

Woodquay Park Enhancement

Site Specific Flood Risk Assessment

231101-PUNCH-XX-XX-RP-C-004

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1 Introduction

1.1 Background

PUNCH Consulting Engineers were appointed by Galway City Council to carry out a Site-Specific Flood Risk Assessment for the proposed Woodquay Park development in Galway City Centre, Co Galway.

The assessment is carried out in full compliance with the requirements of “The Planning System & Flood Risk Management Guidelines” published by the Department of the Environment, Heritage and Local Government in November 2009 and Galway City Council City Development Plan (CDP) 2023-2029.

The proposed site layout is detailed in a series of planning drawings provided by LUC Architects in the planning documentation.

1.2 Existing Site

The subject site is located 450 meters to the North of Galway City Centre. The site is approximately 0.15 hectares in size and is located within Galway City Council’s remit. The site area is a brownfield site with lawns and benches and is currently known as Water’s edge garden.

The proposed site is bordering Corrib Terrace to the south-west and Galway rowing club to the north. Riverside housing estate is bordering the northeast site boundary, and a public car park borders the southern site boundary. The river Corrib runs 30m adjacent to the north boundary. The location of the site is shown in Figure 1-1.



Figure 1-1: Location of the Proposed development (site boundary indicated in red)

1.3 Nature of the Proposed Development

The proposed Woodquay Park Enhancement consists of enhancement measures to existing park to include highways improvements, parking, new paths and paving, seating, lighting, public art, sustainable urban drainage, tree removals and new biodiverse planting. An extract from LUC Architect's site layout drawing is included in Figure 1-2.

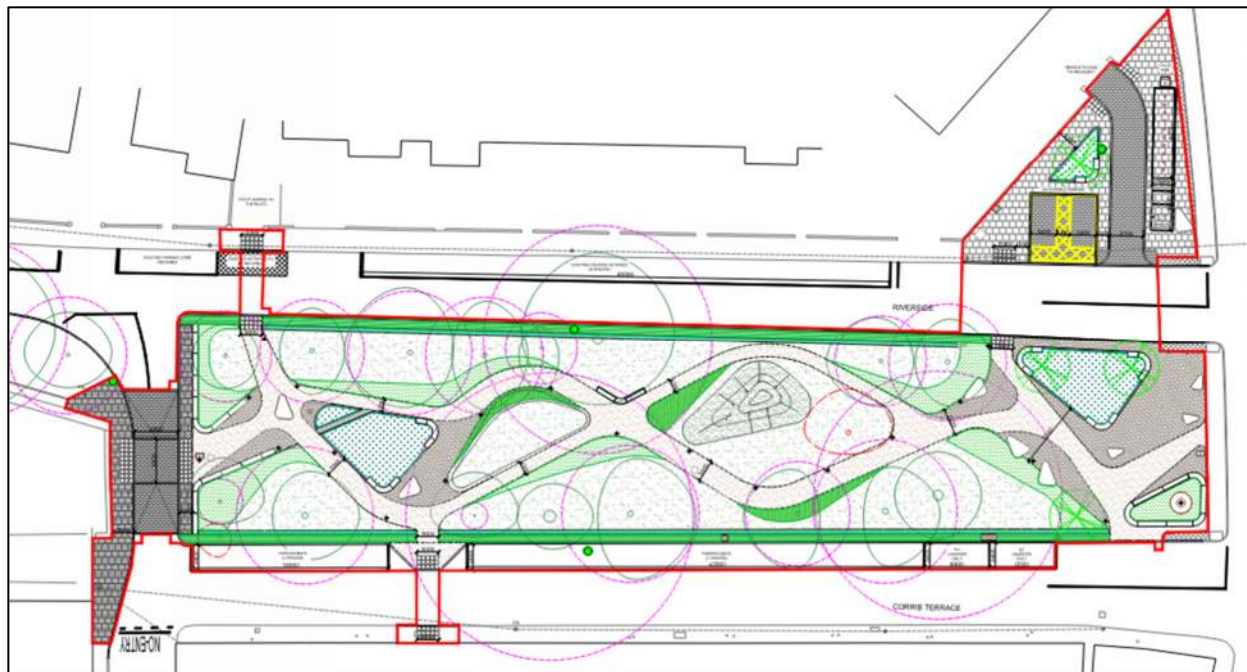


Figure 1-2: Proposed Site Layout (Ref: LUC Architects)

2 Relevant Guidance

2.1 The Planning System and Flood Risk Management Guidelines

In September 2008, “The Planning System and Flood Risk Management” Guidelines were published by the Department of the Environment, Heritage and Local Government in Draft Format. In November 2009, the adopted version of the document was published.

The Flood Risk Management Guidelines give guidance on flood risk and development. The guidelines recommend a precautionary approach when considering flood risk management in the planning system. The core principle of the guidelines is to adopt a flood risk 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 in Table 2-1 below. It should be noted that these do not take into account the presence of flood defences, as there remain risks of overtopping and breach of the defences.

Table 2-1: Flood Zone Designation

Flood Zone	Type of Flooding	Annual Exceedance Probability (AEP)
Flood Zone A	Coastal	Less than a 1:200 (0.5% AEP) year event
	Fluvial	Less than a 1:100 (1% AEP) year event
Flood Zone B	Coastal	Greater than a 1:200 (0.5% AEP) and less than a 1:1000 (0.1% AEP) year event
	Fluvial	Greater than a 1:100 (1% AEP) and less than a 1:1000 (0.1% AEP) year event
Flood Zone C	Coastal	Greater than a 1:1000 (0.1% AEP) year event
	Fluvial	Greater than a 1:1000 (0.1% AEP) year event

Once a flood zone has been identified, the guidelines set out the different types of development appropriate to each zone. Exceptions to the restriction of development due to potential flood risks are provided for through the use of the **Justification Test**, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated. This recognises that there will be a need for future development in existing towns and urban centres that lie within flood risk zones, and that the avoidance of all future development in these areas would be unsustainable.

A three staged approach to undertaking an FRA is recommended:

Stage 1: Flood Risk Identification - Identification of any issues relating to the site that will require further investigation through a Flood Risk Assessment;

Stage 2: Initial Flood Risk Assessment - Involves establishment of the sources of flooding, the extent of the flood risk, potential impacts of the development and possible mitigation measures;

Stage 3: Detailed Flood Risk Assessment - 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.

2.2 Galway City Council City Development Plan 2023 - 2029

Policies relating to flood risk within the Galway City Council City Development Plan (CDP) 2023-2029 are outlined in Chapter 9. The relevant excerpts of the CDP are as follows in relation to flood risk:

“Support, in co-operation with the OPW, the implementation of EU Flood Risk Directive (2007/60/EC), the Flood Risk Regulations (SI No, 122 of 2010) and the DECLG and OPW Guidelines for Planning Authorities, the Planning System and Flood Risk Assessment Management (2009), updated/superseding legislation or departmental guidelines and have regard to the findings and relevant identified actions of the Corrib Catchment Flood Risk Management (CFRAM) Study.”

“Support and facilitate the implementation of the Coirib go Cósta Galway City Flood Relief Scheme in conjunction with the OPW to support a climate resilient city, protect against flooding and minimise the impact of future climate events. Support in general the associated mitigation and adaptation measures in order to prevent flooding and coastal erosion, subject to appropriate environmental, visual, built heritage and other relevant considerations.”

“Ensure the recommendations of the Strategic Flood Risk Assessment (SFRA) for the Galway City Development Plan 2023-2029 are taken into consideration in the assessment of developments in identified areas of flood risk and require site specific Flood Risk Assessment (FRA) and associated design and construction measures appropriate to the scale and nature of the development and the risks arising, in all areas of identified flood risk including on sites where a only small proportion of the site is at risk of flooding and adopt a sequential approach in accordance with the Planning System and Flood Risk Management Guidelines for Planning Authorities (2009).”

A Strategic Flood Risk Assessment (SFRA) was prepared to accompany the Galway City Council CDP and states the following in relation to the preparation of an SSFRA:

- a) As a minimum, all proposed development, including that in Flood Zone C, must consider the impact of surface water flood risks on drainage design. Alternatively, the findings of the CFRAM, or other detailed study, may be drawn upon to inform finished floor levels.
- b) For sites within Flood Zone A or B, a site specific "Stage 2 - Initial FRA" will be required, and may need to be developed into a "Stage 3 - Detailed FRA". The extents of Flood Zone A and B are delineated through this SFRA.
- c) Within the SSFRA the impacts of climate change and residual risk (including culvert/structure blockage) and more extreme scenarios (such as the 0.1% AEP fluvial and tidal event) should be considered and modelled or remodelled where necessary.

2.3 Land Zoning

The land on which the development is proposed is currently zoned as Recreation and Amenity in the Galway City Council City Development Plan as shown in Figure 2-1.

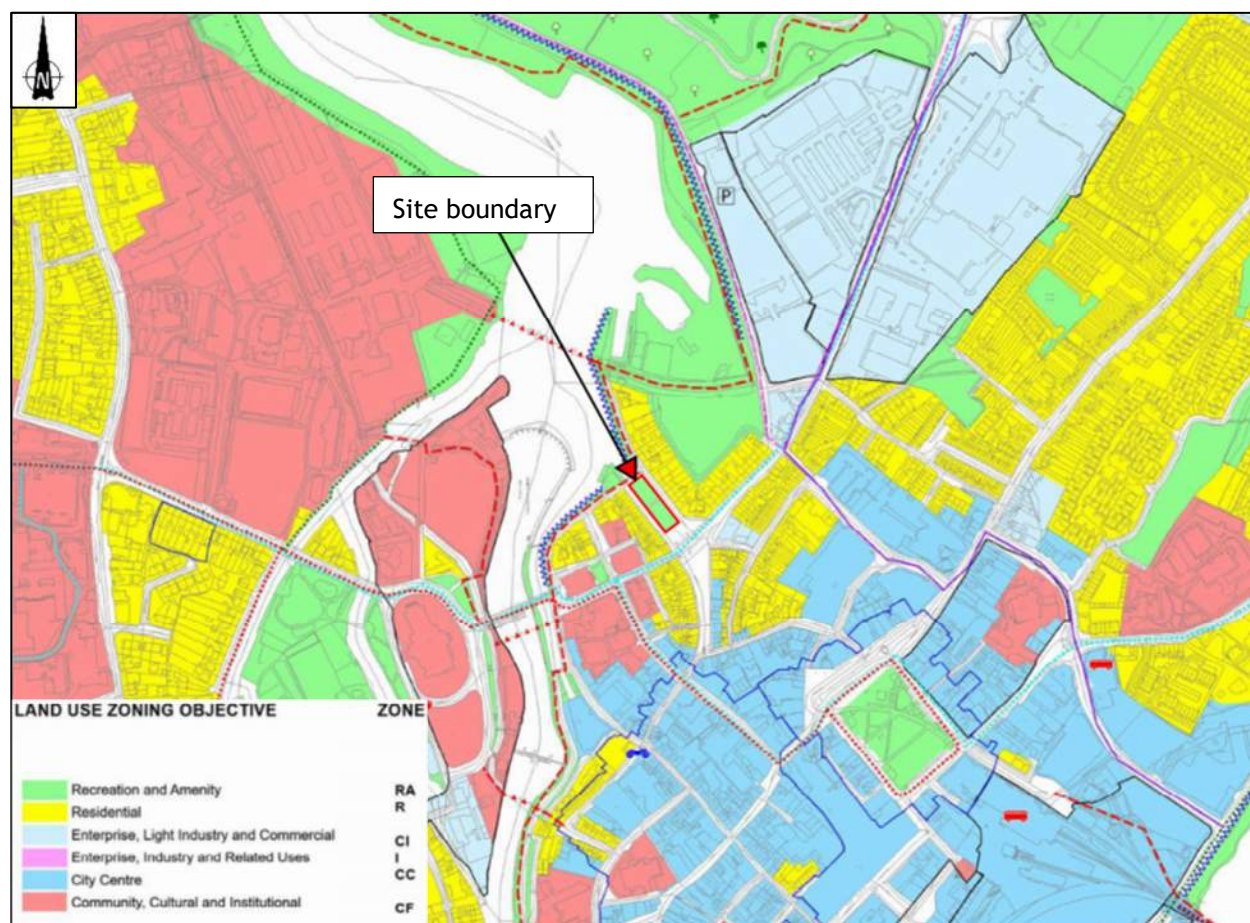


Figure 2-1: Extract from Galway City Council CDP Land Use Zoning Map B City Centre Map

2.4 Flood Risk Management Plan

The OPW publish Flood Risk Management Plans detailing the feasible range of flood risk management measures proposed for their respective river basins. The Flood Risk Management Plan for the Corrib River Basin was published by the OPW in 2018 and is valid for the period 2018-2021. The plan lists current flood management measures in place and potentially viable Flood Relief Works. There are a number of measures proposed in the plan which are applicable for all areas.

3 Flood Risk Identification

3.1 Existing Hydrological Environment

The existing hydrological environment is characterised primarily by the presence of the River Corrib located approximately 8m from the proposed site and it feeds into tributaries Friars River Canal, Eglington Canal, Gaol River and Convent River. These rivers and tributaries flow from north to south and form part of the Corrib River Basin. The hydrological environment around the site is shown in Figure 3-1 below.

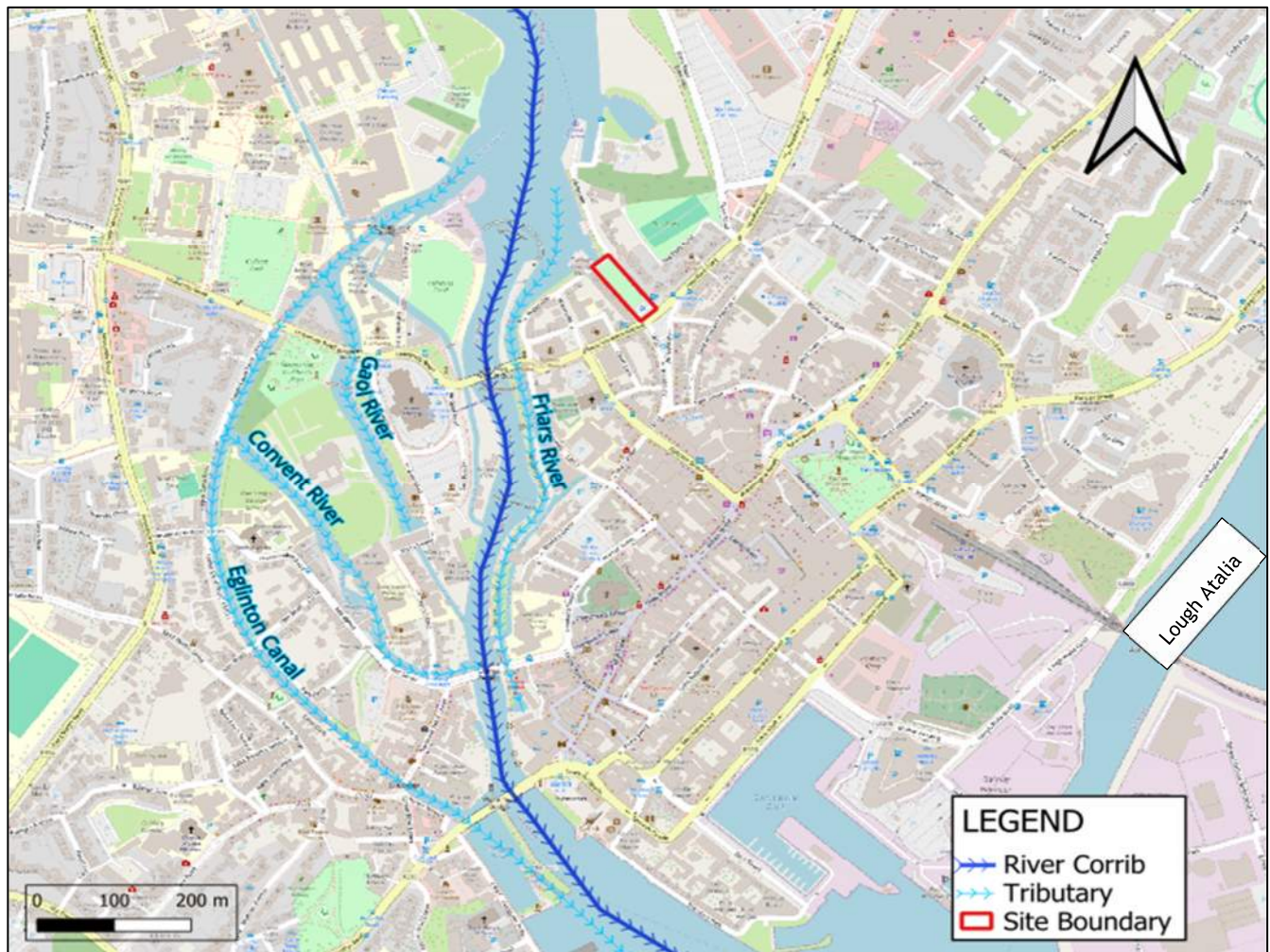


Figure 3-1: Hydrological Environment around the site

3.2 Topographical Survey

A topographical survey of the site and its environs was completed by NCW Surveys in May 2023.

A review of the survey data shows that ground levels on the site fall gently from south-east to north-west towards Friars River Canal. The high points occur on the southeast edge of the site and the low points on the northwest edge.

The topographical survey extent is shown in Figure 3-2 (depicted by spot heights).

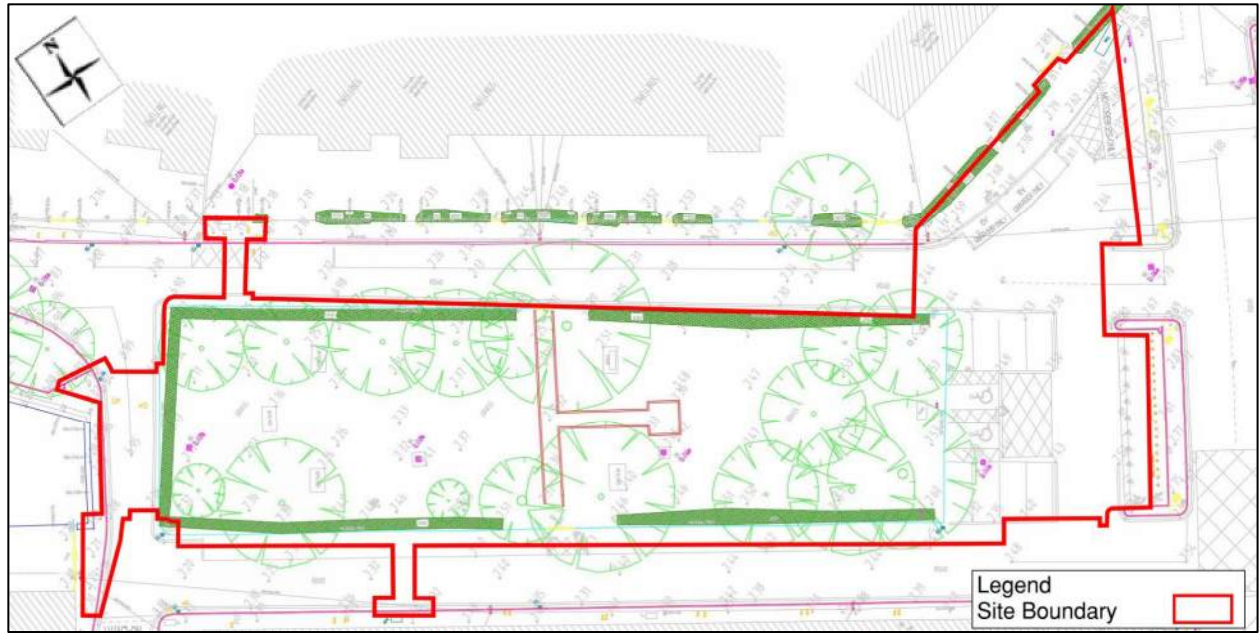


Figure 3-2: Site Topographical Extent

3.3 Site Walkover

PUNCH Consulting Engineers visited the site on the 12th of April 2024 to assess the conditions and key features of the site, to establish any potential sources of flooding and to identify the likely routes of flood waters. Appendix A contains a selection of key images taken during the site visits.

The following was established from the site visit:

- There was some minor ponding on site around existing gully traps.
- It was observed that an existing road gully discharges into the river Corrib directly.
- There was no visible ponding in the park itself observed.

3.4 Review of Historic Mapping

A review of the OSI Historical maps¹ was carried out. Historical 6" maps dating from the period 1829 to 1841 indicate that the site looks to be an old inlet which spurred from the river Corrib. Figure 3-4 shows an extract from the 25-inch historic mapping showing the same inlet.

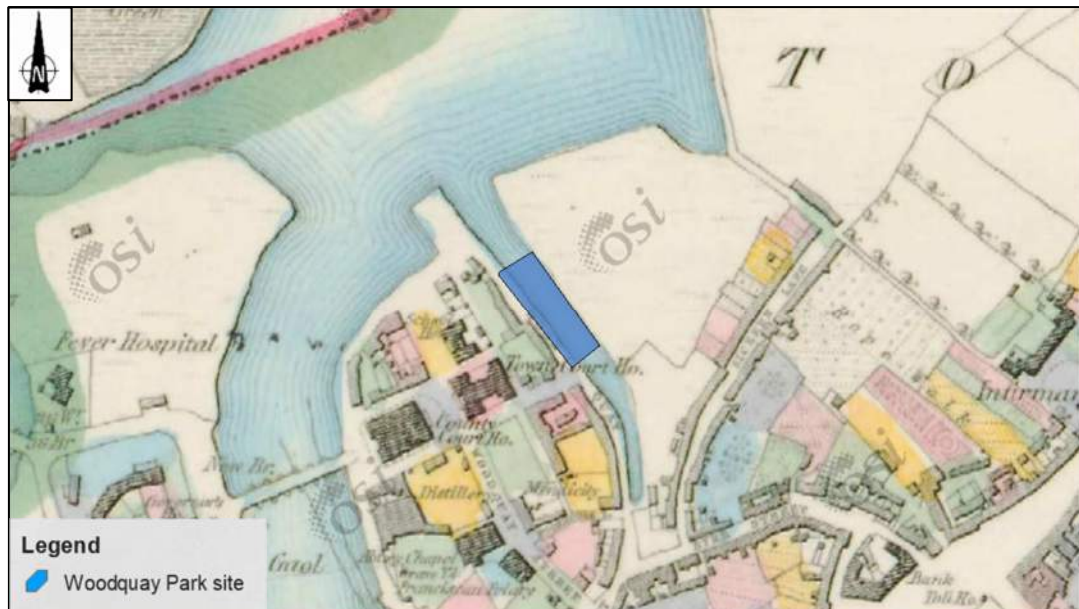


Figure 3-3: Extract from OSI historical 6-inch map

¹ Maps available: <http://map.geohive.ie/mapviewer.html>

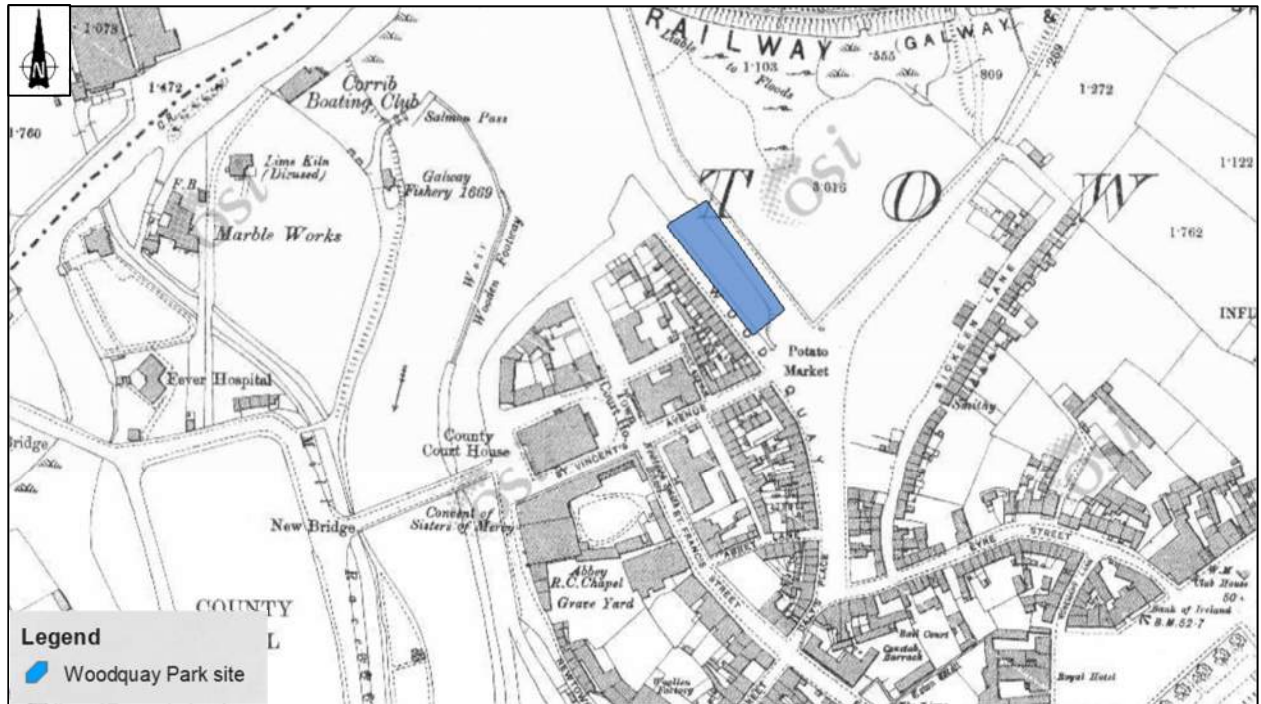


Figure 3-4: Extract from OSI historical 25-inch map

3.5 History of Flooding

The Office of Public Works (OPW) Flood Hazard Mapping website holds a record of historic flood events. A review of the database indicated that there have been no instances of flooding on the proposed site.

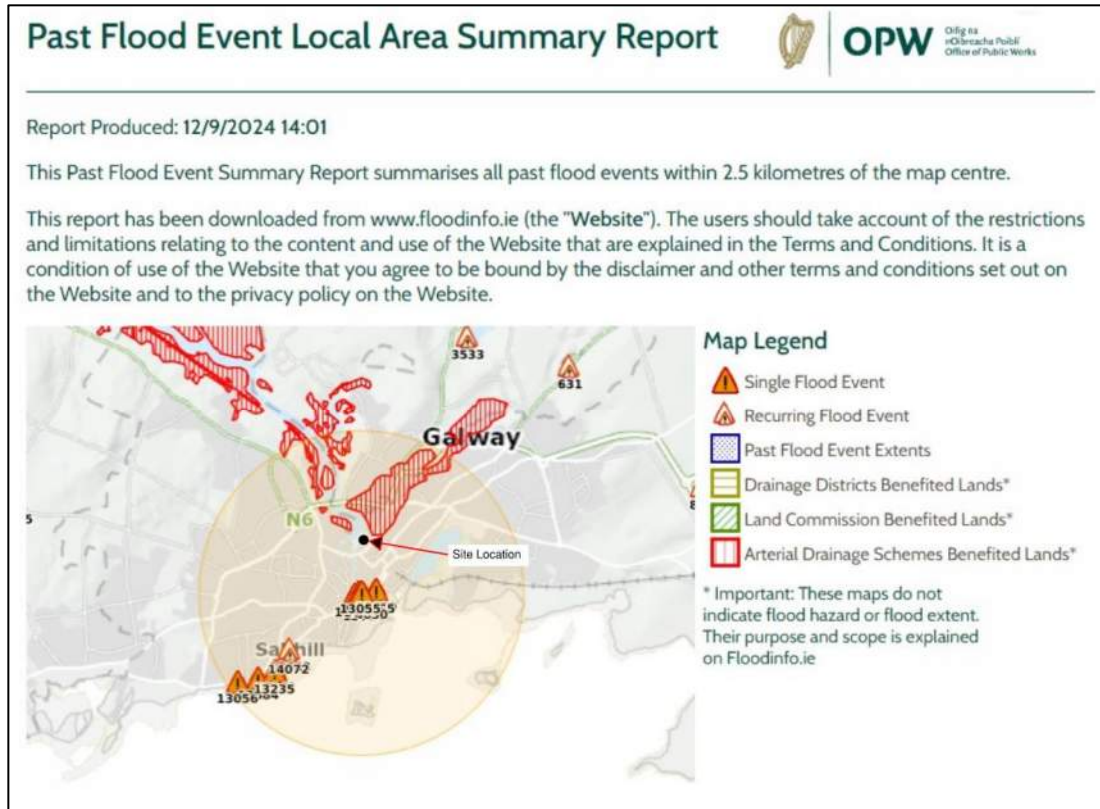


Figure 3-5: Extract from OPW Past Flood Event Local Area Summary Report
<http://www.floodmaps.ie/index.aspx?ReturnUrl=%2fView%2fDefault.aspx>

3.6 Arterial Drainage Scheme

Arterial Drainage Schemes were carried out by the OPW under the Arterial Drainage Act, 1945, to improve land for agriculture and to alleviate flooding. Rivers, lakes, weirs and bridges were modified to enhance conveyance, and embankments were built to control the movement of flood water. Flood protection in the benefiting lands was increased as a result of these schemes.

The site subject to this SSFRA is located close to, but outside of, lands benefitting from the Corrib-Clare Arterial Drainage Scheme which was initially completed between 1954 and 1964. The OPW is tasked with maintaining these drainage works in proper repair and effective condition. The extent of the benefitting lands (associated with arterial drainage embankment E.1) in the vicinity of the site is shown in Figure 3-6.

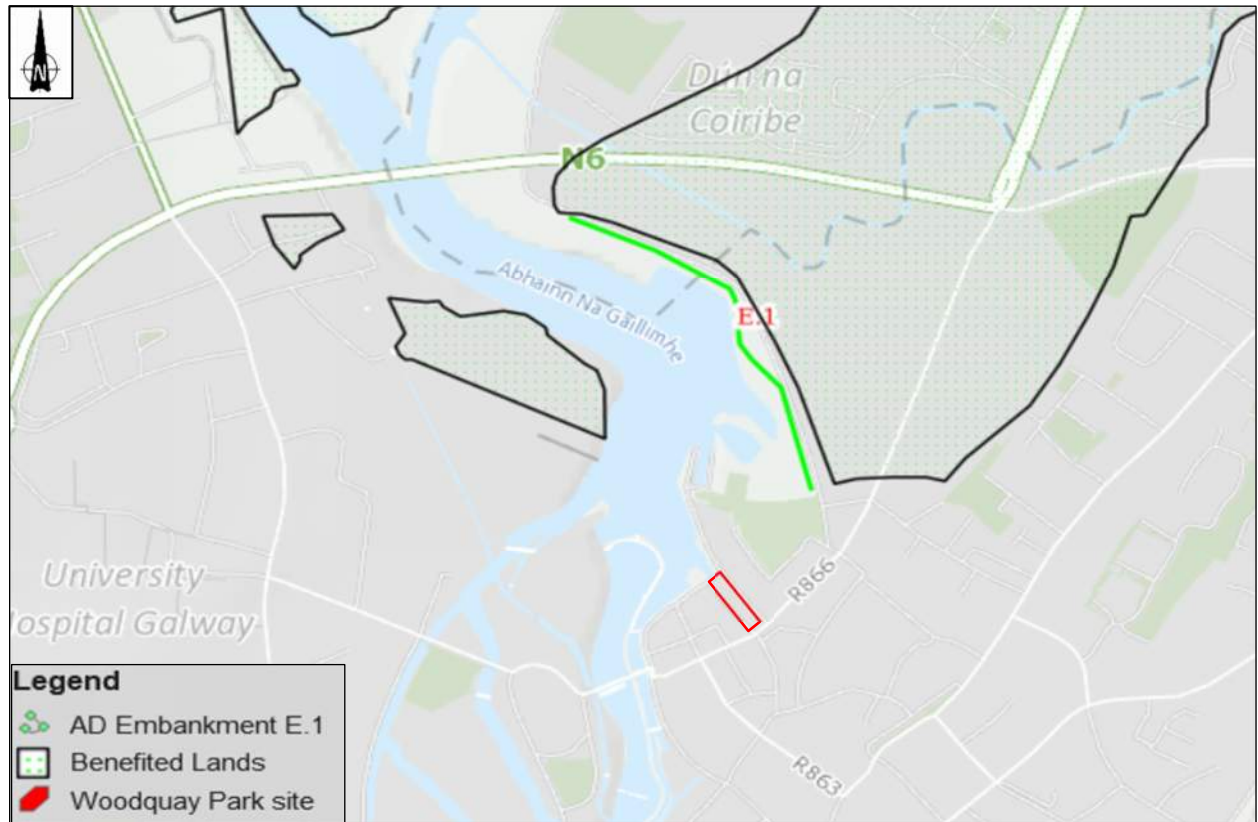


Figure 3-6: Arterial Drainage Scheme - Benefited Lands

3.7 Site Geology

The geology of the site was reviewed using data from the Geological Survey of Ireland (available at www.gsi.ie). The soil type or quaternary sediments within the site boundary is 'Urban' as shown in Figure 3-7 below. The surrounding areas comprise mainly of 'FenPt, Fen Peat'.

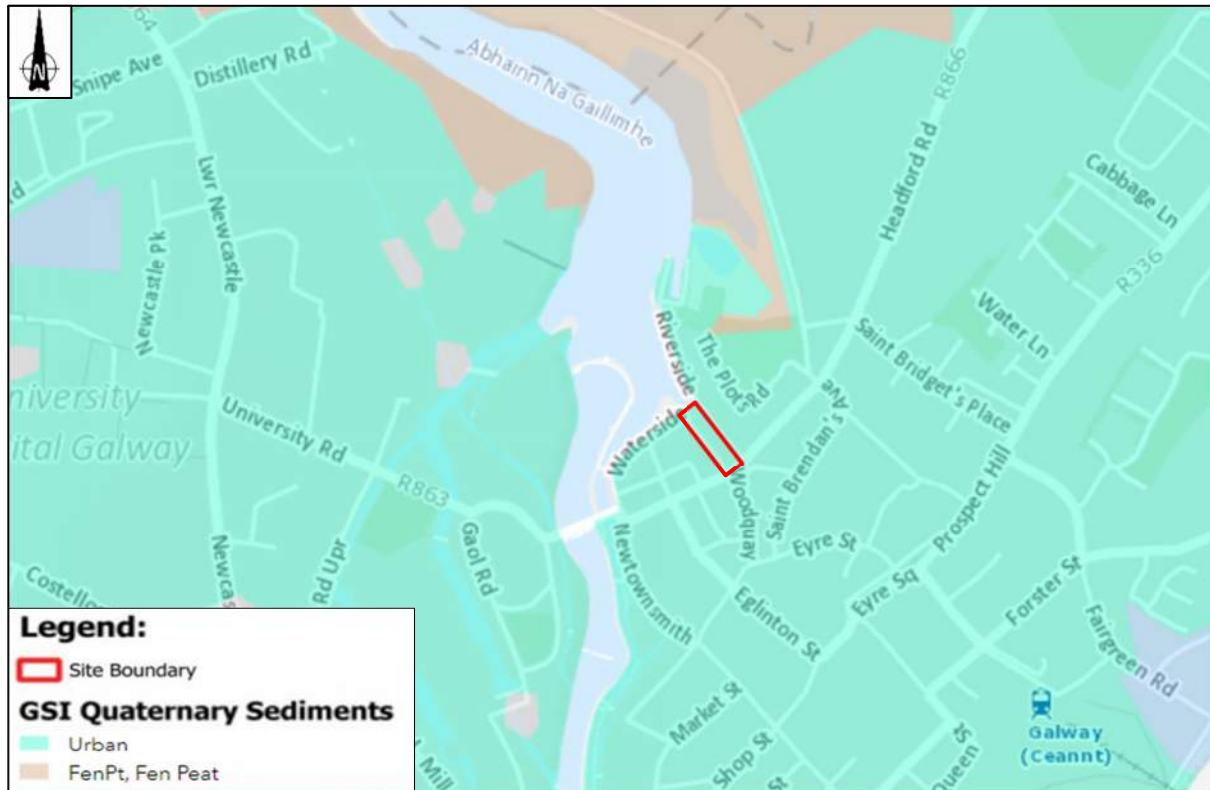


Figure 3-7: Geology of the surrounding area (source: Geological Survey of Ireland (www.gsi.ie))

3.8 Groundwater Flooding

Groundwater flooding occurs when the level of the water stored in the ground rises as a result of prolonged rainfall. A review of data from the Geological Survey of Ireland (GSI), groundwater flooding probability maps indicate that there is no groundwater flooding in this area.

3.9 Pluvial Flooding

Pluvial flooding is the result of rainfall-generated overland flows which arise before run-off can enter any watercourse or sewer. It is usually associated with high intensity rainfall.

3.9.1 Review of Existing Surface Water Infrastructure

A review of the surface water drainage network in the area was undertaken based on the Irish Water GIS database. Figure 3-8 below shows the combined sewer drainage within the site. A 225mm vitrified clay pipe heads in a south westerly direction through the site which connects to a 375mm uPVC pipe that connects to a 300mm vitrified clay pipe which runs along Vincents Avenue.

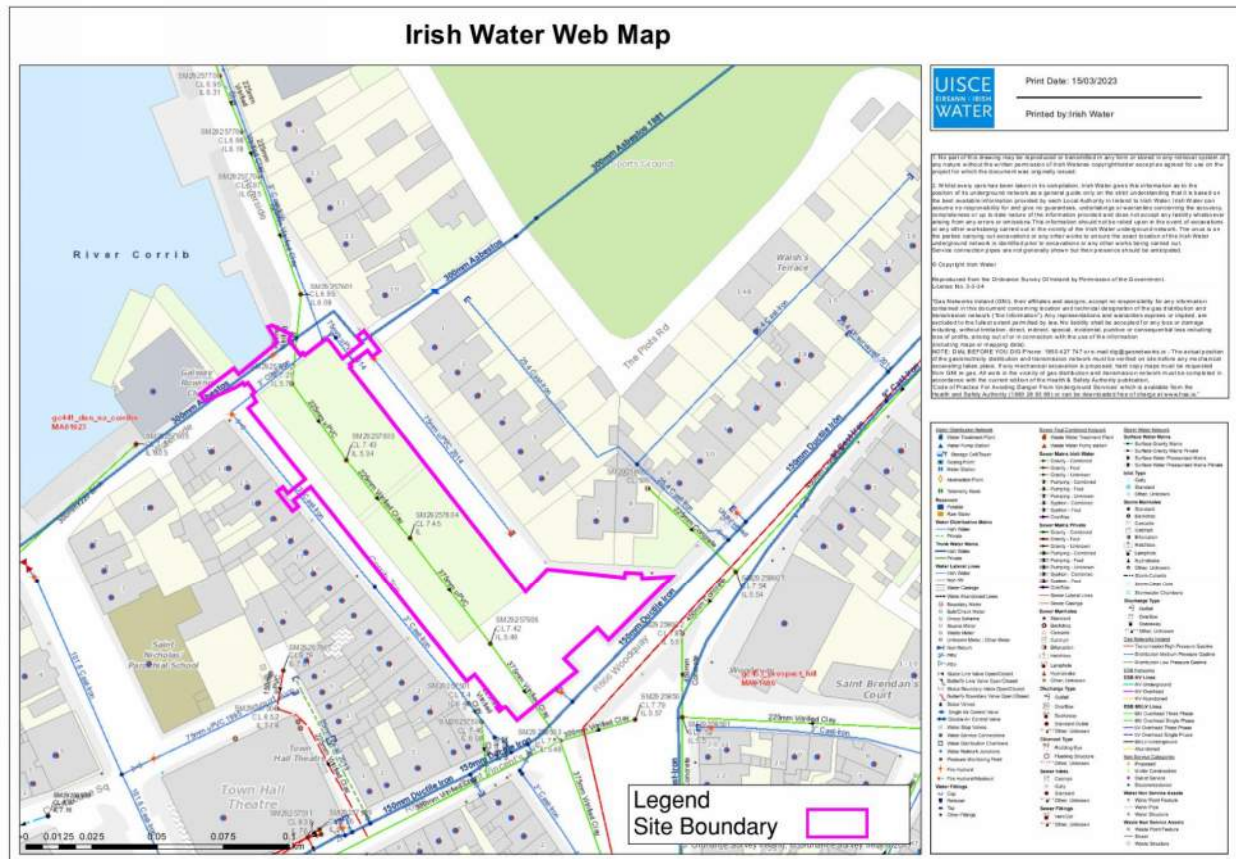


Figure 3-8: Surface Water Infrastructure

3.10 Fluvial Flooding

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

3.10.1 Catchment Flood Risk Assessment and Management Study (CFRAMS) Mapping

The CFRAMS is an OPW led national programme which seeks to identify and map potential existing and future flood hazard in areas at significant risk from flooding. It also aims to identify flood relief measures and prepare Flood Risk Management Plans for these areas.

The site of the proposed development is located in an area which has been assessed as part of the Western Region CFRAM Study. The OPW has published detailed flood hazard mapping for the area based on results from the CFRAMS. This includes flood extent and flood depth mapping for a number of return periods for fluvial and coastal flood events. The CFRAMS assessment in this area is based on hydraulic modelling of the Corrib River and associated tributaries.

Figure 3-9 below shows an extract from the relevant CFRAMS fluvial flood map. Full CFRAMS maps for the area are included in Appendix C of this report.

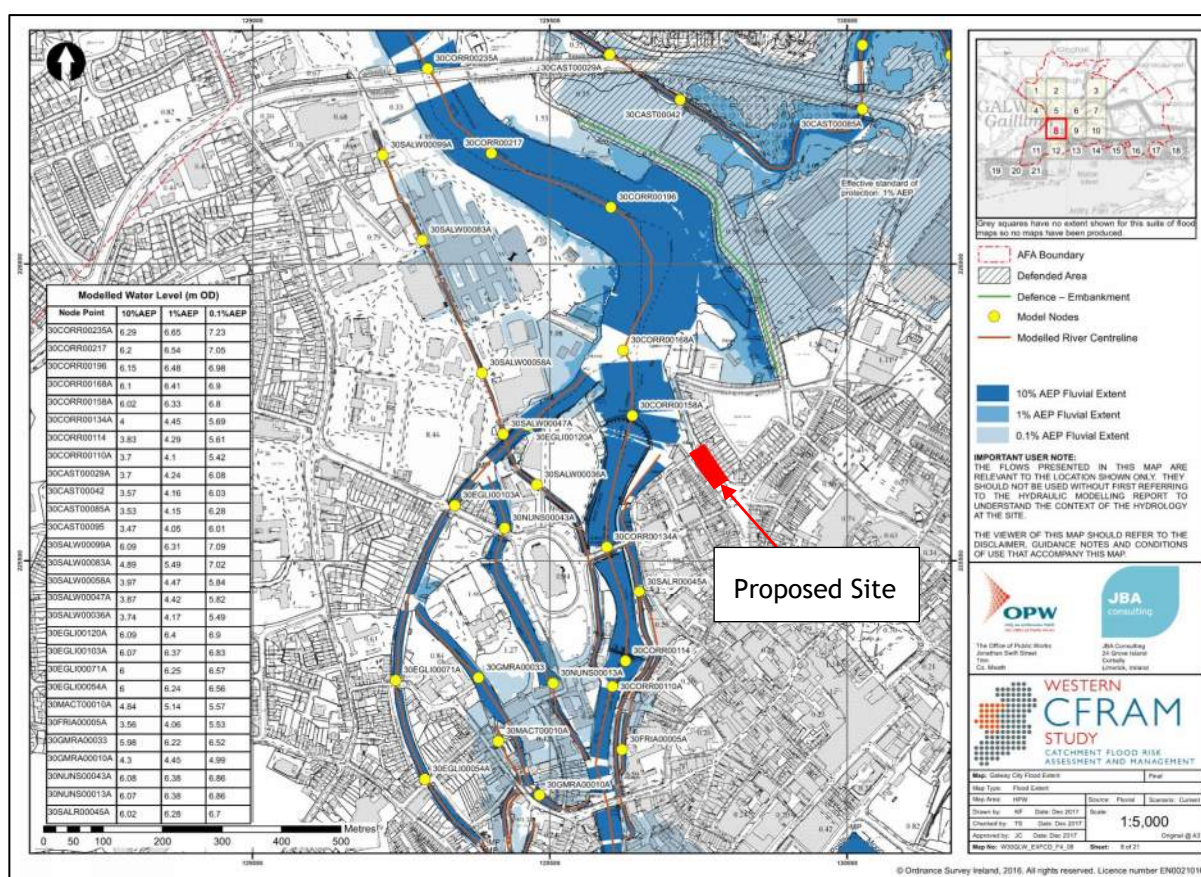


Figure 3-9: Extract from the CFRAMS fluvial map for the area (site indicated in red)

Maps available: <http://www.floodinfo.ie/map/floodmaps/>

The CFRAM mapping revealed that a small portion of the site along the northern boundary is in a fluvial flood risk area (flood risk is less than 1 in 1000) in any given year, Figure 3-10.

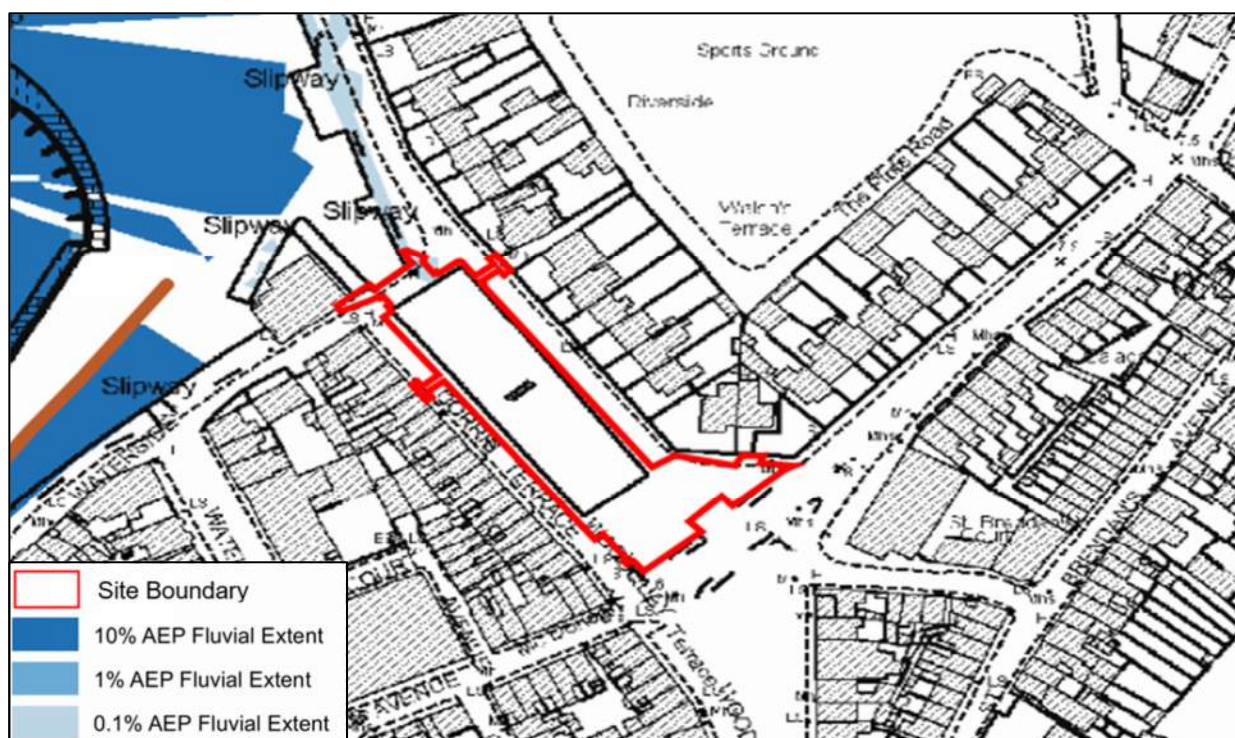


Figure 3-10: Extract from the CFRAMS fluvial map (zoomed in)

The closest node to the site predicts flows and flood levels in the Corrib River as per Table 3-1 below:

Table 3-1: CFRAMS Modelled Coastal Flood Levels Adjacent to the Site

Node	10% AEP (mAOD)	1% AEP (mAOD)	0.1% AEP (mAOD)
30CORR00235A	6.29	6.65	7.23

3.11 Coastal Flooding

Coastal flooding results from sea levels which are higher than normal and result in sea water overflowing onto the land. Coastal flooding is influenced by the following three factors which often work in combination: high tide level, storm surges and wave action.

Examination of CFRAMS coastal flood extent mapping and the National Coastal Flood Hazard Mapping (NCFHM) does not reveal any coastal flood risk to the site. Figure 3-11 presents the CFRAMS coastal flood extents adjacent to the site.



Figure 3-11: Coastal Flood Mapping (CFRAMS)

3.12 Existing Flood Defences

The CFRAM mapping shown in Figure 3-6 identifies an arterial drainage scheme flood defence embankment located northeast of the site. These defences provide a standard of protection of 1% AEP Fluvial Event. Flood mapping presented in the CFRAMS study ignores the presence of flood defences.

3.13 Galway City Council CDP Strategic Flood Risk Assessment

A review of the Galway City Council City Development Plan (CDP) 2023-2029 was carried out with regards to flood risk. A Strategic Flood Risk Assessment (SFRA), prepared as part of the Galway City Council CDP, includes Flood Zone mapping for the area and highlights some areas of flood risk concern associated with the nearby River Corrib.

See Appendix D for a copy of the full flood extent map of the area.



Figure 3-12: Extract from Galway City Council CDP Flood Zone Map A

According to the Galway City Council CDP Flood Zone Map of the area, the development site is not shown to be at risk of flooding as only a small portion of the site located in Flood Zone B and the remainder is in Flood Zone C.

3.14 Estimate of Flood Zone

PUNCH Consulting Engineers have reviewed the available information as outlined in the above sections and have concluded that a small portion of the site is located in Flood Zone B (majority Flood Zone C).

3.15 Site Vulnerability

The Planning System and Flood Risk Management Guidelines gives definitions for the type of developments that can take place in each Flood Zone. Only Coastal and Fluvial flood zones are considered in determining whether a Justification Test is required. The proposed development is water-compatible in nature.

Table 3-2: Matrix of Vulnerability versus Flood Zone to indicate Justification Requirement

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

As the site is located in partially located in Flood Zone B and Flood Zone C, a Justification Test is not required as this type of development is considered appropriate as per Table 4-1 above.

3.16 Sequential Approach

“The Planning System and Flood Risk Management” Guidelines published by the OPW set out a sequential approach to managing flood risk and to avoid development in areas that are at risk. A graphical representation of the Sequential Approach is included in the guidelines and is shown here as Figure 3-13.

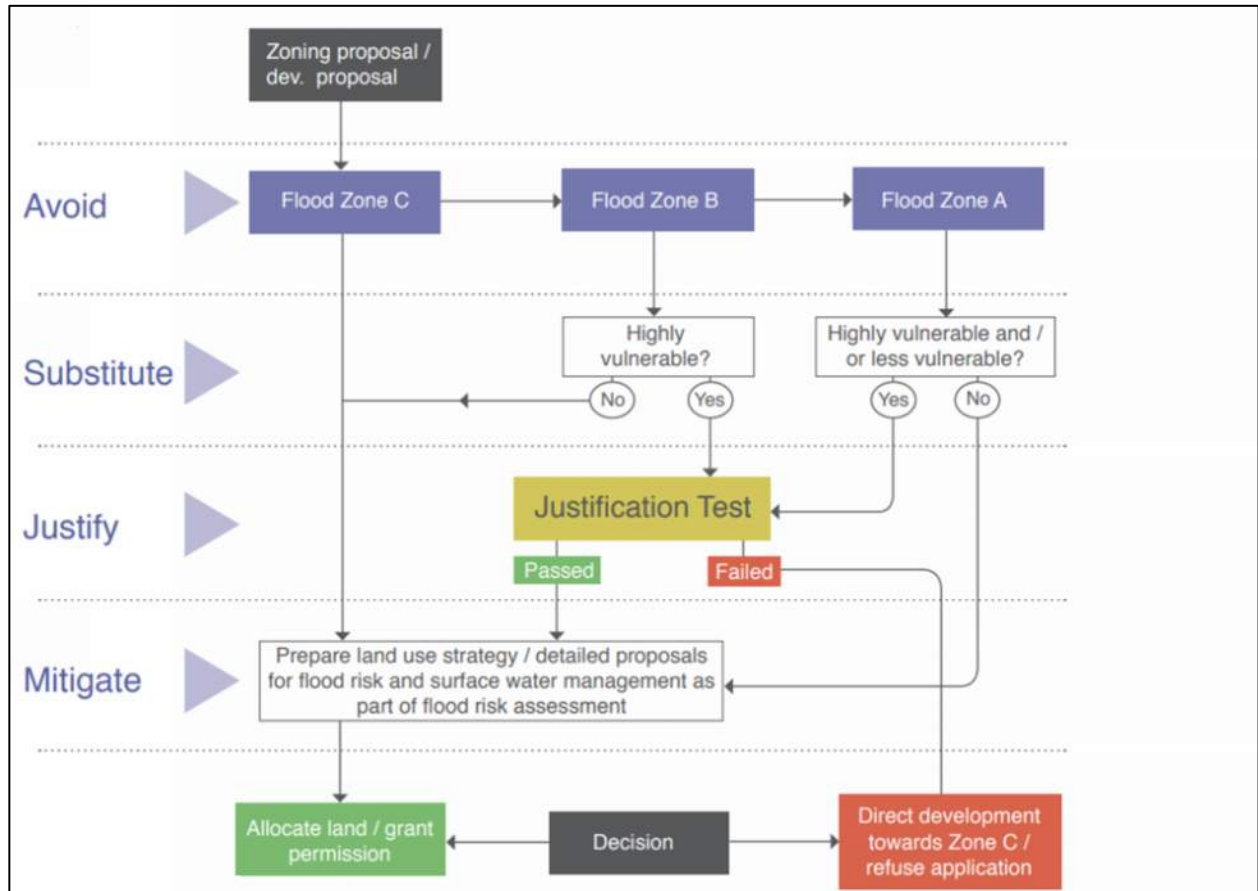


Figure 3-13: Graphical Representation of the Sequential Approach (The Planning System and Flood Risk Management” Guidelines 2009)

Given that the site is water-compatible in nature and partially located in Flood Zone B (majority Flood Zone C), the development is deemed appropriate when examined using the sequential approach shown above.

4 Conclusions

PUNCH Consulting Engineers were appointed by LUC Architects to carry out a Site-Specific Flood Risk Assessment for a proposed Woodquay Park development in Galway City, Galway.

This Site-Specific Flood Risk Assessment has been carried out in accordance with “*The Planning System & Flood Risk Management Guidelines*” published by the Department of the Environment, Heritage and Local Government in November 2009 and the Galway City Council Local Area Plan.

A review of the flood risk in the area was carried out as the site is located near the River Corrib.

Flood Maps produced as part of the CFRAMS and the Galway City Council CDP SFRA were consulted to establish the Flood Zone. It was determined that the proposed development site is partially located in Flood Zone B for Fluvial flooding and Flood Zone C for Coastal Flooding.

The proposed development is water-compatible in nature, at a low risk of flooding and will not impact flood risk to the adjacent area. When examined using the sequential approach proposed in the “*The Planning System & Flood Risk Management*” Guidelines, the development is appropriate.

Appendix A Site Visit Images



Gully trap outfall at Waterside



Surface water ponding observed



Corrib Terrace entrance



Riverside entrance

Appendix B OPW Historic Flood Events Record

Past Flood Event Local Area Summary Report



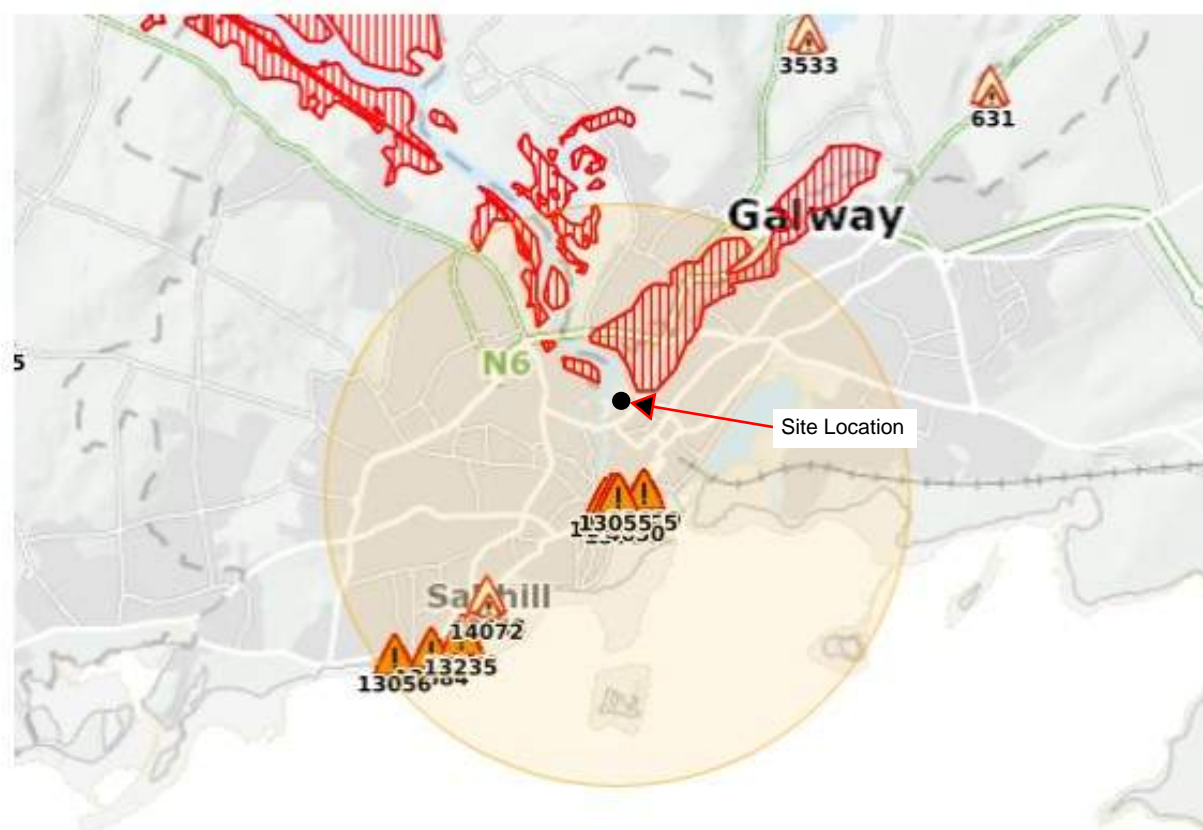
OPW

Oifig na
nOibreacha Poiblí
Office of Public Works

Report Produced: 12/9/2024 14:01

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.

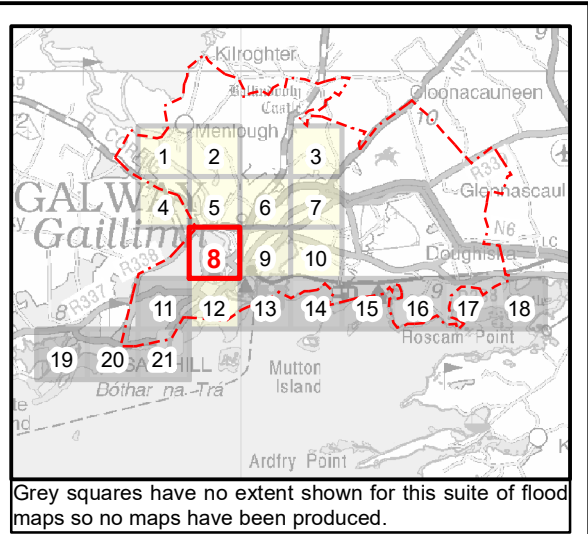
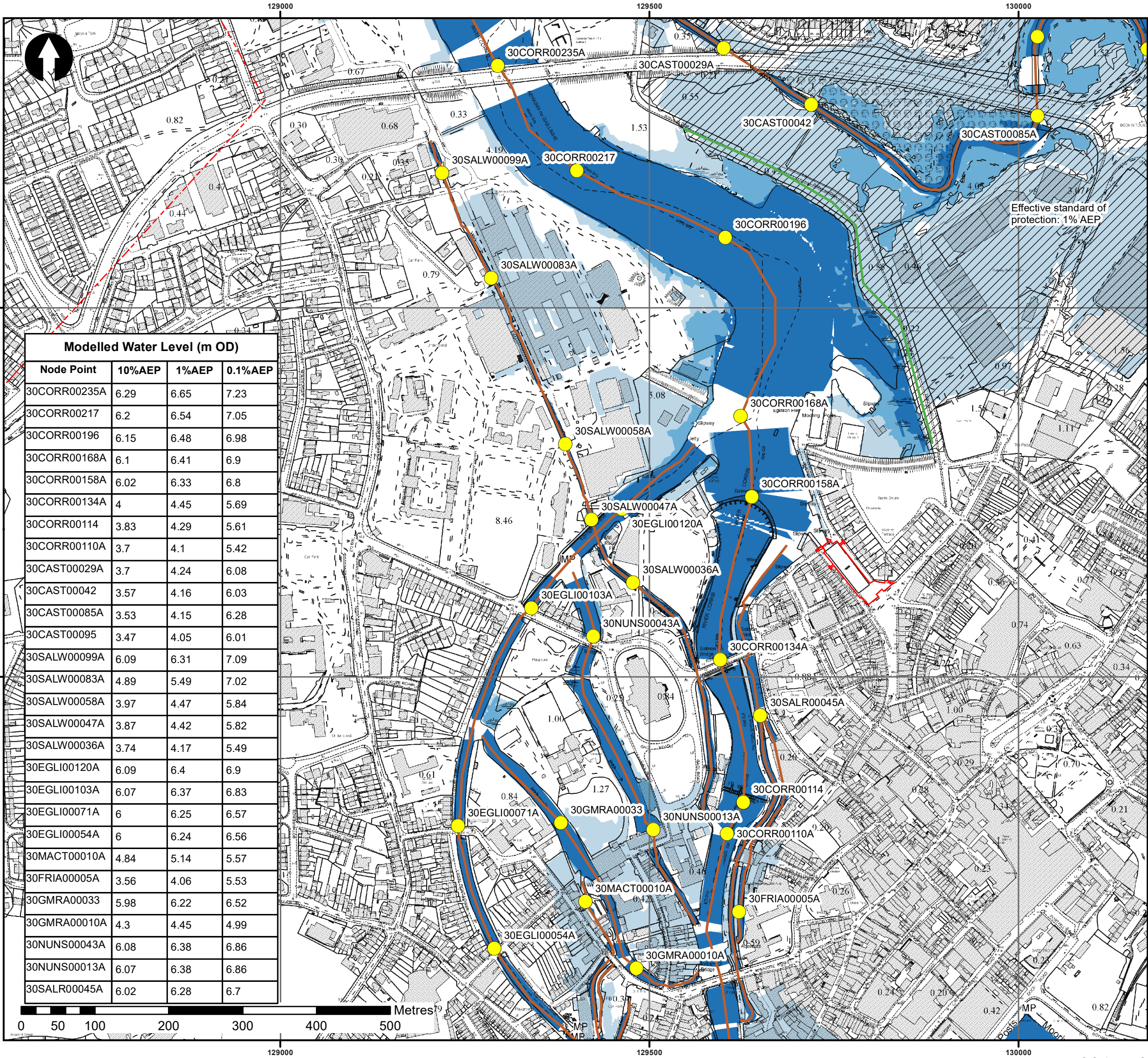


Map Legend

-  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

Appendix C CFRAMS Mapping



- AFA Boundary
- Defended Area
- Defence – Embankment
- Model Nodes
- Modelled River Centreline

- 10% AEP Fluvial Extent
- 1% AEP Fluvial Extent
- 0.1% AEP Fluvial 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



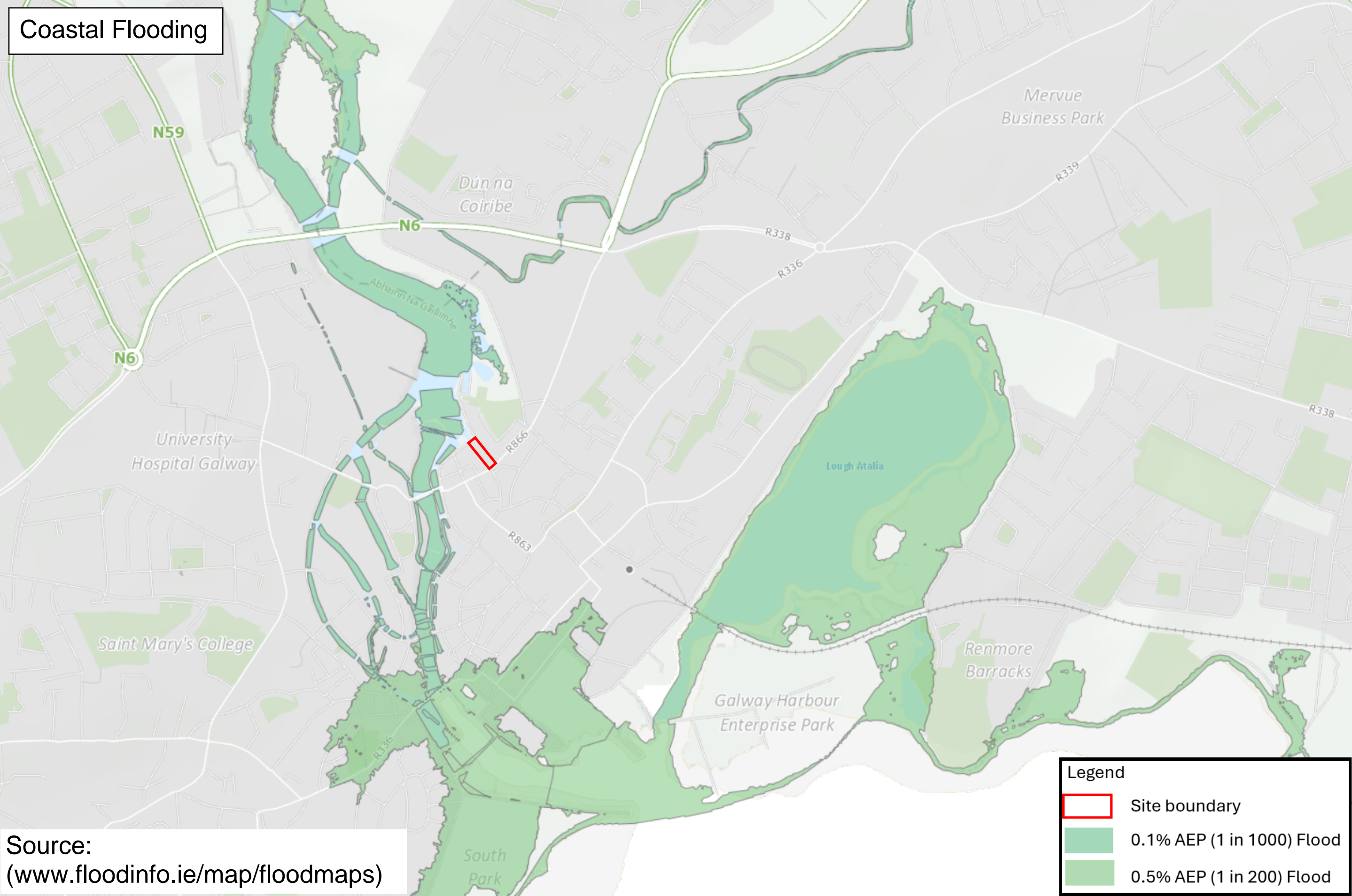
JBA Consulting
24 Grove Island
Corbally
Limerick, Ireland



WESTERN
CFRAM
STUDY
CATCHMENT FLOOD RISK
ASSESSMENT AND MANAGEMENT

Map: Galway City Flood Extent				Final	
Map Type: Flood Extent					
Map Area: HPW			Source: Fluvial		Scenario: Current
Drawn by: KF		Date: Dec 2017		Scale: 1:5,000 Original @ A3	
Checked by: TS		Date: Dec 2017			
Approved by: JC		Date: Dec 2017			
Map No: W30GLW_EXFCD_F4_08			Sheet: 8 of 21		

Coastal Flooding



Legend

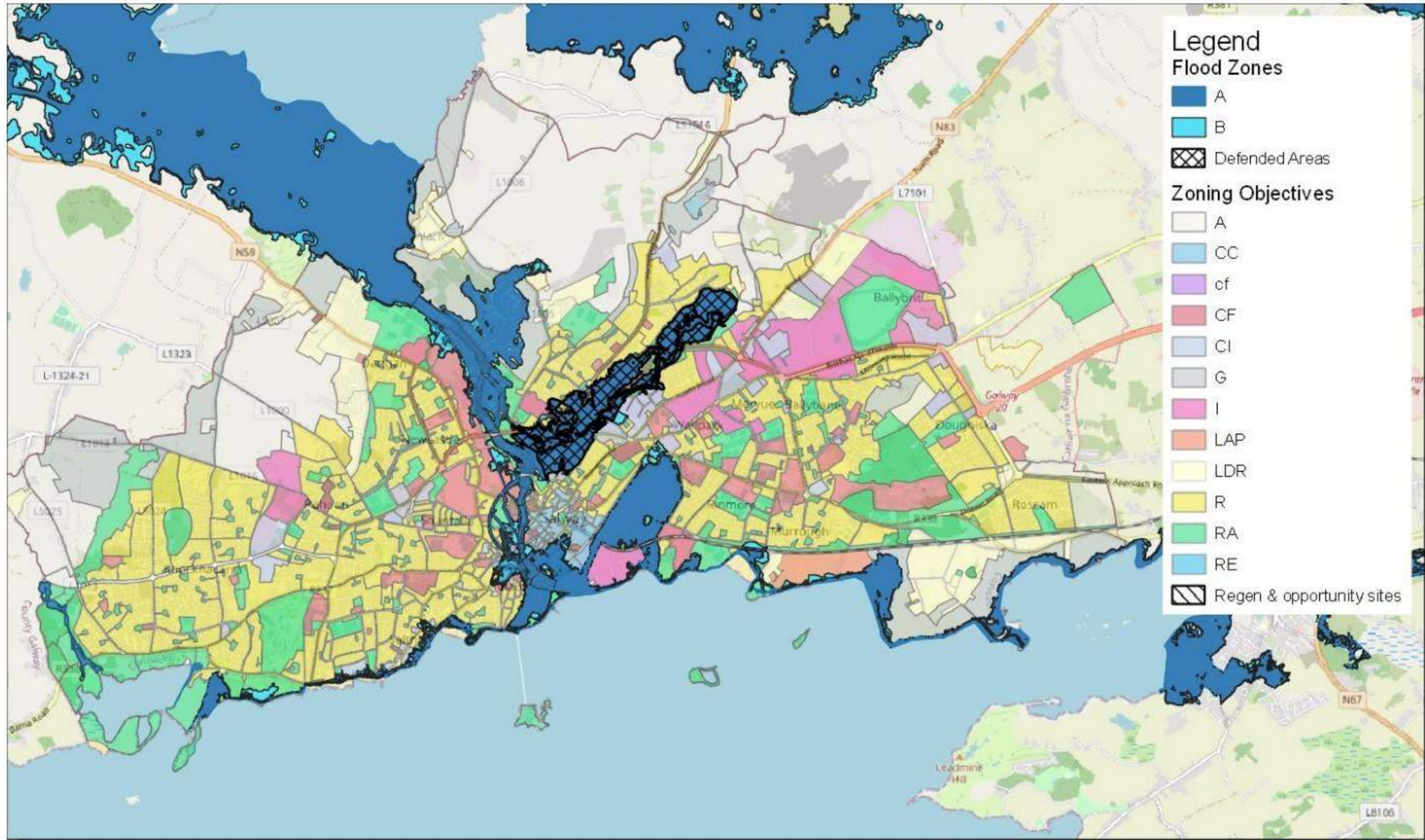
Site boundary

0.1% AEP (1 in 1000) Flood

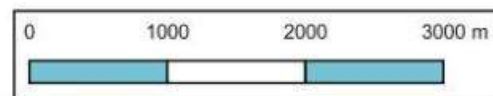
0.5% AEP (1 in 200) Flood

Source:
(www.floodinfo.ie/map/floodmaps)

Appendix D Galway City Council CDP 2023-2029 SFRA Flood Zone Mapping



Flood Zone Map for
Galway City



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database right (2021)