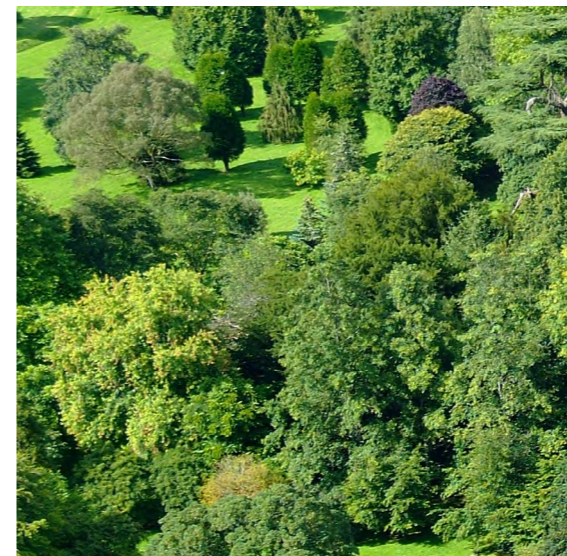
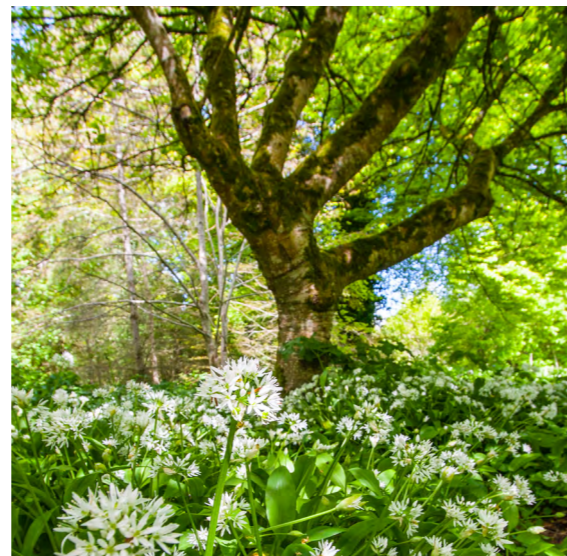




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APPENDIX 8

Water (Hydrology & Hydrogeology)



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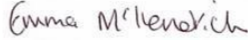
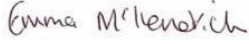

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APPENDIX 8-1

Site Specific Flood Risk Assessment - AECOM

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Quality information

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Site Specific Flood Risk Assessment

Glounthaune SHD

Bluescape Limited

Project number: 60592432
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1. Introduction

1.1 Background

AECOM has been commissioned by Bluescape Limited to carry out a Flood Risk Assessment (FRA) report in support of a Strategic Housing Development (SHD) application to 'An Bord Pleanála' (ABP) for Phase 2 of a proposed residential development in Glounthaune, Co. Cork.

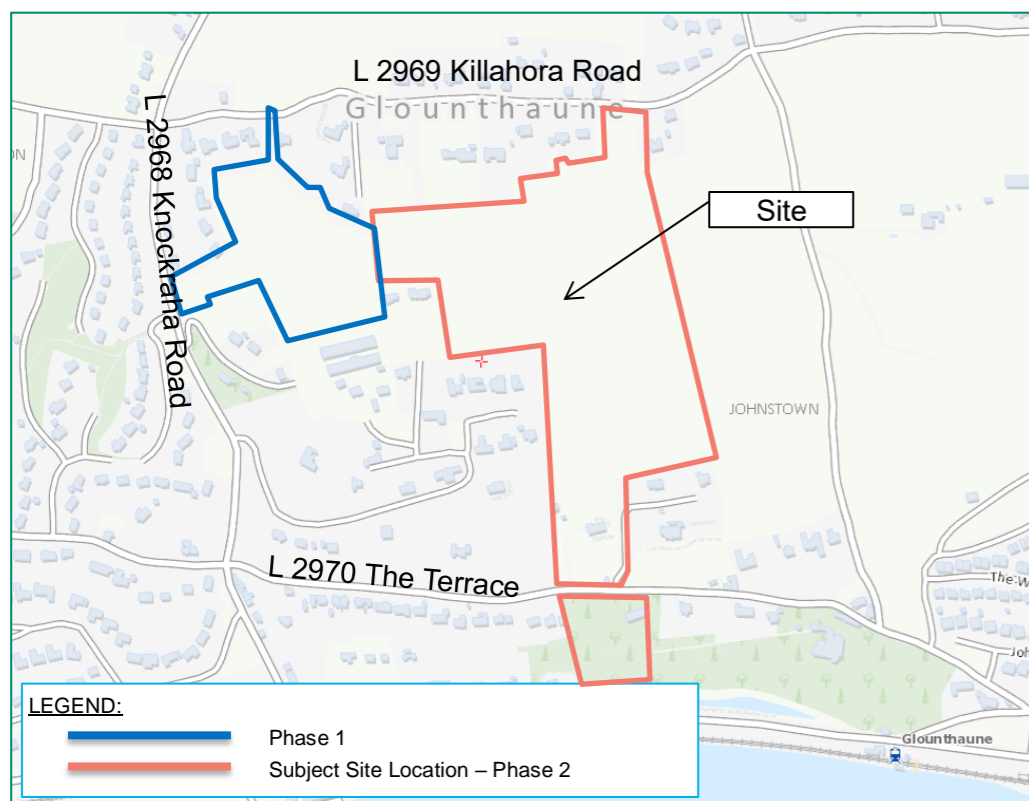


Figure 1 – Site Location – Glounthaune, Co. Cork

This FRA has been carried out in full compliance with the requirements of "The Planning System & Flood Risk Management Guidelines" (PSFRM) published by the Department of the Environment in November 2009.

The current site comprises of a greenfield site. The site measures approximately 13.87 ha in total. The majority of the site is located to the north of The Terrace Road with a small part of the site located to the south of The Terrace Road. The northern part of the site is bounded by existing residential developments to the north, west and south. Agricultural land bounds the site to the east. The southern part of the site is bounded by the L-2970, known locally as 'the Terrace' to the north, existing dwellings to the east and west and Johnstown Close to the south. The public road network surrounding the site is defined by the L-2969 to the north, the L-2968 to the west, and the L-2970, known locally as 'the Terrace' to the south.

1.2 Proposed Development

The proposed development consists of the construction of a mixed-use residential development of 289 no. residential units consisting of 201 no. dwelling houses and 88 no. apartment/duplex units, a two storey creche, 4 no. ESB substations and all ancillary site development works at Lackenroe and Johnstown (townlands), Glounthaune, Co. Cork. The proposed development will be constructed on lands to the north and south of the public road, L-2970, known locally as 'the Terrace'. A portion of the site to the south of 'the Terrace' was

formerly within Ashbourne Garden and is considered to be within the curtilage and attendant grounds of Ashbourne House, which is a Protected Structure (Ref 00498).

The proposed development to the north of 'the Terrace' provides for 260 no. residential units comprising of 196 no. dwelling houses, 64 no. apartment/duplex units and a two storey creche. The 196 no. dwelling houses includes 5 no. 4 bedroom detached dwellings, 44 no. 4 bedroom semi-detached dwellings, 12 no. 4 bedroom townhouses, 2 no. 3 bedroom detached dwellings, 22 no. 3 bedroom semi-detached dwellings, 47 no. 3 bedroom townhouses and 64 no. 2 bedroom townhouses. The 64-no. apartment/duplex units contains 5 no. 3 bedroom units, 32 no. 2 bedroom units and 27 no. 1 bedroom units contained in 6 no. three storey apartment buildings, with ancillary bicycle parking and bins stores.

The proposed development to the south of 'the Terrace' provides for 29 no. residential units comprising of 5 no. dwelling houses and 24 no. apartments. The 5 no. dwellings include 1 no. 3 bedroom detached dwelling, 2 no. 3 bedroom townhouses and 2 no. 2 bedroom townhouses. The proposed apartments are provided in a four-storey mixed-use building containing a ground floor community unit and a commercial unit with apartments at ground and upper floor levels comprising 3 no. 3 bedroom units, 7 no. 2 bedroom units and 14 no. 1 bedroom units with ancillary rooftop terrace, car parking, bicycle parking and bin stores.

Vehicular access to 2 no. dwellings in the lands to the north of 'the Terrace' will be provided via an upgraded entrance from 'the Terrace' with vehicular access to the remainder of dwellings in the lands to the north of 'the Terrace' via the signalised junction from the L-2968 and internal road network permitted by Cork County Council reference 17/5699 and An Bord Pleanála reference 300128-17. A separate secondary emergency access is also proposed from the L-2969 to the north.

Vehicular access to the 5 no. dwellings to the south of the 'the Terrace' will be via a new entrance from 'the Terrace' and the proposed apartment building will be accessed from Johnstown Close. The proposed development also makes provision for a pedestrian link from the proposed development north of 'the Terrace' to Johnstown Close via 'the Terrace' which will include a signalised pedestrian crossing and associated traffic calming measures on 'the Terrace'.

Ancillary site works include the demolition of 1 no. existing derelict dwelling house and associated outbuildings, landscaping and servicing proposals including the realignment of the existing pedestrian/cycle route on Johnstown Close, the undergrounding of existing overhead lines, upgrade of the storm and foul sewer network to the south and east of the subject lands along 'the Terrace' and Johnstown Close (L-3004).

Figure 2 and the drawings Appendix A illustrate the nature of the proposed development.



Figure 2 – Proposed Development Layout (Refer to Drawings for further detail)

2. The Planning System & Flood Risk Management Guidelines

In September 2008 “The Planning System and Flood Risk Management Guidelines for Planning Authorities” (Guidelines) were published by the Department of the Environment, Heritage and Local Government in Draft format. In November 2009, the adopted version of the document was published.

The Guidelines provide guidance on flood risk and development. A precautionary approach is recommended when considering flood risk management in the planning system. The core principle of the guidelines is to adopt a risk based sequential approach to managing flood risk and to avoid development in areas that are at risk. The sequential approach is based on the identification of flood zones for river and coastal flooding.

The objective of a Site-Specific Flood Risk Assessment (FRA) is to assess all types of flood risk to a development. The assessment should investigate potential sources of flood risk and include for the effects of climate change. The assessment is required to examine the impact of the development and the effectiveness of flood mitigation and management measures proposed. It should also present the residual risks that remain after those measures are put in place.

This approach is based on the identification of flood zones for river and coastal flooding. “Flood Zones” are geographical areas used to identify areas at various levels of flood risk. It should be noted that these do not consider the presence of flood defences, as the risks remain of overtopping and breach of the defences. There are three flood zones defined (refer to Figure 3):

Flood Zone A (high probability of flooding) is for lands where the probability of flooding is greatest (greater than 1% or 1 in 100 for river flooding and 0.5% or 1 in 200 for coastal flooding).

Flood Zone B (moderate probability of flooding) refers to lands where the probability of flooding is moderate (between 0.1% or 1 in 1,000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1,000 and 0.5% or 1 in 200 for coastal flooding).

Flood Zone C (low probability of flooding) refers to lands where the probability of flooding is low (less than 0.1% or 1 in 1,000 for both river and coastal flooding).



Figure 3 – Indicative Flood Zone Map (Extract from the Guidelines, Figure 2.3)

Once a flood zone has been identified, the guidelines set out the different types of development appropriate to each zone. Exceptions to the restriction of development due to potential flood risks are provided for through the use of the **Justification Test**, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated. This recognises that there will be a need for future development in existing towns and urban centres that lie within flood risk zones, and that the avoidance of all future development in these areas would be unsustainable. The current Glounthaune Local Area Plan was adopted following the publication of the Guidelines.

A three-staged approach to undertaking an FRA is recommended:

Flood Risk Identification (Stage 1) - Identification of any issues relating to the site that will require further investigation through a Flood Risk Assessment.

Initial Flood Risk Assessment (Stage 2) - Involves establishment of the sources of flooding, the extent of the flood risk, potential impacts of the development and possible mitigation measures.

Detailed Flood Risk Assessment (Stage 3) - Assess flood risk issues in sufficient detail to provide quantitative appraisal of potential flood risk of the development, impacts of the flooding elsewhere and the effectiveness of any proposed mitigation measures.

This report addresses the requirements of a Stage 1 and 2 Flood Risk Assessment as a quantitative appraisal of potential flood risk is not considered to be required.

3. Flood Risk Identification (Stage 1)

The subject site is located in Glounthaune, Co. Cork. The site is situated approximately 285m north of 'Slatty Water' which is north of Lough Mahon within Cork Harbour. Slatty Water is part of the secondary branch of the estuary that is positioned between Little Island and Fota Island. The existing site slopes from north to south with the highest level of approximately 108.00 m OD Malin and lowest level at approximately 4.000 m OD Malin. Figure 4 illustrates the location of the subject site relative to the surrounding water bodies.

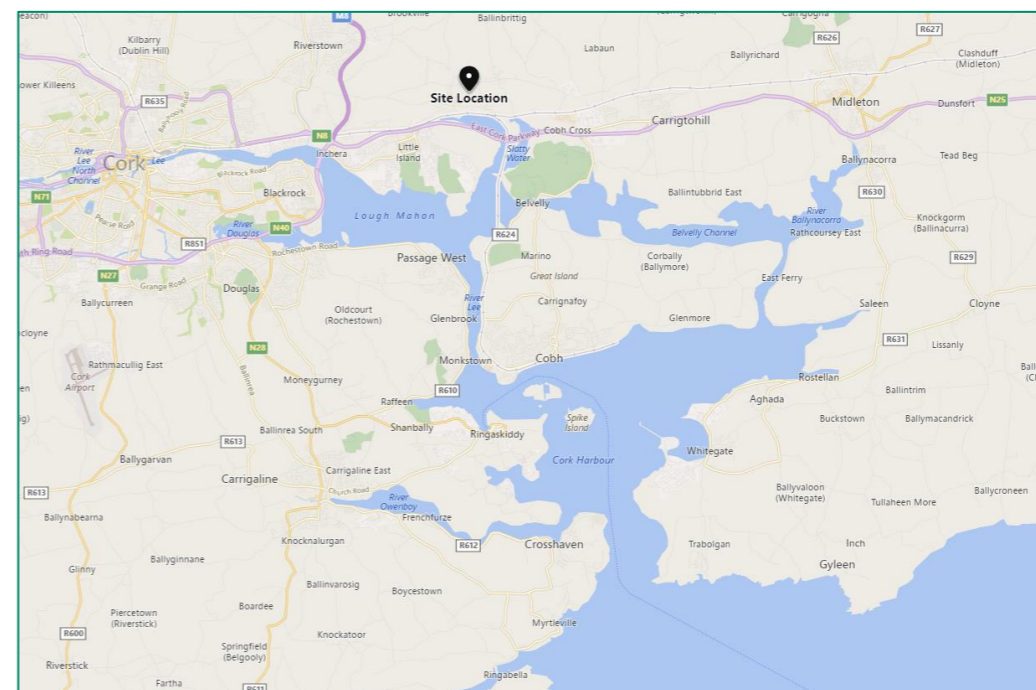


Figure 4 – Location of Proposed Site in Relation to Cork Harbour

3.1 History of Flooding

As part of the overall exercise to establish the potential flood risk to the subject site, AECOM carried out a review of available and recorded information on flooding in the area. The following sources were consulted as part of the review:

- OPW Flood Records,
- Historic Flood Records.

3.1.1 OPW Flood Hazard Mapping

The Office of Public Works (OPW) collates available reports of flooding from all sources (e.g., fluvial, pluvial, coastal, etc.) on a nationwide basis. The OPW's website (www.floodmaps.ie) was consulted to obtain reports of recorded flooding within and surrounding the site. The information available on this website indicates there is a history of flooding in the area to the south of the site, adjoining the public road, Johnstown Close (the former N25).

Figure 5 is an extract from the mapping available on the OPW database and illustrates the location of recorded flood events and reported extents of flooding (blue hatch). There are no recorded flood extents within the subject site. Figure 5 shows one recorded historical flood event, which is located to the south west of the subject site, on the southern side of the rail line. The approximate site location is indicated by the purple dashed line. The recorded event occurred in October 2004 in which one property was flooded. This was a result of high tides and extreme winds which caused the flooding.

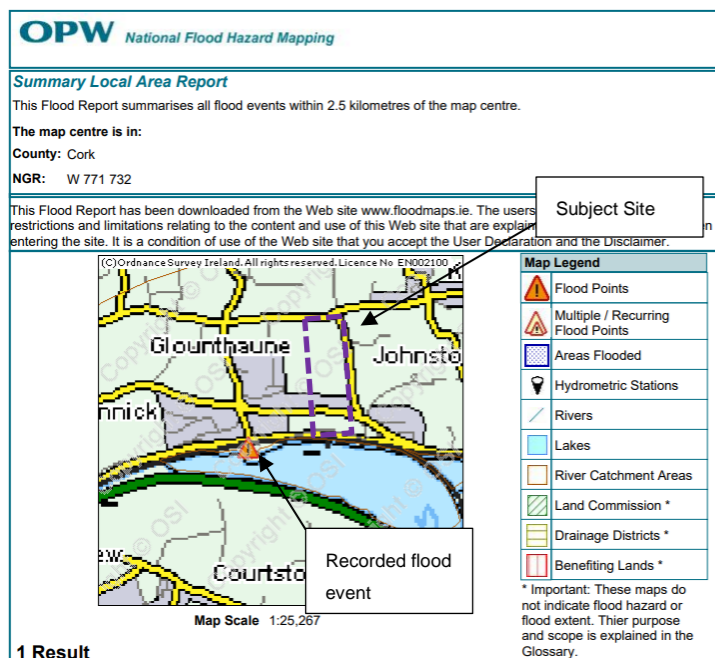


Figure 5 – Historic Flood Events in the Vicinity of the Subject Site (www.floodmaps.ie)

3.1.2 Historic Mapping – OSI

Historical mapping available on OSi.ie was reviewed to identify historic flood plains and areas liable to flooding. There are no records of historic flooding within or surrounding the subject site.

3.2 Indicative Flood Risk Mapping

Predictive flood risk mapping published by the OPW was reviewed to establish the potential flood risk to the subject site.

3.2.1 OPW CFRAM Mapping

The National Catchment Flood Risk Assessment and Management (CFRAM) Programme has examined the flood risk, and possible measures to address the risk, in 300 communities throughout the country at potentially significant flood risk. These communities were identified through the Preliminary Flood Risk Assessment (PFRA), which was a national screening assessment of flood risk.

The CFRAM mapping included in Appendix B illustrates the location of the closest model nodes to the subject site – within Cork Harbour (M9/UA/EXT/CURS/010). This map was published as part of the Lee CFRAM Study in June 2012. Figure 6 illustrates the coastal flood risk mapping available for the subject site. Fluvial flood risk mapping was not published for this area. Based on the CFRAM mapping available, it can be seen that the subject site and proposed entrances/ exits are located within Flood Zone C.

The CFRAM study provides estimates of flood water levels for different Annual Exceedance Probabilities (AEP) at a number of nodes. Table 1 presents the coastal flood water levels for the relevant node that is in the vicinity to the site.

Table 1. CFRAM Coastal Flood Water Levels

Node	10% AEP Water Level (m OD Malin)	0.5% AEP Water Level (m OD Malin)	0.1% AEP Water Level (m OD Malin)
011	2.57	2.86	3.02

Source: M9/UA/EXT/CURS/010



Figure 6 – Extract from the CFRAM (Map M9/UA/EXT/CURS/010)

3.2.2 Cobh Municipal District Local Area Plan – Flood Risk Mapping

The Strategic Flood Risk Assessment published with the Cobh Municipal District Local Area Plan (2017-2022) has also been reviewed. Section 1.8 of the Local Area Plan (LAP) sets out the approach to Flood Risk Assessment and Management. As part of the preparation of the LAP, the flood risk mapping has been updated to reflect the information available from the CFRAM programme and other flood schemes undertaken by the OPW.

A Strategic Flood Risk Assessment (SFRA) has been undertaken as part of the preparation of this plan, and all zoned lands in areas at risk of flooding have been reviewed. The flood zones illustrated in this plan are based on an undefended scenario and do not take the presence of flood protection structures such as walls or embankments into account. Figure 7 is taken from the mapping published as part of the LAP and is available at <http://corklocalareaplans.com/>. This mapping shows the extent of Flood Zone A and B and shows that the subject site is located within Flood Zone C.



Figure 7 – Extract from Mapping published as part of Cobh LAP

4. Initial Flood Risk Assessment

4.1 Potential Sources of Flooding

The potential risk to the proposed development associated with each of the following sources of flooding is presented in this section.

- Fluvial Flooding,
- Coastal/ Tidal Flooding,
- Pluvial Flooding,
- Groundwater Flooding.

4.1.1 Fluvial Flooding

Fluvial flooding is the result of a river exceeding its capacity and excess water spilling out onto the adjacent flood plain. Mapping published as part of the OPW CFRAM study is used to evaluate the fluvial flood risk to the proposed development. As there are no significant watercourses within or surrounding the subject site and given that fluvial flood risk mapping is not available it is considered that the site is located within Flood Zone C.

4.1.2 Coastal/ Tidal Flooding

Coastal flooding is the result of sea levels which are higher than normal and result in sea water overflowing onto the land. Mapping published as part of the OPW Lee CFRAM study shows that the subject is located within Flood Zone C.

4.1.3 Pluvial Flooding

Pluvial flooding is the result of rainfall generated overland flows which arise before run-off can enter any watercourse or sewer. It is usually associated with high intensity rainfall. The PFRA mapping available for the area indicates that the risk of pluvial flooding to the development is low.

It is important to note that the proposed development will be carefully managed in terms of surface water run-off and provision will be made for significant rainfall events. The surface water drainage network will be designed to cater for storm water from the roof of the housing units and the surrounding hardscaped areas in accordance with the Greater Dublin Strategic Drainage Study (GSDSDS) and will contain the 1 in 100-year event plus 20% climate change allowance. Please refer to the Infrastructure Report and the Proposed Drainage Layouts included in the following drawings:

- AECOM Drawing 60592432-ACM-00-00-DR-CE-10-0501
- AECOM Drawing 60592432-ACM-00-00-DR-CE-10-0502
- AECOM Drawing 60592432-ACM-00-00-DR-CE-10-0503
- AECOM Drawing 60592432-ACM-00-00-DR-CE-10-0504
- AECOM Drawing 60592432-ACM-00-00-DR-CE-10-0505
- AECOM Drawing 60592432-ACM-00-00-DR-CE-10-0506
- AECOM Drawing 60592432-ACM-00-00-DR-CE-10-0507

4.1.4 Groundwater Flooding

The GSI has undertaken an assessment of groundwater flood risk. The mapping available does not predict any groundwater flooding within or surrounding the site.

Based on the GSI's online mapping tool, the subject site is underlain by the Gyleen Formation

which consists of 'Sandstone with Mudstone & Siltstone' as represented in Appendix C. Groundwater vulnerability is indicated as being 'Extreme' and the area which may indicate that the site would be susceptible to groundwater flooding. A number of boreholes were carried out on site as part of geotechnical investigation undertaken between 26th July and 24th August 2018. Four standpipe wells were installed in BH01, BH10, BH12 and BH14.

No groundwater was encountered on site during the period of site investigation works. Groundwater monitoring has not been undertaken.

4.2 Estimate of Flood Levels and Flood Zone

Following a review of the predictive flood risk mapping available, it is concluded that the subject site is located within Flood Zone C for coastal and fluvial flood risk and the risk of pluvial and groundwater flooding to the development is low.

4.3 Climate Change

The Flood Risk Management - Climate Change Sectoral Adaptation Plan, 2019 published by the OPW includes the following projections:

- continued sea level rise,
- potentially more severe Atlantic storms, which could generate more significant storm surges and extreme waves,
- increase in the number of heavy rainfall days each year, and,
- wetter winters.

The purpose of the Climate Change Sectoral Adaptation Plan for Flood Risk Management is to:

- outline the potential impacts of climate change on flooding and flood risk management in Ireland,
- identify the objectives for an effective and sustainable approach to adaptation as part of flood risk management for the future,
- promote a coordinated approach to adaptation:
 - within the flood risk management sector and sustainable flood risk management measures in other sectors, and,
 - across the policies and actions of other Sectors including Local Authorities, and,
- recommend any further actions required to meet the objectives for adaptation.

Section 5 of the Climate Change Sectoral Adaptation Plan for Flood Risk Management outlines the potential impacts of climate change on flooding and flood risk as determined through assessments previously undertaken as part of the CFRAM Programme.

For the purposes of the CFRAM Programme, the OPW adopted two indicative potential futures for flood risk assessment; the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS). These were selected to reflect, based on information available at the time, a future in the latter part of the century that would be: a. typical or near to the general average of the future climate projections (MRFS), and b. a more extreme future based on the upper end of the range of projections of future climatic conditions and the impacts such changes would have on the drivers of flood risk (HEFS). Figure 8, taken from the Climate Change Sectoral Adaptation Plan for Flood Risk Management presents the allowances in flood parameters for both the MRFS and HEFS scenarios.

Parameter	MRFS	HEFS
Extreme Rainfall Depths	+ 20%	+ 30%
Peak Flood Flows	+ 20%	+ 30%
Mean Sea Level Rise	+ 500 mm	+ 1000 mm
Land Movement	- 0.5 mm / year ¹	- 0.5 mm / year ¹
Urbanisation	No General Allowance - Review on Case-by-Case Basis	No General Allowance - Review on Case-by-Case Basis
Forestation	- 1/6 Tp ²	- 1/3 Tp ² + 10% SPR ³

Note 1: Applicable to the southern part of the country only (Dublin - Galway and south of this)

Note 2: Reduction in the time to peak (Tp) to allow for potential accelerated runoff that may arise as a result of drainage of afforested land

Note 3: Add 10% to the Standard Percentage Runoff (SPR) rate: This allows for temporary increased runoff rates that may arise following felling of forestry.

Figure 8 – Allowances in Flood Parameters for the Mid-Range and High-End Future Scenarios

As noted in Section 3.2, the predicted 1 in 200-year return period event coastal flood water level is 2.86 m OD Malin, while the 1 in 1000-year return period coastal flood water level is 3.02 m OD Malin. The recommended allowance for climate change is a 500 mm increase in coastal flood water levels and land movement at a rate of -0.5mm/ year. Over 100 years, this would result in an increase of 450 mm on the predicted coastal flood water levels.

4.4 Freeboard

The Planning System and Flood Risk Management Guidelines recommends that minimum floor levels for a new development should be set above the 1 in 100-year river flood level or 1 in 200-year coastal flood level including an allowance for climate change, with an appropriate freeboard.

Figure 9 (taken from Figure 6.1 of the Greater Dublin Strategic Drainage Study) illustrates the level of service and flood protection principles. It is recommended that all finished floor levels of the proposed development are at least 500mm above the predicted maximum 1 in 100-year fluvial flood level or the 1 in 200-year coastal flood level. This is reflected in the proposed development layout.

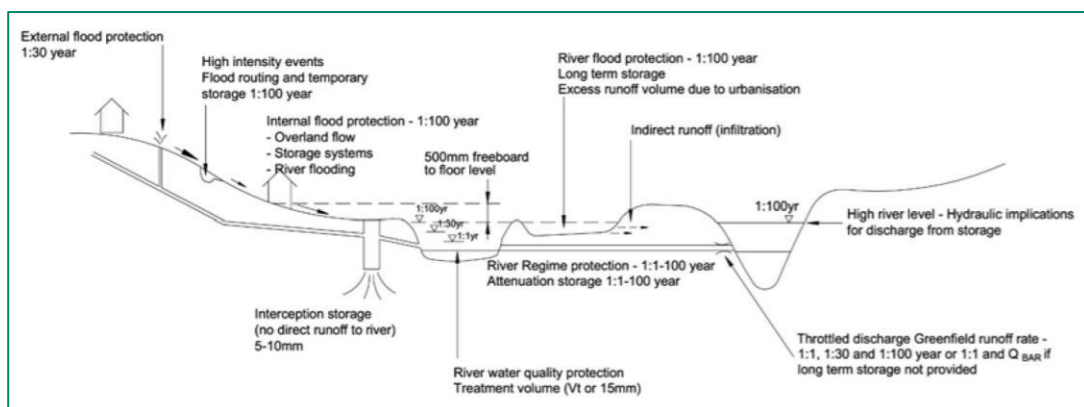


Figure 9 – Level of Service and Flood Protection Principles (extract of GSDS)

As the proposed surface water network is surcharged during the 1 in 100-year storm event, a freeboard exercise has been carried out to ensure the surcharging does not pose a threat either as a result of increase surcharge levels or in event of blockage or partial blockage of the sewers. Please refer to the Infrastructure Report for details of the freeboard provided.

5. Flood Risk Management

Chapter 3 of the Planning System and Flood Risk Management Guidelines (DEHLG/ OPW, 2009) describes the key principles of a risk based sequential approach to managing flood risk. The sequential approach is aimed at directing development toward land that is at low risk of flooding. Figure 10 is extracted from the Guidelines and illustrates the sequence in which a site must be assessed from a flood risk standpoint. Specifically, the order in which the planning authority must be satisfied from a flood risk perspective is to *Avoid* (locate in an area that is not flood prone), then *Substitute* (if in a flood prone zone, then substitute the type of development), *Justify* (if substitution does not reduce flood risk sufficiently, then perform Justification Test) and *Mitigate*. This section discusses the sequential approach recommended in the Guidelines with regard to the proposed development.

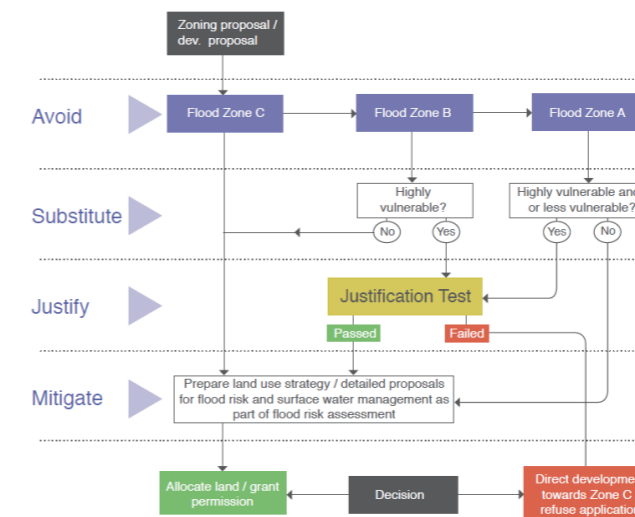


Figure 10 – Sequential Approach Mechanism in the Planning Process

5.1 Vulnerability

Table 3.1 of the Planning System and Flood Risk Management Guidelines for Planning Authorities gives a detailed classification of vulnerability of different types of development. As the project involves the development of dwellings, it is classed as a 'highly vulnerable development' and these are considered a suitable land use for Flood Zone C (please see Table 2) which negates the requirement for a Justification Test.

Table 2 – Vulnerability and Appropriate Flood Zones - Table 3.2 of the PSFRM

	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

5.2 Flood Risk Management

Flood risk management under the EU Floods Directive aims to minimise the risks arising from flooding to people, property, and the environment. Minimising risk can be achieved through structural measures that block or restrict the pathways of floodwaters, such as river defences or non-structural measures that are often aimed at reducing the vulnerability of people and communities such as flood warning, effective flood emergency response, or resilience measures for communities or individual properties.

6. Conclusion

AECOM has been commissioned by Bluescape Ltd. to carry out a Site-Specific Flood Risk Assessment (FRA) report in support of a Strategic Housing Development to An Bord Pleanála for a proposed residential development of 306no. residential units in Glounthaune, Co. Cork.

As the development is in close proximity to Cork Harbour, the risk of coastal flooding has been considered. A review of The Catchment Flood Risk Assessment and Management (CFRAM) study indicates that the development is not at risk from a 1 in 1000-year coastal event. This confirms the site in Flood Zone C with reference to coastal flood risk.

Given that the proposed development is in close proximity to the River Lee, fluvial flooding risk has been considered. The CFRAM mapping available indicates the site is located in Flood Zone C with reference to the River Lee. There are no other significant water courses within the site or in the close proximity causing a fluvial flood threat. This is supported by the lack of recorded fluvial flood events in the vicinity of the proposed development. Therefore, it is concluded that the site is located in Flood Zone C with reference to fluvial flooding.

Buildings with a residential element are classed as highly vulnerable developments and these are considered a suitable land use for Flood Zone C and negated the need for a Justification Test. It is also noted that the proposed development will not increase the flood risk elsewhere.

The GSI website indicates that the groundwater vulnerability for the subject site is extreme. A number of boreholes were carried out on site as part of geotechnical investigation undertaken between 26th July and 24th August 2018. Four standpipe wells were installed in BH01, BH10, BH12 and BH14. No groundwater was encountered on site during the period of site investigation works. Groundwater monitoring has not been undertaken.

It is important to mention that the proposed development will be carefully managed in terms of surface water runoff and provision will be made for significant rainfall events. The surface water drainage network will be designed to cater for storm water from both roofs of the buildings, car parking and pedestrian areas on the entire premises of the development in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) and DLRCC Development Plan 2016-2022 – Policy EI8 and will contain the 1 in 100-year return period rainfall event plus 20% climate change allowance.

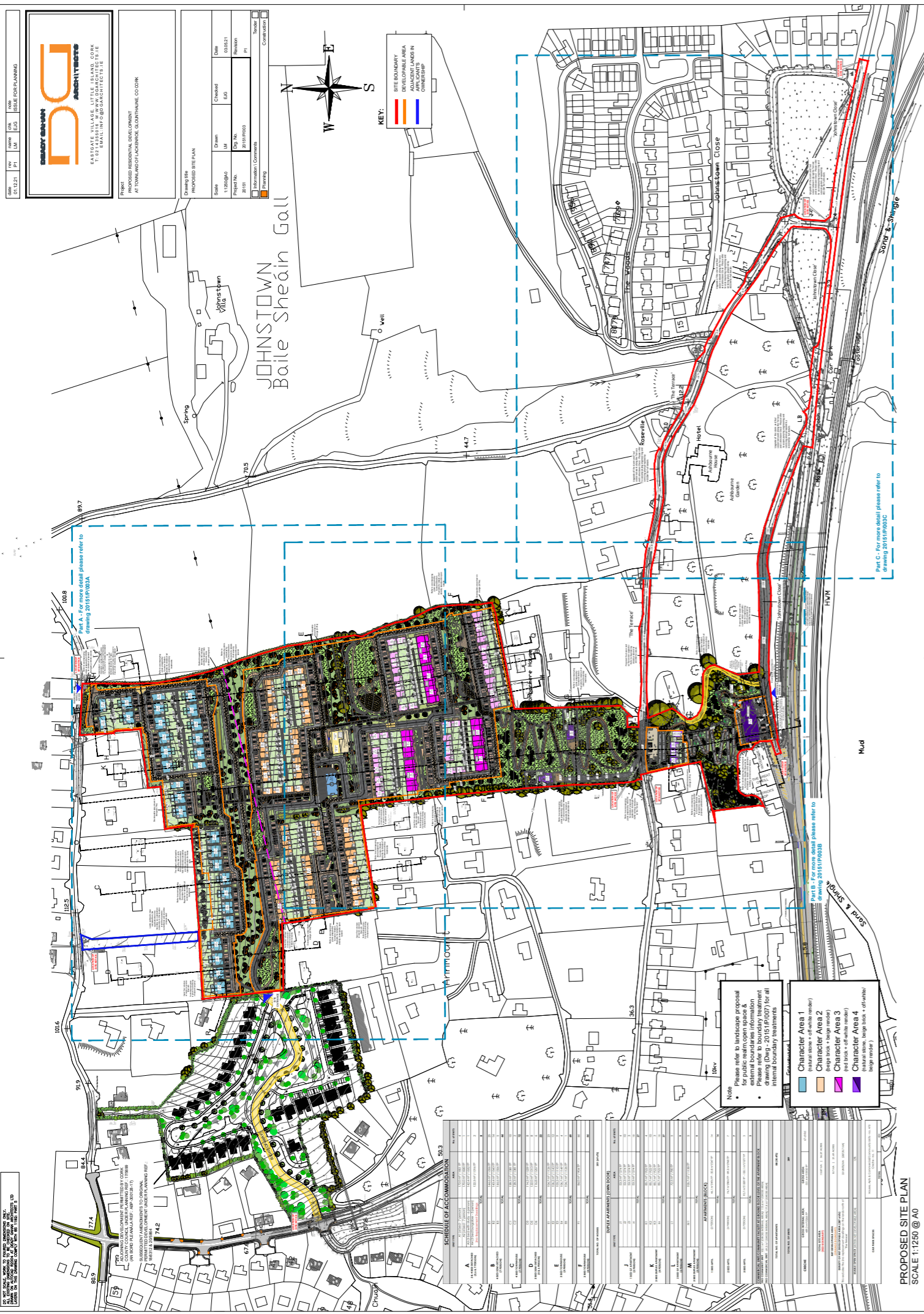
As the proposed surface water network is surcharged during the 1 in 100-year return period rainfall event, a freeboard exercise has been carried out to ensure the surcharging does not pose a threat either as a result of increase surcharge levels or in event of blockage or partial blockage of the sewers.

We note that in case of emergency there is vehicular access for Fire and Ambulance services to the site from all roads surrounding the proposed development.

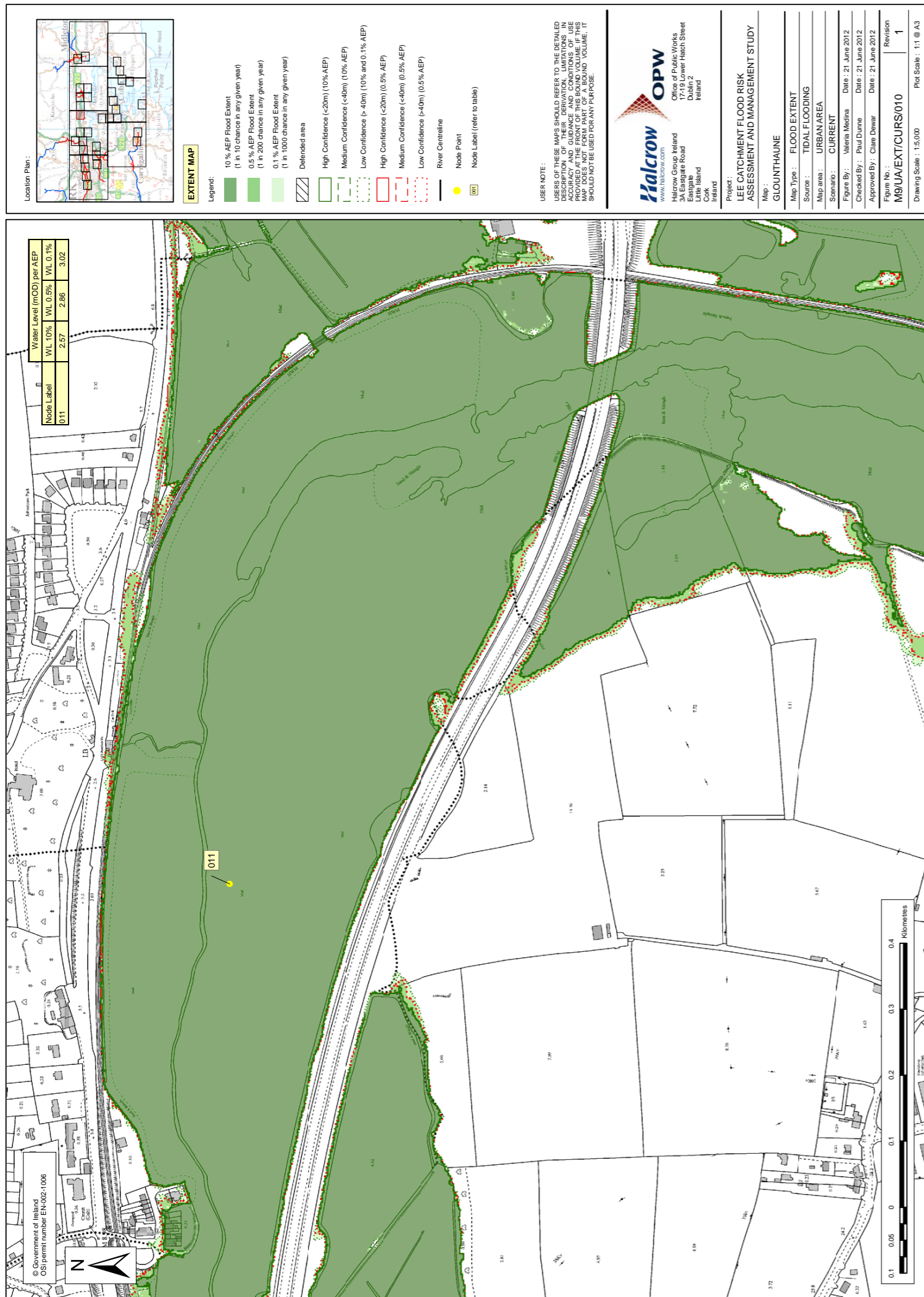
AECOM recommends that any residual flood risk be managed through appropriate maintenance of the proposed drainage network and structures (attenuation tanks, manholes, gullies, channel drains, etc.) and the use of emergency plans and evacuation procedures, which the Client will be preparing upon development occupation in order to suit specific needs.

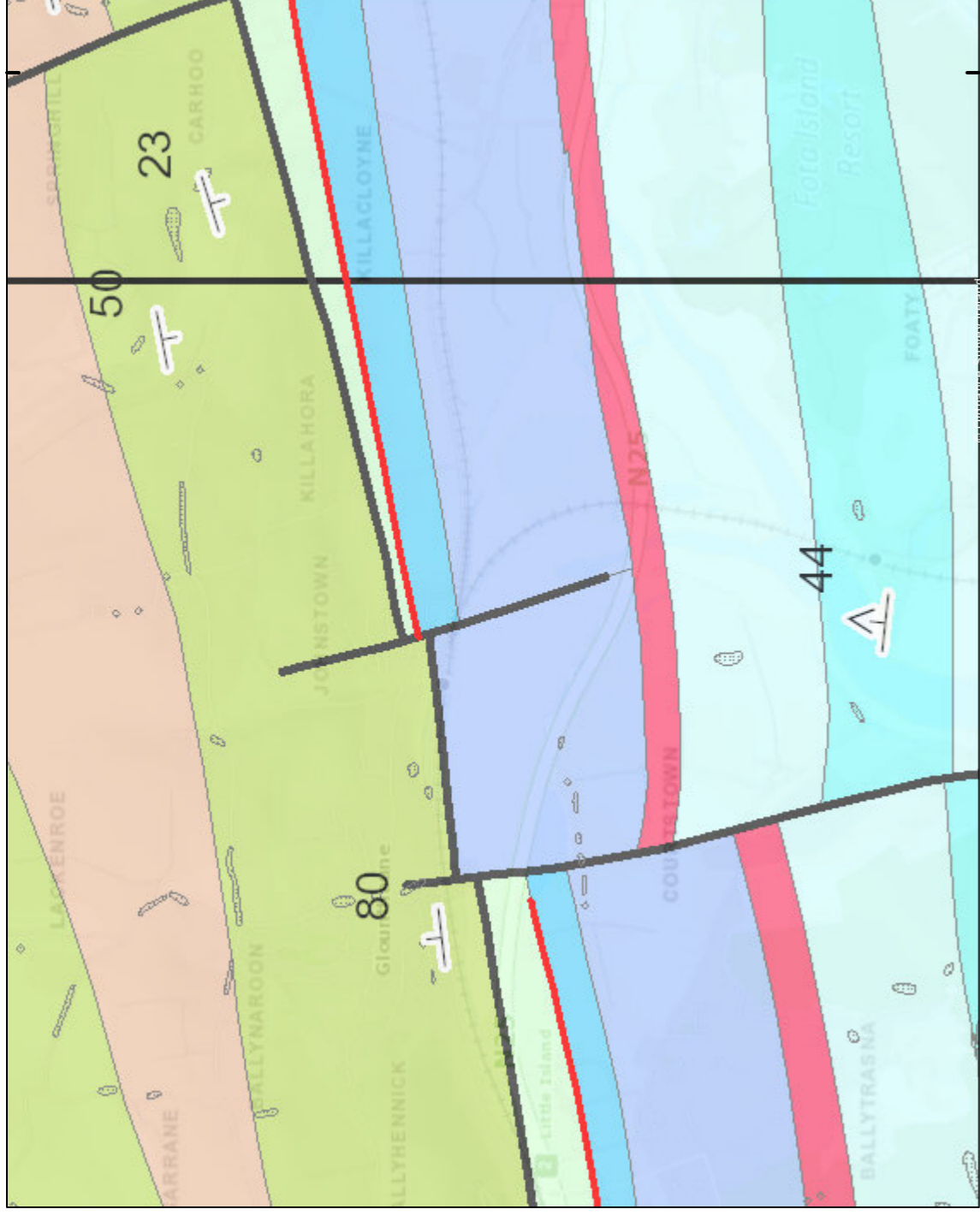
Appendix A – Proposed Development Layout

Appendix B – CFRAM Coastal Flood Extents Map



Appendix C – Groundwater Information



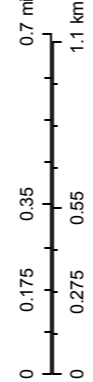


Scale: 1:25,000

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Map Centre Coordinates (ITM) 577.950 573.096
1/18/2019, 12:53:20 PM



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Legend

Structural Symbols 100K ITM 2018

- <all other values>
- Dip of bedding or main foliation, old
- GSI data
- First foliation parallel to bedding
- Foliation trend, Thorr and Rosses Granites
- Horizontal Bedding
- Strike and dip of bedding, right way up
- Strike and dip of bedding, way up
- unknown
- Strike and dip of first foliation
- Strike and dip of overturned bedding
- Strike and dip of second foliation
- Strike and dip of third foliation
- Strike and plunge of first generation fold
- axis
- Strike and plunge of second generation
- fold axis
- Strike and plunge of third generation fold
- axis
- Strike of vertical bedding/foliation
- Strike of vertical first foliation

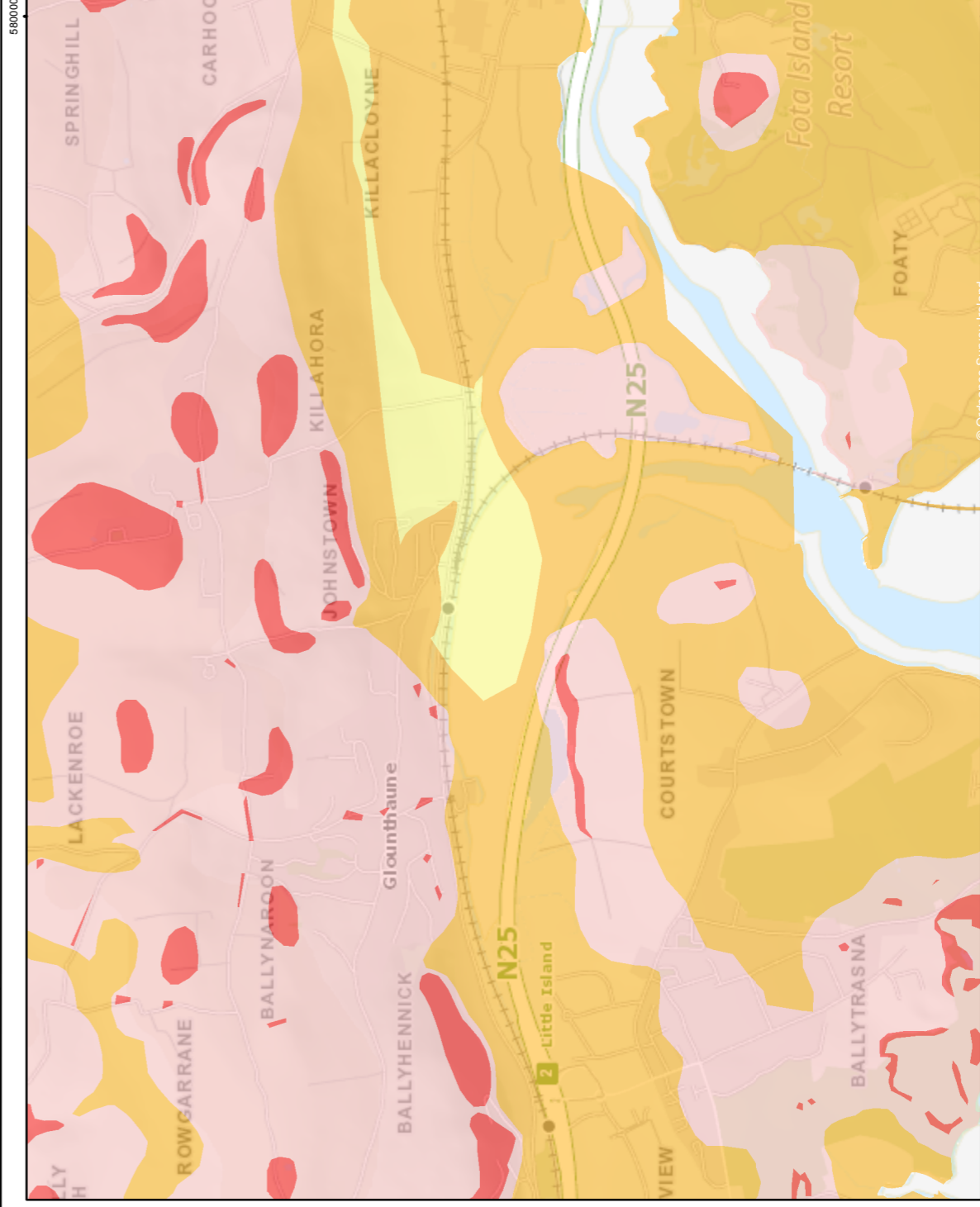
Bedrock Outcrops
100 ITM 2018

Bedrock Linework 100K ITM 2018

- Anticlinal Axis
- Antiformal axis
- Aquifer Boundary
- Area
- Coal seam
- Dyke
- Fault

- Ghost Line
- Goniatite marine band (R1-R4)
- Lithological boundary
- offshore
- Metadolomite sheet, mainly sills
- Paleogene/ Tertiary
- Dyke
- Synclinal Axis
- Synformal axis
- Tectonic Slide, barbs on hanging-wall
- Thin stratigraphical unit, diagrammatic
- Thrust, barbs on hanging-wall side
- Tuff band
- Unconformity, dots on younger side
- X-Section

Groundwater Data



Scale: 1:25,000

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Legend

Groundwater Vulnerability

- X - Rock at or near surface or Karst
- E - Extreme
- H - High
- M - Moderate

Appendix D – OPW Flood Hazard Mapping

Summary Local Area Report

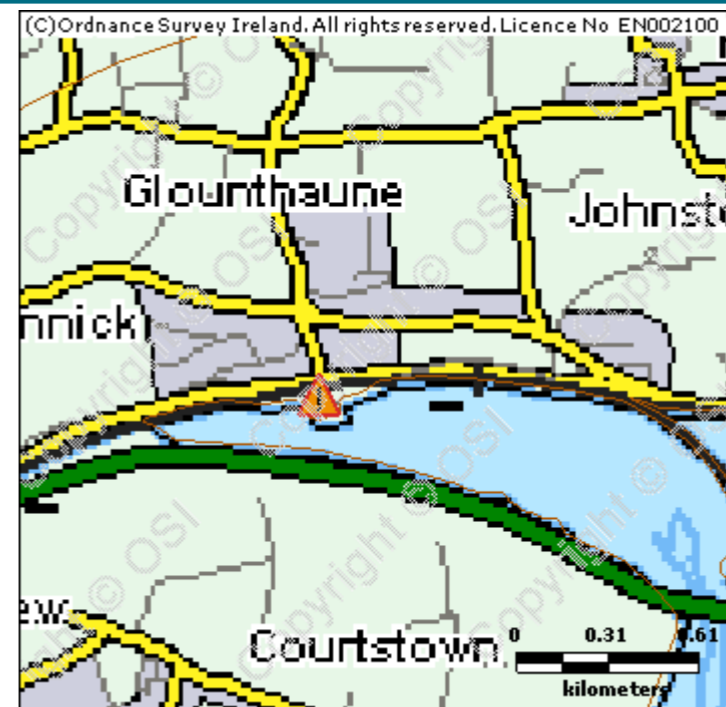
This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Cork

NGR: W 771 732

This Flood Report has been downloaded from the Web site www.floodmaps.ie. The users should take account of the restrictions and limitations relating to the content and use of this Web site that are explained in the Disclaimer box when entering the site. It is a condition of use of the Web site that you accept the User Declaration and the Disclaimer.



Map Legend	
	Flood Points
	Multiple / Recurring Flood Points
	Areas Flooded
	Hydrometric Stations
	Rivers
	Lakes
	River Catchment Areas
	Land Commission *
	Drainage Districts *
	Benefiting Lands *

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained in the Glossary.

Map Scale 1:25,267

1 Result



1. Glounthaune Oct 2004

County: Cork

Start Date: 27/Oct/2004

Flood Quality Code:4

Additional Information: Reports (1) More Mapped Information

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