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MURROUGH WATERFRONT PARK ENHANCEMENT

Part 8 Planning - Engineering Report

P06 Planning | January 2025

ROD
ROUGHAN & O'DONOVAN

Murrough Waterfront Park Enhancement

Part 8 Planning - Engineering Report

Document No: ..... 24.138-ROD-EGN-SW_AE-RP-ZM-400001

Author:..... John Bell (JB) / Ciaran McGee (CMG) / Andrew Thompson (AT)

Checker: ..... John Bell (JB)

Approver:..... John Bell (JB)

Status	Revision	Description	Author	Checked	Approved	Date
Planning	P06	Engineering Report	AT / CMG / JB	JB	JB	27-1-2025

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1. INTRODUCTION

The proposed development consists of enhanced park and facilities at the Murrough Coastal Promenade area, Wicklow Town, Co. Wicklow. The enhanced park will provide new amenities to the town, enhancements on existing facilities and strengthen connections between the coast and the Leitrim River. The site is separated from the Leitrim River by public road for most of its length, and the proposals include for improved connectivity between the two. Additional car parking is to be provided at the north end of the site, and facilities for campervans is to be provided at the south end of the site.

Roughan & O'Donovan (ROD) working with CSR have been appointed by Wicklow County Council o to provide civil and structural engineering services in relation to the scheme. This report sets out the civil & structural engineering items encountered, and the design solutions identified and adopted.

Figure 1-1 Site Location

2. SITE APPRAISAL

In this section, commentary has been provided on the findings from the review of survey information and other site records.

2.1 Topographical Survey

A Topographical Survey was provided by Wicklow County Council. The site is relatively flat apart from manmade earth mounds. The northern half of the site is bounded by The Murrough Road and the southern half of the site is bounded by a number of properties where there are various boundary walls and fences. There are a number of existing amenities that are to be incorporated or enhanced as part of the development.

2.2 Flooding

The map in Figure 2.1 below shows the extend of lands that may flood from the National Coastal Flood Extents 2021 - Present Day. The different shades represent 10, 200 and 1000 year events. This mapping indicates that the Promenade may be prone to occasional coastal flooding.

The proposed works will not increase flood risk, and the proposed Promenade development is considered a water compatible development in accordance with the OPW Guidelines.

Further details of the Flood Maps are shown on Drawing No. MMWT-ROD-EAC_AE-DR-EN-100001 in Appendix A

Figure 2-1 OPW National Coastal Flood Extents

A Flood Risk Assessment has been carried out and it is included in Appendix D. The Flood Risk Assessment for the Murrough Waterfront Park Enhancement Project has been assessed for existing and future sources of flood risk. The most up to date flood

extent mapping undertaken as part of the CFRAMS programme and the National Coastal Flood Hazard Mapping 2021 programme has been reviewed and does not indicate fluvial, coastal or in combination coastal/fluvial flooding on the subject site in the 1 in 200 year or 1 in 1000 year coastal flood event. As per the OPW Guidelines, the entirety of the development site appears to be within Flood Zone C and the proposed development is therefore deemed suitable for the associated flood risk in line with the sequential approach.

2.3 Utility Records

Utility records were obtained for the site from ESB, Gas Networks Ireland, Uisce Éireann and Wicklow County Council. There are a number of services that traverse the site, including a foul sewer, low-pressure gas pipework, underground telecom cables, and electrical / public lighting. There are also services that pass the site along the road in The Murrough Road – Leitrim Place, closely adjacent to the site boundary and within the footprint of the proposed development, including watermains, ESB LV and MV and foul and surface water drainage.

A composite drawing of all existing utilities is shown on Drawing No. MMWT-ROD-GEN_AE-DR-CU-300002 in Appendix B.

3. INFRASTRUCTURE

In this section, commentary has been provided on the proposed infrastructure and the proposed design solutions considered for the proposed toilets, parking, and access.

3.1 Toilet Facilities

The masterplan must include proposals for adequate toilet facilities of an appropriate scale for the public park. These may be considered at multiple locations as is deemed appropriate to the scheme.

The plan includes for two public toilets, one located near the existing plan park and the other located near the other beside the main public car park near the south end of the site. It is proposed that these will be automatic self-cleaning toilets, similar to those provided elsewhere in Wicklow

Connections can be provided to existing power supply, water mains and foul drainage along the Promenade and in the road along The Murrough.

It is proposed to connect to the existing Uisce Eireann water supply and foul sewage infrastructure passing or traversing the site. Details of the proposed water supply and foul drainage connections are shown on Figure 3.1 below. A pre-connection enquiry has been submitted to Uisce Eireann to confirm the details of the connection.

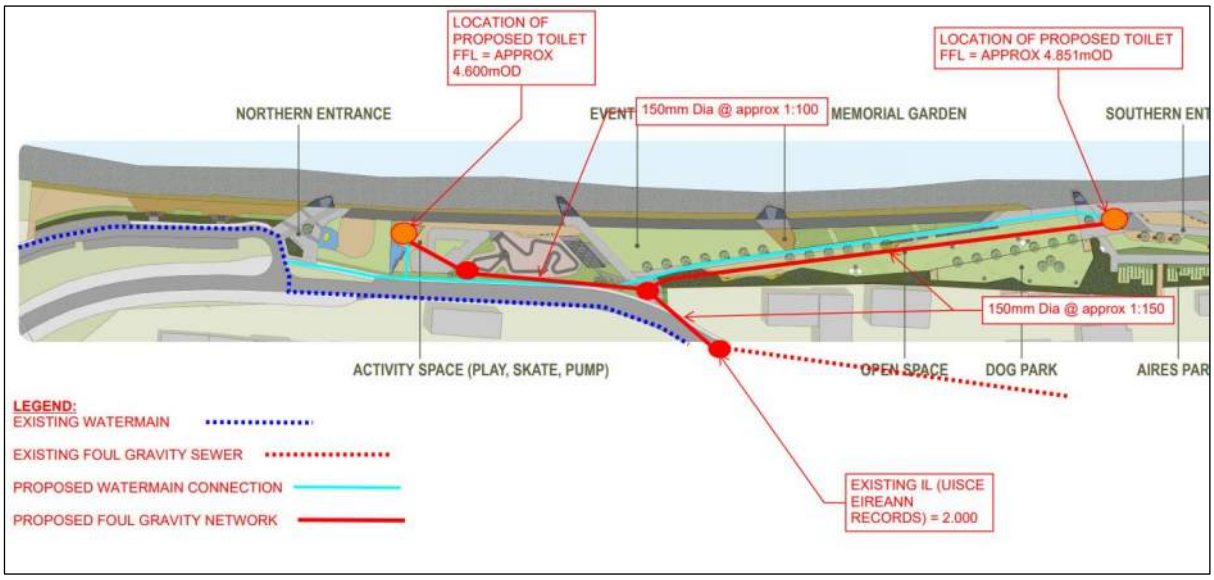

Figure 3-1 Proposed water supply and foul drainage connections

3.2 Power Supply

The development will require power supply for the lighting, toilets and campervan facilities. The ESB records shown in Drawing MMWT-ROD-GEN-SW_AE-DR-CU-300002 included in Appendix B show that there is a number of possible connection points within the site. The exact location of the power connection will be agreed with ESB at detailed design stage and prior to commencement of construction.

3.3 Surface Water Drainage

All surface water across the Promenade currently discharges to ground or directly to the sea. It is proposed to continue this arrangement including through the use of permeable pavements and to use shallow swales in the green areas to allow surface water soak into the ground.

3.4 Pavement Details

A range of pavement types are proposed across the site as detailed on the CSR layout drawings. The following pavement details are proposed:

- Concrete Pavement throughout the Promenade with a range of finished to include brushed, ground concrete and dark aggregate. The concrete mix will be as specified by the Architect and the pavement construction detail will be as per the TII Standard Construction Detail: CC-SCD-01105, which is copied in Appendix C.
- Grasscrete is proposed in the campervan parking area. This proposed pavement will be as per the Typical Grasscrete Construction details designed for heavy vehicle loading, as shown in the details in Appendix C, or similar approved by the Engineer and Architect.

Details of the other proposed surfaces including stone / gravel paths and decking are detailed in the CSR drawing and documents.

3.5 Parking

Twenty additional car parking spaces are proposed to be provide at the north end of the site on the cul-de-sac located off The Murrough road.

It is proposed that 52 bike parking spaces on 26 stands will be provided at a number of locations along the proposed scheme.

3.6 Service & Emergency Access

It is proposed that the Coastal Promenade will be reserved for pedestrians and cyclists only area, however, vehicle access will need to be maintained for emergency access or to accommodate maintenance vehicles. Vehicle access along The Promenade will be controlled with removable and lockable bollards.

3.7 Campervan Facilities

It is proposed to provide campervan facilities near the south end of the site, which will be accessed via the existing public car park, and adjacent one of the proposed public toilets. A total of 11 campervan spaces are to be provided. Access and manoeuvring analysis has been carried out to inform the design of these space, which can accommodate a range of vehicle sizes from larger 7.5t / 8m long ‘motorhomes’ and a more compact and common 5-6m long campervans. An extract of the vehicle tracking analysis is shown in Figure 3.2 below.

Figure 3-2 Vehicle Tracking Analysis – Campervan Facilities

The main access road for campervans will be constructed using standard blacktop road construction details, whereas the parking areas for the campervan will include permeable 'green' pavement using grasscrete or similar as described above.

The campervan facilities will include a toilet disposal point, which will connect to the existing foul drawing network via a shared connection with the proposed public toilet as described above.

4. STRUCTURAL CONCEPTS

As part of the planning design, ROD have carried out initial structural reviews and designs on the Revetment Platforms and the Toilet Block and Stage Shelters. These initial assessments are not intended to lock the structure to a particular type or style but to ensure that the proposals are feasible and can be constructed as proposed.

4.1 Toilet Block and Stage Shelters

It is proposed to provide a toilet block with a covered shelter as well as well as a covered stage area as part of the Works on the promenade.

Generally, the toilet block and stage shelters are intended to be open framed structures with a glass or polycarbonate roof structure that will admit light. The structure is generally proposed to be a steel structure with either Circular Hollow Sections (CHS) or Rectangular Hollow Sections (RHS) for columns, with either timber or Corten steel cladding. The main roof beams will consist of either clad Universal Beam sections or RHS sections, with the final design being determined by the roof cladding material and its weight and deflection allowance. Based on the spans, it is estimated that a minimum depth of 400 to 450mm should be allowed before cladding. A glass structure will be heavier but generally has a reduced deflection allowance due to the brittle nature of the material, while a polycarbonate material is lighter and more flexible but does not weather as well as glass. Intermediate purlin supports will be provided at approximately 1m centres as indicated on the architectural drawings.

It should be noted that the above proposal is simply one manner in which the structure can be completed. A second option with timber columns and beams was also investigated. While the column sizes would be similar to the steel option, it would require deeper beams and would result in significantly higher maintenance in the longer term due to the maritime environment. However, the environmental impacts would be lesser in terms of embodied carbon of the scheme. A detailed review of the various options will be undertaken at the detailed design stage.

Final details will be determined at the detailed design stage of the scheme.

4.2 Revetment Platforms

It is proposed to provide a number of revetment platforms on the coast side of the Promenade. It is not possible to construct these revetments directly on the rock coastal protection, and therefore a suitability designed support / cantilever structure is required. A sketch of the cantilever platform is shown in Drawing MMWT-ROD-SBR-S01_AE-SK-CB-300001 in Appendix C, and the final solution will be subject to detailed design and agreement with the OPW, who manage the coastal protection works.

Due to the corrosive nature of the marine environment and the likelihood of constant wetting and drying of the structure, a concrete structure is likely the preferred option. A cantilever structure with tension and compression piles is envisaged with an approximate maximum span of 5m intended. The pile design will be dependent on the outcome of a detailed Ground Investigation to be undertaken at the commencement of detailed design.

The main structure will likely consist of a concrete slab with an estimated thickness of between 650mm and 750mm depending on the available back span. Alternatively, a

similar concrete beam solution with the decking within the depth of the beams may also be considered at the detailed design stage.

4.3 Retaining Structure

A retaining structure is proposed at the Memorial Space. Details of this retaining structure is included on Drawing MMWT-ROD-SBR-S01_AE-SK-CB-300002 included in Appendix C.

APPENDIX A
FLOOD MAPS

CILL MHANTÁIN
Deiseanna Síoraí

CUNNANE STRATTON REYNOLDS
LAND PLANNING & DESIGN

No.	Revision	Date	By	Chk'd	App'd

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Drawn	Designed	Checked	Approved	Suitability Code - Description
AC	AC	JB	JB	S3 - Review & Comment

Project Stage	Preliminary Design
Project Title	Murrough Masterplan for Wicklow Town
Drawing Title	Coastal Flood Extents
Drawing Number	Project | Originator | Volume | Location | Type | Role | Number MMWT - ROD - EAC - SW_AE - DR - EN - 100001
Scale (A1)	1:1,000
Date	DECEMBER 2024
Job No:	24.138
Rev:	P0

27 January 2023 11:21:40 J:\2024\24138\24138-02_WIP\01 MODELS\01 CAD\03 TEMPLATES\MMWT-ROD-GEN-SW_AE-M2-CH-100001 DRAWING TEMPLATE.DWT

DO NOT SCALE USE FIGURED DIMENSIONS ONLY

APPENDIX B
EXISTING SERVICES RECORDS

PROPOSED POWER, WATER AND
FOUL SEWAGE CONNECTION.

PROPOSED POWER, WATER AND
FOUL SEWAGE CONNECTION.

LEGEND:

- ESB UG LV — EXISTING ESB LV/MV UNDERGROUND CABLE ROUTES
- ESB OH LV — EXISTING ESB LV OVERHEAD LINES
- ESB OH MV — EXISTING ESB MV/LV OVERHEAD LINES
- WM — EXISTING IW UTILITY RECORDS - WATER DISTRIBUTION
- FS — EXISTING IW UTILITY RECORDS - SEWER NETWORK
- EIRCOM UG — EXISTING EIR UNDER GROUND UTILITY RECORDS
- EIRCOM OH — EXISTING EIR OVER HEAD UTILITY RECORDS
- BT — EXISTING BT UTILITY RECORDS
- GAS — EXISTING GNI UTILITY RECORDS
- X — EXISTING GNI DECOMISSIONED UTILITY RECORDS

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Deiseanna Síorai

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No.	Revision	Date	By	Chk'd	App'd
-	-	-	-	-	-

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Drawn	Designed	Checked	Approved	Suitability Code - Description
AC	AC	JB	JB	S3 - Review & Comment

Project Stage	Preliminary Design
Project Title	Murrough Masterplan for Wicklow Town
Drawing Title	Existing Utilities
Drawing Number	Project | Originator | Volume | Location | Type | Role | Number: MMWT - ROD - GEN - SW_AE - DR - CU - 300002
Scale (A1)	1:1000
Date:	DECEMBER 2024
Job No:	23.182
Rev:	P0

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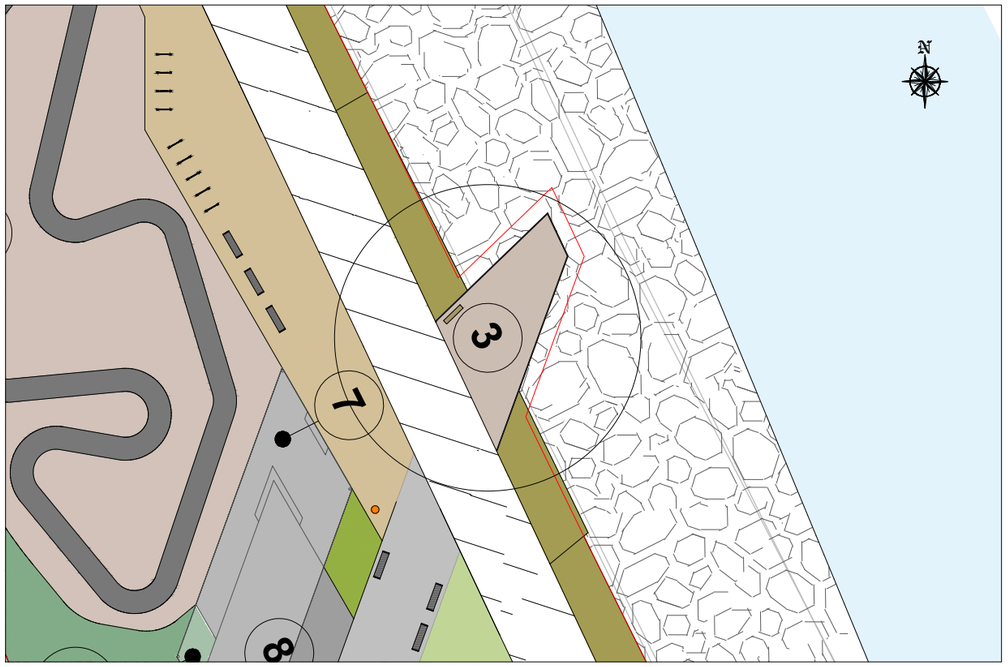
APPENDIX C
DRAWINGS AND CONSTRUCTION DETAILS

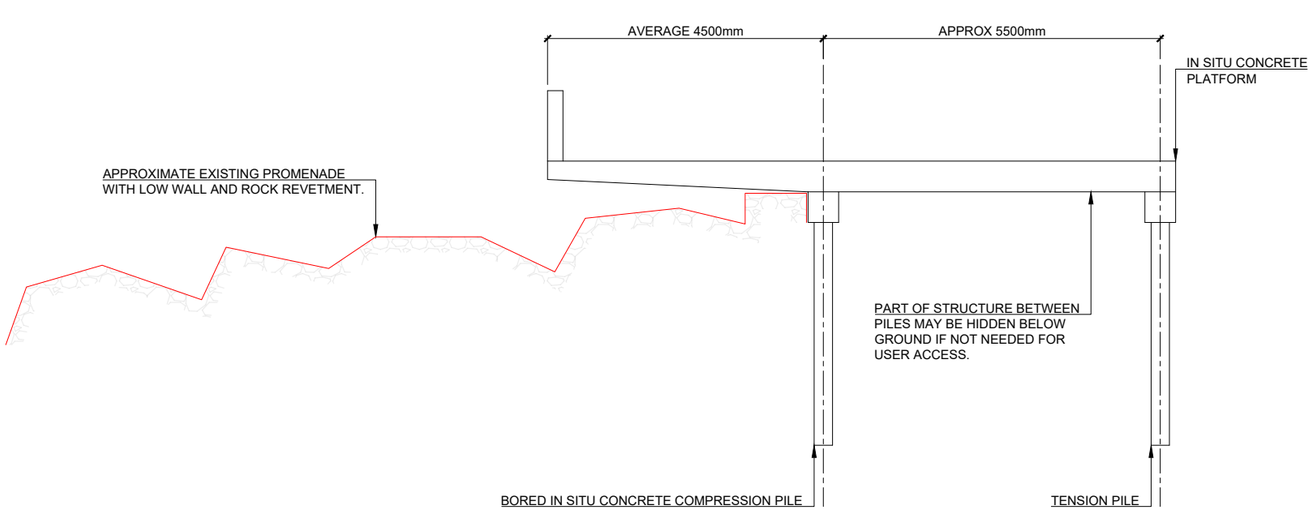


TYPICAL VIEWING PLATFORM
LOCATION AT 731257, 694808

A1 SCALE 1:200
A3 SCALE 1:400

TYPICAL VIEWING PLATFORM
LOCATION AT 731380, 694576

A1 SCALE 1:200
A3 SCALE 1:400



SECTION THROUGH INDICATIVE
REVETMENT STRUCTURAL CONCEPT

A1 SCALE 1:50
A3 SCALE 1:100

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Deiseanna Síoraí

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No.	Revision	Date	By	Chk'd	App'd
-	-	-	-	-	-

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Drawn	Designed	Checked	Approved	Suitability Code - Description
AC	AOK	JB	JB	S0 - Work In Progress

Project Stage	Preliminary Design
Project Title	Murrough Masterplan for Wicklow Town
Drawing Title	Indicative Revetment Structural Concept
Drawing Number	Project | Originator | Volume | Location | Type | Role | Number MMWT - ROD - SBR - S01_AE - SK - CB - 300001
Scale (A1)	As Shown
Date:	JANUARY 2024
Job No:	24.138
Rev:	P0

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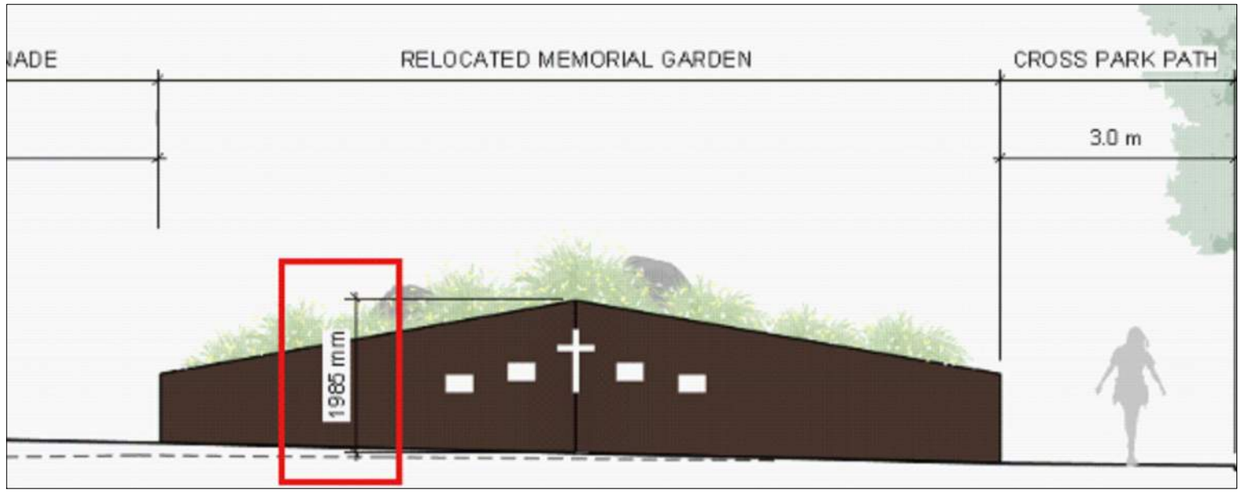

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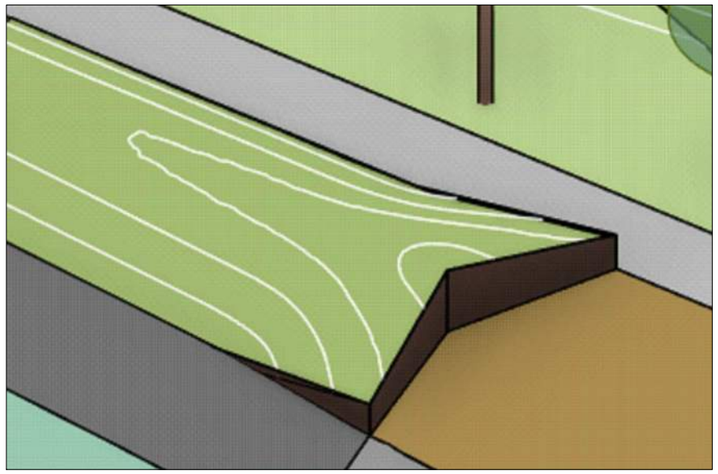
A3 SCALE NTS



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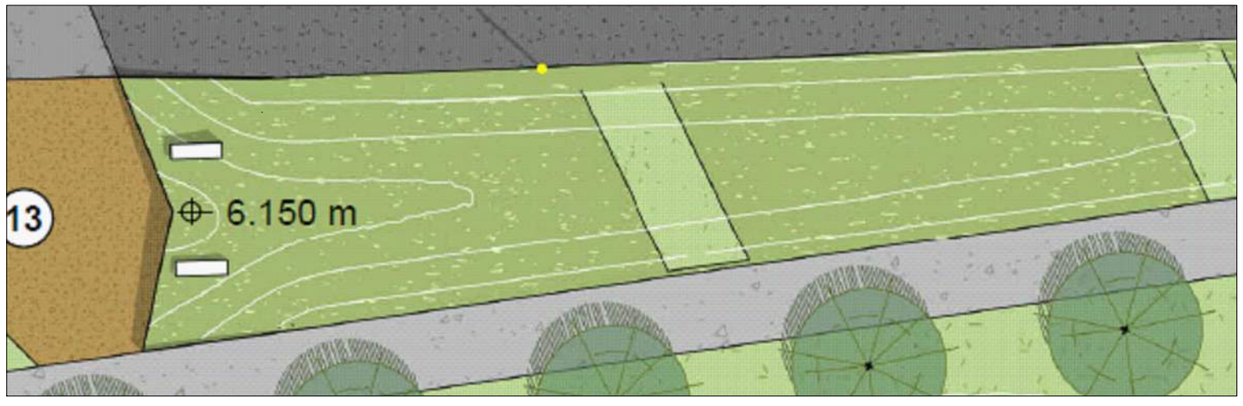
A3 SCALE NTS



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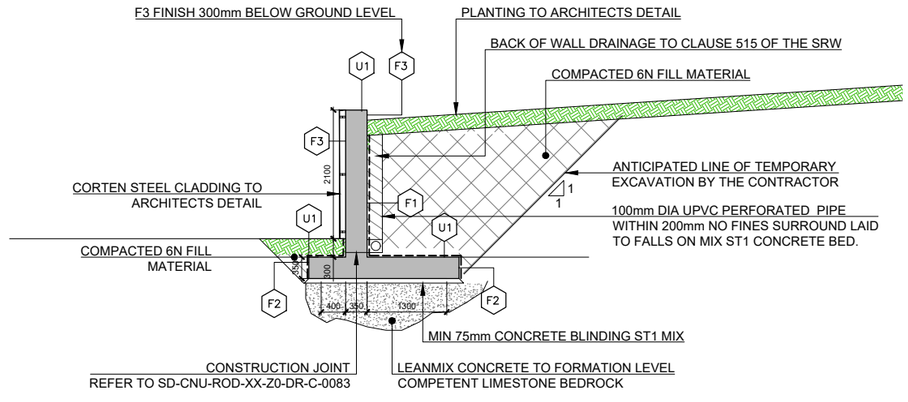

CROSS SECTION OF PROPOSED RETAINING WALL
A1 SCALE 1:50
A3 SCALE 1:100

CILL MHANTÁIN
Deiseanna Síorai

CUNNANE STRATTON REYNOLDS
LAND PLANNING & DESIGN

No.	Revision	Date	By	Chk'd	App'd
-	-	-	-	-	-

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Drawn	Designed	Checked	Approved	Suitability Code - Description
AC	AC	JB	JB	S0 - Work In Progress

Project Stage	Preliminary Design
Project Title	Murrough Masterplan for Wicklow Town
Drawing Title	Detail of Proposed Retaining Wall
Drawing Number	Project | Originator | Volume | Location | Type | Role | Number: MMWT - ROD - SBR - S01_AE - SK - CB - 300002
Scale (A1)	As Shown
Date:	JANUARY 2024
Job No:	24.138
Rev:	P0

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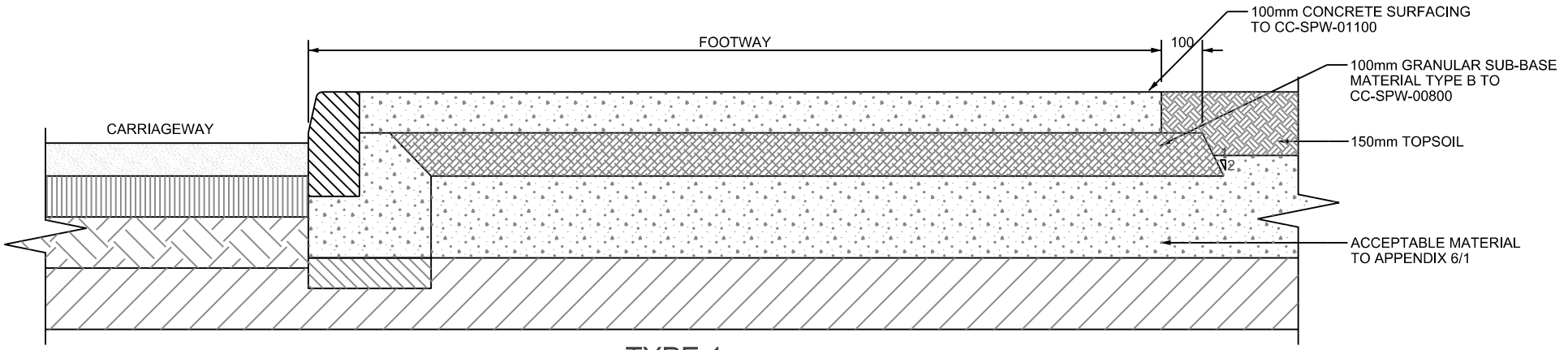

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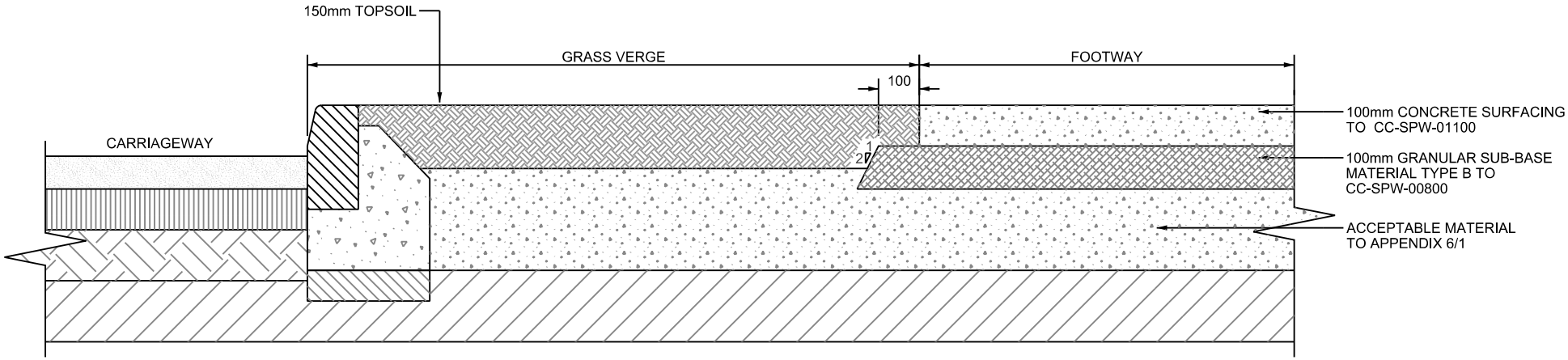

TYPE 2

NOTE:
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2. ALL DIMENSIONS ARE IN MILLIMETRES.

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

ACTIVITY: CC Construction & Commissioning

PUBLICATION TITLE: KERBS, FOOTWAYS AND PAVED AREAS
CONCRETE FOOTWAY

STREAM: STANDARD CONSTRUCTION DETAILS (SCD)

HISTORICAL REFERENCE	DOCUMENTATION SET	PUBLICATION DATE	PUBLICATION NUMBER		
			ACTIVITY	STREAM	DRAWING NUMBER
RCD/1100/5	STANDARDS	MARCH 2000	CC	SCD	01105

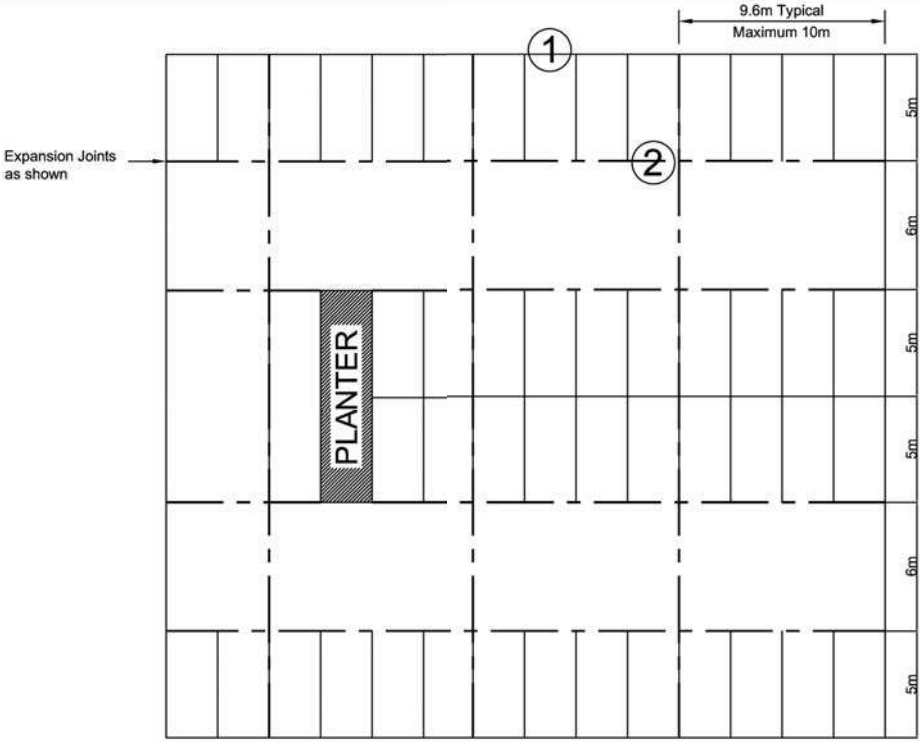
Parking Details

Grasscrete

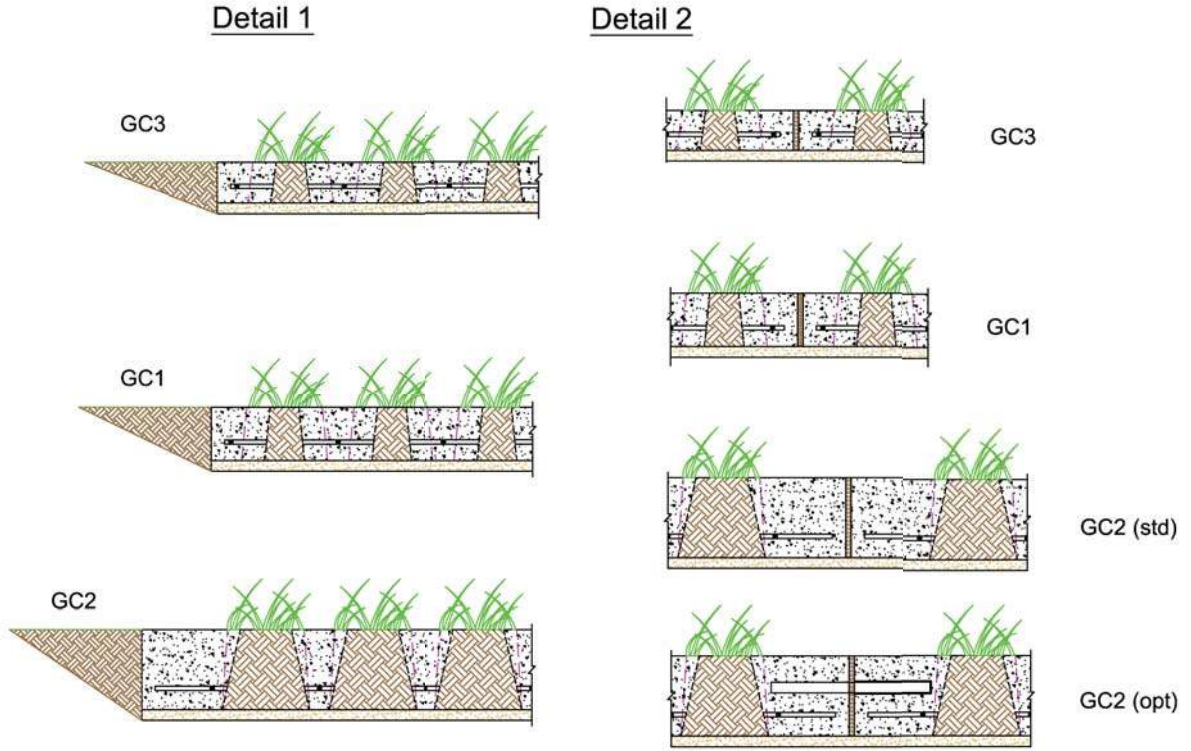
CAD

GrassConcrete

The following information is issued solely as an aid to design and does not assume liability in the final design. Information detailed is subject to change without notice.



Typical longitudinal bay layout for open two way flow.



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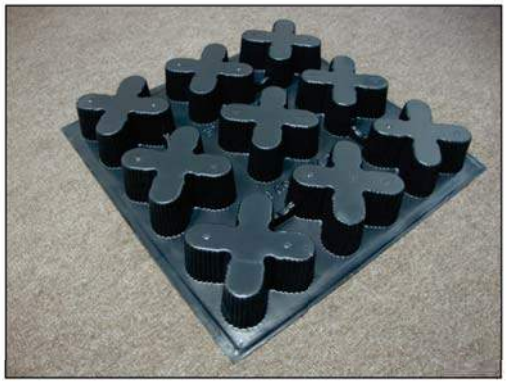

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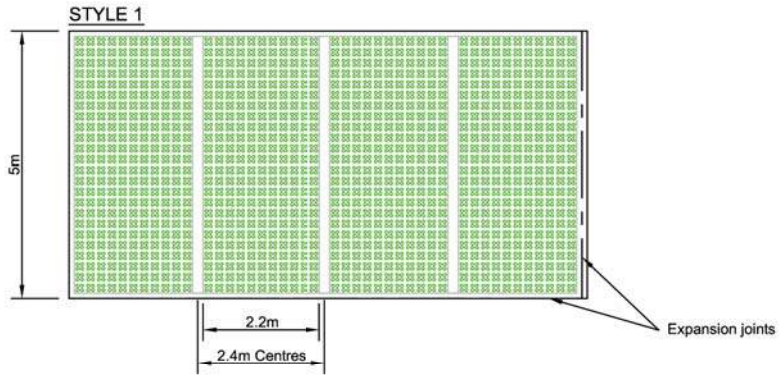
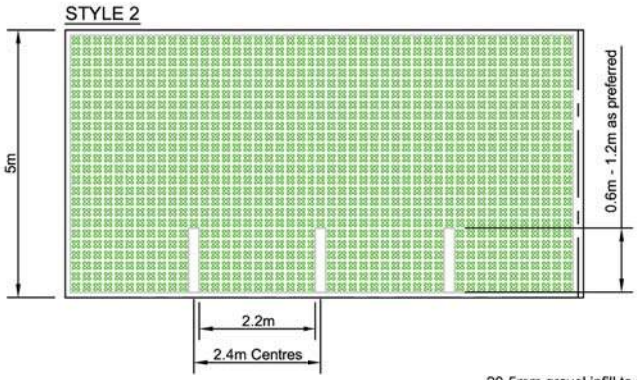
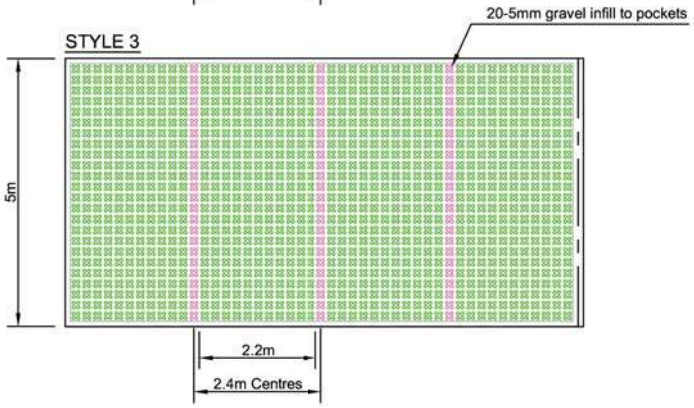
Tel: +44 (0) 1924 379443
Fax: +44 (0) 1924 290289
info@grasscrete.com
www.grasscrete.com

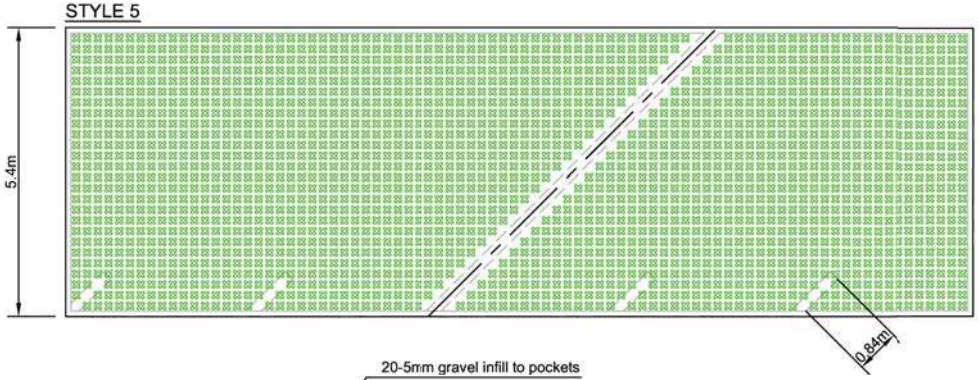
GrassConcrete

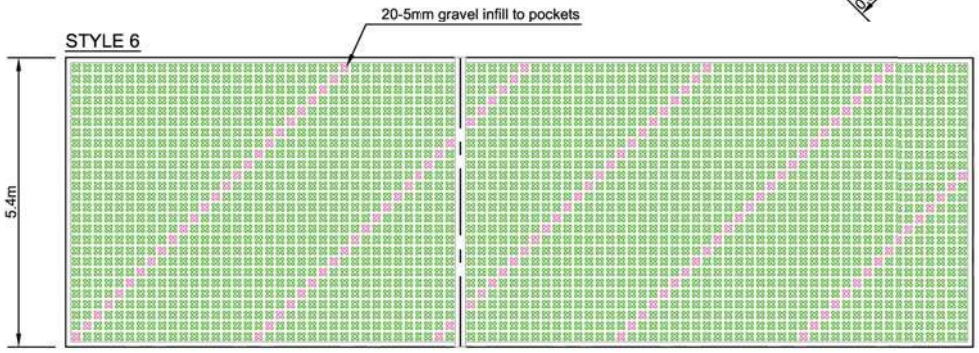
Client	N/A
Client Address	
Site Details	N/A
Site Address	
Revision History	
Drawn By	D Moorhouse
Date	01.12.2010
Checked By	REH
Scale	1:50 @ A3
Project Reference	
Project Title	Typical Grasscrete Parking Details - Carpark Layouts
Drawing Number	GC-CAD-0005
Revision	-











Note:
For commercial vehicle parking same principles are applied with dimensions increased according to vehicle type.

Parking Bay Delineation Types

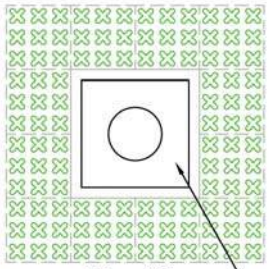
Scale 1 : 50

grass **concrete Ltd.**
Duncan House
142 Thornes Lane
Thornes
Wakefield
WF2 7RE
England
Tel: +44 (0) 1924 379443
Fax: +44 (0) 1924 290289
info@grasscrete.com
www.grasscrete.com

GrassConcrete

Client	N/A
Client Address	
Site Details	N/A
Site Address	
Revision History	
Drawn By	D Moorhouse
Date	21.01.2011
Checked By	REH
Scale	1:50 @ A3
Project Reference	
Project Title	Typical Grasscrete Parking Details - Carpark Delineation
Drawing Number	GC-CAD-0006
Revision	-

Tree pit (rectangular)



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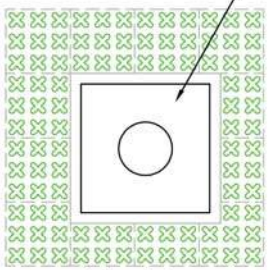
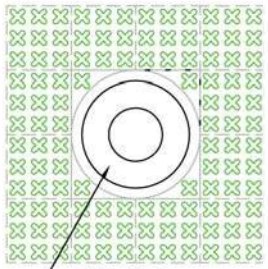
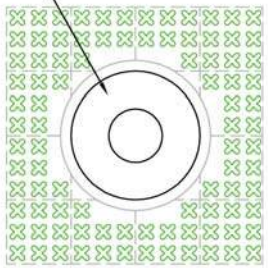


1.4m x 1.4m

Tree pit (circular)



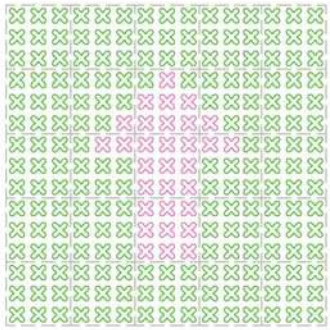
1.2m Radius



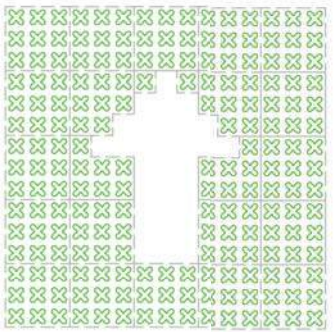
1.4m Radius

Optional infill with Grassroad© polypropylene pavers

Arrow Marker

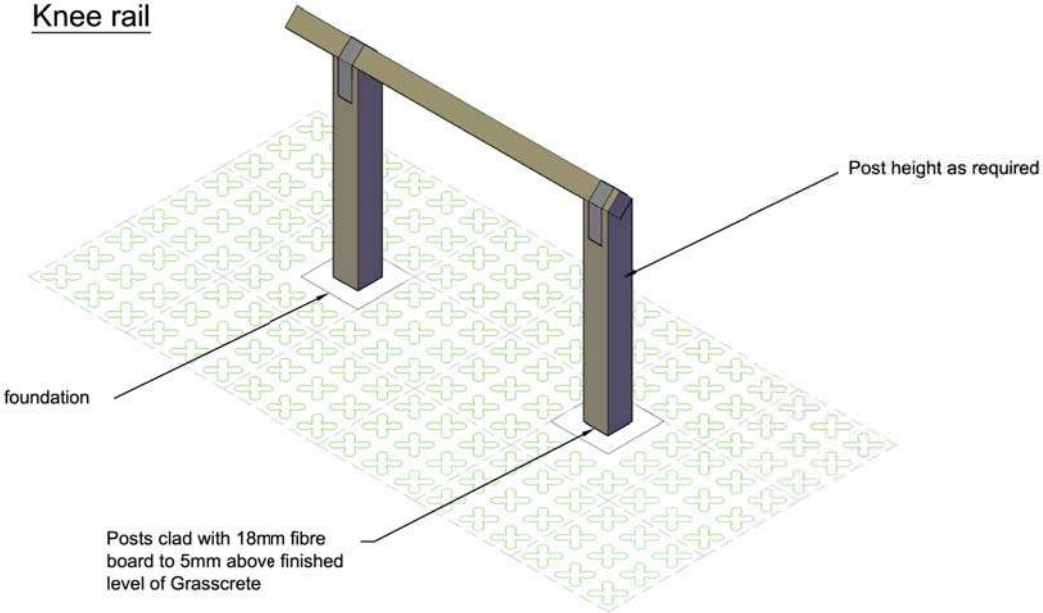


Pockets infilled with 20 to 5mm gravel

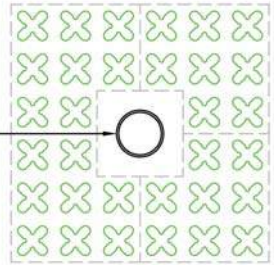


Pockets omitted and cast solid

Knee rail



Mortice for bollard or lighting



Twin wall PVCu pipe section set vertically to 5mm above finished level of Grasscrete to enable subsequent paring to level.

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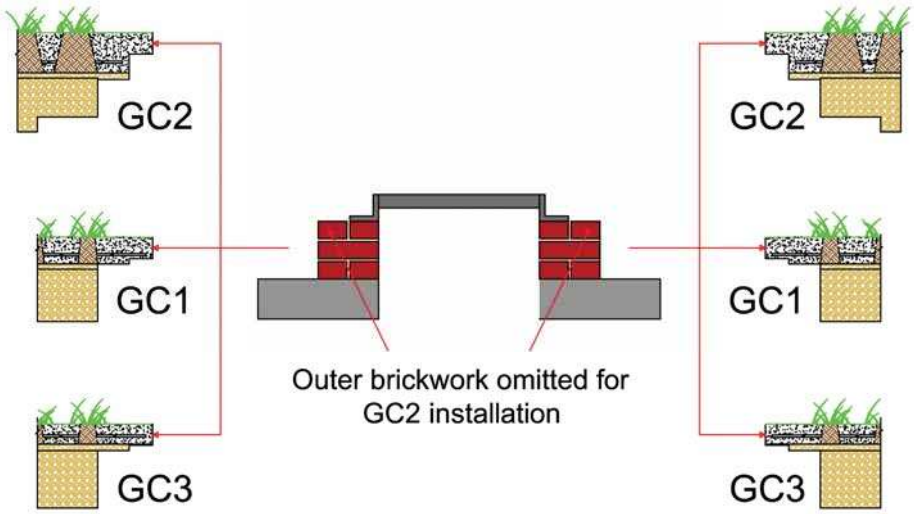
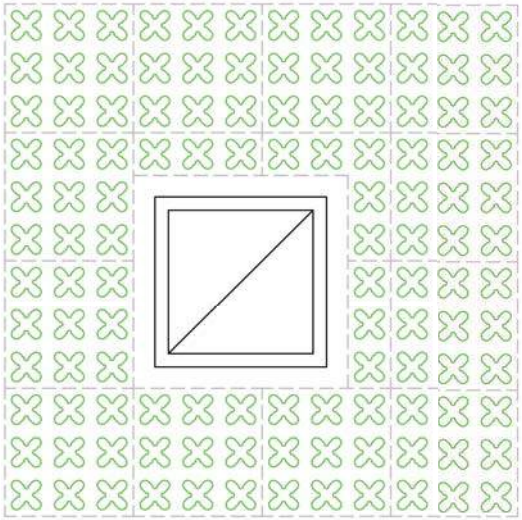
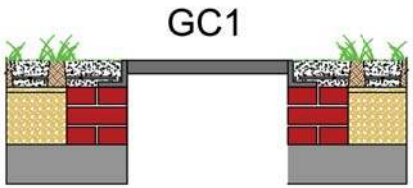
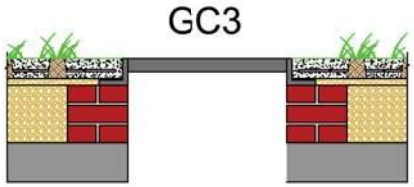
Client	N/A
Client Address	
Site Details	N/A
Site Address	
Revision History	
Drawn By	D Moorhouse
Date	21.01.2011
Checked By	REH
Scale	1:50 @ A3
Project Reference	
Project Title	Typical Grasscrete Parking Details - Features 1 of 2
Drawing Number	GC-CAD-0007
Revision	-

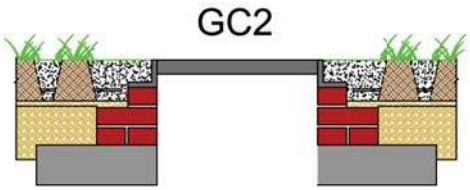


Man hole cover and frame aligned to grasscrete layout





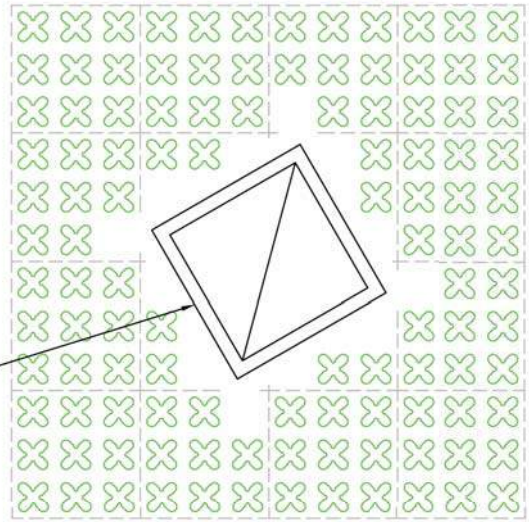




Man Hole Detailing
Scale 1 : 20

Where man holes/inspection chambers are installed not in alignment with the Grasscrete grid formation, a stepped concrete edge will be visible as shown.

Man hole cover and frame not aligned to grasscrete layout



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Site Address	
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Checked By	REH
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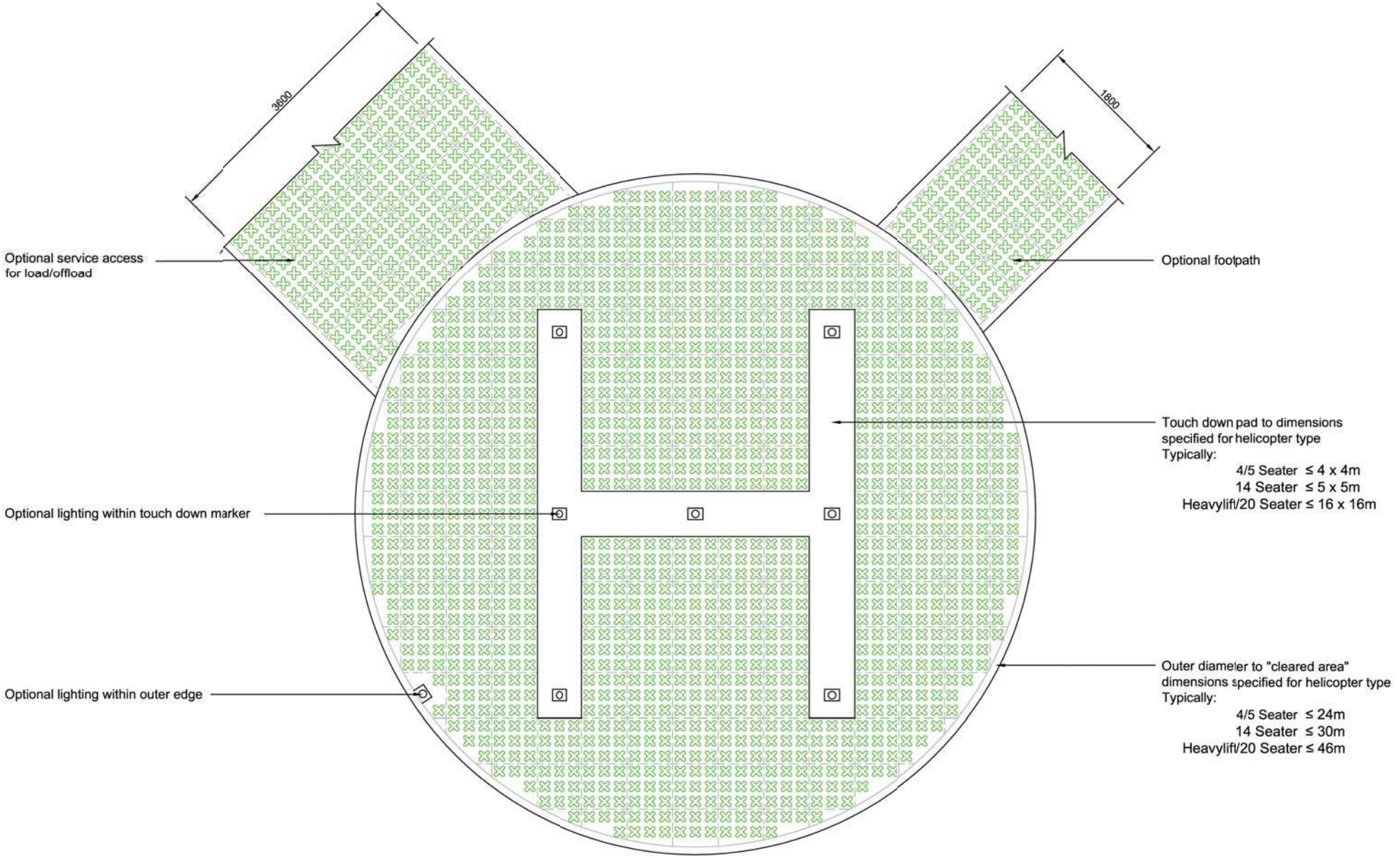
Project Title	Typical Grasscrete Parking Details - Features 2 of 2
Drawing Number	GC-CAD-0008
Revision	-



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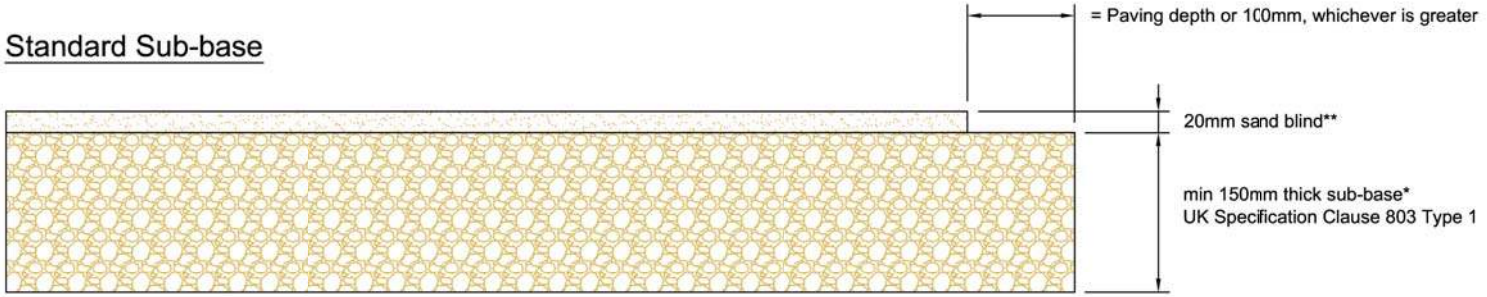
Site Address	
Revision History	
Drawn By	D Moorhouse
Date	24.01.2011
Checked By	REH
Scale	1:50 @ A3
Project Reference	
Project Title	Typical Grasscrete Parking Details - Helipad
Drawing Number	GC-CAD-0009
Revision	-

* Assuming an allowable ground bearing of 45kN/m². For typical sub grades, the following guideline can be considered:

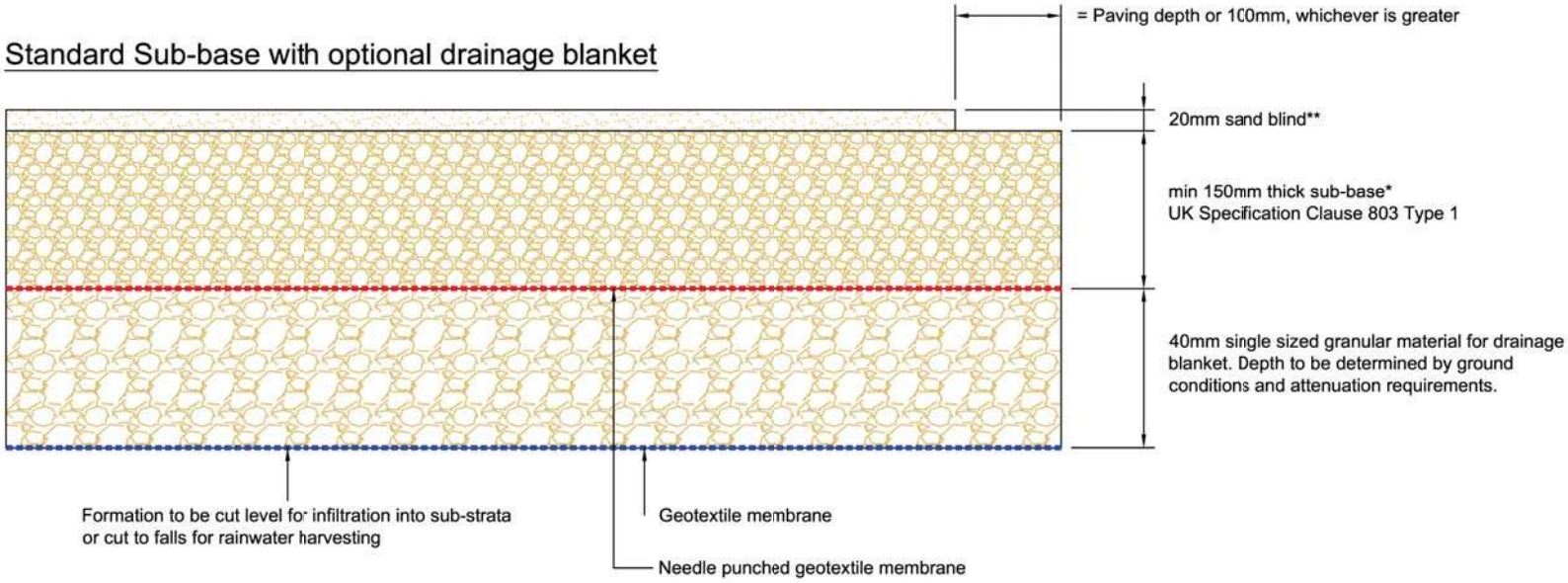
CBR 4%+	150mm Thick
CBR 2 - 4%	250 - 200mm Thick
CBR <2%	300mm + Thick

** The sand blinding layer is intended to create a uniform seating for the Grasscrete formers and to prevent the loss of soil into the sub-base. It is not intended to be a regulating layer.

Standard Sub-base



Standard Sub-base with optional drainage blanket



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Site Address	
Revision History	
Drawn By	D Moorhouse
Date	24.01.2011
Checked By	REH
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Project Reference	
Project Title	Typical Grasscrete Parking Details - Sub-base details
Drawing Number	GC-CAD-0010
Revision	-

APPENDIX D
FLOOD RISK ASSESSMENT

Prepared by
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MURROUGH WATERFRONT PARK ENHANCEMENT

Part 8 Planning - Flood Risk Assessment Report

January 2025

ROD
ROUGHAN & O'DONOVAN

Murrough Waterfront Park Enhancement

Part 8 Planning - Flood Risk Assessment Report

Document No: ..... 24.138-ROD-EWE-SW_AE-RP-EN-300001

Author:..... Aoife O'Sullivan (AOS)

Checker: ..... Ciaran McGee (CMG)

Approver:..... John Bell (JB)

Revision	Description	Made	Checked	Approved	Date
P01	DRAFT	AOS	CMG	JB	23/01/2025

Murrough Waterfront Park Enhancement
Part 8 Planning - Flood Risk Assessment Report

TABLE OF CONTENTS

1. INTRODUCTION

Roughan & O'Donovan Consulting Engineers has carried out a Flood Risk Assessment for the development of enhanced park and facilities at the Murrough Coastal Promenade area, Wicklow Town, Co. Wicklow. This report has been prepared to assess the flood risk to the site and adjacent lands as a result of the proposed development.

2. METHODOLOGY

2.1 Introduction

This report has been prepared in accordance with 'The Planning System and Flood Risk Management Guidelines for Planning Authorities' herein referred to as 'The Guidelines' as published by the Office of Public Works (OPW) and Department of Environment, Heritage and Local Government (DoHLG) in 2009.

2.2 Definition of Flood Risk

Flood risk is a combination of the likelihood of a flood event occurring and the potential consequences arising from that flood event and is then normally expressed in terms of the following relationship:

Flood risk = Likelihood of flooding x Consequences of flooding.

To fully assess flood risk an understanding of where the water comes from (i.e. the source), how and where it flows (i.e. the pathways) and the people and assets affected by it (i.e. the receptors) is required. Figure 2.1 below shows a source-pathway-receptor model reproduced from 'The Guidelines'.

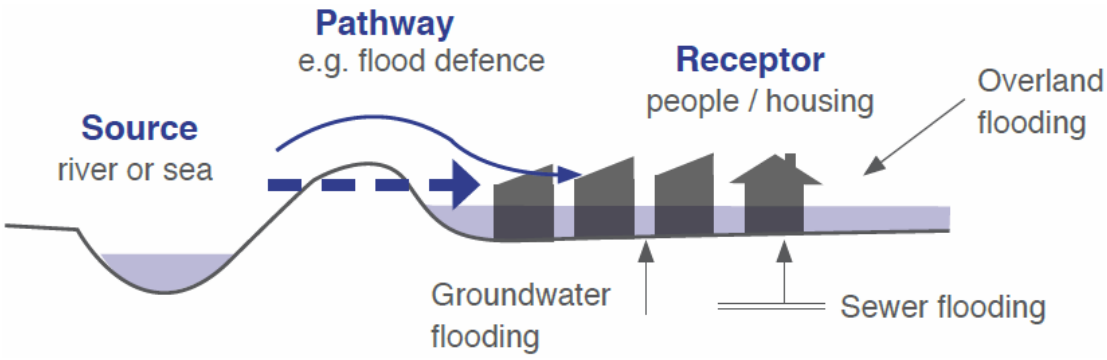


Figure 2.1 Source-Pathway-Receptor Model

The principal sources of flooding are rainfall or higher than normal sea levels. The principal pathways are rivers, drains, sewers, overland flow and river and coastal floodplains. The receptors can include people, their property and the environment. All three elements as well as the vulnerability and exposure of receptors must be examined to determine the potential consequences.

The guidelines set out a staged approach to the assessment of flood risk with each stage carried out only as needed. The stages are listed below:

- Stage I Flood Risk Identification – to identify whether there may be any flooding or surface water management issues.

- Stage II Initial Flood Risk Assessment – to confirm sources of flooding that may affect an area or proposed development, 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.
- Stage III 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.

2.3 Likelihood of Flooding

The Guidelines define the likelihood of flooding as the percentage probability of a flood of a given magnitude or severity occurring or being exceeded in any given year. It is generally expressed as a return period or annual exceedance probability (AEP). A 1% AEP flood indicates a flood event that will be equalled or exceeded on average once every hundred years and has a return period of 1 in 100 years. Annual Exceedance Probability is the inverse of return period as shown in Table 2.1 below.

Table 2.1 Correlation between return period and AEP

Return Period (years)	Annual Exceedance Probability (%)
1	100
10	10
50	2
100	1
200	0.5
1000	0.1

2.4 Definition of Flood Zones

Flood zones are geographical areas within which the likelihood of flooding is in a particular range and are split into three categories in The Guidelines:

Flood Zone A

Flood Zone A where the 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);

Flood Zone B

Flood Zone B where the 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 or 0.5% or 1 in 200 for coastal flooding);

Flood Zone C

Flood Zone C where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding. Flood Zone C covers all plan areas which are not in zones A or B.

It is important to note that when determining flood zones the presence of flood protection structures should be ignored. This is because areas protected by flood defences still carry a residual risk from overtopping or breach of defences and the fact that there is no guarantee that the defences will be maintained in perpetuity.

2.5 Objectives and Principles of the Planning Guidelines

The principle actions when considering flood risk are set out in the planning guidelines and are summarised below:

- *"Flood hazard and potential risk should be determined at the earliest stage of the planning process..."*
- *"Development should preferentially be located in areas with little or no flood hazard thereby avoiding or minimising the risk...."*
- *"Development should only be permitted in areas at risk of flooding when there are no alternative, reasonable sites available..."*
- *"Where development is necessary in areas at risk of flooding an appropriate land use should be selected"*
- *A precautionary approach should be applied, where necessary, to reflect uncertainties in flooding datasets and risk assessment techniques..."*
- *"Land required for current and future flood management... should be pro-actively identified..."*
- *"Flood risk to, and arising from, new development should be managed through location, layout and design incorporating Sustainable Drainage Systems (SuDS) and compensation for any loss of floodplain..."*
- *Strategic environmental assessment (SEA) of regional planning guidelines, development plans and local area plans should include flood risk as one of the key environmental criteria..."*

2.6 The Sequential Approach and Justification Test

The Guidelines outline the sequential approach that is to be applied to all levels of the planning process. This approach should also be used in the design and layout of a development and the broad philosophy is shown in Figure 2.2 below. In general, development in areas with a high risk of flooding should be avoided as per the sequential approach. However, this is not always possible as many town and city centres are within flood zones and are targeted for development.

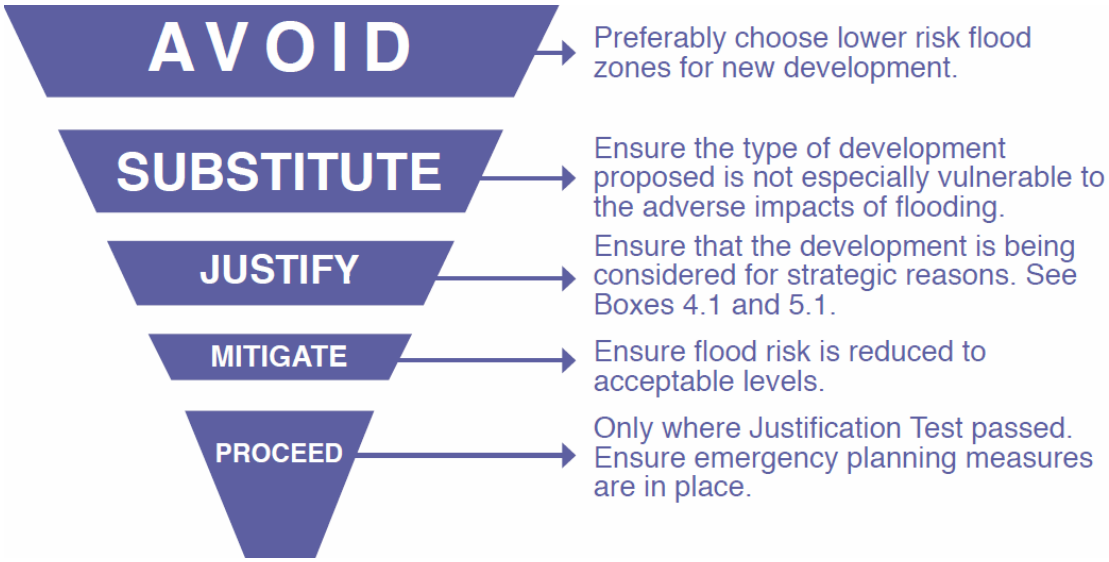


Figure 2.2 Sequential Approach (Source: The Planning System and Flood Risk Management)

The Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of developments that are being considered in areas of moderate or high flood risk. The test comprises the following two processes.

- The first is the Plan-making Justification Test and is used at the plan preparation and adoption stage where it is intended to zone or otherwise designate land which is at moderate or high risk of flooding.
- The second is the Development Management Justification Test and is used at the planning application stage where it is intended to develop land at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be inappropriate for that land.

Table 2.2 below illustrates the types of development that would be required to meet the Justification Test.

Table 2.2 Matrix of Vulnerability Versus Flood Zone to Illustrate Appropriate Development and that Required to Meet the Justification Test (Source: The Planning System and Flood Risk Management)

	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

3. PROJECT SCOPE

The proposed development consists of enhanced park and facilities at the Murrough Coastal Promenade area, Wicklow Town, Co. Wicklow. The enhanced park will provide new amenities to the town, enhancements on existing facilities and strengthen connections between the coast and the Leitrim River. The site is separated from the Leitrim River by public road for most of its length, and the proposals include for improved connectivity between the two. Additional car parking is to be provided at the north end of the site, and facilities for campervans is to be provided at the south end of the site. The site location is shown in Figure 3.1 below.

Figure 3.1 Site Location

4. STAGE 1 FLOOD RISK IDENTIFICATION

4.1 General

This Flood Risk Identification includes a review of the existing information and the identification of any flooding or surface water management issues in the vicinity of the proposed site that may warrant further investigation.

4.2 Vulnerability of the Proposed Site

As per the OPW Guidelines, the majority of the proposed development is classified as a "Water-Compatible" development as it comprises amenity open space while the campervan parking area is classified as a "Less Vulnerable Development" (refer to Figure 4.1 below).

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 4.1 Classification of vulnerability of different types of development (The Planning System and Flood Risk Management, Guidelines for Planning Authorities, November 2009)

4.3 Information Sources Consulted

The following information sources were consulted as part of the Stage I Flood Risk Identification:

Table 4.1 Information Sources Consulted

Source	Comments
Irish Coastal Protection Strategy Study (ICPSS)	OPW Coastal flood Maps
Catchment Flood Risk Assessment and Management Study (CFRAM)	Fluvial & tidal flooding examined; www.floodinfo.ie
National Indicative Fluvial Maps	www.floodinfo.ie
Wicklow County Development Plan 2022 - 2028	Chapter 14 Flood Risk Management Strategic Flood Risk Assessment
Draft Wicklow Town – Rathnew Local Area Plan 2025	Map No.04 Indicative Flood Zones Draft Strategic Flood Risk Assessment
OPW flood records	www.floodinfo.ie
OPW drainage districts	www.floodinfo.ie
National Coastal Flood Hazard Mapping 2021	Coastal Flooding for Present Day, Mid-Range Future Scenario and High-End Future Scenario
Geological Survey of Ireland (GSI) Maps	GSI Teagasc subsoils map consulted to identify if alluvium is present at development site that may indicate the presence of a watercourse and floodplain. Groundwater Flood Data maps consulted to identify if historic groundwater flooding has been recorded within the vicinity of the site.
Historical Maps	OSI Geo Hive 25" and 6'' Historic Mapping
Historical Flooding Events	Historic news articles consulted to identify if historic flooding has been recorded within the immediate vicinity of the development lands.

4.3.1 Previous Flood Risk Assessments and Predictive Flood Maps

(i) Irish Coastal Protection Strategy Study

The Irish Coastal Protection Strategy Study (ICPSS) Phase 2, undertaken by the OPW, covers coastal flooding throughout Ireland. The aim of the ICPSS was to establish extreme coastal flood extents, produce coastal flood extent and flood depth maps and assess and quantify the hazard and potential risk associated with coastal erosion.

The ICPSS flood maps indicate that the development lands are outside but immediately adjacent to the 0.5% and 0.1% AEP tidal flood extents for the Current, Mid Range Future and High End Future Scenarios. The ICPSS mapping does not consider flood defence infrastructure.

The Irish Coastal Protection Strategy Study Phase 2 flood mapping associated with the site is shown in Appendix B.

(ii) Catchment Flood Risk Assessment and Management Study

The Project area is covered within the Eastern CFRAM study areas. The CFRAM programme led by the OPW, provides a detailed assessment of flooding

in areas identified as AFA's during the Preliminary Flood Risk Assessment (PFRA) study. Catchment wide Flood Risk Management Plans were also developed as part of the programme.

The CFRAM mapping does not indicate any fluvial or coastal flooding within the proposed development in extreme fluvial or coastal (0.1%AEP) flood events. However areas adjacent to the proposed development lands are shown to be within Flood Zone A.

The CFRAMs Flood Maps is shown in Appendix C.

(iii) National Indicative Fluvial Maps

The indicative fluvial flood maps were finalised in December 2020. The mapping presents flood extents for river reaches that were not previously modelled as part of the CFRAMS and have catchments larger than 5km². As per the OPW, the use of these maps is to '*provide an indication of areas that maybe prone to flooding. These are not necessarily locally accurate and should not be used as the sole basis for defining the Flood Zones nor for making decisions on planning applications.* The maps identify the site as being outside any fluvial flood extents.

The National Indicative Fluvial Map associated with the site is shown in Appendix D.

(iv) Wicklow County Council Development Plan 2025 – 2028 Strategic Flood Risk Assessment & Draft Wicklow Town – Rathnew Local Area Plan 2025 Strategic Flood Risk Assessment

The purpose of the SFRA's is to provide sufficient information to allow proper planning decisions to be made on sites at risk of flooding over the lifetime of the County Development Plan / Local Area Plan. The county development plan flood management map (map 14.01) is drawn at a scale of 1:300,000 at A4 making the flood extents relative to the site illegible and as such, the Draft Wicklow Town – Rathnew Local Area Plan 2025 SFRA has been consulted. The Draft Local Area Plan Indicative Flood Zones Map (Map No.4) shows no indication of flooding within the proposed development site, however the adjacent lands lie within Flood Zone A and B. The proposed development site is partially shown within an area of potential future flood risk (indicative future scenario flood zone) however the proposed vehicle camping spaces are outside of these extents. The Draft Wicklow Town – Rathnew Local Area Plan 2025 Strategic Flood Risk Assessment Justification Test also concludes that the development site is suitable for the following types of development:

- *Formal and informal landscaped parks with off-road walking / cycling paths, as well as playgrounds, skate parks, 'Mixed Use Games Areas' and outdoor gyms;*
- *Tourist / visitor infrastructure including car parking, Aires sites, information signage / booths, toilets;*
- *Buildings / infrastructure associated with safety, rescue, utilities, etc.*
- *Seasonal markets / fairs / events*

The Wicklow County Council Development Plan 2022 – 2028 Flood Management Map & Draft Wicklow Town – Rathnew Local Area Plan 2025 Indicative Flood Zones Map are shown in Appendix E.

(v) OPW Flood Records

The OPW National Flood Hazard Mapping Web Site, www.floodinfo.ie, was examined to identify any recorded flood events within the vicinity of the proposed

development site. A recurring past flood event (insufficient capacity in a culvert) is recorded approximately 900m northwest of the development site while a second recurring flood event (throttle effect occurring at a bridge on the Marlton Stream) is recorded approximately 1km southwest from the development. A single Coastal/Estuarine related flood event was also recorded in 2018 that occurred approximately 1.2km south of the site.

The OPW Flood Records are shown in Appendix F.

(vi) OPW Drainage Districts

Drainage Districts are areas where drainage schemes to improve land for agricultural purposes were constructed. Under the Arterial Drainage Act, 1945 the OPW undertook a number of arterial drainage schemes to improve land for agricultural production. The OPW has a statutory duty to maintain these schemes, which is delivered through their arterial drainage maintenance programme. The OPW does not have powers to undertake river or channel maintenance other than where these rivers form part of an arterial drainage scheme or flood relief schemes.

There are no OPW Drainage Districts located within the vicinity of the proposed development.

The OPW Drainage Districts Map for the site location is shown in Appendix G.

(vii) National Coastal Flood Hazard Mapping 2021

The national scale coastal flood hazard maps from the ICPSS project that were published by OPW under the PFRA in 2012 are now superseded by the outputs of the National Coastal Flood Hazard Mapping (NCFHM) 2021 project. The maps show the worst case scenario as any flood defences potentially protecting the coastal floodplain are not taken into account, and so are in-line with the definition of the Flood Zones as set out in the Guidelines. The National Coastal Flood Hazard Mapping shows that the proposed development is within Flood Zone C for the present day scenario, mid-range future scenario and high-end future scenario.

The National Coastal Flood Hazard Mapping 2021 associated with the site is shown in Appendix H.

(viii) GSI Maps

GSI Teagasc subsoil and subsoil (Quaternary Sediments) maps were sourced from the GSI Groundwater Data Viewer. The mapping shows that the subsoil characteristics of the proposed site comprise of made ground and marine beach sands. The GSI Bedrock Geology shows that the site is underlain by the Wicklow Head Formation with no evidence of karst in the area. The groundwater vulnerability of the majority of the site is classified as low with a small area on the eastern side of the site classified as high. Finally, the GSI Subsoil Permeability mapping shows that the majority of the site has low permeability with the area of high vulnerability having a high permeability rate.

The GSI groundwater flooding mapping show no indication of flooding at the site.

Refer to Appendix I for GSI mapping.

Refer to Appendix J GSI Groundwater Flooding Probability mapping.

(ix) Historical Maps

Historical maps were consulted to indicate possible areas of flooding documented in the past. The enclosed historical maps have been prepared

using GeoHive, web-based access to authoritative Irish spatial data from multiple providers, including Ordnance Survey Ireland (OSI). No areas of past flooding were indicated on the 6" Cassini or 25" historical maps.

Refer to Appendix K for Historical Maps.

(x) Historic Flood Events

A web search of historic news articles was undertaken to determine if there are any recorded historic flooding events within the vicinity of the site. There are no indications of flooding from historic news articles within the immediate vicinity of the site. The historic news articles indicate that flooding as a result of heavy rainfall occurred in Wicklow Town in September 2019 and January 2013 while flooding as a result of high tides and heavy rainfall was also recorded in February 2014.

Refer to Appendix L for Historic news reports.

4.4 Source – Pathway – Receptor Model

The following source-pathway-receptor model has been developed using the information examined in the Stage I Flood Risk Identification to categorise the sources of flooding, where it flows to (pathway), and the people and infrastructure affected by it (receptors). The likelihood and consequences of each type of flooding have also been assessed to determine the risk. These are summarised in Table 4.2 (adapted from Appendix A of the Guidelines).

Table 4.2 Source-Pathway-Receptor Model

Source	Pathway	Receptor	Likelihood	Consequence	Risk
Coastal	Extreme tides, storm surges or wave overtopping	The Proposed Development	Moderate Possibility	Moderate (Coastal water body and flood extents are immediately adjacent to the site)	Moderate (due to the close proximity of the flood extents to the development)
Fluvial	Overland flow, out of bank	The Proposed Development	Low Possibility	Moderate (distance from fluvial waterbodies and site elevations limit possible flood extents, Development site is within flood zone C)	Low (due to relative distance and elevation of site above nearest fluvial watercourse)
Pluvial / Surface Water	Extreme rainfall events and inadequate surface water drainage	The Proposed Development	Low Possibility	Low (no indicators of previous surface water / pluvial flooding)	Low (if appropriate drainage system is incorporated in development and maintained appropriately)
Ground Water	Rising groundwater levels	The Proposed Development	Low Possibility	Moderate (no indication of previous groundwater	Low (no indication of previous groundwater flooding on the site)

Source	Pathway	Receptor	Likelihood	Consequence	Risk
				flooding at the site)	

4.5 Stage 1 Conclusions

A number of sources of information consulted as part of this Stage 1 assessment indicate that the land immediately adjacent to the site are at risk of coastal flooding. Therefore, a Stage 2 – Initial Flood Risk Assessment is required for the proposed development.

5. STAGE 2 – INITIAL FLOOD RISK ASSESSMENT

5.1 General

The Stage 2 Initial Flood Risk Assessment will confirm the sources of flooding that may affect the proposed development site and appraise the adequacy of existing information.

5.2 Sources of Flooding

5.2.1 Flooding from Sea Level Rises / Coastal Flooding

The Irish Sea and the River Varty Estuary is located immediately adjacent to the proposed development site. The character of the site is influenced by its proximity to these tidal waterbodies, as such, the most prevalent flood risk to the site is from extreme coastal inundation events or coastal events in combination with extreme fluvial events.

As part of the development, it is proposed that ground levels will generally match existing ground levels across the site. A topographic survey undertaken for the site was used to determine the lowest ground level on the site relative to predicted flood levels. The lowest ground level on the site was determined as 3.52mAOD in elevation. The Eastern CFRAMS and ICPSS hydraulic modelling undertaken for the subject watercourses adjacent to the proposed development site has been reviewed and summary outputs are presented below. The CFRAMS and ICPSS mapping indicating model node locations are presented in Appendices B and C.

Table 5.1 CFRAMS Model Outputs – Fluvial Flooding

Node Label	Water Level (OD) 1% AEP	Water Level (OD) 0.1% Level
1016M00148	1.61	1.66
1016M00103	1.61	1.66
1016M00078	1.61	1.65
1016M00063	1.62	1.65
1016M00016	1.65	1.66

Table 5.2 CFRAMS Model outputs – Coastal Flooding

Node Label	Water Level (OD) 0.5% AEP	Water Level (OD) 0.1% Level
1016M00163D	2.00	2.17
1016M00154D	2.00	2.17
1016M00103	2.06	2.24
1016M00051D	2.12	2.30
1016M00016	2.24	2.45

Table 5.3 ICPSS Model outputs – Coastal Flooding

Node Label	Node Description	Water Level (OD) 0.5% AEP	Water Level (OD) 0.1% Level
Point 12	Wicklow Bay – South of the Eastern Site Boundary	2.26	2.48

The minimum ground elevation for the proposed development is 3.52mAOD which is above the highest recorded CFRAM level of 2.24mAOD and ICPSS level of 2.26mAOD in a 1 in 200 year coastal flood event. The minimum ground level on site is also above the highest recorded CFRAM level of 2.45mAOD and ICPSS level of 2.48mAOD in a 1 in 1000 year coastal flood event. Therefore, it can be determined from both the CFRAMS and ICPSS flood extents that the entire development lies within Flood Zone C.

As per the OPW Guidelines, the majority proposed development is regarded as a "Water Compatible Development" which is appropriate for Flood Zone A, B and C, with the exception of the campervan parking area, which lies outside the flood extents at a ground level of 4.65mAOD. This area is classed as "Less Vulnerable Development" and is therefore appropriate within Flood Zone B and C.

Table 4.2 of the Wicklow County Development Plan 2025 – 2028 Strategic Flood Risk Assessment outlines climate change allowances by vulnerability and flood source. For less vulnerable development, a tidal climate change allowance of 0.5m increase in sea level for the MRFS should be used. Table 5.4 below outlines this factor applied to the highest recorded CFRAM and ICPSS coastal flood levels adjacent to the development site.

Table 5.4 Wicklow County Development Plan 2025 – 2028 Strategic Flood Risk Assessment Climate Change Factors

Node Label	Water Level (OD) 0.5% AEP	Water Level (OD) 0.5% AEP + 0.5m (MRFS)
1016M00016 (CFRAMS)	2.24	2.74
Point 12 (ICPSS)	2.26	2.76

The lowest ground level on site is approximately 780mm above the CFRAMS 0.5% AEP Flood Level (including MRFS climate change allowance) and approximately 760mm above the ICPSS 0.5% AEP Flood Level (including MRFS climate change allowance). This is considered a suitable freeboard given the nature of the proposed development.

The MRFS climate scenario was reviewed for both the CFRAMS and ICPSS mapping. These show the effect of climate change induced sea level rise. In extreme flood events exacerbated by climate change the development will likely have an imperceptible impact on flooding in surrounding lands. Any flood waters displaced by the proposed development will be insignificant in comparison with coastal flooding volumes.

6. FLOOD RISK ASSESSMENT CONCLUSION

The Murrough Waterfront Park Enhancement Project has been assessed for existing and future sources of flood risk. The most up to date flood extent mapping undertaken as part of the CFRAMS programme and the National Coastal Flood Hazard Mapping 2021 programme has been reviewed and does not indicate fluvial, coastal or in combination coastal/fluvial flooding on the subject site in the 1 in 200 year or 1 in 1000 year coastal flood event. As per the OPW Guidelines, the entirety of the development site appears to be within Flood Zone C and the proposed development is therefore deemed suitable for the associated flood risk in line with the sequential approach.

APPENDIX A

GLOSSARY OF TERMS

GLOSSARY OF TERMS

Catchment: The area that is drained by a river or artificial drainage system.

Catchment Flood Risk Assessment and Management Studies (CFRAMS): A catchment-based study involving an assessment of the risk of flooding in a catchment and the development of a strategy for managing that risk in order to reduce adverse effects on people, property and the environment. CFRAMS precede the preparation of Flood Risk Management Plans (see entry for FRMP).

Climate change: Long-term variations in global temperature and weather patterns, which occur both naturally and as a result of human activity, primarily through greenhouse gas emissions.

Core of an urban settlement: The core area of a city, town or village which acts as a centre for a broad range of employment, retail, community, residential and transport functions.

Detailed flood risk assessment: A methodology to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of flood hazard and potential risk to an existing or proposed development, of its potential impact on flood elsewhere and of the effectiveness of any proposed measures.

Estuarial (or tidal) flooding: Flooding from an estuary, where water level may be influenced by both river flows and tidal conditions, with the latter usually being dominant.

Flooding (or inundation): Flooding is the overflowing of water onto land that is normally dry. It may be caused by overtopping or breach of banks or defences, inadequate or slow drainage of rainfall, underlying groundwater levels or blocked drains and sewers. It presents a risk only when people, human assets and ecosystems are present in the areas that flood.

Flood Relief Schemes (FRS): A scheme designed to reduce the risk of flooding at a specific location.

Flood Defence: A man-made structure (e.g. embankment, bund, sluice gate, reservoir or barrier) designed to prevent flooding of areas adjacent to the defence.

Flood Risk Assessment (FRA): FRA can be undertaken at any scale from the national down to the individual site and comprises 3 stages: Flood risk identification, initial flood risk assessment and detailed flood risk assessment.

Flood Risk Identification: A desk- based study to identify whether there may be any flooding or surface water management issues related to a plan area or proposed development site that may warrant further investigation.

Flood Hazard: The features of flooding which have harmful impacts on people, property or the environment (such as the depth of water, speed of flow, rate of onset, duration, water quality, etc.).

Floodplain: A flood plain is any low-lying area of land next to a river or stream, which is susceptible to partial or complete inundation by water during a flood event.

Flood Risk: An expression of the combination of the flood probability, or likelihood and the magnitude of the potential consequences of the flood event.

Flood Storage: The temporary storage of excess run-off, or river flow in ponds, basins, reservoirs or on the flood plain.

Flood Zones: A geographic area for which the probability of flooding from rivers, estuaries or the sea is within a particular range.

Fluvial flooding: Flooding from a river or other watercourse.

Groundwater flooding: Flooding caused by groundwater escaping from the ground when the water table rises to or above ground level.

Initial flood risk assessment: A qualitative or semi-quantitative study to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information, to provide a qualitative appraisal of the risk of flooding to development, including the scope of possible mitigation measures, and the potential impact of development on flooding elsewhere, and to determine the need for further detailed assessment.

Freeboard: Factor of safety applied for water surfaces. Defines the distance between normal water level and the top of a structure, such as a dam, that impounds or restrains water.

Justification Test: An assessment of whether a development proposal within an area at risk of flooding meets specific criteria for proper planning and sustainable development and demonstrates that it will not be subject to unacceptable risk nor increase flood risk elsewhere. The justification test should be applied only where development is within flood risk areas that would be defined as inappropriate under the screening test of the sequential risk-based approach adopted by this guidance.

Likelihood (probability) of flooding: A general concept relating to the chance of an event occurring. Likelihood is generally expressed as a probability or a frequency of a flood of a given magnitude or severity occurring or being exceeded in any given year. It is based on the average frequency estimated, measured or extrapolated from records over a large number of years and is usually expressed as the chance of a particular flood level being exceeded in any one year. For example, a 1-in-100 or 1% flood is that which would, on average, be expected to occur once in 100 years, though it could happen at any time.

Ordnance Datum (or OD) Malin: is a vertical datum used by an ordnance survey as the basis for deriving altitudes on maps. A spot height may be expressed as AOD for "above ordnance datum". Usually mean sea level (MSL) is used for the datum. In the Republic of Ireland, OD for the Ordnance Survey of Ireland is Malin Ordnance Datum: the MSL at Portmoor Pier, Malin Head, County Donegal, between 1960 and 1969. Prior to 1970, Poolbeg Ordnance Datum was used: the low water of spring tide at Poolbeg lighthouse, Dublin, on 8 April 1837. Poolbeg OD was about 2.7 metres lower than Malin OD.

Management Train/Treatment Train: the sequence of drainage components that collect, convey, store and treat runoff as it drains through the site.

Mitigation: The term is used to describe an action that helps to lessen the impacts of a process or development on the receiving environment. It is used most often in association with measures that would seek to reduce negative impacts of a process or development.

Pathways: These provide the connection between a particular source (e.g. high river or tide level) and the receptor that may be harmed (e.g. property). In flood risk management, pathways are often 'blocked' by barriers, such as flood defence structures, or otherwise modified to reduce the incidence of flooding.

Pluvial flooding: Usually associated with convective summer thunderstorms or high intensity rainfall cells within longer duration events, pluvial flooding is a result of rainfall-generated overland flows which arise before run-off enters any watercourse or sewer. The intensity of rainfall can be such that the run-off totally overwhelms surface water and underground drainage systems.

Regional Planning Guidelines (RPG): These provide the regional context and priorities for applying national planning strategy to each NUTS III region and encourage greater co-ordination of planning policies at the city/county level. RPGs are an important part of the flood policy hierarchy as they can assist in co-ordinating flood risk management policies at the regional level.

Resilience: Sometimes known as "wet-proofing", resilience relates to how a building is constructed in such a way that, although flood water may enter the building, its impact is minimised, structural integrity is maintained, and repair, drying and cleaning and subsequent reoccupation are facilitated.

Receptors: Things that may be harmed by flooding (e.g. people, houses, buildings or the environment).

Residual risk: The risk which remains after all risk avoidance, substitution and mitigation measures have been implemented, on the basis that such measures can only reduce risk, not eliminate it.

Sequential Approach: The sequential approach is a risk-based method to guide development away from areas that have been identified through a flood risk assessment as being at risk from flooding. Sequential approaches are already established and working effectively in the plan-making and development management processes.

Sustainable Drainage System (SuDS): Drainage systems that are considered to be environmentally beneficial, causing minimal or no long-term detrimental impact.

Site-specific Flood Risk Assessment: An examination of the risks from all sources of flooding of the risks to and potentially arising from development on a specific site, including an examination of the effectiveness and impacts of any control or mitigation measures to be incorporated in that development.

Source: Refers to a source of hazard (e.g. the sea, heavy rainfall).

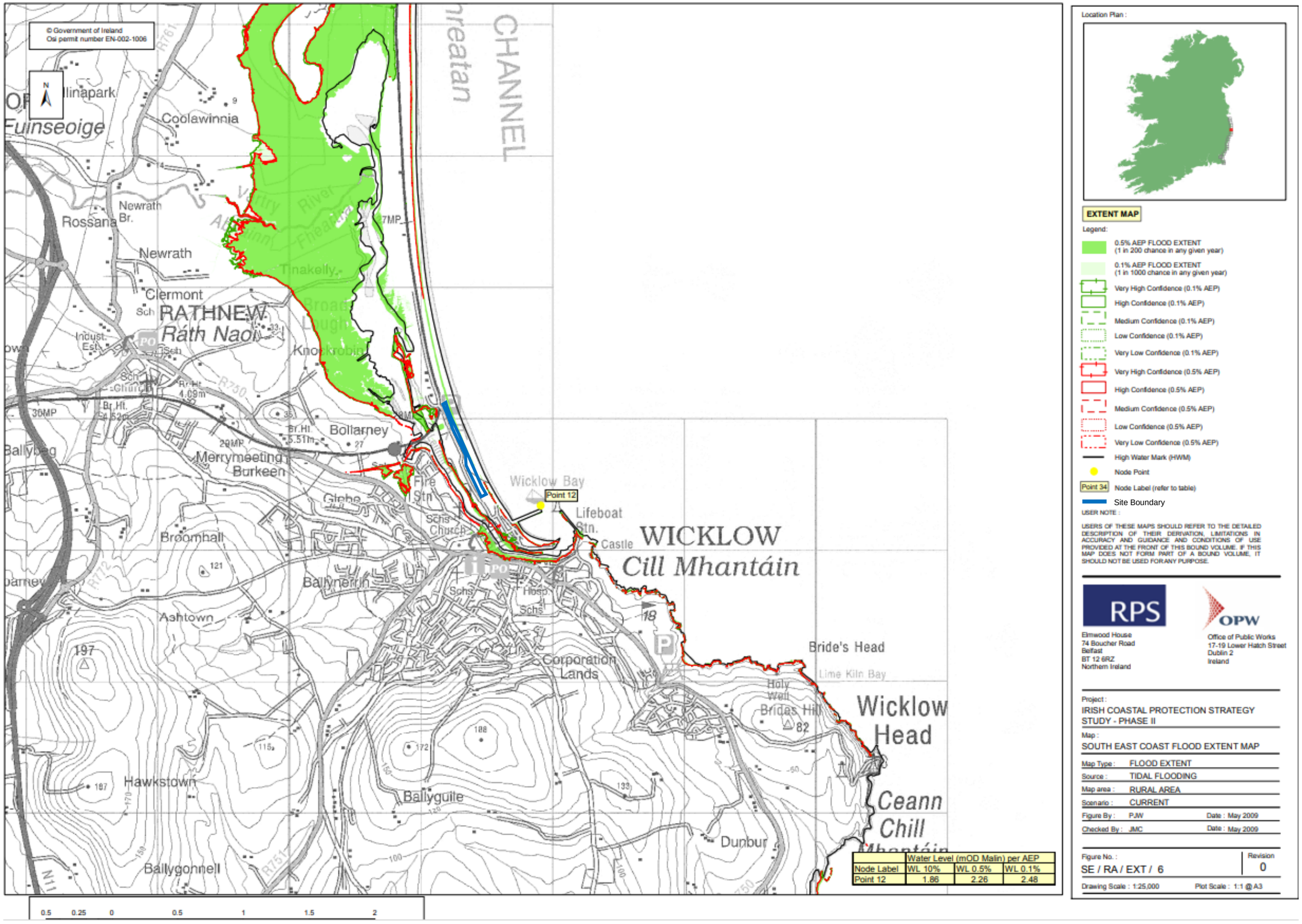
Strategic Flood Risk Assessment: The assessment of flood risk on a wide geographical area against which to assess development proposed in an area (Region, County, Town).

Vulnerability: The resilience of a particular group of people or types of property or habitats, ecosystems or species to flood risk, and their ability to respond to a hazardous condition and the damage or degree of impact they are likely to suffer in the event of a flood. For example, elderly people may be more likely to suffer injury, and be less able to evacuate, in the event of a rapid flood than younger people.

Source: *The definitions above are sourced from the DoEHLG Guidelines for Planning Authorities on 'The Planning System and Flood Risk Management, 2009' and Ciria 753 "the SuDS Manual".*

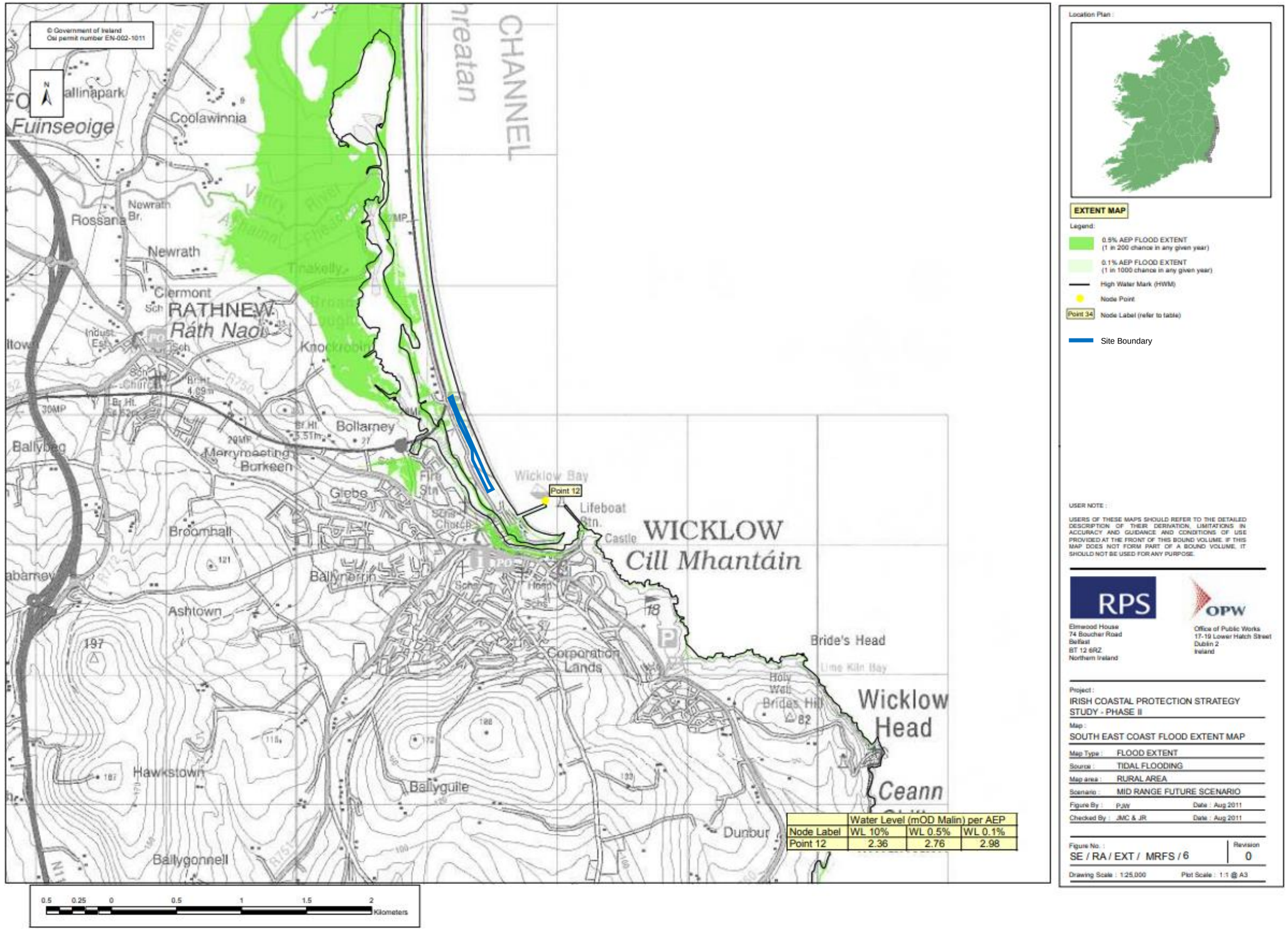
APPENDIX B

IRISH COASTAL PROTECTION STRATEGY STUDY MAPPING



	Water Level (mOD Malin) per AEP		
Node Label	WL 10%	WL 0.5%	WL 0.1%
Point 12	1.86	2.26	2.48

Figure B-1: ICPSS Southeast Coast Flood Map Extent – Current Scenario



	Water Level (mOD Malin) per AEP		
Node Label	WL 10%	WL 0.5%	WL 0.1%
Point 12	2.36	2.76	2.98

Location Plan :

EXTENT MAP

Legend:

- 0.5% AEP FLOOD EXTENT (1 in 200 chance in any given year)
- 0.1% AEP FLOOD EXTENT (1 in 1000 chance in any given year)
- High Water Mark (HWM)
- Node Point
- Point 34 — Node Label (refer to table)
- Site Boundary

USER NOTE :

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF A BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.

RPS
Elmwood House
74 Boucher Road
Belfast
BT 12 6RZ
Northern Ireland

OPW
Office of Public Works
17-19 Lower Hatch Street
Dublin 2
Ireland

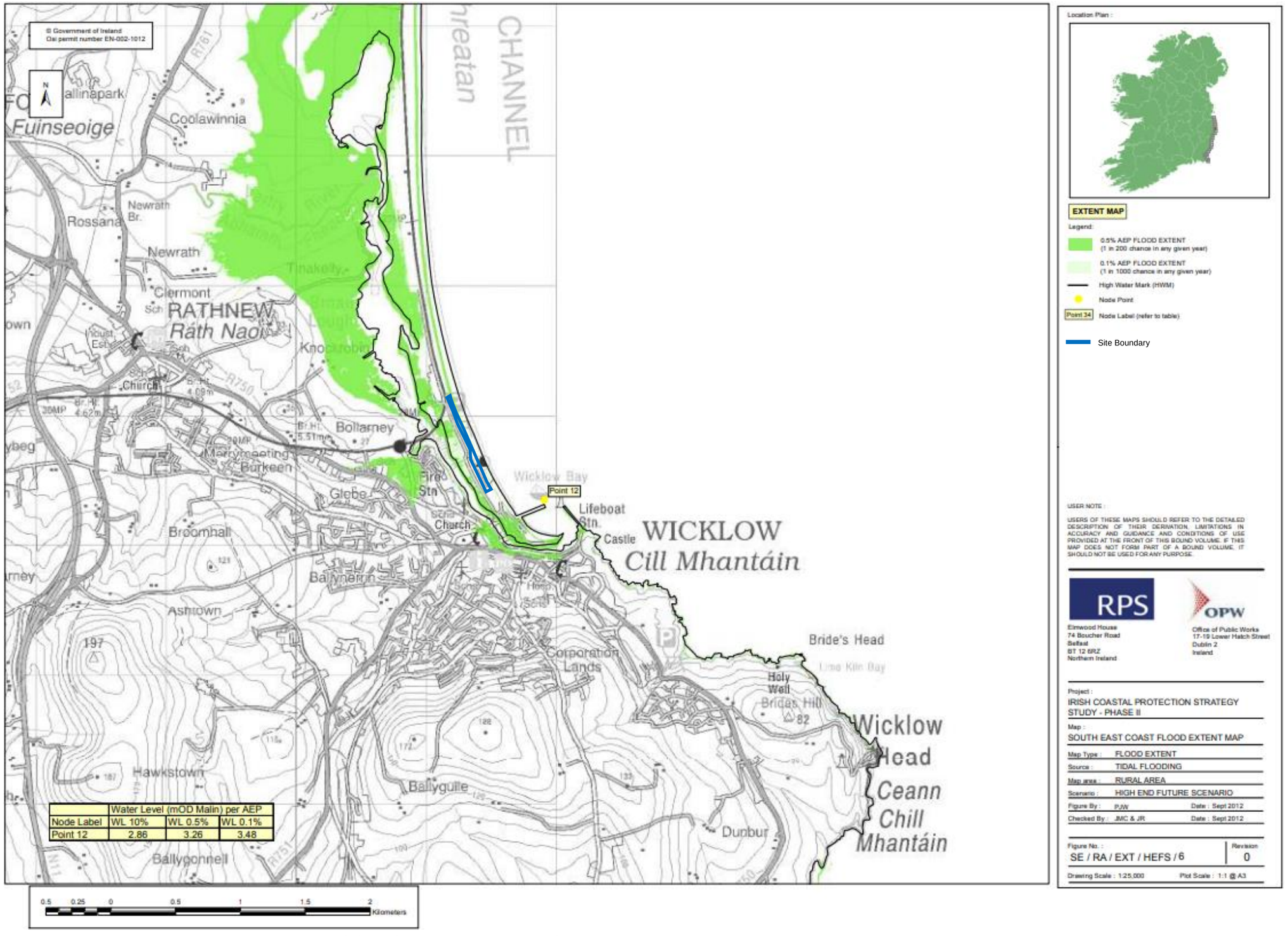
Project :
IRISH COASTAL PROTECTION STRATEGY STUDY - PHASE II

Map :
SOUTH EAST COAST FLOOD EXTENT MAP

Map Type :	FLOOD EXTENT		
Source :	TIDAL FLOODING		
Map area :	RURAL AREA		
Scenario :	MID RANGE FUTURE SCENARIO		
Figure By :	PJW	Date :	Aug 2011
Checked By :	JMC & JR	Date :	Aug 2011

Figure No. : SE / RA / EXT / MRFS / 6
Revision 0
Drawing Scale : 1:25,000
Plot Scale : 1:1 @ A3

Figure B-2: ICPSS Southeast Coast Flood Map Extent – Mid Range Future Scenario



	Water Level (mOD Malin) per AEP		
Node Label	WL 10%	WL 0.5%	WL 0.1%
Point 12	2.86	3.26	3.48

Location Plan :

EXTENT MAP

Legend:

- 0.5% AEP FLOOD EXTENT (1 in 200 chance in any given year)
- 0.1% AEP FLOOD EXTENT (1 in 1000 chance in any given year)
- High Water Mark (HWM)
- Node Point
- Point 34 — Node Label (refer to table)
- Site Boundary

USER NOTE :

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RPS

Elmwood House
74 Boucher Road
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BT 12 6RZ
Northern Ireland

OPW

Office of Public Works
17-19 Lower Hatch Street
Dublin 2
Ireland

Project :
IRISH COASTAL PROTECTION STRATEGY STUDY - PHASE II

Map :
SOUTH EAST COAST FLOOD EXTENT MAP

Map Type :	FLOOD EXTENT
Source :	TIDAL FLOODING
Map area :	RURAL AREA
Scenario :	HIGH END FUTURE SCENARIO
Figure By :	PJW Date : Sept 2012
Checked By :	JMC & JR Date : Sept 2012

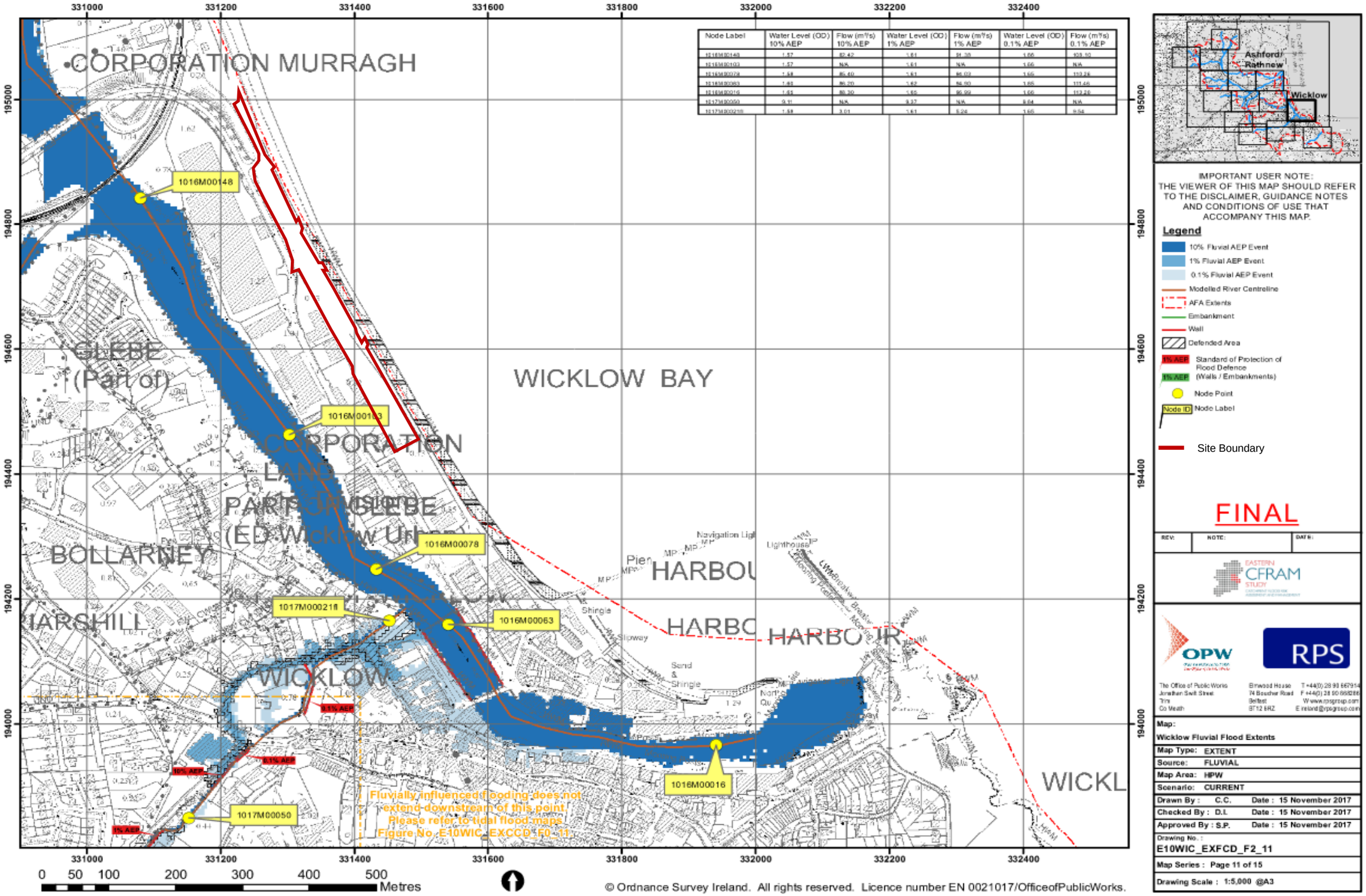
Figure No. : SE / RA / EXT / HEFS / 6 — Revision 0

Drawing Scale : 1:25,000 — Plot Scale : 1:1 @ A3

Figure B-3: ICPSS Southeast Coast Flood Map Extent – *High End Range Future Scenario*

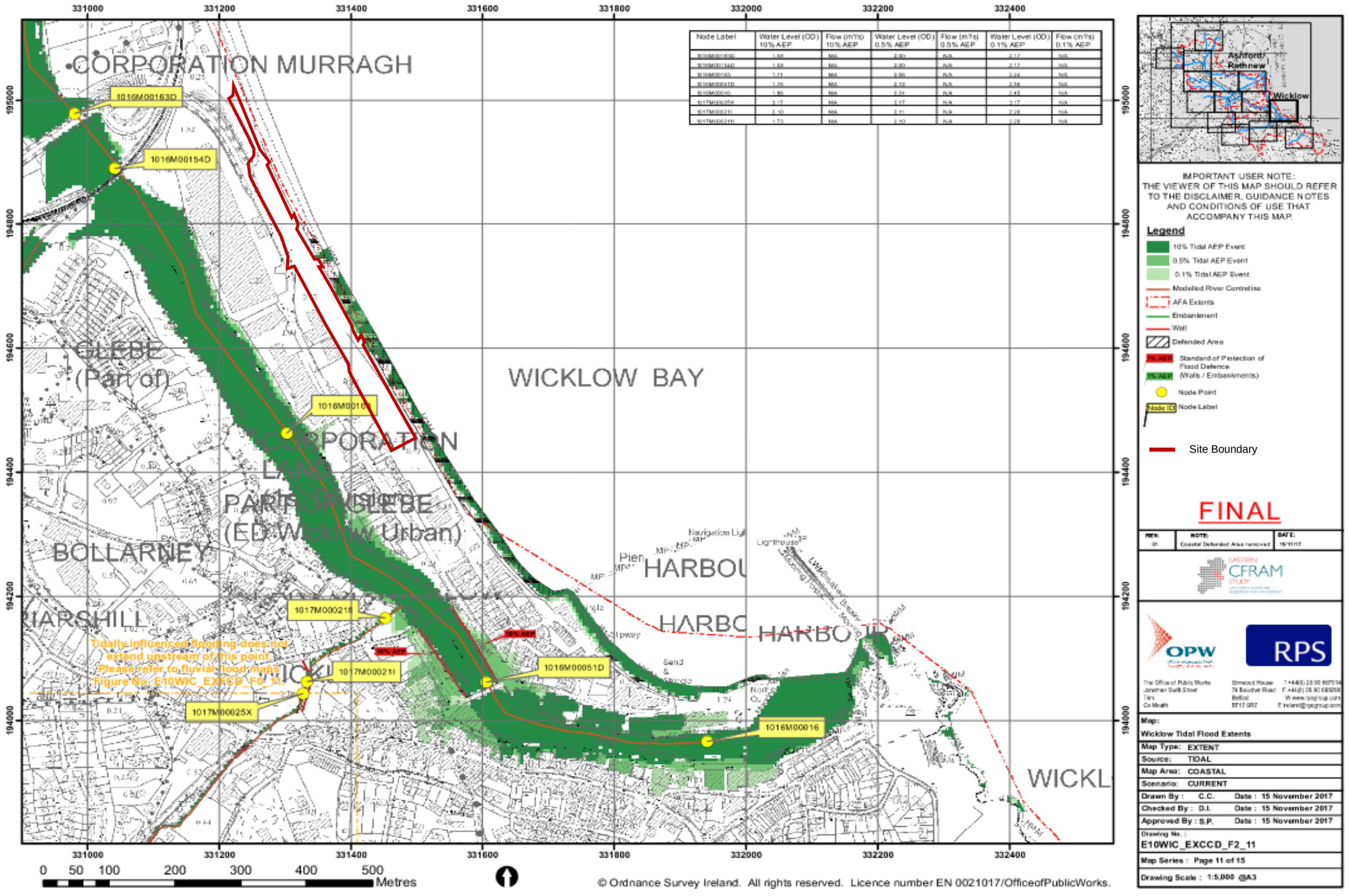
APPENDIX C

CFRAM FLOOD MAPS



Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
1016M00148	1.57	82.42	1.61	91.35	1.66	103.10
1016M00103	1.57	N/A	1.61	N/A	1.66	N/A
1016M00078	1.58	85.40	1.61	95.03	1.65	110.26
1016M00063	1.60	86.20	1.62	96.00	1.65	111.46
1016M00016	1.65	89.30	1.65	99.99	1.66	113.26
1017M00050	9.11	N/A	9.37	N/A	9.64	N/A
1017M00218	1.59	3.01	1.61	3.24	1.65	3.64

Figure C-1: CFRAMs Fluvial Flood Mapping



Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 0.5% AEP	Flow (m³/s) 0.5% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
1016M00163D	1.84	MA	2.00	N/A	2.17	N/A
1016M00154D	1.84	MA	2.00	N/A	2.17	N/A
1016M00153	1.71	MA	2.06	N/A	2.24	N/A
1016M00051D	1.06	MA	2.12	N/A	2.36	N/A
1016M00016	1.85	MA	2.24	N/A	2.45	N/A
1017M00025X	1.17	MA	1.17	N/A	2.17	N/A
1017M00021I	2.10	MA	2.11	N/A	2.28	N/A
1017M00021H	1.73	MA	2.10	N/A	2.28	N/A

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Tidal AEP Event
- 0.5% Tidal AEP Event
- 0.1% Tidal AEP Event
- Modelled River Centreline
- AFA Extents
- Embankment
- Wall
- Defended Area
- 5% AEP Standard of Protection of Flood Defence (Walls / Embankments)
- 1% AEP
- Node Point
- Node ID Node Label
- Site Boundary

FINAL

REV.	NOTE:	DATE:
01	Coastal Defended Area removed	15/11/17

EASTERN CFRAM STUDY

OPW

RPS

The Office of Public Works, Jonathan Swift Street, Trim, Co Meath
Elmwood House, 74 Boucher Road, Belfast, BT12 6RZ
T +44(0) 28 90 667914, F +44(0) 28 90 661256, W www.rpsgroup.com, E ireland@rpsgroup.com

Map:	Wicklow Tidal Flood Extents
Map Type:	EXTENT
Source:	TIDAL
Map Area:	COASTAL
Scenario:	CURRENT
Drawn By : C.C.	Date : 15 November 2017
Checked By : D.I.	Date : 15 November 2017
Approved By : S.P.	Date : 15 November 2017
Drawing No. :	E10WIC_EXCCD_F2_11
Map Series :	Page 11 of 15
Drawing Scale :	1:5,000 @A3

Figure C-2: CFRAMs Coastal Flood Mapping

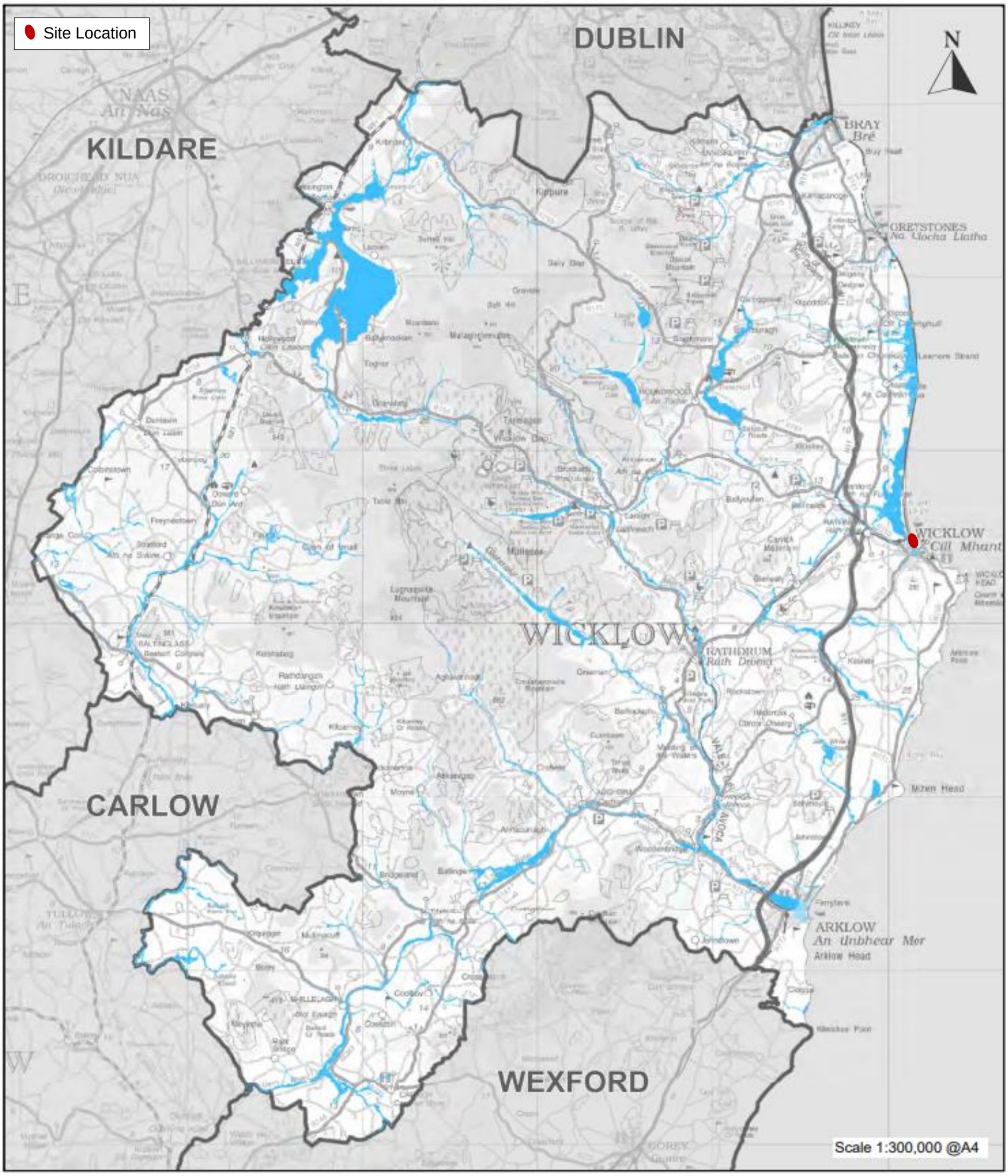
APPENDIX D

NATIONAL INDICATIVE FLUVIAL MAP

Figure D-1: National Indicative Fluvial Mapping

APPENDIX E

WICKLOW COUNTY COUNCIL DEVELOPMENT PLAN 2022 - 2028
&
DRAFT WICKLOW TOWN – RATHNEW LOACAL AREA PLAN 2025
FLOOD MAP MAPS



Flood Management Map No. 14.01

Disclaimer

These Indicative Flood Zones were based on information available at the time of drafting and amending this plan. Any new data and analysis carried out after this date has not been integrated into this map but should be used in conjunction with this map for development proposals. All information may be substantially altered in light of future data and analysis.

Full Disclaimer is included in SFRA

WICKLOW
ENDLESS OPPORTUNITIES

Legend

Indicative Flood Zones

Flood Zone A: High probability of flooding -

Where the 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).

Flood Zone B: Moderate probability of flooding -

Where the 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).

WICKLOW COUNTY DEVELOPMENT PLAN 2022-2028

Wicklow County Council
Planning Department

Figure E-1: Wicklow County Development Plan 2022 - 2028 - Flood Management Map

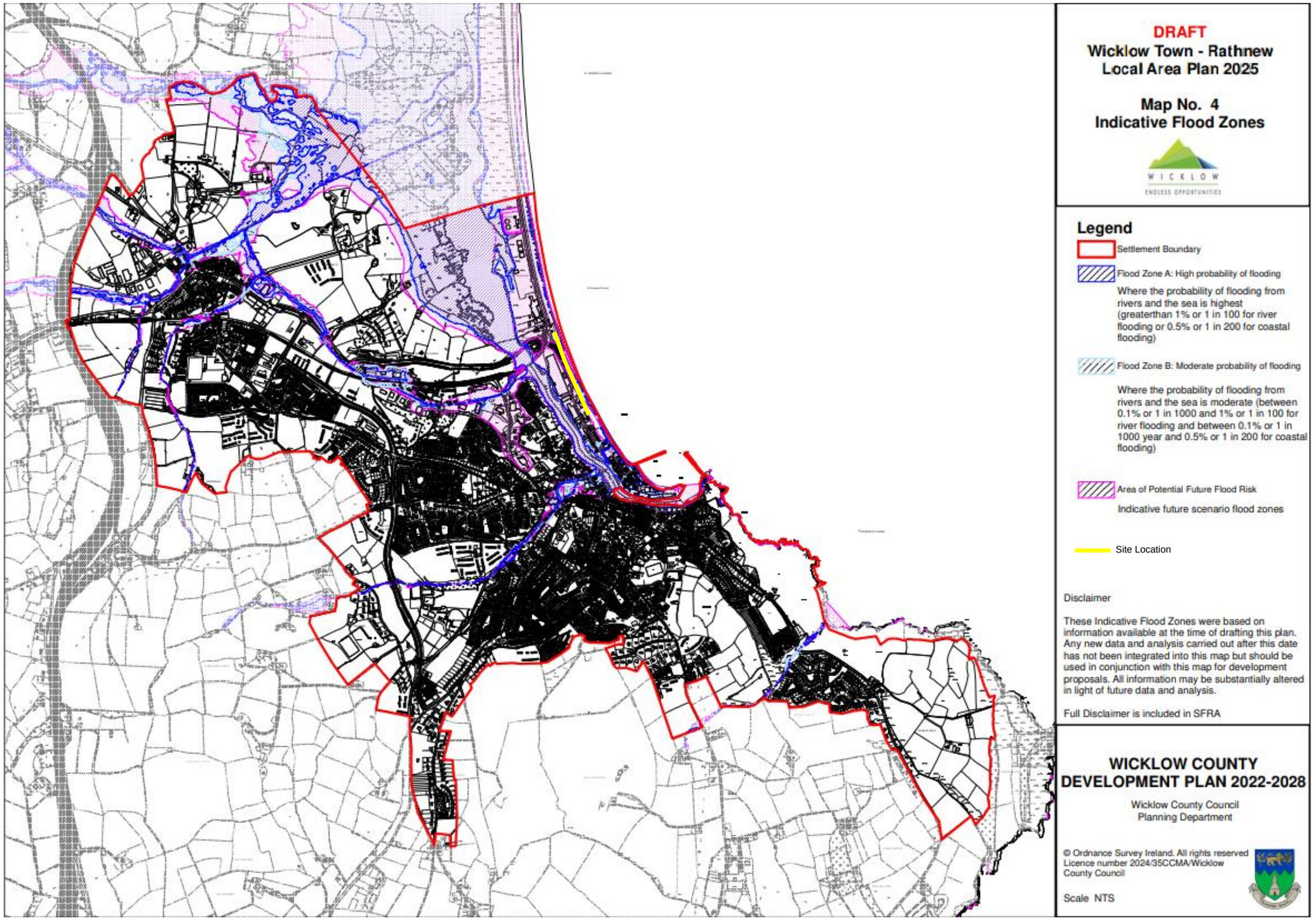


Figure E-2: Draft Wicklow Town - Rathnew Local Area Plan 2025 - Indicative Flood Zones

APPENDIX F

OPW FLOOD RECORDS

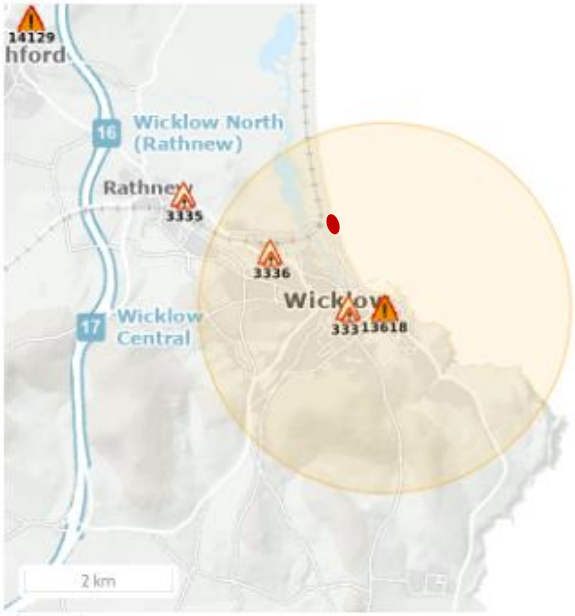
Past Flood Event Local Area Summary Report

OPW Oifig na nOibreacha Poiblí / Office of Public Works

Report Produced: 17/1/2025 11:21

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

Site Location

3 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Flooding at Wicklow on 02/03/2018 (ID-13618)	02/03/2018	Approximate Point
	Additional Information: Reports (0) Press Archive (0)		
2.	Burkeen Stream Wicklow Town Recurring (ID-3336)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		
3.	Marlton Stream Wicklow Town Recurring (ID-3337)	n/a	Approximate Point
	Additional Information: Reports (2) Press Archive (0)		

Figure F-1: Past Flood Events Local Area Summary Report

APPENDIX G

OPW DRAINAGE DISTRICTS MAPPING

Figure G-1: OPW Drainage Map - Drainage Districts

APPENDIX H

NATIONAL COASTAL FLOOD HAZARD MAPPING 2021

Figure H-1: National Coastal Flood Hazard Mapping 2021 - Present Day

Figure H-2: National Coastal Flood Hazard Mapping 2021 - Mid-Range Future Scenario

Figure H-3: National Coastal Flood Hazard Mapping 2021 - High-End Future Scenario

APPENDIX I

GSI MAPPING

Figure I-1: GSI Bedrock Geology Datasets 100k

Figure I-2: Teagasc EPA Soils

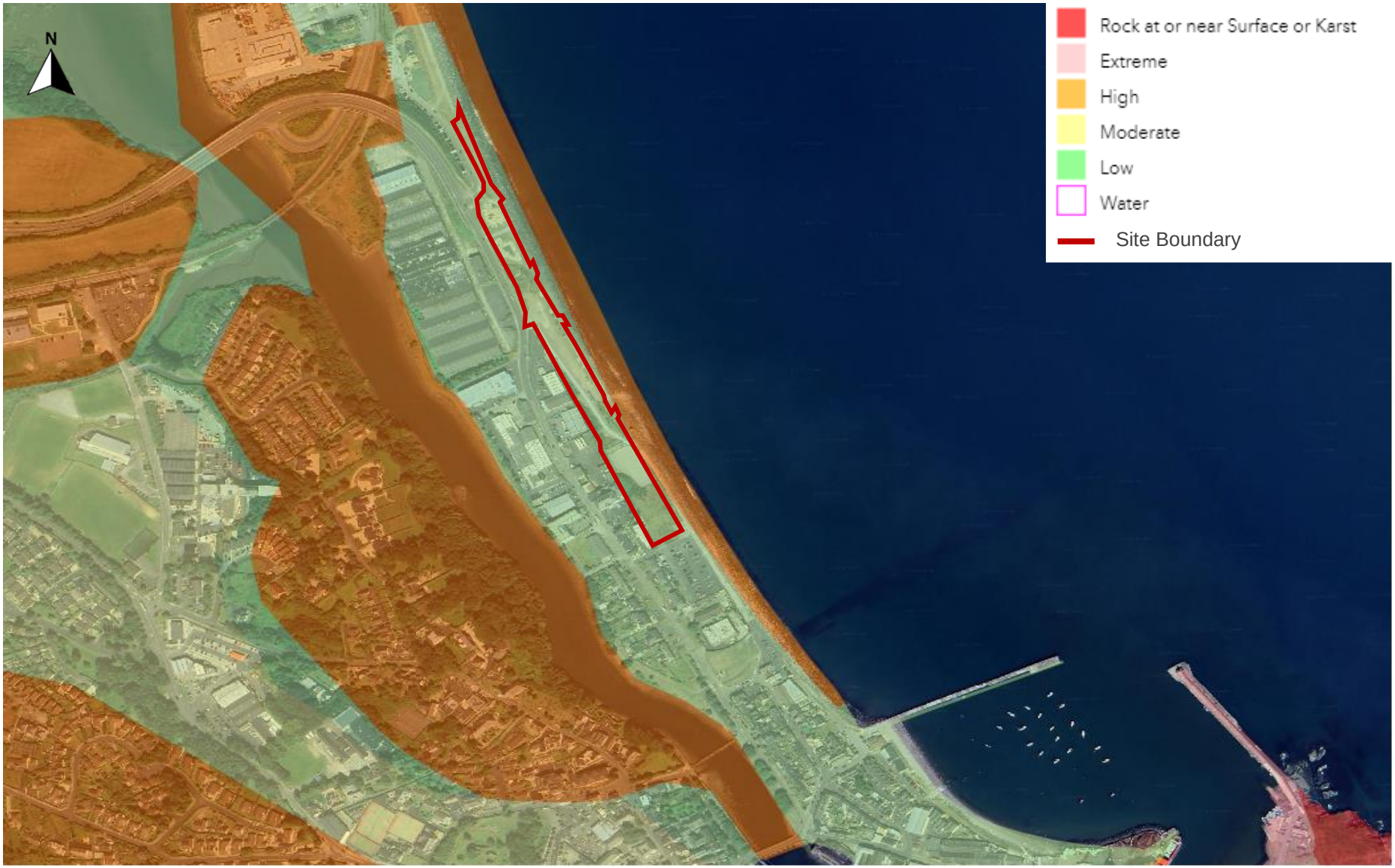


Figure I-3: GSI Groundwater Vulnerability

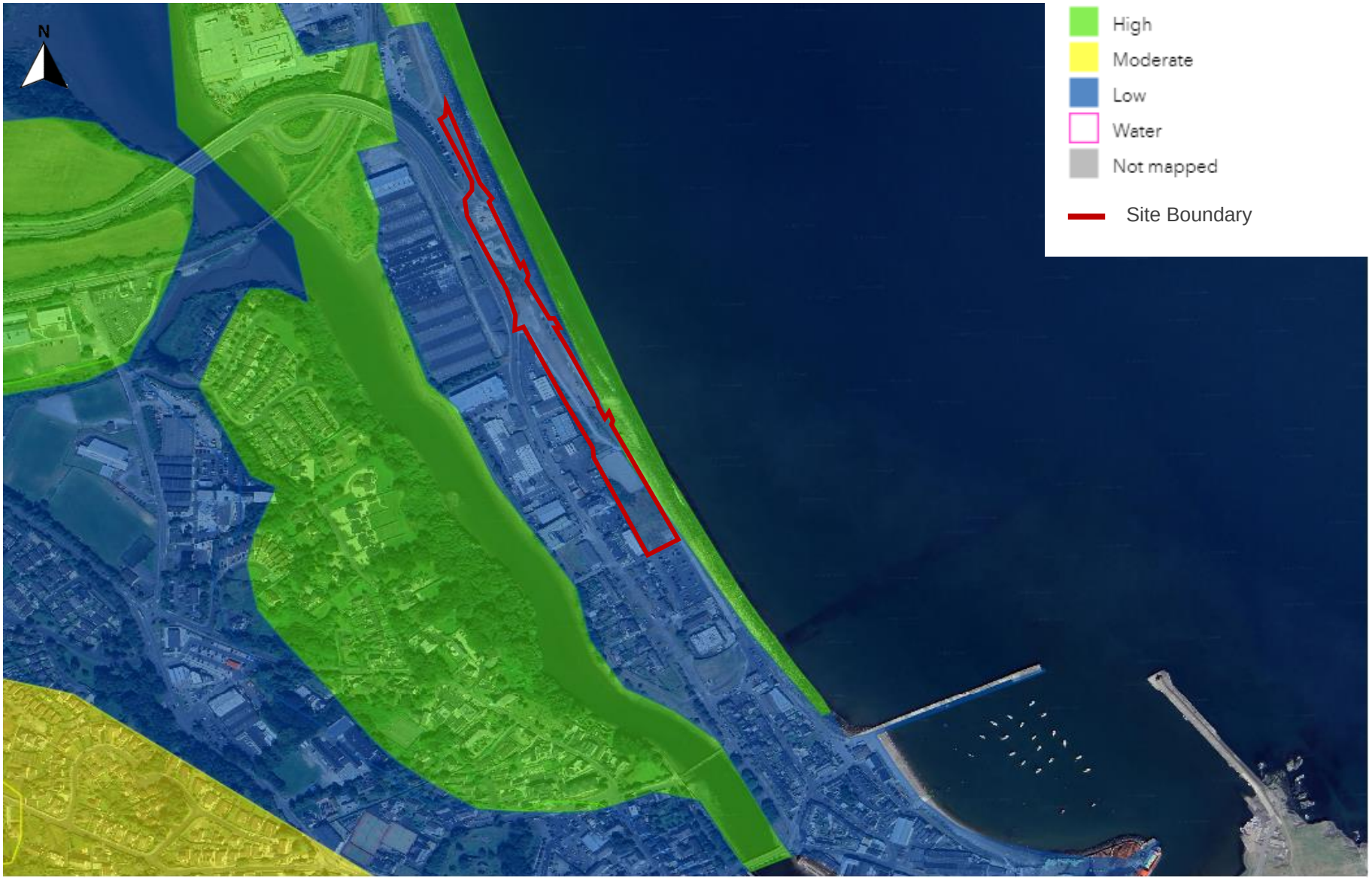


Figure I-4: GSI Subsoil Permeability

Figure I-5: GSI Quaternary Sediments Map

APPENDIX J

GSI GROUNDWATER FLOODING PROBABILITY MAPS

Figure J-1: Geological Survey Ireland Groundwater Flooding Map

APPENDIX K

HISTORICAL MAPPING

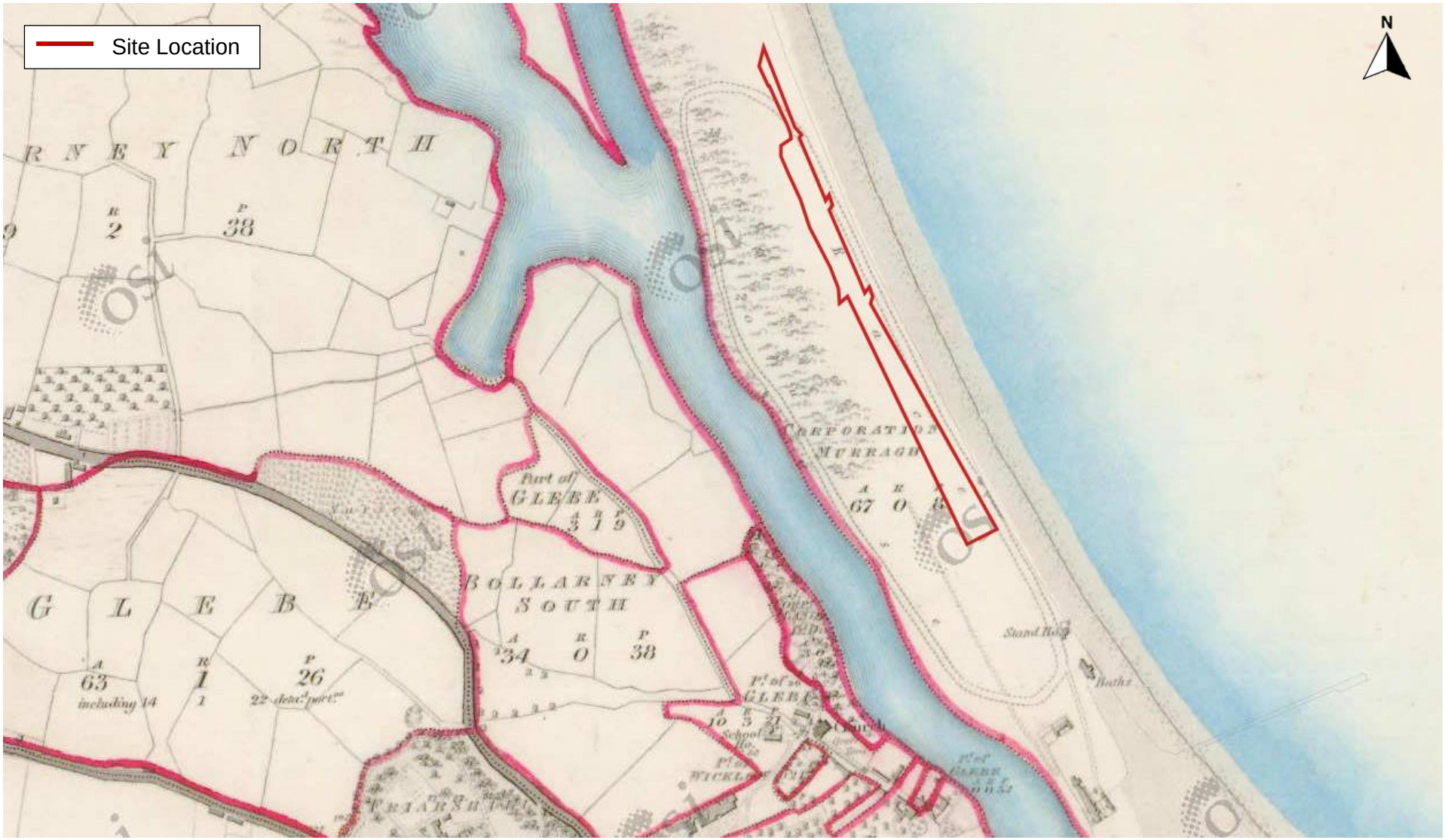


Figure K-1: GeoHive 6 Inch Historic Map (First Edition)

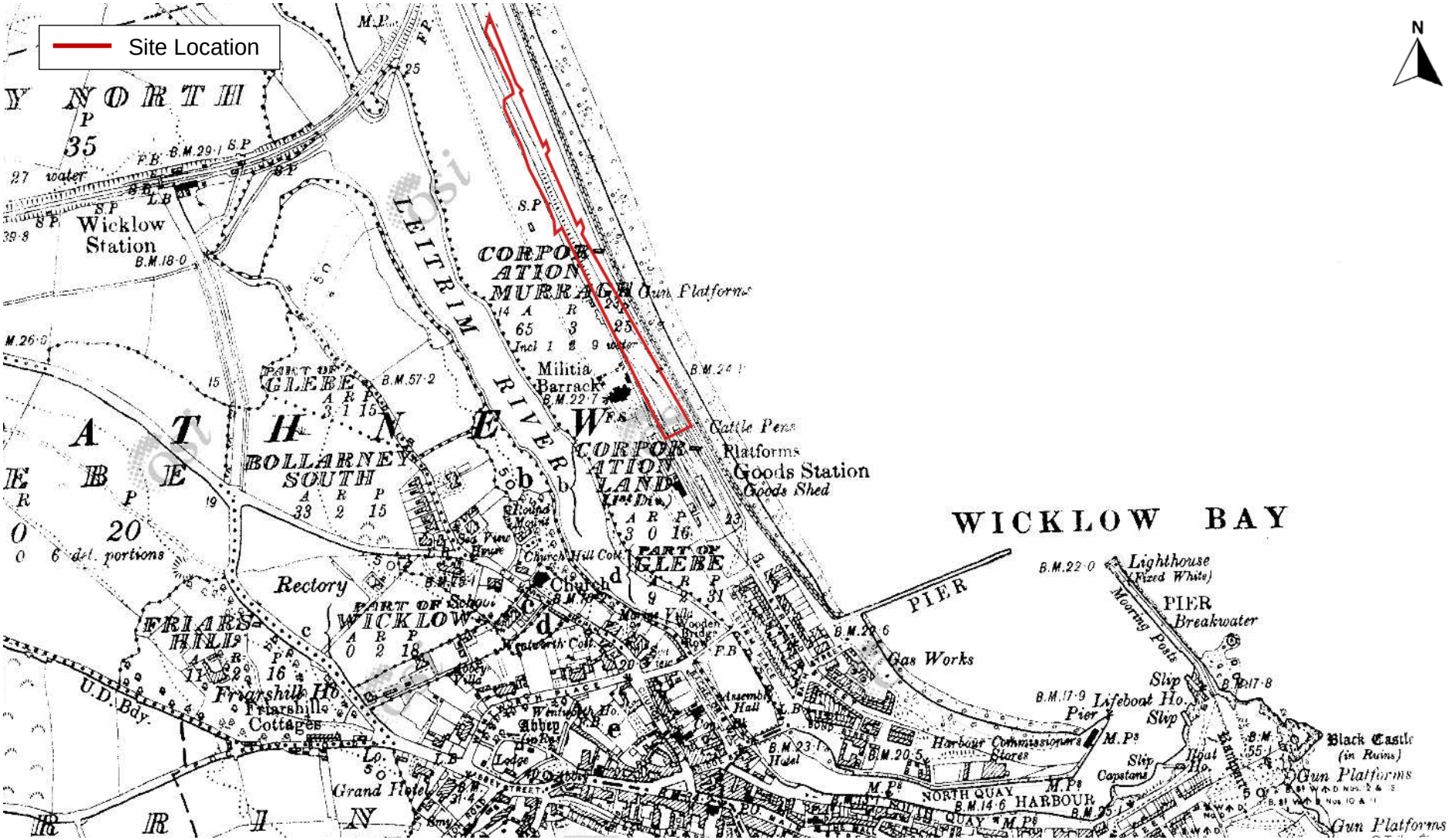


Figure K-2: GeoHive 6 Inch Historic Map (Last Edition)

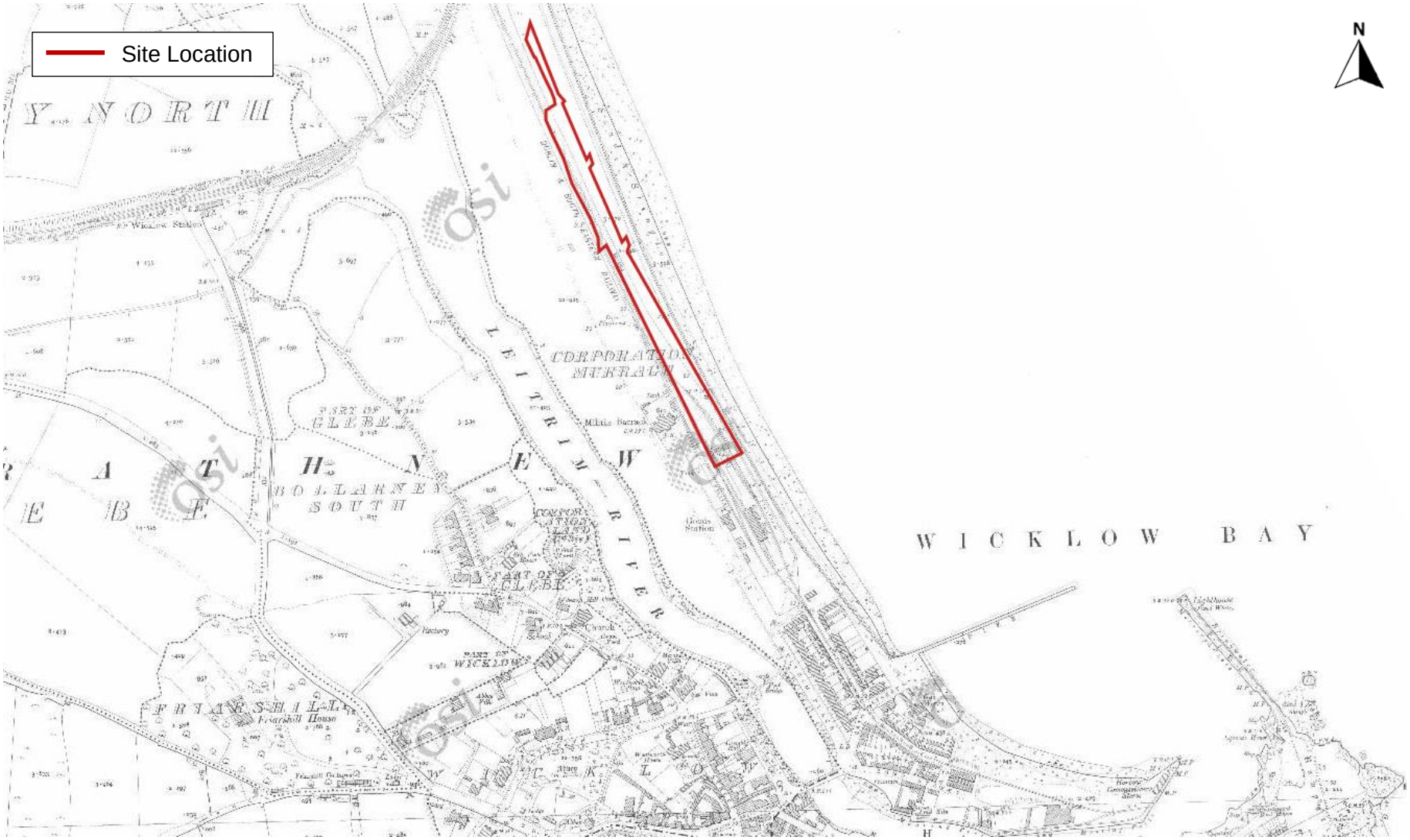


Figure K-3: GeoHive 25 Inch Historic Map

APPENDIX L

HISTORICAL NEWS ARTICLES

Irish Independent

Heavy rainfall leads to flooding in Wicklow town

Myles Buchanan
Wicklow People
Sat 5 Oct 2019 at 00:00

Torrential rainfall on Sunday, September 22, resulted in flooding at a number of locations in Wicklow town.

Over half an inch of rainfall was recorded between 5 a.m. and 7 a.m. on that morning, causing widespread flooding.

Discussing the issue at Thursday's meeting of Wicklow Municipal District, District Engineer Kevin Scanlon described the efforts that were made to try and combat the flooding.

'We had two council crews out on Sunday and Irish Water and Sisk also had crews out. It was a very serious event. We got a good few complaints about drains, houses and gullies. We visited two houses yesterday that flooded. We are liaising with owners to find out what was the cause and will be looking at drainage and other issues.'

Cllr Gail Dunne commended Wicklow County Council's outdoor staff for their efforts.

'I received a lot of phone calls last Sunday. But fair play to the outdoor staff. They were out cleaning up the mess and working hard during the day,' he said.

Cllr Mary Kavanagh warned that the flooding could have been a lot more severe.

'Bridge Street Books would have been flooded if a person didn't happen to be there,' she said.

She also requested that the local authority look into drawing up a list of all problematic drains and gullies in the district. 'There's one outside my house which is like pure cement,' she said.

Cllr John Snell said he had visited three sites over the weekend which were flooded. He was also critical of Veolia, who operate water works in Wicklow town on behalf of Irish Water.

'We need to contact Veolia, who manage the system. If there is a problem like that again then we need to know. If they aren't doing their job properly then, unfortunately, it will affect the businesses across the bridge.'

Mr Scanlon confirmed that staff are looking at all gullies and drains in the urban centres located in the district.

'We can track back where Irish Water and other contractors were working. If they are responsible for the drains being full then we can talk to them.'

Figure L-1: Irish Independent Article - Flooding in Wicklow Town in September 2019

Irish Independent News Opinion Business Sport Life Style Enter

Wicklow town escaped worst of heavy floods

Wicklow People
Wed 12 Feb 2014 at 05:44

WITH thousands of homes and businesses across the country counting the cost of devastating floods, Wicklow town got off relatively lightly with only the South Quay flooding.

High tides and heavy rainfall has meant the South Quay has flooded on three occasions in recent months.

The Town Council had a crew on standby on Tuesday night in case the situation worsened.

At this month's Town Council meeting, Kevin Scanlon, Town Engineer, said Wicklow had been 'very lucky' compared to other towns badly impacted by flooding.

'The tide was high with surging waters and when you get rain, there is nowhere for the rain water to go. The quay clears as soon as the tide goes down.

'Luckily we aren't getting any river flooding. I probably have to say that we have been very lucky.'
Motorists who insist on driving down the South Quay when flood waters are high are also presenting a problem, particularly to local businesses who are trying to prevent water from entering their premises.

'People driving through the flood water are creating waves, which cause difficulties for businesses located along the South Quay.

'That's why we close the road up to The Bridge Tavern. For half and hour or an hour of inconvenience, it stops the shops from being flooded.'

Cllr. Pat Byrne raised the issue of further flood protections at last month's meeting and touched upon the subject again at February's meeting.

'We are fortunate enough to have carried out a job recently enough on the South Quay. That has definitely helped with the flooding.

'The Government has made some funding available to combat flooding and we should be looking at getting a grant for more barriers.'

Figure L-2: Irish Independent Article - Flooding in Wicklow Town in February 2014

Irish Independent

Torrential rainfall leaves garden sheds 'pancaked'

MYLES BUCHANAN

Wed 23 Jan 2013 at 13:51

WICKLOW TOWN suffered considerable flood damage caused by Friday's torrential rainfall.

The river at the Old Froge bust its banks causing the flooding of the Abbey Grounds. Rosehill also experienced problems with rushing flood waters causing a wall to collapse into the back gardens of five houses.

The recently re-opened Bridge Tavern had to close on Friday night after up to 30cm of water swept into the premises. Bridge Street Books was also flooded.

In many cases members of the community and local elected representatives grouped together to combat the rising waters.

Sinn Fein councillors John Snell and Garrett O'Reilly were both involved in trying to protect Rosehill from water rushing down from Ballyguile Hill. Sandbags had been placed outside homes and by 7 p.m. it appeared the threat of flooding had aliveated.

However, continuous rainfall eventually led to a build-up of water flowing towards Rosehill, causing a wall protecting five houses to collapse just before 10 p.m..

Cllr. Garrett O'Reilly says the damage could have been a lot more severe.

' The water was knee high in parts, while there was three to four feet of water out the back. If anyone had been underneath the wall when it collapsed then they would have been killed. Garden sheds were completely pancaked and flattened by the wall after it fell.'

Council staff, members of the Fire- services and the Civil Defence were all out in force to try and battle various ' black spots' around the town.

The river by the Old Forge burst its banks, causing the flooding of the Abbey Grounds. 25 feet of wall surrounding the grounds also collapsed.

Describing the scene, Cllr. O'Reilly says, ' The Abbey Grounds actually looked like a large boating lake.'

There was also heavy flooding reported around Abbey and Main Street, while motorists were advised to avoid the Marlton Road between the Beehive Pub and Wicklow town.

There was flooding on the N11 between Jack Whites and Lil Doyle's, while Barndarrig experienced problems as well. Motorists were also warned to take care while passing under the bridge on the Wicklow town to Rathnew road.

Figure L-3: Irish Independent Article - Flooding in Wicklow Town in January 2013