DOCUMENT TITLE

FLOOD RISK ASSESSMENT
FOR
PROPOSED HOUSING DEVELOPMENT
AT
DONACARNAY, BETTYSTOWN, CO. MEATH

CLIENT
MEATH COUNTY COUNCIL

PROJECT NO. 5514

REVISION	DATE
A	19.02.2021

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Revision History					
Rev	Date	By	Chk	App	Description
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1. INTRODUCTION

McCrae Consulting Engineers (MCE) has prepared this site-specific Flood Risk Assessment (FRA) to assess the proposal to develop two 2-bed bungalows at a vacant site at Blackhill Crescent, Donacarney, Co Meath with respect to the requirements of **The Planning System and Flood Risk Management** (PSFRM) guidelines published by the Department of Environment, Heritage and Local Government in November 2009.

1.1 Overview of the Proposed Development

The site is located near the end of Blackhill Crescent, a well established residential area, circa 100 meters northeast of the centre of Donacarney village, 5km east of Drogheda town centre and 2.5km northwest of Bettystown. Donacarney lies about 1.3km south of the Boyne estuary and 2km inland from the coast at Bettystown golf course. The site lies about 18m above mean sea level. A site location map is shown in figure 1.1

The proposed development will consist of two 2-bed semi-detached bungalows with two car parking spaces each. Fig 1.2 overleaf shows site plan.

Fig 1.1 showing site location with curtilage denoted in red (image courtesy OpenStreetMap)

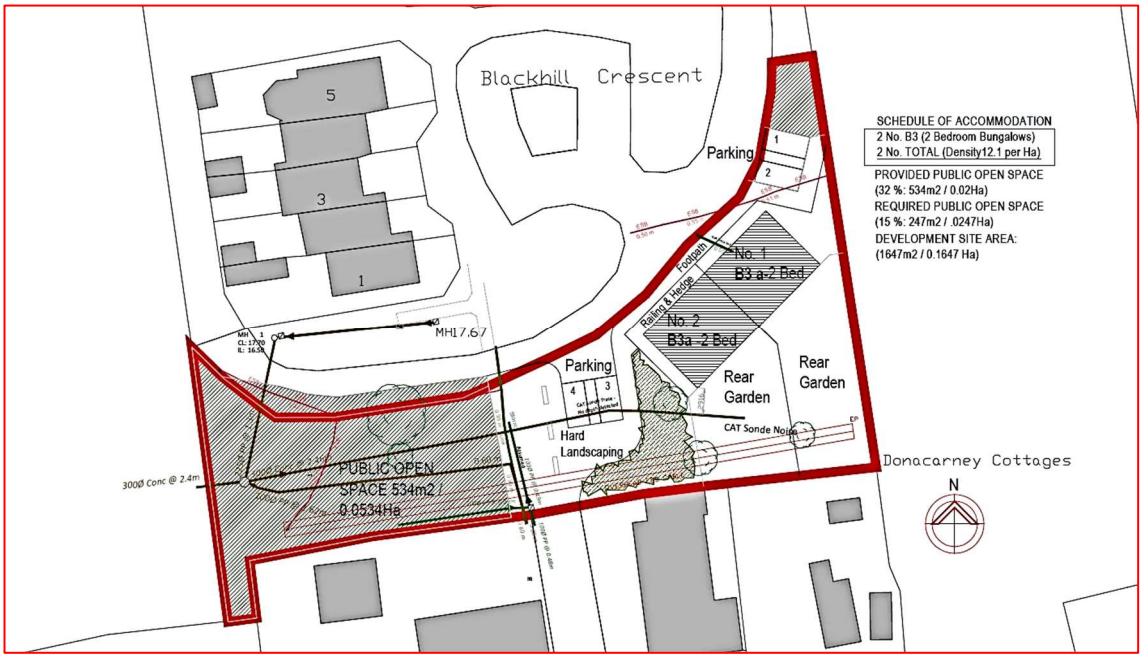


Fig 1.2: site plan with curtilage in RED.

2. FLOOD RISK MANAGEMENT GUIDELINES

The Planning System and Flood Risk Management Guidelines (hereafter referred to as FRM Guidelines) was published in November 2009. The objective of the guidelines is to implement a risk-based sequential approach to managing flood risk and to avoid new development in areas that are at risk. The sequential approach is based on the identification of flood zones for river and coastal flooding as follows:

Flood Zone A

- Lands with a high probability of flooding;
- Subject to flooding in the 1 in 100 year return period storm event - rivers,
- subject to flooding in the 1 in 200 year return period event - coastal/ tidal areas.

Flood Zone B

- Lands with a moderate probability of flooding;
- Subject to flooding in the 1 in 100 year return period storm event - rivers,
- subject to flooding in the 1 in 1000 year return period event– coastal/ tidal areas.

Flood Zone C

- Lands with a low probability of flooding;
- Subject to flooding in the 1 in 100 year return period storm event - rivers,
- subject to flooding events greater than the 1 in 1000 year return period.

The guidelines set out the different types of new development appropriate to each zone as shown in tables 3.1 (vulnerability classes of structures) and 3.2 (matrix of vulnerability) overleaf from the FRM guidelines. Of specific relevance to the proposed development is the classification of residential units as **highly vulnerable development**.

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and 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.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).

*Uses not listed here should be considered on their own merits

Table 3.1 Classification of vulnerability of different types of development

	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

Table 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

Exceptions to the restriction of development are provided for using the Justification Test, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated. This test recognises the need for development in existing towns that lie within flood risk zones and that a blanket ban on any future development within those areas is impractical.

The guidelines recommend a three-stage approach to undertaking an FRA as per the following:

- Flood Risk Identification (Stage 1) - Identification of any potential flooding or surface water issues which may impact the proposed development site.
- Initial Flood Risk Assessment (Stage 2) - Establishment of the sources of flooding, the extent of the flood risk, potential impacts and identification of possible mitigation measures.
- Detailed Flood Risk Assessment (Stage 3) - Assess flood risk issues in sufficient detail to provide quantitative appraisal of potential flood risk of the development, impacts elsewhere of the flooding and the effectiveness of any proposed mitigation measures.

3. FLOOD RISK IDENTIFICATION (Stage 1)

3.1 PFRA Preliminary Flood Risk Assessment

The Preliminary Flood Risk Assessment (PFRA), a national screening exercise conducted by the OPW to identify areas which may be at significant risk of flooding, was completed in December 2011. It used as its data sources any existing available or readily derivable information including public consultation. It subsequently identified over 300 locations nationwide as Areas for Further Assessment (AFAs) and this included both Bettystown and Drogheda as areas for further assessment and identified fluvial/tidal flooding as an applicable source for these areas. The proposed site lies between and outside of these areas of interest.

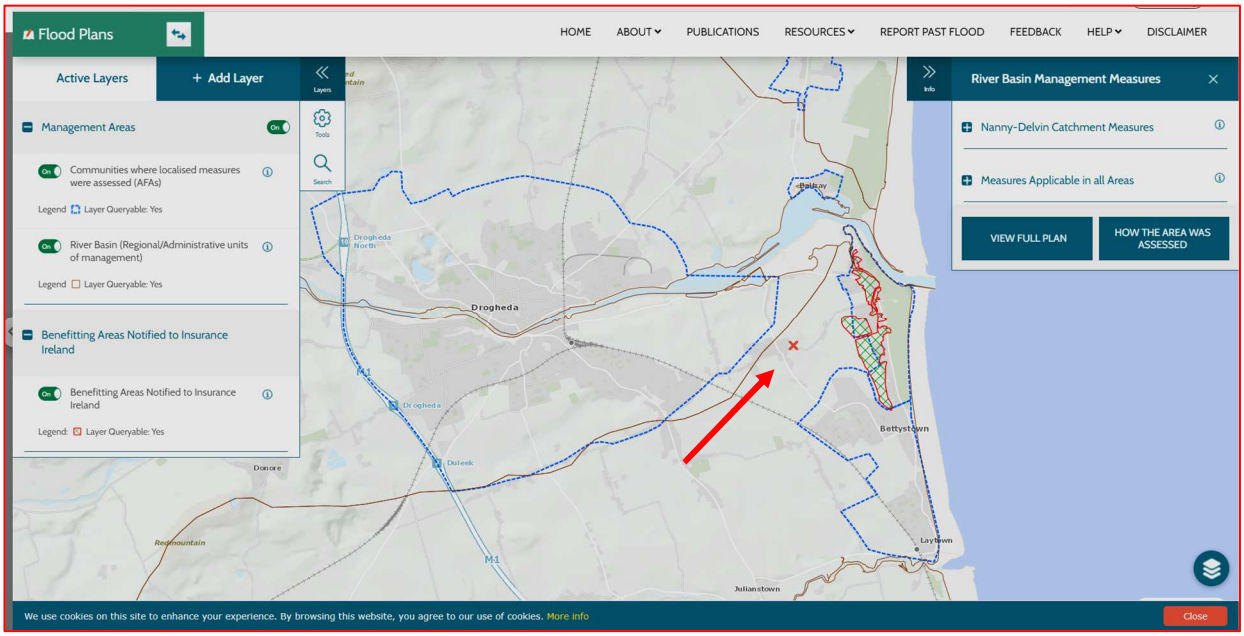


Fig 3.1: Site location (marked X) between Drogheda and Bettystown AFA's.

3.2 CFRAM Flood Risk Mapping

The National Catchment Flood Risk Assessment and Management Program (CFRAM) was developed to meet the requirements of the EU Floods Directive (2007/60/EC) and falls under the auspices of the OPW, the lead agency for flood risk management in Ireland. As part of the CFRAMS program, detailed hydraulic models were constructed for the Nanny-Delvin River Catchment Area which includes This resulted in the production of a series of maps indicating areas of possible flooding under a set of specified scenarios. These three models correspond to 0.1% (1:1000 year return period), 1% (1:100 year return period) and 10% (1:10 year return period) fluvial extent event probabilities respectively.

The maps for Donacarney indicate risks of flooding to the river Boyne occurring north of the village in all three model (low, medium and high risk) scenarios. However, the proposed development lies some 1.3km outside the indicated zones and 16m higher. An extract from the combined risks CFRAM map is reproduced overleaf.

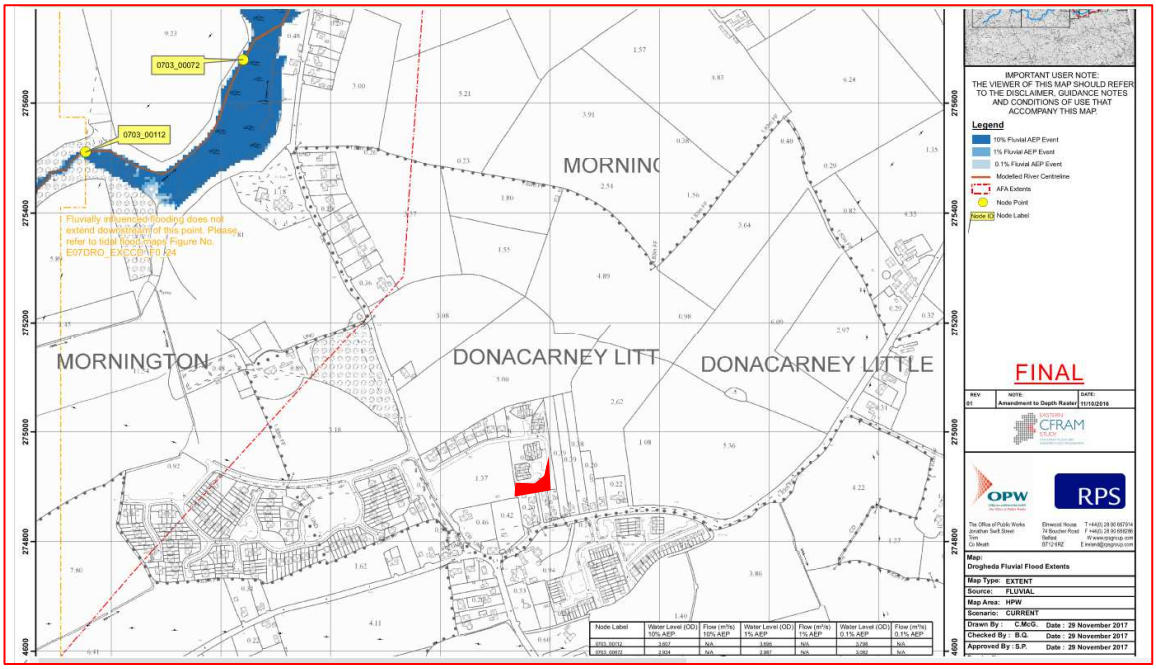


Fig 3.2 Extract of Donacarney fluvial extent model (CFRAM) with site highlighted in red.

A full copy of this model is included in the appendices.

3.3 Stage Conclusions

The outcome of the flood risk identification stage is that there is no recorded evidence that flooding has occurred at the site or it's immediate hinterland in the past and there is a very low probability of flooding occurring in the future. The site is therefore classifiable as **Flood Zone C** in the Matrix of Vulnerability.

4. INITIAL FLOOD RISK ASSESSMENT (Stage 2)

4.1 Potential Flood Sources

All potential flood risks and flood water sources (except snow melt) pertaining to the site area outlined are as follows:

Fluvial Flood Risk

Fluvial flooding arises from a watercourse exceeding its capacity and spilling over adjacent flood plain. There is no watercourse in the proximity of the proposed development.

Pluvial Flood Risk

Pluvial flooding is the result of rainfall-generated overland flows which arise before runoff can enter a watercourse or storm sewer.

Donacarney lies on a largely level plain and there are no neighbouring hills or elevated geological structures which would facilitate the occurrence of fluvial flooding.

We therefore conclude that pluvial flooding will not pose a risk to the development.

Groundwater Flood Risk

Groundwater flooding occurs as a result of water rising up from the underlying rocks or from groundwater flowing from abnormal springs. This type of flooding is usually associated with extended periods of heavy rainfall and is associated with the formation or re-occurrence of turloughs/winter lakes mostly in the karstic limestone areas as found primarily in the West of Ireland.

A review of the Geological Survey of Ireland's Groundwater viewer did not indicate that the site was potentially exposed to groundwater flooding (see fig 4.1 below).

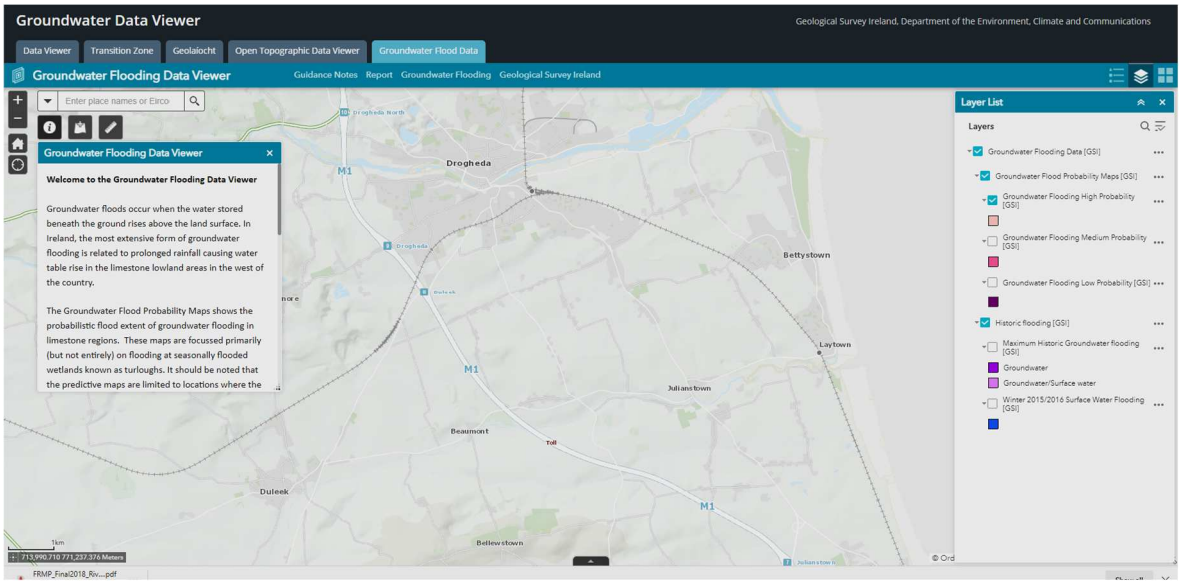


Fig 4.1 Screenshot of GSI groundwater flooding map with no area on the map highlighted.

We therefore conclude that groundwater flooding will not pose a risk to the development.

Coastal/Tidal Flood Risk

Coastal/Tidal flooding results from a high tide combined with a storm surge resulting in the inundation of the flood plain at coastal locations or on the tidal reaches of rivers. As Donacarney is located some 2 km from the coast (at Bettystown), 1.3km from the Boyne estuary and the site is some 18m above sea level we conclude that no risk is associated with coastal/tidal flooding.

Surcharge of Existing Drainage Systems

No records of any surcharging of the existing drainage systems on the site are recorded on the OPW flood maps.

4.2 Historical Records

A review of available historical sources has not indicated any history of flooding associated with the site. The old Ordinance Survey maps do not contain any indication of the area either being prone to flooding or being recorded as marsh land.

Floodmaps.ie indicate two flooding events occurring within 1km of the proposed development. The first is a recurring flood at Donacarney school (#958 on the image below) arising from low lying land, some 300m south of the site. The second (#940), located c. 1 km to the north, is a recurring event associated with flooding in the Boyne.

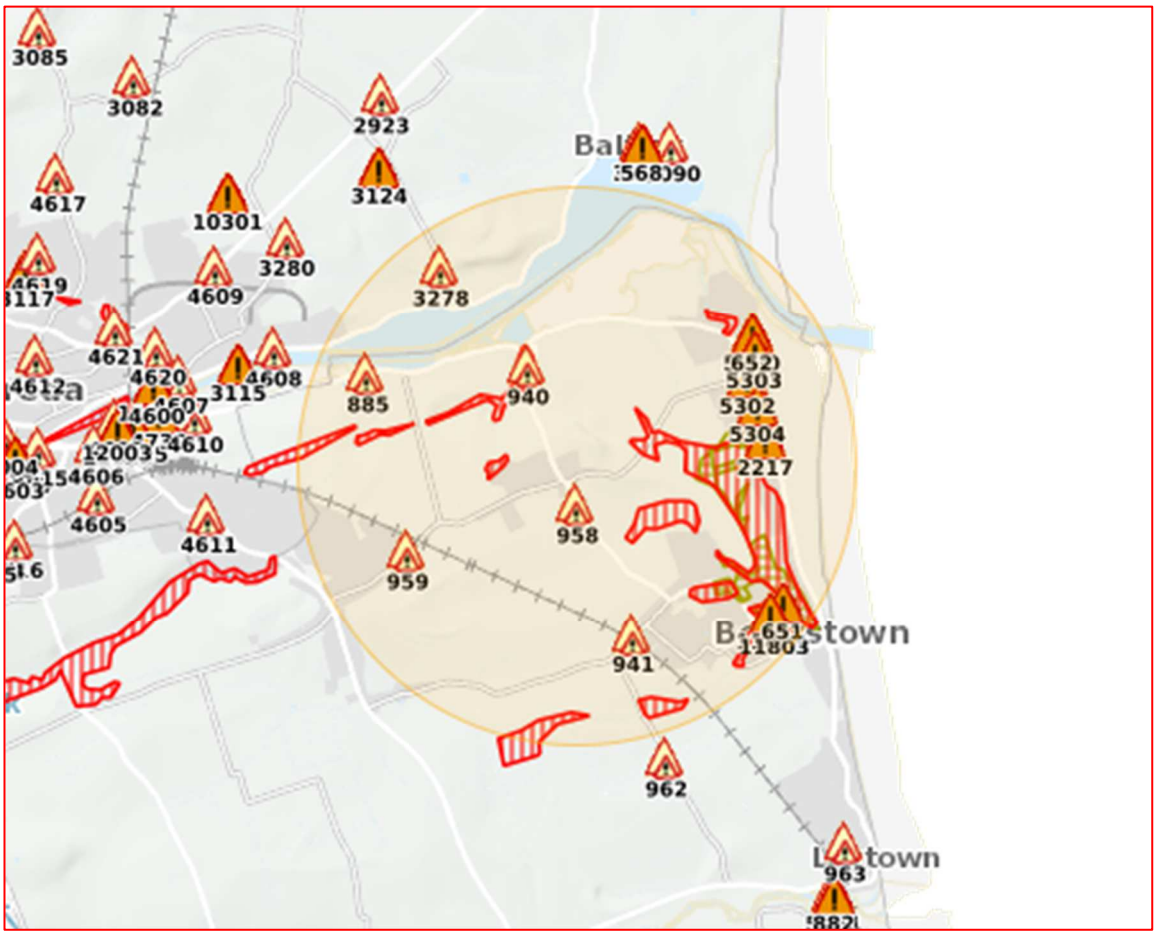


Fig 4.2 Extract from floodmaps.ie indicating all events within a 2.5km radius

A copy of the full historical flooding map is included in the appendices.

4.3. Existing Flood Risk Management Measures

The OPW Flood Risk Management Plan for the Boyne Basin details the following local FRM schemes:

> *The Mornington Flood Relief Scheme, which comprises flood defence walls and embankments along the Mornington Stream and a pumping station upstream of Lady's Finger Bridge, provides protection against a 100-Year fluvial flood (1% Annual Exceedance Probability) and a 200-Year tidal flood (0.5% Annual Exceedance Probability) for 162 properties.*
>
> *The Northlands Flood Relief Scheme was initiated in 2013 following major flooding in 2008 and 2012, and has been substantially completed. The Scheme, which comprises of flood defence walls and a non-return flap valve, provides protection against a 100-Year flood (1% Annual Exceedance Probability) for 27 properties against flooding from the Mornington stream and its tributary.*

The proposed site lies outside of the areas of benefit of these schemes. A screenshot of the area indicating the benefitting areas is given below with the site location indicated with an X.

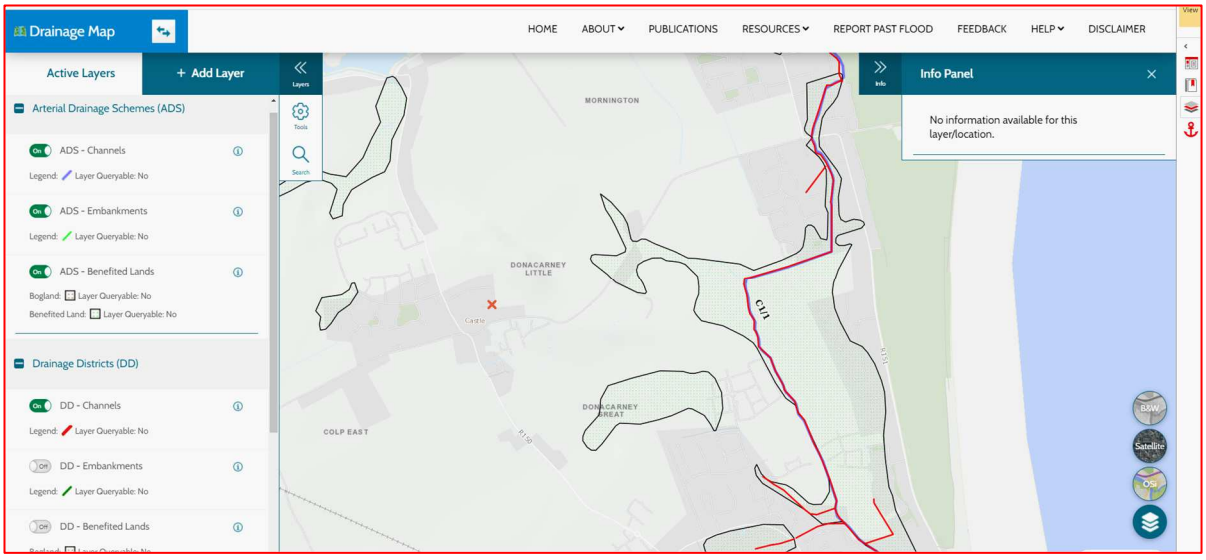


Fig 4.3 screenshot of Donacarney area drainage map with site marked as red cross

4.4 Local Knowledge

We did not establish any local anecdotal evidence of past flooding events which would contradict or otherwise impact on the conclusions arrived at from review of the publicly available primary sources of information.

4.5 Stage Conclusions

The outcome of the **Initial Flood Risk Assessment** is that the risk of flooding occurring at the site is low and the classification of the site as **Flood Zone C** in the Matrix of Vulnerability remains appropriate.

5. CONCLUSION

All existing available information has been reviewed in preparation of this flood risk assessment. The CFRAMS flood zoning maps published by the Office of Public Works (OPW) indicate that the development will not be affected by a 1-in-1000-year flood event.

There is no extant information publicly available that indicates that the proposed site is or will become at risk of flooding events exceeding the lowest probabilities defined in the guidelines. The site is therefore classifiable as **Flood Zone C** in the OPW Guidelines Matrix of Vulnerability meaning that residential development is appropriate for the site and there is no requirement to proceed to stage 3 (detailed flood risk assessment).

We are therefore fully satisfied that the proposals to develop this site properly achieve full compliance with the requirements of **The Planning System and Flood Management Guidelines** as published by the Department of Environment, Heritage and Local Government in November 2009.

Nial O Brien BE, MIEI
19/02/2021

APPENDIX 1
AREA FLOOD HISTORY MAP FROM FLOODMAPS.IE

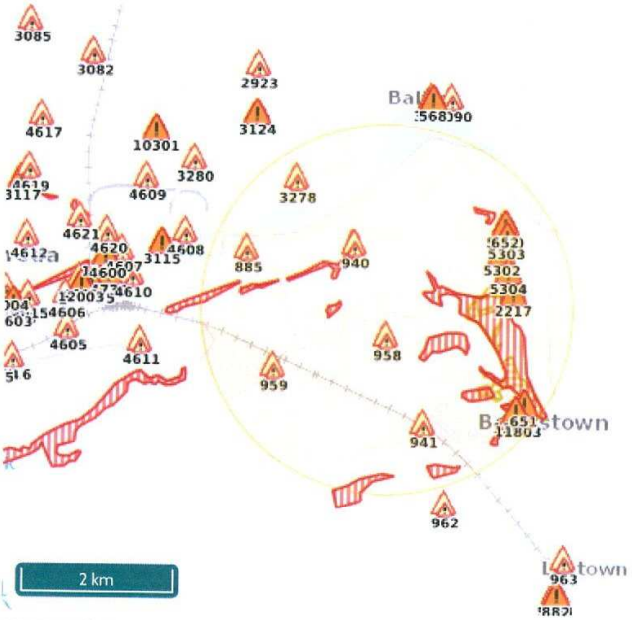
Past Flood Event Local Area Summary Report

OPW Oifig na nOibreacha Poibli/ Office of Public Works

Report Produced: **19/2/2021 14:14**

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*

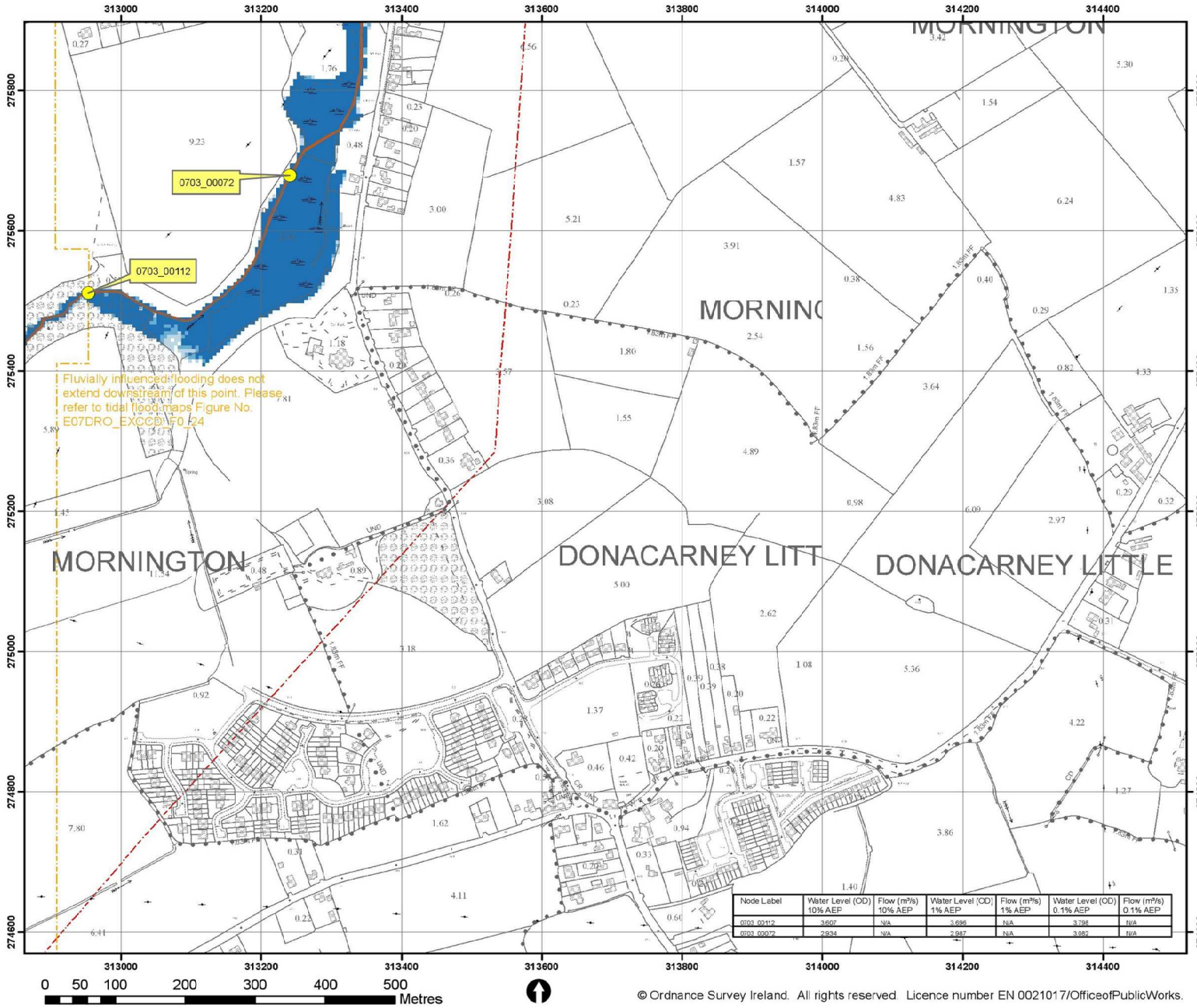
* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

15 Results

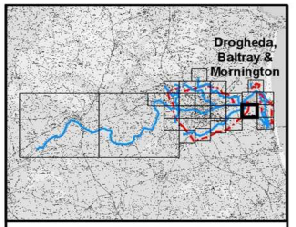
	Name (Flood_ID)	Start Date	Event Location
1.	Mornington November 2000 (ID-651)	06/11/2000	Approximate Point
	Additional Information: Reports (2) Press Archive (2)		
2.	Mornington February 2002 (ID-652)	01/02/2002	Approximate Point
	Additional Information: Reports (3) Press Archive (0)		
3.	Marsh Road, Drogheda Recurring (ID-885)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
4.	Mornington West Recurring (ID-940)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
5.	Piltown Meath Recurring (ID-941)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
6.	Donacarney School R150 Recurring (ID-958)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		

	Name (Flood_ID)	Start Date	Event Location
7.	Colp West Recurring (ID-959) Additional Information: Reports (2) Press Archive (0)	n/a	Approximate Point
8.	Mornington/Bettystown Nov 2000 (ID-2217) Additional Information: Reports (3) Press Archive (0)	06/11/2000	Approximate Point
9.	Beaulieu, Termonfeckin, Co. Louth Recurring (ID-3278) Additional Information: Reports (1) Press Archive (1)	n/a	Approximate Point
10.	Mornington Feb 2002 1 (ID-5300) Additional Information: Reports (1) Press Archive (0)	01/02/2002	Approximate Point
11.	Mornington Feb 2002 2 (ID-5302) Additional Information: Reports (2) Press Archive (0)	01/02/2002	Approximate Point
12.	Mornington Feb 2002 3 (ID-5303) Additional Information: Reports (1) Press Archive (0)	01/02/2002	Approximate Point
13.	Mornington Feb 2002 4 (ID-5304) Additional Information: Reports (1) Press Archive (0)	01/02/2002	Approximate Point
14.	Mornington River Northlands Estate, Bettystown, Co Meath 26th September 2012 (ID-11803) Additional Information: Reports (1) Press Archive (0)	26/09/2012	Approximate Point
15.	Flooding at Northlands Housing Development, Bettystown, Co Meath on 24th Oct 2011 (ID-11648) Additional Information: Reports (1) Press Archive (0)	24/10/2011	Exact Point

APPENDIX 2
CFRAM MODEL INDICATING 0.1%, 1% & 10% PROBABILITY FLOOD EVENTS



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
0703_00112	3.607	N/A	3.696	N/A	3.798	N/A
0703_00072	2.934	N/A	2.987	N/A	3.082	N/A



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:
01	Amendment to Depth Raster	11/10/2016

EASTERN CFRAM STUDY

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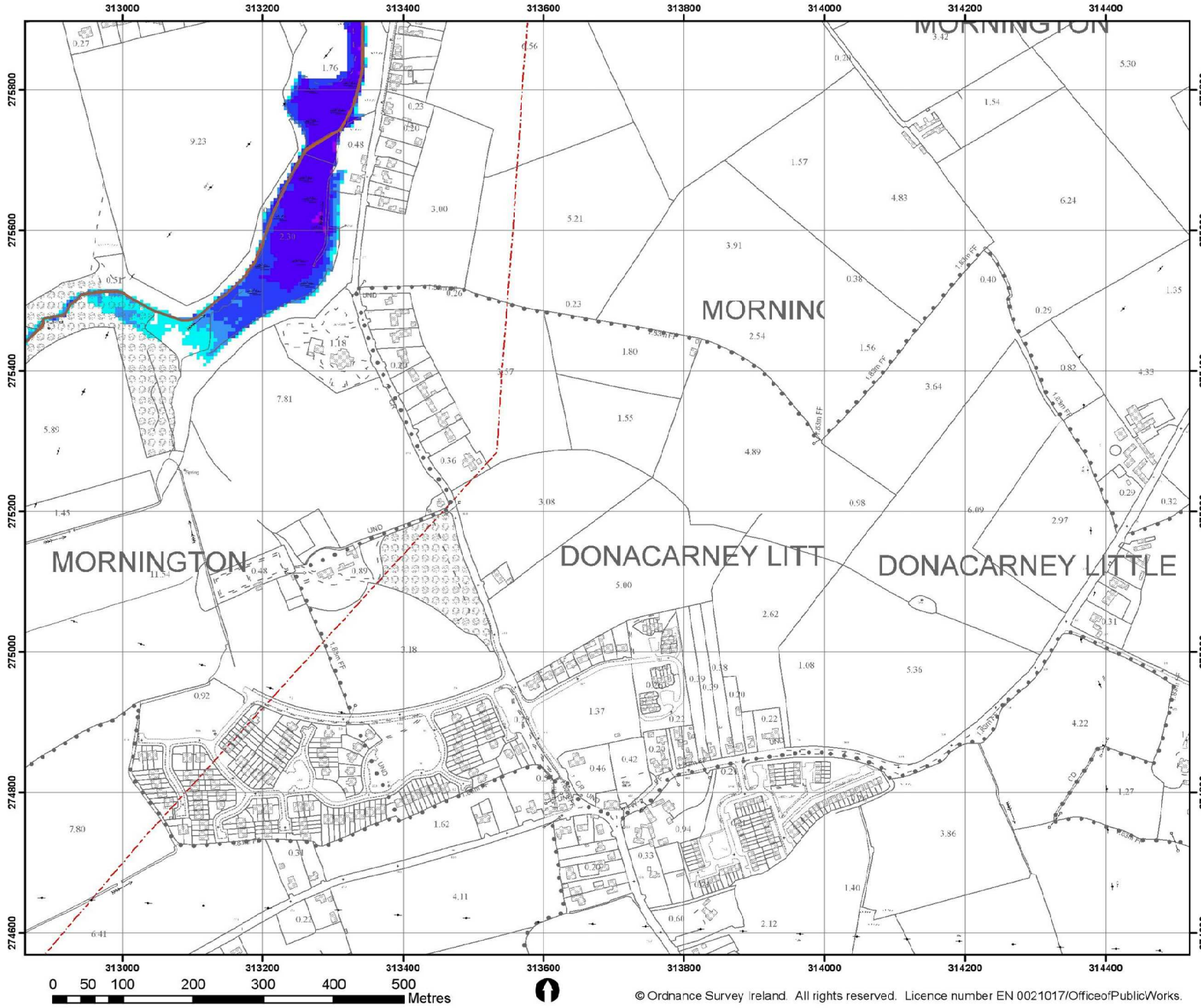
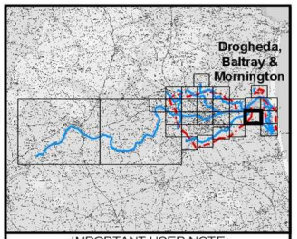
Map: Drogheda Fluvial Flood Extents

Map Type:	EXTENT
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By : C.McG.	Date : 29 November 2017
Checked By : B.Q.	Date : 29 November 2017
Approved By : S.P.	Date : 29 November 2017
Drawing No. :	E07DRO_EXFCD_F4_24
Map Series :	Page 24 of 29
Drawing Scale :	1:5,000 @ A3

MCE MCE

APPENDIX 3
CFRAM MODEL INDICATING FLOOD DEPTHS FOR LOW RISK EVENTS





IMPORTANT USER NOTE:
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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:	NOTE:	DATE:
01	Amendment to Depth Raster	11/10/2016

EASTERN CFRAM STUDY

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Map:
Drogheda Fluvial Flood Depths

Map Type:	DEPTH
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By:	C.McG. Date : 29 November 2017
Checked By :	B.Q. Date : 29 November 2017
Approved By :	G.G. Date : 29 November 2017
Drawing No. :	E07DRO_DPFCD100_F4_24
Map Series :	Page 24 of 29
Drawing Scale :	1:5,000 @A3

MCE MCE