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KILDARE COUNTY COUNCIL

PROPOSED SOCIAL HOUSING AT ARDCLOUGH ROAD

FLOOD RISK ASSESSMENT



PROJECT NAME: PROPOSED SOCIAL HOUSING AT ARDCLOUGH ROAD

REPORT NAME: FLOOD RISK ASSESSMENT

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1.0 INTRODUCTION

1.1 Appointment

TOBIN Consulting Engineers have been commissioned by Kildare County Council to prepare a Flood Risk Assessment and Justification Test for the site of a Proposed Social Housing Development at Ardclough Road, Celbridge Co, Kildare.

1.2 Administrative Jurisdiction

The site is located within the administrative jurisdiction of Kildare County Council, whose offices are located at Devoy Park, Naas, County Kildare.



Figure 1-1: Site Location Drawing 11162-2000

The proposed development is located in Celbridge in Northeast County Kildare, see figure 1-1 above of Site Location drawing 11162-2000, drawing located in Appendix A. The site is zoned primarily for residential development. The site is bounded to the West and North by undeveloped lands, earmarked to be developed into a Park by Kildare County Council. To the east of the site is the Ardclough road and a number of residential units. The South is undeveloped lands used for agricultural purposes.

1.3 Proposed Development

The proposed development at the site will consist of the following:

- 39 No. Residential Units, comprising of single storey, two storey and three storey Dwellings.
 - Associated Site works, including road, footway and ancillary services.



Figure 1-2: Site Layout Drawing 11162-2004

1.4 The Flood Risk Management Climate Change Adaptation Plan

The Flood Risk Management Climate Change Adaptation Plan (published May 2015) has been prepared under the remit of the National Climate Change Adaptation Framework. It sets out the policy on climate change adaptation of the Office of Public Works (OPW), the lead agency for flood risk management in Ireland, based on a current understanding of the potential consequences of climate change for flooding and flood risk in Ireland, and the adaptation actions to be implemented by the OPW and other responsible Departments and agencies in the Flood risk management sector.

The document recommends two future flood risk scenarios for considering future implications of factors, including climate change, in relation to future flooding. The Mid-Range Future Scenario (MRFS) recommends a 'likely' future scenario while the High-End Future Scenario (HEFS) represents a more 'extreme' future scenario. Table 1-1 sets out the allowances for both od these scenarios.

Table 1-1: Allowance in Flood Parameters for the Mid-Range and High-End Future Scenarios

Parameter	MRFS	HEFS
Extreme Rainfall Depths	+ 20%	+ 30%
Peak Flood Flows	+ 20%	+ 30%
Mean Sea Level Rise	+ 500 mm	+ 1000 mm
Land Movement	- 0.5 mm / year ¹	- 0.5 mm / year ¹
Urbanisation	<i>No General Allowance – Review on Case-by-Case Basis</i>	<i>No General Allowance – Review on Case-by-Case Basis</i>
Forestation	- 1/6 Tp ²	- 1/3 Tp ² + 10% SPR ³

Note 1: Applicable to the southern part of the country only (Dublin – Galway and south of this)

Note 2: Reduction in the time to peak (Tp) to allow for potential accelerated runoff that may arise as a result of drainage of afforested land

Note 3: Add 10% to the Standard Percentage Runoff (SPR) rate: This allows for temporary increased runoff rates that may arise following felling of forestry.

For the purpose of this flood risk assessment, we have assessed the proposed development against the Mid Range Future Scenario as it represents a likely future scenario.

1.5 The Kildare County Development Plan

Section 17.8 (Volume 1) of the 2017-2023 Kildare County Development Plan (CDP) deals with the topic of flooding. The salient information pertaining to flood risk at the subject site is referenced below:

All applications for development shall include proposals for restricting the rate of surface water run-off in accordance with the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS).

- *Developments shall incorporate Sustainable urban Drainage Systems (SuDS) as appropriate in accordance with the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS).*
- *Proposals for development shall be subject to site specific flood risk assessment in accordance with Chapter 7 of the Count Development Plan.*
- *Applicants shall have regard to the strategies, objectives and policies contained within Chapter 7 of the Count Development Plan at all stages of their development proposals, as well as the requirements of The Planning System and Flood Risk Management – Guidelines for Planning Authorities, DEHLG (2009).*
- *Proposals for surface water attenuation systems should include maintenance proposals and procedures.*
- *Proposals to construct new and replacement culverts and bridges on watercourses shall be subject to the approval of the Office of Public Works, in accordance with Section 50 of the Arterial Drainage Act 1945 and the Planning System and Flood Risk Management Guidelines, DEHLG, (2009). These applications will be made to the Office of Public Works by the developer post receipt of planning permission. Approval shall be obtained prior to commencement of the works. The minimum permissible diameter of any culvert shall be 900mm with access to be provided for maintenance as appropriate.*

- *Peak flood flows used in the design of culvert sizes, channel sizes and flood alleviation works to be undertaken as part of a development shall be calculated in accordance with a method approved by the Office of Public Works.*

Applicants are required to conduct a flood impact assessment in accordance with The Planning System and Flood Risk Management – Guidelines for Planning Authorities (2009) in all applications where a potential flood risk exists.

All new developments shall be designed and constructed to meet the following minimum flood design standards:

- *For urban areas - the 1% AEP storm event + a 20% allowance for climate change*
- *For rural areas - the 1% AEP storm event + a 20% allowance for climate change*

Section 7.5.4 of the CDP notes that a countywide Strategic Flood Risk Assessment (SFRA) was carried out as part of the plan. This SFRA broadly summarised the recommendations of the PSFRM guidelines and discussed specific sources of flood risk in a number of small towns in Co. Kildare. The larger towns in Co. Kildare, including Celbridge, are subject to their own Local Area Plans and were specifically excluded from discussion in the County SFRA.

2.0 SITE FLOOD HISTORY & FLOOD DATA

2.1 Sources of Information

TOBIN Consulting Engineers reviewed information collected from the below sources to identify any existing flood risk to the site and proposed development.

- Historic flood maps and reports from the OPW www.floodinfo.ie
- CFRAMS Study
- Celbridge Local Area Plan 2017-2023

2.2 Historic Flooding

A past flood event summary can be viewed in Appendix B. This was generated on the website www.floodinfo.ie and lists out the flood events which happened within 2.5km of our proposed site.

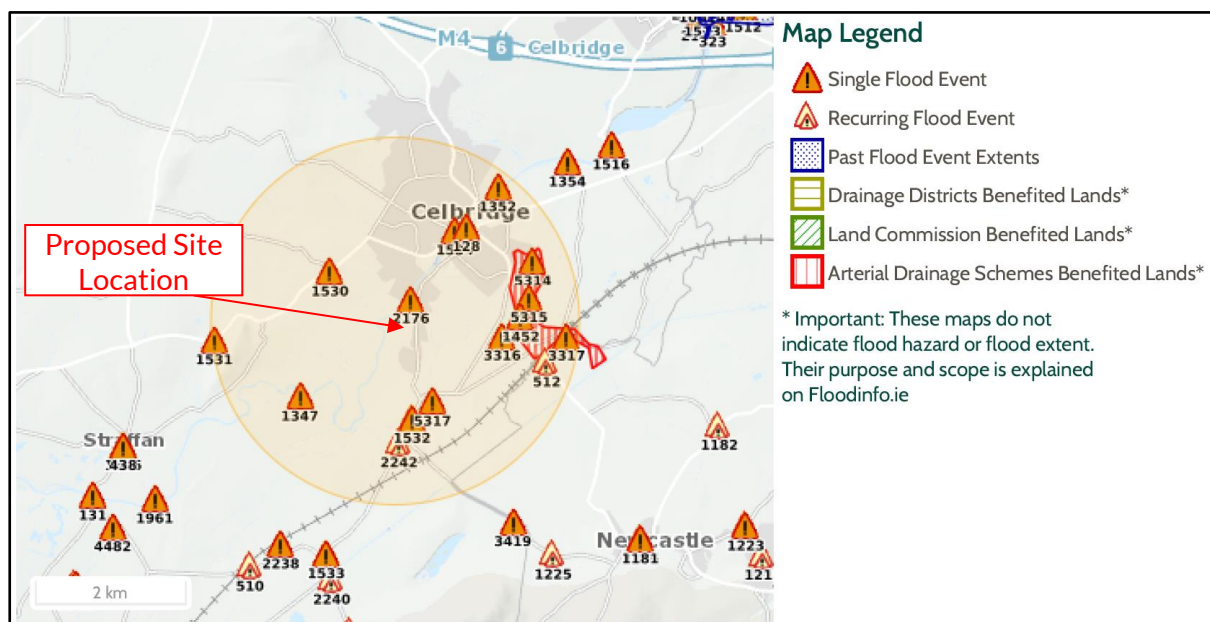


Figure 2-1: Past Flood Events within 2.5km of Site

The only flood event located within close proximity to the site was Flood Event identified as 2176. The remaining 18 results mentioned within the summary are determined to be a sufficient distance away that they would not affect the proposed site.

Under Event 2176 flooding occurred in the river Liffey in 1954, after a heavy rainfall event flooding occurred along the Liffey. From reading the newspaper reports attributed to the flooding, there is no account of flooding occurring at the location shown as most of the flooding was placed in Dublin City. The only mention of Celbridge within the newspaper articles and reports states “There was only limited communication with Galway, Claremorns, Celbridge and Maynooth.”. Therefore, it is assumed reasonable to omit this flooding event as it is not a concern.

2.3 OPW PFRA

The Preliminary Flood Risk Assessment (PFRA) is a requirement of the EU Flood Directive (2007/60/EC). One of the PFRA deliverables is flood probability mapping for various sources:

pluvial (surface water), groundwater, fluvial and tidal. The PFRA is a preliminary or ‘indicative’ assessment and analysis has been undertaken to identify areas potentially prone to flooding. The OPW PRFA study has been largely superseded by the CFRAM programme, however it does provide valuable information regarding pluvial and groundwater flooding. The PRFA flood maps are also the main source of flood risk in areas not covered by the CFRAM programme. See figure 2-2 below for the OPW PRFA flood extents at the site and surrounding area.

Review of the PFRA study highlights possible pluvial/surface water flooding in the Southwest corner of the site. The full PFRA Map can be seen in Appendix F.

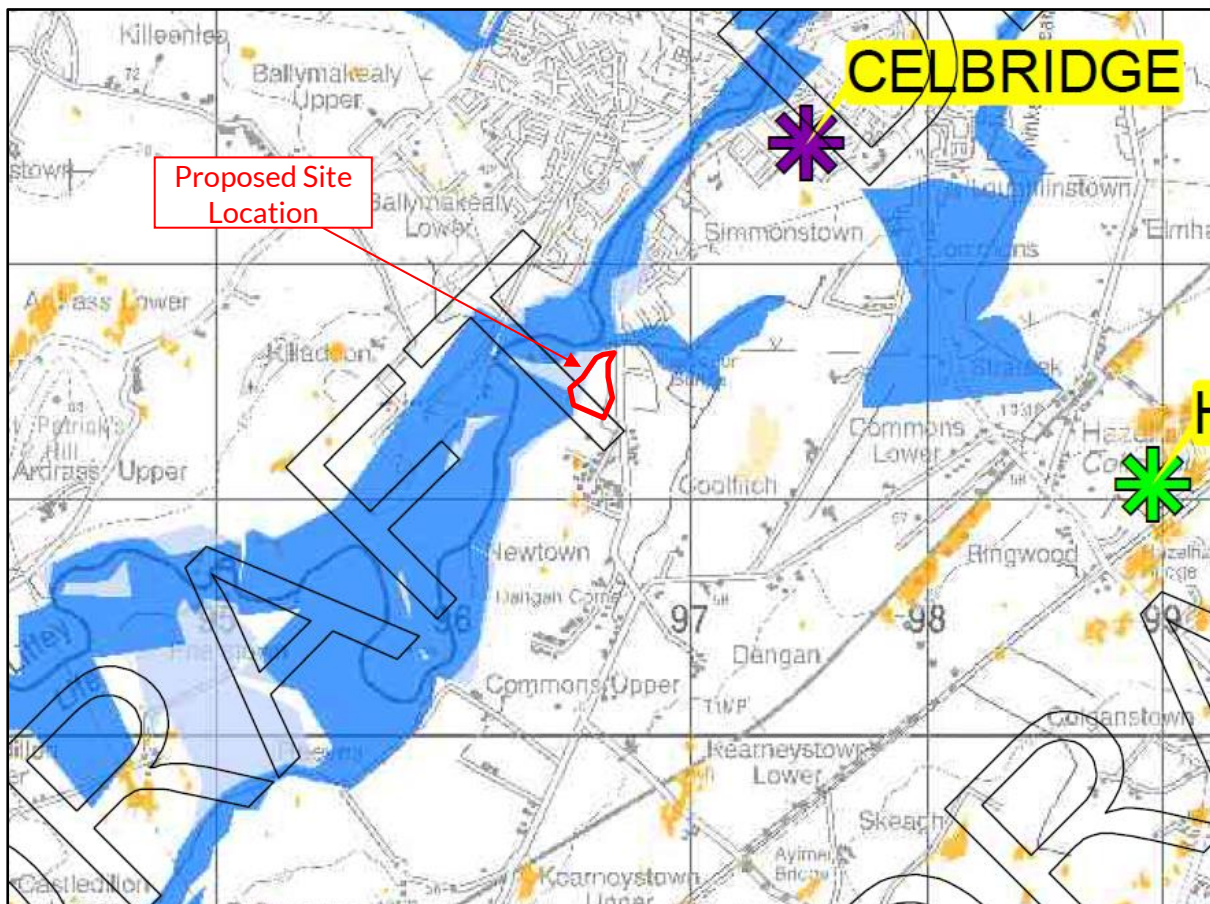


Figure 2-2: OPW Preliminary Flood Assessment (PFRA)

Much of the surface water arising in Celbridge town is managed by an existing storm sewer network and there is no record of pluvial flooding or ponding of surface water occurring in the vicinity of the subject site.

With reference to Drawings 11162-2010 and 11162-2011 included in Appendix A; surface water arising within the development site will be managed by a dedicated storm water drainage system designed (by TOBIN) in accordance with SUDS.

The drainage system, detailed in the Engineering Services Report, includes the following measures: flow restriction (hydrobrake), stormwater attenuation, petrol interceptor, permeable paving, tree pits and dry swales.

The proposed stormwater drainage system will discharge to the River Liffey at greenfield runoff rates. The network was designed to accommodate a 100-year MRFS rainfall event plus 20% climate change such to ensure manholes do not flood.

The landscaping and topography of the developed site shall provide safe exceedance flow paths in the event of extreme flood events or in the case of a blockage of the drainage system, so as to minimise risks to people and property.

2.4 CFRAMS

The proposed site was identified as a flood risk area in the national Catchment Flood Risk Assessment and Management (CFRAM) study. Celbridge, Co Kildare is included under the Eastern CFRAM study. Figure 2-3 below presents the CFRAM *mapping of predicted fluvial* flood extents for the 1 in 10, 100 and 1000 year return periods. The proposed site is identified by the red line boundary.

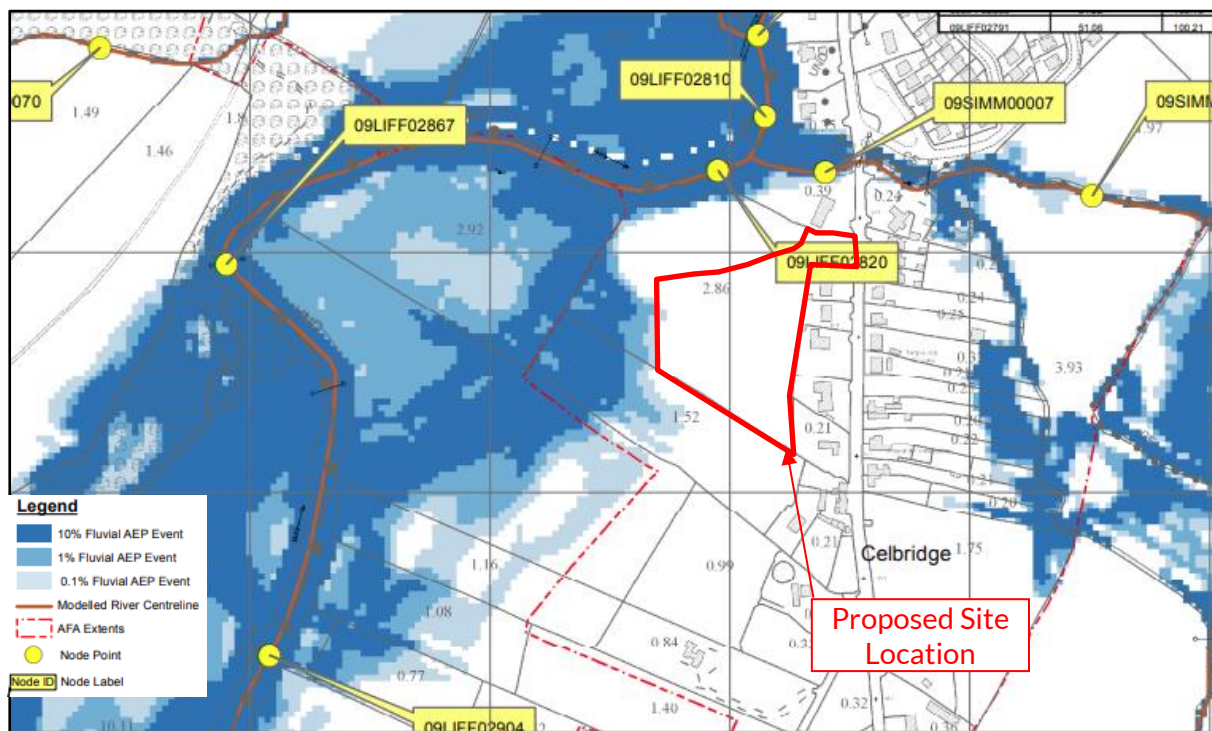


Figure 2-3: Extract from CFRAM Mapping

A small portion of the western area of the site has been identified as being liable to flooding from the 1:10 year (10%) Annual Exceedance Probability (AEP) fluvial flood event. The lands adjacent the site to the west, a future recreational park, are liable to flooding from the 1:100 year (1%) and 1:1000 year (0.1%) AEP fluvial flood event, as can be seen in figure 2-2 above.

The source of the flooding is associated with the River Liffey.

The entire CFRAMS Maps can be seen in Appendix C.

Table 2-1: Nodes & Their Corresponding Information

Node Label	Type of Flooding	Water Level (OD) 10% AEP	Water Level (OD) 1% AEP	Water Level (OD) 0.1% AEP
09LIFF02867	Fluvial	53.06	53.16	53.29
09LIFF02820	Fluvial	52.82	52.88	52.95
09LIFF02810	Fluvial	52.76	52.82	52.89

The Node with proximity closest to the site and whose information would be more associated with the site is 09LIFF02820. The predicted high-water level identified at 09LIFF02820 during its 0.1% AEP is 52.95m.

2.5 Celbridge Local Area Plan

Included in the Celbridge Local Area plan 2017 – 2023 is a Strategic Flood Risk Assessment Map, please see appendix D for the entirety of the map. An Extract of the area of the proposed site is shown in figure 2-4 below. Proposed Site by orange line.

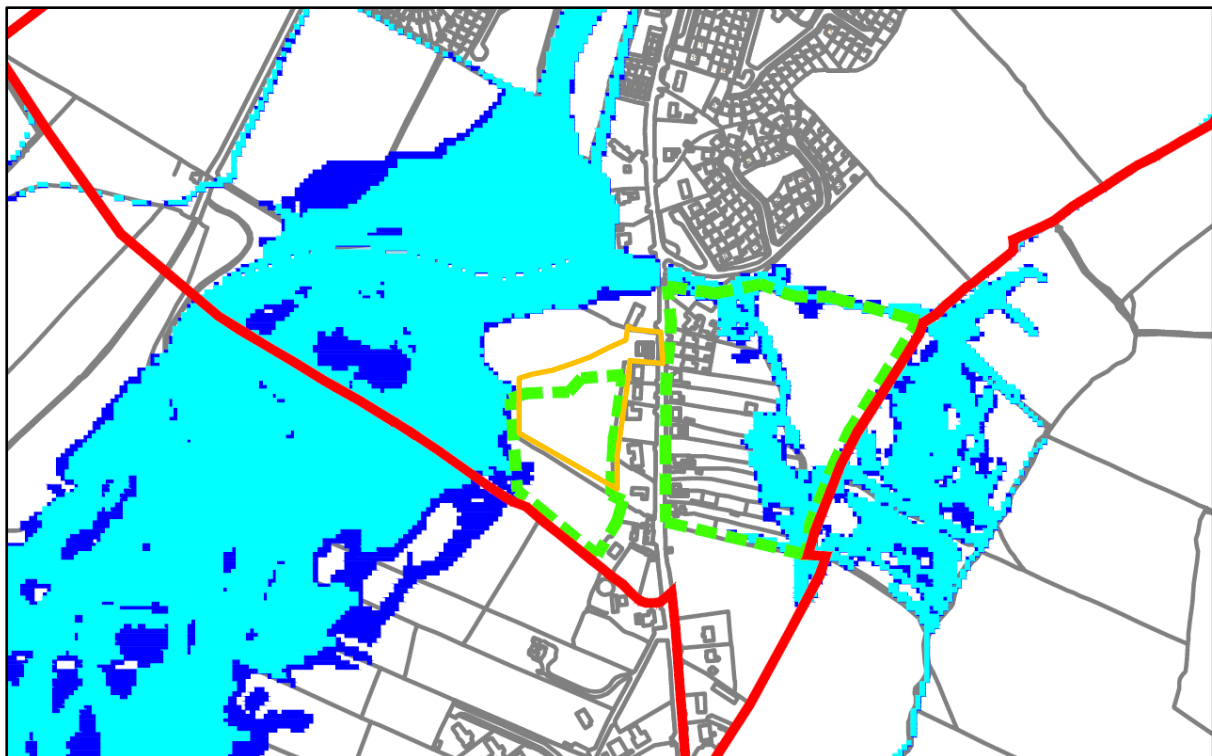


Figure 2-4: Local Area Plan Flood Risk Assessment

The map indicates that the west edge of the site has the potential for flooding under the 1% (1:100) AEP and the 0.1% (1:1000 Year) AEP fluvial flood events while the eastern portion of the site is not at a risk of flooding.

2.6 Topographical Survey Information

Please see Appendix E for the Topographical Survey Information of the proposed site. Spot levels across the site confirm that the site has a Northwestern fall, with levels varying from around 53.80m OD at the Southeastern edge of the site to 53.00m OD at the Northwestern Edge.

The levels above confirm there is no risk of fluvial flooding from the 0.1% AEP of Node 09LIFF02820, with a 0.1% AEP level of 52.95m. Please see contour 53.00m OD highlighted below in figure 2-5.



Figure 2-5: 53.00m OD Contour Highlighted

2.7 Coastal Flood Risk

The subject site in Celbridge is approximately 23km inland, on existing ground at an elevation between 53.00m and 53.80m. On this basis, it is estimated that the risk of coastal flooding to the proposed development is minimal.

2.8 Groundwater Flood Risk

Based on the mapped by the Geological Survey Ireland (GSI), see figure 2-6, the bedrock in the area consists of limestone and shale.

The makeup of soil in the Celbridge Area is shown in Figure 2-7. The town area itself is shown as urban/ made ground. The location of the subject site is shown as Scree.

With reference to figure 2-8 there are no recorded karst features in Celbridge area.

Based on the results of the PFRA study, and mapping by the GSI there is no evidence to suggest there is any groundwater flooding at the proposed site.

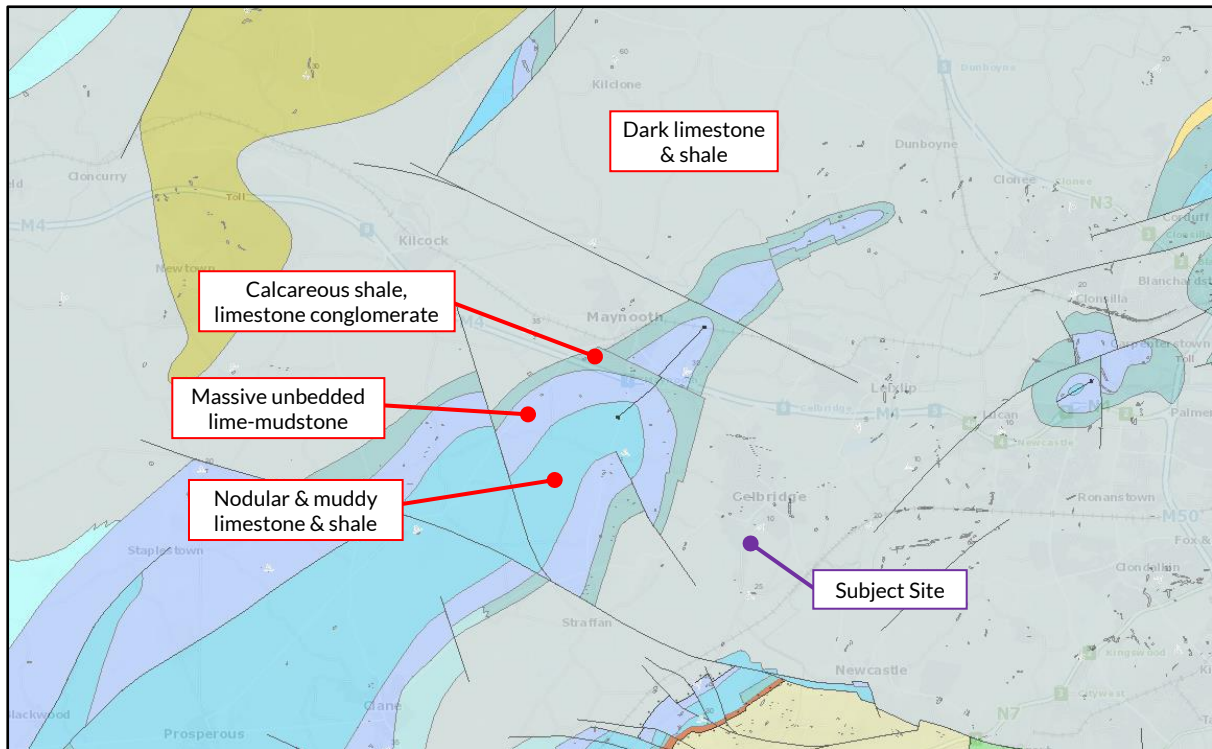


Figure 2-6: Bedrock Geology in the Celbridge Area (GSI – 100k)

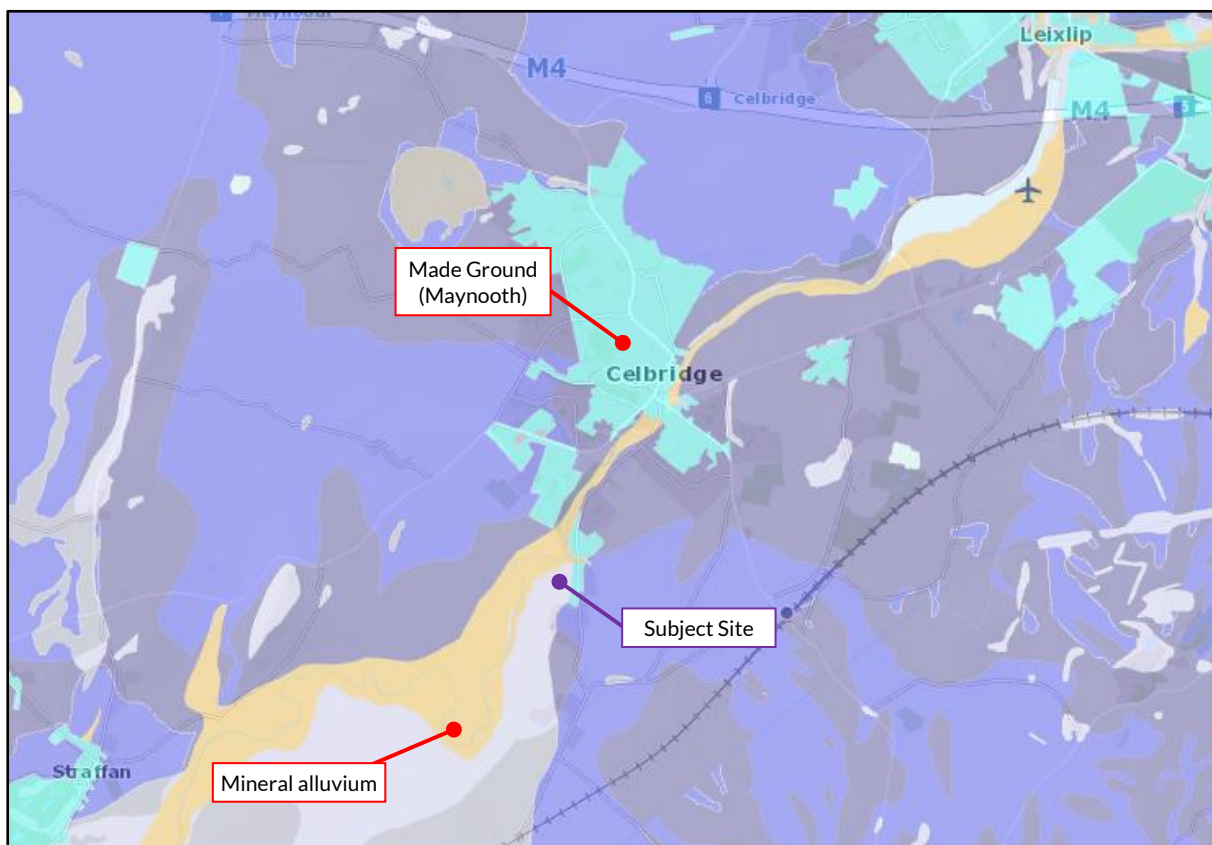


Figure 2-7: Soil Mapping (Teagasc)

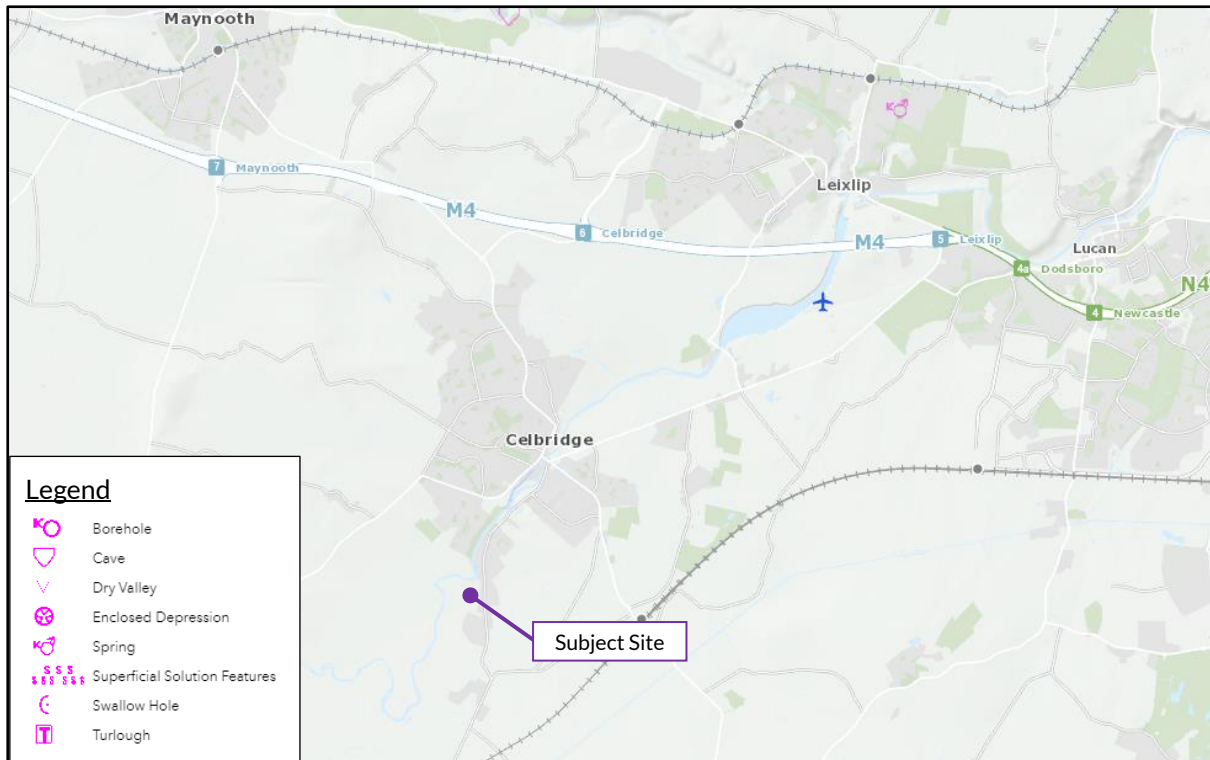


Figure 2-8: Karst Mapping (GSI)

2.9 Impact of the development elsewhere

It is predicted that the proposed development is not at risk from flooding during the 1,000 year mid range future scenario. Therefore, the development will not affect floodplain storage or obstruct the flow path of any existing watercourses.

Surface water arising onsite will be managed by an onsite storm water drainage system and onsite attenuation. On this basis, it is predicted that the proposed development will not contribute towards flood risk elsewhere in the area.

2.10 Proposed Site Layout

Below in figure 2-9 is an approximate overlay of the Proposed Site Layout on the Kildare County Council's Flood Risk Assessment Map. The proposed plans have the social housing development lying outside the 0.1% (1:1000 year) AEP flood event. There is potential for a portion of the 0.1% (1:1000 year) AEP flood event to enter the sites boundaries but this solely located to the Northeast edge of the site which is proposed to be a landscaped area.



Figure 2-9: Approximate Overlay of Site Layout on Local Area Flood Risk Assessment Map

2.11 Summary

The above information indicates that the site is not at risk of flooding even though flooding will occur on the site's western boundary under the 1% (1:100 year) AEP and 0.1% (1:1000 year) AEP fluvial events. The source of the flooding is associated with the River Liffey which is located Northwest of the proposed site. The maximum water levels for the 0.1% (1:1000 year) AEP event is +52.960mOD based on the highest-level marker (09LIFF02820). The lowest proposed Finish Floor Level of the residential units is +53.45mOD, 0.5m above the maximum water level.

3.0 SEQUENTIAL APPROACH & JUSTIFICATION TESTS

The sequential approach & justification tests procedures are outlined in the “Planning System and Flood Risk Management Guidelines for Planning Authorities” 2009 and is summarised/adopted below.

3.1 Sequential Approach

The sequential approach makes use of existing flood risk assessments and other data identifying flood zones for rivers, coastal and pluvial flooding and the classification of the vulnerability of flooding of different types of development.

The primary objective of the sequential approach is to direct potential developments towards land that is at low risk of flooding. The philosophy used in the approach is:

1. Avoid – preferably choose lower risk flood zones for new developments.
2. Substitute – Ensure the type of development proposed is not especially vulnerable to the adverse impact of flooding.
3. Justify – Ensure that the development is being considered for strategic reasons.
4. Mitigate – Ensure flood risk is reduced to minimal levels.
5. Proceed – Only where justification Test is passed, and emergency planning measures are in place.

The sequential approach makes use of flood risk assessment and of prior identification of flood zones for river and coastal flooding. It also classifies the vulnerability to flooding of different types of development as outlined in the section below.

3.1.1 Flood Zones.

Flood zones are geographical areas within which the likelihood of flooding is more common, 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 of flood zones defined for the purposes of the 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).

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.

The proposed site is within Flood Zone Type ‘C’ based on the site-specific survey.

3.1.2 Vulnerability Classes

The vulnerability class of different types of developments are outline in figure 3.1 below.

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	<p>Garda, ambulance and fire stations and command centres required to be operational during flooding;</p> <p>Hospitals;</p> <p>Emergency access and egress points;</p> <p>Schools;</p> <p>Dwelling houses, student halls of residence and hostels;</p> <p>Residential institutions such as residential care homes, children's homes and social services homes;</p> <p>Caravans and mobile home parks;</p> <p>Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and</p> <p>Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.</p>
Less vulnerable development	<p>Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions;</p> <p>Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans;</p> <p>Land and buildings used for agriculture and forestry;</p> <p>Waste treatment (except landfill and hazardous waste);</p> <p>Mineral working and processing; and</p> <p>Local transport infrastructure.</p>
Water-compatible development	<p>Flood control infrastructure;</p> <p>Docks, marinas and wharves;</p> <p>Navigation facilities;</p> <p>Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location;</p> <p>Water-based recreation and tourism (excluding sleeping accommodation);</p> <p>Lifeguard and coastguard stations;</p> <p>Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and</p> <p>Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).</p>
*Uses not listed here should be considered on their own merits	

Figure 3-1: Classification of Vulnerability of Different Types of Developments

Figure 3-2 below illustrates those types of developments which would be appropriate to each flood zone and those which would be required to meet the Justification Test.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Figure 3-2: Vulnerability of Development vs. Flood Zone

In order to pass the first level of the sequential approach the site needs to be assessed under the avoidance criteria. This is outlined below:

As the proposed development is located in flood zone type 'C' and is of a 'Highly Vulnerable' category then the development is deemed appropriate for the site in question and no further assessment is required.

4.0 SUMMARY AND CONCLUSIONS

TOBIN Consulting Engineers were requested to carry out a Flood Risk Assessment for the proposed development at Ardclough Road, Celbridge, Co. Kildare.

The Flood Risk Assessment undertook a review of:

- The Planning System & Flood Risk Management (PSFRM) Guidelines
- Flood Risk Management Climate Change Adaptation Plan
- Kildare County Development Plan
- The Celbridge Local Area Plan
- OPW National Flood Hazard Mapping
- OPW National Preliminary Flood Risk Assessment Maps
- OPW South Eastern CFRAM study

In relation to the PSFRM guidelines and sensitivity to flooding; the proposed development contains elements which are considered 'highly vulnerable' (residential apartments), 'less vulnerable' (office space, roads) and 'water compatible' (car parking and amenity area).

Evidence gathered from the publicly available site-specific survey data indicates that the proposed site lies outside the flood zone for both the 1.0% (1:100 year) and 0.1% (1:100 year) AEP flood events, as indicated on the CFRAM maps.

This result corresponds with the findings of the Sequential Approach adopted in Section 3 of this report. The highly Vulnerable development is deemed appropriate for the site in question.

The proposed developments Ground Floor levels shall be required to be a minimum of +53.45mOD which is 500mm above the predicted CFRAMS 0.1% (1:1000 year) flood level of +52.950mOD.

Surface water arising onsite will be managed by a dedicated storm water drainage system designed in accordance with SUDS. The landscaping and topography of the developed site shall provide safe exceedance flow paths in the event of extreme flood events or in the case of a blockage of the drainage system, so as to minimise pluvial flood risk to people and property.

There is no evidence to suggest coastal and groundwater as potential sources of flood risk to the proposed development.

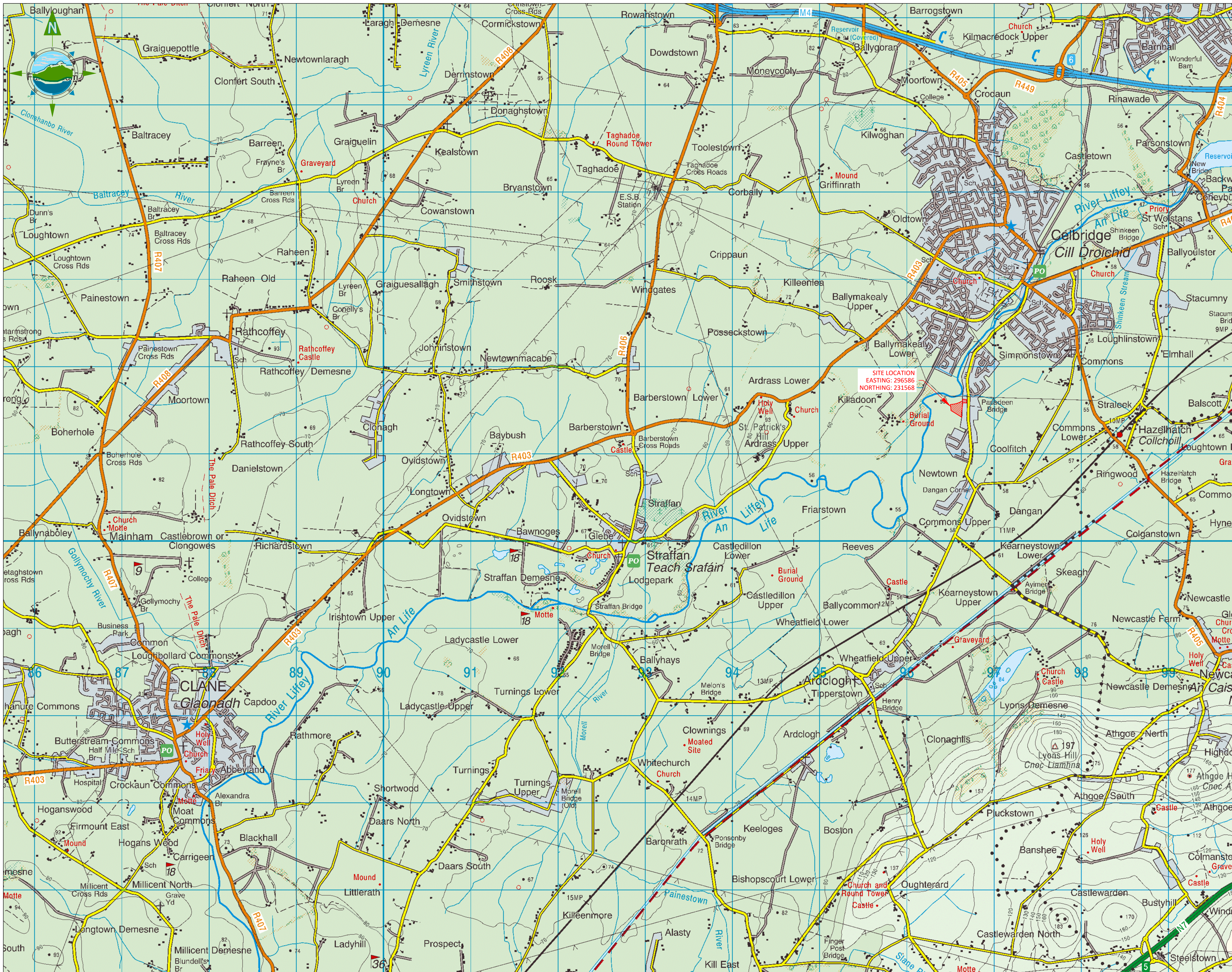
It is estimated that the risk of flooding to the proposed development will be minimal. It is also predicted that the proposed development will not impact flood risk elsewhere in the area.

Appendix A – Site Drawings

11162-2000 Site Location


11162-2004 Site Layout

11162-2010 Proposed Drainage Layout



- NOTES
GENERAL:
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
 3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH RELEVANT DRAWINGS AND SPECIFICATIONS.
 5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
P01	31/05/2021	ISSUED FOR INFORMATION	PF	MC

Client: 

Project: **Ardclough Road
Celbridge**

Title: **Site Location**

Scale @ A1: **1:10,000**

Prepared by: PF Checked: MC Date: 31/05/2021

Project Director: Brian Carroll

Drawing Status: Information

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P01	31/05/2021	ISSUED FOR INFORMATION	PF	MC

Client: 

Project: **Ardclough Road
Celbridge**

Title: **Proposed
Site Layout**

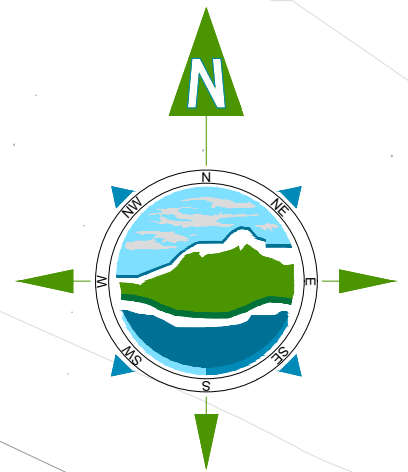
Scale @ A1: **1:500**

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PF	MC	31/05/2021
Project Director: Brian Carroll		
Drawing Status: Information		

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LEGEND:

- PLANNING BOUNDARY —
- PROPOSED FOUL PIPE —
- PROPOSED FOUL MANHOLE ○
- PROPOSED PRIVATE CONNECTION —
- PROPOSED SURFACE WATER PIPE —
- PROPOSED SURFACE WATER MANHOLE □
- PERFORATED PIPE —
- PROPOSED DRY SWALE —
- PROPOSED PERMEABLE SURFACING
- PROPOSED TREE PITS

- NOTES GENERAL:**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
 3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH RELEVANT DRAWINGS AND SPECIFICATIONS.
 5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
P01	23/07/2021	ISSUED FOR INFORMATION	PF	MC

Client:

Project: **Ardclough Road Celbridge**

Title: **PROPOSED DRAINAGE LAYOUT**

Surface Water											
Pipe Number	Upstream Manhole Label	Manhole (mm)	Cover Level (m)	Invert Level (m)	Manhole Depth (m)	Pipe Cover (m)	Pipe Diameter (mm)	Length (m)	Slope	Downstream Invert level	Downstream Manhole Label
1.000	1		53.580	52.155	1.425	1.200	225	14.182	200.00	52.084	2
1.001	2		53.460	52.084	1.376	1.151	225	49.493	225.00	51.864	3
1.002	3		53.250	51.864	1.386	1.161	225	13.044	225.00	51.806	4
1.003	4		53.350	51.806	1.544	1.319	225	34.402	225.00	51.653	6
2.000	5		53.660	52.235	1.425	1.200	225	31.558	200.00	52.077	6
1.004	6		53.490	51.503	1.987	1.612	375	52.155	299.70	51.329	7
1.005	7		53.700	51.329	2.371	1.996	375	12.415	300.00	51.288	9
3.000	8		53.500	51.875	1.625	1.400	225	30.273	200.50	51.724	9
1.006	9		53.600	51.288	2.312	1.937	375	9.586	299.60	51.256	Tank
1.007	Tank		53.300	51.256					300.00	50.999	11
1.008	11		53.300	50.999	2.301	1.926	375	30.540	299.40	50.897	Outfall

Foul Water											
Pipe Number	Upstream Manhole Label	Manhole Diameter (mm)	Cover Level (m)	Invert Level (m)	Manhole Depth (m)	Pipe Cover (m)	Pipe Diameter (mm)	Length (m)	Slope	Downstream Invert level	Downstream Manhole Label
1.000	1	1200	53.600	52.625	0.975	0.750	225	10.746	225.00	52.577	2
1.001	2	1200	53.700	52.577	1.123	0.898	225	50.474	225.00	52.353	4
2.000	3	1200	53.660	52.760	0.900	0.750	150	34.505	103.90	52.428	4
1.002	4	1200	53.490	52.353	1.137	0.912	225	32.387	225.00	52.209	5
1.003	5	1200	53.350	52.209	1.141	0.916	225	14.367	225.00	52.145	9
3.000	6	1200	53.500	52.600	0.900	0.750	150	20.654	135.60	52.448	7
3.001	7	1200	53.450	52.448	1.002	0.852	150	15.598	135.60	52.333	8
3.002	8	1200	53.550	52.333	1.217	1.067	150	17.423	135.60	52.205	9
1.004	9	1200	53.250	52.129	1.121	0.896	225	47.582	225.00	51.918	10
1.005	10	1200	53.500	51.918	1.582	1.357	225	38.777	200.00	51.724	11

Cells highlighted Indicate Pipe is to be incased in concrete, where the cover is less than 1.2m in Roads, as per detail on DWG 11162-2040

Scale @ A1: **1:500**

Prepared by: PF Checked: MC Date: 23/07/2021

Project Director: Brian Carroll

Drawing Status: Information

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Drawing No: **11162-2010 P01**

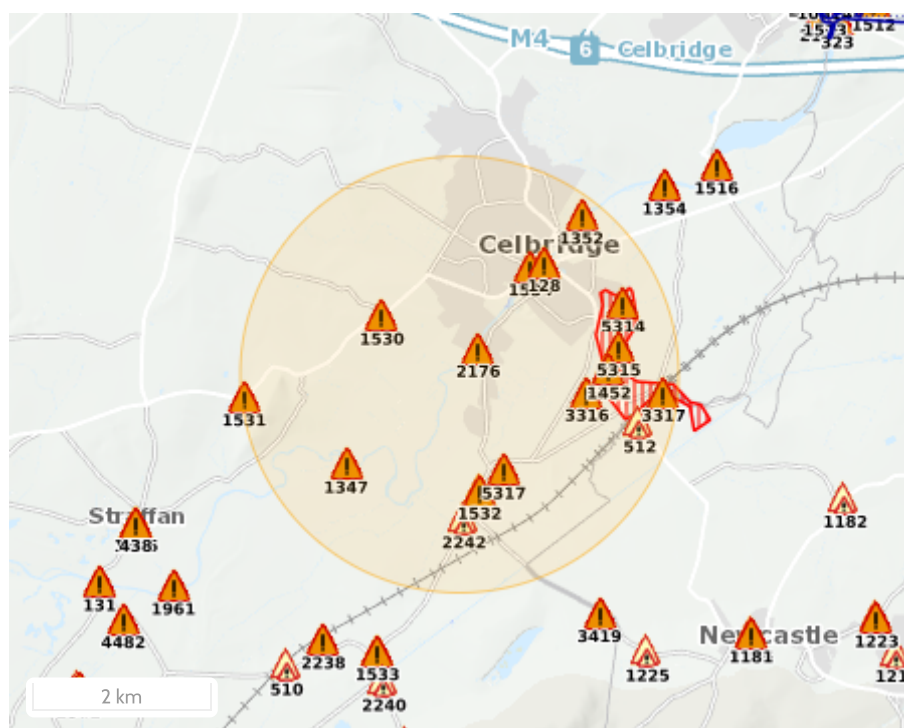
Revision:

Appendix B – Past Flood Summary Report

Report Produced: 1/10/2021 16:18

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

This report has been downloaded from www.floodinfo.ie (the "Website"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.



Map Legend

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

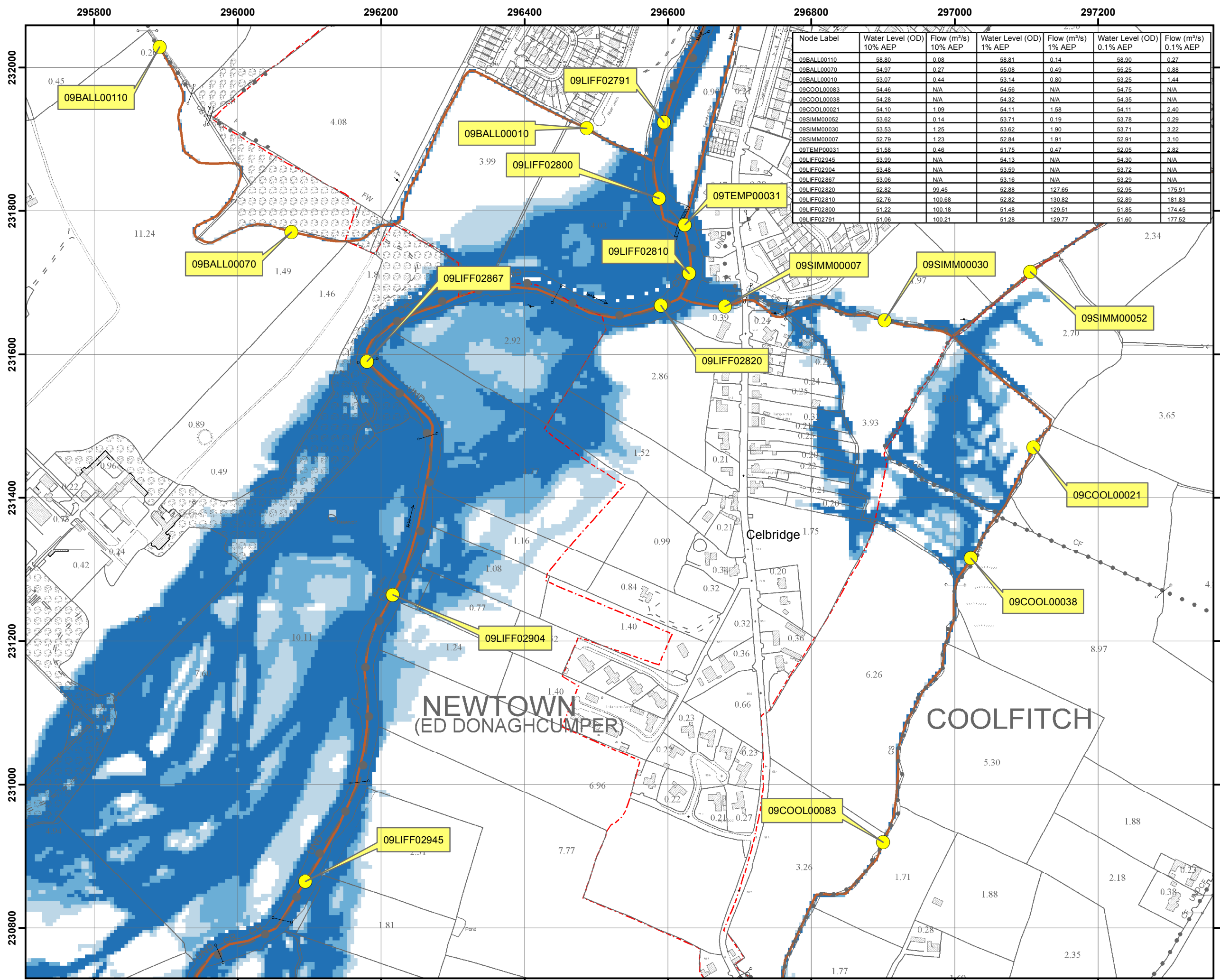
* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

21 Results

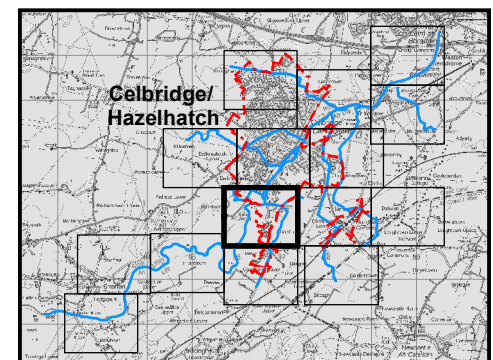
Name (Flood_ID)	Start Date	Event Location
1. Liffey Celbridge Dec 1954 (ID-128) Additional Information: Reports (4) Press Archive (2)	08/12/1954	Approximate Point
2. Shinkeen Hazelhatch Recurring (ID-512) Additional Information: Reports (2) Press Archive (9)	n/a	Approximate Point
3. Liffey Straffan to Celbridge June 1993 (ID-1347) Additional Information: Reports (3) Press Archive (1)	10/06/1993	Approximate Point
4. Liffey Celbridge Nov 2000 (ID-1352) Additional Information: Reports (3) Press Archive (6)	05/11/2000	Approximate Point
5. Shinkeen Hazelhatch Sports Club Recurring (ID-1452) Additional Information: Reports (7) Press Archive (0)	n/a	Approximate Point
6. Clane Road, Ballymakealy Celbridge Nov 2002 (ID-1530) Additional Information: Reports (2) Press Archive (0)	14/11/2002	Approximate Point

Appendix D – Flood Risk Assessment Map

Appendix C – CFRAM Mapping



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
09BALL00110	58.80	0.08	58.81	0.14	58.90	0.27
09BALL00070	54.97	0.27	55.08	0.49	55.25	0.88
09BALL00010	53.07	0.44	53.14	0.80	53.25	1.44
09COOL00083	54.46	N/A	54.56	N/A	54.75	N/A
09COOL00038	54.28	N/A	54.32	N/A	54.35	N/A
09COOL00021	54.10	1.09	54.11	1.58	54.11	2.40
09SIMM00052	53.62	0.14	53.71	0.19	53.78	0.29
09SIMM00030	53.53	1.25	53.62	1.90	53.71	3.22
09SIMM00007	52.79	1.23	52.84	1.91	52.91	3.10
09TEMP00031	51.58	0.46	51.75	0.47	52.05	2.82
09LIFF02945	53.99	N/A	54.13	N/A	54.30	N/A
09LIFF02904	53.48	N/A	53.59	N/A	53.72	N/A
09LIFF02867	53.06	N/A	53.16	N/A	53.29	N/A
09LIFF02820	52.82	99.45	52.88	127.85	52.95	175.91
09LIFF02810	52.76	100.68	52.82	130.82	52.89	181.83
09LIFF02800	51.22	100.18	51.48	129.51	51.85	174.45
09LIFF02791	51.06	100.21	51.28	129.77	51.60	177.52



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: 01	NOTE: Model update on Crippaun watercourse	DATE: 15/05/2017
---------	--	------------------

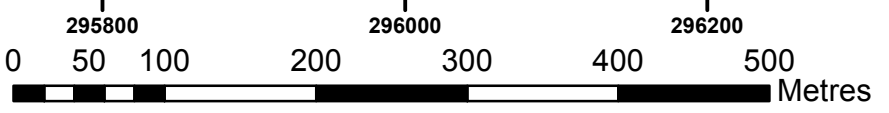


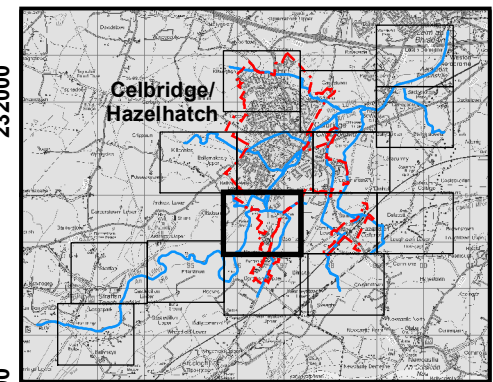
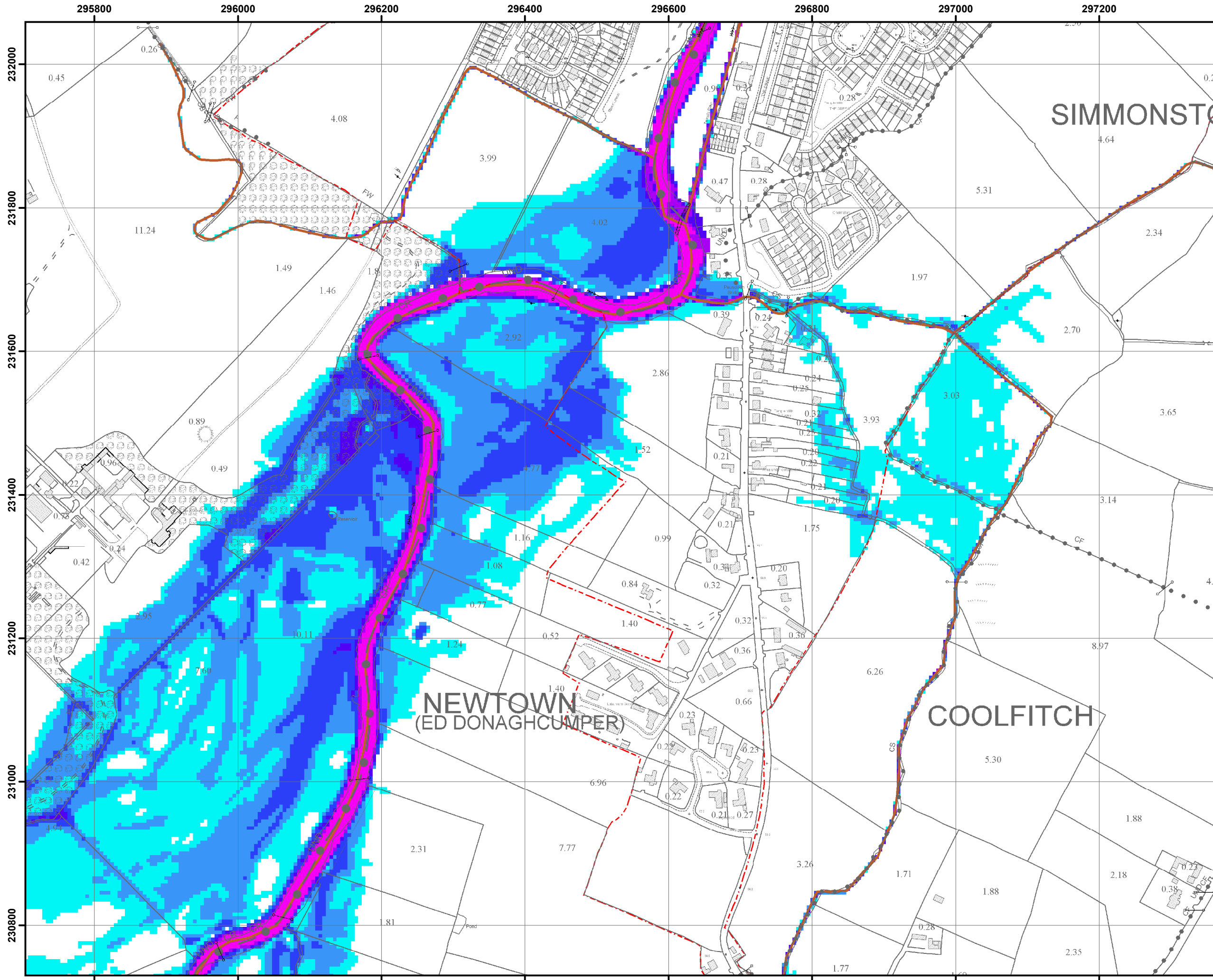
OPW
The Office of Public Works

RPS

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 F +44(0) 28 90 668286
 W www.rpsgroup.com
 E ireland@rpsgroup.com

Map: Celbridge Fluvial Flood Extents	
Map Type: EXTENT	
Source: FLUVIAL	
Map Area: HPW	
Scenario: CURRENT	
Drawn By: F.M.C.	Date: 19 May 2017
Checked By: S.P.	Date: 19 May 2017
Approved By: G.G.	Date: 19 May 2017
Drawing No.: E09CEL_EXFCD_F1_05	
Map Series: Page 5 of 15	
Drawing Scale: 1:5,000 @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% Fluvial AEP 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: 01	NOTE: Model update on Crippaun watercourse	DATE: 15/05/2017
---------	--	------------------

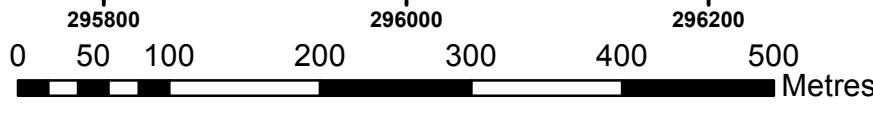


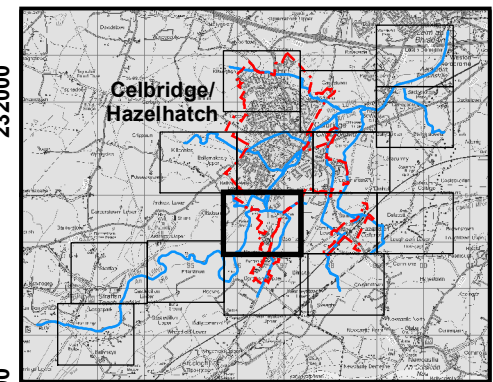
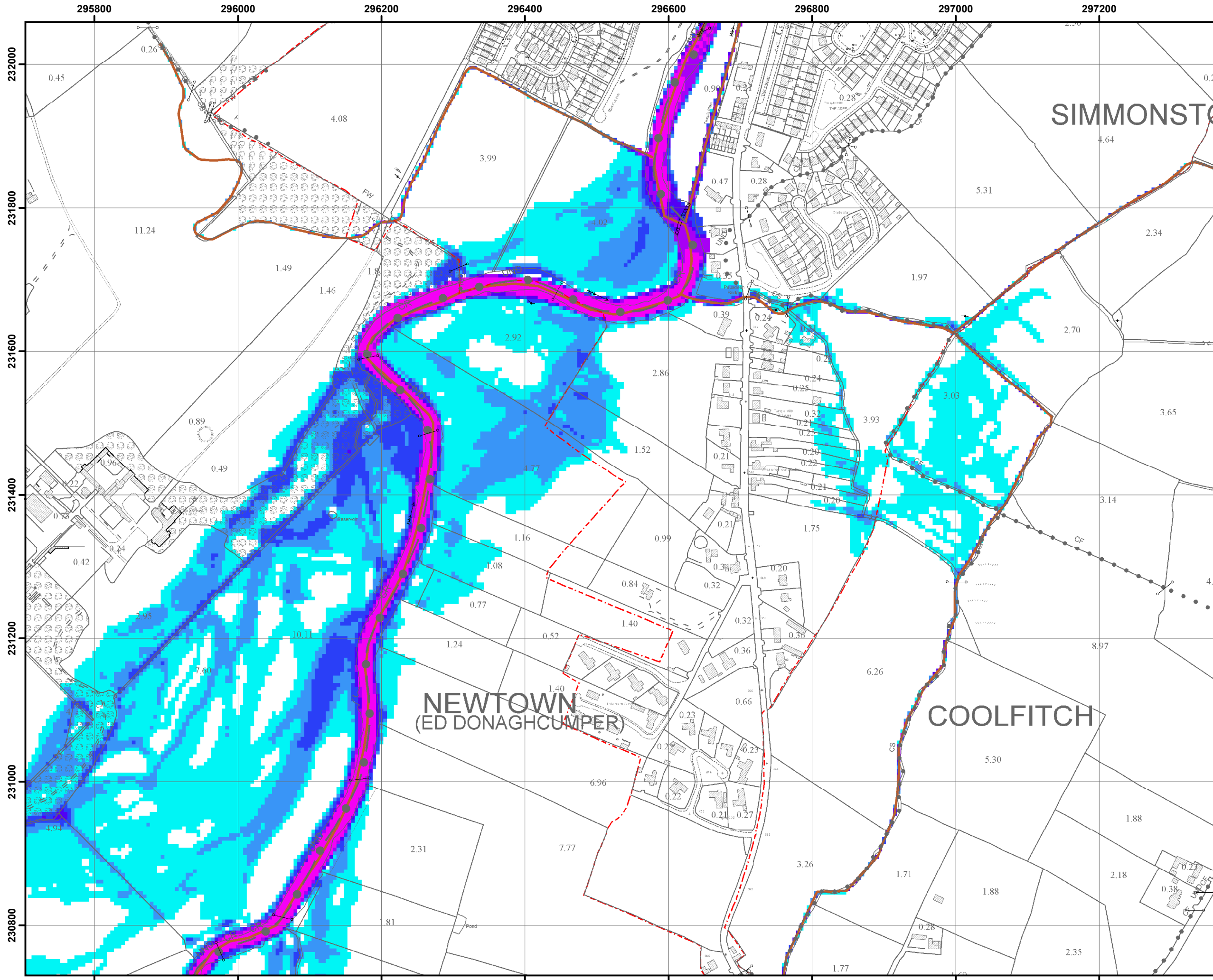
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 W www.rpsgroup.com
 E ireland@rpsgroup.com

Map:	
Celbridge Fluvial Flood Depths	
Map Type: DEPTH	
Source: FLUVIAL	
Map Area: HPW	
Scenario: CURRENT	
Drawn By: C.C.	Date: 19 May 2017
Checked By: S.P.	Date: 19 May 2017
Approved By: G.G.	Date: 19 May 2017
Drawing No.: E09CEL_DPFCD001_F1_05	
Map Series: Page 5 of 15	
Drawing Scale: 1:5,000 @ A3	





IMPORTANT USER NOTE:
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Legend

1% Fluvial AEP 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

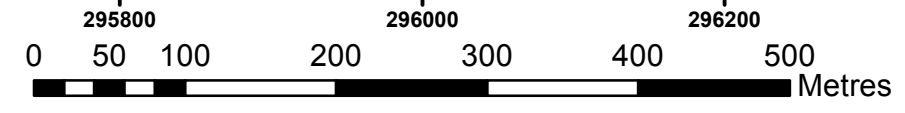
REV: 01	NOTE: Model update on Crippaun watercourse	DATE: 15/05/2017
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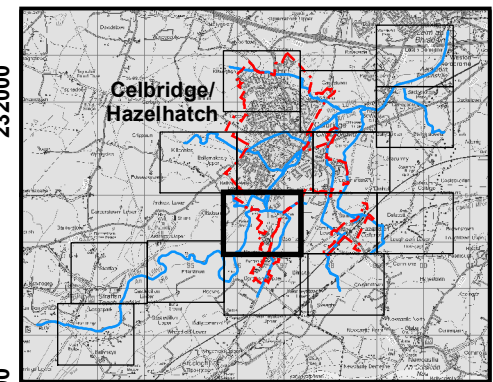
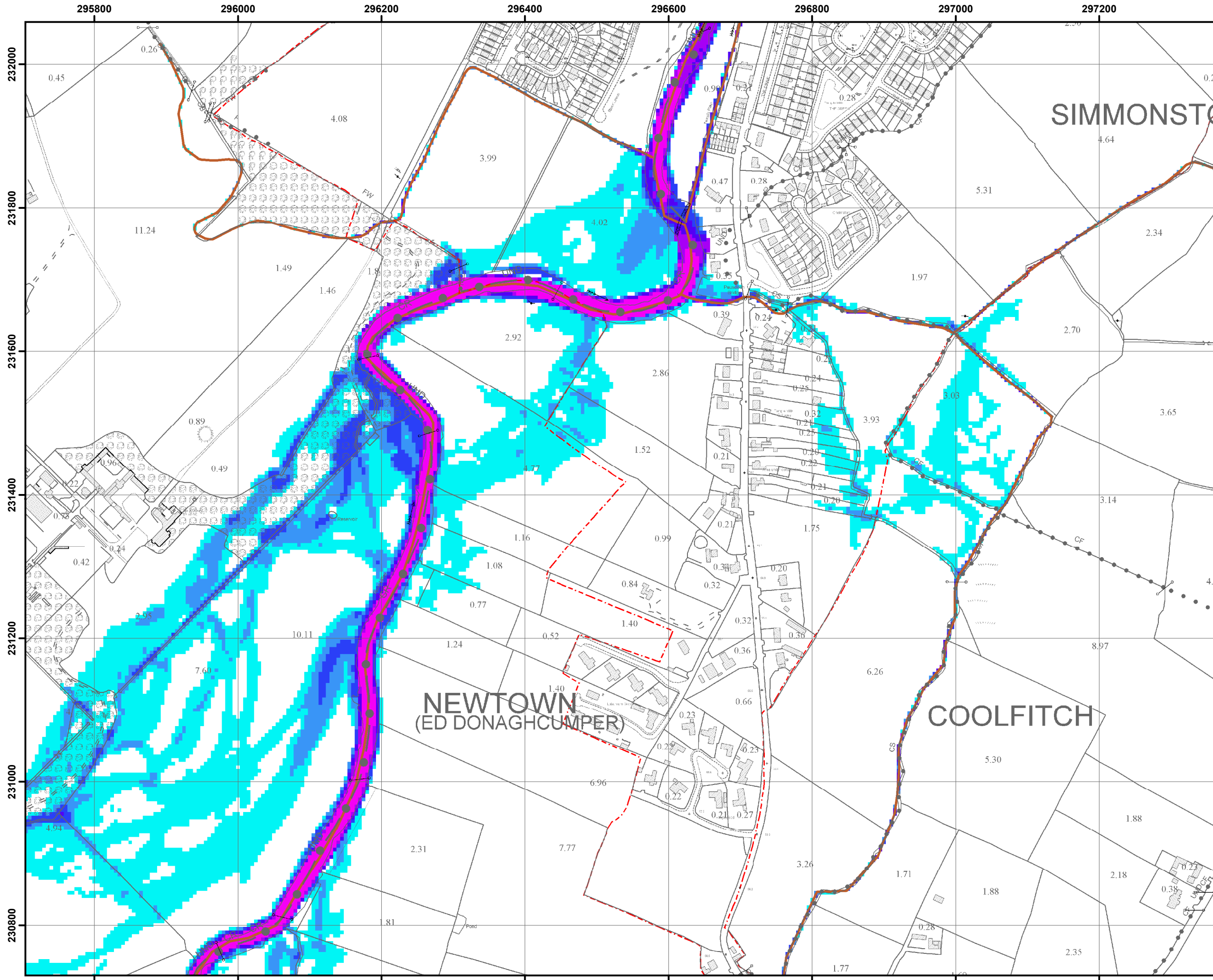


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Eireland@rpsgroup.com

Map:	
Celbridge Fluvial Flood Depths	
Map Type: DEPTH	
Source: FLUVIAL	
Map Area: HPW	
Scenario: CURRENT	
Drawn By : C.C.	Date : 19 May 2017
Checked By : S.P.	Date : 19 May 2017
Approved By : G.G.	Date : 19 May 2017
Drawing No. : E09CEL_DPFCD010_F1_05	
Map Series : Page 5 of 15	
Drawing Scale : 1:5,000 @ 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

10% Fluvial AEP 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: 01	NOTE: Model update on Crippaun watercourse	DATE: 15/05/2017
---------	--	------------------



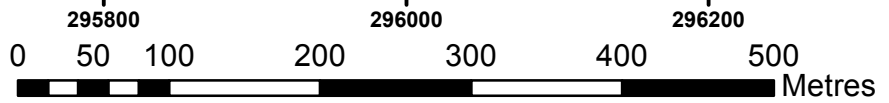
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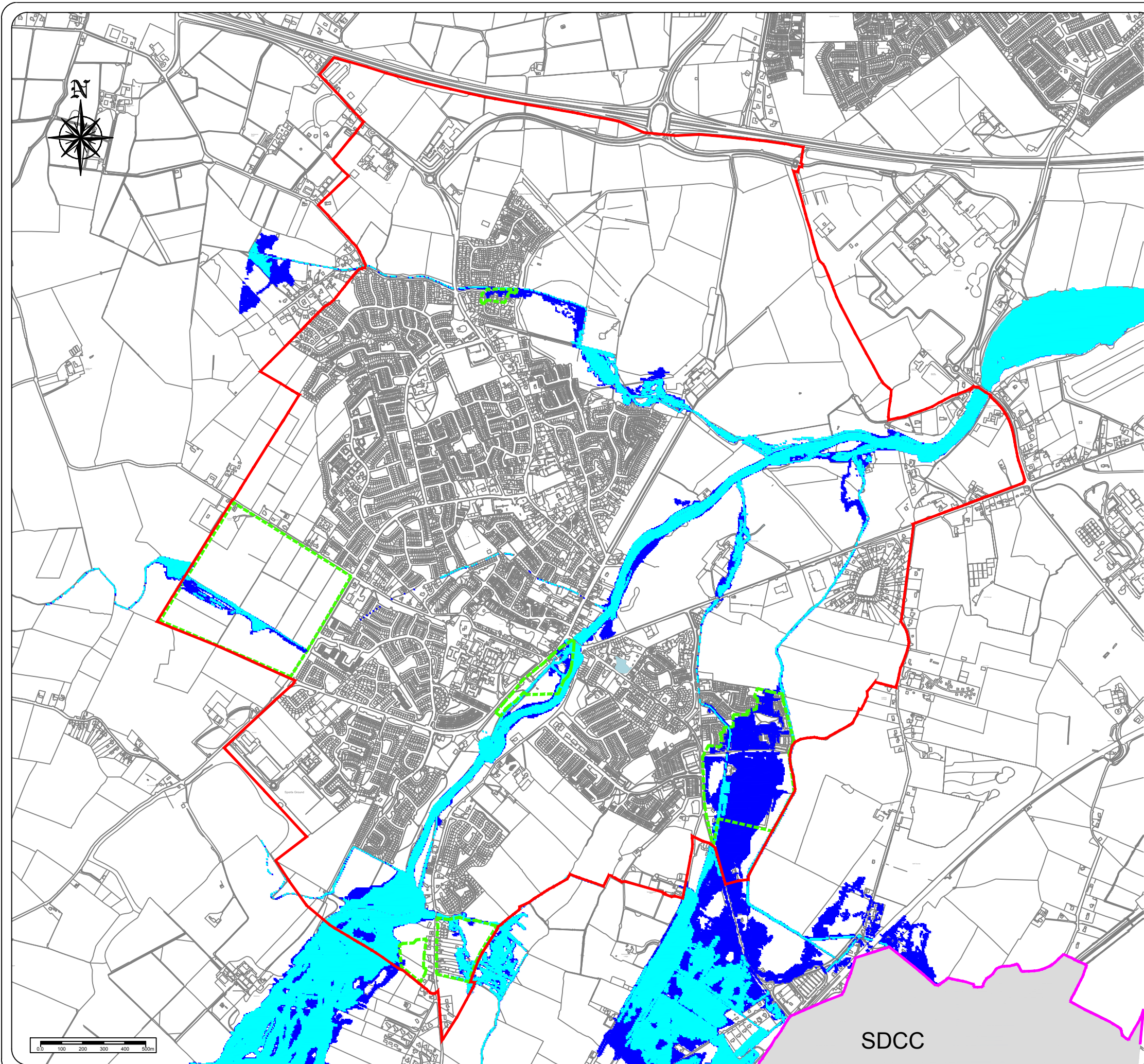
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Map:
Celbridge Fluvial Flood Depths







Map Type:	DEPTH
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By:	C.C. Date: 19 May 2017
Checked By:	S.P. Date: 19 May 2017
Approved By:	G.G. Date: 19 May 2017
Drawing No.:	E09CEL_DPFCD100_F1_05
Map Series:	Page 5 of 15
Drawing Scale:	1:5,000 @ A3





Kildare County Council
 Planning Department
 Áras Chill Dara,
 Devoy Park, Naas,
 Co Kildare.

Celbridge Local Area Plan 2017-2023




- Legend :**
-  Local Area Plan Boundary
 -  Kildare County Boundary
 -  Rivers, Canal & Lakes
 -  Flood Zone A- 100 year Flood Event
 -  Flood Zone B- 1000 year Flood Event
 -  Development proposals for lands outlined thus are to be the subject of site-specific Flood Risk Assessment appropriate to the type and scale of the development being proposed

Strategic Flood Risk Assessment Map

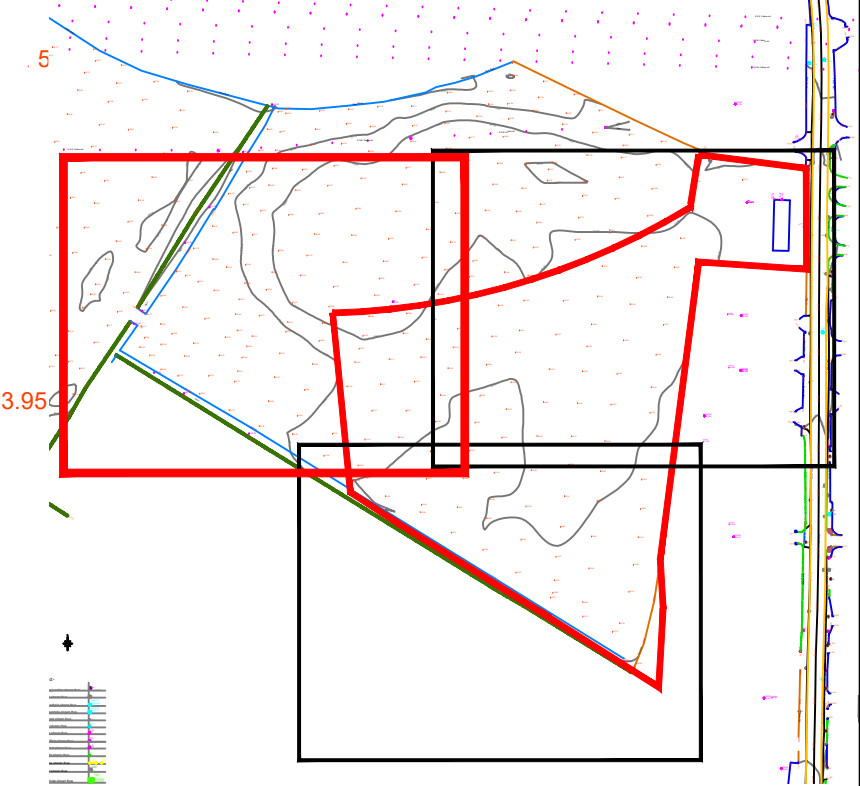
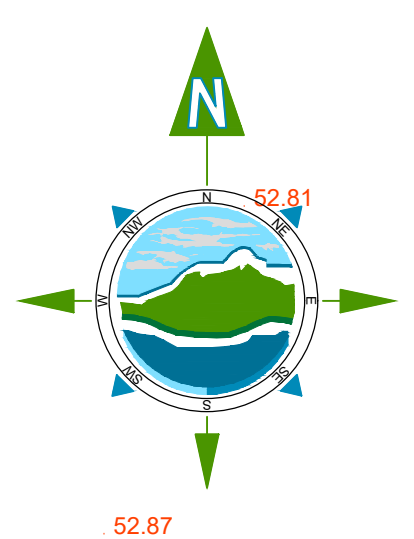
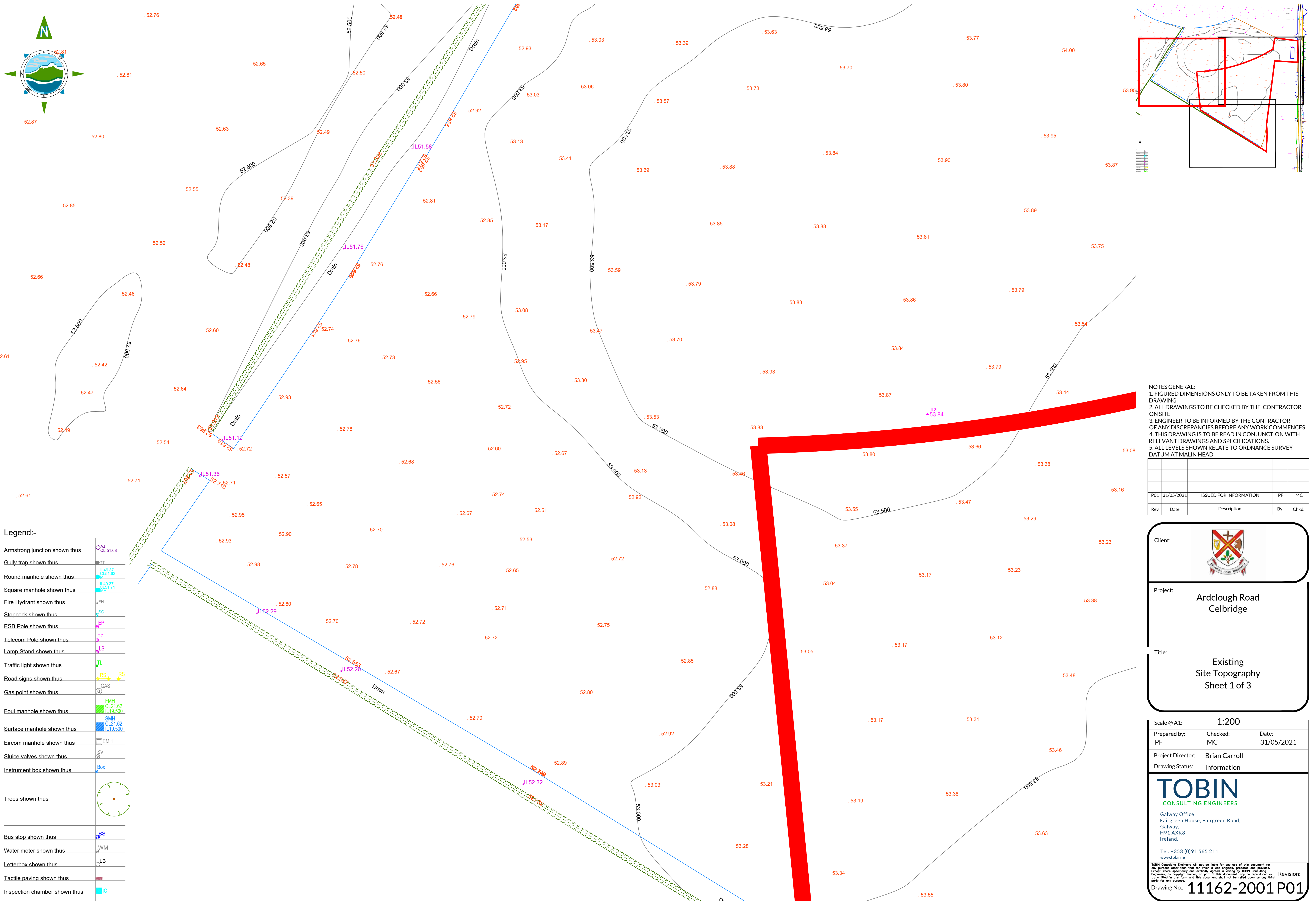
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Date: September 2017	Drawing No: 200/17/888		
© Ordnance Survey Ireland. All rights reserved. Licence No.: 2004/07CCMA (Kildare County Council)	<table border="1"> <tr> <td>Drawn by: N.H.</td> <td>Checked by: L.C.</td> </tr> </table>	Drawn by: N.H.	Checked by: L.C.
Drawn by: N.H.	Checked by: L.C.		

This drawing is to be read in conjunction with the written statement

SDCC

	Name (Flood_ID)	Start Date	Event Location
7.	 Clane Road, Ardrass Celbridge Nov 2002 (ID-1531) Additional Information: Reports (2) Press Archive (0)	14/11/2002	Approximate Point
8.	 Ardclough Road, Dangan Corner Nov 2002 (ID-1532) Additional Information: Reports (2) Press Archive (0)	14/11/2002	Approximate Point
9.	 Oldtown Road Junction, Celbridge Nov 2002 (ID-1534) Additional Information: Reports (2) Press Archive (2)	14/11/2002	Approximate Point
10.	 Commons Upper Dangan Recurring (ID-1537) Additional Information: Reports (2) Press Archive (0)	n/a	Approximate Point
11.	 Liffey Temple Mills Dec 1954 (ID-2176) Additional Information: Reports (4) Press Archive (3)	08/12/1954	Exact Point
12.	 Ardclough Commons Upper recurring (ID-2242) Additional Information: Reports (2) Press Archive (0)	01/11/2000	Approximate Point
13.	 Common Upper Nov 2000 (ID-3315) Additional Information: Reports (2) Press Archive (0)	05/11/2000	Approximate Point
14.	 Commons Lower Nov 2000 (ID-3316) Additional Information: Reports (1) Press Archive (0)	05/11/2000	Approximate Point
15.	 Shinkeen Hazelhatch River Road Nov 2000 (ID-3317) Additional Information: Reports (3) Press Archive (10)	05/11/2000	Approximate Point
16.	 Commons Upper Ardclough April 1998 (ID-3667) Additional Information: Reports (1) Press Archive (0)	10/04/1998	Approximate Point
17.	 Liffey Celbridge June 1993 (ID-9) Additional Information: Reports (6) Press Archive (7)	10/06/1993	Approximate Point
18.	 Shinkeen downstream Nov 2000 (ID-5314) Additional Information: Reports (1) Press Archive (11)	05/11/2000	Approximate Point
19.	 Shinkeen River Loughlinstown Nov 2000 (ID-5315) Additional Information: Reports (1) Press Archive (0)	05/11/2000	Approximate Point
20.	 Dangan Corner Nov 2000 (ID-5317) Additional Information: Reports (1) Press Archive (0)	05/11/2000	Approximate Point
21.	 Hazelhatch Sports Clubs Nov 2000 (ID-5318) Additional Information: Reports (1) Press Archive (10)	05/11/2000	Approximate Point

Appendix E – Topographical Survey Information



- Legend:-**
- Armstrong junction shown thus
 - Gully trap shown thus
 - Round manhole shown thus
 - Square manhole shown thus
 - Fire Hydrant shown thus
 - Stopcock shown thus
 - ESB Pole shown thus
 - Telecom Pole shown thus
 - Lamp Stand shown thus
 - Traffic light shown thus
 - Road signs shown thus
 - Gas point shown thus
 - Foul manhole shown thus
 - Surface manhole shown thus
 - Eircom manhole shown thus
 - Sluice valves shown thus
 - Instrument box shown thus
 - Trees shown thus
 - Bus stop shown thus
 - Water meter shown thus
 - Letterbox shown thus
 - Tactile paving shown thus
 - Inspection chamber shown thus

NOTES GENERAL:
 1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
 3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH RELEVANT DRAWINGS AND SPECIFICATIONS.
 5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
P01	31/05/2021	ISSUED FOR INFORMATION	PF	MC

Client:

Project: **Airdclough Road
Celbridge**

Title: **Existing
Site Topography
Sheet 1 of 3**

Scale @ A1: **1:200**

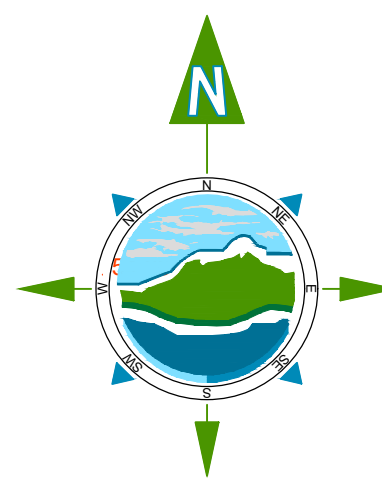
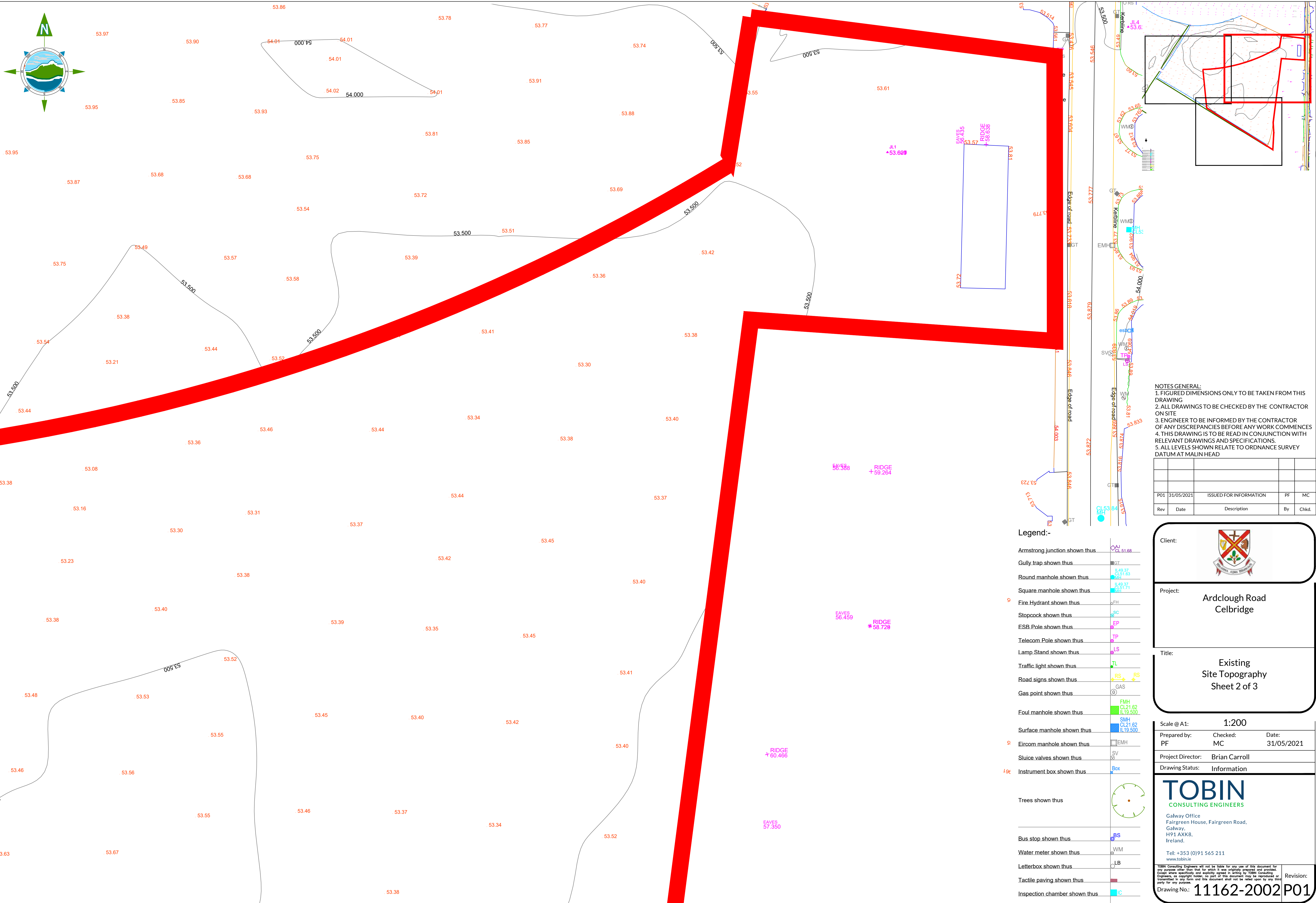
Prepared by:	Checked:	Date:
PF	MC	31/05/2021
Project Director: Brian Carroll		
Drawing Status: Information		

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Drawing No: **11162-2001 P01**

Revision:



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 3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH RELEVANT DRAWINGS AND SPECIFICATIONS.
 5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
P01	31/05/2021	ISSUED FOR INFORMATION	PF	MC

- Legend:-**
- Armstrong junction shown thus
 - Gully trap shown thus
 - Round manhole shown thus
 - Square manhole shown thus
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 - Eiroom manhole shown thus
 - Sluice valves shown thus
 - Instrument box shown thus
 - Trees shown thus
 - Bus stop shown thus
 - Water meter shown thus
 - Letterbox shown thus
 - Tactile paving shown thus
 - Inspection chamber shown thus

Client:

Project: **Airdclough Road
Celbridge**

Title: **Existing
Site Topography
Sheet 2 of 3**

Scale @ A1: **1:200**

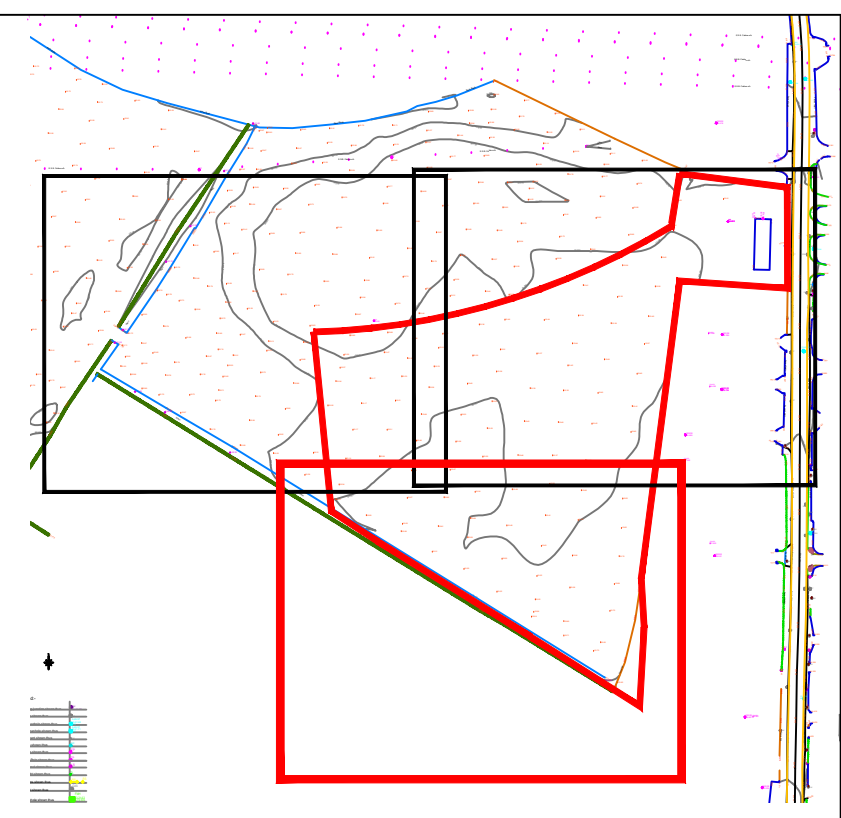
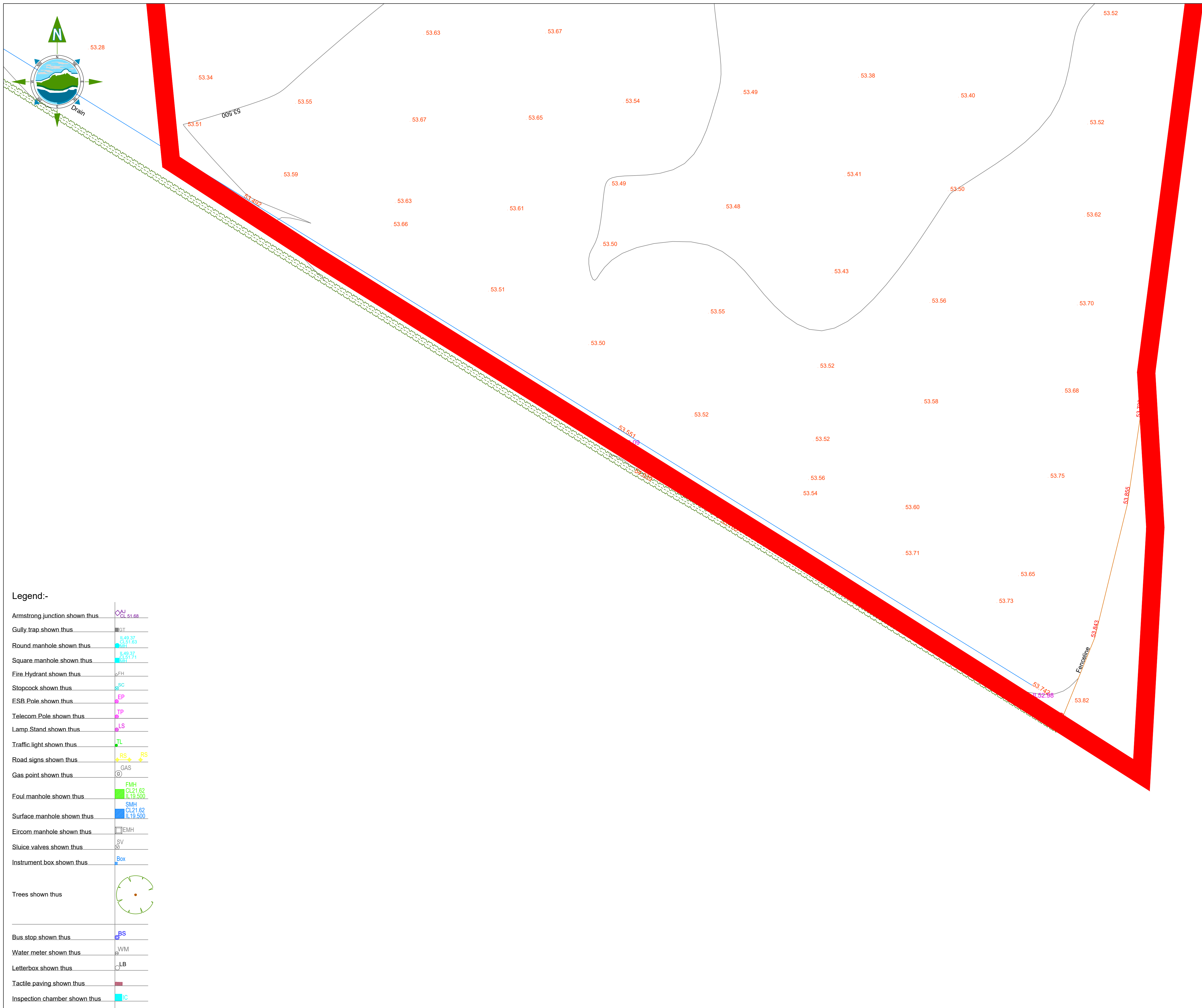
Prepared by:	Checked:	Date:
PF	MC	31/05/2021
Project Director: Brian Carroll		
Drawing Status: Information		

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Drawing No: **11162-2002 P01**

Revision: _____



- NOTES GENERAL:
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 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
 3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH RELEVANT DRAWINGS AND SPECIFICATIONS.
 5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
P01	31/05/2021	ISSUED FOR INFORMATION	PF	MC

Legend:-

- Armstrong junction shown thus
- Gully trap shown thus
- Round manhole shown thus
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- Fire Hydrant shown thus
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- Letterbox shown thus
- Tactile paving shown thus
- Inspection chamber shown thus

Client:

Project: **Ardclough Road
Celbridge**

Title: **Existing
Site Topography
Sheet 3 of 3**

Scale @ A1: **1:200**

Prepared by:	Checked:	Date:
PF	MC	31/05/2021
Project Director: Brian Carroll		
Drawing Status: Information		

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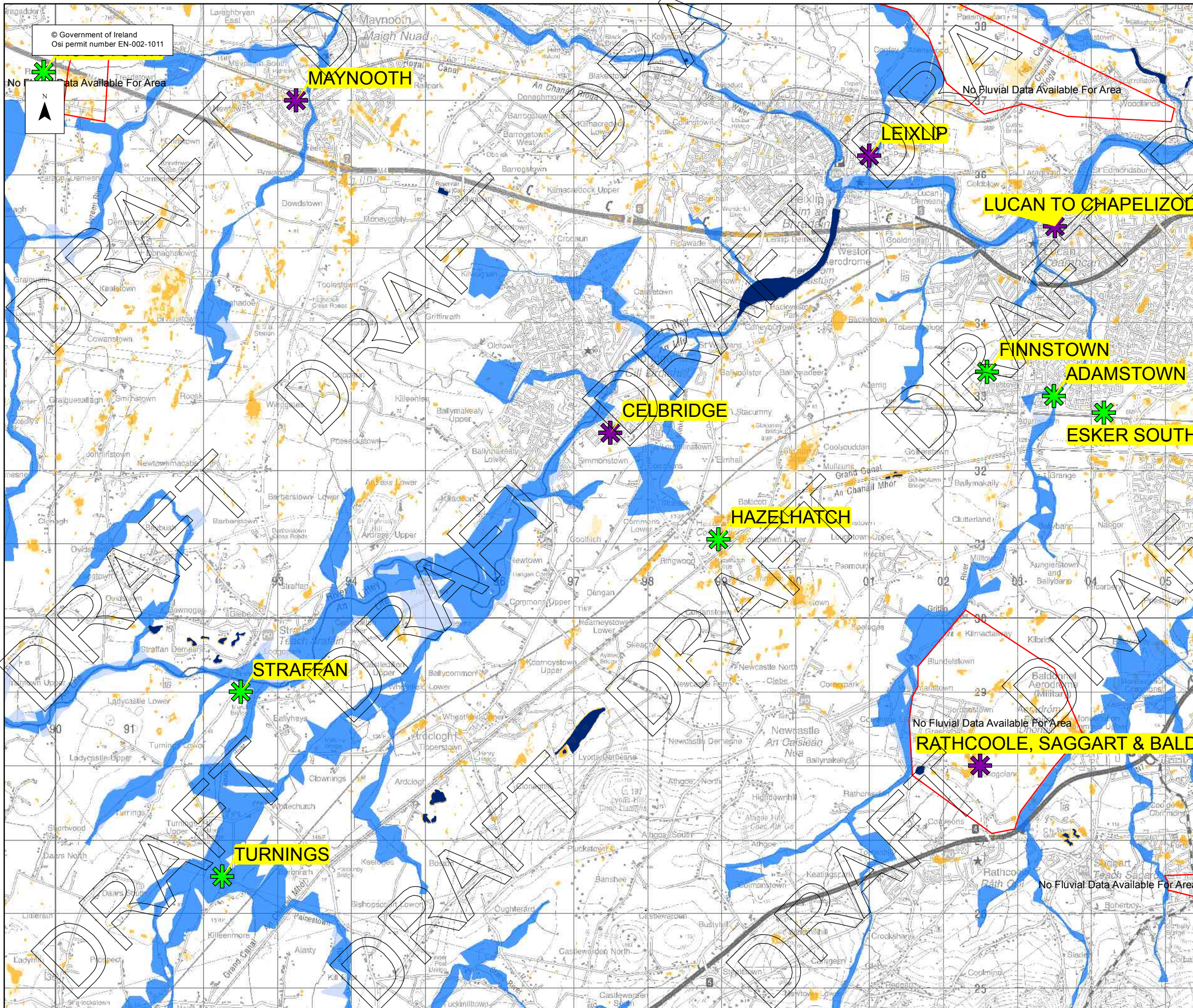
Tel: +353 (0)91 565 211
www.tobin.ie

Drawing No: **11162-2003 P01**

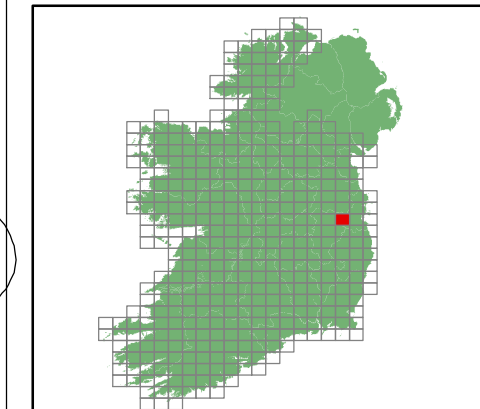
Revision:

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Appendix F – Preliminary Flood Risk Assessment Map



Location Plan :



Legend:

Flood Extents

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

Lakes / Turloughs

PFRA Outcomes

- ✱ Probable Area for Further 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



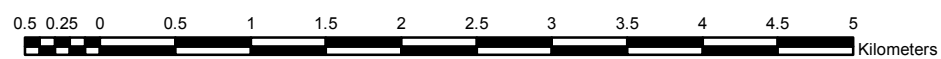
Project :
PRELIMINARY FLOOD RISK ASSESSMENT (PFRA)

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



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