ORANMORE LRD

CARTRON

ORANMORE, CO. GALWAY

MARSHALL YARDS

DEVELOPMENT COMPANY LTD.

Site Specific Flood Risk Assessment

September 2023

(Revision 02 – May 2024)

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Client: Marshall Yards Development Company Ltd

Project Title: Oranmore LRD

Address: Lands at Cartron, Oranmore, Galway

Report Title: Site Specific Flood Risk Assessment

Job Number: 23011

Report Ref: 23011-FRA-RPT-001

Author: Brian McCormack

Date: September 2023

Revision	Issue Date	Description	Prepared	Reviewed	Approved
-	18/09/23	Draft Issue	BMC		
01	29/11/23	Section 32B Submission	BMC	DO	CK
02	24/04/24	Final Report	BMC	DO	CK

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1.0 INTRODUCTION

1.1 Background

AKM Consulting Engineers were commissioned by Marshall Yards Development Company Ltd. to prepare a Site Specific Flood Risk Assessment (SSFRA) for a proposed residential development of 171 units & a creche at Cartron, Coast Road, Oranmore, Co. Galway. This flood risk assessment has been carried out in accordance with 'The Planning System and Flood Risk Management Guidelines' published in November 2009 by the Department of the Environment, Community and Local Government (DECLG) and the Office of Public Works (OPW).

1.2 Existing Site

The existing site is a fully zoned green field site in the Garraun Urban Framework Plan circa 5.5 hectares in size. The lands are bound to the west by an existing dwelling house. The lands are bound to the north by the rail line, to the east by a dwelling and farm buildings and to the south by The Coast Road (R338).

Galway Bay and the Noth Atlantic Ocean are located circa 75m to the south of the subject site.

The lands generally fall from northwest to southeast at an average gradient of circa 1 in 14. These gradients are based on topographical survey data. There are a small band of trees to the east of the site. There are other hedges and trees scattered throughout the site. There are 3 no entrances to the site. 2 no. entrances from the south from the Coast Road and 1 no. to the east from the local road (L71051).

There are no public foul water sewers or surface water sewers adjacent to the site. There is an existing rising main located along the Coast Road to the south. There is a 350mm diameter watermain located to the south of the site along the Coast Road.

Figure 1.1 Aerial Photograph of subject site [Source: Google Earth]

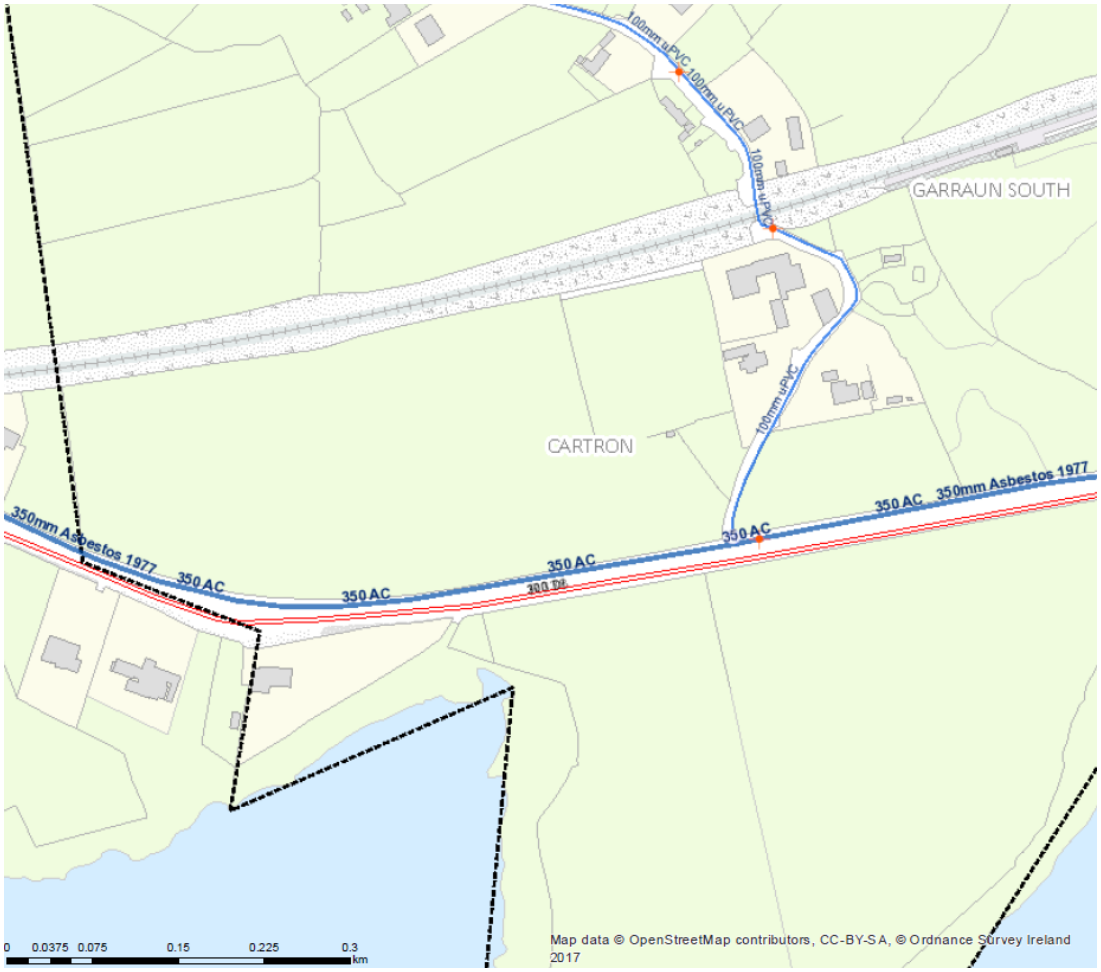


Figure 1.2 Existing Water Services Map [Source: Irish Water]

There are no rivers, streams or watercourses located on the site or adjacent to the site. (See figure 1.3 below)

Figure 1.3 Existing River Waterbodies Map [Source: EPA]

1.3 Proposed Development

Planning permission for the following Large Scale Residential Development (LRD) comprising the demolition of the existing shed and associated structures on site and the construction of 171 no. residential units, 1 no. creche and all associated development works including the provision of pedestrian/cyclist facilities along the R338 public road connecting to Oranmore rail station, 1 no. ESB substation, 1 no. pumping station, the undergrounding of the existing ESB sites traversing the site, footpaths, lighting, parking, drainage, bicycle and bin stores and landscaping/amenity areas at Cartron (townland), Oranmore, Co. Galway. Access will be via a new entrance on the L-71051 to the east.

Surface water run-off from the development will be dealt with onsite via a combination of onsite infiltration and an extensive SuDS (Sustainable Urban Drainage Systems) approach.

Foul water will be drained to an onsite pumping station which will then discharge same via pumping to a gravity standoff manhole circa 900m to the east of the site close to Oranmore.

Figure 1.4 Proposed Site Layout

2.0 PLANNING SYSTEM & FLOOD RISK MANAGEMENT GUIDELINES

2.1 General

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

The flood risk management guidelines give guidance on flood risk and development. They recommend a precautional approach when considering flood risk management in the planning system. The core principle of the guidelines is to adopt a risk based sequential approach to managing flood risk and to avoid development in areas that are at risk. The sequential approach is based on the identification of flood zones for river and coastal flooding.

The guidelines include definitions of Flood zones A, B, and C as noted below.

Zone A (high probability of flooding) is for lands where the probability of flooding is greatest (greater than 1% or the 1 in 100 for river flooding and 0.5% of 1 in 200 for coastal flooding)

Zone B (moderate probability of flooding) refers to lands where the probability of flooding is greatest (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% and 1 in 1000 and 0.5% or 1 in 200 for coastal flooding)

Zone C (low probability of flooding) refers to lands where the probability of flooding is low (less than 0.1% or 1 in 1000 for both river and coastal flooding)

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

It should be noted that Flood Zone C includes all areas outside of Flood Zones A or B.

2.2 Flood Risk Assessment Stages

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

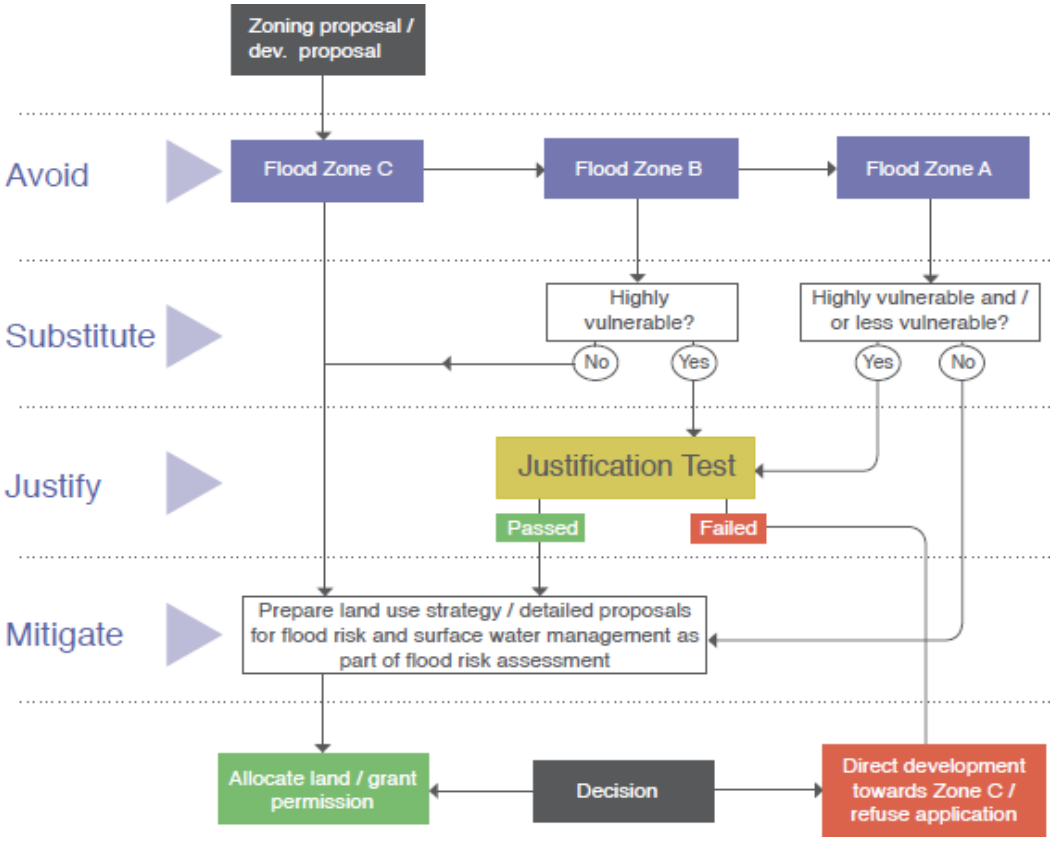


Figure 2.1 – Sequential Approach mechanism in the Planning Process

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

The proposed residential development includes dwelling houses so it is classified as 'highly vulnerable development' as per *table 3.1* above.

Table 3.2 of the Flood Risk Management Guidelines (shown below) identifies the types of development that would be appropriate for each flood zone and those that 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

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

A three staged approach to undertaking a Flood Risk Assessment is recommended.

Flood Risk Identification (Stage 1) – Identification of any issues relating to the site that will require further investigation through a Flood Risk Assessment.

Initial Flood Risk Assessment (Stage 2) – Involves establishment of the sources of flooding, the extent of the flood risk, potential impacts of the development and 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 of the flooding elsewhere and the effectiveness of any proposed mitigation measures.

This report addresses the requirements for Stage 1 and Stage 2.

3.0 FLOOD RISK IDENTIFICATION STAGE

3.1 General

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

3.2 Information Sources Consulted

Information sources consulted for the identification exercise are outlined in *table 3.3* below.

Information Source	Comments
Predictive and historic flood maps, and Benefiting Lands Maps, such as those at http://www.floodmaps.ie;	OPW www.floodmaps.ie & www.floodinfo.ie website consulted. FSU Web Portal
Expert advice from OPW who may be able to provide reports containing the results of detailed modelling and flood-mapping studies, including critical drainage areas, and information on historic flood events, including flooding from all sources;	Historic flood hazard maps and info obtained from OPW's floodmaps.ie website
Predictive coastal & fluvial flood maps.	PFRA flood extents map consulted.
Previous Strategic Flood Risk Assessments;	CFRAM Study.
Topographical maps, in particular digital elevation models produced by aerial survey or ground survey techniques;	OSI Maps consulted including Geohive & Site topographic survey undertaken.
Information on flood defence condition and performance;	No flood defence information available.
Alluvial deposit maps of the Geological Survey of Ireland (which would allow the potential for the implementation of source control and infiltration techniques, groundwater, and overland flood risk to be assessed). These maps, while not providing full coverage, can indicate areas that have flooded in the past (the source of the alluvium) and may be particularly useful at the early stages of the FRA process where no other information is available;	GSI maps consulted.
Walkover survey to assess potential sources of flooding, likely routes for flood waters and the site's key features, including flood defences.	Walkover survey conducted.

National, regional & local spatial plans, such as the National Spatial Strategy, regional planning guidelines, development plans & local area plans provide key information on existing and potential future receptors.	Galway County Council Development Plan and Garraun Framework Plan consulted.
Geotechnical examination of soil type present, infiltration rates, groundwater level, and depth of culverted stream.	Ground Investigation conducted
Review of known watercourses present in the local river catchment.	EPA website consulted

Table 3.3 - Information sources consulted

3.3 Site Assessment

3.3.1 Existing Hydrological Features

Figure 3.1 below is taken from the EPA website to identify existing waterbodies. There are no watercourses, rivers, or streams on the site or in the immediate vicinity of the site. The North Atlantic Ocean and Galway Bay is located circa 75m to the south of the site.

Figure 3.1 – Hydrological Features in vicinity of proposed development (Source EPA.ie).

3.3.2 Existing Geology and Hydrogeology of the Area

The Geological Survey of Ireland (GSI) provides information on their public online mapping service at www.gsi.ie on subsoil and aquifer vulnerability. The maps shown below in *Figure 3.2* and *3.3* depict the subsoil permeability and aquifer vulnerability for the proposed development site respectively.

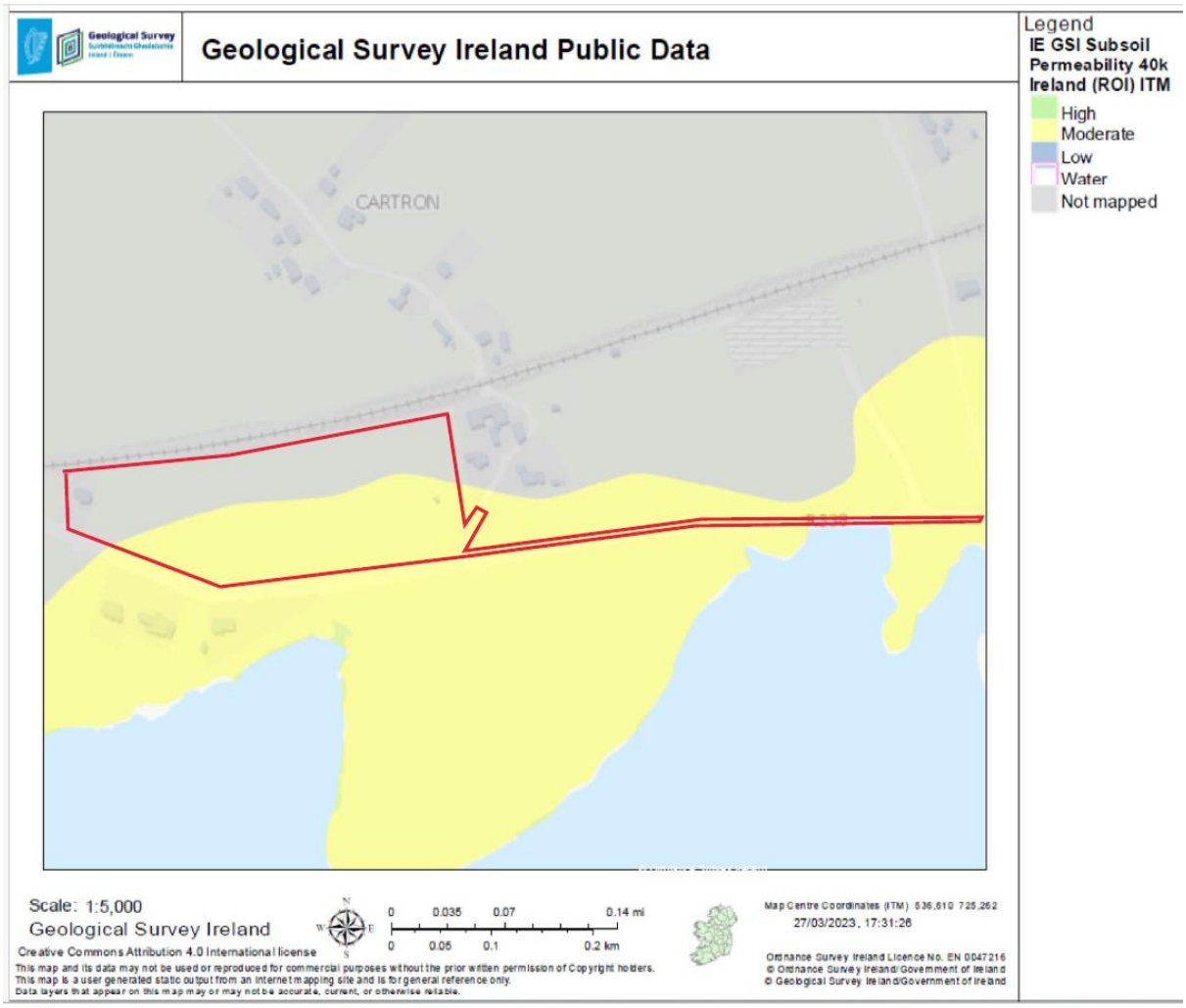


Figure 3.2 GSI Subsoil Permeability Mapping [Source: GSI].

Subsoil permeability is mapped as moderate for the southern half of the site. The northern half of the site is not mapped.

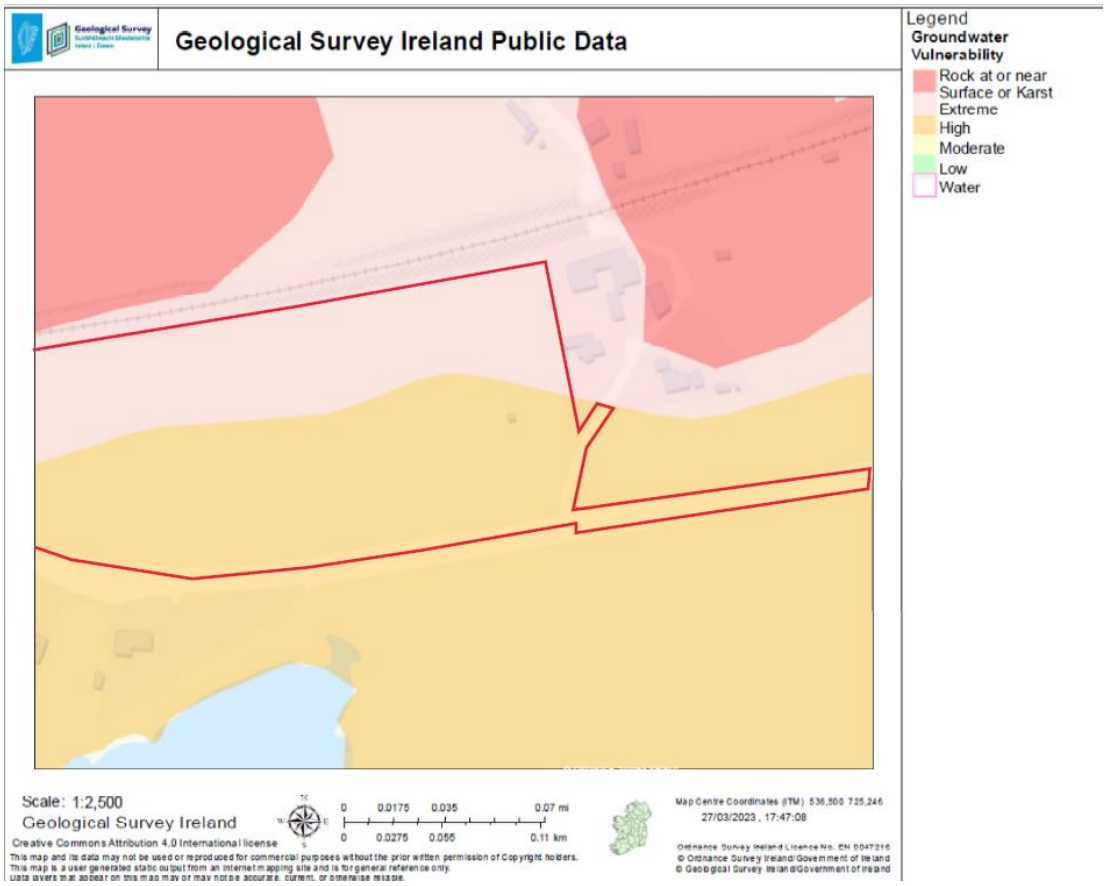


Figure 3.3 GSI Aquifer Vulnerability Mapping [Source: GSI], Aquifer vulnerability of Extreme and High.

Aquifer vulnerability in this region is shown as having a varying degree of vulnerability ranging from High (H) to Extreme (E) rating (See *figure 3.3* above). The vulnerability rating for an area indicates and is a measure of the likelihood of contamination. The vulnerability map helps to ensure that a groundwater protection scheme is not necessarily restrictive on human economic activity and the vulnerability map helps in the choice of preventative measures and enables developments which have a significant potential to contaminate to be located in areas of lower vulnerability.

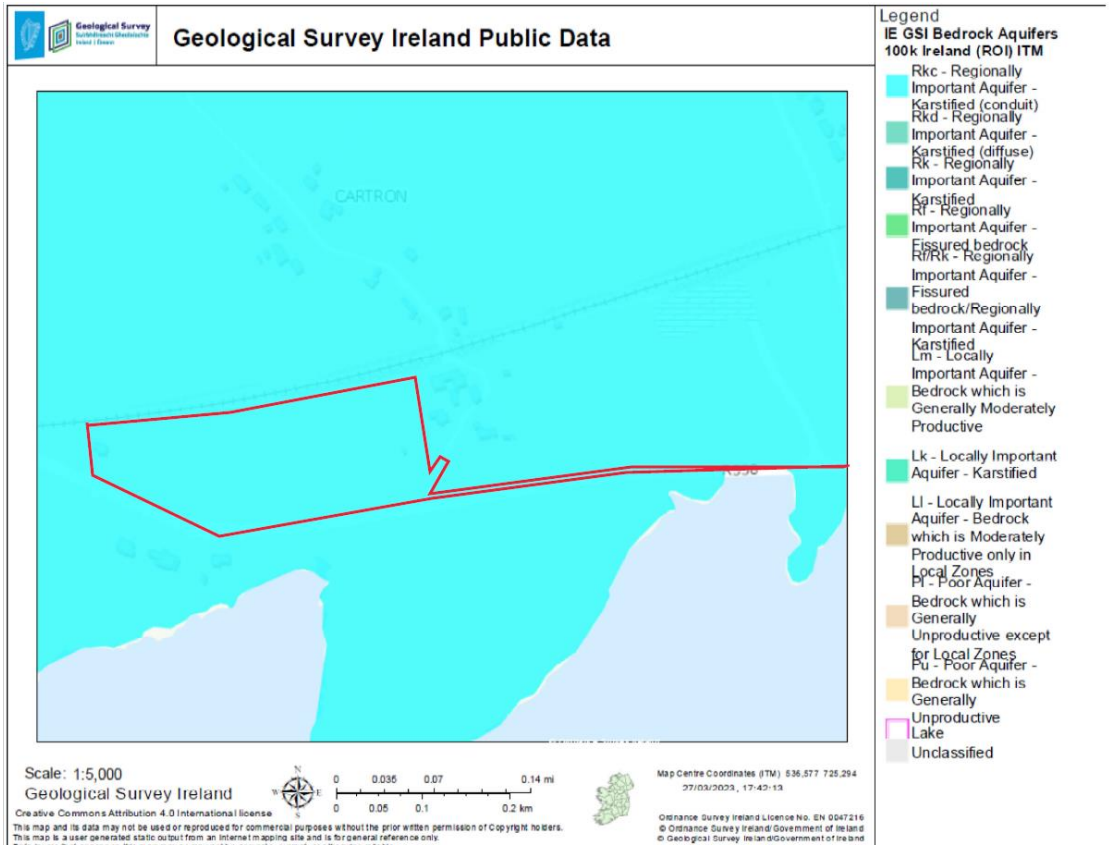


Figure 3.4 Bedrock Aquifers [Source: GSI]

The bedrock aquifer is considered a regionally important aquifer below for the subject site, see figure 3.4 above.

3.3.3 Flooding History in the Area

The National Flood Hazard Mapping website www.floodmaps.ie shows no records of historic flooding events at the subject site. There are some historic flood events within a 2.5km radius of the subject site. A Summary Local Area Report was generated for the site which identifies all flooding events which occurred within 2.5km of the proposed development. (See *Appendix A*). The nearest historical coastal flood event to the proposed development site occurred in 2014 at Oranmore, circa 400m to the east.

4.0 FLOOD RISK ASSESSMENT

4.1 Sources of Flooding

4.1.1 Fluvial Flood Risk

Fluvial flooding is the result of a river or stream exceeding its capacity and excess water spilling out onto the adjacent floodplain.

There are no nearby rivers or streams in the vicinity of the site.

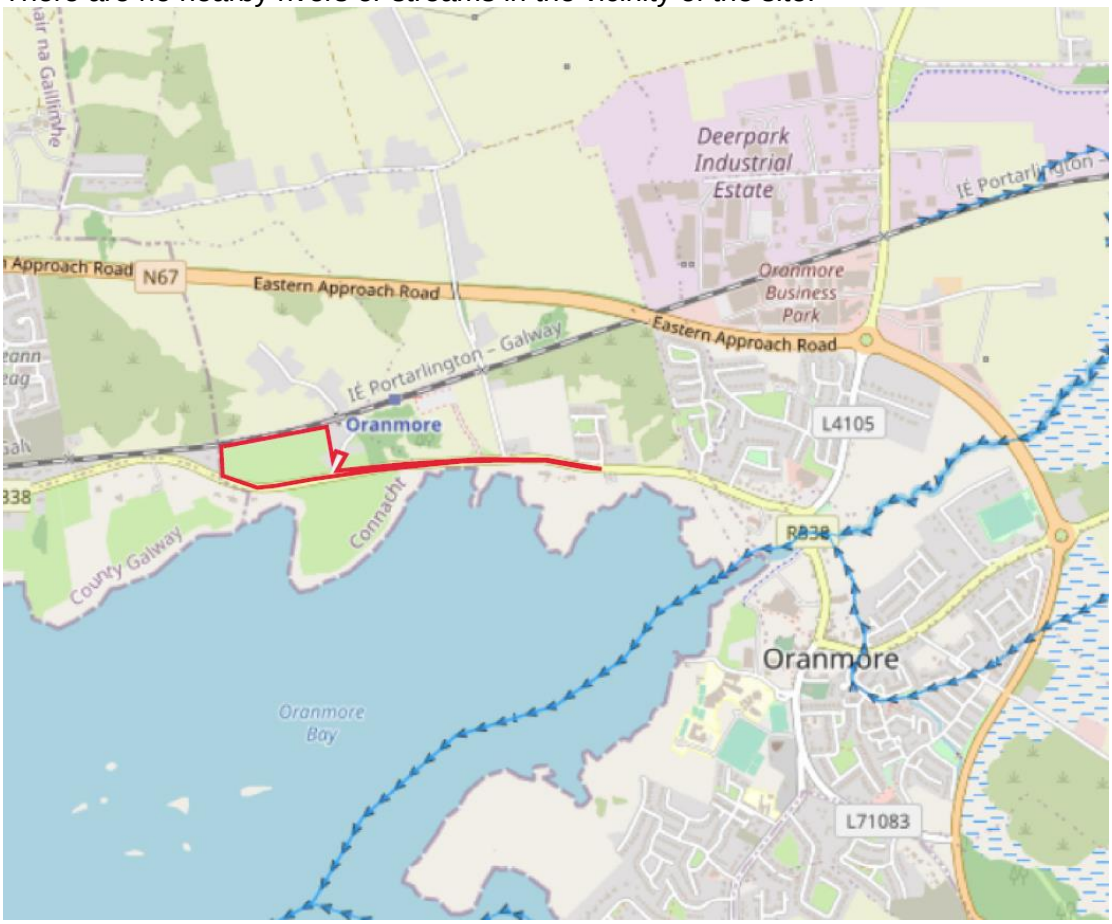


Figure 4.1 Hydrological Features in vicinity of proposed development (Source EPA.ie).

From a review of the available information, it is considered that the site is at a very low risk of fluvial flooding.

4.1.2 Coastal/Tidal Flooding

Coastal flooding results from sea levels which are higher than normal and result in sea water overflowing onto the land. The subject site is located circa 75m to the north of the North Atlantic Ocean and Galway Bay at an elevation ranging from +4.3m at the south east corner to circa +14m OD at the north west corner. CFRAM coastal mapping for the area has been prepared and shows no coastal flooding on the subject site for the 0.1% event. The coastal flood risk for the subject site is considered very low.

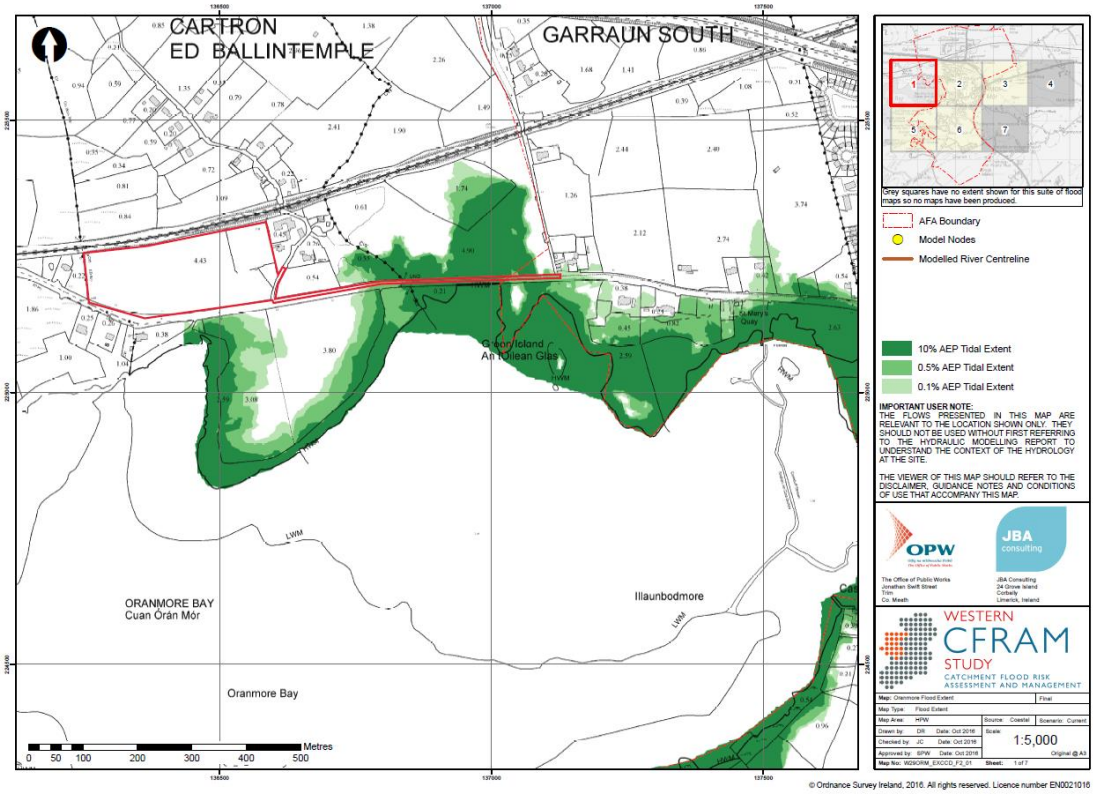


Figure 4.2 CFRAM Coastal Flood Extents Map for the area. No coastal flooding predicted.

National Indicative Coastal Flood Hazard/CFRAM Mapping has been prepared for the area for both the mid-range future scenario and high-end future scenario coastal flooding events.

The mid-range future scenario takes in the potential effects of climate change with an increase in rainfall of 20% and sea level rise of 500mm. The high-end future scenario takes in the potential effects of climate change with an increase in rainfall of 30% and seal level rise of 1000mm.

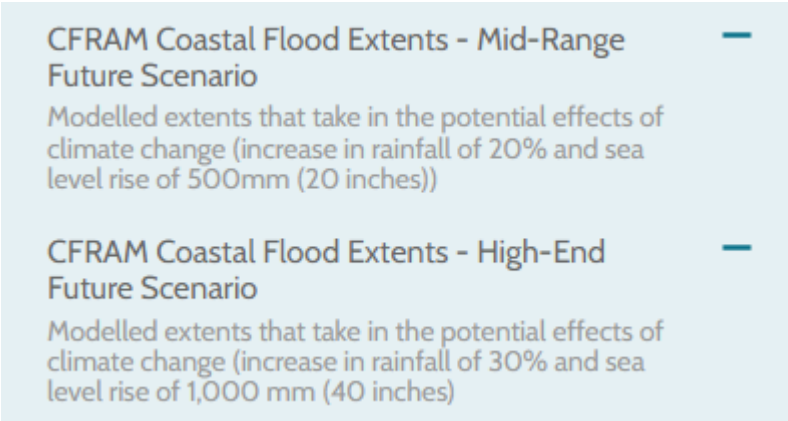


Figure 4.3 CFRAM Coastal Flood Mid-Range future scenario flood extents pre-development

Figure 4.3 above and figures 4.4 & 4.5 below show the extent of the mid-range future scenario and high-end future scenario for the pre-development and post development site. It can be seen that there is no predicted coastal flooding to any properties within the development for either future scenario even for the 1000 year event post-development.

Figure 4.4 CFRAM Coastal Flood High-End future scenario flood extents pre-development

Figure 4.5 CFRAM Coastal Flood High-End & Mid-Range future scenario flood extents post development

4.1.3 Pluvial Flood Risk

Pluvial flooding occurs when the amount of rainfall exceeds the capacity of urban storm water drainage systems or the ground to absorb it. Extensive onsite infiltration testing has been carried out which showed the majority of infiltration tests passing at a depth of 0.9m below the existing ground level.

There are no nearby storm water drainage systems in the vicinity of the site.

From the information detailed above, the subject site can be accurately characterised as being in Flood Zone C – Low Probability of Pluvial Flooding.

4.1.4 Groundwater Flood Risk

There is no historical evidence of groundwater flooding at the site. During the excavation of 8 No. Trial Pits, groundwater was not struck on any occasion. Groundwater flood risk is considered to be low.

4.1.5 Artificial Drainage Systems Flood Risk

No artificial drainage systems have been identified at the proposed site so drainage system flood risk is not considered relevant.

4.2 Flood Zone

The CFRAMs flood modelling maps indicate that no vulnerable development within the subject site would be subject fluvial or coastal flood risk. The Planning System and Flood Risk Management Guidelines for Planning Authorities, classes residential development as a highly vulnerable land use and is therefore appropriate for development only within Flood Zone C without the need to provide a justification test.

This FRA confirms the proposed development footprint within the subject site as being located wholly within Flood Zone C and is therefore appropriate for residential development from a flood risk perspective. It is the finding of this site-specific flood risk assessment that the current Flood Zone of the entire site can be defined as Flood Zone C.

Flood Zone C is defined in the Planning System and Flood Risk Management Guidelines where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 year return for both river and coastal flooding).

4.3 Vulnerability

Table 3.1 of the Planning System and Flood Risk Management Guidelines for Planning Authorities gives a detailed classification of vulnerability of different types of development. A justification test is not required for buildings with a commercial / industrial use or buildings within Flood Zone C. Since this development is planned within areas characterized as being Flood Zone C this will negate the need to carry out a 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

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

5.0 CONCLUSIONS

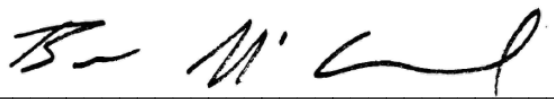
A flood risk assessment for the proposed residential development at Cartron, Coast Road, Oranmore, Co. Galway has been undertaken following the methodology recommended in the FRM Guidelines. The following is the summary of the flood risk assessment:

- The National Flooding website www.floodmaps.ie does not have any record of historic flooding at the site.
- Flood Maps prepared as part of the CFRAM study indicate that the site lies outside the 0.1% AEP coastal flood extent, indicating the site lies within Flood Zone C.

- The type of development is defined as ‘Highly Vulnerable Development’. As the development site is in Flood Zone C, and as per the Matrix of Vulnerability no justification test was necessary and it is deemed as appropriate development.
- Finished floor levels of dwelling houses on the proposed site will be on average 650mm above existing ground level which will provide additional freeboard against the nearby high water predicted flood levels.
- No compensatory flood storage is required as a result of an increase in site levels as the site does not currently provide any flood storage based on current predicted flood levels for the level of protection required by planning guidelines. Should the high-end future scenario take place and a 1 in 1000yr storm event, no vulnerable part of the development would be subject to flooding. In this scenario, any water displaced by the raising of levels within the site would be contained within open ocean and would not result in a sea-level rise or an increase in the risk of flooding elsewhere. There are no EPA listed water courses in the vicinity of the site.

It is recommended to incorporate appropriate SuDS principles to ensure that any surface water that may accumulate on the site is managed sufficiently and sustainably while discharging in a controlled manner via infiltration to the ground below.

Signed:



Brian McCormack BE, CEng., P.Grad.Dip., MIEI

APPENDIX A – PAST FLOOD SUMMARY REPORT

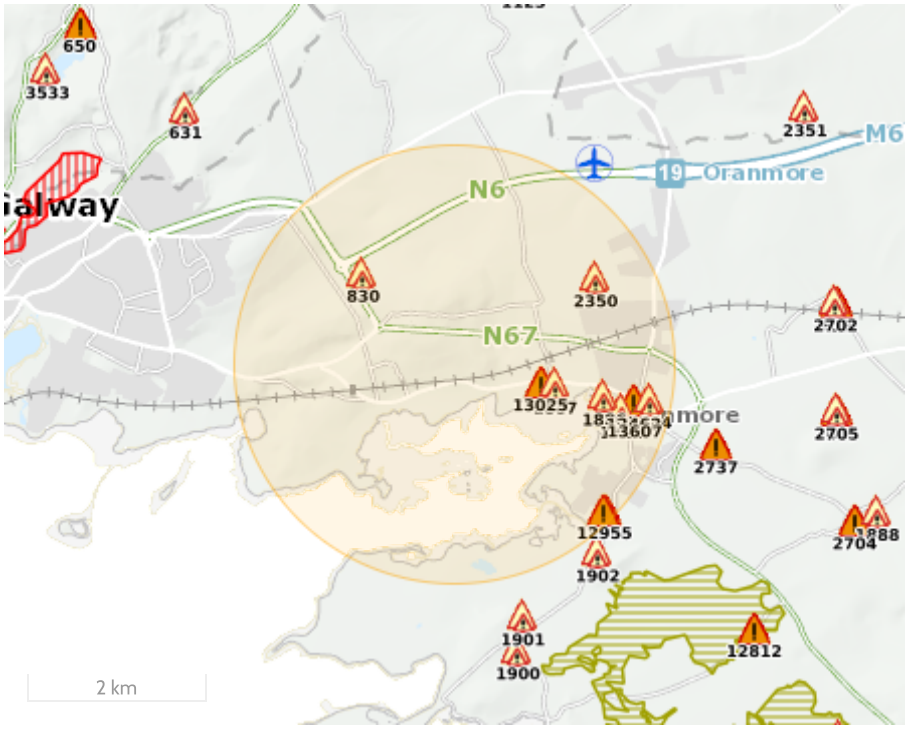
Past Flood Event Local Area Summary Report

OPW Oifig na nOibreacha Poiblí Office of Public Works

Report Produced: **31/3/2023 12:14**

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*

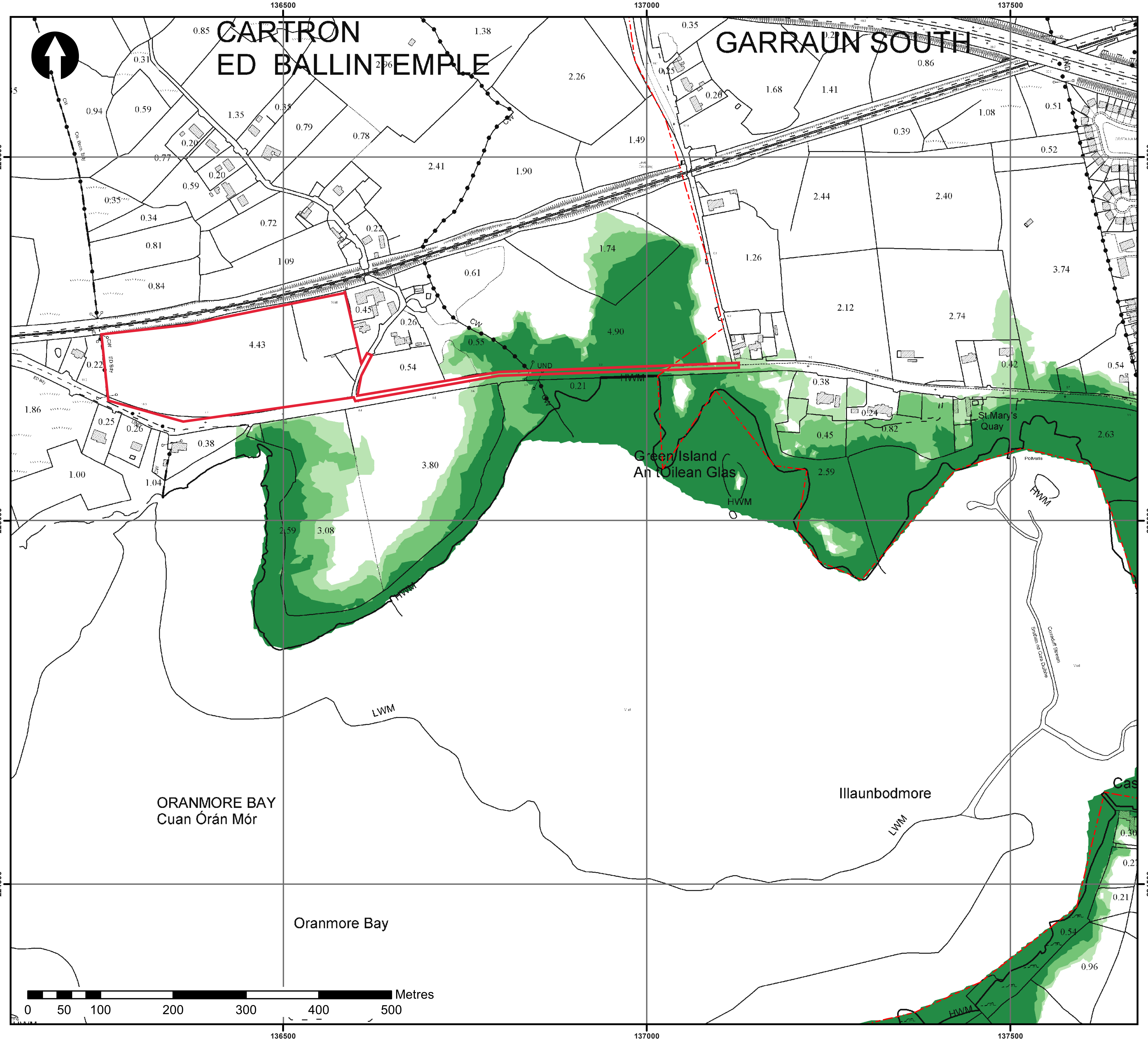
* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

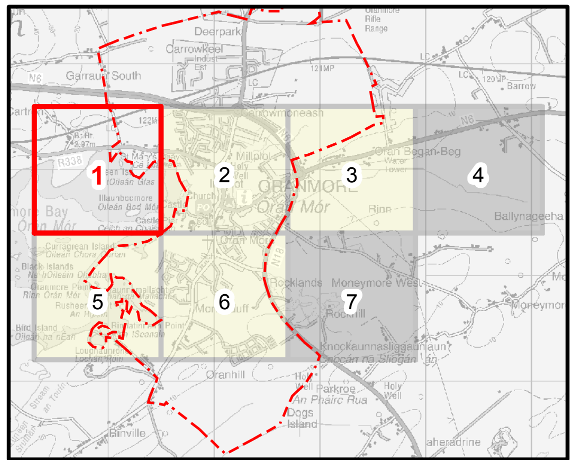
11 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Flooding at Oranmore on 18/12/2013 (ID-12955)	18/12/2013	Approximate Point
	Additional Information: Reports (0) Press Archive (0)		
2.	Flooding at Oranmore on 03/01/2014 (ID-13025)	03/01/2014	Approximate Point
	Additional Information: Reports (0) Press Archive (0)		
3.	Flooding at Oranmore on 02/01/2018 (ID-13607)	02/01/2018	Approximate Point
	Additional Information: Reports (0) Press Archive (0)		
4.	Flooding in Oranmore on 18th Dec 2013 & 3rd Jan 2014 (ID-12462)	18/12/2013	Approximate Point
	Additional Information: Reports (0) Press Archive (0)		
5.	Flooding at Claregalway on 31/01/2014 (ID-13044)	31/01/2014	Approximate Point
	Additional Information: Reports (0) Press Archive (0)		
6.	Turlough - Doughiska, Galway (ID-830)	n/a	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		

	Name (Flood_ID)	Start Date	Event Location
7.	Millpot, Oranmore Recurring (ID-1884)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
8.	Innplot, Oranmore Recurring (ID-1885)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
9.	St Mary's Quay, Oranmore Recurring (ID-1886)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
10.	Green Island, Oranmore Recurring (ID-1887)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
11.	Glennascaul Deerpark Oranmore Recurring (ID-2350)	n/a	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		

APPENDIX B – CFRAM COASTAL FLOOD EXTENTS





Grey squares have no extent shown for this suite of flood maps so no maps have been produced.

AFA Boundary

Model Nodes

Modelled River Centreline

10% AEP Tidal Extent

0.5% AEP Tidal Extent

0.1% AEP Tidal Extent

IMPORTANT USER NOTE:
THE FLOWS PRESENTED IN THIS MAP ARE RELEVANT TO THE LOCATION SHOWN ONLY. THEY SHOULD NOT BE USED WITHOUT FIRST REFERRING TO THE HYDRAULIC MODELLING REPORT TO UNDERSTAND THE CONTEXT OF THE HYDROLOGY AT THE SITE.

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

The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath

JBA Consulting
24 Grove Island
Corbally
Limerick, Ireland

WESTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

Map: Oranmore Flood Extent		Final	
Map Type: Flood Extent			
Map Area: HPW		Source: Coastal	Scenario: Current
Drawn by: DR	Date: Oct 2016	Scale: 1:5,000	
Checked by: JC	Date: Oct 2016		
Approved by: SPW	Date: Oct 2016		Original @ A3
Map No: W29ORM_EXCCD_F2_01		Sheet: 1 of 7	