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Loughrea Fire Station at Athenry Road, Loughrea, Co. Galway

Flood Risk Assessment

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Document Control Sheet	
Document Reference	LFS-RP-TOB-CE-0001_TOBIN - FRA Loughrea Fire Station
Report Status	Issued
Report Date	May 2022
Current Revision	D00
Client:	Vincent Hannon Architects
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Project Number	11315

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Revision	Description	Author:	Date	Reviewed By:	Date	Authorised by:	Date
D00	Issued	CS	19/05/2022	BM	26/05/2022	SK	26/05/2022
D01	Updated Site Layout	FOC	17/07/2024	ST	17/07/2024	KD	17/07/2024

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1.0 INTRODUCTION

TOBIN Consulting Engineers were appointed by Vincent Hannon Architects to undertake a Flood Risk Assessment (FRA) for a proposed Fire Station Site (see Figure 1-2) at Athenry Road, Loughrea, Co. Galway.

As shown in Figure 1-1, the approximately 0.45ha greenfield site is located approximately 575m north of Lough Rea along the R446 also known as the Athenry Road. The site is located on the outskirts of Loughrea on the north-western side of the town.

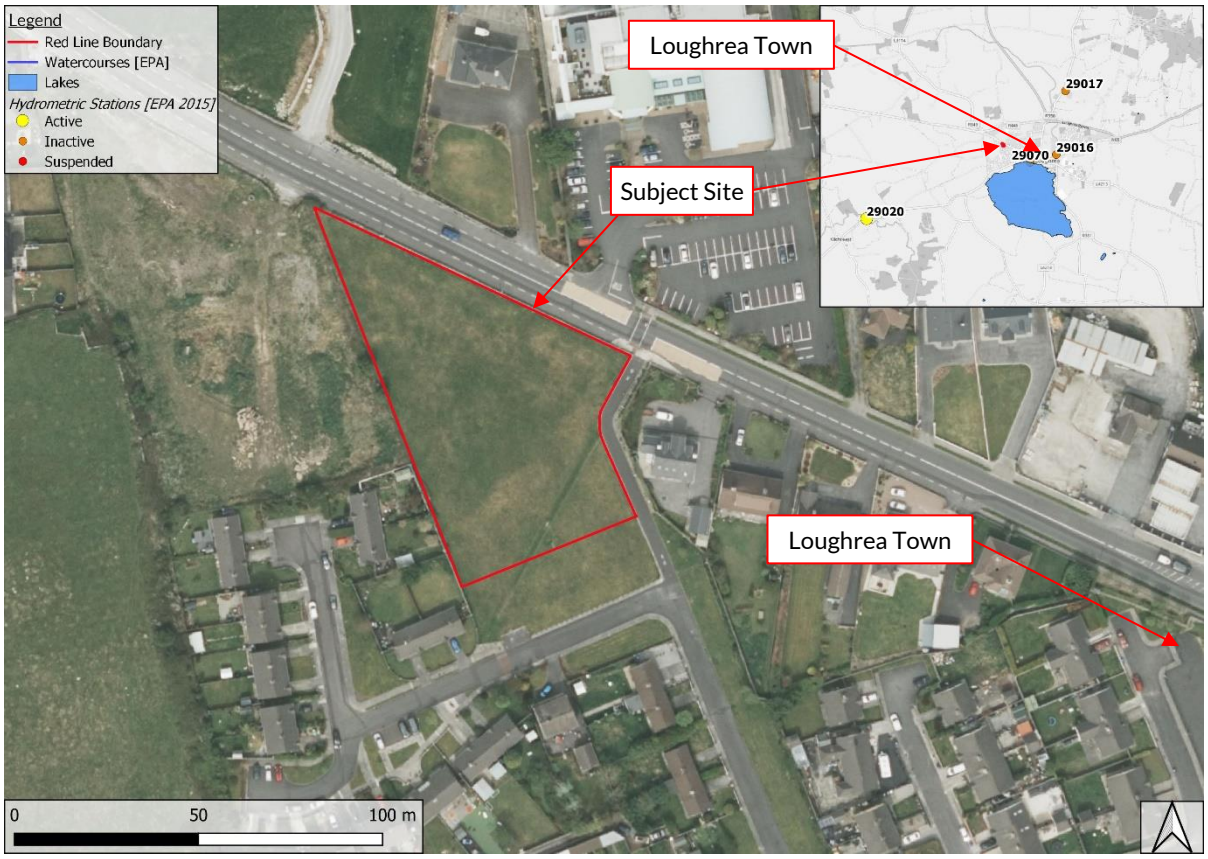

Figure 1-1 Site Location

The subject site has existing ground levels ranging from approximately 93.57mOD at the western site boundary, to approximately 96.45mOD at the northern corner of the site border. The existing ground levels within the proposed development section ranges from approximately 95.83mOD at the northern tip of the building to 93.81mOD at the southern end of the fire station.

The purpose of this Stage 2 FRA report is to identify, quantify, and communicate the risks of flooding, if any, to the proposed development.

The proposed Fire Station will consist of an appliance bay, a training and muster area, car parking spaces for visitors and staff, a training tower, a shed and an expansion zone (see Figure 1-2).

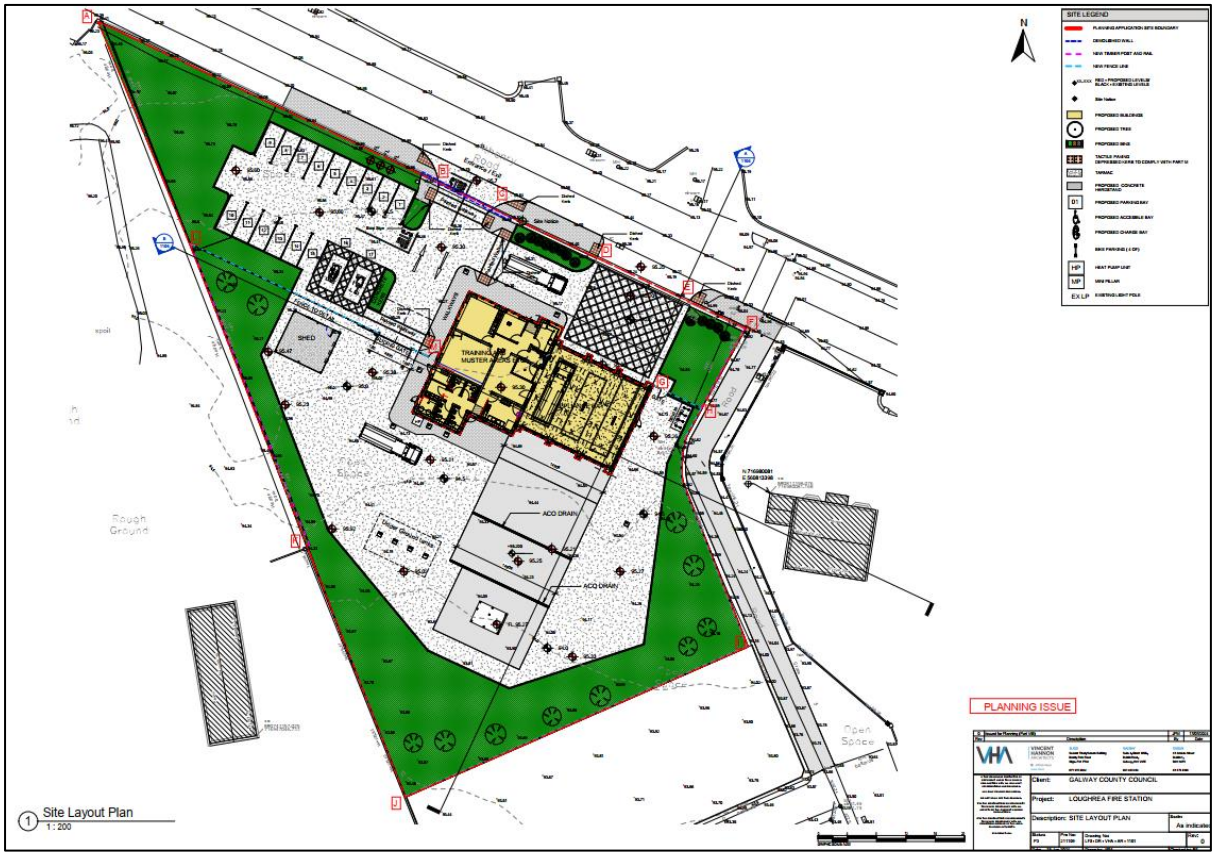

Figure 1-2 Proposed Fire Station Development

2.0 FLOOD RISK MANAGEMENT GUIDANCE

This Stage 2 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 (2022 – 2028)
- DRAFT Loughrea Local Area Plan (2024-2030)
- DRAFT Loughrea Strategic Flood Risk Assessment (2024-2030)

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. Fire Stations, such as the proposed development, are required to be operational during flooding are as such are considered "essential infrastructure". Therefore, the proposed development is classed as "highly vulnerable" in terms of sensitivity to flooding and is appropriate in Flood Zone C.

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)	Fluvial & Pluvial Flooding More frequent than 1% AEP Coastal Flooding More frequent than 0.5% AEP	Justification Test	Justification Test	Appropriate
B (Medium)	Fluvial & Pluvial Flooding 0.1% to 1% AEP Coastal Flooding 0.1% to 0.5% AEP	Justification Test	Appropriate	Appropriate
C (Low)	Fluvial, Pluvial & Coastal Flooding Less frequent than 0.1% AEP	Appropriate	Appropriate	Appropriate

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

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

2.3 Galway County Development Plan 2022-2028

The Galway County Development Plan (GCDP)2022-2028 sets out the policies and objectives and the overall strategy for the development of the County over the plan period 2022-2028.

Chapter 14 of the Galway County Development Plan 2022-2028 outlines the County plan for Climate Change, Energy and Renewable Resource. Section 14.6 of the Draft Galway County Development Plan discusses Flooding and Flood Risk Management for the County. The policies are as follows:

ObjectiveFL1 Flood Risk Management Guidelines

It is the policy objective of Galway County Council to support, in co-operation with the OPW, the implementation of the EU Flood Risk Directive (2007/60/EC), the Flood Risk Regulations (SI No. 122 of 2010) and the DEHLG/OPW publication The Planning System and Flood Risk Management Guidelines (2009) (and any updated/superseding legislation or policy guidance) and Department Circular PL2/2014 or any updated / superseding version.

Objective FL 2 Flood Risk Management and Assessment

Comply with the requirements of the DoEHLG/OPW The Planning System and Flood Risk Management Guidelines for Planning Authorities and its accompanying Technical Appendices Document 2009 (including any updated/superseding documents).

This will include the following:

a) *Avoid, reduce and/or mitigate, as appropriate in accordance with the Guidelines;*

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 The Planning System and Flood Risk Management Guidelines 2009 (or any superseding document); Any flood risk assessment should include an assessment of the potential impacts of climate change, such as an increase in the extent or probability of flooding, and any associated measures necessary to address these impacts;*

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;*

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.*

Objective FL 3 Principles of the Flood Risk Management Guidelines

The Planning Authority shall implement the key principles of flood risk management set out in the Flood Risk Management Guidelines as follows:

a) *Avoid development that will be at risk of flooding or that will increase the flooding risk elsewhere, where possible;*

b) *Substitute less vulnerable uses, where avoidance is not possible; and*

c) *Mitigate and manage the risk, where avoidance and substitution are not possible.*

Development should only be permitted in areas at risk of flooding when there are no alternative, reasonable sites available in areas at lower risk that also meet the objectives of proper planning and sustainable development. Vulnerable development in areas which have the highest flood risk should be avoided and/or only considered in exceptional circumstances (through a prescribed Justification Test) if adequate land or sites are not available in areas which have lower flood risk.

Objective FL 4 Flood Relief Schemes

The Planning Authority shall support and co-operate with the Office of Public Works (OPW) in the delivery of Flood Relief Schemes.

Objective FL 5 Catchment Planning

The Planning Authority will support the OPW'S CFRAM Programme and catchment-based Flood Planning Groups, especially where catchments go beyond the Council's administrative boundary, in the development and implementation of catchment-based strategies for the management of flood risk - including those relating to storage and conveyance.

Objective FL 6 Surface Water Drainage and Sustainable Drainage Systems (SuDs)

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.

Objective FL 7 Protection of Waterbodies and Watercourses

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.

Objective FL 8 Flood Risk Assessment for Planning Applications and CFRAMS

Protect Flood Zone A and Flood Zone B from inappropriate development and direct developments/land uses into the appropriate Flood Zone in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities 2009 (or any superseding document) and the guidance contained in Development Management Standard 69.

Site-specific Flood Risk Assessment (FRA) is required for all planning applications in areas at elevated 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. The Planning Authority shall have regard to the results of any CFRAM Studies in the assessment of planning applications.

Development proposals will need to be accompanied by a Development Management Justification Test in addition to the site-specific Flood Risk Assessment.

Where only a small proportion of a site is at risk of flooding, the sequential approach shall be applied in site planning, in order to seek to ensure that no encroachment onto or loss of the flood plain occurs and/or that only water compatible development such as Open Space would be permitted for the lands which are identified as being at risk of flooding within that site.

In Flood Zone C, where the probability of flooding is low (less than 0.1%, Flood Zone C), site-specific Flood Risk Assessment may be required, and the developer should satisfy themselves that the probability of flooding is appropriate to the development being proposed.

In addition to the County Plan SFRA datasets (including the Flood Zones, CFRAMS mapping, historical and predictive groundwater mapping, predictive pluvial mapping and historical flood risk indicator mapping, such as the Benefitting Lands mapping), new and emerging datasets (such as the OPW's National Fluvial Mapping that will supersede existing PFRA fluvial mapping for catchments greater than 5km2) must be consulted by prospective applicants for developments and will be made available to lower-tier Development Management processed in the Council.

Applications for developments in coastal areas and associated assessments shall also consider wave overtopping and coastal erosion.

Objective FL 9 SFRA of Lower Tier Plans

Lower tier plans shall undertake SFRA (Strategic Flood Risk Assessment) in compliance with the Flood Risk Management Guidelines.

Objective FL 10 SFRA/FRA and Climate Change

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 Assessment of Potential Future Scenarios for Flood Risk Management (or any superseding document) shall be consulted with to this effect.

Objective FL 11 SFRA/FRA and Climate Change

Flood risk may constitute a significant environmental effect of a development proposal that in certain circumstances may trigger a sub-threshold EIA. FRA should therefore be an integral part of any EIA undertaken for projects within the County.

Objective FL 12 Inland Fisheries

It is a policy objective of the Planning Authority to consult, where necessary, with Inland Fisheries Ireland, the National Parks and Wildlife Service and other relevant agencies in the construction of flood alleviation measures in County Galway.

Objective FL 13 Flood Vulnerable Zones

It is a policy objective of the Planning Authority to take account of and incorporate into local planning policy and decision making, including possible future variations to this plan, CFRAM measures that may be published in the future, including planned investment measures for managing and reducing flood risk.

Objective FL 14 CFRAM

It is Council policy objective to ensure that applications pertaining to existing developments in flood vulnerable zones provide details of structural and non-structural risk management measures to include, but not be limited to specifications of the following - floor levels, internal layout, flood resilient construction, flood resistant construction, emergency response planning, access and egress during flood events.

Objective FL 15 Flood Risk Management

Ensure each flood risk management activity is examined to determine actions required to embed and provide for effective climate change adaptation as set out in the OPW Climate Change Sectoral Adaptation Plan for Flood Risk Management applicable at the time.

Objective FL 16 Benefitting Land

Applications for development on land identified as benefitting land may be prone to flooding, and as such site-specific flood risk assessments may be required in these areas.

Objective FL 17 Consultation with OPW

Consult with the OPW in relation to proposed developments in the vicinity of drainage channels and rivers for which the OPW are responsible and retain a strip on either side of such channels

where required, to facilitate maintenance access thereto. In addition, promote the sustainable management and uses of water bodies and avoid culverting or realignment of these features

Objective FL 18 Inappropriate Development on Flood Zones

- *Where a development/land use is proposed within any area subject to this objective the development proposal will need to be accompanied by a detailed hydrological assessment and robust SUDS design which demonstrates the capacity to withstand potential flood events to maintain water quality and avoid potential effects to ecological features.*
- *Any development proposals should be considered with caution and will be required to comply with The Planning System and Flood Risk Management Guidelines for Planning Authorities/Circular PL2/2014 & the associated Development Management Justification Test.*
- *Climate Change should be duly considered in any development proposal.*
- *Protect the riparian zones of watercourse systems throughout the plan area through a general 10 metre protection buffer from rivers within the plan area as measured from the near riverbank, (this distance may be increased and decreased on a site-by-site basis, as appropriate).*
- *Any development proposals submitted for this site will require a detailed ecological report(s), carried out by suitably qualified personnel for the purposes of informing Appropriate Assessment Screening by Galway County Council, the competent authority.*
- *The relevant lands will be outlined and flagged with a symbol on the land use zoning map and on the GIS system of Galway County Council so that staff and the public are aware of the special conditions/constraints attached.*
- *A briefing will be provided to relevant staff within Galway County Council on the special conditions and constraints on relevant lands.*

2.4 DRAFT Loughrea Local Area Plan 2024 – 2030

As part of the DRAFT Loughrea Local Area Plan a Land Use Zoning map was produced. The mapping is shown in Figure 2-2 and has the subject site zoned for "Community Facilities". The LAP states that the CDP sets out the strategic aims and key policy objectives for Galway County in Chapter 14, as listed in Section 2.3.

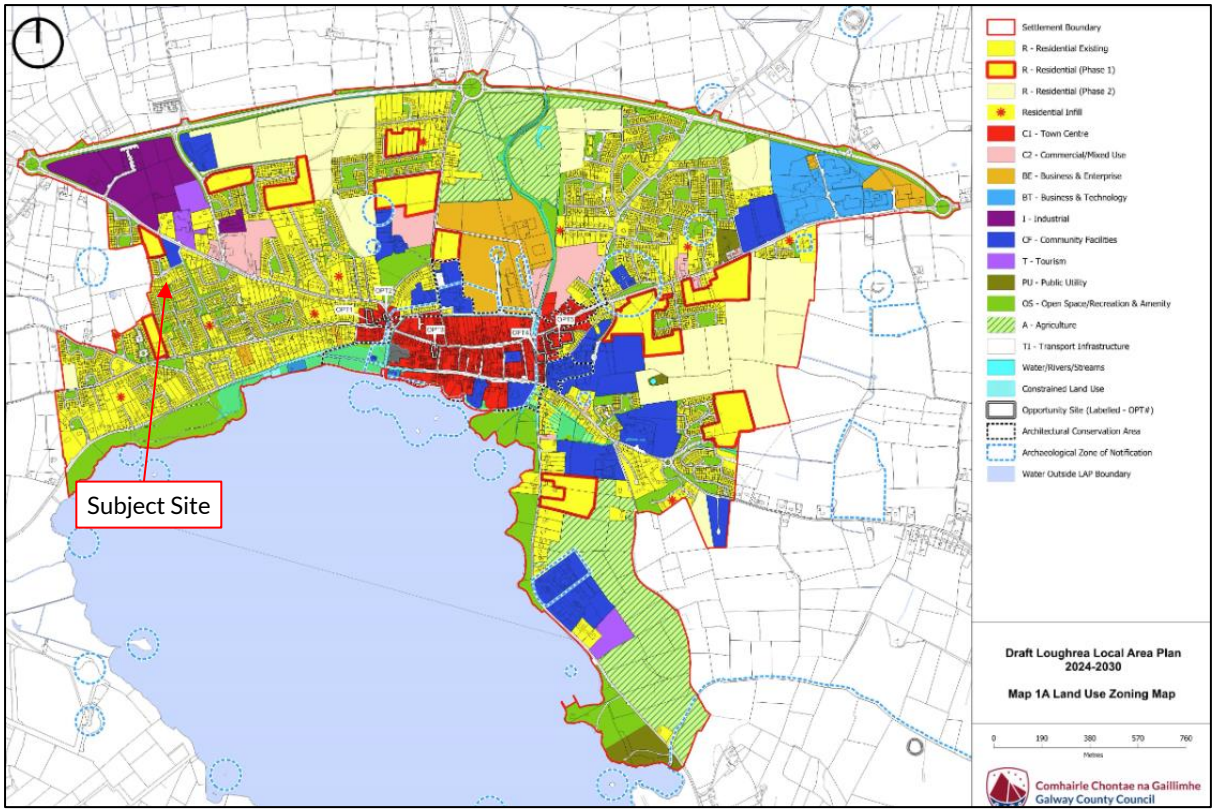

Figure 2-2: Loughrea Land Use Zone Mapping

2.5 DRAFT Loughrea Strategic Flood Risk Assessment 2024 – 2030

Flood Zone mapping was produced as part of the Loughrea Strategic Flood Risk Assessment (SFRA). The mapping shows that the subject site is located in Flood Zone C.

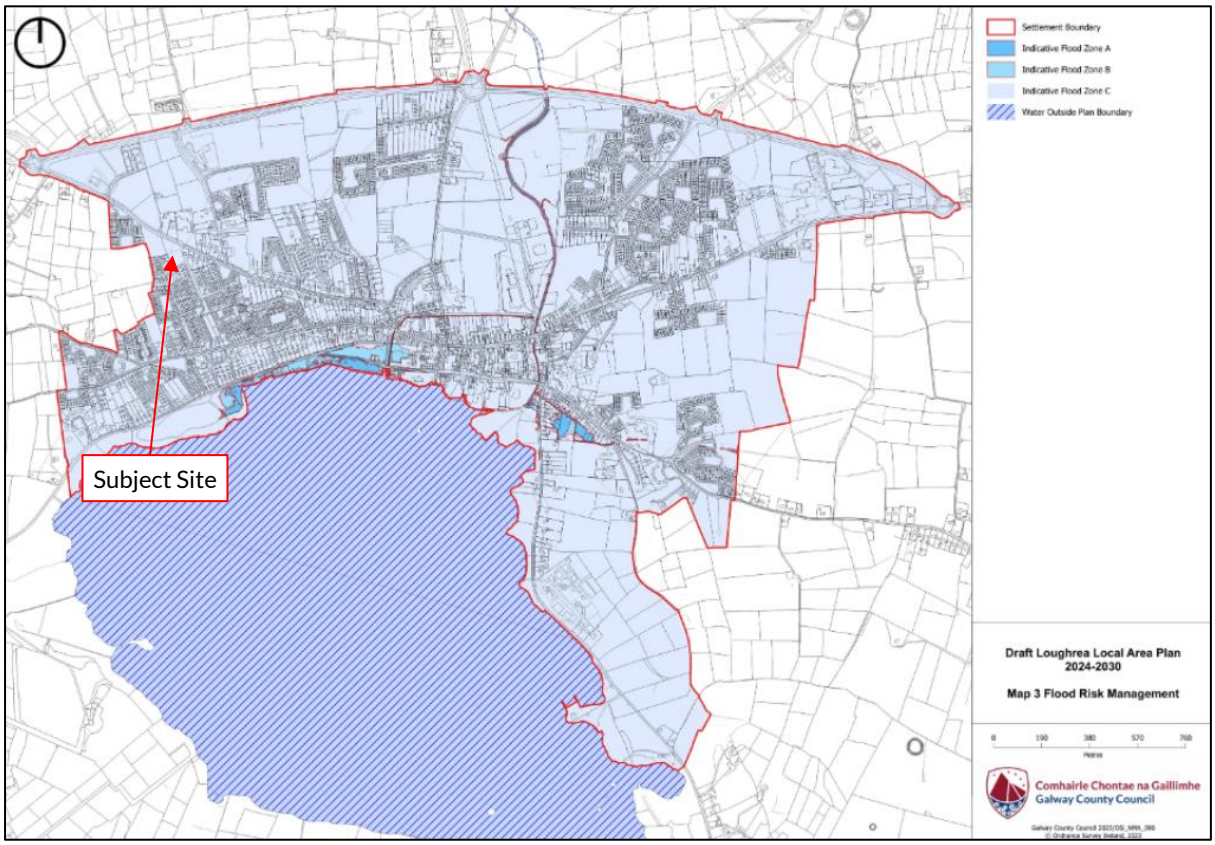

Figure 2-3: Loughrea Flood Zone Mapping

3.0 INITIAL FLOOD RISK ASESSMENT

3.1 Past Flood Events

The OPW's National Flood Information Portal[1] 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, there are two recorded locations of recurring flooding noted within Loughrea and surrounding areas.

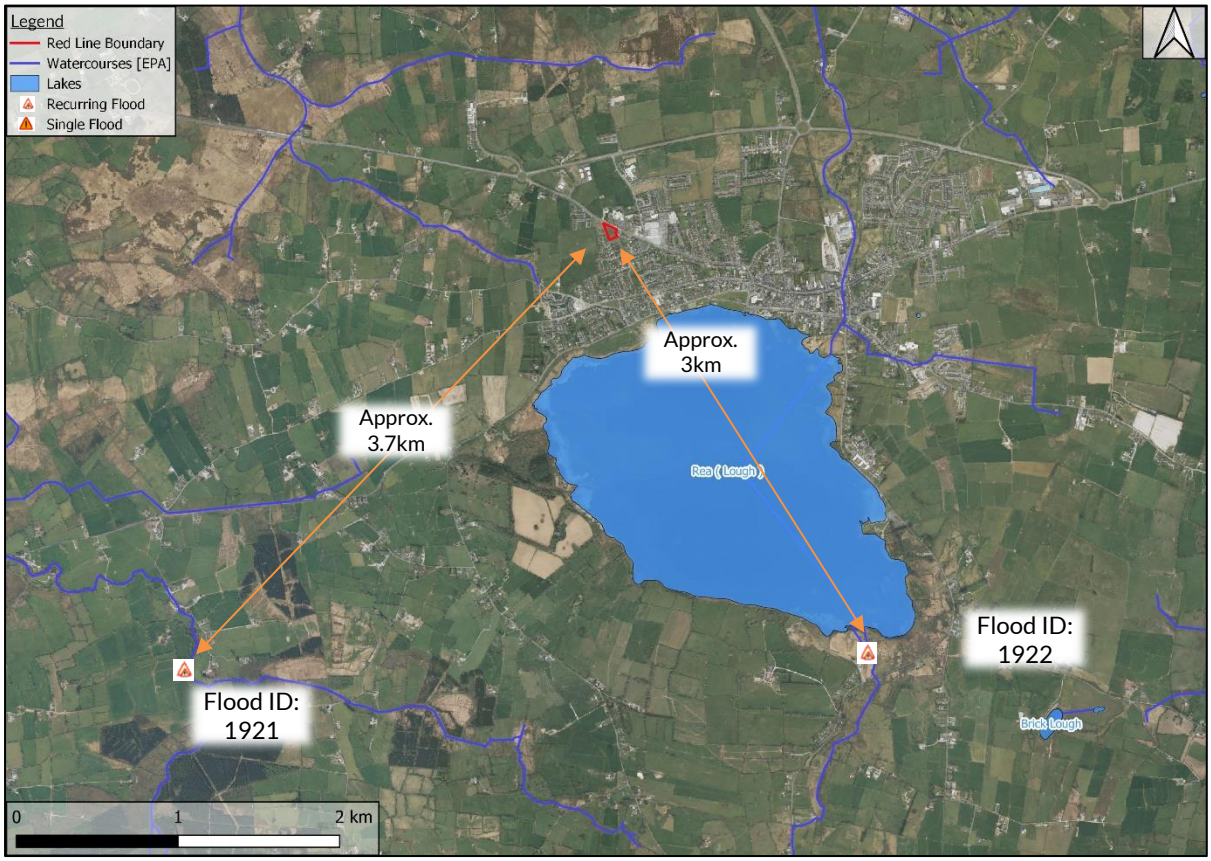

Figure 3-1 OPW Flood Map of Past Flood Events

The nearest recorded flood event on the OPW's National Flood Information Portal is located 3km from the proposed development.

Meeting minutes from a meeting with the Loughrea Area Engineer on 10th May 2005[2] provides a report on two locations recurring flooding, as follows:

- Ballingarry (Flood ID: 1921) – River overflows its banks after exceptional heavy rain approximately every 5 years.
- Earlspark, Loughrea (Flood ID: 1922) – Lake level rises every year

[1] floodinfo.ie
[2] https://www.floodinfo.ie/map/pf_addinfo_report/1921/

3.2 OPW Preliminary Flood Risk Assessment (PFRA) Study

In 2009, the OPW produced a series of maps to assist in the development of a broad-scale FRA throughout Ireland. These maps were produced from several sources.

The OPW's National Preliminary Flood Risk Assessment (PFRA) Overview Report from March 2012 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"*[3].

Figure 3-2 provides an overview of the fluvial, coastal, pluvial, and groundwater indicative flood extents in the vicinity of the subject site.

Figure 3-2 Indicative Flood Mapping [extract from PFRA Map 161]

The PFRA indicative flood mapping indicates that the proposed development site is not liable to fluvial, pluvial, coastal or groundwater flooding.

Limitations on potential sources of error associated with the PFRA maps include:

- Assumed channel capacity (due to absence of channel survey information)
- Absence of flood defences and other drainage improvements and channel structures (bridges, weirs, culverts)
- Local errors in the national Digital Terrain Model (DTM)

Improved hydraulic modelling was carried out through the Catchment Flood Risk Assessment and Management Study (CFRAM) in 2015 (discussed in Section 3.3) and is considered more accurate than the PFRA study as it utilised surveyed river geometry, including the recently completed flood relief works.

[3] The National Preliminary Flood Risk Assessment (PFRA) Overview Report, OPW (March 2012)

3.3 Catchment Flood Risk Assessment and Management Study

In 2015, the OPW produced flood maps[1] 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.

3.3.1 Fluvial Flood Risk (CFRAM)

CFRAM mapping of the existing 100-Year and 1000-Year predicted fluvial flood extents, presented in the figure below, indicates the subject site is not at risk of flooding during a 0.1% AEP event.

Figure 3-3 Loughrea CFRAM Existing Fluvial Flood Extents

Based on the CFRAM mapping, the subject site is located within Flood Zone C, outside of the 0.1% AEP fluvial flood extent. The nearest predicted water levels estimated in Loughrea town as part of the CFRAM study are 80.26mOD and 80.51mOD for the current scenario 1% and 0.1% AEP events respectively (reference node 29LREA00059A)[4]. The subject site has existing ground levels ranging from approximately 93.57mOD at the western site boundary, to approximately 96.45mOD at the northern corner of the site border, >13.06m above the predicted flood levels during a 0.1% AEP flood event.

[4] Shannon CFRAM Study Map No: S27ENS_EXFCD_F1_01 (June 2016)

3.4 Geological Survey Ireland Mapping

The Geological Survey Ireland (GSI) provides mapping[5] with data related to Ireland's subsurface. Based on the map shown in Figure 3-4, there nearest karst feature (caves, springs, turloughs, etc.) is 3.1km from the proposed development site.

Two enclosed depressions are located 3.1km and 4km east of the subject site.

Figure 3-4 GSI Mapping of Karst Features

[5] https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx

Predicted groundwater flood mapping produced by GSI indicates that he nearest area of predicted groundwater flooding to the subject site is 8.3km south-west (see Figure 3-5).

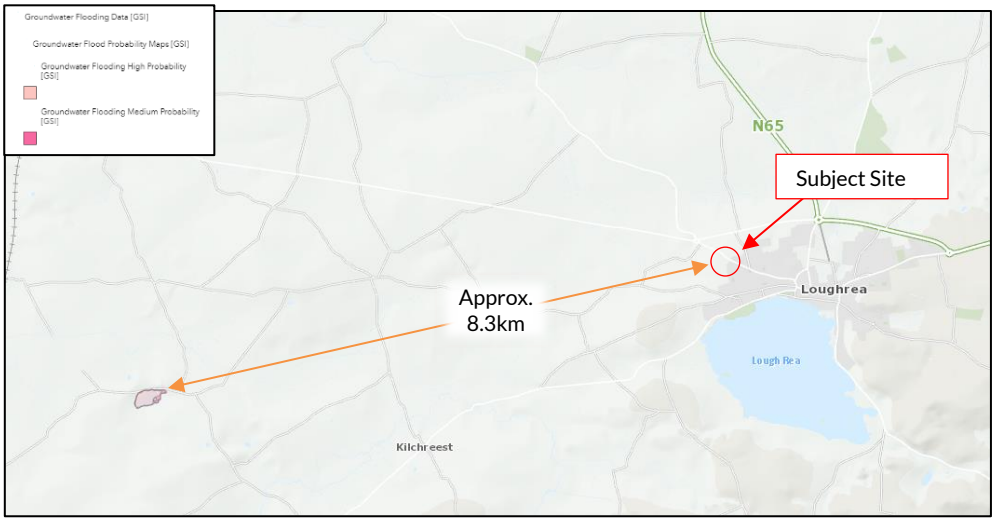

Figure 3-5 GSI Mapping of Groundwater Flooding (Historic and Predicted)

4.0 DETAILED FLOOD RISK ASESSMENT

As per Section 2.1.1, the PSFRM Guidelines classify Fire Stations, such as the proposed development, as "highly vulnerable" in terms of sensitivity to flooding. Such developments are considered appropriate in Flood Zone C, where there is less than a 0.1% Annual Exceedance Probability (AEP) of fluvial, pluvial, groundwater and coastal flooding.

4.1 Fluvial Flooding

The subject site is located approximately 575m north of Lough Rea along the R446 (also known as the Athenry Road).

Based on the fluvial flood extent mapping, produced by the OPW in the PFRA and CFRAM Studies, it is estimated that the risk of fluvial flooding to the proposed development is minimal.

The existing ground at the subject site (≥93.57mOD) is more than 12.85m above the 0.1% AEP CFRAM fluvial flood levels (80.72mOD) which is the highest water levels estimated in Loughrea town.

4.2 Pluvial Flooding

Based on the indicative pluvial flood mapping presented in the OPW Preliminary Flood Risk Assessment, 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 3-2).

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

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.

Therefore, it is estimated that risk of pluvial flooding associated with the proposed development is minimal.

4.3 Groundwater Flooding

Based on a review of Geological Survey Ireland (GSI) subsurface mapping of karst features, historic and predicted groundwater flooding in the area (Figure 3-4), and the PFRA study (Figure 3-2), there is no evidence to suggest liability to groundwater flooding at the proposed development site.

4.4 Coastal Flooding

The proposed site in Loughrea is located more than 22km inland, with minimum site elevations in the region of 93.57mOD. The nearest predicted 0.1% AEP MRFS coastal flood level at Oranmore is estimated by the West Coast ICPSS Study to be approximately 4.56mOD [reference node W5].[6]

[6] West Coast ICPSS Study Phase IV – Coastal MRFS Flood Extent: Map no. W / RA / EXT / MRFS / 9

Therefore, it is estimated that the proposed development is not at risk of coastal flooding.

4.5 The Justification Test

With reference to the PSFRM Guidelines, the proposed Fire Station is classified as "highly vulnerable" in terms of sensitivity to flooding.

Based on the findings of this Flood Risk Assessment, the subject site is located in Flood Zone C, i.e. there is less than a 0.1% Annual Exceedance Probability (AEP) of pluvial/fluvial/coastal/groundwater flooding.

As the Planning System and Flood Risk Management Guidelines consider "highly vulnerable" developments appropriate in Flood Zone C, the Justification Test does not need to be applied.

5.0 CONCLUSIONS

TOBIN Consulting Engineers were commissioned to undertake a Flood Risk Assessment (FRA) for a proposed Fire Station Site at Athenry Road, Loughrea, Co. Galway.

The Planning System and Flood Risk Management (PSFRM) Guidelines (OPW/DoEHLG, 2009) classify Fire Stations as "essential infrastructure", and therefore "highly vulnerable" in terms of sensitivity to flooding. Therefore, as the proposed development is a Fire Station the development is considered ''highly vulnerable'' and appropriate in Flood Zone C (less than 1% AEP).

Fluvial Flooding:

As per Section 4.1, based on the fluvial flood extent mapping, produced by the OPW in the PFRA and CFRAM Studies (Figure 3-2, Figure 3-3), it is estimated that the risk of fluvial flooding to the proposed development is minimal.

The existing ground at the subject site (≥93.57mOD) is more than 12.85m above the 0.1% AEP CFRAM fluvial flood levels (80.72mOD) which is the highest water levels estimated in Loughrea town.

Therefore, it is predicted that fluvial flood risk to the development is minimal.

Pluvial Flooding:

Predicted pluvial flood extents presented in the OPW Preliminary Flood Risk Assessment indicate that the subject site is not at risk from pluvial flooding.

Given that surface water arising at the site will be managed by a dedicated stormwater drainage system designed in accordance with SuDS, and the landscaping and topography of the site will provide safe exceedance flow paths to minimise residual risks associated with extreme flooding, it is estimated that the risk of pluvial flooding to the proposed development site is minimal.

Groundwater Flooding:

As per Section 3.4 and Section 4.3, there is no evidence to suggest groundwater as a potential source of flood risk to the proposed development site.

Coastal Flooding:

As per Section 4.4, the proposed development is not at risk from coastal flooding due to its existing ground elevations and distance from predicted coastal flood risk.

Based on the findings of this Flood Risk Assessment, the subject site is appropriately located in Flood Zone C in accordance with the Planning System and Flood Risk Management Guidelines.

As there is no identified source of flood risk at the subject site, the proposed development is located outside predicted flow paths and floodplain extents, and 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, it is predicted that the development will not exacerbate flood risk to the surrounding environment