



Comhairle Cathrach na Gaillimhe
Galway City Council

Wolfe Tone Pedestrian Bridge II



Stage 1 and 2 Flood Risk Assessment FEBRUARY 2022



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1. Introduction

Ryan Hanley have been commissioned by Galway City Council to prepare a Stage 1 and 2 Flood Risk Assessment report for the proposed development of a second pedestrian bridge over the River Corrib at the downstream face of Wolfetone Bridge, Galway City.

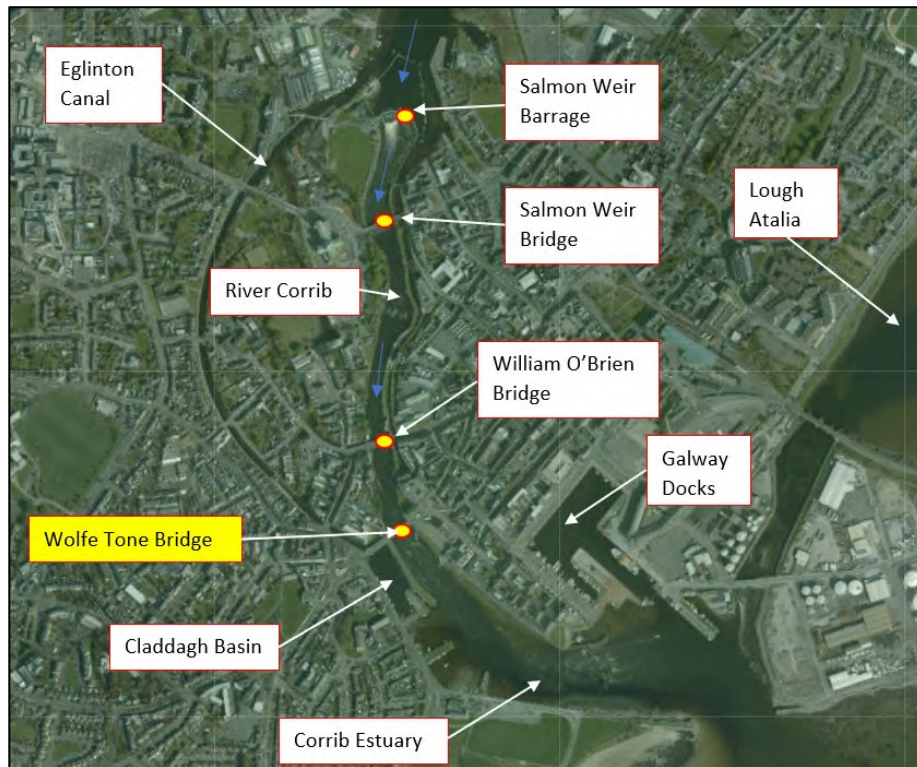


Figure 1-1: Location of Wolfetone Bridge at Galway City



Figure 1-2: Photomontage of Proposed Pedestrian Bridge II at Wolfe Tone Bridge

Under the Planning System and Flood Risk Management Guidelines for Planning Authorities (DoEHLG & OPW, 2009), any proposed development site must undergo a Flood Risk Assessment to ensure sustainable development and effective management of flood risk.

The scope of this site-specific FRA includes:

- A review of “The Planning System and Flood Risk Management Guidelines for Planning Authorities and Technical Appendices (November 2009)” (OPW / DoEHLG)
- A description of the existing site and proposed development sites and the baseline data used in this report.
- Preparation of a site-specific Flood Risk Assessment Report including:
 - Identification of potential sources of flood risk
 - Hydrological Assessment
 - Hydraulic Assessment
 - Flood Risk Assessment
 - Completion of a Justification Test/ Commensurate Assessment (if applicable) for the site
 - Identify the residual flood risk and recommending specific mitigation measures and inform decisions relation to planning.

Topographical and water level data supplied in this report are based on surveys undertaken on behalf of Ryan Hanley Ltd. and OPW hydrometric gauge data and are relative to the Ordnance Survey Datum Malin Head unless otherwise stated.



Figure 1-3: Downstream face of Wolfe Tone Bridge taken from the Right bank of the River Corrib

2. The Planning System and Flood Risk Management Guidelines OPW

This Flood Risk Assessment has been undertaken in accordance with “The Planning System and Flood Risk Management: Guidelines for Planning Authorities & Technical Appendices” produced by the Office of Public Works in November 2009.

2.1 The Planning Systems and Flood Risk Management Document

The Planning Guidelines give guidance on flood risk; its identification, assessment and management in areas of potential development. The Guidelines recommend a “precautionary approach” (See Sections 1.11, 2.30, 3.1 and 5.16 of the Guidelines) when considering flood risk management in the planning system. The core principle of the guidelines is to adopt a risk based approach to managing flood risk and to avoid development in areas that are at flood risk. This sequential approach is based on the identification of flood zones for river, lake and coastal flooding, as shown in Figure 2-1 and Table 2-1.



Figure 2-1: Indicative Flood Zones (OPW & DoEHLG, 2009)

Flood Zone	Definition	Annual Exceedance Probability
A	Probability of flooding from rivers and the sea is highest	Greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding
B	Probability of flooding from rivers and the sea is moderate	Between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding
C	Probability of flooding from rivers and the sea is low. Flood Zone C covers all areas of the plan which are not in zones A or B	Less than 0.1% or 1 in 1000 for both river and coastal flooding

Table 2-1: Flood Zoning Definitions

2.2 Vulnerability and Land Use

The guidelines recognise that the vulnerability of potential development to flooding depends on the specific type of land use. Thus, defining the vulnerability of land use types to flooding can help when choosing appropriate development types in areas that are prone to flooding. Figure 2-2 characterises different land use types and their vulnerabilities.

The probability and vulnerability of flooding informs the requirement for the application of a Justification Test. The decision matrix, illustrated in Figure 2.3 below, shows a simple way of combining probability and vulnerability of flooding in order to classify the potential risk to the proposed development. Where the risk is considered high, then a Justification Test is required and applied.

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).
*Uses not listed here should be considered on their own merits	

Figure 2-2: Extract from Guidelines for Planning Authorities - Classification of vulnerability of different types of development

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Figure 2-3: Extract from Guidelines for Planning Authorities - Matrix of vulnerability versus flood zones required to meet the Justification Test

The Justification Test represents a series of conditions that must be met when flood risk is considered significant. Even if the Justification Test is not applied, an appropriately detailed Flood Risk Assessment should be completed in order to fully consider flood risk to the potential development. These conditions are set out in Figure 2-4 below (section 5.1.5 of the 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 2-4: Extract from Guidelines for Planning Authorities – Box 5.1 Justification for development management

2.3 Stages of Flood Risk Assessment

“The Planning System and Flood Risk Management: Guidelines for Planning Authorities” document outlines that a staged approach to Flood Risk Assessment should be adopted and the stages of appraisal and assessment are as follows:

“Stage 1 Flood Risk Identification – to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and LAP’s or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels;

Stage 2 Initial Flood Risk Assessment – to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped; and

Stage 3 Detailed Flood Risk Assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.”

The Guidelines recognise that ‘all stages may not be needed to complete a Flood Risk Assessment.’ The required level of detail ‘will depend on the level of risk and the potential conflict with proposed development and the scale of mitigation measures being proposed.’

This flood risk assessment report is considered appropriate and sufficient to allow an informed decision with respect to the proposed development on the grounds of flood risk.

3. Stage 1 -Flood Risk Identification

This section of the report describes the proposed Pedestrian Bridge (II) Development at Wolfe Tone Bridge and presents the study area hydrology information relative to the proposed site and the associated Stage 1 - flood risk assessment.

3.1 Site Description

The existing Wolfe Tone Bridge comprises reinforced concrete beams supported on masonry abutments and piers, bearing onto bedrock, and with a concrete deck and bridge parapet walls.

Galway City Council propose to construct a pedestrian bridge immediately downstream of Wolfe Tone Bridge spanning the River Corrib Estuary. A pedestrian bridge was constructed previously immediately upstream of the bridge in 2004. The new pedestrian bridge works will comprise the following:

- A galvanised steel superstructure which will be cantilevered off the existing Wolfe Tone bridge reinforced concrete beams and supported on the existing quay wall masonry. The superstructure will extend approximately 2.5m downstream of the bridge and will have a span of 53.8m between quay wall faces.
- An aluminium 2.0m wide pedestrian only walkway deck supported by the steel superstructure, with finished levels of 3.7mOD on the eastern (left) bank and 3.8mOD on the western (right). The deck structure will extend 0.5m onto banks and will include approach ramps (less than 5m long anticipated).
- A 1.25m high stainless steel parapet with handrail.
- At the location of the proposed superstructure cantilever supports (which will be located at the bridge abutments and piers), there will be concrete infill works undertaken to the underside of the existing bridge between the two downstream most reinforced concrete beams to facilitate the proposed 75mm diameter tie-in bolts installation.
- The soffit of the superstructure deck will be above the soffit of the existing Wolfe Tone Bridge Beams.
- The cantilever supports will have a minimum level of 1.9mOD.
- Removal of short sections of existing above street level walls at the bridge and quay on the east bank and relocation of kiosks, street lighting and street furniture as necessary.
- Installing a new pedestrian crossing at the east end of the bridge.

The new bridge will be designed and constructed to include materials and structural details appropriate for the coastal/ saltwater/ urban environment location, the effects of wave action and potential submersion during extreme high water levels/ storm surge events in the estuary and extreme river flows and will be designed not to impede the flow conveyance at the bridge.

3.2 Galway City Flood Relief Scheme

Galway City Council and the OPW are currently progressing studies and assessments for the Galway City (Coirib go Cósta) Flood Relief Scheme. No scheme design has yet been published. However, as part of this scheme, it is likely that:

- New flood defences will be required in the vicinity of the proposed pedestrian bridge at Wolfe Tone Bridge, the Claddagh and Spanish Parade; and,
- The proposed pedestrian bridge will be located outside the flood defences.

The proposed pedestrian bridge design has been developed, further to consultation with Galway City Council, such that it will not impede any potential new flood defences at Wolfe Tone Bridge. It is expected that during significant flood events that the operation, by Galway City Council, of the new flood defences in the vicinity of Wolfe Tone Bridge would include for closing off access to the pedestrian bridges (I and II) for the appropriate duration associated with the event's flood risk.

3.3 Proposed Pedestrian Bridge Construction Stage

The construction of the proposed pedestrian bridge will likely utilise cranes, located on the road and adjacent quaysides at Wolfe Tone Bridge, to install the structure. Scaffolding works will be required for the preparation of the existing bridge superstructure to receive the proposed pedestrian bridge cantilever supports etc. This temporary scaffolding works may require short duration instream works.

The adjacent Spanish Parade Area (located below 3.2mOD) could potential be used for a temporary compound during the construction stage of the proposed pedestrian bridge.

A copy of the proposed development drawings is included in Appendix A of this report. Extracts from these drawings are given below.

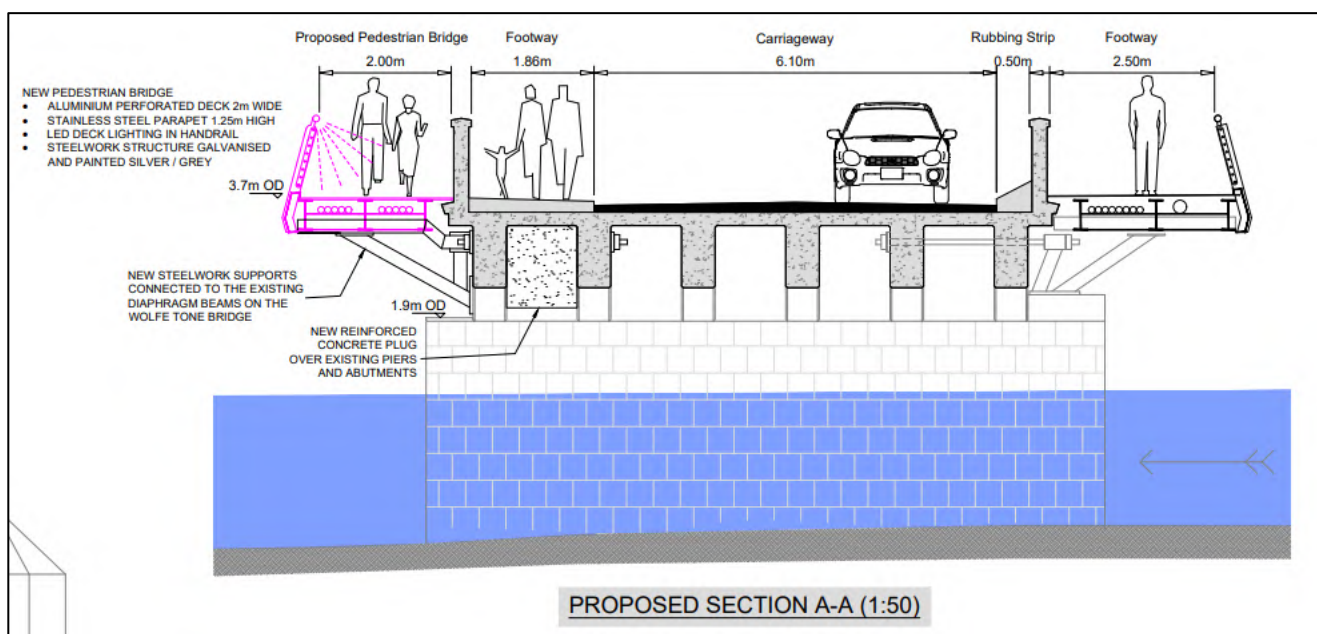


Figure 3-1: Cross-Section of Proposed Pedestrian Bridge

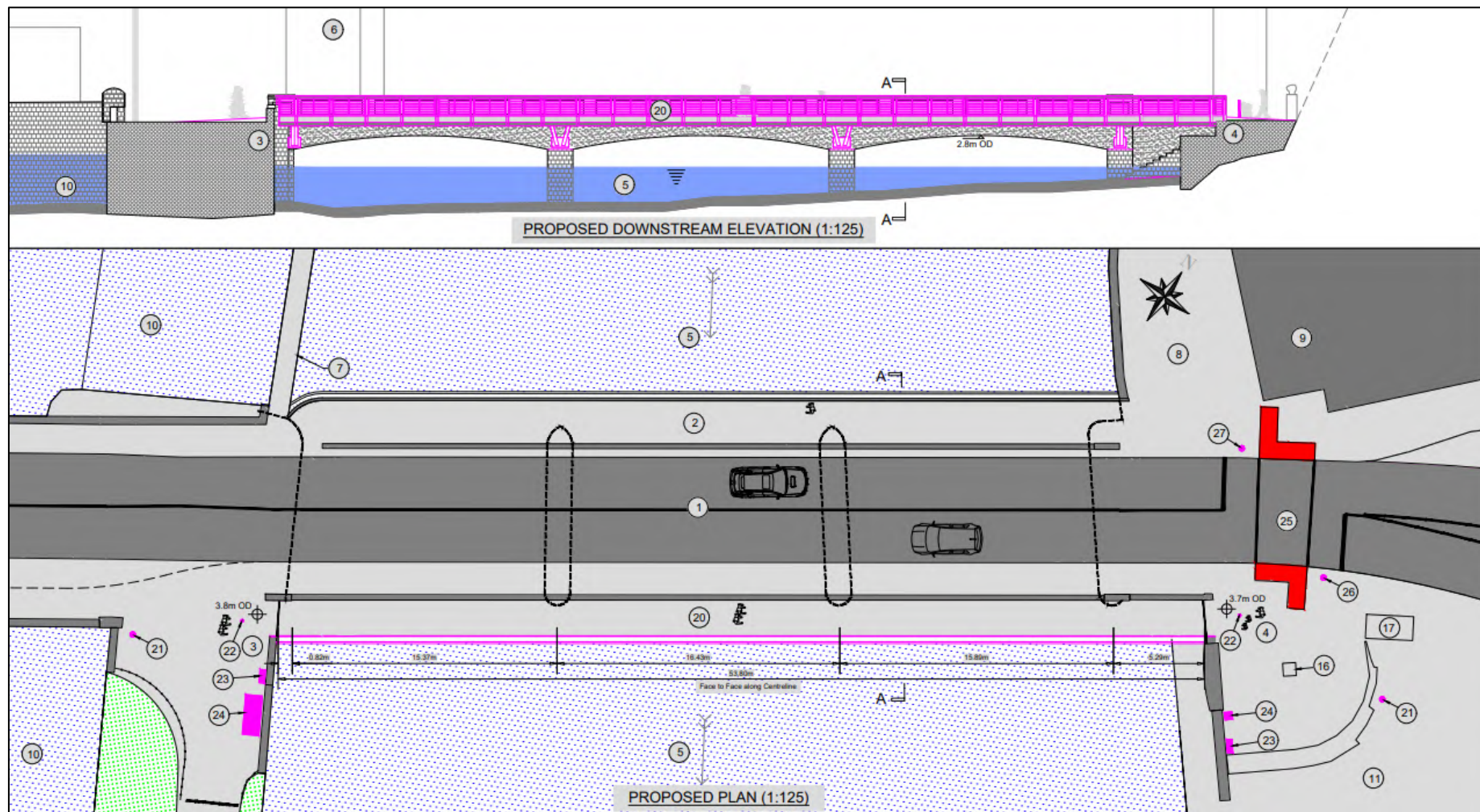


Figure 3-2: Elevation and Plan of Proposed Pedestrian Bridge

3.4 Study Area Hydrology

Wolfe Tone Bridge spans the River Corrib channel within the Corrib Estuary which in turn discharges to Galway Bay. The River Corrib drains from Lough Corrib and has a catchment area of approximately 3110 km² at Wolfe Tone Bridge (Figure 3-3).

The proposed structure site will be in a complex hydrological environment including:

- High velocity/ turbulent river flows (River Corrib), with areas of extreme turbulence downstream of the abutment and piers and
- Estuarine / tidal area (Claddagh Basin – Galway Bay)
- Potential to be exposed to wave climate during extreme high water events in the estuary associated with Atlantic Storms (Galway)



Figure 3-3: River Corrin Catchment at Galway City

The OPW published the Irish Coastal Wave and Water Level Modelling Study (ICWWS) in 2018 which was undertaken as an update to the previous Irish Coastal Protection Strategy Study (ICPSS, 2013) and provides estimates of extreme water levels around the coast of Ireland for a range of Annual Exceedance Probabilities (AEPs). Extreme water level estimates are provided for present day sea levels as well as for Mid-Range Future (MRFS) and High End Future (HEFS) Scenarios. Figure 3-4 presents the associated estimation points relevant to Galway City and Table 3-1 provides the projected water levels for these points

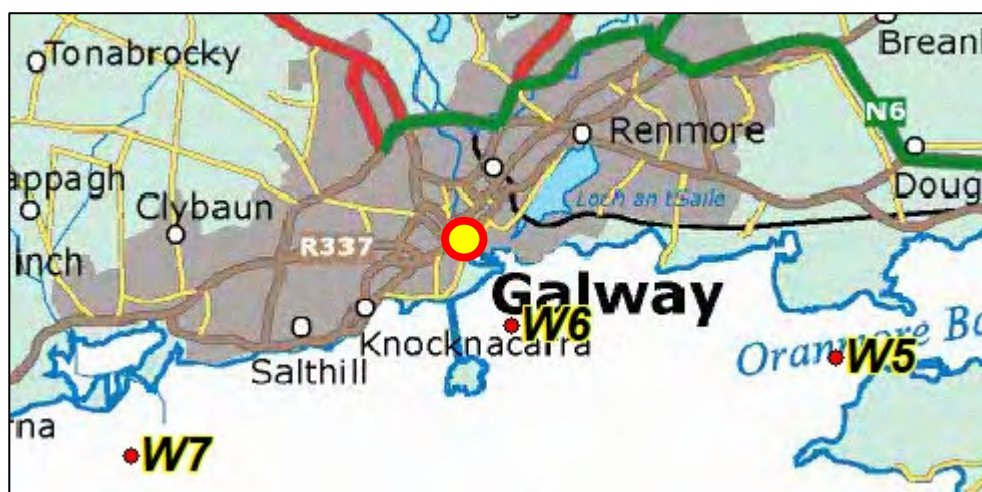


Figure 3-4: Location of ICWWS estimation points at Galway City. New Bridge site shown with yellow circle

Annual Exceedance Probability (AEP)	1 in..	Roscam (W5)	Galway City (W6)	Salthill (W7)
Units	year	mOD	mOD	mOD
50% AEP	2	3.31	3.29	3.26
20% AEP	5	3.46	3.44	3.40
10% AEP	10	3.57	3.55	3.51
5% AEP	20	3.68	3.66	3.61
2% AEP	50	3.82	3.80	3.74
1% AEP	100	3.92	3.90	3.84
0.5% AEP (Flood Zone A)	200	4.03	4.01	3.94
0.1% AEP (Flood Zone B)	1000	4.28	4.26	4.18
0.5%AEP+MRFS	200	4.53	4.51	4.44
0.5%AEP+HEFS	1000	5.03	5.01	4.94
0.1%AEP+MRFS	200	4.78	4.76	4.68
0.1%AEP+HEFS	1000	5.28	5.26	5.18

Table 3-1: ICWWS (2018) Coastal Design High Water Levels

The OPW operate hydrometric gauge (Site Ref: 30061) on the right bank immediately downstream of Wolfe Tone Bridge and at Oranmore (Site Ref: 29015). The Marine Institute operate a tidal gauge (site ref: 29062) at Galway Port. Table 3-2 presents the Duration Percentiles for Flows and water level (measured at Low Tide) at Wolfe Tone Bridge.

DURATION PERCENTILES								
Flows equalled or exceeded for the given percentage of time (m3/s) (Data derived for the period 2009 to 2019)								
1%	5%	10%	25%	50%	75%	90%	95%	99%
245.378	213.347	181.962	136.537	82.285	41.704	29.555	24.498	12.741
Levels equalled or exceeded for the given percentage of time (m Malin Head OSGM15) (Data derived for the period 2004 to 2019)								
1%	5%	10%	25%	50%	75%	90%	95%	99%
1.698	1.492	1.373	1.151	0.907	0.698	0.533	0.456	0.328

Table 3-2: Wolfe Tone Bridge Gauge 30061 Statistics (river flows and levels at low tide)

The highest water levels recorded on the Corrib Estuary and the estimated return period of the event relative to the ICWWS are summarised in Table 3-3 below:

Event	Date	Corrib Estuary*	Inner Galway Bay	Approximate Return Period (relative to ICWWS)
January 2018	02/01/2018 Storm Eleanor	3.854 mOD	3.795 mOD	Between 50 and 100 year
January 2014	01/02/2014	3.629 mOD	3.663 mOD	Between 10 and 20 year
	03/01/2014	3.589 mOD	3.662 mOD	Between 10 and 20 year
February 1997	10/02/1997	3.57 mOD	3.54 mOD	Circa 10 year
January 1995	17/01/1995	3.434 mOD	3.55 mOD	Between 5 and 10 year
October 2017	16/10/2017 Storm Ophelia	3.31 mOD *	3.354 mOD	Between 2 and 5 year
AMAX Median		3.124 mOD	3.08 mOD	
AMAX Average		3.15 mOD	3.125 mOD	

Table 3-3: Recorded Extreme Flood Levels in the Corrib Estuary

Note: * = At Wolfe Tone Bridge gauge unless otherwise stated, ** = At Galway Harbour gauge



Figure 3-5: Storm Eleanor (Met Éireann Report – RTE News)- Orange Warning

3.5 CFRAM Study

Flood Extent mapping has been produced for Galway City as part of OPW Western CFRAM study. The associated current scenario fluvial and coastal flood extent maps for the proposed project area are included in Appendix B of this report.

The flood extent maps show Wolfe Tone Bridge to at risk of tidal inundation in 1 in 200 year (0.5% AEP) event and fluvial flooding in a 1 in 1000 year (0.1% AEP) event.

3.6 Preliminary Flood Risk Assessment

The Corrib Estuary is the flood source (fluvial-coastal) at the proposed development site. As summarised above, the site has a hydrometric gauge and the OPW has undertaken an assessment of coastal extreme water levels for Galway City. No further hydrological or hydraulic assessments are required to inform this study.

Based on the information in Table 3-3, the proposed bridge site would have been submerged during Storm Elenore (3.85mOD <1%AEP).

Based on the flood zoning definitions given in Figure 2-1 above, on the CFRAM flood extent mapping and on the assessment of recent historic flood event data, it is confirmed that the proposed pedestrian bridge development (deck level of 3.7mOD) will be in **Flood Zone A** (High Flood Risk).

The supporting cantilever structure (between 3.3mOD and 1.9mOD) would be expected to be submerged several times a year.

4. Stage 2 - Flood Risk Assessment

This section of the report discusses the land use vulnerability and provides for an appraisal of flood risk at the proposed pedestrian bridge site.

4.1 Land Use Vulnerability and Flood Zone

In accordance with 'The Planning System and Flood Risk Management Guidelines for Planning Authorities', the proposed pedestrian bridge is classed as:

- Local Transport Infrastructure; and,
- 'Less Vulnerable Development'.

Based on the Western CFRAM study flood extents mapping, on the historic extreme water level data available from the Wolfe Tone Bridge hydrometric gauge located immediately adjacent to the proposed development site, and on the ICWWS coastal water levels projections for Galway Bay, the proposed development is clearly located within **Flood Zone A** as set out in Section 3.3. above.

4.2 Justification Test

As the proposed developed is confirmed to lie with **Flood Zone A** and is classed as 'less vulnerable development:

- the proposed development will be required to pass a justification test in accordance with Box 5.1 of "The Planning System and Flood Risk Management: Guidelines for Planning Authorities & Technical Appendices"

The justification test is summarised in Table 4-1 below:

Ref	Condition	Response
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.	Wolfe Tone Bridge is the downstream most bridge over the River Corrib and is located on the coastal road network at Galway City, linking the city centre with the Claddagh and Salthill areas. The AADT at the bridge was estimated at 21,000 in 2012. The bridge also acts a pedestrian access between the historic and important tourism sites at the Spanish Arch and the Claddagh, and between the city centre and the residential areas accessed from Father Griffin Road and at the Claddagh. Galway County Council has undertaken a safety risk assessment at Wolfe Tone Bridge and have concluded that the existing footpath on the south side of Wolfe Tone Bridge is unsafe for pedestrians due to the inadequate space available between them and the heavy traffic volumes using the bridge. To mitigate this unacceptable safety risk, Galway City Council propose to develop a pedestrian bridge at the downstream (south) face of Wolfe Tone Bridge. The pedestrian bridge will also improve pedestrian connectivity between the Spanish Arch and the Claddagh regions of Galway City.
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;	The proposed pedestrian bridge will have a soffit level of 3.3mOD which is 0.5m above the soffit level of the arches of the existing Wolfe Tone Bridge which are at 2.8mOD. The proposed pedestrian bridge supports will be located at the existing bridge piers and abutment walls. See Figure 3-1 and 3-2 above. The proposed pedestrian bridge has been designed to not impede flow discharging from under the existing bridge arches and therefore will not impact the existing bridge's flow conveyance capacity. It will not be possible to raise the proposed bridge deck level and associated footpaths with an appropriate freeboard above the Flood Zone A water level (>4.0mOD). There is no location downstream of Wolfe Tone Bridge where the new bridge could be located which would be outside Flood Zone A or B.
(ii)	The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;	The proposed pedestrian bridge will be located outside the likely extents of the proposed Galway City Flood Relief Scheme flood defences. As set out in Section 3.2 above, the new bridge has been designed so that it will not impede the development of the new flood defences. During the current scenario and as part of the operation of the new flood defences in the vicinity of Wolfe Tone Bridge, it is expected that Galway City Council will temporarily close off access to both this proposed bridge (II) and the existing pedestrian bridge (I) at Wolfe Tone Bridge during a significant flood event. The proposed bridge will tie into existing foot path levels at Wolfe Tone Bridge. The proposed pedestrian bridge deck levels range between 3.7mOD and 3.8mOD. The existing footpaths at the proposed bridge tie-ins are located within Flood Zone A.

(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	See above. The proposed pedestrian bridge has been designed not to impede the development of new flood defences for Galway City. It is expected that access to the new bridge will be temporarily closed off during significant flood events (both pre and post the flood relief scheme). The proposed bridge has been designed to be water compatible and to withstand inundation from the estuary during significant flood events.
(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 proposed pedestrian bridge has been designed not to impede the development of new flood defences for Galway City. The proposed bridge will improve pedestrian connectivity across the River Corrib and will mitigate the identified current pedestrian high safety risk at Wolfe Tone Bridge. The proposed bridge will be of similar design and details as the existing pedestrian bridge (I) located at the upstream (north) face of Wolfe Tone Bridge. A photomontage of the proposed development is included in Figure 1-2 above.
5.16	Where development has to take place in areas at risk of flooding following the application of these Guidelines, the risks should be mitigated and managed through the location, lay-out and design of the development to reduce such risks to an acceptable level.	The following mitigations will be in place: - Galway City Council will close off access to the pedestrian bridges at Wolfe Tone Bridge during significant flood events in the Corrib Estuary. - The proposed bridge has been designed to be water compatible and to withstand inundation from the estuary during significant flood events. - The proposed bridge development has been designed to not impede the development of new flood defences for Galway City at Wolfe Tone Bridge. - The construction of the new pedestrian bridge will be programmed and planned to be undertaken during times of low risk of either fluvial or coastal flooding. The associated construction compound and temporary works, if they unavoidably need to be located within Flood Zone A or B, will be designed to be readily removable and appropriately designed to withstand flood inundation. These mitigations are appropriate to manage the flood risk associated with the proposed development site.

Table 4-1: Justification Test for the proposed bridge development

5. Summary and Conclusion

Galway City Council propose to install a second pedestrian bridge at Wolfe Tone Bridge, which spans the River Corrib channel within the Corrib Estuary, to mitigate the current pedestrian safety risks associated with the southern foot path at the bridge.

A Stage 1 and 2 Flood risk assessment has been undertaken for the proposed pedestrian bridge development in accordance with the Planning System and Flood Risk Management Guidelines for Planning Authorities (DoEHLG & OPW, 2009).

The proposed development location has been identified to be located within Flood Zone A (within a high flood risk area) based on the Western CFRAM study, the ICWWS data for Galway Bay and historic extreme water level data available from the hydrometric gauges in the Corrib Estuary and Inner Galway Bay area. No further hydrological and hydraulic assessments are required to inform this flood risk assessment.

In accordance with the guidelines, the proposed development:

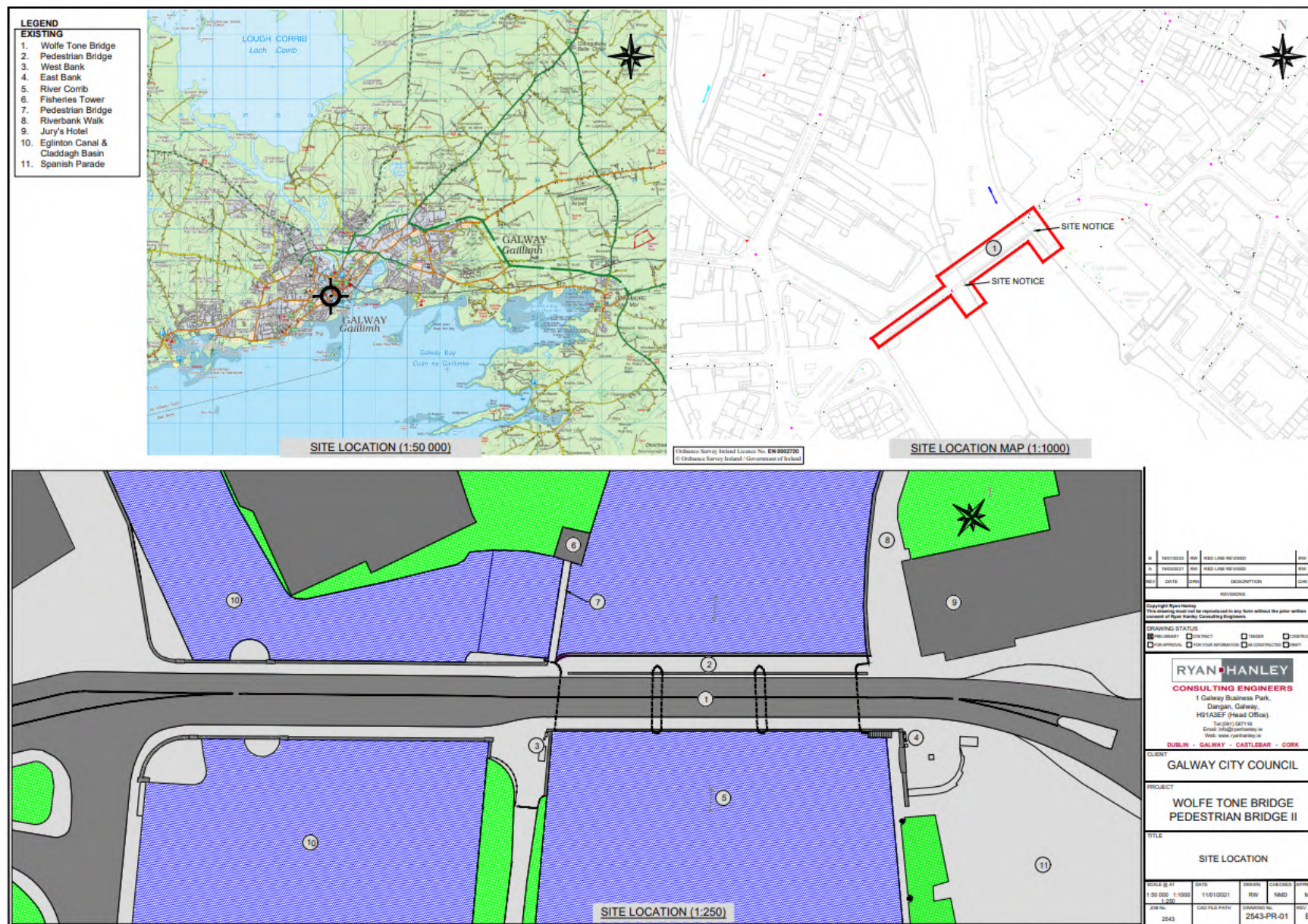
- Is categorised as Local Transport Infrastructure,
- Is classed as 'Less Vulnerable Development' to flooding; and therefore,
- Requires a Justification Test as it lies within Flood Zone A.

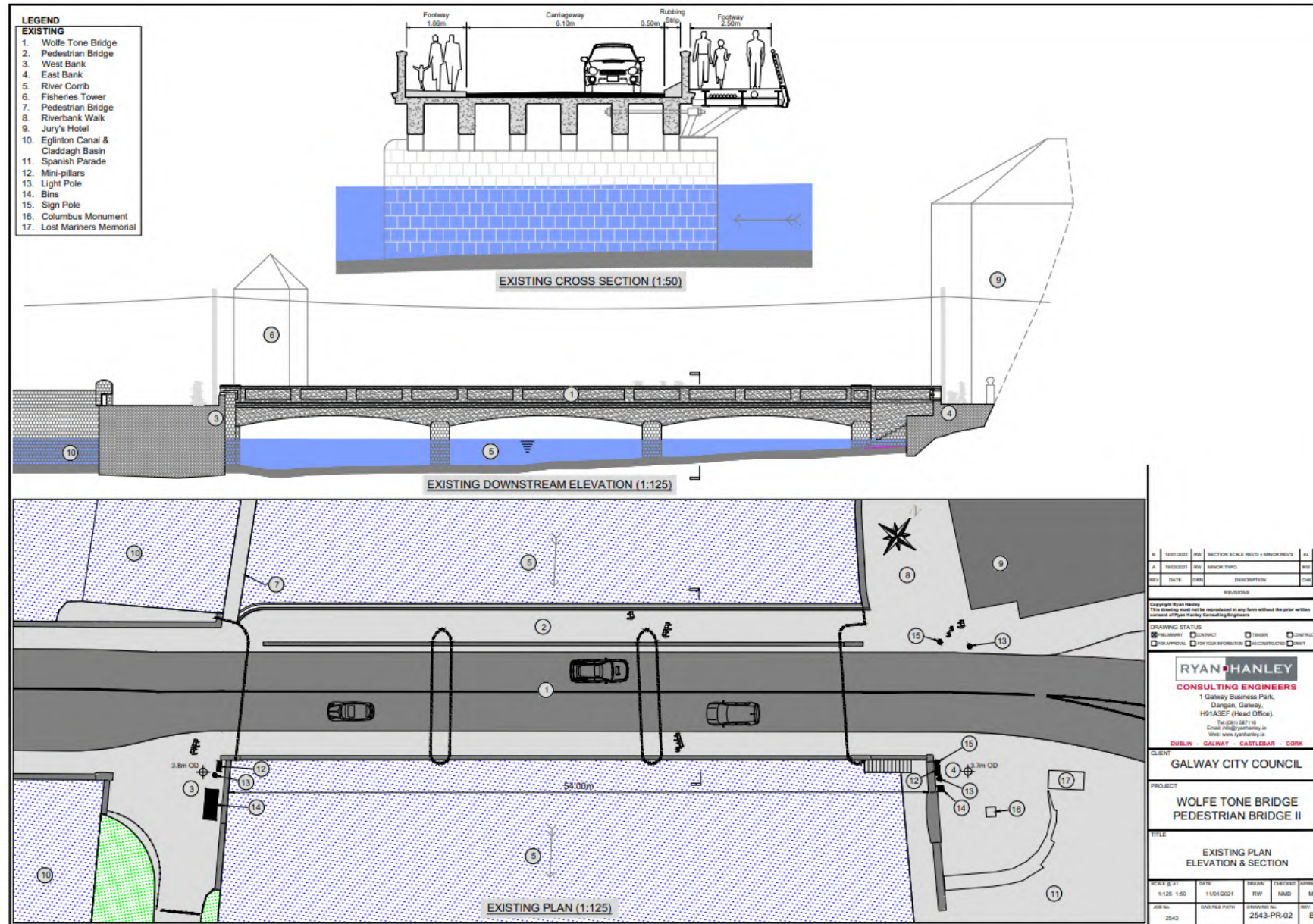
A justification test has been undertaken for the development which confirms that:

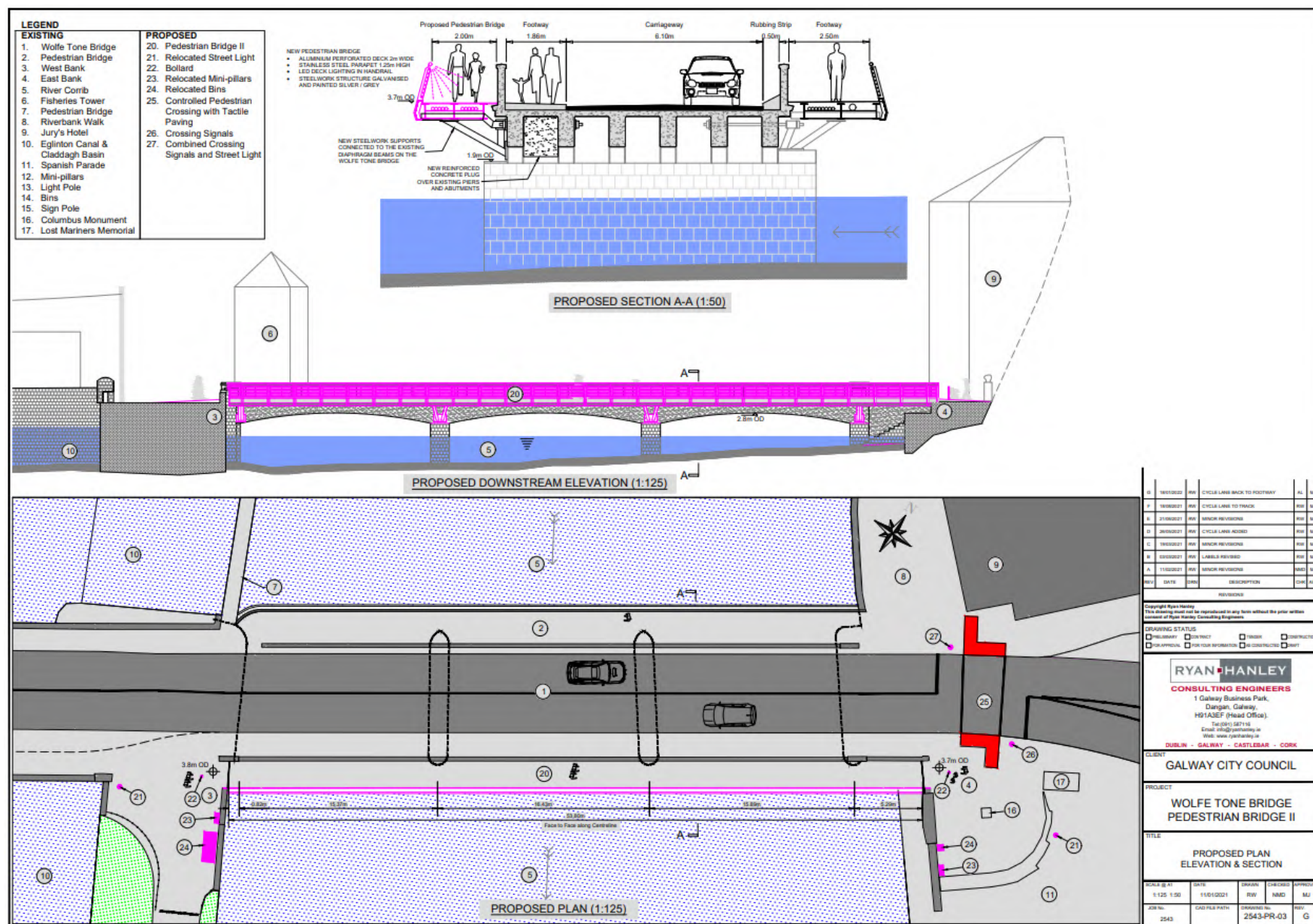
- The proposed development is required to mitigate the current high safety risk to pedestrians at Wolfe Tone Bridge.
- The proposed development will improve pedestrian connectivity between the City Centre and Spanish Arch areas, and the Claddagh and Father Griffin Road areas.
- The bridge has been designed to not impede flow conveyance at Wolfe Tone Bridge, to be water compatible and to withstand inundation from the Corrib Estuary.
- There is no other suitable location at lower flood risk for this proposed development that will achieve its proposed function, i.e. to reduce pedestrian safety risk at the existing footpath and improve pedestrian connectivity on the south side of Wolfe Tone Bridge.
- It is not possible to construct a new pedestrian bridge at the Wolfe Tone Bridge outside of Flood Zone A or B.
- The proposed bridge has been designed to not impede the future development of flood defences at Wolfe Tone Bridge.
- Access to the new pedestrian bridge will be expected to be temporarily closed off by Galway City Council during times of significant flood risk in the Corrib Estuary.
- The proposed bridge will be of similar design and details as the existing pedestrian bridge located on the upstream face of Wolfe Tone Bridge.
- The construction of the new pedestrian bridge will be programmed and planned to be undertaken during times of low risk of either fluvial or coastal flooding. The associated construction compound and temporary works, if they unavoidably need to be located within Flood Zone A or B, will be designed to be readily removable and appropriately designed to withstand flood inundation.

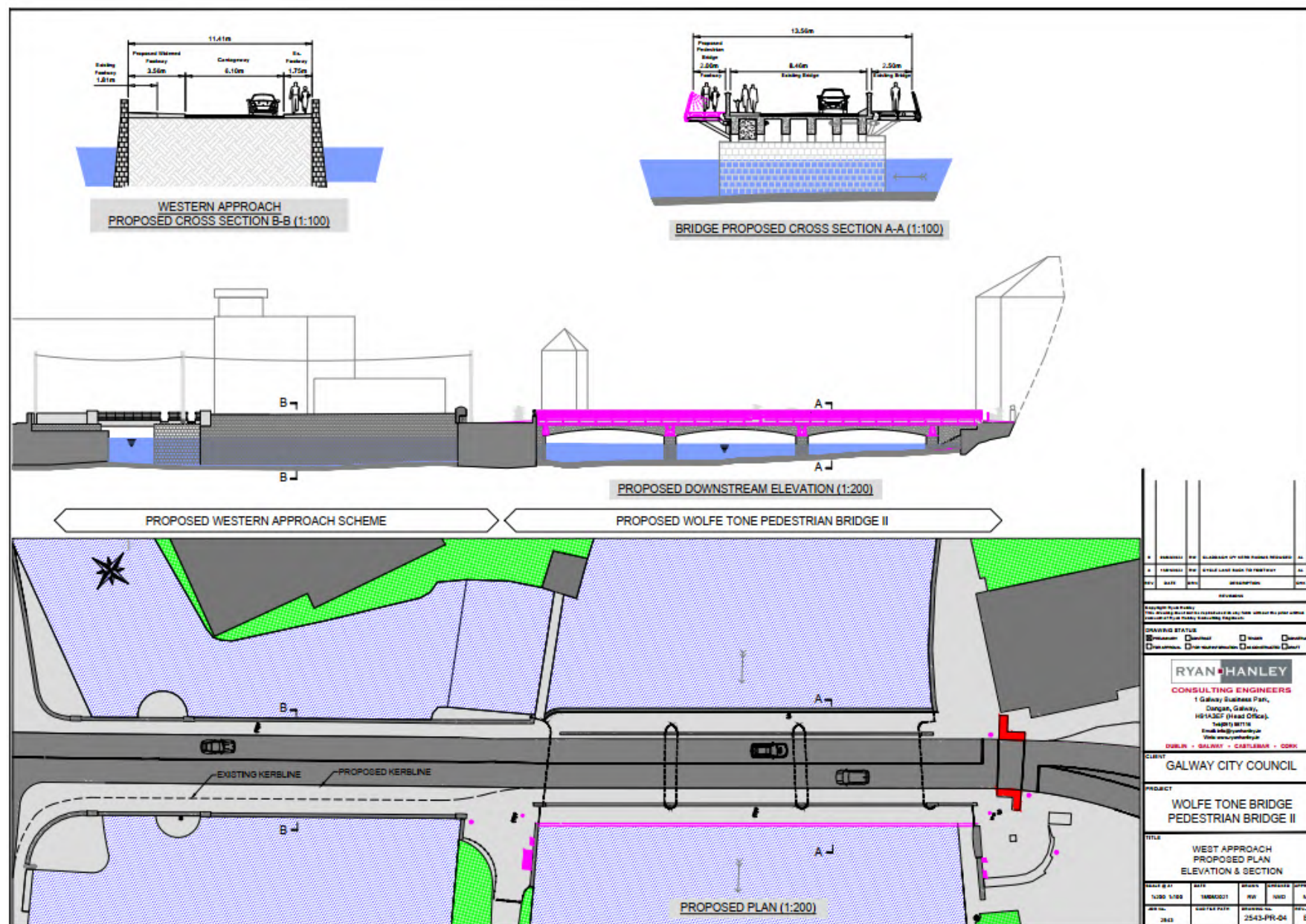
As such, the proposed development clearly passes the justification test requirements set out in Section 5 of the guidelines.

Appendix A – Proposed Pedestrian Bridge Drawings

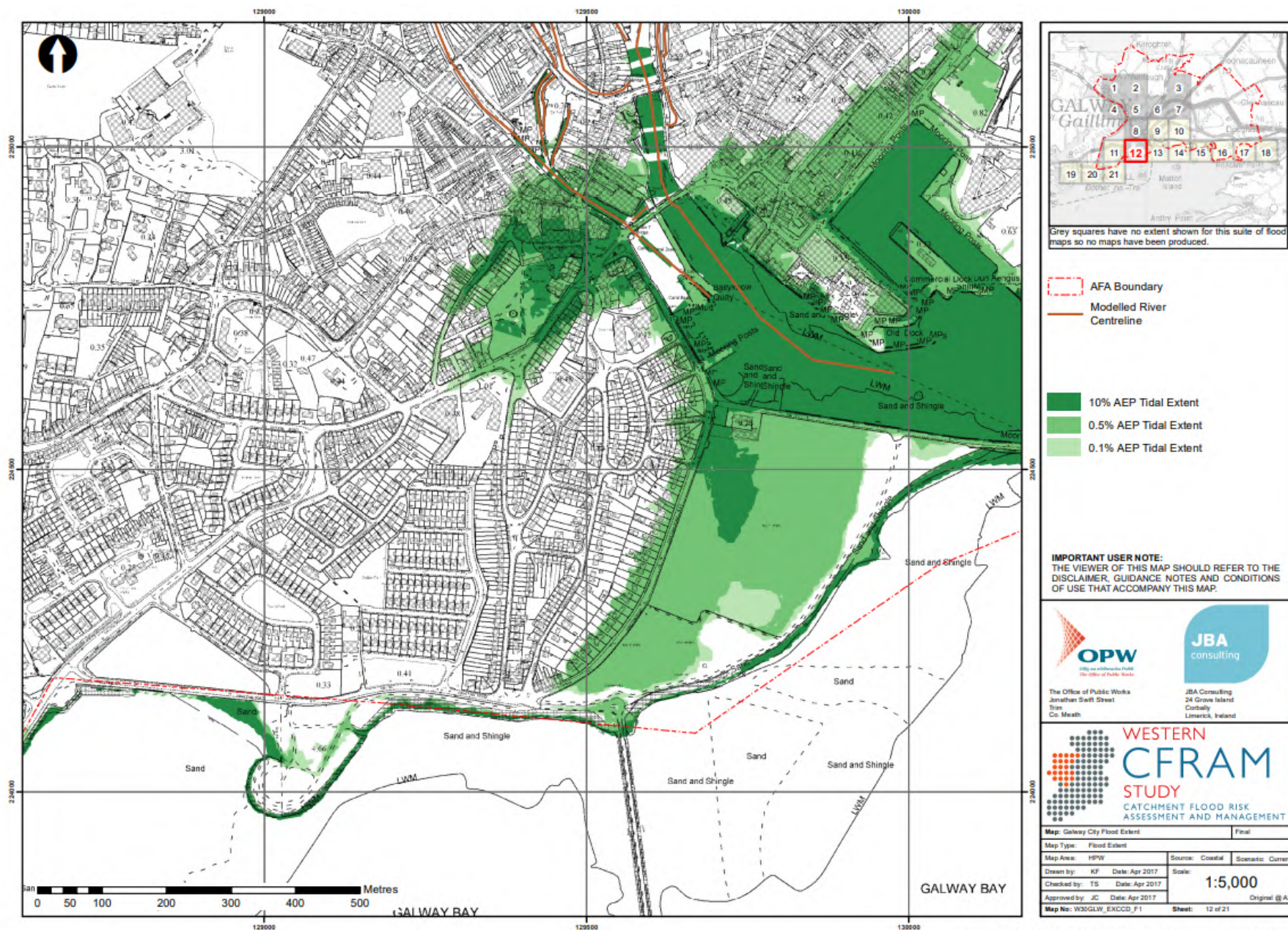


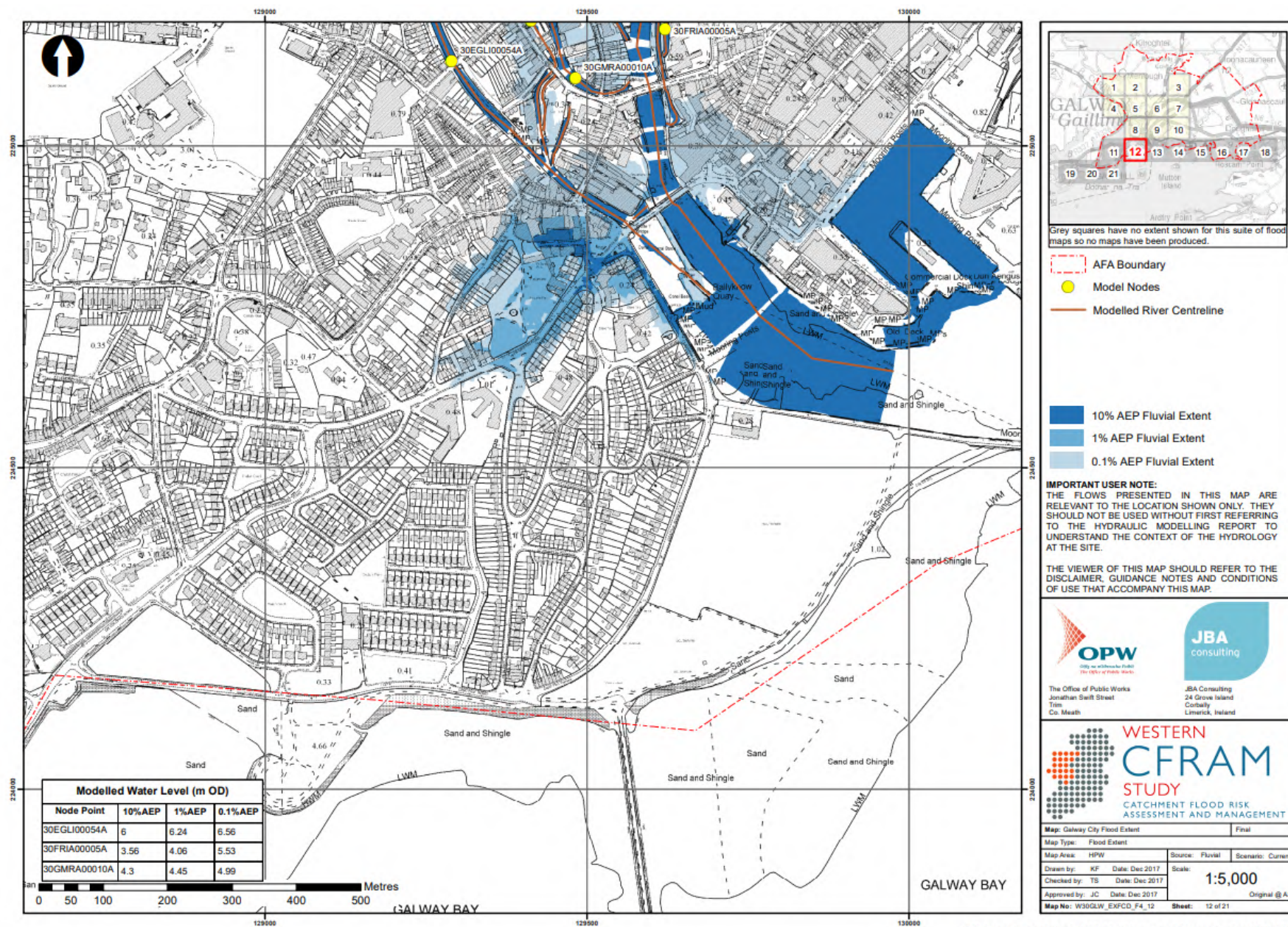






Appendix B – CFRAM Flood Extents Maps for the Wolfe Tone Bridge area.





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