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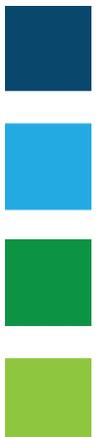


Comhairle Chontae na Gaillimhe  
Galway County Council

Galway County Council

Proposed Fire Station, Prospect, Athenry, Co. Galway

Flood Risk Assessment



# Proposed Fire Station, Prospect, Athenry, Co. Galway

## Flood Risk Assessment

Document Control Sheet	
Document Reference	10964-TR01 FRA Athenry Fire Station
Report Status	Draft
Report Date	February 2021
Current Revision	A
Client:	Galway County Council
Client Address:	Áras an Chontae Prospect Hill Galway H91 H6KX
Project Number	10964

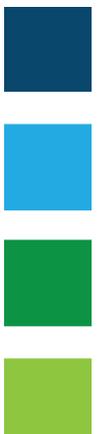
Galway Office Fairgreen House, Fairgreen Road, Galway, H91 AXK8, Ireland  Tel: +353 (0)91 565 211	Dublin Office Block 10-4, Blanchardstown Corporate Park, Dublin 15, D15 X98N, Ireland  Tel: +353 (0)1 803 0406	Castlebar Office Market Square, Castlebar, Mayo, F23 Y427, Ireland  Tel: +353 (0)94 902 1401
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Revision	Description	Author:	Date	Reviewed By:	Date	Authorised by:	Date
A	Draft	ML	04/03/2021	CK	04/03/2021	CK	04/03/2021

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## 1.0 INTRODUCTION

TOBIN Consulting Engineers were appointed by Galway County Council (GCC) to undertake a Flood Risk Assessment (FRA) for the construction of a new Fire Station at Prospect, Athenry, Co. Galway.

Figure 1-1 shows the location of the subject site to the south-east of Athenry town centre. The 0.7ha greenfield site has existing ground levels ranging from approximately 40.2mOD along the northern site border adjacent to the railway, sloping steadily through the site to 37.2mOD before rising again to approximately 39.5mOD at the eastern corner of the site bordering Prospect.

A topographical survey of the proposed development site is provided in Appendix 1.

The River Clarin (also known as the Clarinbridge River) flows through Athenry, with several small tributaries flowing to the main watercourse. The River Clarin itself is the closest watercourse to the site location, approximately 575m northeast of the site.

The purpose of this report is to communicate any potential flood risks to people and future development at the site.

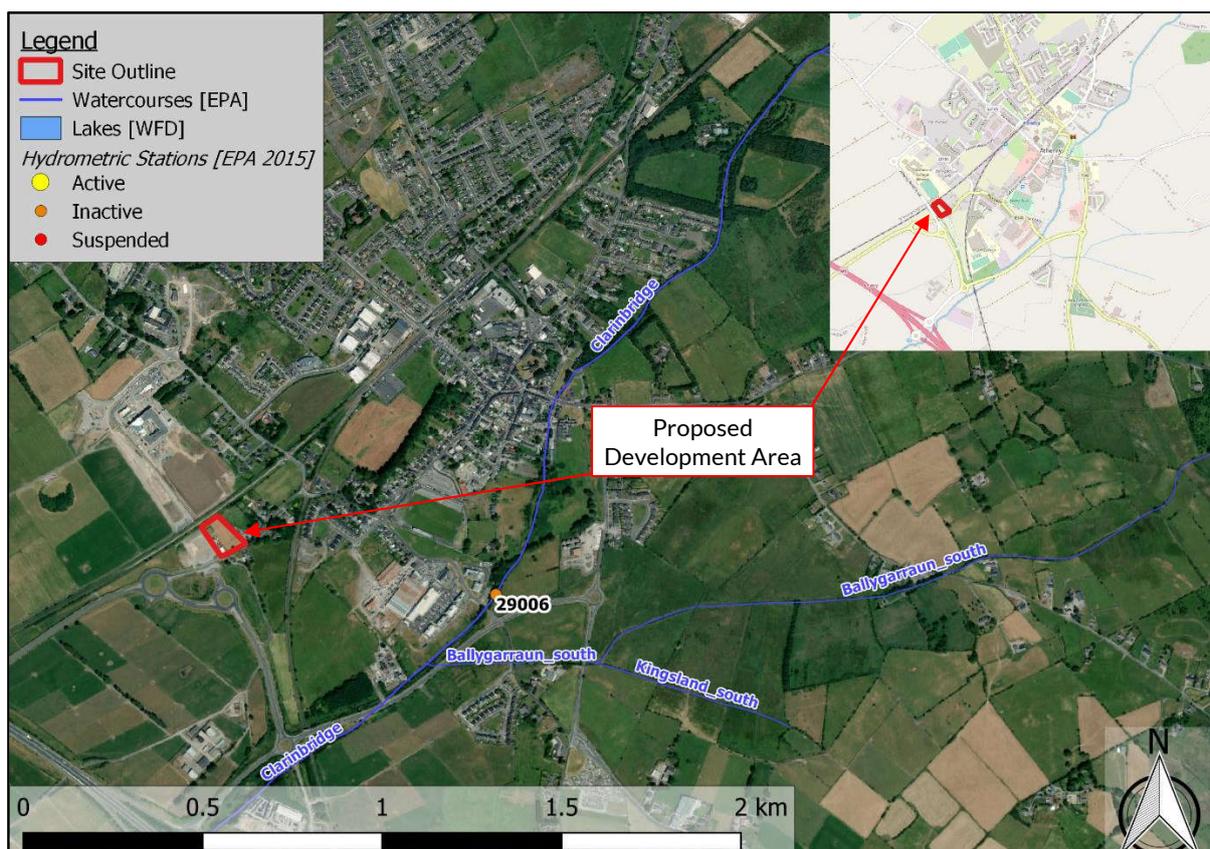


Figure 1-1 Site Location

## 2.0 FLOOD RISK MANAGEMENT GUIDANCE

This Strategic Flood Risk Assessment was carried out in accordance with the following flood risk management guidance documents:

- The Planning System and Flood Risk Management Guidelines for Planning Authorities
- Flood Risk Management Climate Change Sectoral Adaptation Plan
- Galway County Development Plan
- Athenry Local Area Plan

### 2.1 The Planning System and Flood Risk Management Guidelines

The Planning System and Flood Risk Management Guidelines for Planning Authorities (PSFRM Guidelines) were published in 2009 by the Office of Public Works (OPW) and Department of the Environment, Heritage and Local Government (DoEHLG). Their aim is to ensure that flood risk is considered in development proposals and the assessment of planning applications.

#### 2.1.1 Flood Zones and Vulnerability Classes

The PSFRM Guidelines discuss flood risk in terms of flood zones A, B, and C, which correspond to areas of high, medium, or low probability of flooding, respectively. The extents of each flood zone are based on the Annual Exceedance Probability (AEP) of various flood events.

The PSFRM Guidelines also categorise different types of development into three vulnerability classes based on their sensitivity to flooding. Garda, fire and ambulance stations are considered “highly vulnerable” and are required to be operational during flooding.

Table 2-1 shows a decision matrix that indicates which types of development are appropriate in each flood zone and when the Justification Test (see Section 2.1.2) must be satisfied. The annual exceedance probabilities used to define each flood zone are also provided.

*Table 2-1 Decision Matrix for Determining the Appropriateness of a Development*

Flood Zone (Probability)	Annual Exceedance Probability (AEP)	Development Appropriateness		
		Highly Vulnerable	Less Vulnerable	Water Compatible
A (High)	<u>Fluvial &amp; Pluvial Flooding</u> More frequent than 1% AEP	Justification Test	Justification Test	Appropriate
B (Medium)	<u>Fluvial &amp; Pluvial Flooding</u> 0.1% to 1% AEP	Justification Test	Appropriate	Appropriate
C (Low)	<u>Fluvial &amp; Pluvial Flooding</u> Less frequent than 0.1% AEP	Appropriate	Appropriate	Appropriate

Note: Given that coastal flooding is not a potential source of risk to the proposed development, the probabilities for coastal flooding have been omitted from this table.

## 2.1.2 The Justification Test

Any proposed development being considered in an inappropriate flood zone (as determined by Table 2-1) must satisfy the criteria of the Justification Test outlined in Figure 2-1 (taken from the PSFRM Guidelines).

### Box 5.1 Justification Test for development management (to be submitted by the applicant)

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
  - (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
  - (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
  - (iii) The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
  - (iv) The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Refer to section 5.28 in relation to minor and infill developments.

*Figure 2-1 Criteria of the Justification Test*

## 2.2 The Flood Risk Management Climate Change Adaptation Plan

The Flood Risk Management Climate Change Sectoral Adaptation Plan was published in 2019 under the National Adaptation Framework and Climate Action Plan. This plan outlines the OPW's approach to climate change adaptation in terms of flood risk management.

This approach is based on a current understanding of the potential impacts of climate change on flooding and flood risk. Research has shown that climate change is likely to worsen flooding through more extreme rainfall patterns, more severe river flows, and rising mean sea levels.

To account for these changes, the Adaptation Plan presents two future flood risk scenarios to consider when assessing flood risk:

- Mid-Range Future Scenario (MRFS)
- High-End Future Scenario (HEFS)

Table 2-2 indicates the allowances that should be added to estimates of extreme rainfall depths, peak flood flows, and mean sea levels for the future scenarios.

*Table 2-2 Climate Change Adaptation Allowances for Future Flood Risk Scenarios*

Parameter	Mid-Range Future Scenario (MRFS)	High-End Future Scenario (HEFS)
Extreme Rainfall Depths	+ 20%	+ 30%
Peak River Flood Flows	+ 20%	+ 30%
Mean Sea Level Rise	+ 0.5 m	+ 1 m

## 2.3 Galway County Development Plan 2015-2021

The current Galway County Development Plan provides a strategic framework for planning and sustainable development in Co. Galway for 2014 to 2020. Chapter 8 outlines Galway County Council's strategy for the management of Climate Change & Flooding, with Sections 8.6 and 8.7 outlining County Policies for effective flood risk management, setting out the following key objectives:

Flood Risk Management Objectives
<p><b>Objective FL 1 – Flood Risk Management and Assessment</b></p> <p>Comply with the requirements of the DoEHLG/OPW <i>The Planning System and Flood Risk Management-Guidelines for Planning Authorities</i> and its accompanying <i>Technical Appendices Document 2009</i> (including any updated/superseding documents).</p> <p>This will include the following:</p> <ul style="list-style-type: none"> <li>(a) Avoid, reduce and/or mitigate, as appropriate in accordance with the Guidelines;</li> <li>(b) Development proposals in areas where there is an identified or potential risk of flooding or that could give rise to a risk of flooding elsewhere will be required to carry out a Site-Specific Flood Risk Assessment, and justification test where appropriate, in accordance with the provisions of <i>The Planning System and Flood Risk Management Guidelines 2009</i> (or any superseding document);</li> <li>(c) Development that would be subject to an inappropriate risk of flooding or that would cause or exacerbate such a risk at other locations shall not normally be permitted;</li> <li>(d) Galway County Council shall work with other bodies and organisations, as appropriate, to help protect critical infrastructure, including water and wastewater, within the County, from risk of flooding.</li> </ul>
<p><b>Objective FL 2 – Surface Water Drainage and Sustainable Drainage Systems (SuDs)</b></p> <p>Maintain and enhance, as appropriate, the existing surface water drainage system in the County. Ensure that new developments are adequately serviced with surface water drainage infrastructure and promote the use of Sustainable Drainage Systems in all new developments. Surface water run-off from development sites will be limited to pre-development levels and planning applications for new developments will be required to provide details of surface water drainage and sustainable drainage systems proposals.</p>
<p><b>Objective FL 3 – Protection of Waterbodies and Watercourses</b></p> <p>Protect waterbodies and watercourses within the County from inappropriate development, including rivers, streams, associated undeveloped riparian strips, wetlands and natural floodplains. This will include protection buffers in riverine, wetland and coastal areas as appropriate.</p>
<p><b>Objective FL 4 – Flood Risk Assessment for Planning Applications and CFRAMS</b></p> <p>Site-specific Flood Risk Assessment (FRA) is required for all planning applications in areas at risk of flooding, even for developments appropriate to the particular flood zone. The detail of these site-specific FRAs will depend on the level of risk and scale of development. A detailed site-specific FRA should quantify the risks, the effects of selected mitigation and the management of any residual risks.</p> <p>The Council shall have regard to the results of any CFRAM Studies in the assessment of planning applications.</p>
<p><b>Objective FL 5 – SFRA/FRA and Climate Change</b></p> <p>SFRAs and site-specific FRAs shall provide information on the implications of climate change with regard to flood risk in relevant locations. The 2009 OPW Draft Guidance on <i>Assessment of Potential Future Scenarios for Flood Risk Management</i> (or any superseding document) shall be consulted with to this effect.</p>
<p><b>Objective FL 6 – FRA and Environmental Impact Assessment (EIA)</b></p> <p>Flood risk may constitute a significant environmental effect of a development proposal that in certain circumstances may trigger a sub-threshold EIS. FRA should therefore be an integral part of any EIA undertaken for projects within the County.</p>

Figure 2-2 Galway County Council Flood Risk Management Objectives

## 2.4 Athenry Local Area Plan 2012-2022

The current Athenry Local Area Plan (LAP) for 2012 to 2022 details the planning strategy and land use zoning to guide sustainable development in Athenry. The LAP cites flooding as a key consideration in development of the plan and land use zoning for Athenry.

The LAP sets forth seven (7) Development Strategy Objectives, with Objective DS7 guiding Flood Risk Management and Assessment, as follows:

- DS7** Ensure that proposals for new developments located within identified or potential flood risk areas, or which may exacerbate the risk of flooding elsewhere, are assessed in accordance with the provisions of the Flood Risk Management Guidelines 2009 (or any updated/superseding document) and the relevant policies and objectives in this Plan.

The LAP and relevant flood mapping have been compiled based upon the OPW Preliminary Flood Risk Assessment (PFRA), and the Galway County Council and specific Athenry Plan Area A Strategic Flood Risk Assessments (SFRAs), with mapping validated by Athenry flood records.

Figure 2-3 shows an excerpt of Athenry LAP 2012 Map 3B, including flood zone and indicative pluvial flood mapping for Athenry Town Centre. This mapping indicates the site is located in flood zone C, and is not at risk during a 0.1% AEP fluvial or pluvial flood event.

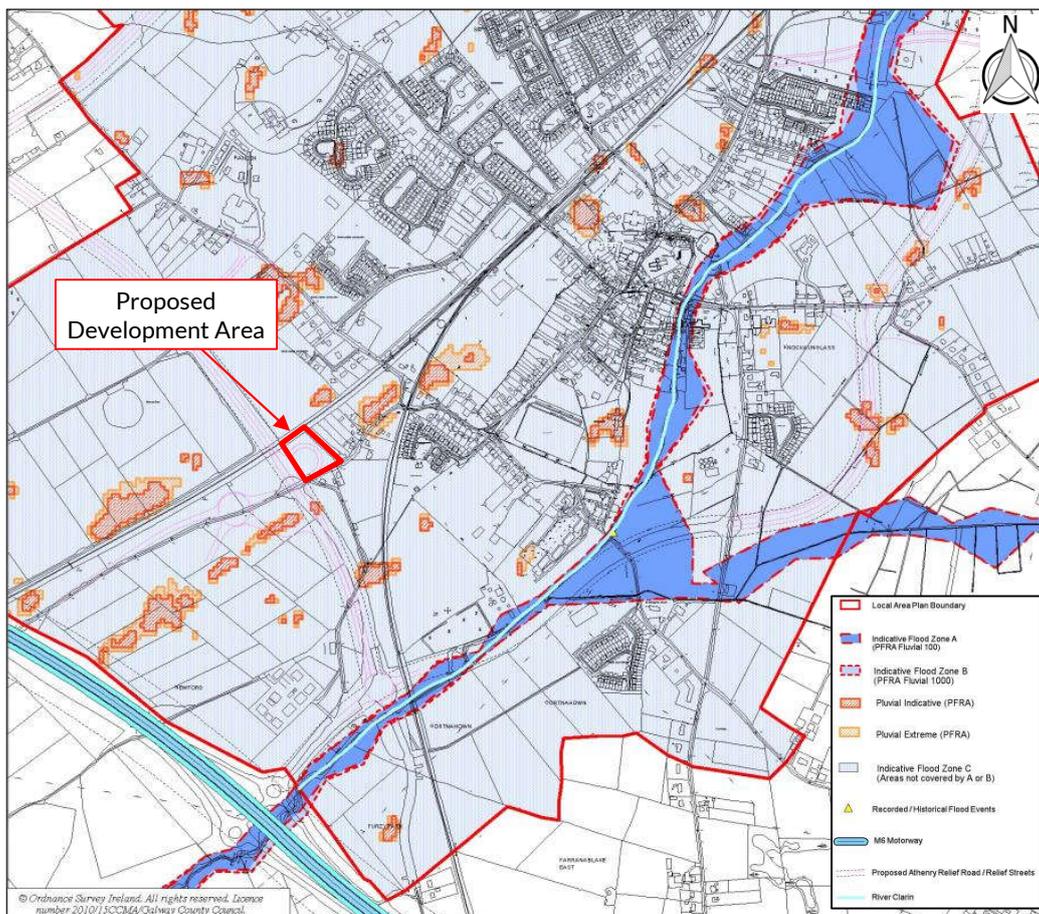


Figure 2-3 Flood Zone and Indicative Pluvial Flood Mapping from the Athenry Local Area Plan 2012-2022

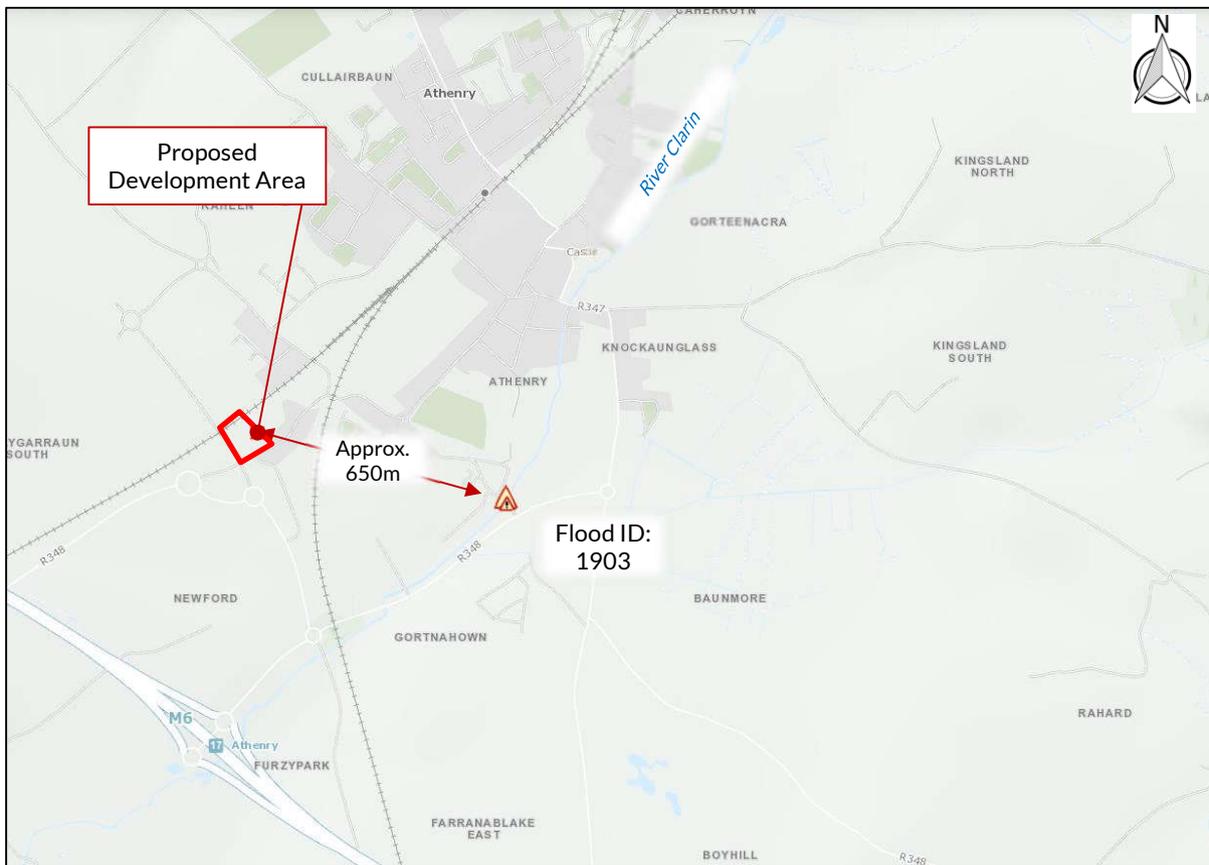
### 3.0 INITIAL FLOOD RISK ASESMENT

#### 3.1 Past Flood Events

The OPW’s National Flood Information Portal<sup>1</sup> provides past flood event mapping with records of flooding reports, meeting minutes, photos, and/or hydrometric data.

Based on the flood map shown in Figure 3-1, recurring flooding is noted approximately 650m southeast of the proposed development site (Flood ID: 1903–Clarín R348 bridge Athenry Recurring). Meeting minutes from a 2005 meeting with the Electoral Engineer reports the River Clarín annually overflows its banks in this location following heavy rain, noting the R348 road is liable to flood<sup>2</sup>.

No historical flooding has been identified at the proposed development site.



*Figure 3-1 OPW Flood Map of Past Flood Events*

<sup>1</sup> floodinfo.ie

<sup>2</sup> Galway County Council Oral Report- Loughrea Electoral Engineer (10<sup>th</sup> May 2005)

### 3.2 Catchment Flood Risk Assessment and Management Study

In 2015, the OPW produced flood maps<sup>1</sup> as part of the Catchment Flood Risk Assessment and Management (CFRAM) Study. The flood extents in these maps are based on detailed modelling of Areas for Further Assessment identified by the National Preliminary Flood Risk Assessment.

CFRAM mapping of existing flood extents, presented in Figure 3-2, indicates the development is not at risk of flooding from the River Clarin or its tributaries during a 0.1% AEP fluvial flood event. The subject site is located in Flood Zone C.

Water surface levels for the 0.1% and 1% AEP fluvial event are estimated as 27.93mOD and 27.42mOD<sup>3</sup>, respectively, in the adjacent floodplain. The subject site (ground elevations 37.2mOD to 40.2mOD) is over 10m above the estimated 0.1% AEP flood level in the Clarin River.

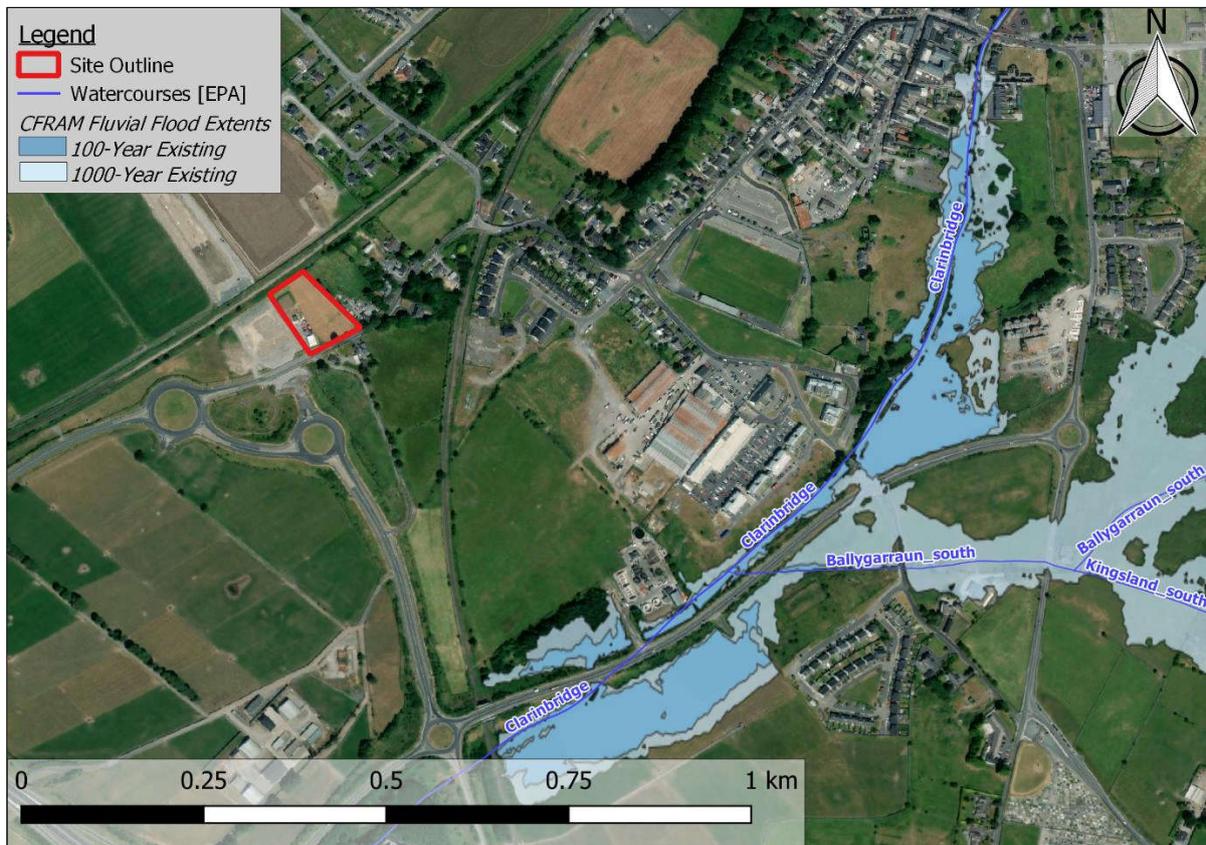


Figure 3-2 CFRAM Current Fluvial Flood Extents

The Western CFRAM study also included an assessment of the likely impact of climate change on flood risk in the area. The flood extents for a Mid-Range Future Scenario are shown in Figure 3-3. Based on the findings of the study the proposed fire station is not at risk of flooding during a 0.1% AEP MRFS fluvial flood event.

<sup>3</sup> Western CFRAM Study Map No: W29ATH\_EXFCD\_F2\_05 (October 2016)

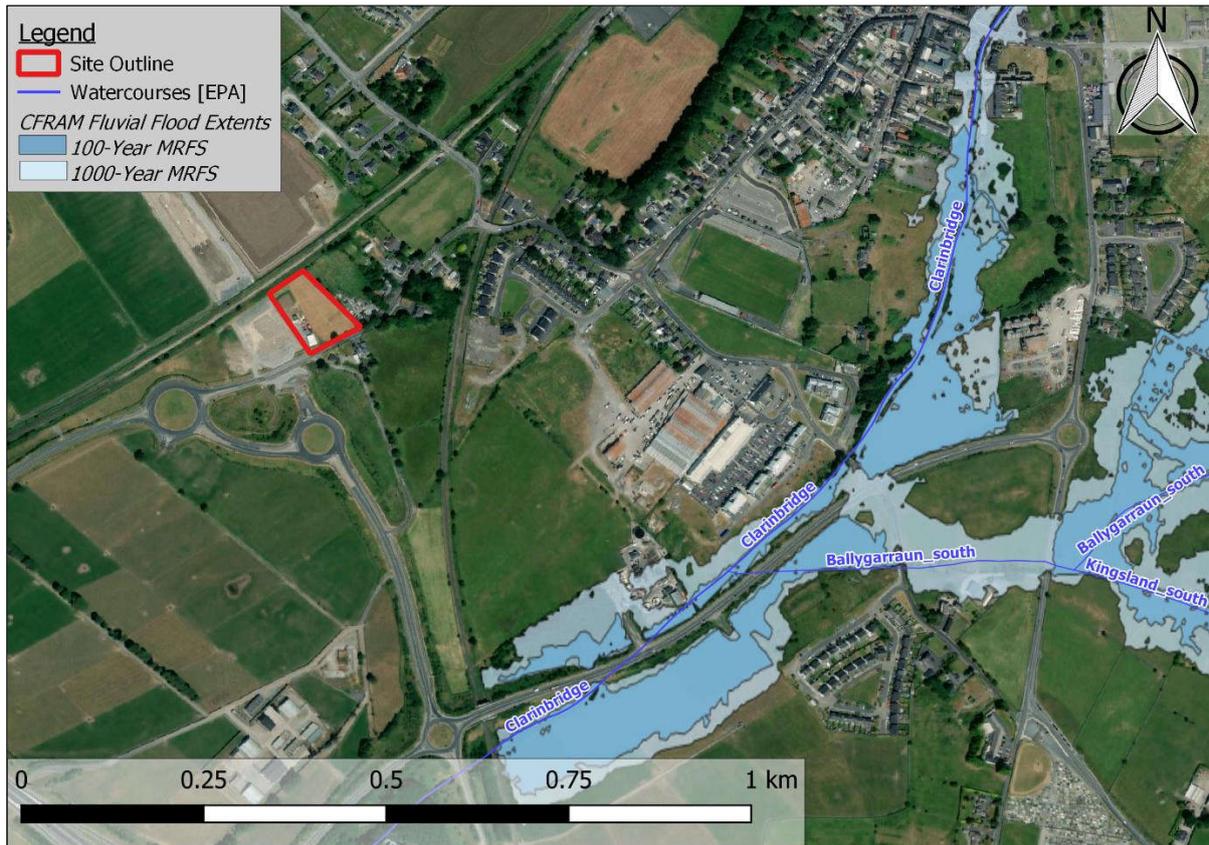


Figure 3-3 CFRAM MRFS Fluvial Flood Extents

### 3.3 OPW Preliminary Flood Risk Assessment (PFRA) Study

In 2009 the OPW produced a series of maps to assist in the development of a Preliminary Flood Risk Assessment (PFRA) throughout the country. The indicative flood mapping was included in the Athenry Local Area Plan, see Figure 2-3.

The PFRA study indicates that subject site is not at risk of fluvial/pluvial/groundwater/coastal flooding during a 0.1% AEP event.

It should be noted that *“the flood extents shown on these maps are based on broad-scale simple analysis and may not be accurate for a specific location”*<sup>4</sup>.

The results of the CFRAM study (discussed in Section 3.2) are considered more accurate than the PFRA study as it is based on more detailed surveyed information.

<sup>4</sup> The National Preliminary Flood Risk Assessment (PFRA) Overview Report, OPW (March 2012)

### 3.4 Geological Survey Ireland Mapping

The Geological Survey Ireland (GSI) provides mapping<sup>5</sup> with data related to Ireland’s subsurface. Based on the map shown in Figure 3-4, there are two karst features (caves, springs, turloughs, etc.) in the surrounding 1km area: a pair of swallow holes approximately 850m to the northeast, and 950m to the south. Outside of this radius, a series of enclosed depressions are located approximately 1.7km to the northwest, while the nearest spring is located 2.0km to the southwest.

Due to the topography in the area any groundwater arising at these features would drain towards the Clarin River. There are no depressions at the proposed Fire Station site in which groundwater could pond.

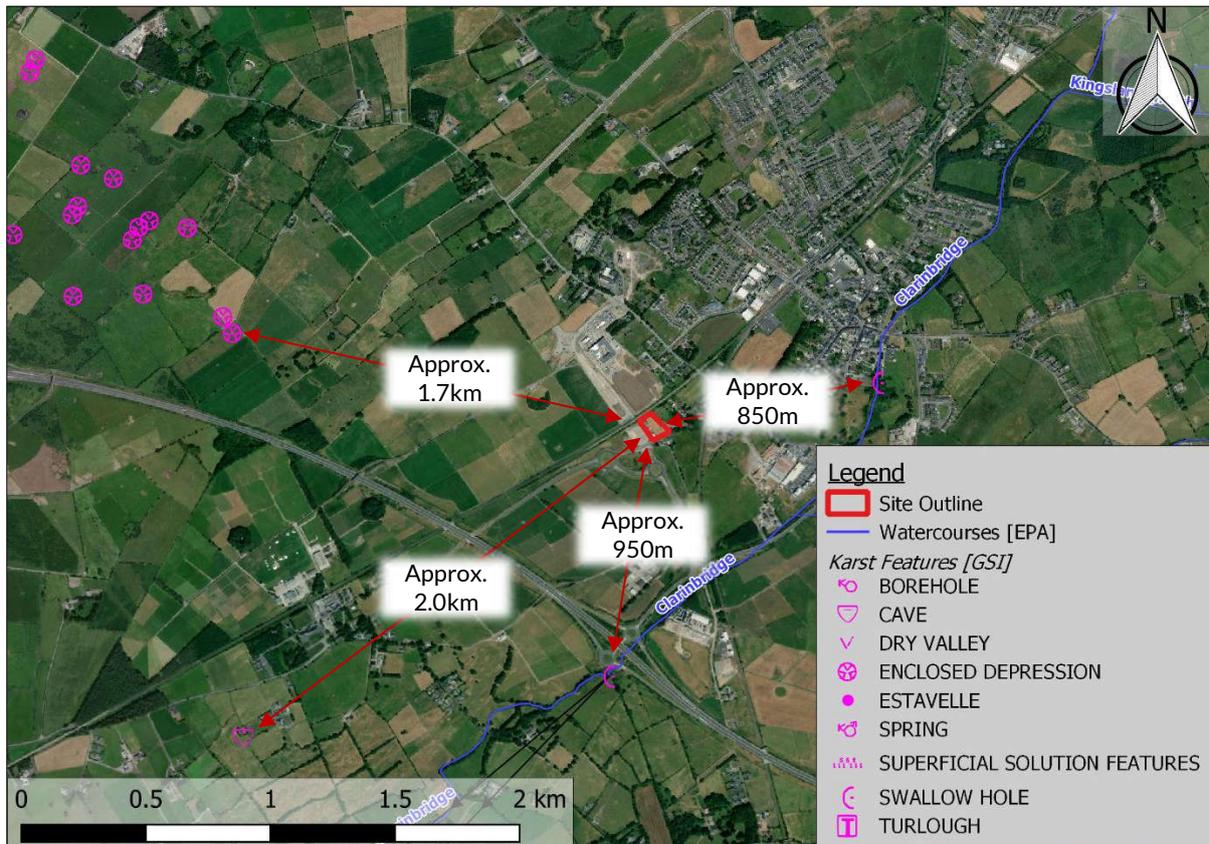


Figure 3-4 GSI Mapping of Karst Features

<sup>5</sup> <https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx>

## 4.0 DETAILED FLOOD RISK ASSESSMENT

The PSFRM Guidelines classify fire stations as “highly vulnerable” in terms of sensitivity to flooding. Such facilities are required to be operational during a flood event. As such, the proposed development should be constructed in flood zone C—where there is less than a 0.1% Annual Exceedance Probability (AEP) of pluvial and fluvial flooding.

A Mid-Range Future Scenario (MRFS) has also been considered as part of this assessment to allow for the likely effects of climate change.

### 4.1 Pluvial Flooding

Based on the indicative pluvial flood mapping presented in the Athenry Local Area Plan 2012, it is estimated that the subject site is not at risk from pluvial flooding during an extreme 0.1% AEP pluvial flood event (see Figure 2-3).

The landscaping and topography of the developed site will provide safe exceedance flow paths and prevent surface water ponding to minimise residual risks associated with an extreme flood event or a scenario where the stormwater drainage system becomes blocked.

Surface water arising at the site will be managed by a dedicated stormwater drainage system designed in accordance with Sustainable Drainage Systems (SuDS) principles, limiting discharge from the site to greenfield runoff rates.

### 4.2 Fluvial Flooding

There are no historical flood reports in the vicinity of the subject site.

Based on previous flood studies for the area completed by the OPW (CFRAM and PFRA), the proposed development site is not at risk of flooding from the River Clarin or its tributaries during a 0.1% AEP MRFS fluvial flood event (see Figure 3-3).

The site itself is located more than 500m from the nearest watercourse and is approximately 10m above the estimated 0.1% AEP flood level.

The development includes a stormwater management system which will limit the discharge of surface water from the site to greenfield rate in accordance with SUDS. The development will therefore not contribute an increase in flood risk elsewhere.

Therefore, it is estimated that the risk of fluvial flooding associated with the proposed fire station is minimal.

### 4.3 Groundwater Flooding

Based on Geological Survey Ireland (GSI) subsurface mapping, there are no karst features (caves, springs, turloughs, etc.) of concern to the proposed site location (see Figure 3-4). Therefore, the proposed development at the site is not estimated to be at risk of groundwater flooding.

#### **4.4 Coastal Flooding**

Given that site elevations are in the region of 38mOD, and the site location's distance inland, it is estimated that the development is not at risk of coastal flooding.

#### **4.5 The Justification Test**

Based on the findings of this assessment, the proposed fire station is appropriately located in Flood Zone C. The Justification test therefore does not apply.

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## 5.0 CONCLUSIONS

TOBIN Consulting Engineers were appointed by Galway Galway County Council (GCC) to undertake a Flood Risk Assessment (FRA) for their proposed Fire Station at Prospect, Athenry, Co. Galway for development of a proposed fire station.

The Planning System and Flood Risk Management (PSFRM) Guidelines (OPW/DoEHLG, 2009) classify fire stations as “highly vulnerable” in terms of their sensitivity to flooding. The proposed development should therefore be built in Flood Zone C, where there is less than a 0.1% Annual Exceedance Probability (AEP) of flooding.

### Pluvial Flooding:

Based on the results of pluvial modelling by HR Wallingford as part of the OPW’s PFRA study, the subject site is not at risk of pluvial flooding. The site is located in Pluvial Flood Zone C.

Surface water arising at the site will be managed by a dedicated stormwater drainage system designed in accordance with SuDS limiting discharge from the site to greenfield runoff rates. On this basis, it is predicted that the development of the site will not increase the risk of flooding elsewhere in the catchment.

The landscaping and topography of the site will provide safe exceedance flow paths and prevent surface water ponding to minimise residual risks associated with extreme flooding or blockage of the stormwater drainage system.

It is therefore estimated that the risk of pluvial flooding associated with the proposed fire station is minimal.

### Fluvial Flooding:

Based on previous flood studies in the area by the OPW (CFRAM and PFRA), it is estimated that the proposed development site is not at risk of fluvial flooding from the River Clarin or its tributaries. The subject site is over 10m higher than the estimated 0.1% AEP flood level in the nearby river.

The risk of fluvial flooding associated with the proposed fire station is minimal.

### Groundwater Flooding:

There is no evidence to suggest groundwater as a potential source of flood risk to the proposed development site.

### Coastal/Tidal Flooding:

The site is not at risk of coastal flooding due to its elevation and distance inland.

Based on the results of this Flood Risk Assessment, the proposed Fire Station is appropriately located in Flood Zone C.

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# Appendix 1 - Drawings

191-F Topographical Survey



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**Galway**

Fairgreen House,  
Fairgreen Road,  
Galway,  
H91 AXK8,  
Ireland.  
Tel: +353 (0)91 565 211

**Dublin**

Block 10-4,  
Blanchardstown Corporate Park,  
Dublin 15,  
D15 X98N,  
Ireland.  
Tel: +353 (0)1 803 0406

**Castlebar**

Market Square,  
Castlebar,  
Mayo,  
F23 Y427,  
Ireland.  
Tel: +353 (0)94 902 1401