Markievicz Bridge Refurbishment Works

Site Specific Flood Risk Assessment
224138-PUNCH-XX-XX-RP-C-0003

April 2025

Document Control

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1 Introduction

1.1 Background

Sligo County Council (SCC) proposes to carry out bridge rehabilitation works on Markievicz Bridge in Sligo Town, Co. Sligo. PUNCH Consulting Engineers (PUNCH) have been engaged by SCC to assess and design repair works to the bridge piers and riverbed.

The bridge is located on Bridge Street, in the centre of Sligo Town and spans the River Garavogue. It was originally constructed in 1648 and is now listed as a protected structure. The bridge location is shown in Figure 1-1 below.

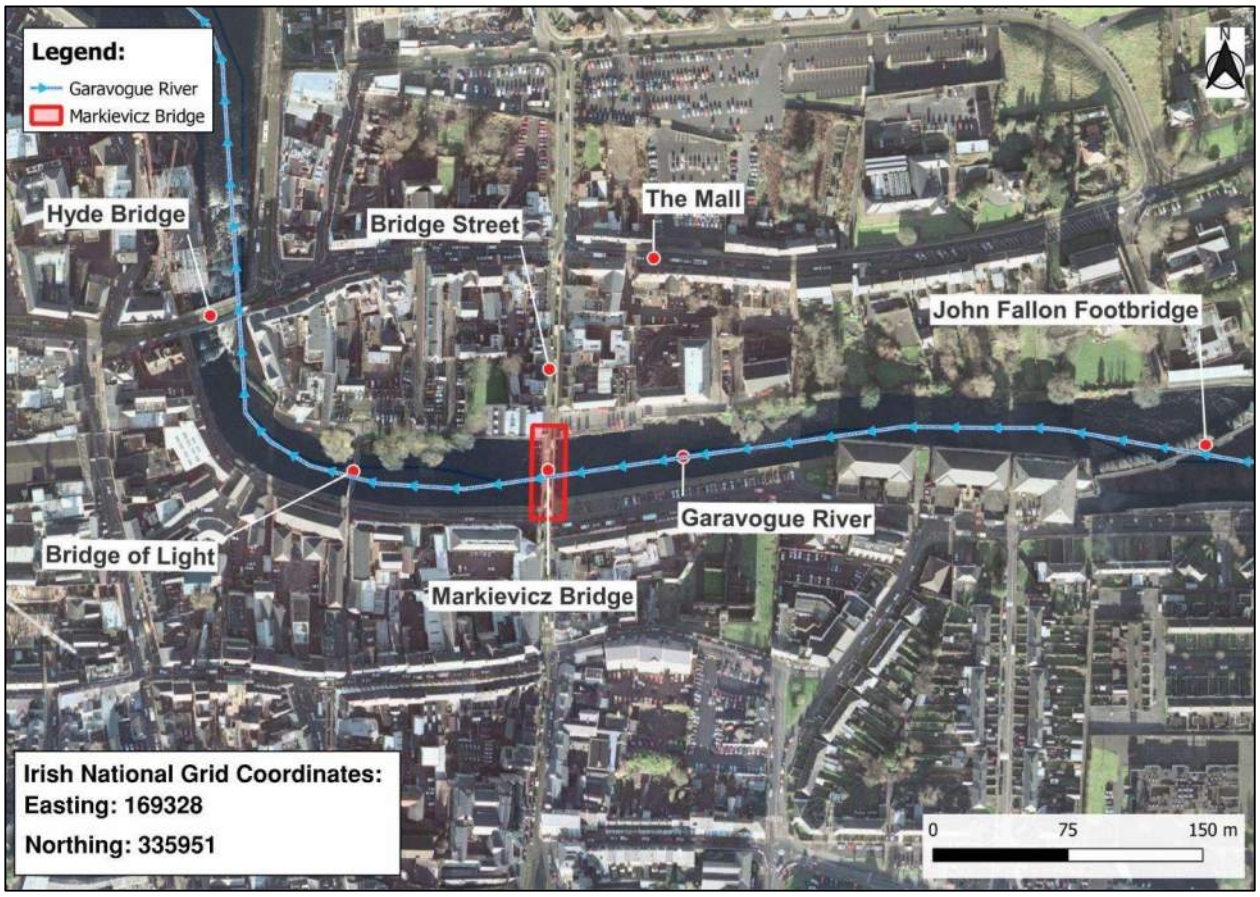


Figure 1-1: Bridge Location

1.2 Bridge Description

The National Inventory of Architectural Heritage provides the following description of Markievicz Bridge:

> "Seven-arch bridge over river, built 1673. Repointed coursed rubble limestone walls centred on triangular cutwaters to piers to upriver (east) elevation on mass concrete bases having rendered pyramidal capping with margined tooled cut-limestone coping to benchmark-inscribed parapets. Series of seven segmental arches with margined tooled limestone ashlar block-and-start voussoirs (east) or rough hewn limestone voussoirs (west). Sited spanning Garvogue River."

The bridge carries two lanes of south bound traffic, as well as a pedestrian footpath on the west (downstream) side.

At the southernmost span (Span 7, refer to Phone 1-1 and Photo 1-2 below), a new raised height concrete base has been constructed such that the span will only allow passage of water in high water conditions.

The upstream side of the span has also been amended with the construction of a splayed wall with cast-in holes for water passage. This creates increased circulation space for pedestrians at bridge deck level and gives the appearance of a six span bridge on the upstream elevation.

A longitudinal construction joint in the arch barrels indicate the bridge was widened in the upstream direction. See upstream and downstream elevations in Photo 1-1 and Photo 1-2 below. See Appendix A for further images.

Photo 1-1: Markievicz Bridge upstream elevation

Photo 1-2: Markievicz Bridge downstream elevation

1.2.1 Bridge Structural Inspection

Punch Consulting Engineers carried out a structural inspection of the bridge in July 2021. The resulting Structural Inspection Report concluded that *Remediation of the riverbed damage (scour) is of the highest importance for this bridge. Minor localised masonry repointing as well as routine vegetation clearance are also recommended.*

A subsequent decision was made to expand the project scope to include full vegetation clearance, masonry cleaning and repointing of the entire bridge.

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 2.

2.2 Sligo County Development Plan 2024 – 2030

Policies relating to flood risk within the Sligo County Development Plan (SCDP) 2024-2030 are outlined in Chapter 32 (Flood Risk). The relevant excerpts of the CDP are as follows:

32.1.1 Flood Risk Management Guidelines

National policy in relation to flood management is set out in the document "The Planning System and Flood Risk Management- Guidelines for Planning Authorities" (DoECLG & OPW, 2009). The document sets out fundamental principles to guide regional authorities, local authorities, developers and their representatives when evaluating flood risk. These are:

1. *Avoidance of development in areas at risk of flooding by not permitting development in such areas unless fully justified and where capability exists to manage risk without impacting elsewhere;*
2. *Application of a sequential approach to flood risk management based on:*
    a. *Avoidance of development in areas of high/moderate flood risk;*
    b. *Reduction of flood risk through incorporation of less vulnerable uses;*
    c. *mitigation of flood risk in assessing suitability of locations for new development;*
3. *The incorporation of flood risk assessment into the process of making decisions on planning applications and planning appeals.*

32.1.2 Strategic Flood Risk Assessment (SFRA)

Section 32.1.2 of the SCDP outlines a Strategic Flood Risk Assessment (SFRA) which was prepared to accompany the SCDP. This SFRA states the following in relation to the preparation of an SSFRA:

Flood Risk Management Policies

– ***P-FRM-6****: Require development proposals, where appropriate, to be accompanied by a detailed flood risk assessment in accordance with the provisions of the DoEHLG and OPW's Planning System and Flood Risk Management Guidelines for Planning Authorities and to address flood risk management in the detailed design of development, as set out in Appendix B of the Guidelines. The following provisions shall apply:*

    A*. Extensions of existing uses or minor development within flood risk areas may be permitted, provided that they: – do not obstruct important flow paths; – do not introduce a number of people into flood risk areas; – do not entail the storage of hazardous substances; do not have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities; – do not increase the risk of flooding elsewhere.*

    B*. Applications for development within Flood Zones A or B and on lands subject to the mid-range future scenario floods extents, as published by the Office of Public Works, shall be subject to site-specific flood risk assessment and shall provide details of structural and non-structural flood risk management measures, such as those relating to floor levels, internal layout, flood-resistant construction, flood-resilient construction, emergency response planning and access and egress during flood events (for more detail refer to Chapter 33 "Development Management Standards" subsection 33.2.6 "Flood risk assessment"). Site-specific flood risk assessments shall consider climate change impacts and adaptation measures, shall apply the precautionary approach recommended in the Guidelines, and shall be informed by the advice on the expected impacts of climate change and the allowances to be provided for future flood risk management (refer to the OPW's 2019 Flood Risk Management Climate Change Sectoral Adaptation Plan and the guidance on potential future scenarios contained therein).*

    C*. Where a 'Justification Test' applies, it must be demonstrated to the satisfaction of the Planning Authority that the flood risk can be adequately managed, and that the use and the development of the lands will not cause unacceptable impacts elsewhere.*

***D**. In Flood Zone C, where the probability of flooding is low (less than 0.1%), site-specific flood risk assessment may be required, and the developers should satisfy themselves that the probability of flooding is appropriate to the development being proposed. Prospective applicants shall consult the SFRA datasets accompanying this Development Plan and the most up-to-date Catchment Flood Risk Assessment and Management (CFRAM) Programme climate scenario mapping. Applications for development on sites identified as "'benefitting lands' may be prone to flooding, and site-specific flood risk assessments may be required in these areas.*

***E**. Groundwater and pluvial flood risks shall be considered by any site-specific flood risk assessment undertaken at project level, in compliance with the Planning Systems and Flood Risk Management Guidelines (DEHLG, 2009). Note: For the avoidance of doubt, the OPW's Preliminary Flood Risk Assessment indicative pluvial maps (2012) are NOT considered to be reliable for assessing pluvial risk.*

3 Flood Risk Identification

3.1 Overview of the Catchment

The Flood Studies Update (FSU) was reviewed to determine the watershed catchment area of the River Garavogue at Markievicz Bridge. An FSU node approximately 175m downstream of the bridge, with a node ID of 35_4183_7, was chosen to assist in the delineation of the boundary. The catchment area at this node is 369.27 km^2 and is shown in Figure 3-1 below.

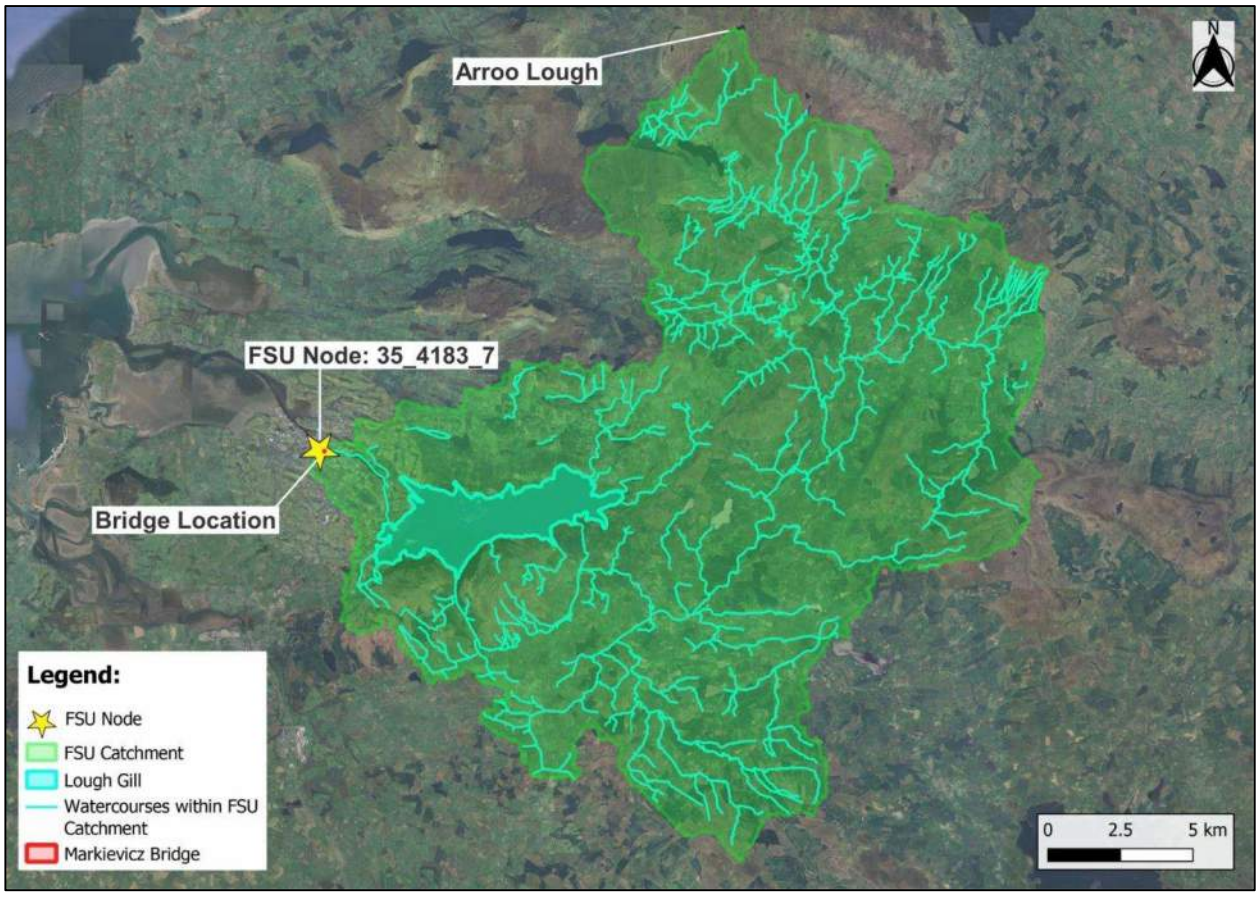


Figure 3-1: Catchment Boundary

The highest point of the catchment is approximately 470m AOD at Arroo Lough, located 45km upstream of the node in Co. Leitrim. Lough Gill fall within the catchment and has a surface area of approximately 14km^2 or 4% of the total watershed area. The landscape is mountainous and predominantly in agricultural use with the urban centre of Sligo Town located at the downstream extent.

3.2 Topographic and Bathymetric Survey

Topographic and bathymetric surveys of Markievicz Bridge and the Garavogue Riverbed were undertaken by Hughes Hydro and Topographic Surveys in June 2023. The topographic data collected includes the bridge deck, portions of the northern and southern quay walls, the upstream and downstream faces of the bridge and 8 no. river cross-sections. The bathymetric survey recorded levels over a 30m stretch of the riverbed in the vicinity of Markievicz Bridge.

The survey extents are shown in Figure 3-2 and Figure 3-3. The topographic survey data is included in Appendix B of this report.

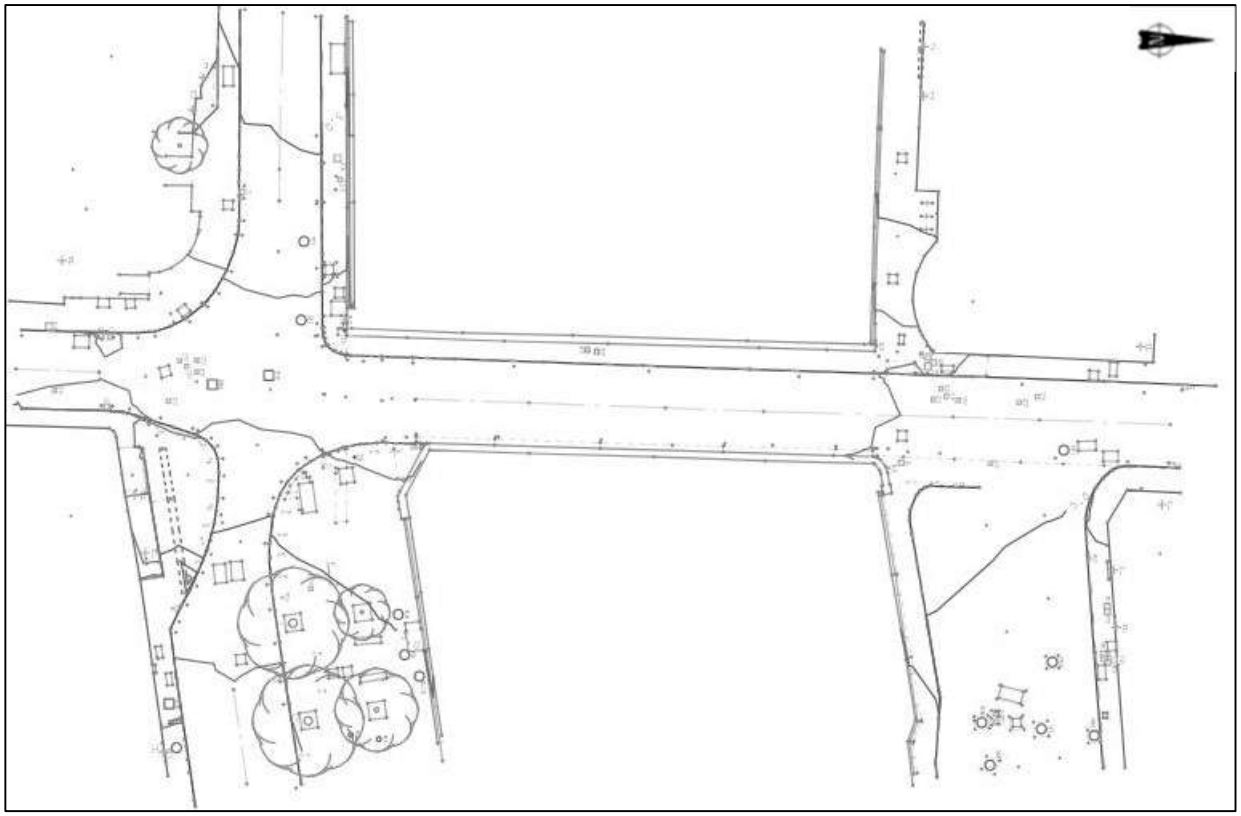


Figure 3-2: Topographic Survey Extent (Bridge Deck)

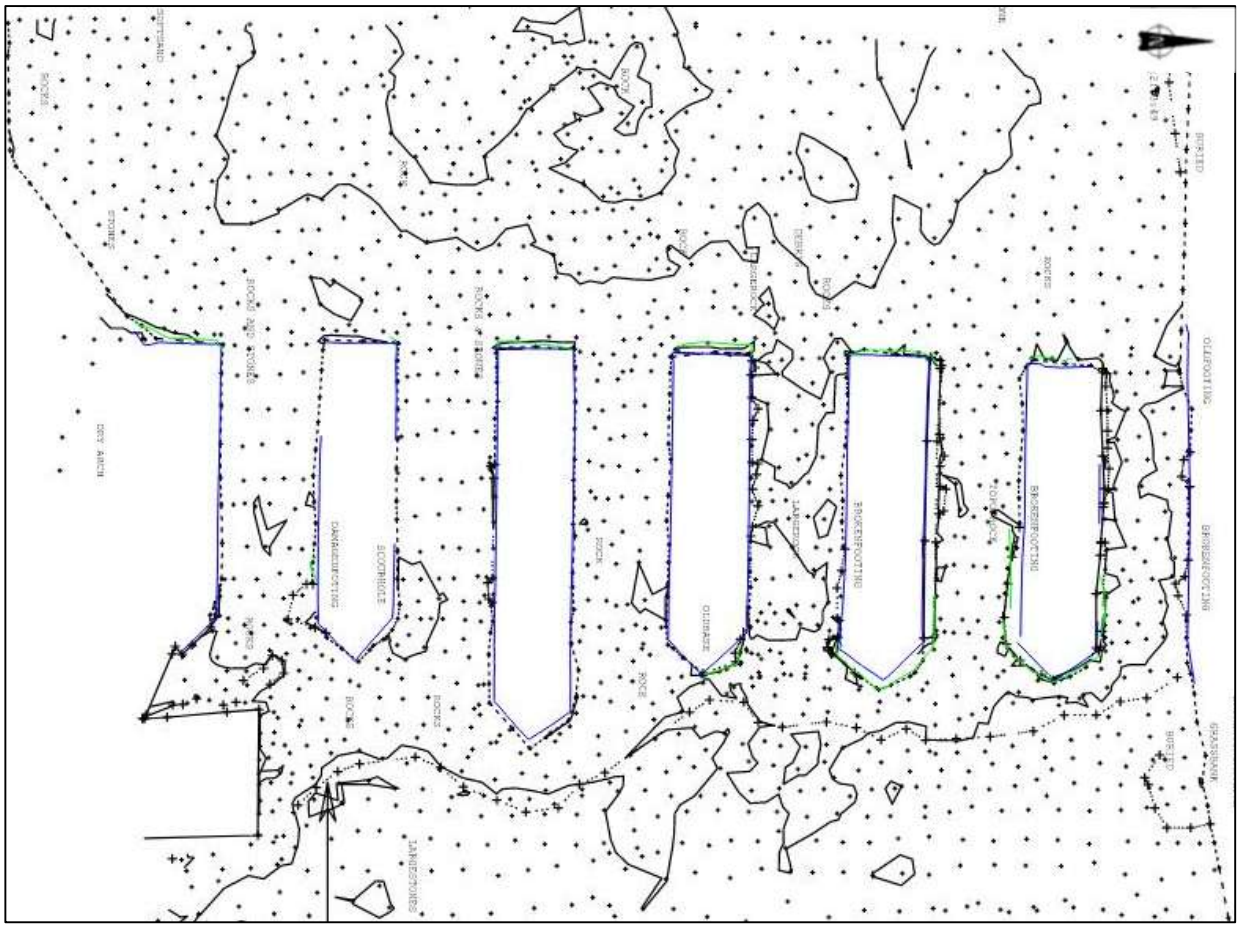


Figure 3-3: Bathymetric Survey Extent

3.3 Catchment Geology

The geology of the catchment was reviewed using data from the Geological Survey of Ireland (available at www.gsi.ie). The quaternary sediments or soil types within the catchment were identified as a mixture of TNSSs (Till derived from namurian sandstones and shales), Rck (Bedrock outcrop or subcrop), KaRck (Kartsified bedrock outcrop or subcrop), Scree, TLs (Till derived from limestones), TMp (Till derived from metamorphic rocks), BktPt (Blanket Peat) and Cut (Cut over raised peat), with small pockets of A (Alluvium), TCh (Till derived from cherts), GLs (Gravels derived from limestones), Fill (Made ground) and Urban. The full catchment geology is presented below in Figure 3-4.

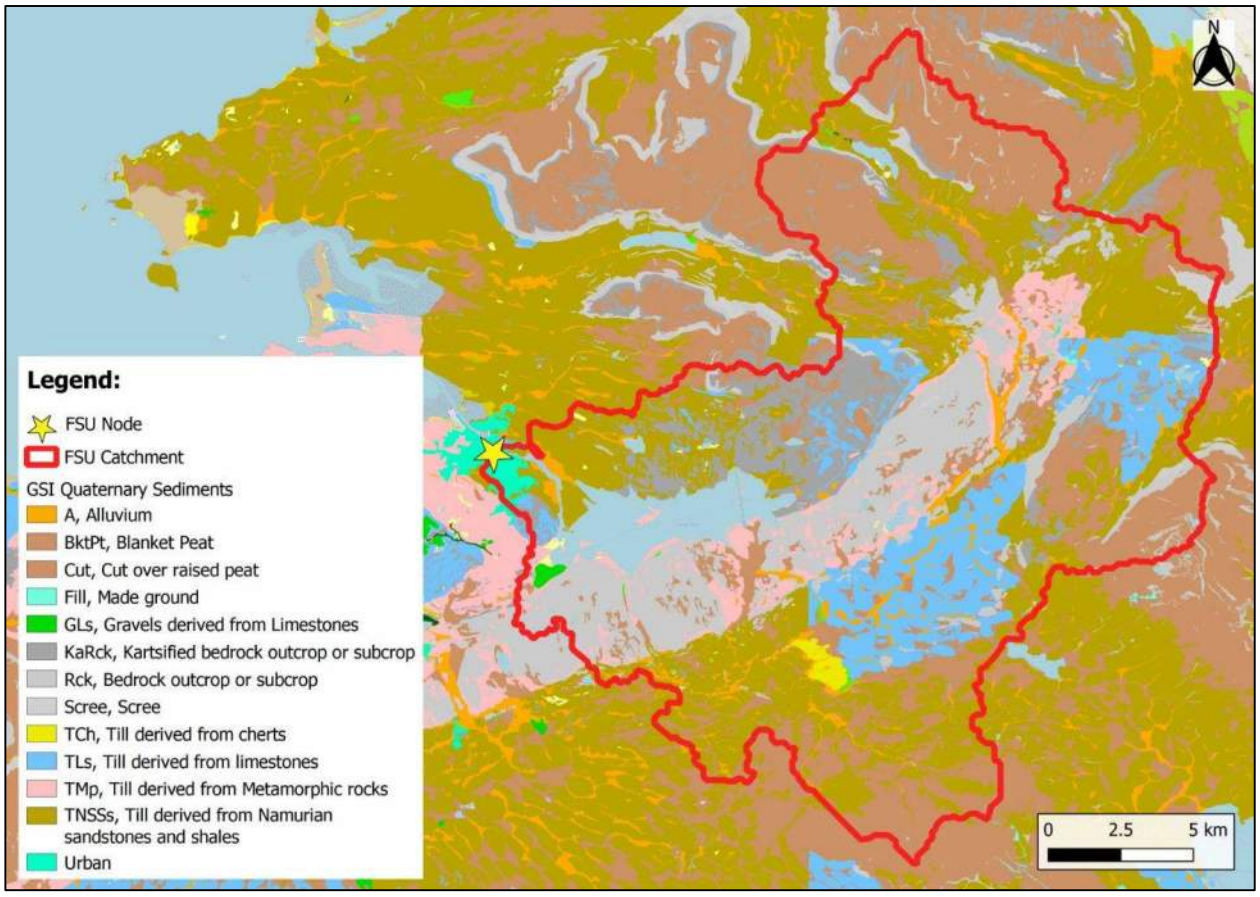


Figure 3-4: Catchment Geology

3.4 History of Flooding

The OPW Flood Hazard Mapping website holds a record of historic flood events. A review of this database indicated that there have been no reported incidences of flooding at Markievicz Bridge as shown in Figure 3-5. Please refer to Appendix C for the full OPW record of flooding in the vicinity of the bridge site.

It is acknowledged that this is not a guaranteed complete record of all flood events in the area.

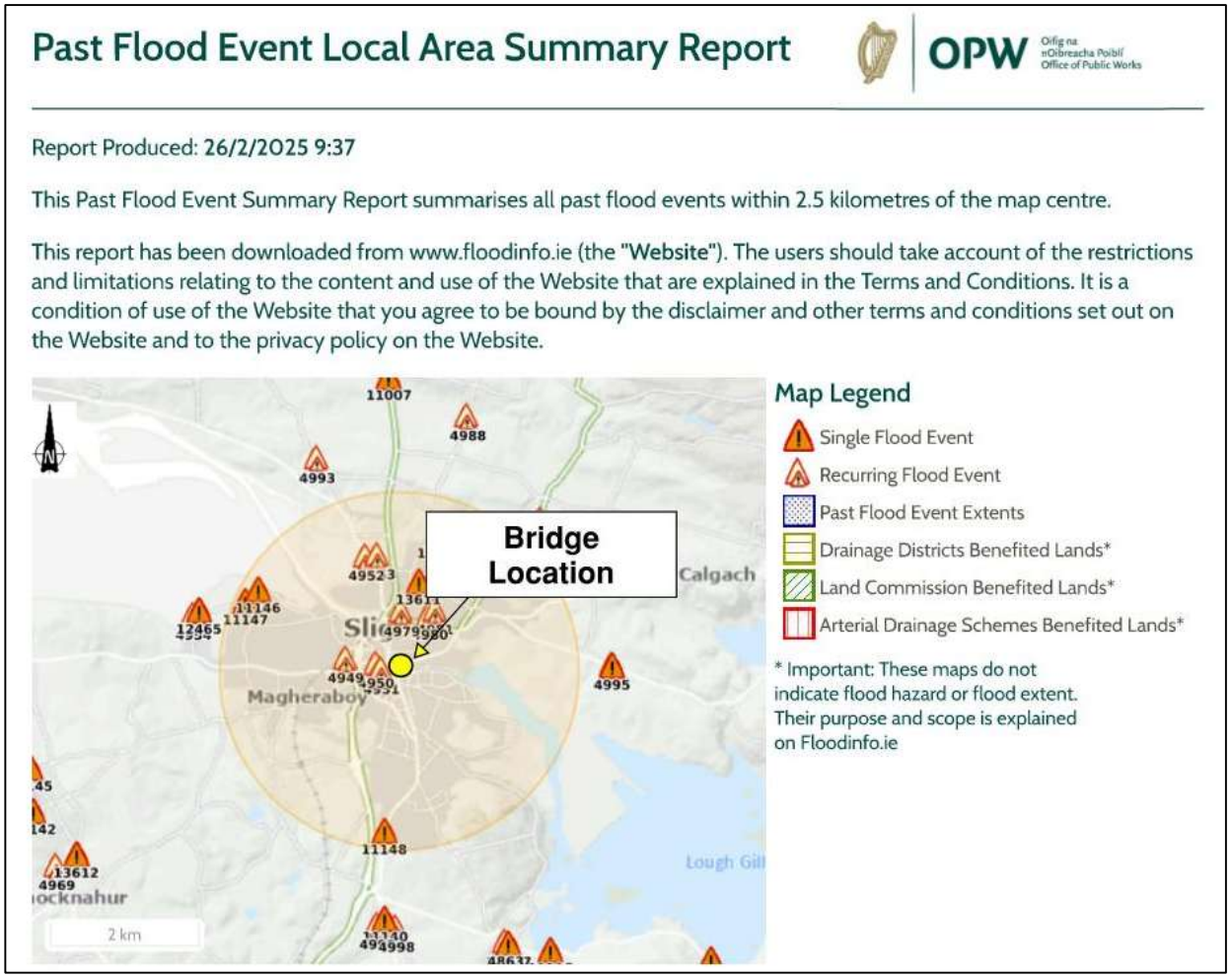


Figure 3-5: OPW Flood Past Flood Event Mapping

3.5 Review of Historic Mapping

A review of the OSI Historical maps[1] was carried out and Figure 3-6 below shows an extract from the 25-inch historic map for the site created between 1888 and 1913.

[1] Maps available: http://map.geohive.ie/mapviewer.html

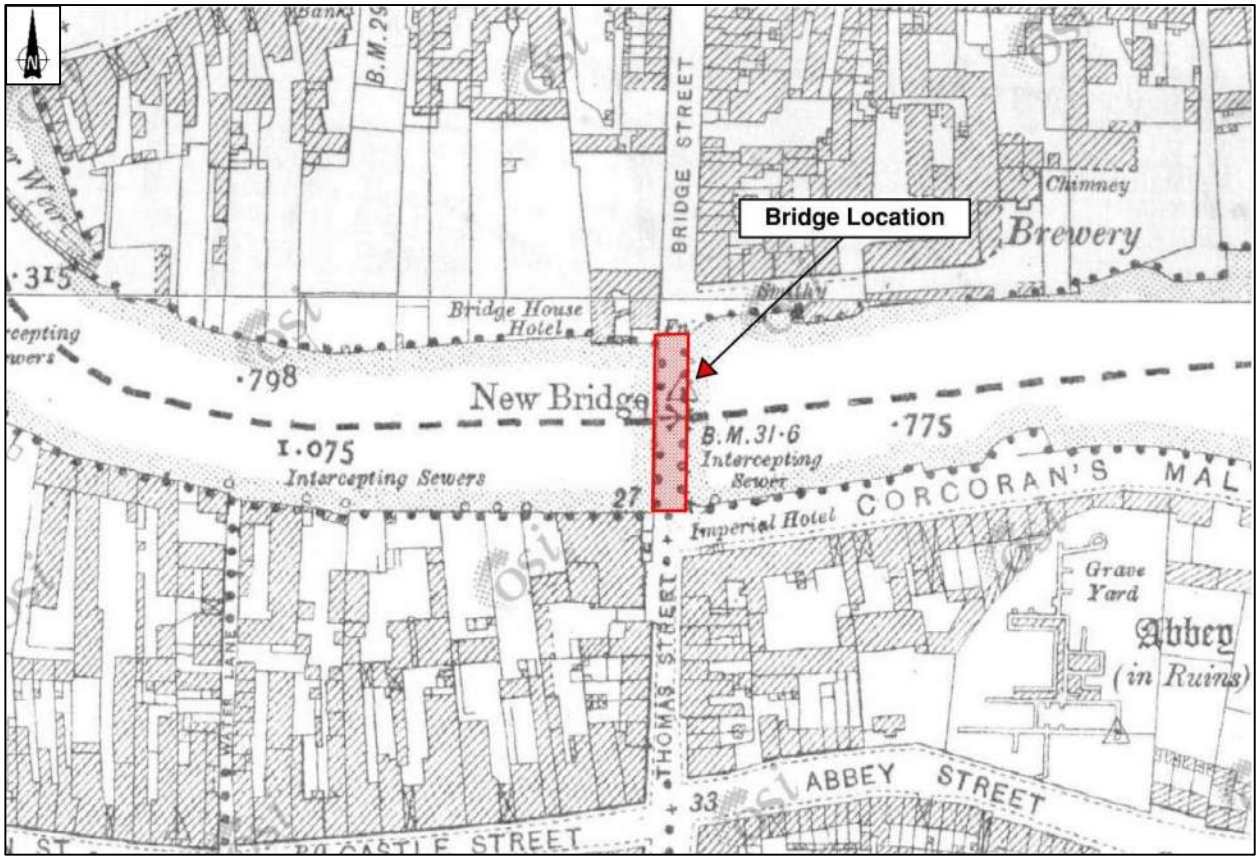


Figure 3-6: Extract from OSI historical 25-inch map

3.6 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, does not indicate a groundwater flood risk in the vicinity of Markievicz Bridge.

3.7 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.

3.7.1 Review of Existing Drainage Infrastructure

A review of the drainage network in the area was undertaken based on the Irish Water GIS database. Figure 3-7 below is an extract from the Web Map Service for Irish Water's existing drainage records. The drawing indicates:

- A 900mm concrete stormwater sewer flowing northwards along Thomas Street and discharging into the Garavogue upstream of Markievicz Bridge.
- A 300mm cast iron combined sewer traverses the Garavogue River and then travels westwards along the quay wall at Rockwood Parade.

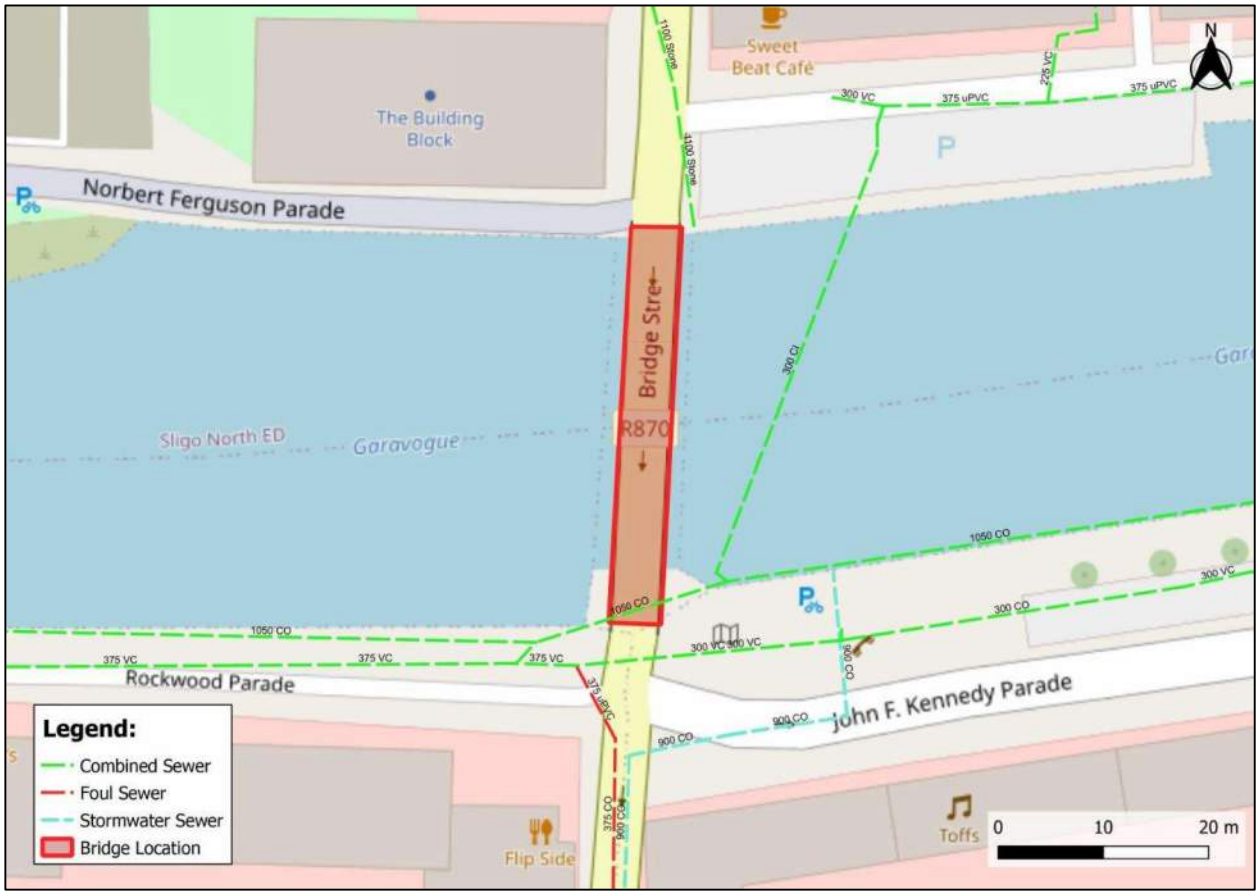


Figure 3-7: Existing Drainage Network

3.8 Fluvial Flooding

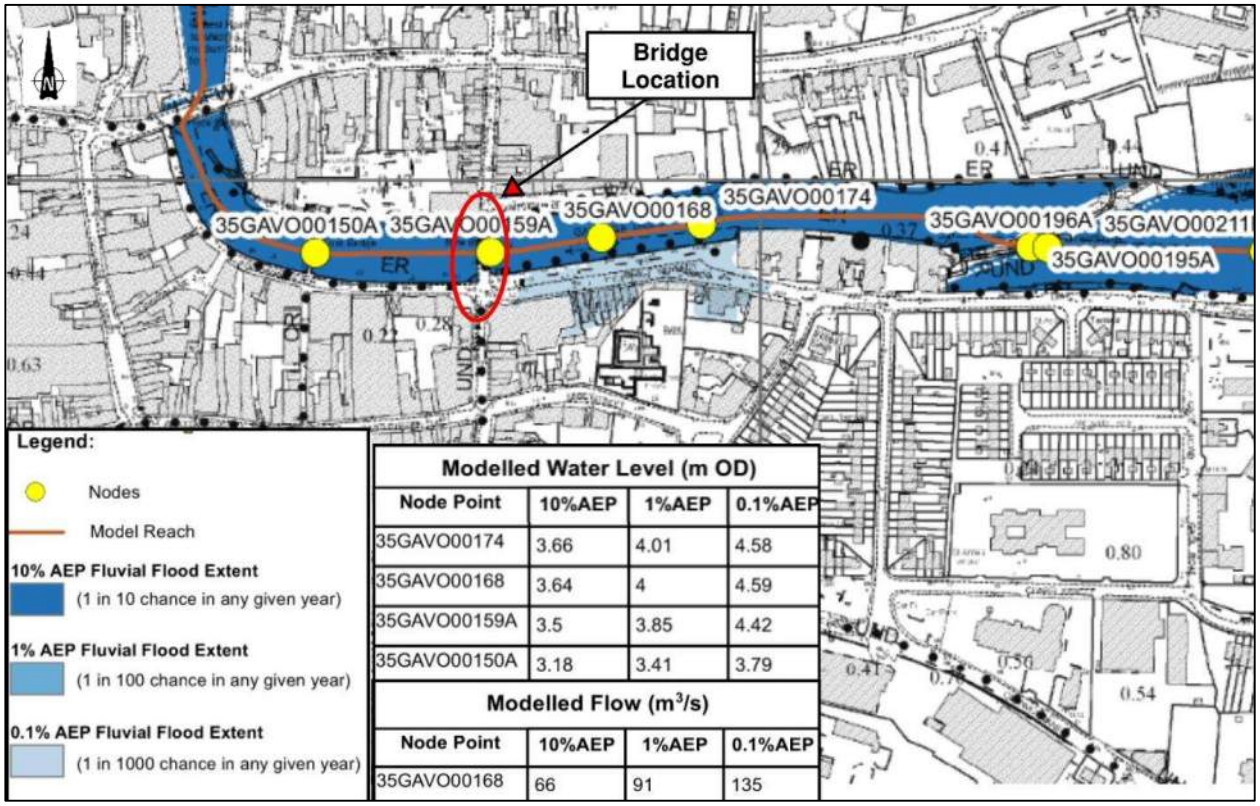
Fluvial flooding is the result of a river exceeding its capacity and excess water spilling out onto the adjacent floodplain.

3.8.1 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 bridge is located in an area which has been assessed as part of the Sligo Bay and Drowse CFRAM Study (UoM 35). The OPW has published detailed flood hazard mapping for this area which is available online for public viewing. 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 River Garavogue.

Figure 3-8 below is an extract from the Sligo CFRAMS fluvial flood map in the vicinity of Markievicz Bridge. Full CFRAMS mapping for the area is presented in Appendix D



Modelled Water Level (m OD)

Node Point	10%AEP	1%AEP	0.1%AEP
35GAVO00174	3.66	4.01	4.58
35GAVO00168	3.64	4	4.59
35GAVO00159A	3.5	3.85	4.42
35GAVO00150A	3.18	3.41	3.79

Modelled Flow (m^3/s)

Node Point	10%AEP	1%AEP	0.1%AEP
35GAVO00168	66	91	135

Figure 3-8: Extract from CFRAMS Fluvial Flood Map

As can be seen from the map above, the River Garavogue is contained within the river banks for the 10%, 1% and 0.1% AEP fluvial events at Markievicz Bridge. There is some out of banks flooding shown on the adjacent John F Kennedy Parade in the 0.1% AEP fluvial event.

The CFRAMS flood levels at Markievicz Bridge are shown in Table 3-1 below.

Table 3-1: CFRAMS Flood Levels

Node	10% AEP	1% AEP	0.1% AEP
35GAVO00156A	3.5 mAOD	3.85 mAOD	4.42 mAOD

The CFRAMS fluvial flood extent mapping provides modelled flows in the River Garavogue at a node adjacent to Markievicz Bridge. These flows are presented in Table 3-2 below:

Table 3-2: CFRAMS Maximum Flows

Node	10% AEP	1% AEP	0.1% AEP
35GAVO00168	66 m^3/s	91 m^3/s	135 m^3/s

3.9 Coastal Flooding

Coastal flooding is the result of sea levels that are higher than normal and result in sea water overflowing onto the land during high tides or storm surges.

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

Figure 3-9 below is an extract from the relevant Sligo Bay and Drowse CFRAMS coastal flood extent map and Figure 3-9 presents the modelled flood level from the adjacent CFRAMS node.

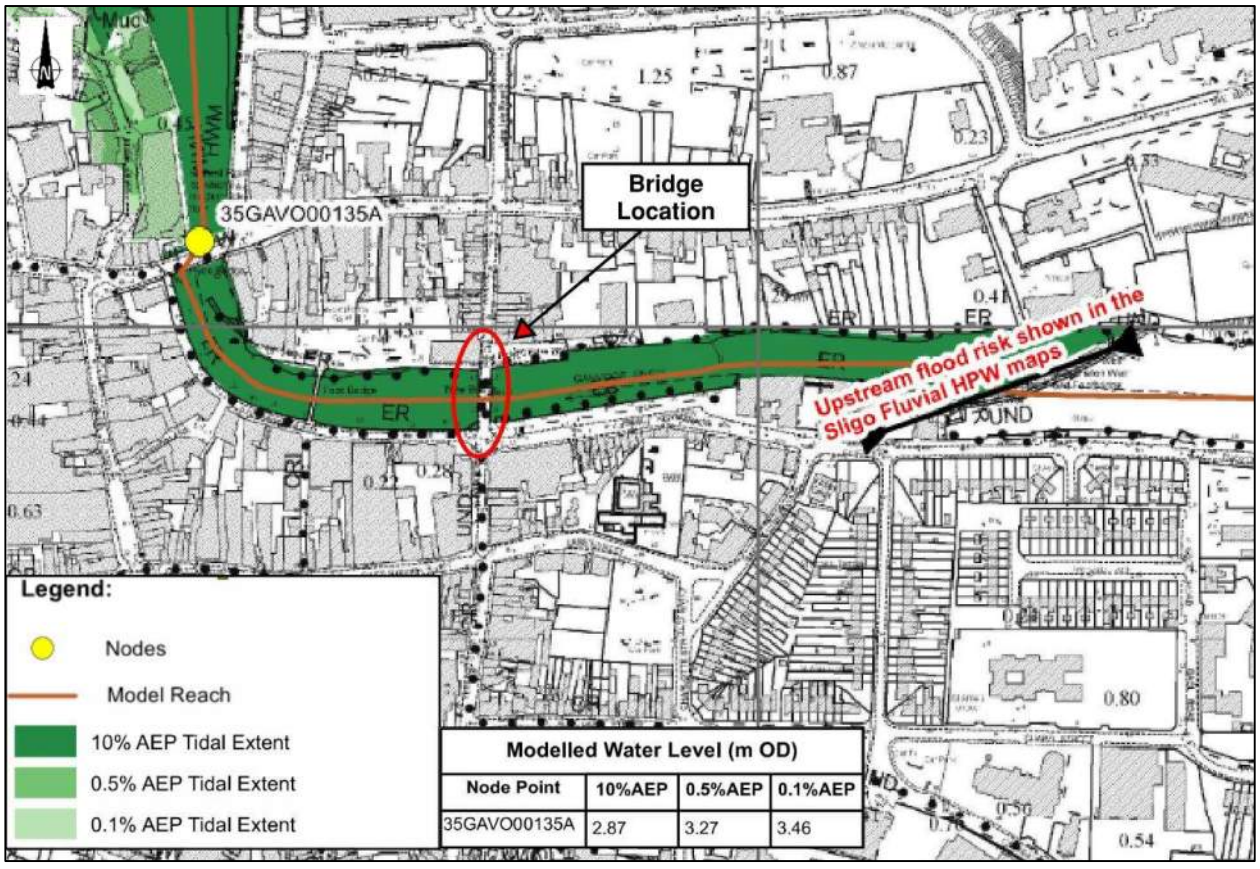


Figure 3-9: Extract from CFRAMS Coastal Flood Extent Mapping

As shown in Figure 3-9 above, coastal flood waters from the 10%, 0.5% and 0.1% AEP events are contained within the riverbanks at Markievicz Bridge.

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

NODE	10%AEP	0.5%AEP	0.1%AEP
35GAVO00135A	2.87 mAOD	3.27 mAOD	3.46 mAOD

3.9.2 National Coastal Flood Hazard Mapping

The OPW published the National Coastal Flood Hazard Mapping (NCFHM) in 2021 and they are now publicly available on https://www.floodinfo.ie/map/coastal_map/. The NCFHM project produced updated national scale coastal flood extent and depth maps. These maps are 'predictive' flood maps showing indicative areas predicted to be inundated during a theoretical flood event with an estimated probability of occurrence. These flood maps do not take account of any existing flood defences or climate change.

Current Scenario NCFHM flood extents in the vicinity of Markievicz Bridge Figure 3-10. The figure shows small pockets of flooding adjacent to the bridge during the 0.5% and 0.1% AEP events.

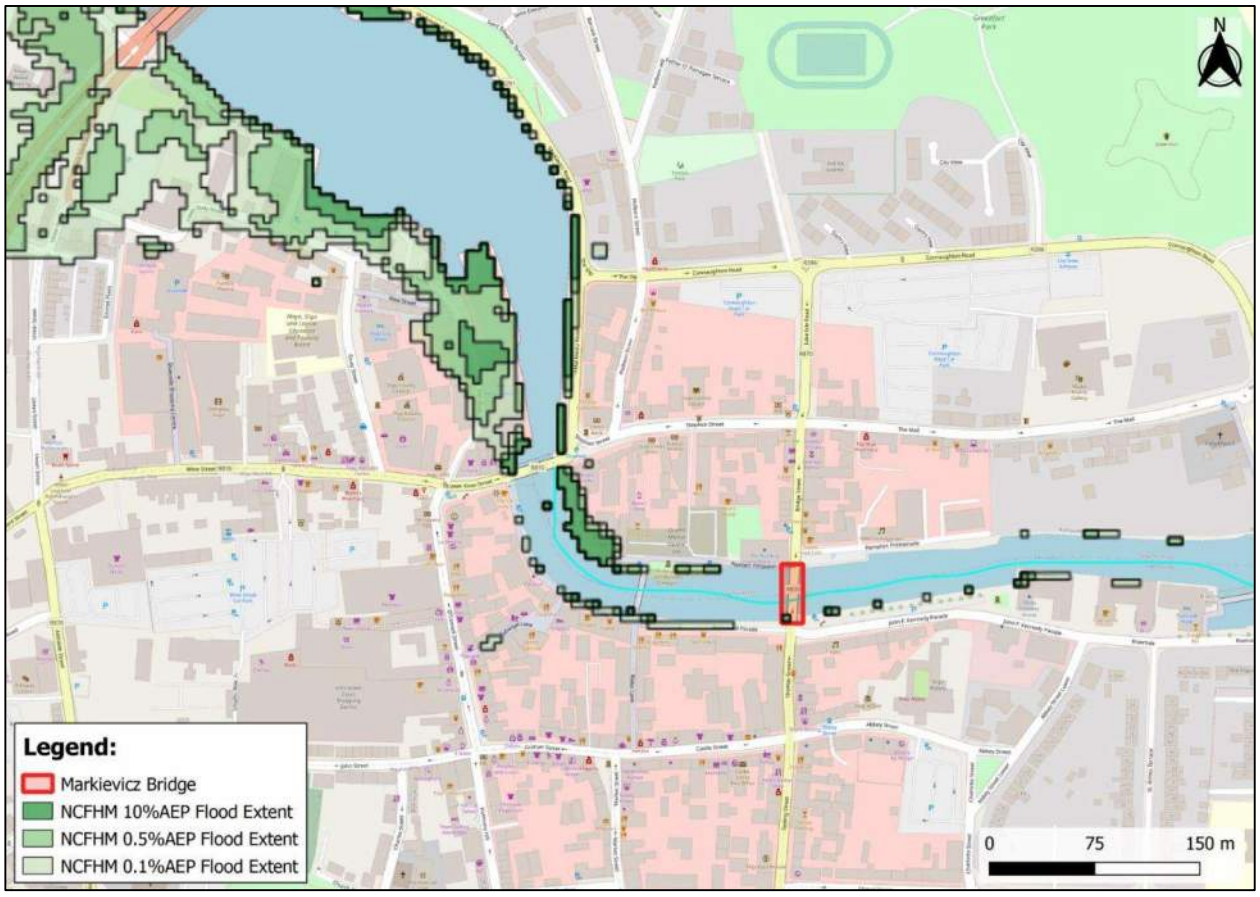


Figure 3-10: NCFMH Flood Extents – Current Scenario

3.10 Existing Flood Defences

There are no formal flood defences identified on the CFRAMS fluvial or coastal extent mapping. However, it has been noted from site visits that the River Garavogue is canalised through Sligo Town Centre between stone and reinforced concrete quay walls.

3.11 Sligo CDP Strategic Flood Risk Assessment

A review of the SCDP 2024-2030 was carried out with regards to flood risk. A Strategic Flood Risk Assessment (SFRA), prepared as part of the SCDP, includes Flood Zone mapping for the area and highlights some areas of flood risk concern associated with the River Garavogue. Figure 3-11 below is an extract from the SFRA Indictive Flood Zone Map for Silgo Town.

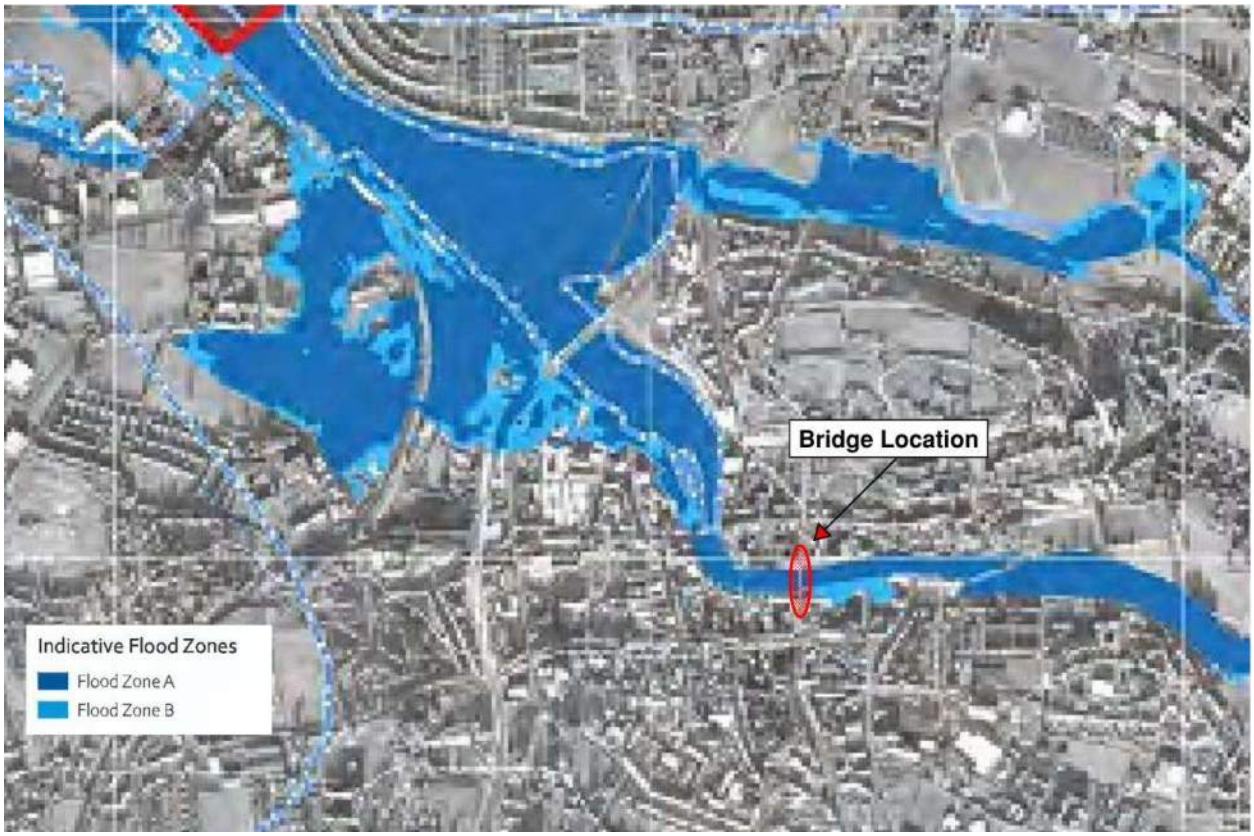


Figure 3-11: Extract from Sligo CDP 2024-2030 SFRA Flood Zone Map for Sligo Town

3.12 Estimate of Flood Zone

PUNCH Consulting Engineers has reviewed the available information as outlined in the above sections and concluded that the site is bridge arches are located in Flood Zone A and is therefore at high risk of flooding. It is also noted that the bridge deck is located in Flood Zone C.

4 Flood Risk Assessment

4.1 Sources of Flooding

When carrying out a Flood Risk Assessment, one should consider all potential risk and sources of flood water at the site. In general, the relevant flood sources are:

Fluvial Flooding

Fluvial flooding is the result of a river exceeding its capacity and excess water spilling out onto the adjacent floodplain. The proposed site is located approximately on the Garavogue River. From a review of the available information, it is considered that the site is at risk of fluvial flooding.

Coastal Flooding

Coastal flooding is the result of sea levels which are higher than normal and result in sea water overflowing onto the land during high tides or storm surges. The site is located within a tidal section of the Garavogue River. From a review of the available information, it is considered that the site is not at risk of coastal flooding.

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. Due to the nature of the proposed works within the river channel, pluvial flooding is not considered a risk.

Groundwater Flooding

Groundwater flooding occurs when the level of the water stored in the ground rises as a result of prolonged rainfall. From a review of the available information, a groundwater flood risk has not been identified at the site.

4.2 Site Vulnerability

The proposed development is a bridge, which is classified as “Water-compatible Development”. 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.

Table 4-1: 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 Flood Zone A and water-compatible in nature a Justification Test is not required.

5 Conclusions

Sligo County Council (SCC) proposes to carry out bridge rehabilitation works on Markievicz Bridge in Sligo Town, Co. Sligo. PUNCH Consulting Engineers (PUNCH) have been engaged by SCC to assess and design repair works to the bridge piers and riverbed.

The assessment is carried out in full compliance with the requirements of "The Planning System & Flood Risk Management – Guidelines for Planning Authorities" published by the Office of Public Works (OPW) and the Sligo CDP 2024-2030.

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

Flood Maps produced as part of the CFRAMS and the Sligo CDP SFRA were consulted to establish the Flood Zone. It was determined that the bridge arches are currently located in Flood Zone A for fluvial and coastal flooding. The bridge deck is located in Flood Zone C.

As the bridge is classified as water-compatible development in accordance with the Planning System and Flood Risk Management Guidelines, a Justification Test is not required.

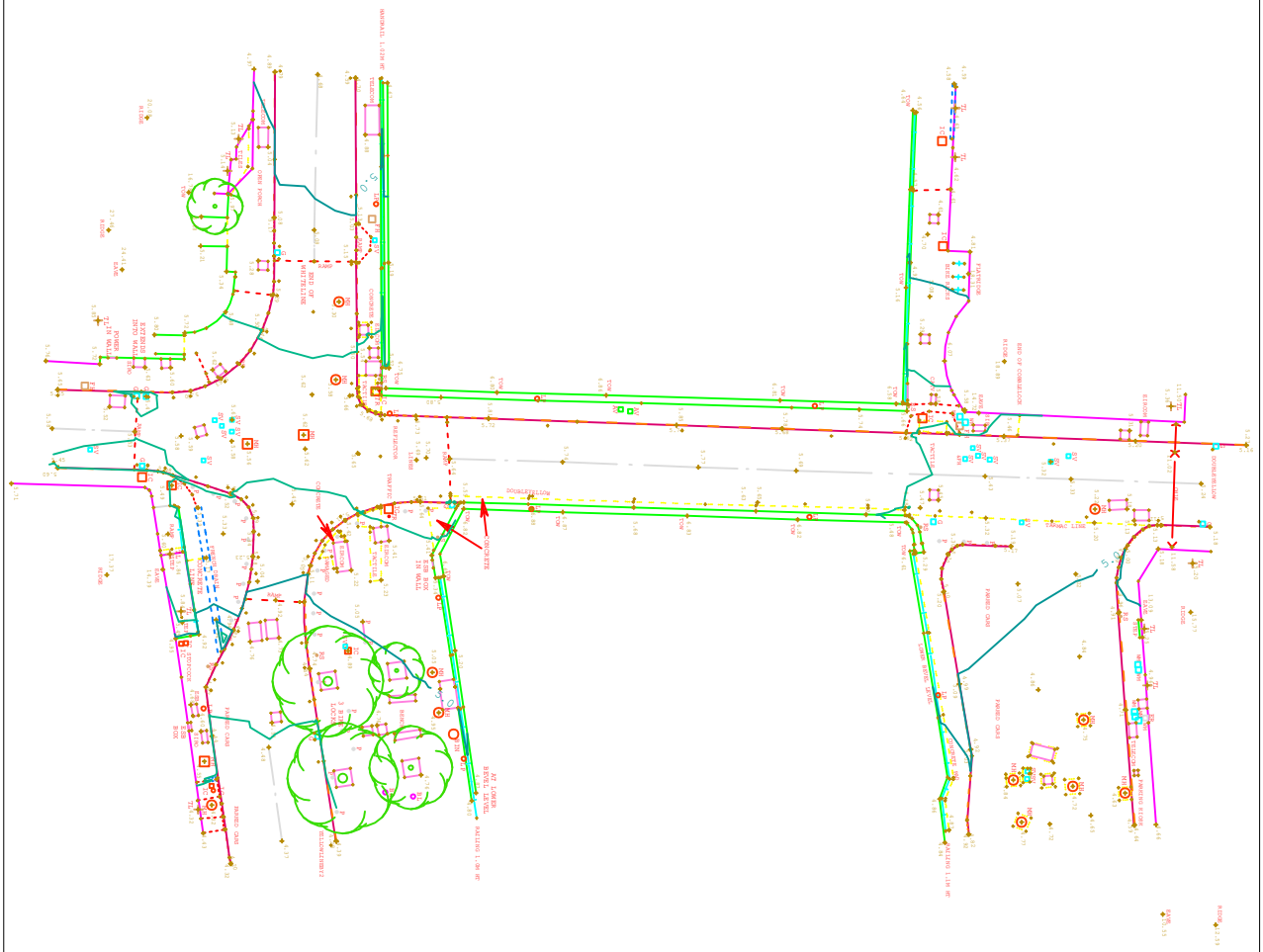
Appendix A Site Images

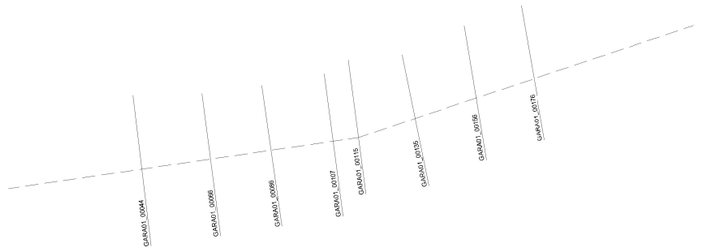
Image 1: Upstream Face of Existing Bridge. View from John F Kennedy Parade

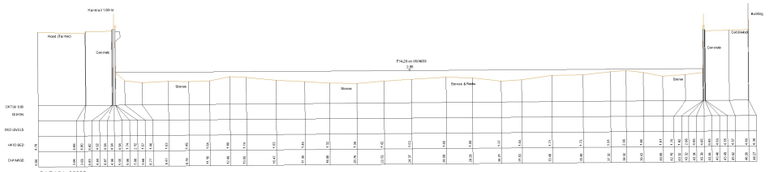
Image 2: Downstream Face of Existing Bridge. View from Norbert Ferguson Parade

Image 3: Downstream Face of Existing Bridge. View from Rockwood Parade

Appendix B Topographical Survey Data







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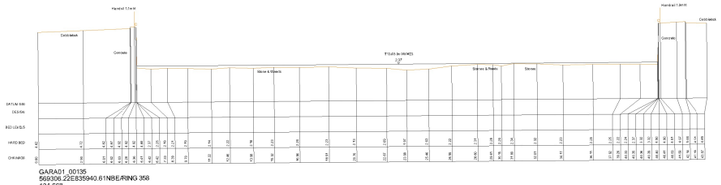

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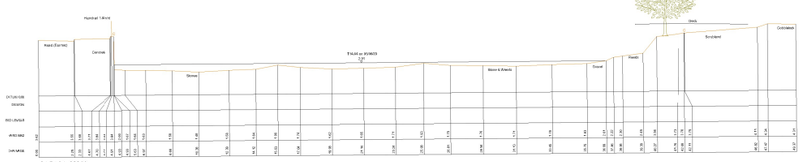

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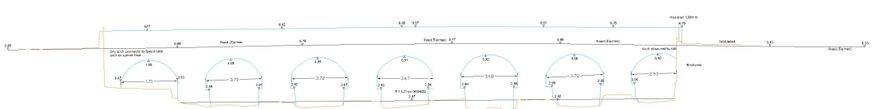
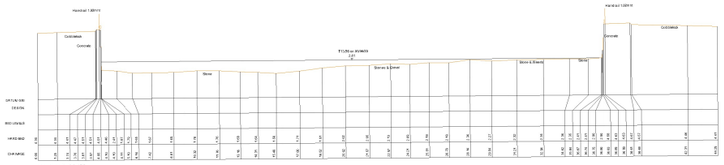
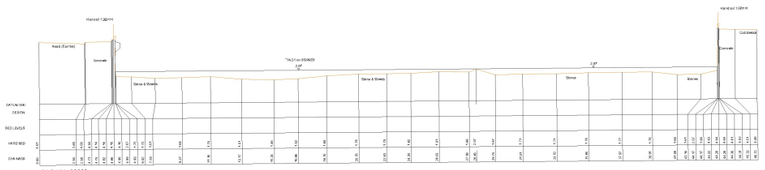




GARA01_00156
569326.17E835945.92NBEARING 360
155.784
74.454
Open Channel



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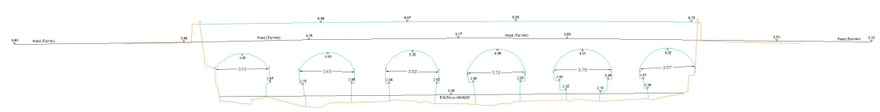
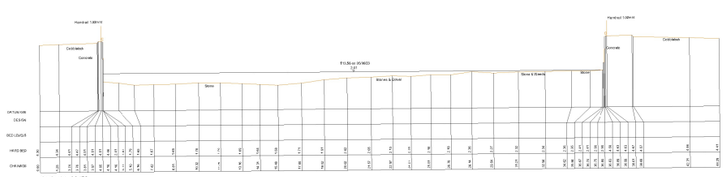
66.381
163.857
Open Channel





GARA01_00156
569326.17E835945.92NBEARING 360
155.784
74.454
Open Channel

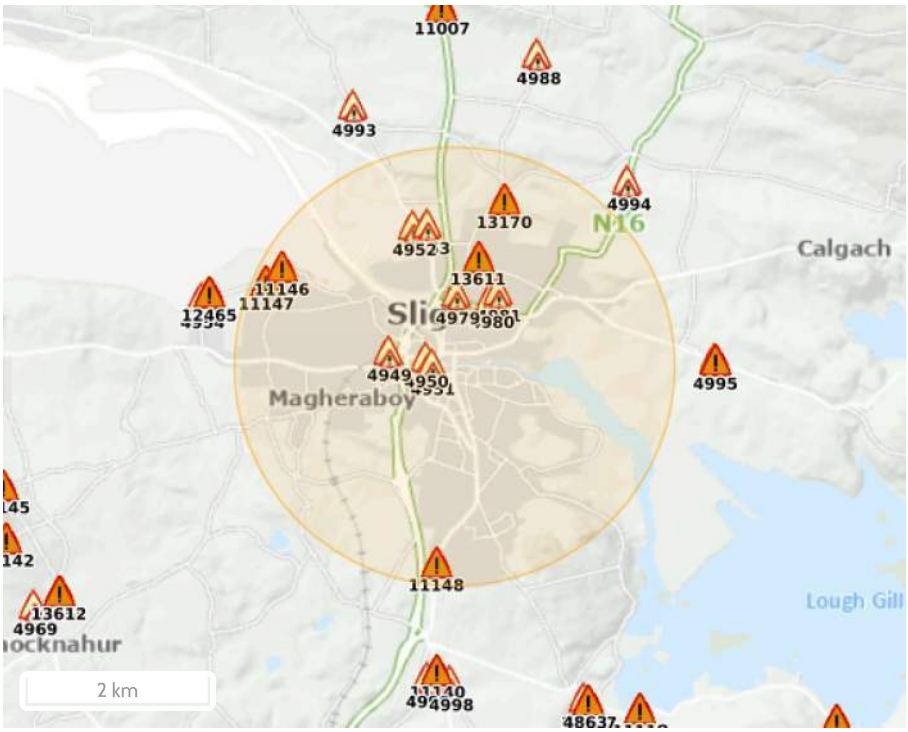
Appendix C OPW Historic Flood Events Record

Past Flood Event Local Area Summary Report

Report Produced: **26/2/2025 9:37**

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*

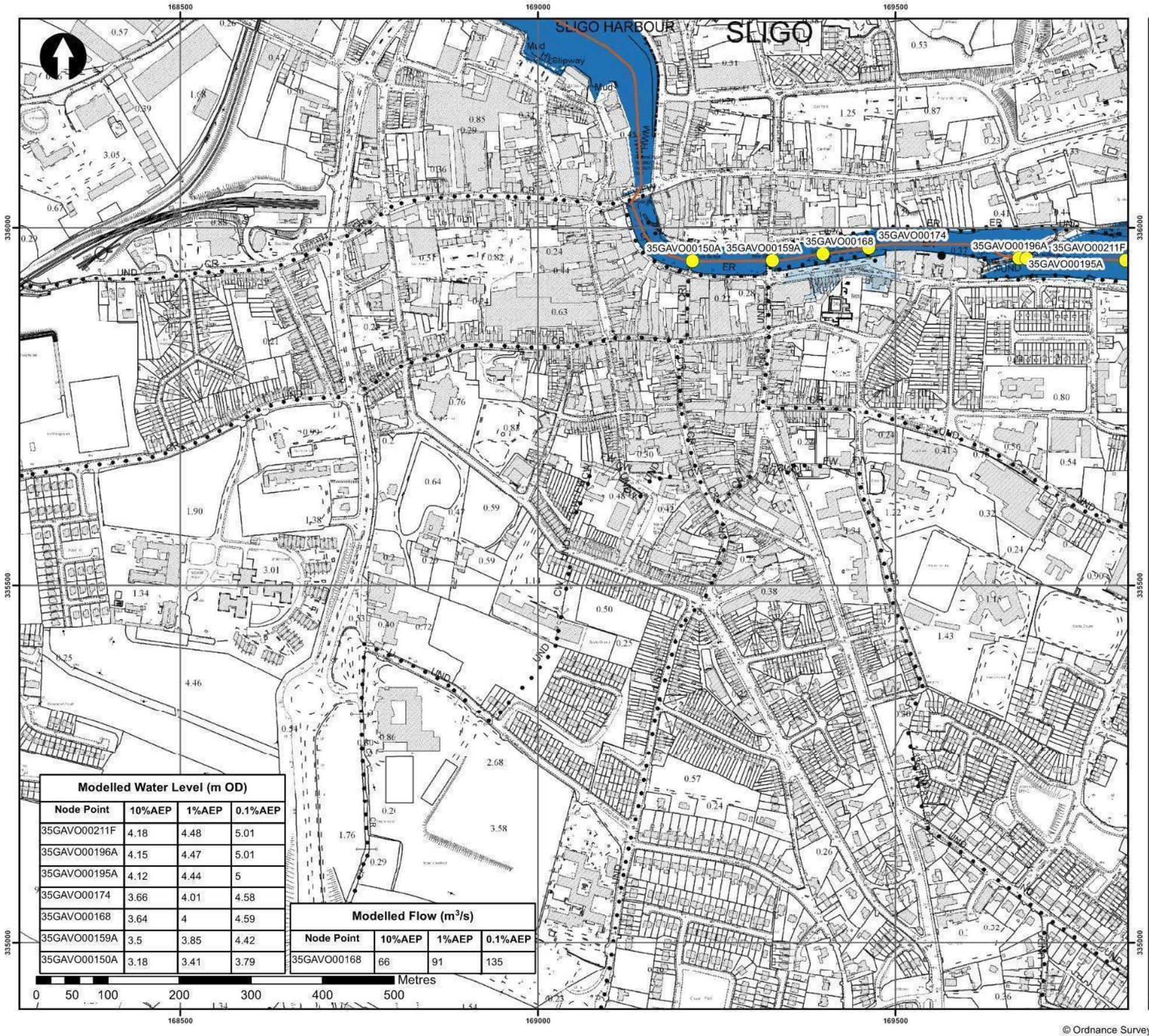
* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

13 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Flooding at Rathbraughan on 05/06/2015 (ID-13170)	05/06/2015	Approximate Point
	Additional Information: Reports (0) Press Archive (0)		
2.	Finisklin Road Recurring (ID-4949)	n/a	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
3.	Lower Quay Street Sligo Recurring (ID-4950)	n/a	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
4.	Fish Street Sligo Recurring (ID-4951)	n/a	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
5.	R291 Mardyke Sligo Recurring (ID-4952)	n/a	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
6.	Area between R291 and N15 Recurring (ID-4953)	n/a	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		

	Name (Flood_ID)	Start Date	Event Location
7.	Near Sligo Hospital Recurring (ID-4979) **Additional Information:** Reports (1) Press Archive (0)	n/a	Approximate Point
8.	Near Sligo Institute of Technology Recurring (ID-4980) **Additional Information:** Reports (1) Press Archive (0)	n/a	Approximate Point
9.	Sligo Institute of Technology Recurring (ID-4981) **Additional Information:** Reports (1) Press Archive (0)	n/a	Approximate Point
10.	Flooding at Finisklin, Strandhill, Sligo Co. Co. Nov 2009 (ID-11147) **Additional Information:** Reports (1) Press Archive (0)	18/11/2009	Approximate Point
11.	Flooding at Sligo on 20/01/2018 (ID-13611) **Additional Information:** Reports (0) Press Archive (0)	20/01/2018	Approximate Point
12.	Flooding at Finisklin (second location), Strandhill, Co. Sligo. Nov 2009 (ID-11146) **Additional Information:** Reports (1) Press Archive (0)	18/11/2009	Approximate Point
13.	Flooding at Carrowroe, Strandhill, Co. Sligo. Nov 2009 (ID-11148) **Additional Information:** Reports (1) Press Archive (0)	18/11/2009	Approximate Point

Appendix D CFRAMS Mapping

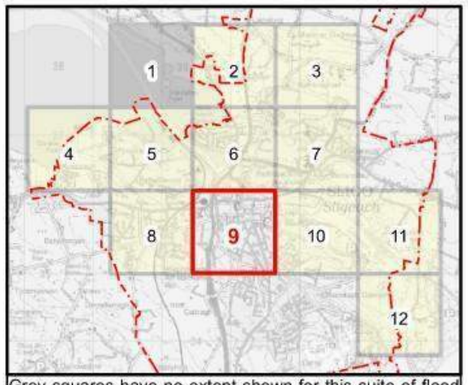


Modelled Water Level (m OD)

Node Point	10%AEP	1%AEP	0.1%AEP
35GAVO00211F	4.18	4.48	5.01
35GAVO00196A	4.15	4.47	5.01
35GAVO00195A	4.12	4.44	5
35GAVO00174	3.66	4.01	4.58
35GAVO00168	3.64	4	4.59
35GAVO00159A	3.5	3.85	4.42
35GAVO00150A	3.18	3.41	3.79

Modelled Flow (m^3/s)

Node Point	10%AEP	1%AEP	0.1%AEP
35GAVO00168	66	91	135



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 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.

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

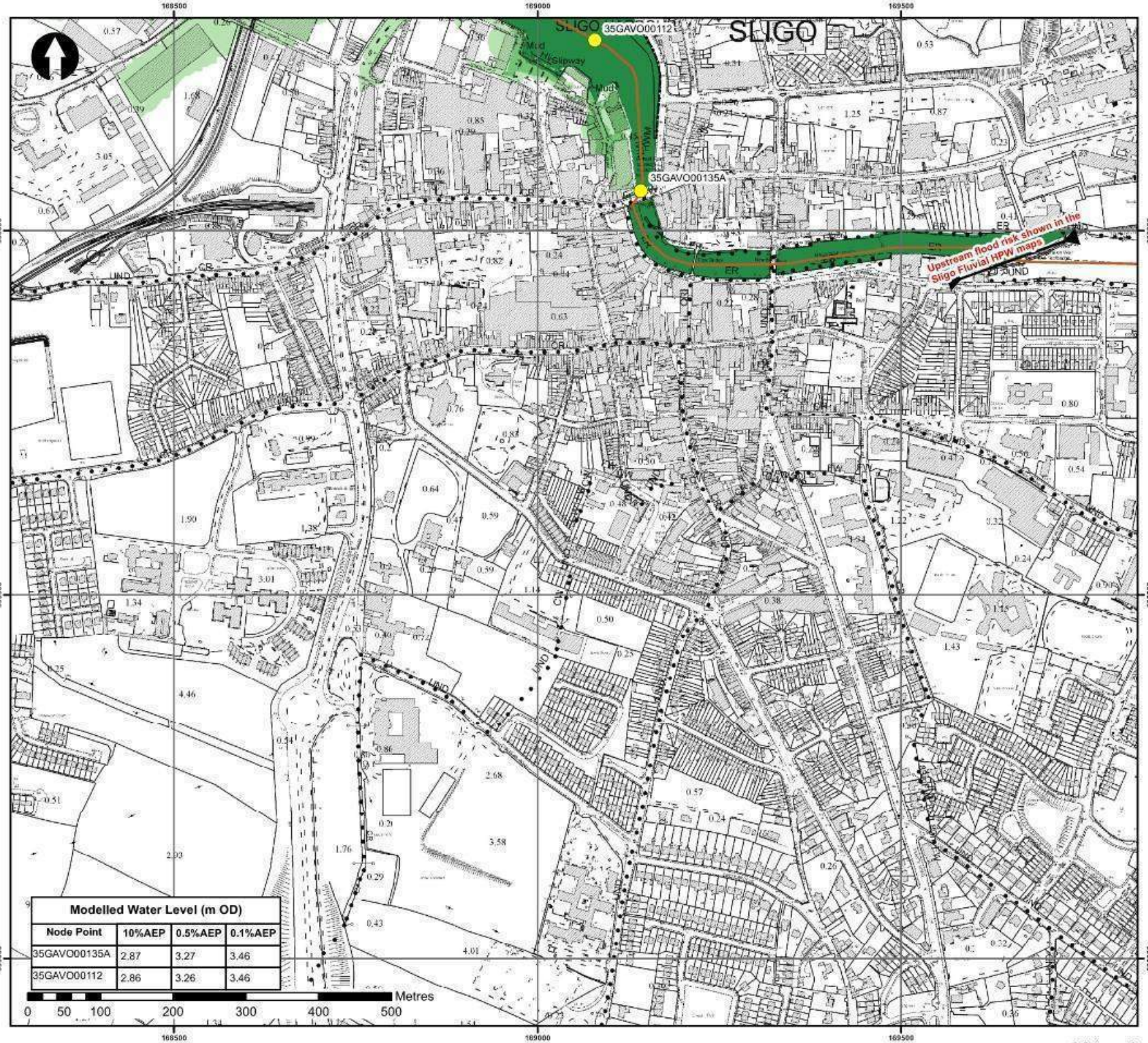
The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath

JBA consulting

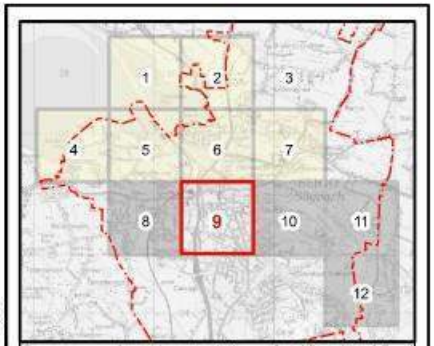
JBA Consulting
24 Grove Island
Corbally
Limerick, Ireland

WESTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

Map: Sligo and Environs Flood Extent			Final
Map Type: Flood Extent			
Map Area: HPW		Source: Fluvial	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: W35SLG_EXFCD_F3_09		**Sheet:** 9 of 12	



Modelled Water Level (m OD)			
Node Point	10%AEP	0.5%AEP	0.1%AEP
35GAVO00135A	2.87	3.27	3.46
35GAVO00112	2.86	3.26	3.46



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.

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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: Sligo and Environs 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: W3SSLG_EXCCD_F3_09		Sheet: 9 of 12	