this is considered to be very low risk, given the fact that the records of fluvial flooding on the site or environs, i.e. 0.1% AEP Extreme Event (1:1000yr), is located in an area which is circa 345m to the west of the site, as identified on the mapping included within the Eastern CFRAM Study HA09 Hydraulics Report, Baldonnel Model, as carried out by the RPS Group - refer Appendix A.

From a levels perspective, it appears that the peak water level, as taken from the above report, is circa 70.50m. The lowest finished surface level on site is circa 74.26m and the lowest building finished floor level has been set at 74.50m, which is well in excess of the required 500mm above the highest known 1:1000yr flood level.

There is a small area of flooding indicated on the CFRAM mapping, circa 270m to the west of the subject site, which forms part of the CyrusOne data centre project, which is currently well under construction, however, there is no flooding at all indicated on the subject site, i.e. E09CAM_DPFCD001_F1_13 refer Appendix C. Even though there is no flooding indicated on the subject site, mapping in the aforementioned hydraulics report is considered to be more accurate, given that both the modelled flows and the hydrology flow estimation have been compared, in order to produce the mapping as contained in the Hydraulic Report. It is also specifically stated on the aforementioned CFRAM mapping, that the Baldonnel AFA flood maps, detailing flooding from the Griffeen River, are to be taken into account, i.e. as above, refer Appendix A.

Further to the above, we have also produced a flood extents map, based on the information from the CFRAM mapping with regard to the 1:1000yr flood level, at the culvert crossing beneath the Nangor Road and current topographical survey information, which provides more accurate data when indicating flood extents.

The topographical survey is based on ITM (Irish Transverse Mercator), GPS compatible mapping and is used extensively by Ordnance Survey Ireland, whereas, the CFRAM mapping relies on Lidar (Light Detection & Ranging) survey, which is not nearly as accurate as a topographical survey, as it is conducted by air. The accuracy of Lidar survey varies between 50mm – 200mm vertically and between 400mm – 1500mm horizontally.

Additionally the OPW Flood Hazard Mapping, refer Appendix B, indicates no reference to flooding on or near the environs, of the subject site.

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 data centre development site, which encompasses 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 being provided, together with a hydrobrake flow control mechanism limiting the total outflow to the Q-bar run-off rate of 0.5 l/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 tank
- Surface water attenuation has been provided and sized based on a Q-bar run-off rate of 0.5 l/s
- A Hydrobrake mechanism has been installed to restrict the outflow into the existing network accordingly, i.e. 0.5 l/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 existing 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.

Any fluvial flooding adjacent to the environs of the site is considered to be of an extreme nature, i.e. 1:1000 year storm event and would not jeopardise the proposed development of the site, particularly as 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.

Additionally, a wetland area has been installed as part of the data centre development site, which provides a buffer zone between the Baldonnell Road edge and the proposed data centre and subject site development. This area is also set at a level well below the finished levels of the subject site.

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

Hydraulic Modelling Map – Fig. 4.1.40

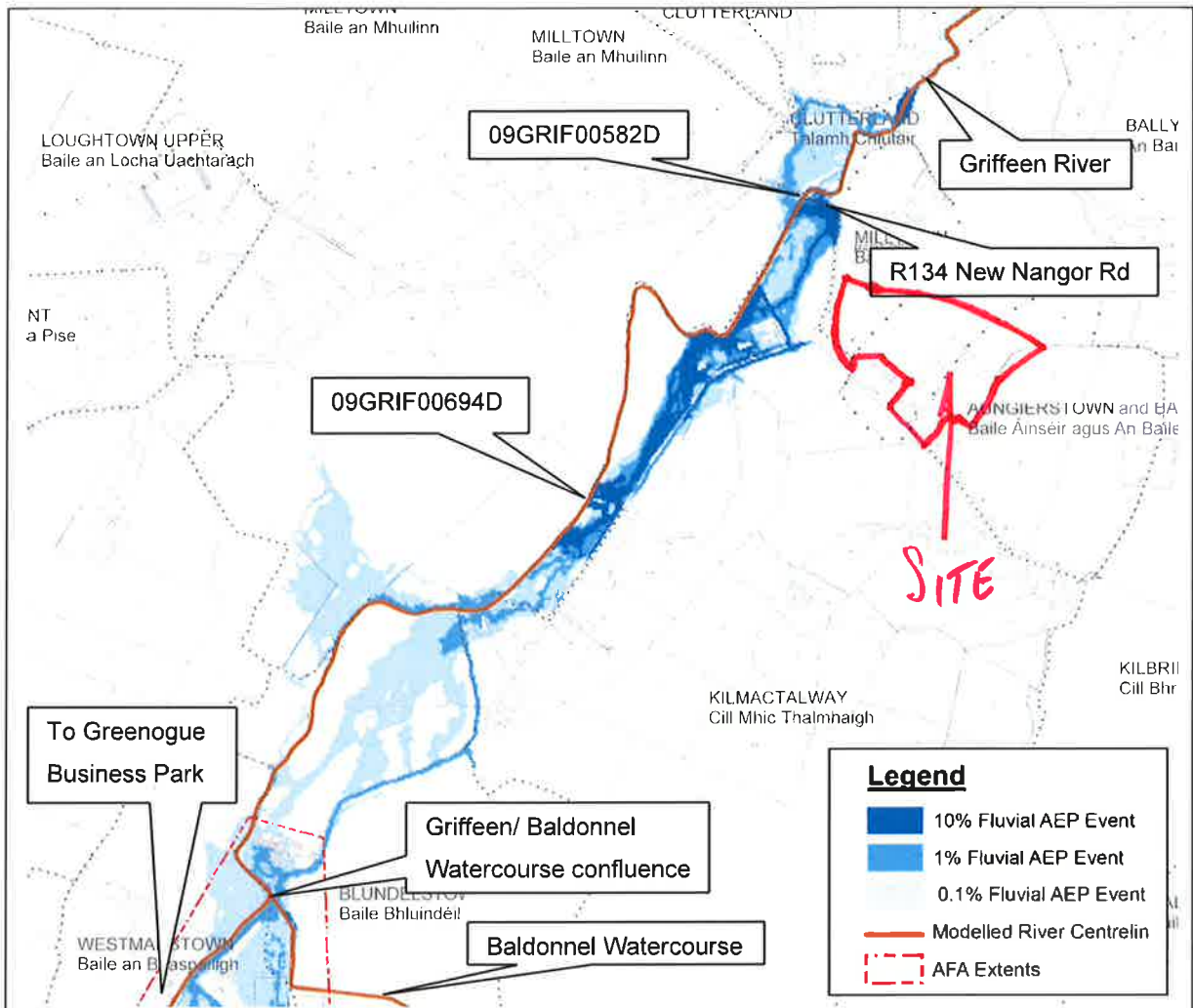


Figure 4.1.40: Flood extents on the Griffeen River downstream of Greenogue Business Park

(n) Flooding was found to occur on the Griffeen River during design runs of 0.1% AEP due to insufficient capacity of culvert 09GRIF00474I, as shown in Figure 4.1.41. This flooding was found to affect an area of agricultural land and a local road. Localised flooding was also found to occur immediately upstream of the inlet to bridge 09GRIF00389D which passes under the Grand Canal. This flooding occurs during design runs of 1% AEP or greater due to the restrictive effect of this bridge, and was found to affect a localised area of agricultural land.

Appendix B

OPW - National Flood Hazard Mapping

Summary Local Area Report

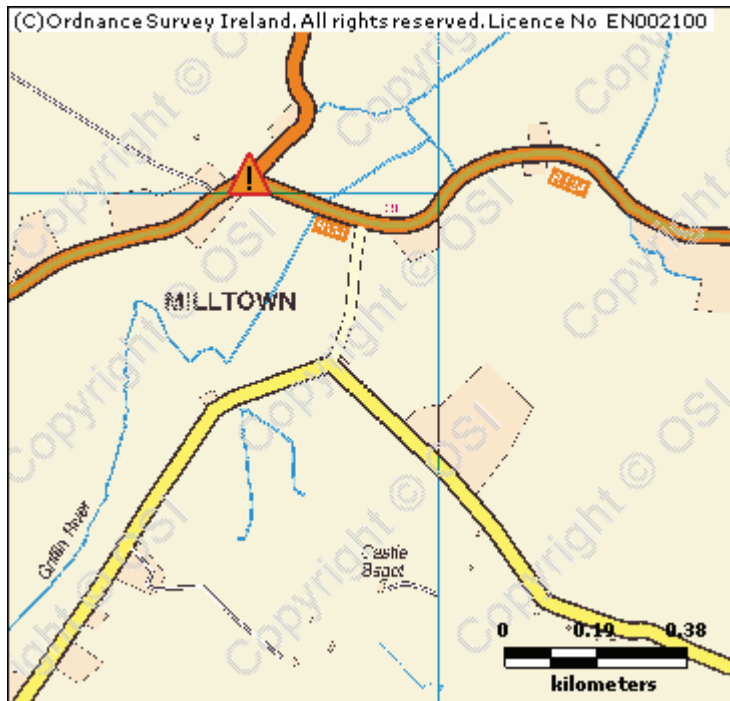
This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Dublin

NGR: O 028 306

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 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.

6 Results

1. Griffeen November 2000
 County: Dublin
 Start Date: 05/Nov/2000
 Flood Quality Code: 1
 Additional Information: [Photos \(6\)](#) [Reports \(9\)](#) [Press Archive \(6\)](#) [More Mapped Information](#)

2. Flooding at Greenogue Business Park, Rathcoole, Co. Dublin on 24th Oct 2011
 County: Dublin
 Start Date: 24/Oct/2011
 Flood Quality Code: 2
 Additional Information: [Reports \(1\)](#) [More Mapped Information](#)

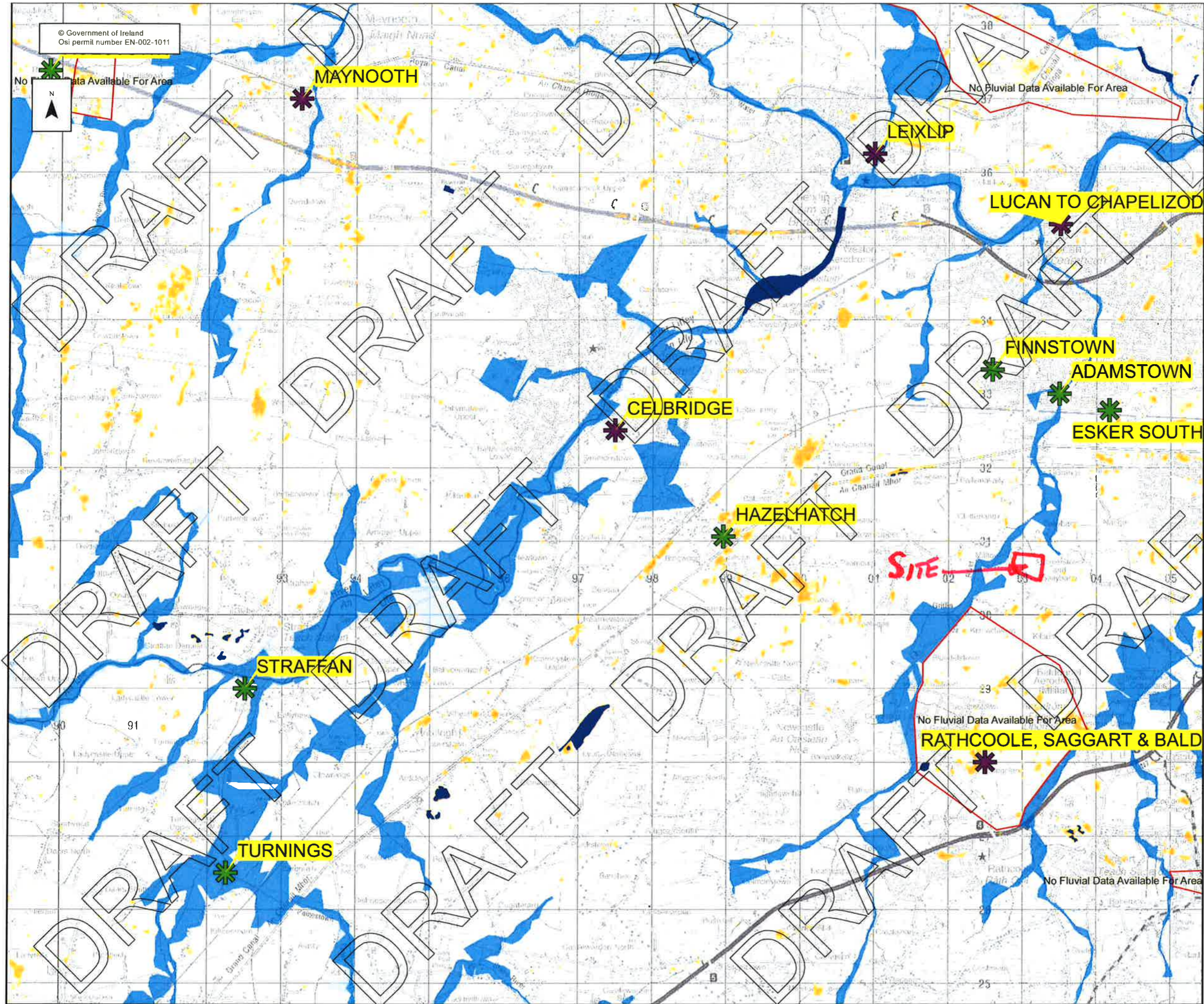
3. Aylmer Road Newcastle Nov 2000
 County: Dublin
 Start Date: 05/Nov/2000
 Flood Quality Code: 3
 Additional Information: [Reports \(2\)](#) [Press Archive \(1\)](#) [More Mapped Information](#)

4. Peamount R134 R120 junction Nov 2000
 County: Dublin
 Start Date: 05/Nov/2000
 Flood Quality Code: 3
 Additional Information: [Reports \(1\)](#) [Press Archive \(1\)](#) [More Mapped Information](#)

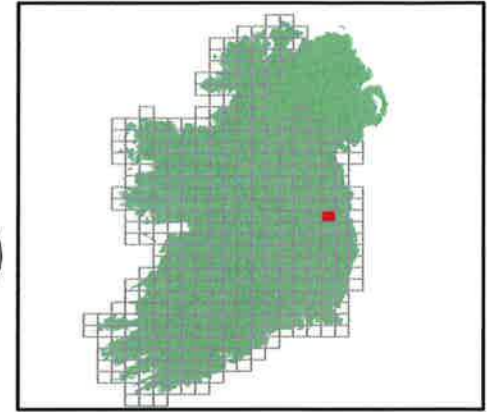
5. Peamount Road Recurring
 County: Dublin
 Start Date:
 Flood Quality Code: 4

Appendix C

OPW - PFRA & CFRAM Mapping



Location Plan :



Legend:

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

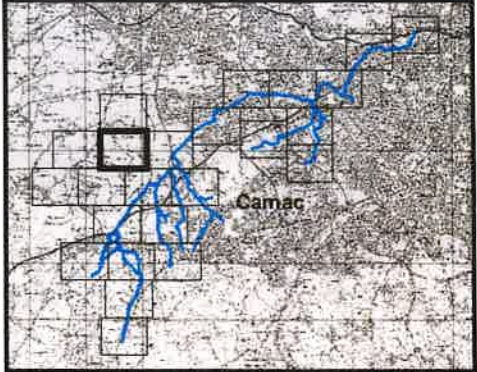
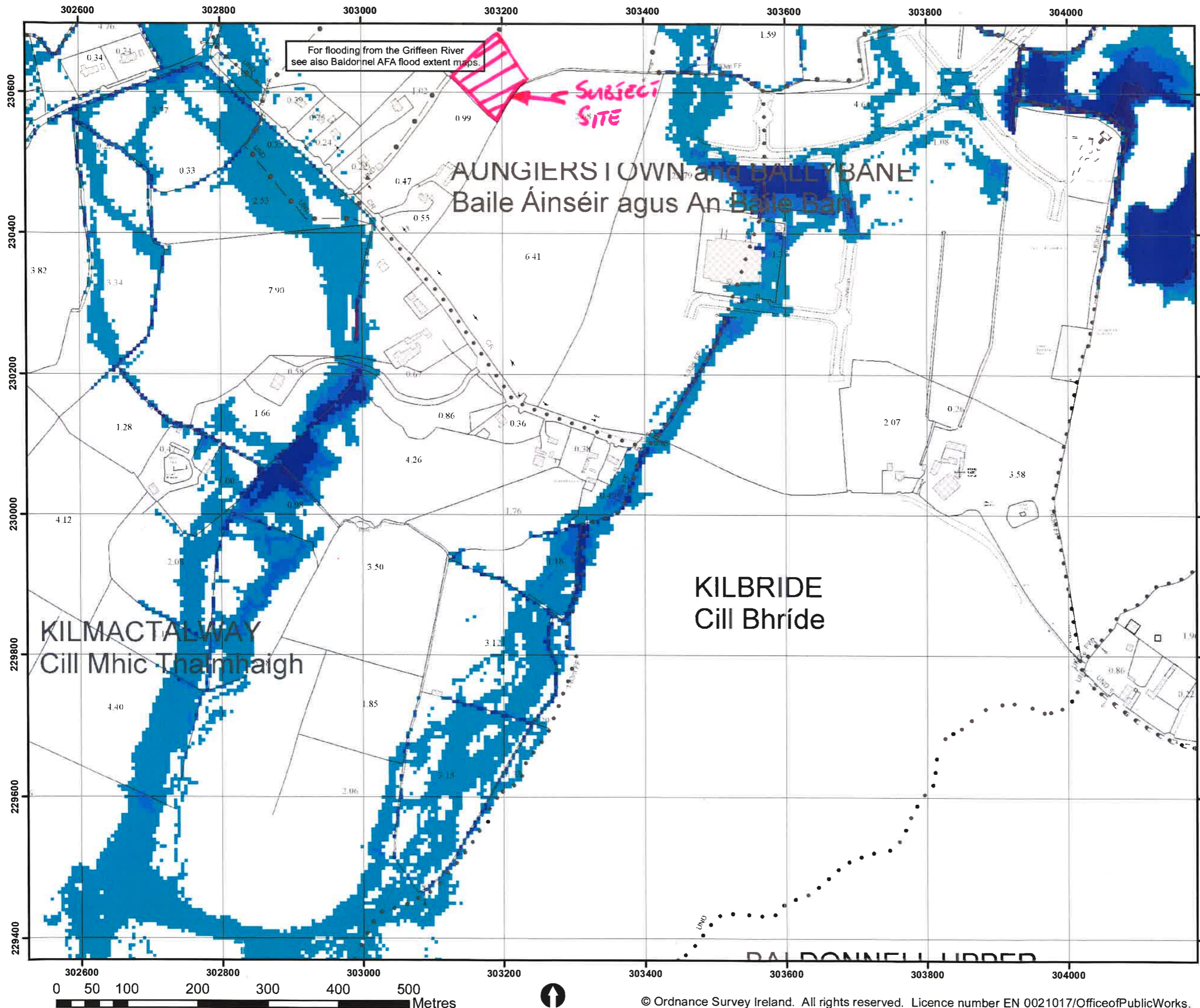


Project:
 PRELIMINARY FLOOD RISK ASSESSMENT (PFRA)

Map:
 PFRA Indicative extents and outcomes
 - Draft for Consultation

Figure By : PJW	Date : July 2011
Checked By : MA	Date : July 2011
Figure No. : 2019 / MAP / 237 / A	Revision : 0
Drawing Scale : 1:50,000	Plot Scale : 1:1 @ A3





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

Legend

0.1% AEP Fluvial Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m

Modelled River Centreline

AFA Extents

FINAL

REV:	NOTE:	DATE:

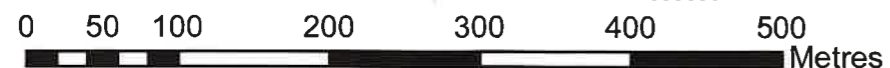


The Office of Public Works
 Jonathan Swift Street
 Trim
 Co Meath

Elmwood House
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 Belfast
 BT12 6RZ

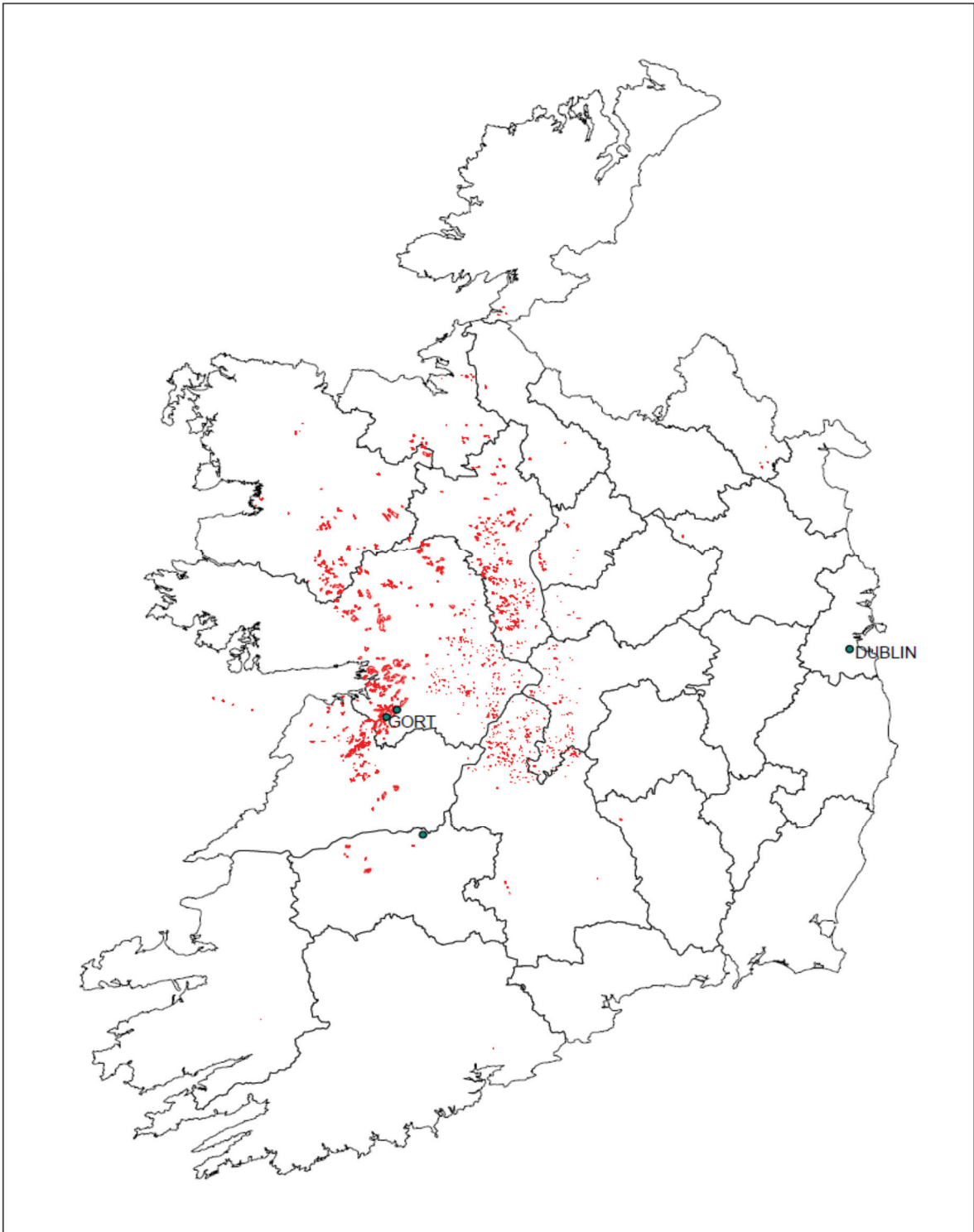
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 E ireland@rpsgroup.com

Map:	
Camac Fluvial Flood Depths	
Map Type: DEPTH	
Source: FLUVIAL	
Map Area: HPW	
Scenario: CURRENT	
Drawn By: C.C.	Date: 27 October 2017
Checked By: A.S.	Date: 27 October 2017
Approved By: S.P.	Date: 27 October 2017
Drawing No.: E09CAM_DPFCD001_F1_13	
Map Series: Page 13 of 24	
Drawing Scale: 1:5,000 @A3	



Appendix D

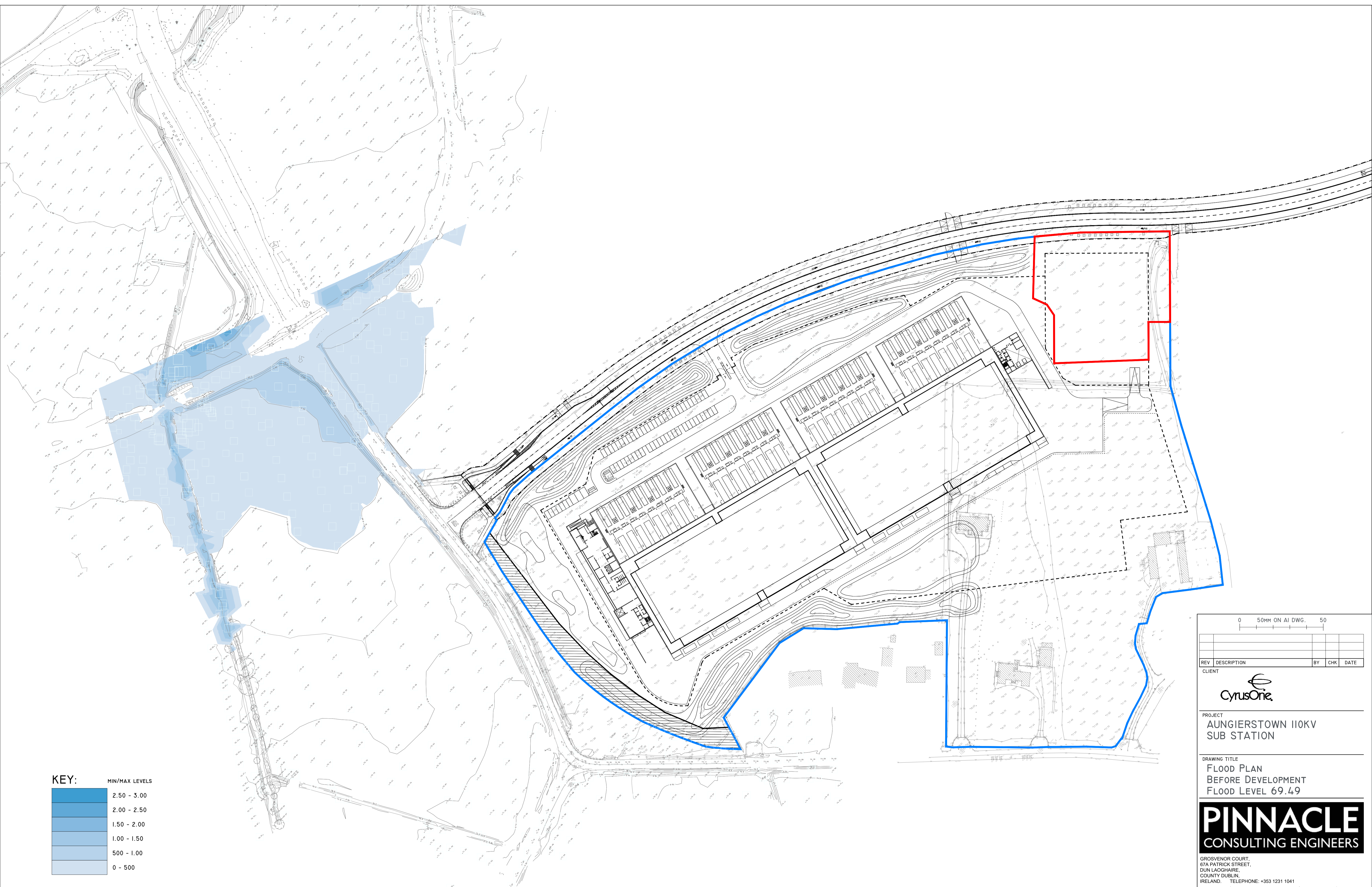
OPW – Preliminary Groundwater Flood Hazard Map



Title		Preliminary Groundwater Flood Hazard Map		 Mott MacDonald Water & Environment Demeter House, Station Road Cambridge CB1 2RS Tel +44 (0) 1223 463500 Fax +44 (0) 1223 461007 www.mottmac.com	Legend  County boundary  Location  Area at risk of groundwater flooding
Figure	Size	Drawn	RAH		
6.6	A4	Checked	SB		
Drawing No:	262128BA/2.1	Approved	SB		
Date:	24/06/2010	Rev No	01		

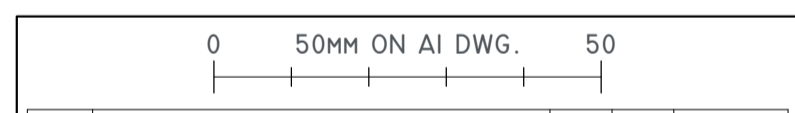
Appendix E

**1:1000yr Flood Extent
(Griffeen River) @ Level 69.49m**



KEY:

MIN/MAX LEVELS	
	2.50 - 3.00
	2.00 - 2.50
	1.50 - 2.00
	1.00 - 1.50
	500 - 1.00
	0 - 500



REV	DESCRIPTION	BY	CHK	DATE

CLIENT

PROJECT
**AUNGIERSTOWN 110KV
 SUB STATION**

DRAWING TITLE
**FLOOD PLAN
 BEFORE DEVELOPMENT
 FLOOD LEVEL 69.49**

**PINNACLE
 CONSULTING ENGINEERS**

GROSVENOR COURT,
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 DUN LAOGHAIRE,
 COUNTY DUBLIN,
 IRELAND. TELEPHONE: +353 1231 1041
 NORWICH | WELWYN GARDEN CITY | LONDON | BRISTOL

DRAWING STATUS

PLANNING			
SCALE	DATE	DRAWN BY	CHECKED
1:1000	DEC '20	KR	JM
DRG NO.	REVISION	SHEET SIZE	
261	-	A1	

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