



South Western CFRAM Study

Screening for Appropriate Assessment: UoM22

August 2017

Office of Public Works

South Western CFRAM Study

Screening for Appropriate Assessment: UoM22

August 2017

Office of Public Works

Jonathan Swift Street
Trim
Co. Meath

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
A	18 December 2014	R. Mansfield	B. O' Connor	F. McGivern	Initial Draft for submission to CFRAM AA Workshop (January 2015)
B	23/12/15	R. Mansfield	B. O' Connor	F. McGivern	Update options
C	June 2016	N. Roche	R. Mansfield	B. O' Connor	Final for consultation
D	August 2017	R. Mansfield	B. O' Connor	F. McGivern	Revisions following consultation
E	December 2017	R Mansfield/ E Johnston	B. O' Connor	F. McGivern	Figures added

Please read carefully the following statements and conditions of use of the data, contained in this report. Accessing the information and data denotes agreement to, and unconditional acceptance of, all of the statements and conditions.

I have read in full, understand and accept all of the above notes and warnings concerning the source, reliability and use of the data available in this report.

I agree that the Commissioners of Public Works in Ireland have the absolute right to reprocess, revise, add to, or remove any data made available in this report as they deem necessary, and that I will in no way hold the Commissioners of Public Works in Ireland liable for any damage or cost incurred as a result of such acts.

I will use any such data made available in an appropriate and responsible manner and in accordance with the above notes, warnings and conditions.

I understand that the Commissioners of Public Works in Ireland do not guarantee the accuracy of any data made available, or any site to which these pages connect and it is my responsibility to independently verify and quality control any of the data used and ensure that it is fit for use.

I further understand that the Commissioners of Public Works in Ireland shall have no liability to me for any loss or damage arising as a result of my use of or reliance on this data.

I will not pass on any data used to any third party without ensuring that said party is fully aware of the notes, warnings and conditions of use.

I accept all responsibility for the use of any data made available that is downloaded, read or interpreted or used in any way by myself, or that is passed to a third party by myself, and will in no way hold the Commissioners of Public Works in Ireland liable for any damage or loss howsoever arising out of the use or interpretation of this data

Information class: Standard

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

Legal Disclaimer

This report is subject to the limitations and warranties contained in the contract between the commissioning party (Office of Public Works) and Mott MacDonald Ireland.

Contents

Chapter	Title	Page
	Executive Summary	i
1	Introduction	1
1.1	Flood Risk Assessment and Management in Ireland	1
2	Appropriate Assessment	4
2.1	Statutory Requirement for Appropriate Assessment	4
2.2	Appropriate Assessment – The Process	5
2.3	Objective of Appropriate Assessment Screening	6
2.4	Methodology	7
2.5	Consultation	9
3	Description of the Plan	10
3.1	Flood Risk Management Plan	10
3.2	Overview of the South Western River Basin District	11
3.2.1	Units of Management in the SWRBD	11
3.3	Flood Risk Management Options	12
3.4	The Laune-Maine-Dingle Bay (UoM22)	14
3.4.1	Areas for Further Assessment in UoM 22	16
3.5	Flood Risk Management Options for the Laune / Maine / Dingle Bay UoM	16
3.5.1	Non-Structural Measures	17
3.5.2	Structural Measures	19
3.6	Flood Risk Management Options with Potential for Significant Effects on Natura 2000 Sites	20
3.6.1	Potential Impacts of Non-Structural Options in UoM 22	21
3.6.2	Potential Impacts of Structural Options in UoM 22	22
4	Characteristics of Natura 2000 Sites	25
4.1	Natura 2000 Sites within the Zone of Impact	25
4.2	Likelihood of Impacts on Natura 2000 Sites	32
4.2.1	Castleisland AFA	33
4.2.2	Dingle AFA	33
4.2.3	Killarney AFA	34
4.2.4	Milltown AFA	35
4.3	In Combination Impacts	36
4.3.1	General	36
4.3.2	Plans and Projects That Might Act In-combination	37
5	Significance of Impacts on Natura 2000 Sites	40
5.1	General	40
5.2	Assessment of Significance	40

6	Conclusions and Screening Statement	44
6.1	Screening Statement _____	44
7	References	47

Figures

Figure 2-1 Appropriate Assessment the Process _____	6
Figure 3-1 South Western River Basin District (SWRBD) _____	11
Figure 3-2 Units of Management and Areas for Further Assessment in the SWRBD _____	12
Figure 3-3 Laune / Maine / Dingle Bay UoM 22 _____	16

Tables

Table 3.1: Suite of Flood Risk Management Options _____	13
Table 3.2: List of AFAs in the Laune / Maine / Dingle Bay UoM _____	16
Table 3.3: AFAs suitable for Flood Forecasting _____	18
Table 3.4: Structural Flood Risk Management Options for UoM 22 _____	20
Table 4.1: Noise Levels, dB(A), at Various Distances from Construction Activities _____	33
Table 5.1: Assessment of Significance of Impacts for Killarney _____	41
Table 6.1: Screening Matrix for UoM 22 _____	44

Executive Summary

Introduction

The Office of Public Works (OPW) is the competent authority in Ireland for the implementation of the EU Floods Directive [2007/60/EC], which is transposed into Irish law by the European Communities (Assessment and Management of Flood Risk) Regulations, 2010. The Floods Directive requires Member States to:

- Identify areas of existing or foreseeable future potentially significant flood risk (referred to as Areas for Further Assessment - AFAs);
- Prepare flood hazard and risk maps for the AFAs;
- Prepare Flood Risk Management Plans, setting objectives for managing the flood risk within the AFAs and setting out a prioritised set of measures for achieving those objectives.

The programme for the delivery of flood risk management in Ireland comprised the following phases:

- i Preliminary Flood Risk Assessment, which was completed in 2011, identified areas of existing or foreseeable future potentially significant flood risk (referred to as 'Areas for Further Assessment'/AFAs);
- i CFRAM Studies, which were completed in the period 2011 to 2016;
- i The Flood Risk Management Plans were produced for each CFRAM study in 2017;

The Flood Risk Management Plans will be implemented from 2017 onwards and will be reviewed on a rolling six-yearly cycle.

Mott MacDonald Ireland Ltd. was appointed by the OPW to undertake the above activities as part of the Catchment Flood Risk Assessment and Management Study (CFRAMs) for the South Western River Basin District.

The South Western River Basin District CFRAM study (and output Flood Risk Management Plans) have been informed by Appropriate Assessment, the requirement for which is derived from Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive). Appropriate Assessment is the process of determining whether the Flood Risk Management Plan is likely to pose a risk to the attainment or maintenance of conservation objectives for areas protected for their ecological value within the State (Natura 2000 sites - Special Areas of Conservation and Special Protection Areas), and the identification of alternatives or mitigation as appropriate.

One Flood Risk Management Plan has not been developed for the entire South Western River Basin District but rather, targeted individual plans were produced on a waterbody catchment basis (Units of Management basis). The South Western River Basin District is broken down into five Units of Management:

- The Munster Blackwater Catchment (UoM18)
- The Lee / Cork Harbour Catchment (UoM19)
- The Bandon / Skibbereen Catchment (UoM20)
- The Dunmanus / Bantry / Kenmare Bay Catchment (UoM21)

- The Laune / Maine / Dingle Bay Catchment (UoM22)

UoMs are further broken down in to Areas for Further Assessment (AFAs). These are communities within an individual UoM with a quantifiable flood risk and include towns, villages and areas where significant development is anticipated. Associated with AFAs are high and medium priority watercourses. High priority watercourses are located within and 2km upstream of AFAs whereas medium priority watercourses are the interconnecting watercourses between AFAs or the coast.

The Laune-Maine-Dingle Bay (UoM22)

The Laune / Maine / Dingle Bay Unit of Management (UoM 22) covers an area of approximately 2,031km². The large majority of the area is in County Kerry with parts in County Cork. The main rivers within UoM 22 are the Maine, the Flesk and the Laune. UoM 22 also has a number of large lakes including Lough Leane and Muckross Lake.

The Laune / Maine / Dingle Bay UoM contains six Areas for Further Assessment (AFAs): Castleisland, Dingle, Glenflesk, Killarney, Milltown and Portmagee

Flood risk management options for the Laune / Maine / Dingle Bay UoM were provisionally identified through options appraisal as:

AFA	Viable Options
Castleisland	<ul style="list-style-type: none"> Option 1 - Walls and Embankments - construction of flood defences and localised protection works in Anglore Upper, Anglore Lower and within the town centre. Option 2 - Flood Defences & Flow Diversion: fluvial flood defences comprising of walls and embankments and the construction of an open channel to divert the Anglore around Tullig
Dingle	<ul style="list-style-type: none"> Option 1 - Flood defences and storage – Storage on the Dingle Stream comprising embankments up to 5m in height coupled with flood walls of 1.1 to 1.8m in proximity to the harbour and defences 2.7 m to 2.9m on the Milltown River estuary. Option 2 - Flood defences and diversion – Flow diversion from Dingle Stream through agricultural lands via a 2,000m culvert to the harbour coupled with flood walls of 1.1 to 1.8m in proximity to the harbour and defences 2.7 m to 2.9m on the Milltown River estuary. Option 3 - Flood defences and embankments – Flood walls along the R559 road within the town comprising walls between 1.1m and 5.4m in height and defences 2.7 m to 2.9m on the Milltown River estuary.
Glenflesk	<ul style="list-style-type: none"> No options are proposed
Killarney	<ul style="list-style-type: none"> Option 1 - Flood Defences - defences include walls and embankments ranging in height from 1m to 2m.
Milltown	<ul style="list-style-type: none"> Option 1 - Flood Defence -These defences include walls and embankments on the Ashullish Stream. Option 2 - Flow Diversion/Flood Defences-flow diversion from the Ashullish Stream to the Rathpogue west Stream in combination with the construction of flood defences
Portmagee	<ul style="list-style-type: none"> No options are proposed

Natura 2000 Sites

Viable flood risk management options have been determined for the AFAs of Castleisland, Dingle, Killarney and Milltown.

- i The Castleisland AFA does not overlap with any Natura 2000 site boundary. The Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161) is approximately 5km north of Castleisland. This is designated for Hen Harrier (*Circus cyaneus*). There is no potential for impact on this qualifying feature given the absence of suitable Hen Harrier nesting (conifer forestry) and foraging (bog and heath) habitat within the environs of Castleisland.
- i The Dingle AFA boundary does not overlap with any Natura 2000 site boundary. Mount Brandon SAC (000375) is located immediately north of Dingle AFA. The Dingle Peninsula SPA is approximately 2.5km south of Dingle AFA.
- i Viable flood risk management options are identified for the River Flesk in Killarney. The Flesk flows into Lough Leane which is part of the Killarney National Park SAC and SPA. The Flesk River is also part of the SAC.
- i Milltown is located along a number of tributaries of the River Maine. The AFA does not overlap with the Natura 2000 site boundary, however the River Maine flows into Castlemaine Harbour SAC and SPA.

There is potential for impacts to the qualifying features of Mount Brandon SAC (000375), the Dingle Peninsula SPA (004153), the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365), the Killarney National Park SPA (004038) and Castlemaine Harbour SAC (000343) and SPA (004029).

Potential Impacts on Qualifying Features

Castleisland

There is no potential for the flood risk management works in the Castleisland AFA to impact upon Natura 2000 sites due to absence of connectivity to any Natura 2000 site and distance from sites.

Dingle

The Dingle Peninsula SPA is approximately 2.5km south of Dingle AFA. Disturbance to conservation interests of the SPA is extremely unlikely given distance from site.

There is no hydrological connection between the Dingle AFA and the freshwater pearl mussel population in the Owenmore River, part of Mount Brandon SAC. Impacts on freshwater pearl mussel are extremely unlikely.

Killarney

It is near certain that freshwater pearl mussel would be impacted by sediment runoff to the watercourse from construction of the proposed flood risk management options.

Similarly Atlantic Salmon and Lamprey may be impacted by sedimentation, although it should be noted that these species are less sensitive to sedimentation than pearl mussel.

Sediment may be released to the Flesk River during the works. Sediment deposition on vegetation can impact photosynthesis and can smother vegetation. It is probable that sedimentation could impact floating river vegetation.

Otter may be disturbed by the works on the Flesk River.

Milltown

Milltown is on the freshwater section of River Maine. Estuarine and coastal qualifying features of the SAC do not feature within the environs of Milltown. Impacts on estuaries, intertidal mudflats and sandflats, perennial vegetation of stony banks and salt meadows are therefore extremely unlikely.

The Aghullish and Ballyoughtrough streams are sub-optimal habitat for Atlantic Salmon and Lamprey Otter. Impacts are therefore extremely unlikely.

Significance of Impacts

Significant impacts on lamprey and Atlantic salmon within the River Flesk, part of the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365), are uncertain.

Significant impacts on freshwater pearl mussel within the River Flesk, part of the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365), are extremely likely.

Significant impacts on floating river vegetation within the River Flesk, part of the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365), are uncertain.

Screening Statement

This Appropriate Assessment Screening was carried out in conjunction with the preliminary option appraisal process, Document Ref: Preliminary Options Report for UoM22. The option appraisal assessed each viable flood risk management option in terms of potential technical, social and environmental impacts. The option selection stage concluded that viable preferred options for each AFA in UoM22 were as follows:

AFA	Preferred Option
Castleisland	Flood Defences
Dingle	Storage and Flood Defences
Glenflesk	No options are proposed
Killarney	Flood Defences
Milltown	No beneficial viable option was identified.

No impacts of flood risk management measures were identified as likely for the Castleisland AFA and Dingle AFA and Milltown AFA. No options are proposed for the Glenflesk AFA, therefore there will be no impacts.

This screening for Appropriate Assessment has determined that **significant effects are likely or uncertain** for the Killarney National Park, Macgillicuddy's Reeks and Caragh River Catchment SAC (000365) as a result of flood risk management options in the Killarney AFA.

1 Introduction

1.1 Flood Risk Assessment and Management in Ireland

Flood risk management in Ireland has historically focused on land drainage schemes for the improvement of agricultural land. The 1945 Arterial Drainage Act established a national drainage authority (the Office of Public Works) with the remit of implementing a national arterial drainage programme. The Arterial Drainage Act was amended in 1995 to include for the protection of urban areas suffering from flooding.

In 2004, the Irish Government adopted a new National Flood Policy for Ireland which shifted the emphasis in addressing flood risk away from arterial drainage (targeted towards the protection of agriculture and cities / town liable to serious flooding) and towards a waterbody catchment-based flood risk assessment (a similar catchment-based management approach to that already being implemented under the Water Framework Directive 2000/60/EC).

In 2007 the Floods Directive [2007/60/EC] was published which requires the establishment of a framework of measures to reduce the risks of flood damage. The Floods Directive was transposed into Irish law by the European Communities (Assessment and Management of Flood Risks) Regulations, 2010 (S.I. No. 122 of 2010). The Regulations identify the Office of Public Works (OPW) as the lead agency in implementing flood management policy in Ireland.

Catchment Flood Risk Assessment and Management (CFRAM) Studies

For the purpose of delivering on the components of the National Flood Policy and on the requirements of the European Union Floods Directive, the OPW, in conjunction with local authorities and stakeholders, conducted a number of Catchment Flood Risk Assessment and Management (CFRAM) Studies. These studies are the core activity from which medium to long-term strategies for the reduction and management of flood risk in Ireland will be achieved.

The overarching objectives of the CFRAM Studies were to:

- Identify and map the existing and potential future flood hazard within the study area;
- Assess and map the existing and potential future flood risk within the study area;
- Identify viable structural and non-structural options and measures for the effective and sustainable management of flood risk within the study area;
- Prepare Flood Risk Management Plans (FRMPs) setting out recommendations to manage the existing flood risk and also the potential future flood risk which may increase due to climate change, development, and other pressures that may arise in the future. FRMPs set out policies, strategies, measures and actions that should be pursued by the relevant bodies (including the OPW, Local Authorities and other Stakeholders), to achieve the most cost-effective and sustainable management of existing and potential future flood risk within the study area, taking account of environmental plans, objectives and legislative requirements and other statutory plans and requirements¹.

¹ The Floods Directive requires that Flood Risk Management Plans should take into account the particular characteristics of the areas they cover and provide for tailored solutions according to the needs and priorities of those areas, whilst promoting the

The programme for the delivery of flood risk management in Ireland comprised of the following phases:

- Preliminary Flood Risk Assessment, which was completed in 2011, identified areas of existing or foreseeable future potentially significant flood risk (referred to as 'Areas for Further Assessment'/AFAs);
- CFRAM Studies, which were completed in the period 2011 to 2017;
- Flood Risk Management Plans were produced for each CFRAM study in 2017;
- The Flood Risk Management Plans will be implemented from 2017 onwards and will be reviewed on a rolling six-yearly cycle.

It is emphasised that observations and views submitted as part of the consultation on the Draft Flood Risk Management Plan (and associated Strategic Environment Assessment and Appropriate Assessment) have been reviewed and taken into account in the preparation of the finalised Plans

Furthermore, once the FRMP is adopted, measures involving physical works (e.g., flood protection schemes) will need to be further developed at a local, project level before Exhibition or submission for planning approval. At this stage, local information that cannot be captured at the Plan-level of assessment, such as ground investigation results and project-level environmental assessments, may give rise to some amendment of the proposed measure to ensure that it is fully adapted, developed and appropriate within the local context.

While the degree of detail of the assessment undertaken to date would give confidence that any amendments should generally not be significant, the measures set out in the FRMP may be subject to some amendment prior to implementation, and in some cases, may be subject to significant amendment.

In this context, it is stressed that the SEA and AA undertaken in relation to the FRMP are plan-level assessments. The FRMP will inform the progression of the preferred measures, but project-level assessments will need to be undertaken as appropriate under the relevant legislation for consenting to that project for any physical works that may progress in the future. The approval of the Final FRMP does not confer approval or permission for the installation or construction of any physical works. The requirements for EIA and/or AA Screening, including any particular issues such as knowledge gaps or mitigation measures that are expected to be necessary, are set out in the Environmental Report or Natura Impact Statement as relevant.

It should be noted that the detailed designs for flood risk management measures are not developed as part of the Flood Risk Management Plans / CFRAM Studies but rather measures will be progressed on a scheme by scheme basis, outside of the scope of the CFRAM studies.

The OPW has commissioned a CFRAM study for each of Ireland's seven River Basin Districts (RBDs)². This report is a Screening for Appropriate Assessment produced in accordance with the Habitats Directive and pertains to the South Western River Basin District.

² River Basin Districts (RBDs) are the main units for the management of river basins and have been delineated by Member States under Article 3 of the Water Framework Directive (2000/60/EC). RBDs are areas of land and sea, made up of one or more neighbouring river basins together with their associated groundwaters and coastal waters.

2 Appropriate Assessment

2.1 Statutory Requirement for Appropriate Assessment

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive) is European Community legislation regarding nature conservation. The intention of the Directive is to aim to ensure biodiversity through the conservation of natural habitats and wild fauna and flora in Europe. The Habitats Directive was transposed into Irish law by the European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94/1997) which was subsequently revoked and replaced by the European Communities (Birds and Natural Habitats) Regulations 2011.

A network of sites of conservation importance hosting habitats and/or species identified in the Directives as needing to be either maintained at or returned to favourable conservation status have been identified by each Member State. These sites are known as the Natura 2000 network and in Ireland, Natura 2000 sites comprise areas designated as Special Areas of Conservation (SACs) and candidate Special Areas of Conservation (cSACs), and/or Special Protection Areas (SPAs) and candidate Special Protection Areas (cSPAs).

The Habitats Directive requires that where a plan or project is likely to have a significant effect on a Natura 2000 Site, while not directly connected with or necessary to the nature conservation management of the site, it shall be subject to 'Appropriate Assessment' to identify any implications for the site in view of the site's conservation objectives³.

Specifically, Article 6(3) of the Habitats Directive states:

*Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to **appropriate assessment** of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.*

The CFRAM studies will identify viable strategies and measures for flood risk management in Ireland, some of which will be within areas designated under the Natura 2000 network. The Flood Risk Management Plans developed under these studies **are not directly connected with or necessary to the management of any Natura 2000 sites**. Therefore, in the context of the Habitats Directive, the Plans must be subjected to Screening for Appropriate Assessment is to determine whether the strategies or measures outlined therein are likely to have a significant effect on a Natura 2000 site, either alone or in

³ The NPWS is currently developing Conservation Management Plans for all SACs nationally. Objectives for the conservation of the features of interest for which the site is designated are set out in the Conservation Management Plans and the principal pressures impacting the achievement of Favourable Conservation Status are identified. Strategies to meet the objectives are also identified.

combination with other plans or projects. Where significant effects are determined to be likely the Plans are statutorily required to be subjected to Appropriate Assessment.

2.2 Appropriate Assessment – The Process

The European Commission in 2002 published guidance on the assessment of plans and projects significantly affecting Natura 2000 sites. This guidance provides details of the general approach to Appropriate Assessment. The guidance sets out a tiered/staged approach as summarised below:

Stage 1 - Screening for a likely significant effect: An initial assessment of the project or plan's effect on a European site(s). A description of the plan/project and the elements that have the potential to impact on Natura 2000 sites must be provided. The potential impacts and their significance must be assessed. If it cannot be concluded that there will be no significant effect upon a European site, an Appropriate Assessment is required; (*Note this report is a Screening Assessment*).

Stage 2 - Appropriate Assessment: The consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts. The output of this stage of Appropriate Assessment is a Natura Impact Statement (NIS) report;

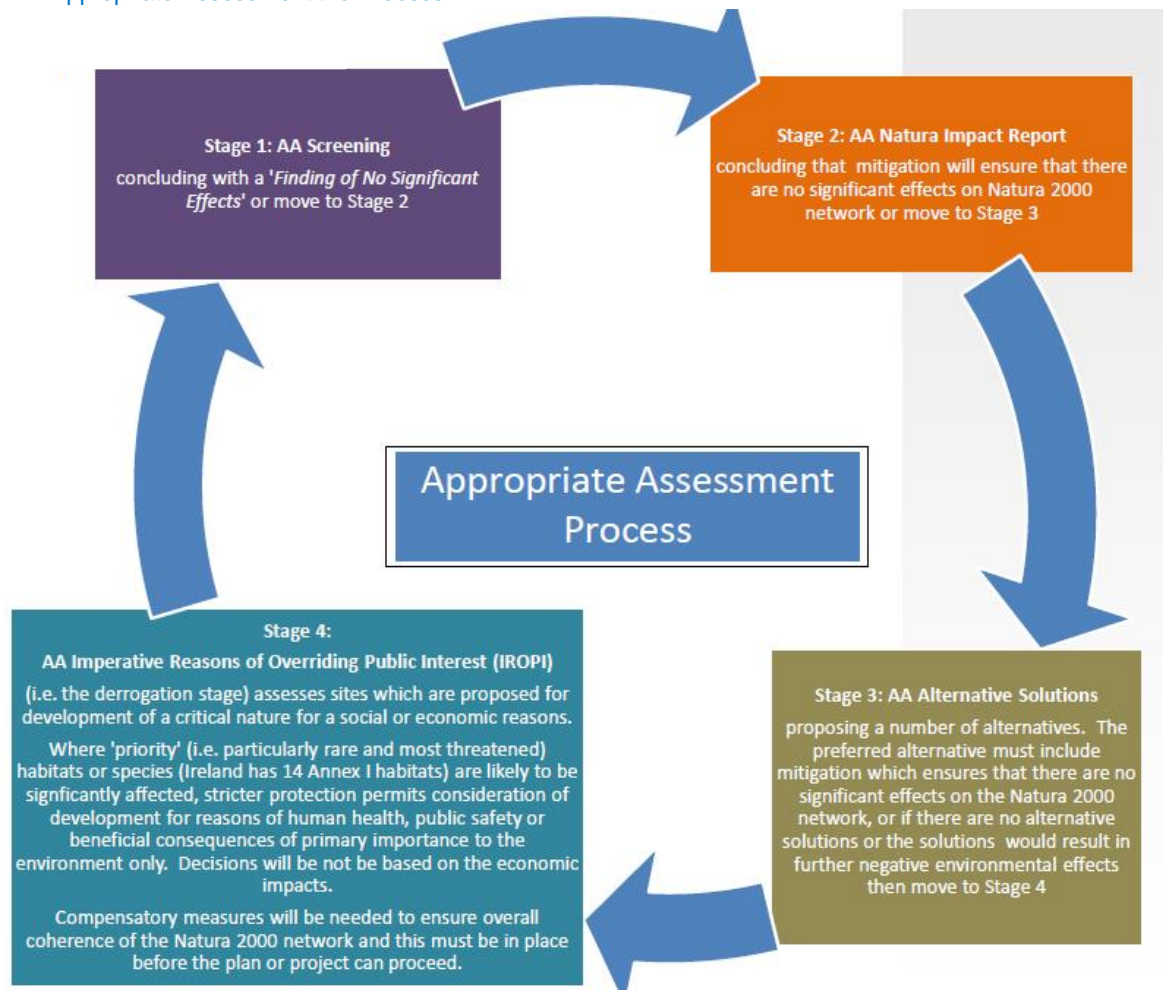
Stage 3 – Assessment of alternative solutions: The process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site (where mitigation cannot be achieved); and

Stage 4 – Assessment where no alternative solutions exist and where adverse impacts remain: Development of compensatory measures where, in the light of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed.

Each stage in the process determines whether a further stage is required. If, for example, the conclusions at the end of Stage 1 are that there will be no significant impacts on the Natura 2000 site, there is no requirement to carry out an Appropriate Assessment (Stage 2). The approach to Appropriate Assessment screening must however apply the precautionary principle i.e. where it cannot be definitively determined that a plan/project will not adversely impact the integrity of the Natura 2000 site then it must be assumed that there is potential for impact and a full Appropriate Assessment must be carried out.

The objective of the process is to provide adequate information, based on the best available scientific information, to inform the Competent Authority to enable them to conduct an assessment of whether the plan or project is likely to have a significant effect on the conservation objectives of the relevant Natura 2000 sites within the zone of influence. Where adverse impacts are identified mitigation measures necessary to avoid, reduce or offset such impacts must be prescribed.

Figure 2-1 Appropriate Assessment the Process



Source: West Regional Authority (WRA) in association with the Environmental Protection Agency (EPA) (2013) Draft 'SEA Resource Manual for Local and Regional Authorities'

2.3 Objective of Appropriate Assessment Screening

The objective of this Screening for Appropriate Assessment is to determine whether the South Western RBD Flood Risk Management Plans are likely to have adverse effects on conservation objectives of Natura 2000 sites. The direct, indirect and in-combination ecological impacts of the proposed plan policies / measures on Natura 2000 sites are identified and the necessity to carry out an Appropriate Assessment is determined. The outcomes of the assessment are also summarised in a 'Screening Matrix' presented in Section 6.

The DEHLG Guidance (2009) [revised, February 2010], '*Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities*' requires that the findings and recommendations of Appropriate Assessment informs the policies and strategies of the Plan.

Information contained in the Appropriate Assessment that will inform the South Western RBD Flood Risk Management Plans (FRMP) includes the following;

- i the areas likely to be significantly affected by the plan;
- i any existing environmental characteristics which are relevant to the plan including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC;
- i the environmental protection objectives and qualifying interests (established at international, Community or Member State level) which are relevant to the areas of the environment likely to be affected by the plan;
- i the likely significant effects on the Natura 2000 sites, such as impacts on biodiversity, fauna, flora, soil, water, etc.
- i the measures envisaged to mitigate against any significant adverse effects on the designated sites of implementing the plan; and
- i alternatives to the proposals in the plan and their potential effectiveness in maintaining the conservation value of the site.

2.4 Methodology

This screening assessment has been prepared in accordance with all relevant guidance and legislation including:

- i European Communities (Birds and Natural Habitats) Regulations 2011;
- i NPWS (2012) Marine Natura Impact Statements in Irish Special Areas of Conservation. A Working Document.
- i DEHLG (2009) Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities [revised, February 2010];
- i EC (2000) Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC;
- i EC (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC;
- i EC (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC: Clarification of the concepts of alternative solutions and imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission.

An extensive data collection exercise was conducted as part of this Appropriate Assessment Screening. Available information utilised in the preparation of this report includes:

- i Conservation Status Assessment Reports⁴ (CSARs), Backing Documents and Maps prepared in accordance with Article 17 of the Habitats Directive;

⁴ Every six years, Member States of the European Union are required to report on the conservation status of all habitats and species listed on the annexes of the Habitats Directive as required under Article 17 of the Directive. Ireland submitted our conservation

- i Natura 2000 Site Synopsis, Data Forms and Conservation Objective Reports available from NPWS;
- i Published and unpublished NPWS reports on protected habitats and species including Irish Wildlife Manual reports, Species Action Plans and Conservation Management Plans;
- i Existing relevant mapping and databases e.g. waterbody status, species and habitat distribution etc. (sourced from the Environmental Protection Agency - <http://gis.epa.ie/>, the National Biodiversity Data Centre - <http://maps.biodiversityireland.ie> and the National Parks and Wildlife Services - <http://www.npws.ie/mapsanddata/>).

2.4.1 Identification of Natura 2000 Sites Within the Zone of Influence

DEHLG Guidance states that screening for Appropriate Assessment should be carried out for any Natura 2000 site within the likely 'Zone of Influence' of a plan or project. For projects, the guidance recommends that the Zone of Influence must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in combination effects. Projects have the potential to impact on European sites beyond the confines of the individual sites themselves.

The Zone of Influence of a project is the area in which qualifying interests are present which are sensitive to the effects that may be caused by the activities associated with the project. The zone of influence will therefore vary relative to the scale of the effect and relative to the sensitivity of the receptor to the effect.

In order to establish the zone of influence and to determine baseline conditions, nationally available data on protected habitats and species was mapped using GIS. This data was interrogated for any physical, hydrological, or ecological connectivity to the activities associated with the project. All Natura 2000 sites within 15km of the UoM boundary were identified and the Zone of Influence were therefore determined. This included all Natura 2000 sites traversed by works and those with potential connectivity to the activities associated with the project. The Zone of Influence is determined using the source-pathway-receptor (SPR) approach as follows:

- The first step in the SPR assessment is to identify the likely direct, indirect and cumulative impacts from the project (i.e. identify the source). The likely effects of the project are detailed in Section 3 of this report.
- Secondly the pathway between the impacts (source) and receptor must be determined i.e. the spatial and temporal limits of the likely effects (biological / chemical / physical changes) are identified.
- Finally, the presence of ecological receptors (in this case European Sites and/or their qualifying features / conservation interests) within the spatial and temporal limits of the likely effects are determined and the sensitivity of these ecological receptors to effects is assessed. Where there is no sensitivity, the ecological receptor will not be impacted and therefore is not within the 'zone of influence'.

status report to the European Commission in June 2013. The assessment document may be viewed on the NPWS website: <http://www.npws.ie/publications/article17assessments/article172013assessmentdocuments/>

2.5 Consultation

A National Workshop on Appropriate Assessment (AA) of Flood Risk Management Plans (FRMP) was held between the Office of Public Works (OPW), their consultants on the CFRAMs projects and the National Parks & Wildlife Service (NPWS) on the 28th January 2015. The NPWS outlined their expectations of the AA for the FRMPs as follows:

- i The zone of influence of flood risk management options should be identified on a case by case basis using the Source-Pathway-Receptor approach;
- i Any mitigation prescribed in the NIS should be specific and should be demonstrated to be achievable and effective;
- i Consideration should be given the construction impacts at Plan level;
- i Appropriate Assessment must be based on scientific evidence;
- i If an option for one AFA needs to go to IRPOI then it may be the case that the entire FRMP will need to go through IROPI;
- i Care needs to be taken in how the Freshwater Pearl Mussel is considered.

The draft Flood Risk Management Plans and the associated SEA and AA assessments were subject to public consultation between July 2016 and September 2016. A series of Public Consultation Days were held to engage locally and directly with the community and provide people with opportunity to discuss and fully understand the Draft FRMPs and associated environmental assessments. The feedback and comments received through public consultation (which includes observations and recommendations received from the SEA statutory consultees) have been taken into account in the Final FRMPs (and in the associated SEAs and AAs). The manner in which consultation feedback has been taken into account is presented in the SEA statements for each FRMP.

3 Description of the Plan

3.1 Flood Risk Management Plan

The Floods Directive [2007/60/EC] requires the establishment of a framework of measures to reduce the risks of flood damage. Catchment Flood Risk Assessment and Management (CFRAM) Studies were commissioned to determine flood hazard and identify risk receptors that are susceptible to flooding in Ireland. Measures to mitigate risk (both existing and future) were also determined. The outputs of the CFRAM studies are Flood Risk Management Plans (FMRPs). The purpose of the FMRPs was to set out policies, strategies, measures and actions that should be pursued by the relevant bodies to achieve the most cost-effective and sustainable management of existing and potential future flood risk.

One Flood Risk Management Plan was not developed for the entire South Western River Basin District but rather, targeted individual plans were produced on a waterbody catchment basis (Units of Management basis). The South Western River Basin District is therefore broken down into Units of Management (UoMs) for the purpose of implementing the Floods Directive.

UoMs are representative of existing Hydrometric Area boundaries constituting major catchments or river basins typically greater than 1,000km² and their associated coastal areas, or conglomerations of smaller river basins and their associated coastal areas.

The FRMPs include a prioritised set of actions and measures aimed at meeting defined flood risk management objectives for each UoM. The flood risk management objectives are set out under four categories (Technical, Economic, Social, and Environmental), and include objectives such as:

- | Minimise health and safety risk of flood risk management options;
- | Manage risk to agricultural land;
- | Minimise risk to social amenity;
- | Minimise the risk of environmental pollution;
- | Avoid damage to, and where possible enhance, fisheries within the catchment.

A description of the flood risk management objectives which are particular to each UoM is included in the Flood Risk Management Plans.

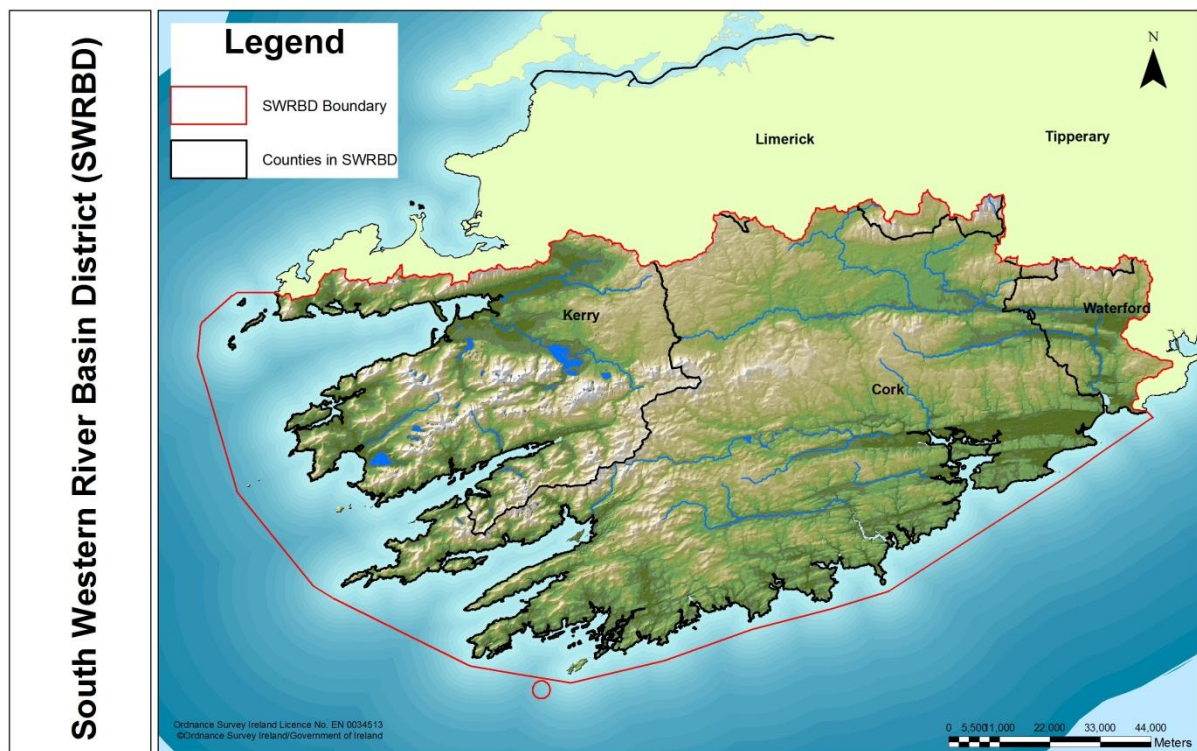
The Flood Risk Management Plans demonstrate the indicative costs and benefits of the preferred actions and measures, the robust reasoning for the identification of a measure as a preferred option and the priority each measure should be afforded. The plans also recommend a programme of work (including a prioritised and costed programme of policies, strategies, actions and measures) to be implemented by the OPW, Local Authorities or other relevant bodies to mitigate flood risk in each UoM.

The FRMPs will influence, and will in turn be influenced by external statutory and non-statutory plans, strategies and policies and programmes. National and local policies relating to the protection of the environment have been considered in the development of the FRMPs. This process was conducted as part of the Strategic Environmental Assessment of the FRMPs.

3.2 Overview of the South Western River Basin District

The South Western River Basin District (SWRBD) covers an area of approximately 11,160 km² and includes most of county Cork, large parts of counties Kerry and Waterford along with small parts of the counties of Tipperary and Limerick. The SWRBD contains over 1,800 km of coastline along the Atlantic Ocean and the Celtic Sea.

Figure 3-1 South Western River Basin District (SWRBD)



3.2.1 Units of Management in the SWRBD

There are five Units of Management within the South Western River Basin District which follow watershed catchment boundaries rather than political boundaries. The Units are as follows;

- i The Munster Blackwater Catchment (UoM18)
- i The Lee / Cork Harbour Catchment (UoM19)
- i The Bandon / Skibbereen Catchment (UoM20)
- i The Dunmanus / Bantry / Kenmare Bay Catchment (UoM21)
- i The Laune / Maine / Dingle Bay Catchment (UoM22)

UoMs are further broken down into Areas for Further Assessment (AFAs). The SWRBD includes 26 Nr. Areas for Further Assessment (AFAs).

Figure 3-2 Units of Management and Areas for Further Assessment in the SWRBD



3.3 Flood Risk Management Options

The CFRAM study for the SWRBD included *options appraisal*, to identify the preferred measures and options to manage flood risk for each UoM in the SWRBD. Receptors to flood risk within each UoM in the SWRBD were identified through detailed technical studies. The potential options to manage the flood risk of the various receptors were provisionally identified and were assessed for viability.

A flood risk management option consists of one, or more commonly a combination of, flood risk management measures. The suite of flood risk management options considered under the CFRAM study are presented in Table 3.1.

Table 3.1: Suite of Flood Risk Management Options

Option	Description
Do Nothing	Implement no new flood risk management measures and abandon any existing practices.
Existing Regime	Continue with any existing flood risk management practices, such as reactive maintenance.
Do Minimum	Implement additional minimal measures to reduce the flood risk in specific problem areas without introducing a comprehensive strategy - infill gaps in existing walls, maintain channel.
Non-Structural Measures	<p>Planning and development control measures (zoning of land for flood risk appropriate development, prevention of inappropriate incremental development, review of existing Local Authority policies in relation to planning and development and of inter-jurisdictional co-operation within the catchment, etc.);</p> <p>Building regulations (regulations relating to floor levels, flood-proofing, flood resilience, sustainable drainage systems, prevention of reconstruction or redevelopment in flood-risk areas, etc.);</p> <p>Sustainable urban drainage systems (SUDS);</p> <p>Installation of a flood forecasting and warning system and development of emergency flood response procedures;</p> <p>Targeted public awareness and preparedness campaign;</p> <p>Individual property flood resistance (protection / flood-proofing) and resilience;</p> <p>Land use management, including creation of wetlands, riparian buffer zones, etc.</p>
Structural measures	<p>Storage (single or multiple site flood water storage, flood retardation, etc.)</p> <p>Flow diversion (full diversion / bypass channel, flood relief channel, etc.)</p> <p>Increase conveyance (in-channel works, floodplain earthworks, removal of constraints / constrictions, channel / floodplain clearance, etc.)</p> <p>Construct flood defences (walls, embankments, demountable defences, etc.)</p> <p>Rehabilitate, improve existing defences</p> <p>Relocation of properties</p> <p>Localised protection works (e.g. minor raising of existing defences / levels).</p>
Channel or Flood Defence Maintenance Works / Programme	-
Other relevant works	-

Flood risk management options were developed for each UoM in the SWRBD. All of the available options from the prescribed suite (Table 3.1) are not applicable to every UoM. Options appraisal involved the technical assessment⁵ of all options to determine those which are applicable and viable for each UoM and associated AFAs. Following the technical assessment, a cost analysis of the viable options was conducted such that a preferred option (in terms of effectiveness, potential impacts, and cost) was determined.

The options proposed in the Flood Risk Management Plans are set at an appropriate scale which includes the following levels:

⁵ The effectiveness and potential impacts of each FRM option is considered in terms of the following criteria:

- Applicability to the area
- Economic (potential benefits, impacts, likely costs etc.)
- Environmental (potential impacts and benefits)
- Social (impacts on people, society and the likely acceptability of the method) and
- Cultural (potential benefits and impacts upon heritage sites and resources)

- i Units of Management (UoM) – i.e. at river basin catchment level;
- i Analysis Unit (AU) - these are sub-catchments or coastal areas within the Unit of Management;
- i Areas for Further Assessment (AFAs) - these are communities within an individual UoM with a quantifiable flood risk and include towns, villages and areas where significant development is anticipated. Associated with AFAs are high and medium priority watercourses. High priority watercourses are located within and 2km upstream of AFAs whereas medium priority watercourses are the interconnecting watercourses between AFAs⁶.

3.4 The Laune-Maine-Dingle Bay (UoM22)

The Laune / Maine / Dingle Bay Unit of Management (UoM 22) covers an area of approximately 2,031km². The large majority of the area is in County Kerry with parts in County Cork. The main rivers within UoM 22 are the Maine, the Flesk and the Laune. UoM 22 also has a number of large lakes including Lough Leane and Muckross Lake.

River Maine Catchment

This catchment includes 32km of the River Maine from Castleisland to its tidal outfall into Castlemaine Harbour. The River Shanowen rises near Mount Eagle and flows westwards towards Castleisland where it joins with the Anglore Stream to form the River Maine at Castleisland. The River Maine then continues to flow westwards joining with the Glanshearoon Stream at the downstream of Castleisland and the Little Maine River at Springmount before flowing south-westwards to Currans Bridge.

Downstream of Currans Bridge, the River Maine becomes increasingly embanked above the surrounding floodplain. The major tributary of the Brown Flesk joins the River Maine near the N22 crossing at Riverville gauge. A portion of the Brown Flesk is diverted through a bypass channel to join the River Maine downstream of the old Maine Bridge. Downstream of the Tralia River, the River Maine becomes increasingly tidally-influenced and is tidally-dominated by Castlemaine. The River Maine continues to meander across the tidal floodplain where it is joined by a number of embanked tributaries notably Ashullish Stream from Milltown. The River Maine outfalls into the Castlemaine natural harbour at the ferry crossing, before flowing out into Dingle Bay.

Ashullish Stream is a steep watercourse which flows north-westwards through the centre of Milltown, under the N70 to outfall via a penstock into the River Maine. The main tributary Sruhaun Ballyoughtragh Stream flows in a north-westerly direction to Chapel Bridge flowing past the GAA grounds and alongside Old Station road before turning west into embanked sections to join Ashullish Stream.

There are two watercourses within the Dingle AFA; Dingle Stream and Milltown River. Dingle flows in a south-westerly direction into central Dingle along Spa Road, under Bridge Street and along the Mall to outfall at the eastern end of the marina. Milltown River flows southwards to Ballinabooly where the

⁶ The designation of a watercourse as high priority or medium priority is not a reflection of how the watercourse is viewed in terms of its importance in flood risk management planning.

Ballyeabought River joins from the east. Milltown River then becomes increasingly tidally influenced as it continues southwards where a minor tributary joins under the R559 and then outfalls into Dingle Harbour at Milltown Bridge.

River Laune Catchment

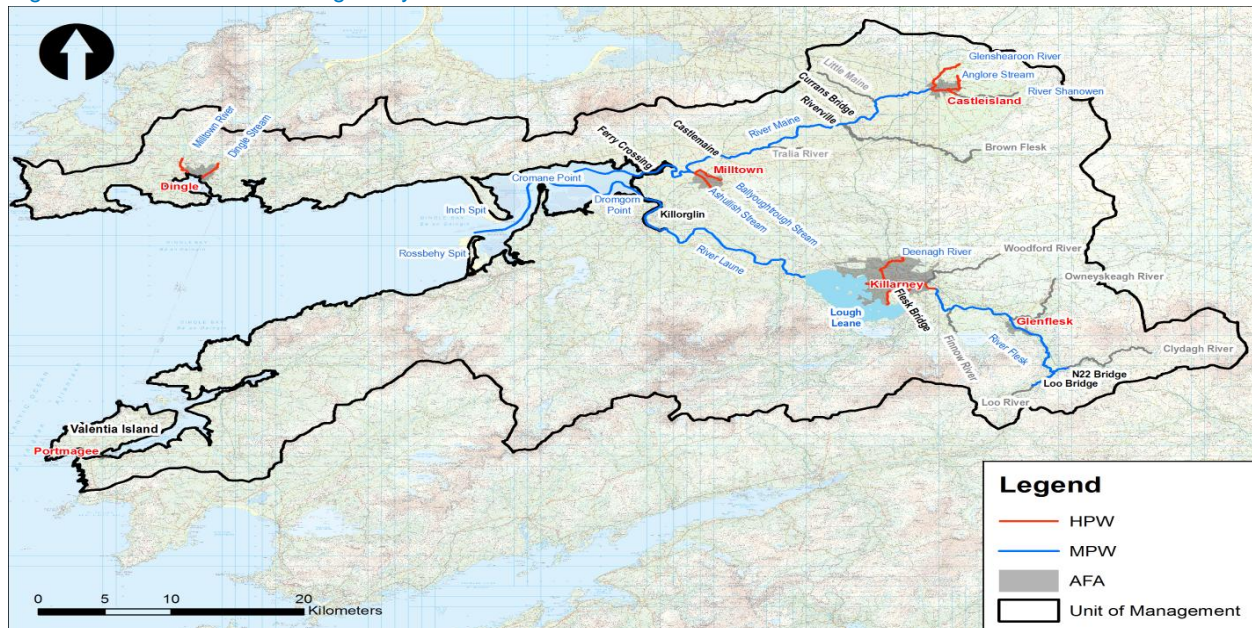
This catchment includes 73km of river in the River Laune catchment from the N22 Bridge to tidal outfall downstream of Killorglin. The River Clydagh rises near Mullaghanish and flows over steep ground to join with the Loo River downstream of Loo Bridge to form the River Flesk. The River Flesk flows in a north-westerly direction across shallow gradients to Glenflesk and joins with the River Owenyskeagh River 2km downstream of the town. Downstream of Flesk Bridge, the River Flesk has a steeper gradient until it reaches Mill Road Bridge and flows west along the southern edge of Killarney before outfalling into Lough Leane. The River Deenagh flows along the North of Killarney before turning southwards along Port Road and then westwards through the Killarney National Park to outfall into Lough Leane. A number of other rivers flow into Lough Leane including Owenreagh River and Muckcross Lake outfall. These inflows combine with River Flesk and Deenagh to form the River Laune at the outfall. The River Laune then flows in a north-westerly direction to Killorglin where it outfalls into Castlemaine Harbour at Dromgorn Point.

The River Maine and River Laune both outfall into the naturally formed Castlemaine Harbour. Castlemaine Harbour is a complex estuary that extends west from the Maine and Laune into Dingle Bay. A series of complex sand bars and key spit features at the estuary outfall divert the tidal currents and protect the harbour from extreme storm waves. The key features include:

- Cromane Point (70235,100114)
- Inch Point (67660,96865)
- Rossbehy Point (65705,94730)

The Maine and Laune low-tide channels are between 300m to 400m wide combining into one channel near Aughill's Bridge which is 1.7km wide at low tide.

Figure 3-3 Laune / Maine / Dingle Bay UoM 22



3.4.1 Areas for Further Assessment in UoM 22

The Laune / Maine / Dingle Bay UoM contains six Areas for Further Assessment (AFAs). Associated with the AFAs is 134km of high and medium priority watercourse.

Table 3.2: List of AFAs in the Laune / Maine / Dingle Bay UoM

Name	Unique ID	Fluvial Flood Risk	Coastal Flood Risk	County	Easting	Northing
Castleisland	220323	Yes	No	Kerry	97750	110000
Dingle	220327	Yes	Yes	Kerry	44500	101000
Glenflesk	225502	Yes	No	Kerry	106621	85316
Killarney	220337	Yes	No	Kerry	97000	90500
Milltown	220339	Yes	No	Kerry	82500	101000
Portmagee	220340	No	Yes	Kerry	36500	73000

3.5 Flood Risk Management Options for the Laune / Maine / Dingle Bay UoM

Flood risk management options for the Laune / Maine / Dingle Bay UoM have been identified through option appraisal. Non-structural and structural options (as described in Table 3.1 of this report) will be combined to reduce the risk of damage to properties from flooding. Structural options are not viable for all AFAs however non-structural measures can be applied on a UoM basis.

This Appropriate Assessment Screening was carried out in conjunction with the option appraisal process such that potential environmental impacts of the various options are considered at option selection stage.

3.5.1 Non-Structural Measures

Planning Control

In November 2009, the Guidelines on the Planning System and Flood Risk Management, jointly developed by DECLG and the OPW, were published under Section 28 of the Planning Acts. These Guidelines provide a systematic and transparent framework for the consideration of flood risk in the planning and development management processes, whereby:

A sequential approach should be adopted to planning and development based on avoidance, reduction and mitigation of flood risk.

A flood risk assessment should be undertaken that should inform the process of decision-making within the planning and development management processes at an early stage.

Development should be avoided in floodplains unless there are demonstrable, wider sustainability and proper planning objectives that justify appropriate development and where the flood risk to such development can be reduced and managed to an acceptable level without increasing flood risk elsewhere (as set out through the Justification test).

The proper application of the Guidelines by the planning authorities is essential to avoid inappropriate development in flood prone areas, and hence avoid unnecessary increases in flood risk into the future. The flood mapping provided as part of the FRMP will facilitate the application of the Guidelines.

In flood-prone areas where development can be justified (i.e., re-development, infill development or new development that has passed the Justification Test), the planning authorities can manage the risk by setting suitable objectives or conditions, such as minimum floor levels or flood resistant or resilient building methods.

Building Regulations / Planning Conditions

The risk of damage to properties from flooding can be mitigated by the use of appropriate construction techniques and materials. For example the damage caused to an internal wall of a property by flooding can depend on the materials and methods of its construction. A timber stud partition covered with plasterboard with low level electrical wiring would have to be completely replaced following immersion in flood water. However, a solid concrete block wall covered with tiles and high level electrical wiring on the other hand would only have to be washed down following a flood.

If for a particular town or high flood probability areas, certain building regulations or planning conditions were adopted that ensured structures were flood resilient through specified construction methods, building

fabrics and uses, a decrease in the risk of damage could be achieved. The question of whether such regulations or planning conditions could be imposed upon developers, business owners or householders in flood prone areas would need to be addressed at implementation stage.

Flood Forecasting

Flood forecasting is a means of providing advanced warning of an impending flood event. A reliable advance warning system allows protective measures to be put in place and protective actions to be carried out in advance of a flood event. These actions and measures can reduce the damage caused in a flood event.

Flood forecasting is not a viable Flood Risk Management Measure for all of the UoM 22 AFAs. This is because the time between transmitting a flood forecast and the arrival of flood waters may not be long enough for people to take effective action to reduce flood damage. Flood warning is a viable option in the Castleisland, Dingle and Killarney AFAs. The infrastructure required for flood forecasting in these AFAs are listed in Table 3.3.

Table 3.3: AFAs suitable for Flood Forecasting

AFA	Infrastructure
Castleisland	Rain gauges
	River level gauges
	Flood forecasting and warning systems
Dingle Tidal	Subscribe to OPW surge forecast system
Killarney	Rain gauges
	River level gauges
	Flood forecasting and warning systems

Public Awareness

Many of the measures to mitigate and manage flood risk and the potential consequences for flooding will involve the public at large. It is therefore important that the public is made aware of where to find information, what the information means and what actions the public and business owners can take to reduce the damage that would occur to their properties, possessions, and interests in the event of a flood.

Measures to increase and promote public awareness include:

- i Identifying the areas prone to flooding
- i Information on measures to be implemented to reduce and / or manage the risk of flooding
- i Measures in place to provide advance warning of flooding
- i Establishment of methods to interface with the public and in particular the owners of vulnerable properties, i.e. workshops and meetings, Facebook, Twitter, text messaging, newsprint, websites, etc.

Land Use Management

Land Use Management includes strategies to control overland flow, such as improving agricultural and forestry practices in key catchment areas. Local natural flood management measures such as the creation of wetlands or forestry to retain overland flow could also be adopted.

Emergency Response Planning

Well prepared and executed emergency response plans can significantly reduce the impact of flood events, particularly for human health and welfare.

The Framework for Major Emergency Management was developed in 2005 and was adopted by Government decision in 2006. Its purpose is to set out common arrangements and structures for front line public sector emergency management in Ireland. The Framework is based on the internationally recognized systems approach that, in essence, proposes an iterative cycle of continuous activity through five stages of emergency management:

- Hazard Identification
- Mitigation
- Preparedness
- Response
- Recovery

Under the Framework, Local Authorities are designated as the lead agency for co-ordinating the response to severe weather events, and each Local Authority should have, as a specific sub-plan of its Major Emergency Plan, a plan for responding to severe weather emergencies, whether a major emergency is declared or not. The other principal response agencies should include sub-plans for responding to notifications from the Local Authorities of severe weather warnings.

A Guide to Flood Emergencies (MEM Guidance Document 11, July 2013) has been published to assist the Principal Response Agencies in meeting their responsibilities, under the Framework for Major Emergency Management, and to deliver on the responsibilities of the OPW and the Local Authorities with respect to emergency planning as set out in the Report of the Flood Policy Review Group. The Guide provides advice on the development and implementation of consistently effective flood emergency response and short-term recovery planning by the Principal Response Agencies and others, and includes a template plan

3.5.2 Structural Measures

Structural flood risk management options for the Laune / Maine / Dingle Bay UoM are shown in Table 3.4. The preferred option for the AFAs emerges following technical assessment and cost analysis of the viable options and following input from public consultation.

Options are presented in terms of the viable options considered for each AFA. Drawings showing the viable flood risk management options are included in the Preliminary Options Report. It should be noted that these drawings are indicative only. The locations in which viable options may be constructed within the AFAs may change at detailed design stage if an option is progressed through a scheme.

The preferred option for the AFAs emerges following technical assessment and cost analysis of the viable options and following input from public consultation.

Table 3.4: Structural Flood Risk Management Options for UoM 22

AFA	Viable Options
Castleisland	<ul style="list-style-type: none"> Option 1 - Walls and Embankments - construction of flood defences and localised protection works in Anglore Upper, Anglore Lower and within the town centre. Option 2 - Flood Defences & Flow Diversion: fluvial flood defences comprising of walls and embankments and the construction of an open channel to divert the Anglore around Tullig
Dingle	<ul style="list-style-type: none"> Option 1 - Flood defences and storage – Storage on the Dingle Stream comprising embankments up to 5m in height coupled with flood walls of 1.1 to 1.8m in proximity to the harbour and defences 2.7 m to 2.9m on the Milltown River estuary. Option 2 - Flood defences and diversion – Flow diversion from Dingle Stream through agricultural lands via a 2,000m culvert to the harbour coupled with flood walls of 1.1 to 1.8m in proximity to the harbour and defences 2.7 m to 2.9m on the Milltown River estuary. Option 3 - Flood defences and embankments – Flood walls along the R559 road within the town comprising walls between 1.1m and 5.4m in height and defences 2.7 m to 2.9m on the Milltown River estuary.
Glenflesk	<ul style="list-style-type: none"> No options are proposed
Killarney	<ul style="list-style-type: none"> Option 1 - Flood Defences - defences include walls and embankments ranging in height from 1m to 2m.
Milltown	<ul style="list-style-type: none"> Option 1 - Flood Defence -These defences include walls and embankments on the Ashullish Stream. Option 2 - Flow Diversion/Flood Defences-flow diversion from the Ashullish Stream to the Rathpogue west Stream in combination with the construction of flood defences
Portmagee	<ul style="list-style-type: none"> No options are proposed

3.6 Flood Risk Management Options with Potential for Significant Effects on Natura 2000 Sites

Flood risk management measures, while having a positive social impact can have a negative environmental impact. The requirement for ecological protection can limit potential options for flood risk management. The South Western River Basin District contains a variety of habitats and species of conservation concern which are protected under national and European legislation. A flood risk management option is unlikely to emerge as the preferred option for an AFA where there is an associated significant impact on species or habitats for which Ireland has designated areas for their protection (i.e. Natura 2000 Sites).

The potential impacts of the structural and non-structural flood risk management options for UoM 22 are characterised hereunder.

3.6.1 Potential Impacts of Non-Structural Options in UoM 22

Periodic high (flood) and low (drought) flows are a natural element of river hydrology. The flora and fauna inhabiting a watercourse and its riparian zone will be adapted to the natural variation in flow and level which is typical of the system. An extreme flood event, outside of the river systems normal range, can have negative impacts on the ecology of the watercourse as follows:

- i Prolonged submergence of riparian flora can result in damage to and loss of species, this can provide opportunity for colonisation by invasive species;
- i Increase pollution of the watercourse due to high levels of runoff from land and increased erosion of river banks due to high flow velocities can lead to high sedimentation in the river which can have subsequent negative impacts on fishery habitat;
- i Reduced biomass in the watercourse due to the washing out of macroinvertebrates and detritus which has subsequent impacts on populations of consumers in the watercourse;

With the exception of Land Use Management, non-structural measures will not restrain the flow of water during an extreme flood event. The implementation of these measures cannot therefore influence the current frequency, extent or depth of flooding. Impacts on an ecosystem from an extreme flood event will not be prevented by the implementation of non-structural measures. Non-structural measures can however prevent future exacerbation of flooding by ensuring that development within the catchment will not increase runoff to the watercourse through Planning Control.

Land Use Management aims at retaining / delaying runoff within a catchment such that a sudden increase in flows in a watercourse is not experienced / is limited. This option can have the effect of reducing the depth and extent of a flood event. There will be an associated reduction in the potential negative impacts on ecology. Land Use Management provides an opportunity to increase biodiversity through creation of woodland or wetland habitat in place of agricultural lands. This can have a long term positive impact.

Flood Forecasting requires the installation of gauges along a watercourse to measure level and flow. Typically river gauges are installed within a housing (usually a PVC pipe) strapped to a bridge. The bridge acts as a supporting structure to the gauge housing, thereby eliminated the requirement for bankside works. It is not always practical to site a river gauge at the location of a bridge, in which case a bank-side structure is required to support the gauge. The installation of a gauge and supporting structure can have the following impacts on the watercourse:

- i permanent removal of riparian vegetation to accommodate the support structure;
- i temporary disturbance of river bank and river bed during installation resulting in the release of sediment into the watercourse which can cause temporary deterioration in the quality of fishery habitat and can smother immobile flora and fauna in the watercourse;
- i release of concrete into the watercourse (where the structure is not prefabricated) which can result in reduced water quality with subsequent negative consequences for the ecology of the watercourse;
- i temporary noise and physical disturbance to species in proximity to the gauge site during installation;

- i alteration of water turbulence / flow pattern in the immediate vicinity of the gauge structure which can result a change in erosion / deposition pattern locally and therefore a change in habitat.

3.6.2 Potential Impacts of Structural Options in UoM 22

The viable structural options identified for the management of for the extreme flood event within the UoM can be summarised as Storage, Flow Diversion and Flood Walls and Embankments. The potential impacts associated with each viable structural option are presented hereunder.

Storage

Storage is provided upstream of a flood risk area in order to limit the flow in the downstream watercourse such that it does not overtop its banks. The storage area will come in to operation in times of flood flows. Implementation of flood storage requires the availability of land upstream of the flood risk area with suitable topography which can be allowed to flood during flood conditions in the river. A storage area / reservoir is typically formed by constructing earth embankments perpendicular to the course of the river coupled with a control structure on the watercourse which will limit flows to that which can be accommodated downstream. The storage area is designed such that during flood flows the watercourse will overtop its banks into the surrounding lands within the storage area (which is contained by the earth embankments) and the control structure will ensure that flows downstream are maintained at levels which will not overtop the banks.

Flood Storage has been assessed as a viable option for the Dingle Stream, in Dingle. An area of approximately 23,100m² is required. Earth embankments, up to 5m in height will retain the flood waters coupled with a control structure.

Construction of the flood storage area will require that earth is brought to site for embankment construction. Potential significant environmental effects associated with the construction of embankments include:

- i Sedimentation of the Dingle Stream. Sediment deposition in a watercourse can cause a temporary to short term reduction the quality of fishery habitat. Sedimentation can reduce light penetration in the water column and can affect oxygen levels both in the river bed and in the free moving water thereby impacting river vegetation and river fauna. Sedimentation can block the gills of in-stream fauna.
- i Introduction of invasive species, e.g. Japanese Knotweed, in the earth imported to site.

The storage areas will require a control structure (sluice gate / penstock) to be installed on the watercourse to ensure downstream flows are maintained below extreme flood levels. The installation of the control structure will require in-stream works. Installation of a sluice gate / penstock requires that bed and bank material is excavated and the section is replaced by a concrete channel and walls such that the control structure can be anchored to the concrete. Potential significant environmental effects associated with the installation of the control structure include:

- i Permanent loss of stream bed and stream bank within the footprint of the control structure;

- | Damage to stream bed and bank due to machinery movement in-stream;
- | Release of sediment in to the watercourse during installation caused by disturbance to stream bed and banks (sedimentation effects are discussed in relation to the embankments above);
- | Obstruction to fish passage within the channel when the control structure is restricting flows;
- | Isolation of fish within the flooded storage area in the event that flood waters subside rapidly;
- | Creation of temporary wetland habitat within the storage area during flooding;

Flood Walls and Embankments

Flood Walls and Embankments are physical structures designed to contain floodwaters for a defined flood event. Floodwalls can be constructed from a variety of materials including concrete, brick / stone masonry and steel. Embankments are typically constructed from earth which is vegetated to protect against erosion.

The construction of flood walls and embankments has been determined to be a viable option in Castleisland, Dingle, Killarney and Milltown AFAs. The physical implementation of these structural measures can have the following environmental effects:

- | Temporary release of sediment to the watercourse from embankments with subsequent effects on habitat quality;
- | Compaction of riparian area due to weight of embankment and machinery movement during construction (note embankment design would need to consider ground stability).
- | Introduction of invasive species, e.g. Japanese Knotweed, in the earth imported to site for embankments;
- | Accidental spill of construction materials e.g. concrete for wall construction, which can have toxic effects on flora and fauna;
- | Noise disturbance to species during construction.

Flow Diversion

Flow diversion involves the interception of flood flows within a watercourse and diverting these flows through an artificial channel or conduit into another watercourse or into another section of the same watercourse such that a reduction in water volumes is achieved within areas at risk of flooding.

Flow diversion has been identified as a viable option in Dingle (from the Dingle Stream into the harbour) and Milltown (from the Ashullish Stream to the Ballyoughtrough Stream). Potential environmental effects of flow diversion include:

- | Scouring at the culvert discharge point resulting in possible loss of habitat;
- | Damage to habitat in the harbour at and within immediate proximity of the culvert discharge point due to freshwater influences during flood events;

- | Increased flow volume and velocity in the Ballyoughtrough stream during storm events. This can cause bankside erosion and associated loss of habitat (note the stream has been assessed as having the capacity to physically accommodate the increased volume without overtopping it's banks);
- | Scouring of the bed of the Ballyoughtrough stream at the culvert discharge point resulting in possible loss of fishery habitat and sedimentation of the watercourse;
- | Attraction of fish into the culvert and ultimately into the stream when the culvert is in operation. This could influence fish / lamprey populations in the River Maine downstream; and
- | Destruction of habitat for culvert construction.

4 Characteristics of Natura 2000 Sites

4.1 Natura 2000 Sites within the Zone of Impact

Natura sites which are located within 15km of UoM 22, and have been considered as part of this screening are presented in table 4.1, along with the distance to the Natura sites and identification of Source-Pathway-Receptors. Viable flood risk management options have been determined for the AFAs of Castleisland, Dingle, Killarney and Milltown. The AFAs and their location in relation to Natura 2000 sites within 15km is presented in figures 4.1-4.4

Table 4.1: Natura Sites Within 15km of UoM 22 AFAs

Natura 2000 site	Distance from proposed works (km)	Source-Pathway-Receptor Identification
Special Areas of Conservation (SAC)		
Killarney National Park, Macgillicuddy's Reeks and Caragh River Catchment SAC (000365)	0.0km	Viable flood risk management options are identified for the River Flesk in Killarney. The Flesk flows into Lough Leane which is part of the Killarney National Park SAC. The Flesk River is also part of the SAC.
Mount Brandon SAC (000375)	0.0km	The Dingle AFA boundary does not overlap with any Natura 2000 site boundary. Mount Brandon SAC (000375) is located immediately north of Dingle AFA.
Valencia Harbour/Portmagee Channel SAC (002262)	0.0km	No viable flood defence measures were identified in Portmagee, therefore there is no viable source-pathway-receptor identified.
Sheheree (Ardagh) Bog SAC (000382)	0.3km	No viable source pathway receptor identified
Castlemaine Harbour SAC (000343)	0.3km	Viable flood risk management options are identified for the Ashullish Stream a tributary of the River Maine. The AFA does not overlap with the Natura 2000 site boundary, however the River Maine flows into Castlemaine Harbour SAC.
Slieve Mish Mountains SAC (002185)	4.4km	No viable source pathway receptor identified
Lower River Shannon SAC (002165)	6.2km	No viable source pathway receptor identified
Old Domestic Building, Curraglass Wood SAC (002041)	6.4km	No viable source pathway receptor identified
Blackwater River (Cork/Waterford) SAC (002170)	8.8km	No viable source pathway receptor identified
Ballinskelligs Bay and Inny Estuary SAC (000335)	8.8km	No viable source pathway receptor identified
Lough Yganavan And Lough Nambrackdarrig SAC (000370)	10.2km	No viable source pathway receptor identified
Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)	10.3km	No viable source pathway receptor identified

Natura 2000 site	Distance from proposed works (km)	Source-Pathway-Receptor Identification
Kilgarvan Ice House SAC (000364)	11.2km	No viable source pathway receptor identified
Ballyseedy Wood SAC (002112)	11.4km	No viable source pathway receptor identified
Blasket Islands SAC (002172)	11.4km	No viable source pathway receptor identified
Mullaghanish Bog SAC (001890)	13.9km	No viable source pathway receptor identified
St. Gobnet's Wood SAC (000106)	14.1km	No viable source pathway receptor identified
Special Protection Areas (SPA)		
Killarney National Park SPA (004038)	0.0km	<ul style="list-style-type: none"> Viable flood risk management options are identified for the River Flesk in Killarney. The Flesk flows into Lough Leane which is part of the Killarney National Park SPA. The Flesk River is also part of the SAC.
Iveragh Peninsula SPA (004154)	0.7km	<ul style="list-style-type: none"> No viable flood defence measures were identified in Portmagee, therefore there is no viable source-pathway-receptor identified.
Dingle Peninsula SPA (004153)	1.4km	<ul style="list-style-type: none"> The Dingle AFA boundary does not overlap with any Natura 2000 site boundary however given proximity to the SPA a viable source pathway receptor has been identified
Castlemaine Harbour SPA (004029)	1.5km	<ul style="list-style-type: none"> Viable flood risk management options are identified for the Ashullish Stream a tributary of the River Maine. The AFA does not overlap with the Natura 2000 site boundary, however the River Maine flows into Castlemaine Harbour SPA.
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)	2.2km	The Castleisland AFA does not overlap with any Natura 2000 site boundary. The Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161) is approximately 5km north of the Castleisland AFA. This is designated for Hen Harrier (<i>Circus cyaneus</i>). There is no potential for impact on this qualifying feature given the absence of suitable Hen Harrier nesting (conifer forestry) and foraging (bog and heath) habitat within the environs of Castleisland.
Puffin Island SPA (004003)	4.1km	No viable source pathway receptor identified
Tralee Bay Complex SPA (004188)	10.5km	No viable source pathway receptor identified
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)	10.8km	No viable source pathway receptor identified
Eirk Bog SPA (004108)	12.8km	No viable source pathway receptor identified
Mullaghanish to Musheramore Mountains SPA (004162)	13.1km	No viable source pathway receptor identified
Skelligs SPA (004007)	13.6km	No viable source pathway receptor identified

Natura 2000 site	Distance from proposed works (km)	Source-Pathway-Receptor Identification
Blasket Islands SPA (004008)	13.9km	No viable source pathway receptor identified

There is potential that impacts as described in Section 3.6 of this Screening Assessment could affect the qualifying features of Mount Brandon SAC (000375), the Dingle Peninsula SPA (004153), the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365) and the Killarney National Park SPA (004038) and Castlemaine Harbour SAC (000343) and SPA (004029).

Figure 4.1: Castleisland AFA Boundary in Relation to EU (Natura 2000) Sites

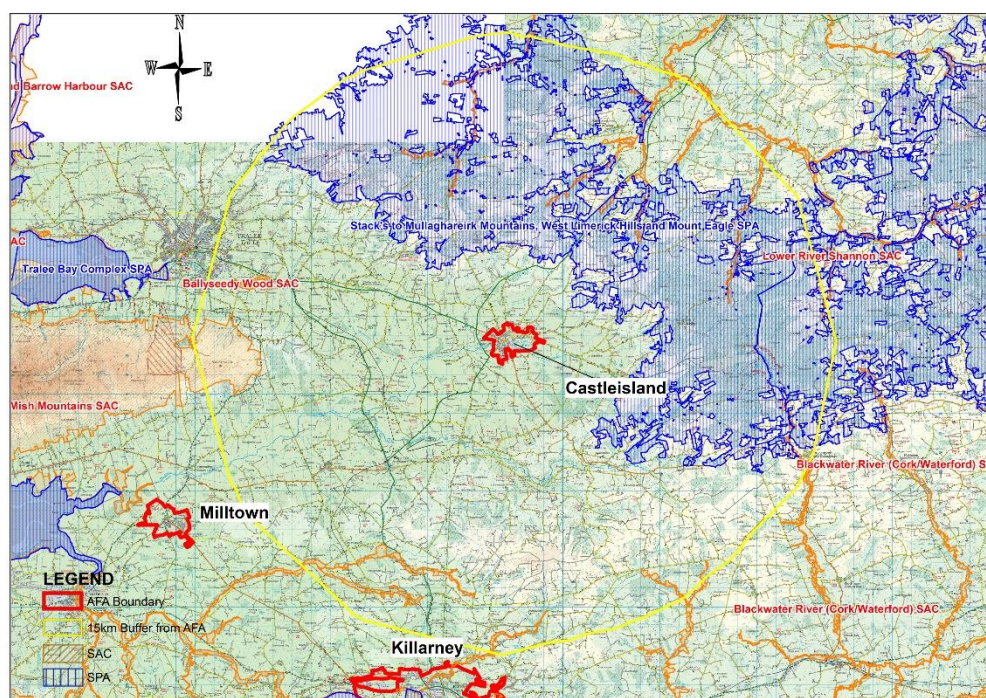


Figure 4.2: Dingle AFA Boundary in Relation to EU (Natura 2000) Sites



Figure 4.3: Killarney AFA Boundary in Relation to EU (Natura 2000) Sites

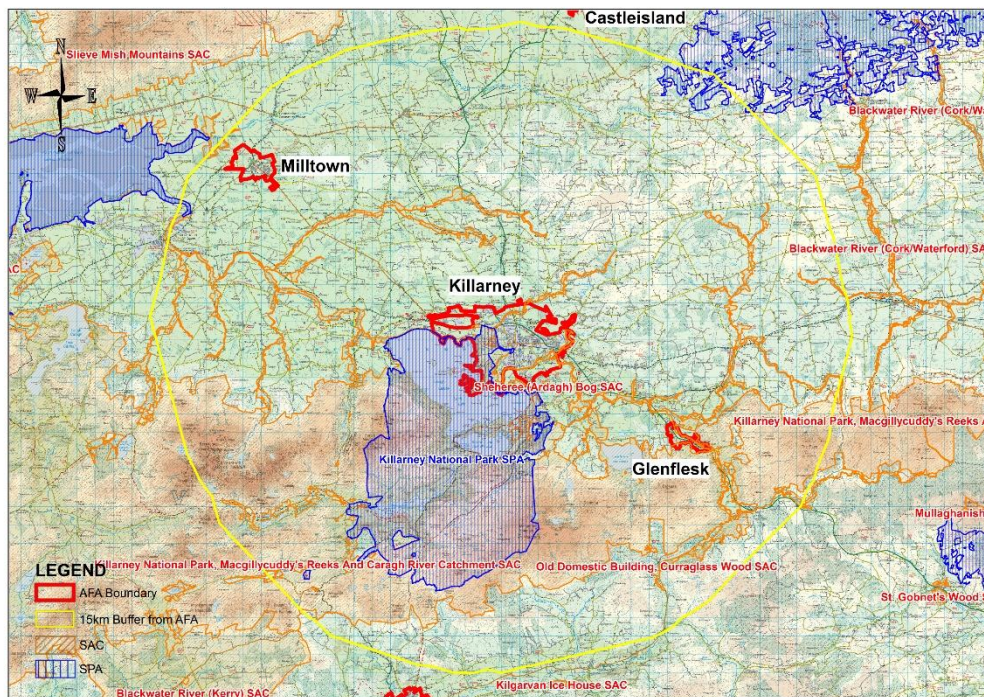
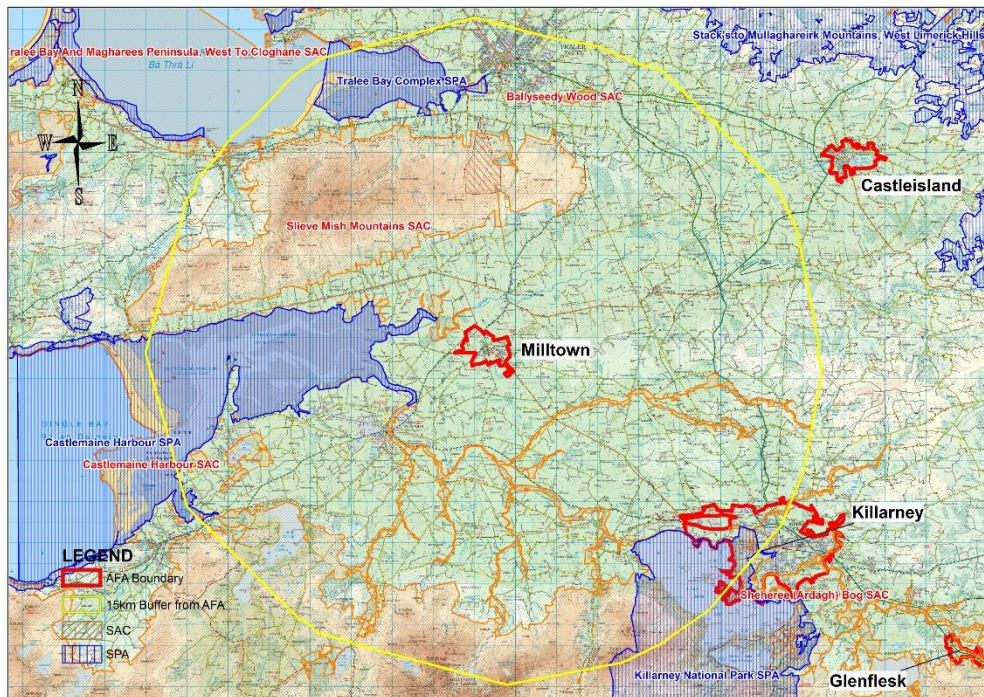


Figure 4.4: Milltown AFA Boundary in Relation to EU (Natura 2000) Sites



Mount Brandon SAC (000375)

This site comprises the central and north-western areas of the Dingle Peninsula and includes Mount Brandon. The site is of ecological importance due to the presence of Annex I habitats listed in the EU Habitats Directive, such as Active blanket bog, Northern Atlantic wet heath, Alpine and Boreal heath, Vegetated sea cliffs, cliff vegetation and Oligotrophic/mesotrophic standing waters.

A population of freshwater pearl mussel (*Margaritifera margaritifera*) is present within the Owenmore River. There are five known populations of the rare Killarney fern (*Trichomanes speciosum*) within the site.

Qualifying features of the site are: [1029] freshwater pearl mussel (*Margaritifera margaritifera*), [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts [1421] Killarney fern (*Trichomanes speciosum*), [3130] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*, [4010] Northern Atlantic wet heaths with *Erica tetralix* [4060] Alpine and Boreal heaths, [7130] Blanket bogs (* if active only), [8210] Calcareous rocky slopes with chasmophytic vegetation, [8220] Siliceous rocky slopes with chasmophytic (cliff) vegetation.

Dingle Peninsula SPA (004153)

The Dingle Peninsula SPA encompasses the high coast and sea cliff sections of the peninsula from south of Brandon Point in the north, around to the end of the peninsula at Sleah Head, and as far east as Inch in the south. The site includes the sea cliffs, the land adjacent to the cliff edge, an area of sand dunes near Murreagh and also several upland areas further inland of the coast about Ballybrack, Lough Doon, Anscaul Lough, Arraglen and Ballynane. The high water mark forms the seaward boundary.

The site is designated for fulmar (*Fulmarus glacialis*) [A009], peregrine (*Falco peregrinus*) [A103] and chough (*Pyrrhocorax pyrrhocorax*) [A346].

Killarney National Park, Macgillicuddy's Reeks and Caragh River Catchment SAC (000365)

This site is of great ecological importance. It includes the most extensive oakwoods in the country, with some of the best bryophyte communities in Europe. Qualifying features are: Kerry slug (*Geomalacus maculosus*) [1024], freshwater pearl mussel (*Margaritifera margaritifera*) [1029], marsh fritillary (*Euphydryas aurinia*) [1065], sea lamprey (*Petromyzon marinus*) [1095], brook lamprey (*Lampetra planeri*) [1096], river lamprey (*Lampetra fluviatilis*) [1099], twaite shad (*Alosa fallax fallax*) [1103], salmon (*Salmo salar*) [1106], lesser horseshoe bat (*Rhinolophus hipposideros*) [1303], otter (*Lutra lutra*) [1355], Killarney fern (*Trichomanes speciosum*) [1421], slender naiad (*Najas flexilis*) [1833], oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110], oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoto-Nanojuncetea* [3130], water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation [3260], northern Atlantic wet heaths with *Erica tetralix* [4010], European dry heaths [4030], Alpine and Boreal heaths [4060], *Juniperus communis* formations on heaths or calcareous grasslands [5130], Calaminarian grasslands of the *Violetalia calaminariae* [6130], molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410], blanket bog (*active only) [7130], depressions on peat substrates of the *Rhynchosporion* [7150], old sessile oak woods with *Ilex* and *Blechnum* in British Isles [91A0], alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0] and *Taxus baccata* woods of the British Isles [91J0].

Killarney National Park SPA (004038)

This site encompasses the lakes and part of the Macgillicuddy's Reeks in the vicinity of Killarney.

The site is designated for merlin (*Falco columbarius*) [A098] and greenland white-fronted goose (*Anser albifrons flavirostris*) [A395].

Castlemaine Harbour SAC (000343)

The site occupies the whole inner section of Dingle Bay, i.e. Castlemaine Harbour, the spits of Inch and White Strand/Rosbehy and a little of the coastline to the west. Milltown AFA does not occur within the boundary of the site. The River Maine, almost to Castlemaine, and much of the River Laune catchment are also included within the site. The site is of ecological importance due to the presence of Annex I habitats

listed in the EU Habitats Directive, such as estuaries, salt meadows, mudflats and sandflats and sand dune systems, and priority Annex I alluvial forest and fixed coastal dunes with herbaceous vegetation. Other qualifying features are: sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), Atlantic salmon (*Salmo salar*), otter (*Lutra lutra*) and petalwort (*Petalophyllum ralfsii*).

Castlemaine Harbour SPA (004029)

Castlemaine Harbour SPA is a large coastal site occupying the innermost part of Dingle Bay. It extends from the lower tidal reaches of the River Maine and River Laune to west of the Inch and Rosbehy peninsulas. The site is important wintering and non breeding bird site. Qualifying features include; red throated diver (*Gavia stellate*), cormorant (*Phalacrocorax carbo*), light bellied brent goose (*Branta bernicla hrota*), wigeon (*Anas penelope*), mallard (*Anas platyrhynchos*), pintail (*Anas acuta*), scaup (*Aythya marila*), common scoter (*Melanitta nigra*), oystercatcher (*Haematopus ostralegus*), ringed plover (*Charadrius hiaticula*), sanderling (*Calidris alba*), bar-tailed godwit (*Limosa lapponica*), redshank (*Tringa tetanus*), greenshank (*Tringa nebularia*), turnstone (*Arenaria interpres*), chough (*Pyrrhocorax pyrrhocorax*) and wetland and waterbirds.

4.2 Likelihood of Impacts on Natura 2000 Sites

The likelihood of the potential impacts as described in Section 3.6 of this Screening Assessment affecting the qualifying features of the Kenmare River SAC (002158) and the Bearn Peninsula SPA (004155) is determined through Source-Pathway-Receptor assessment.

A review of available data was carried out to determine the presence of qualifying features of the designated areas within the environs of Castleisland, Dingle, Glenflesk, Killarney and Milltown AFAs. Data reviewed included:

- i Protected species spatial datasets for the SWRBD provided by NPWS
- i Article 17 spatial data on protected habitats and species available through NPWS website
- i Article 12 reporting data on breeding distributions and ranges of protected bird species available through NPWS website
- i iWebs data
- i National Survey of Native Woodlands 2003-2008 spatial data available through NPWS website
- i Irish Semi-natural Grassland Survey spatial data available through NPWS website
- i Coastal Monitoring Project 2004-2006 available through NPWS website
- i Saltmarsh Monitoring Project 2006-2008 available through NPWS website
- i Protected species data sourced through the National Biodiversity Data Centre

The likelihood of an impact occurring is characterised in accordance with the NRA (2009) classification:

- i Near-certain: >95% chance of occurring as predicted
- i Probable: 50-95% chance of occurring as predicted
- i Unlikely: 5-50% chance of occurring as predicted
- i Extremely unlikely: <5% chance of occurring as predicted

4.2.1 Castleisland AFA

There is no potential for the flood risk management works in the Castleisland AFA to impact upon Natura 2000 sites due to absence of connectivity to any Natura 2000 site and distance from sites. Castleisland AFA is screened out from further assessment.

4.2.2 Dingle AFA

The Dingle Peninsula SPA is approximately 2.5km south of Dingle AFA. Disturbance to conservation interests of the SPA is extremely unlikely given distance from site. The flight response distance (i.e. the point at which the bird moves away from a source of disturbance) varies between species, is greater during adverse weather, and depends on the acclimatisation of the birds to such disturbance. Wetland birds have been documented to tolerate noise levels at or below 70dB(A) (Institute of Estuarine & Coastal Studies, University of Hull, 2009). BS 5228-1:2009+A1:2014 prescribes typical noise level data for various construction plant and activities within 10m from source. The inverse square law⁷ can be applied to determine likely noise levels at varying distances from the AFA boundary (Table 4.2).

Table 4.2: Noise Levels, dB(A), at Various Distances from Construction Activities

Distance from Source (m)	Tracked excavator	Mixing cement - large lorry concrete mixer	Dumper Truck (empty)	Dumper Truck (tipping fill)	Breaking concrete	Dozer	Wheeled Loading Lorry
10	78	77	87	79	96	81	80
20	74	73	83	75	92	77	76
40	68	67	77	69	86	71	70
80	62	61	71	63	80	65	64
160	56	55	65	57	74	59	58
320	50	49	59	51	68	53	52
640	44	43	53	45	62	47	46
1280	38	37	47	39	56	41	40
2560	32	31	41	33	50	35	34

Based on BS 5228-1:2009+A1:2014

From Table 4.2, noise generated during construction will have diminished to tolerable levels for wetland birds [70dB(A)] within 320m of the works.

There is no hydrological connection between the Dingle AFA and the Freshwater Pearl Mussel population in the Owenmore River, part of Mount Brandon SAC. Impacts on Freshwater Pearl Mussel are extremely unlikely.

⁷ Inverse Square Law – For every doubling of the distance from the noise source, the sound pressure levels will broadly be reduced by 6 decibels (dB)

Dingle AFA is outside the boundary of Mount Brandon SAC. Direct impacts on habitats and flora for which the site is designated are extremely unlikely.

4.2.3 Killarney AFA

Impacts on the conservation interests of the Killarney National Park SPA (004038) are extremely unlikely given that the flood walls and embankments would be constructed within the urban setting of the town which is sub-optimal habitat for merlin and greenland white-fronted goose and works are proposed for outside of the SPA boundary.

The likelihood of potential impacts of constructing Flood Walls and Embankments on the Flesk River and in proximity to the Killarney waste water treatment plant on the qualifying features of the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365) are discussed hereunder.

Impacts on a number of qualifying features of the site are extremely unlikely due to absence of connectivity between the flood protection works and the supporting habitat of the species:

- i The foodstuff (and habitat) of marsh fritillary, devil's-bit scabious (*Succissa pratensis*) occurs in rich grassland, heath, fens, bog habitat. The flood protection works are concentrated along riparian habitat. There is no potential for destruction of marsh fritillary habitat.
- i There are no documented records of Annex I habitats including heaths, grassland, woodlands and bog at the proposed flood management locations and given the urban setting of the proposed works, such Annex I habitats are extremely unlikely to occur.
- i The Kerry slug is associated with oak woodland habitat with sufficient lichen / moss cover or blanket bog. The narrow riparian treeline is sub-optimal habitat.
- i Slender naiad occurs on the lakes. There is no potential for direct damage to this species.
- i Killarney fern inhabits damp very well shaded environments which do not dry out e.g. dripping caves. The riparian treeline along the river Flesk is sub-optimal habitat.

The embankments proposed along the Flesk River are within riparian habitat. Removal of bankside vegetation and the construction of earth mounds bank-side has an associated risk of sediment runoff to the watercourse. Sediment runoff has potential to cause impacts on freshwater pearl mussel which is particularly sensitive to elevations in siltation levels. The Freshwater Pearl Mussel Regulations require that there are no artificially elevated levels of siltation in pearl mussel habitat. The infilling of stable cobbles/gravels with sediment prevents oxygen movement into interstitial spaces and can lead to the death of juvenile mussels. Also adult mussels can suffer death due to a defensive response to water turbidity and pollution (they clam up and therefore cannot take up oxygen from the water). It is near certain that freshwater pearl mussel would be impacted by sediment runoff to the watercourse from construction of the proposed flood risk management options.

In considering the potential impacts of sedimentation and pollution on freshwater pearl mussel, consideration must be given to the life cycle of this species. Freshwater pearl mussel can live for more than 100 years. Reproduction takes place through the release of sperm into the open water which is then inhaled by the female mussels. Glochidia (larva) are brooded by the females and then released into the

open water in an event lasting one to two days between July and September (DEHLG, March 2010). A percentage of the glochidia will attach to the gills of passing host fish (typically brown trout and salmon in Ireland) where they will develop further. Once developed into young mussels they will drop off and burrow into gravel where they will filter feed. Once mature, they will migrate downstream to coarser substrate. The free migration of fish species is important in ensuring reproduction of freshwater pearl mussel. The glochidia stage in the freshwater pearl mussel life cycle may be indirectly impacted if sedimentation inhibits migration of host fish. It is unlikely that sedimentation or accidental pollution would occur in coincidence with glochidia release (given the short time over which the event occurs) however it cannot be discounted.

Similarly Atlantic salmon and lamprey may be impacted by sedimentation, although it should be noted that these species are less sensitive to sedimentation than pearl mussel. Infilling of gravel beds can inhibit spawning and large sediment plumes can act as a barrier to passage to suitable habitat. Brook lamprey were recorded spawning in the middle reaches of the Flesk (Kurz and Costello, 1999). Impacts on lamprey and Atlantic salmon are probable.

Otter occur around the Lakes of Killarney. There are records for Otter (spraints and path) on the Flesk River near the N71 bridge crossing (Source: <http://maps.biodiversityireland.ie/#/Map>). A flood embankment is proposed within close proximity to this location. Otter are likely to be temporarily disturbed from this area during the works. It is likely that otter also use other areas of the Flesk River. The construction of flood embankments near Fleming's Caravan Park at Whitebridge may require the removal of riparian vegetation. There is potential for disturbance to otter and damage of otter resting places.

Lesser horseshoe bat roosts occur within 1km of the proposed works. Lesser Horseshoe Bats normally forage in woodlands/scrub within 2.5km of their roosts (Schofield, 2008). It is highly unlikely that bat commuting or foraging would be affected by the implementation of defences within Killarney Town given the location of these measures within an urban setting (lesser horseshoe bats are highly unlikely to be foraging within this environment as they will avoid brightly lit areas).

Watercourses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation may be represented in the River Flesk. There are no in-stream works associated with this option therefore damage to habitat is extremely unlikely. Sediment may be released to the Flesk River during the works. Sediment deposition on vegetation can impact photosynthesis and can smother vegetation. It is probable that sedimentation could impact this habitat.

4.2.4 Milltown AFA

Impacts on the conservation interests of the Castlemaine SPA (004029) are extremely unlikely given that the proposed measures would be constructed within the urban setting of the town which is sub-optimal habitat for wintering birds and works are proposed for are approximately 3.5km outside of the SPA boundary.

The likelihood of potential impacts of constructing flood Walls and embankments in the town and flow diversion on the Ashullish Stream to the Ballyoughtrough Stream on the qualifying features of the Castlemaine Harbour SAC (000343) are discussed hereunder:

Milltown is on the freshwater section of River Maine. Estuarine and coastal qualifying features of the SAC do not feature within the environs of Milltown. Impacts on estuaries, intertidal mudflats and sandflats, perennial vegetation of stony banks and salt meadows are therefore extremely unlikely.

The River Maine is designated as salmonid. Atlantic Salmon and Lamprey require the same qualities in spawning habitat. The Ashullish Stream and Ballyoughtrough stream are upstream of the River Maine. IFI WFD monitoring of the River Maine was carried out within a length section of the river upstream of Milltown at the Maine Bridge lower (station no 22M010700A) in 2008. Species recorded were brown trout (*Salmo trutta*), European eel (*Anguilla anguilla*), flounder (*Platichthys flesus*), lamprey sp (*Petromyzon spp*), minnow (*Phoxinus phoxinus*), salmon (*Salmo salar*), sea trout (*Salmo trutta*), and three-spined stickleback (*Gasterosteus aculeatus*). The embankment locations on the Ashullish Stream are set back from the watercourse. It is unlikely that sediment runoff will enter the River Maine.

The Aghullish Stream and Ballyoughtrough stream are channelised and have low levels of overhanging vegetation. They are sub-optimal habitat for lamprey and Atlantic salmon. In-stream works during construction of the flow diversion channel or scouring during operation is unlikely to cause damage to lamprey and Atlantic salmon habitat.

The Aghullish and Ballyoughtrough streams are modified (channelised) and have gappy riparian vegetation. They are unlikely to support otter. It is of note however that otter have been observed in the River Maine downstream. Impacts on otter from noise are unlikely given the distance from the proposed flood protection works and the River Maine.

The Aghullish and Ballyoughtrough streams have low fishery value and are unlikely to be a food source for otter (a qualifying feature of the SAC). Indirect impact on foraging habitat for otter is therefore extremely unlikely. Engineering works to the stream will not alter the existing value of the habitat.

Petalwort (*Petalophyllum ralfsii*) is a thalloid liverwort of damp calcareous dune slacks and machair. In Ireland, petalwort is considered Least Concern (Lockhart et al., 2012). These habitats do not occur within the Milltown AFA. Populations were documented along the Inch spit in 1983. Impacts on habitat are therefore extremely unlikely.

4.3 In Combination Impacts

4.3.1 General

Article 6(3) of the Habitats Directive requires that:

*Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, **either individually or in combination with other plans or projects**, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives.*

Thus, the likely aggregate effect of individual impacts associated with other plans and projects is considered when determining whether the likely impacts on the FRMP could have significant effects on Natura 2000 sites. That is, an impact on its own may not pose significant adverse effects on the integrity of a Natura 2000 site, however where two or more impacts act in combination this can create a significant effect.

The likely impacts of the FRMP on Natura 2000 sites have been identified as follows:

- Killarney AFA: impacts from sedimentation on floating river vegetation, freshwater pearl mussel, lamprey and Atlantic salmon, disturbance to otter and/or damage to otter resting places,
- Dingle, Castlemaine and Milltown AFAs: no impacts.
- No options are proposed for the Glenflesk AFA: no impacts

The potential for the impacts of the FRMP to be exacerbated by impacts from other plans and projects such that the effects on the Natura 2000 Network become significant in terms of the conservation objectives of the European sites is presented hereunder.

European Commission guidance: *Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC* identifies that plans and projects which are already completed are excluded from the assessment requirements of Article 6(3) unless they are having continuing effects on a Natura 2000 site such that they are causing progressive loss of site integrity.

4.3.2 Plans and Projects That Might Act In-combination

4.3.2.1 County / Local Area Plans

The South East Kerry Settlements Local Area Plan includes the following objectives:

- (OO-4) Ensure that the water quality of the River Flesk, a spawning river, is maintained and protected from inappropriate development.
- (OO-5) Physical interference with the bed or banks of the River Flesk will be subject to the approval of the South West Fisheries Board and the OPW.
- (OO-6) Developments within the flood plain of the River Flesk will not be permitted. Any applications for developments in proximity of the river shall be accompanied by a flood impact assessment.

As such, in-combination impacts are not expected.

4.3.2.2 Existing Flood Relief Schemes and Arterial Drainage Schemes

River Maine Catchment Drainage Scheme

Construction of the scheme commenced in 1959 and was completed in 1963 under the Arterial Drainage Act 1945. The scheme comprises flood defence embankments, sluice structures and bridges. The scheme is maintained by the OPW under their Arterial Drainage Maintenance Programme.

The National Arterial Drainage Maintenance List for the period 2016 to 2021 was subjected to Appropriate Assessment and Strategic Environmental Assessment⁸. Mitigation prescribed in the Natura Impact Statement and adopted into the SEA includes the requirement that proposed arterial drainage maintenance activities should undergo an Appropriate Assessment at project level.

A specific Natura Impact Statement (NIS) for the maintenance of the River Maine Arterial Drainage Scheme (up to 2018) has been produced. The NIS requires mitigation for a number of protected species including otter, lamprey, salmonids and white-clawed crayfish.

The River Maine Drainage scheme is included in the River Enhancement Programme (REP). The REP is a capital works initiative whereby IFI design enhancement plans while OPW fund and undertake the works. The River Maine has undergone several capital works including:

- Construction of alternating deflectors and paired deflectors;
- Excavation of a thalweg;
- Installation of vortex weirs with pool and gravel shoal
- Stabilisation of eroding banks

No impacts on Natura 2000 sites have been identified in association with the progression of the Milltown Flood Relief Scheme. Given the scale of the Milltown scheme and the location of the scheme relative to the River Maine arterial drainage scheme, it is unlikely that combined effects would occur.

Minor Flood Mitigation Works & Coastal Protection Scheme

The Minor Works Scheme was introduced by the Office of Public Works in 2009. The purpose of the scheme is to provide funding to Local Authorities to undertake minor flood mitigation works or studies to address localised flooding and coastal protection problems within their administrative areas. The scheme generally applies where a solution can be readily identified and achieved in a short time frame.

There were no minor works projects approved for funding in UoM 22 for 2016 & 2017.

⁸ The National Arterial Drainage Maintenance List of Activities 2016-2021 Volume III Natura Impact Statement, February 2016 and The National Arterial Drainage Maintenance List of Activities 2016-2021 Volume II- Final SEA Environmental Report, February 2017 available through: <http://www.opw.ie/en/flood-risk-management/operations/environmentalactivities/arterialdrainagemaintenancesea2016-2021/#d.en.36453>

4.3.2.3 Other Development

Planning Permissions

A search was undertaken of Kerry County Council's online planning enquiry system to determine the location of valid planning applications within each AFA which might have the potential to exacerbate any potential impact of the proposed flood risk management options. The planning search identified several residential planning applications. Due to the nature of the planning applications, distance, and lack of physical or hydrological connectivity to the proposed development site, and the designated sites, there is no potential for in combination impacts on the Natura 2000 sites.

Other CFRAM Schemes

The Glenflesk AFA and the Killarney AFA are on the Flesk River. Given that there are no options proposed or the Glenflesk AFA, there is no potential in-combination impacts from flood risk management options in both AFAs.

5 Significance of Impacts on Natura 2000 Sites

5.1 General

The significance of an impact is relative to the existing condition/conservation status of a Natura 2000 site and to the scale of the impact in space and time.

Favourable conservation condition of an Annex I habitat is achieved when:

- i its natural range, and area it covers within that range, are stable or increasing,
- i the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- i the conservation status of its typical species is favourable.

The favourable conservation condition of an Annex II species is achieved when:

- i population dynamics data on the species concerned indicate that it is maintaining itself on a long term basis as a viable component of its natural habitats, and
- i the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- i there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Impacts are assessed as significant where the conservation objectives of a Natura 2000 site are undermined.

5.2 Assessment of Significance

Impacts have been determined for the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365) from the potential flood risk management options in the Killarney AFA.

Where it is determined that a likely impact of the flood risk management options will have a significant impact on a Natura 2000 site, the flood risk management options must be assessed through full Appropriate Assessment. The precautionary principle must be applied in determining significance of an impact. Where the significance of an impact cannot definitively be ascertained on the basis of the information available it is required to progress to full Appropriate Assessment i.e. an option cannot be screened out unless there is certainty that no significant impact is likely.

Site-specific conservation objectives have been developed for a proportion of Natura 2000 sites in Ireland. These site-specific conservation objectives provide detailed measurable targets relative to the ecology of individual species or habitats for which a site is designated which must be achieved or maintained in order to meet favourable conservation status. Site-Specific conservation objectives are not currently available for the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365). In the absence of site-specific conservation objectives, reference is made to other designated areas for which relevant species / habitat specific attributes, measures and targets have been established. These will act as a reference point from which an assessment of the potential for significant affects to conservation objectives can be made.

Table 5.1: Assessment of Significance of Impacts for Killarney

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
Atlantic Salmon	<p>Distribution - 100% of river channels down to second order accessible from estuary</p> <p>Adult spawning fish - Conservation Limit (CL) for each system consistently exceeded.</p> <p>Salmon fry abundance - Maintain or exceed 0+ fry mean catchment-wide abundance threshold value.</p> <p>Out-migrating smolt abundance - No significant decline</p> <p>Number and distribution of redds - No decline in number and distribution of spawning redds due to anthropogenic causes</p> <p>Water quality - At least Q4 at all sites sampled by EPA</p>	Sediment release during construction forming a barrier to migration and degrading spawning habitat	<p>Physical barrier to migration due to sedimentation will be a temporary impact associated with the construction period only.</p> <p>The distribution target for Atlantic salmon would be temporarily impacted. This would be significant if it were to occur during inland migration of salmon during spring /summer or seaward migration of salmon smolts between April and June.</p> <p>Sedimentation of spawning gravels will significantly impact the target for number and distribution of redds.</p>
Lamprey	<p><u>Sea Lamprey:</u></p> <p>Distribution - Greater than 75% of the main stem length of rivers in the SAC should be accessible from the estuary. Artificial barriers can block or cause difficulties to lampreys' upstream migration.</p> <p>Extent and distribution of spawning habitat - No decline in extent and distribution of spawning beds</p> <p>Population structure of juveniles - At least three age/size groups present</p> <p>Juvenile density in fine sediment - at least 1/m²</p> <p>Availability of juvenile habitat - More than 50% of sample sites positive</p> <p><u>Brook & River Lamprey:</u></p> <p>Distribution - Access to all water courses down to first order streams</p> <p>Extent and distribution of spawning habitat - No decline in extent and distribution of spawning beds</p> <p>Population structure of juveniles - At least three age/size groups present</p>	Damage to Lamprey spawning habitat through sedimentation and impediment of lamprey passage by sediment plume	<p>Significance of Impact is uncertain given absence of data on location of spawning habitat. Precautionary approach must be applied. It must be assumed that spawning habitat will be impacted by the storage and diversion options. Such an impact is significant in terms of achieving the conservation target of 'no decline in extent and distribution of spawning beds'.</p> <p>A sediment plume in the watercourse due to runoff or river bed / bank disturbance would be temporary in nature and will not form a permanent barrier to lamprey distribution. Conservation objective targets will therefore not be significantly impacted.</p>

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
	<p>Juvenile density in fine sediment - at least 2/m²</p> <p>Availability of juvenile habitat - More than 50% of sample sites positive</p>		
Freshwater Pearl Mussel	<p>Distribution – Maintain the length of channel from the most upstream records of the freshwater pearl mussel to the most downstream records of live mussels.</p> <p>Population – No Target however it should be maintaining itself in the long term in accordance with generic conservation objectives.</p> <p>Recruitment - The objective is to restore to 20% of the population equating to young mussels and %5 juvenile mussels.</p> <p>Adult mortality - No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution (considered to be natural loss).</p> <p>Habitat extent – No Target</p> <p>Water quality - restore high Water Framework Directive biological quality elements.</p> <p>Substratum quality – target is <5% filamentous Algae and macrophytes and achieve stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment and good redox potential.</p> <p>Hydrological regime - Restore appropriate hydrological regimes such that 1) high flows can wash fine sediments from the substratum, 2) low flows do not exacerbate the deposition of fines and 3) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle</p> <p>Host fish - Fish presence is considered sufficient in the catchment. The conservation objective is to maintain sufficient</p>	<p>Sedimentation of the watercourse resulting in death of adult pearl mussel.</p> <p>The glochidia stage in the Freshwater Pearl Mussel life cycle may be indirectly impacted if sedimentation inhibits migration of host fish.</p>	<p>Death of adult mussels will significantly impact the conservation target for 'Population', 'Distribution' and 'Adult Mortality'.</p> <p>A sediment plume in the Flesk river could inhibit accessibility of host fish to glochidia which is significant in terms of achieving the conservation target for 'Recruitment'.</p>

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
	juvenile salmonids to host glochidial larvae.		
Floating river vegetation	The full distribution of this habitat and its sub-types in this site are currently unknown. Also the sub-types of this habitat are poorly understood and their typical species in Ireland have not yet been defined. Significance of impact cannot be determined in the absence of such information.		

6 Conclusions and Screening Statement

6.1 Screening Statement

This Appropriate Assessment Screening is carried out in conjunction with the preliminary comprehensive option appraisal process, Document Ref: Preliminary Options Report for UoM22. The option appraisal assessed each viable flood risk management option in terms of potential technical, social and environmental impacts. The option selection stage concluded that viable preferred options for each AFA in UoM22 were identified as follows;

AFA	Preferred Option
Castleisland	Flood Defences
Dingle	Storage and Flood Defences
Glenflesk	No options are proposed
Killarney	Flood Defences
Milltown	Non-Structural Measures

The preferred option for Milltown AFA was flood defences. However, the preferred option is not cost beneficial within this AFA, therefore non-structural measures (e.g. land use management) will be adopted.

No significant effects of flood risk management measures were identified for the Castleisland AFA and Dingle AFA and Milltown AFA and are screened out from further assessment.

No options are proposed for the Glenflesk AFA, therefore there will be no significant effects.

The assessment has determined that **significant effects are likely or uncertain** for the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365) as a result of flood risk management options in the Killarney AFA.

Further assessment is necessary to determine if the preferred flood risk management option within the Killarney AFA will have a significant adverse effect on the integrity of the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC, in view of the sites conservation objectives.

Table 6.1: Screening Matrix for UoM 22

Screening Matrix	
Project	
Brief description of the project or plan	Flood embankments on the river Flesk in Killarney
Natura 2000 Site	
Brief description of the Natura 2000 site(s)	Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365) This site is of great ecological importance. It includes the most extensive oakwoods in the country, with some of the best bryophyte communities in Europe. Qualifying features are: Kerry slug (<i>Geomalacus maculosus</i>) [1024], freshwater pearl mussel (<i>Margaritifera margaritifera</i>) [1029], marsh fritillary (<i>Euphydryas aurinia</i>) [1065], sea lamprey (<i>Petromyzon marinus</i>) [1095],

Screening Matrix	
	<p>Brook lamprey (<i>Lampetra planeri</i>) [1096], river lamprey (<i>Lampetra fluviatilis</i>) [1099], twaite shad (<i>Alosa fallax fallax</i>) [1103], salmon (<i>Salmo salar</i>) [1106], lesser horseshoe bat (<i>Rhinolophus hipposideros</i>) [1303], otter (<i>Lutra lutra</i>) [1355], Killarney fern (<i>Trichomanes speciosum</i>) [1421], slender naiad (<i>Najas flexilis</i>) [1833], oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) [3110], oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoto-Nanojuncetea</i> [3130], water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260], northern Atlantic wet heaths with <i>Erica tetralix</i> [4010], European dry heaths [4030], Alpine and Boreal heaths [4060], <i>Juniperus communis</i> formations on heaths or calcareous grasslands [5130], <i>Calaminarian</i> grasslands of the <i>Violetalia calaminariae</i> [6130], <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410], Blanket bog (*active only) [7130], depressions on peat substrates of the <i>Rhynchosporion</i> [7150], old sessile oak woods with Ilex and Blechnum in British Isles [91A0], alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] and <i>Taxus baccata</i> woods of the British Isles [91J0].</p>
Assessment Criteria	
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 site.	Construction of earth embankments in close proximity to the River Flesk within Killarney
<p>Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the Natura 2000 site by virtue of:</p> <p>Size and scale;</p> <p>Land-take;</p> <p>Distance from the Natura 2000 site or key features of the site;</p> <p>Resource requirements (water abstraction etc);</p> <p>Emissions (disposal to land, water or air);</p> <p>Excavation requirements;</p> <p>Transportation requirements;</p> <p>Duration of construction, operation, decommissioning etc;</p> <p>Other.</p>	Sedimentation of the watercourse in Killarney.
<p>Describe any likely changes to the site arising as a result of:</p> <p>Reduction in habitat area;</p> <p>Disturbance to key species;</p> <p>Habitat or species fragmentation;</p> <p>Reduction in species density;</p> <p>Changes in key indicators of conservation value (water quality etc);</p>	<p>Death of adult freshwater pearl mussels</p> <p>Deterioration of spawning habitat quality</p> <p>Interference with fish migration</p> <p>Damage to in-stream vegetation</p>

Screening Matrix	
Climate change.	
Describe any likely impacts on the Natura 2000 site as a whole in terms of:	Deterioration in water quality through sediment deposition.
Interference with the key relationships that define the structure of the site;	Interference with movement of Atlantic salmon to suitable habitat
Interference with key relationships that define the function of the site.	
Provide indicators of significance as a result of the identification of effects set out above in terms of:	Deterioration in habitat quality
Loss;	
Fragmentation;	
Disruption;	
Disturbance;	
Change to key elements of the site.	
Describe from the above those elements of the project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	<p>Sedimentation of the Flesk River will result in deterioration of habitat quality for freshwater pearl mussel, lamprey, Atlantic salmon and floating river vegetation.</p> <p>This impact is likely to cause death of adult pearl mussels, reduced availability of clean gravels for lamprey and Atlantic salmon spawning and changes to species composition of floating river vegetation.</p>

7 References

- DAHG (2014) Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters
- DEHLG (2009) Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities;
- EC (2000) Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.
- EC (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.
- Falvey J. P., Costello M. J. and Dempsey S. (1997) A survey of intertidal sediment biotopes in estuaries in Ireland. Unpublished report to the National Parks and Wildlife Service, Dublin, 258 pp.
- Fossitt (2000) A Guide to Habitats in Ireland
- Holman *et al* (2014). *IAQM Guidance on the assessment of dust from demolition and construction*, Institute of Air Quality Management, London. www.iaqm/wp-content/uploads/guidance/dust_assessment.pdf.
- Institute of Estuarine & Coastal Studies, University of Hull (2009) Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Report to Humber INCA
- King J. J. and Linnane S. M. (2004) The status and distribution of lamprey and shad in the Slaney and Munster Blackwater SACs. Irish Wildlife Manuals, No. 14. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
- Kurz, I. and Costello, M. J. (1999) An outline of the biology, distribution and conservation of lampreys in Ireland. Irish Wildlife Manuals, No. 5, 27 pp, Dublin, Dúchas, The Heritage Service
- Martin J. R., Perrin P.M., Delaney A. M., O'Neill F.H., McNutt K.E. (2008) Irish Semi-Natural Grasslands Survey. Annual Report No. 1: Counties Cork and Waterford
- Mc Donnell, R.J. and Gormally, M.J. (2011). Distribution and population dynamics of the Kerry Slug, *Geomalacus maculosus* (*Arionidae*). Irish Wildlife Manuals, No. 54. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- Ní Dhúill, E., Smyth, N., Waldren, S. & Lynn, D. (2015) Monitoring methods for the Killarney Fern (*Trichomanes speciosum* Willd.) in Ireland. Irish Wildlife Manuals, No. 82. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.
- NPWS (2015a) Conservation objectives for Killarney National Park, Macgillicuddy's Reeks and Caragh River Catchment SAC [000365]. Generic Version 4.0. Department of Arts, Heritage and the Gaeltacht.

NPWS (2015b) Conservation objectives for Mount Brandon SAC [000375]. Generic Version 4.0.
Department of Arts, Heritage and the Gaeltacht

NPWS (2013b) The status of EU Protected habitats and Species in Ireland. Backing Documents, Article 17
forms, Maps. Volumes 1, 2 and 3.

NPWS (2012a) Marine Natura Impact Statements in Irish Special Areas of Conservation, A working
Document.

NPWS (2005) Management Plan for Killarney National Park 2005-2009.

NRA, 1st June, 2009 Guidelines for Assessment of Ecological Impacts of National Roads Schemes.
Revision 2

Office of Public Works (April 2011) Arterial Drainage Maintenance Service Environmental Management
Protocols & Standard Operating Procedures

Office of Public Works (April 2014) National Screening of Freshwater Pearl Mussels as part of the CFRAM
programme (Unpublished Report)

Reid, N., Dingerkus, S.K., Stone, R.E., Pietravalle, S., Kelly, R., Buckley, J., Beebee, T.J.C. & Wilkinson,
J.W. (2013) National Frog Survey of Ireland 2010/11. Irish Wildlife Manuals, No. 58. National Parks and
Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

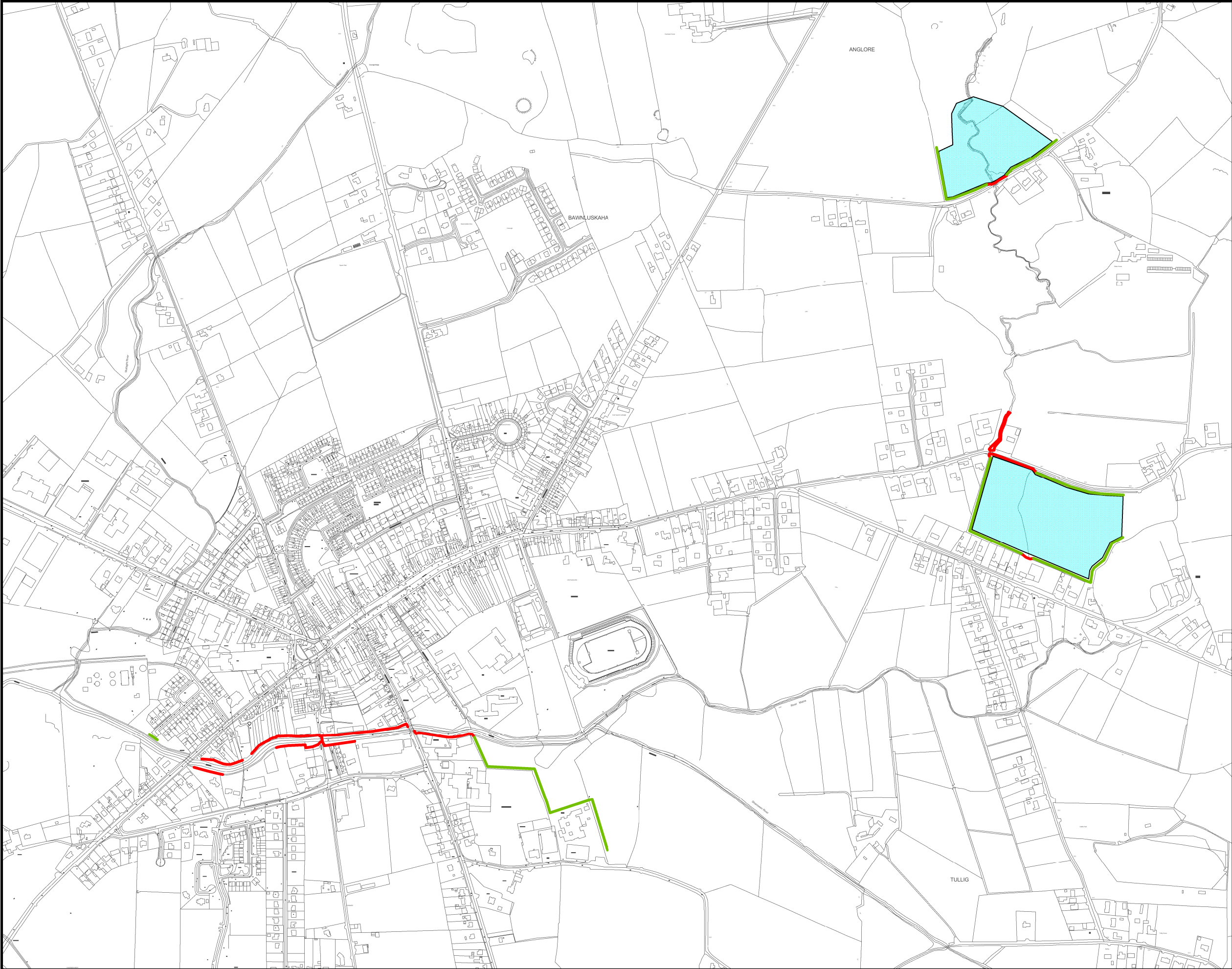
Ruddock M. & Whitfield D.P. (2007) A Review of Disturbance Distances in Selected Bird Species. A report
from Natural Research (Projects) Ltd to Scottish Natural Heritage

Ryle T., Murray A., Connolly K., Swann M. (2009) Coastal Monitoring Project 2004-2006. Report to the
National Parks and Wildlife Service.

Schofield, H.W. (2008) The Lesser horseshoe bat conservation handbook. Report for the Vincent Wildlife
Trust.

Weilgart, L. (2013). A review of the impacts of seismic airgun surveys on marine life. Submitted to the CBD
Expert Workshop on Underwater Noise and its Impacts on Marine and Coastal Biodiversity, 25-27
February 2014, London, UK. Available at: <http://www.cbd.int/doc/?meeting=MCBEM-2014-01>

8 Appendix



Flood Defence Walls

Flood Defence Embankments

Possible Flood Areas



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



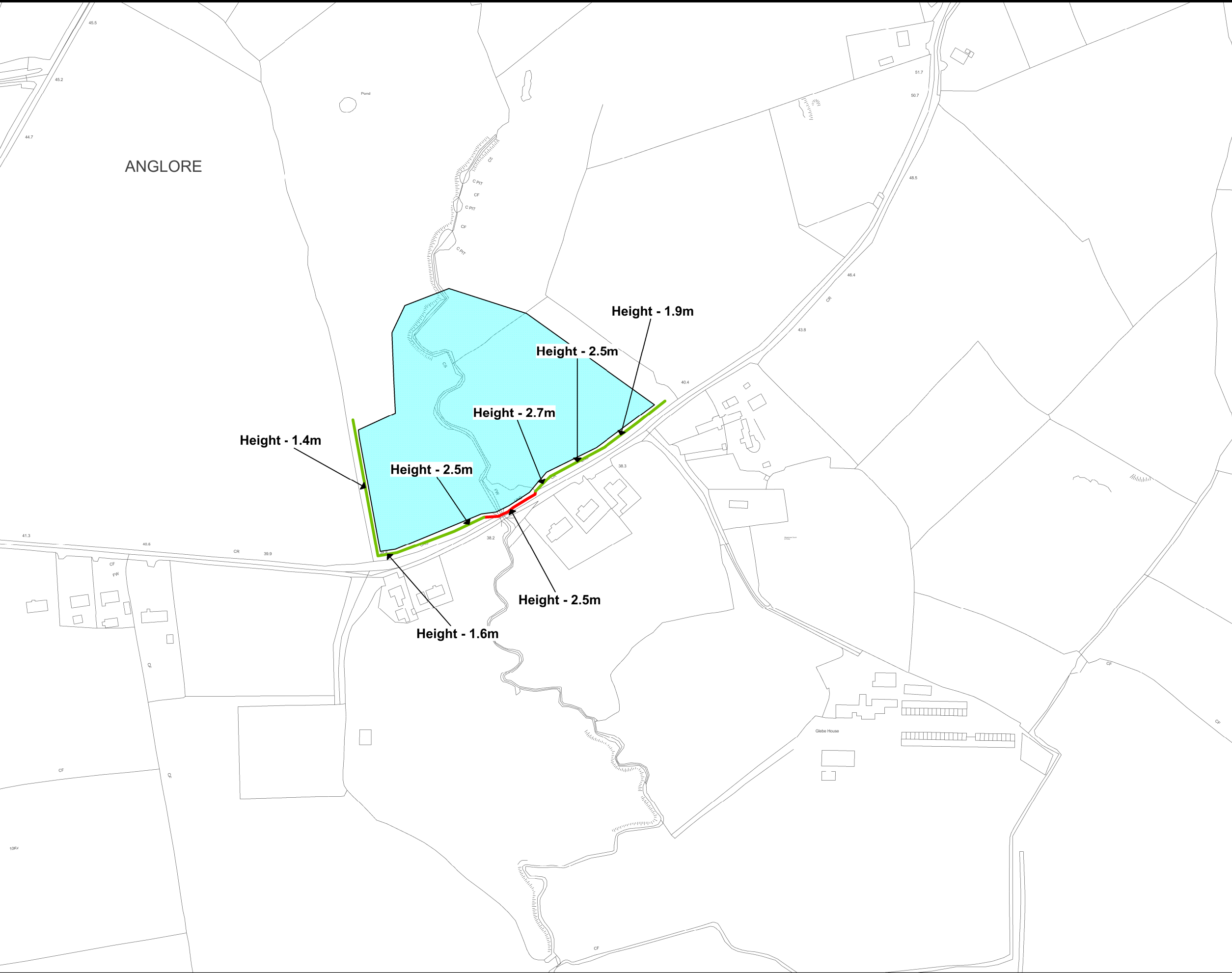
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Castleisland Flood Defences - Overview (excl. Crag)	
Map Type:	Preliminary Options
Source:	Fluvial Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-CD-201-P1
Sheet:	1 of 5
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankments

Possible Flood Areas

SOUTH WESTERN
CFRAM
STUDY
CATCHMENT FLOOD RISK
ASSESSMENT AND MANAGEMENT



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



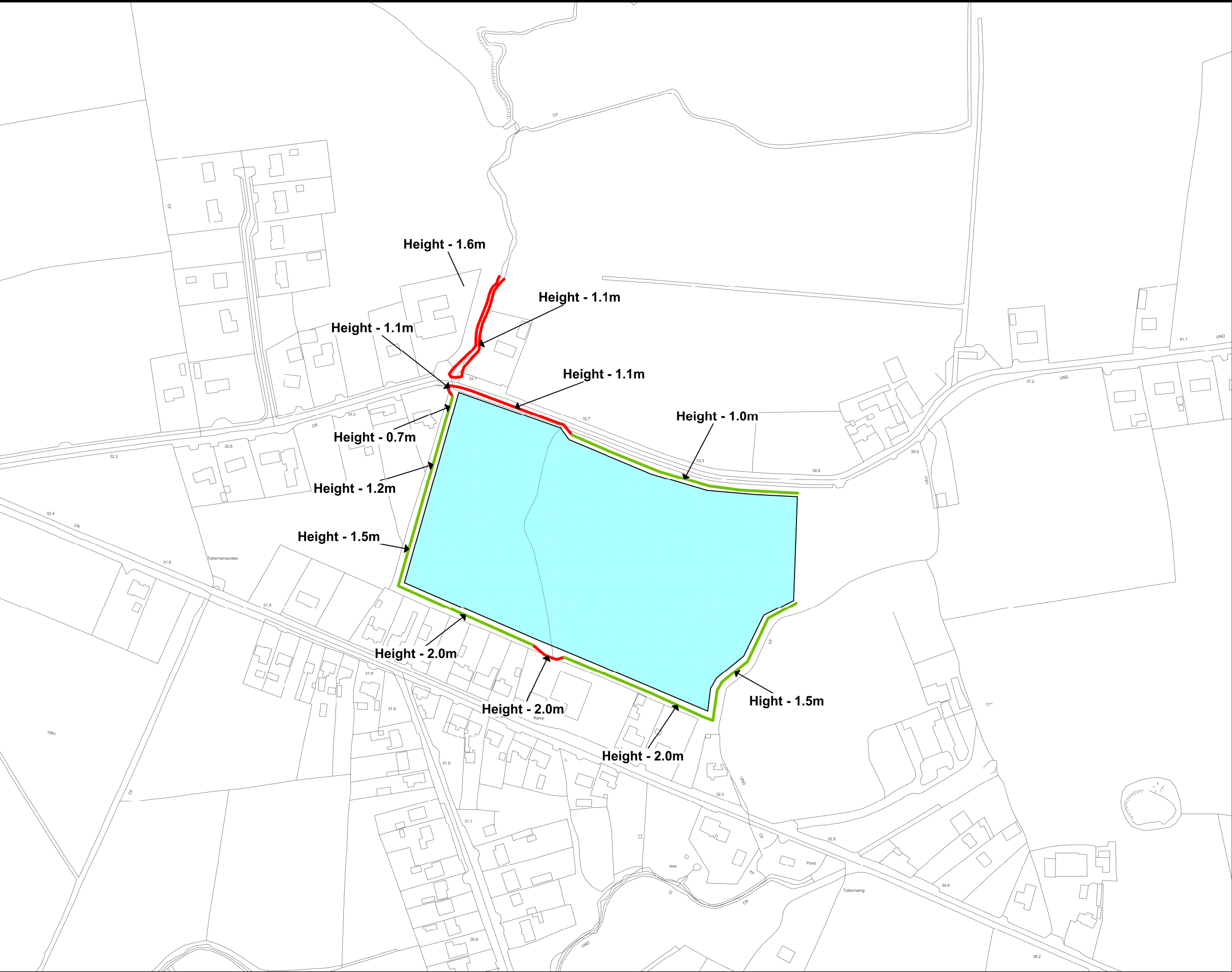
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project :			
South Western CFRAM Study			
Map :		Castleisland Flood Defences	
Map Type:	Preliminary Options		
Source:	Fluvial Flooding		
Map Area:	Urban Area		
Scenario:	Current		
Drawn by:	Tony Donovan		
Checked by:	Barry O'Connor		
Approved by:	Fintan McGivern		
Map No.:	MMD-296235-E-DR-22-CD-202-P1		
Sheet:	2 of 5	Revision:	P1
Drawing Scale:	NTS	Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



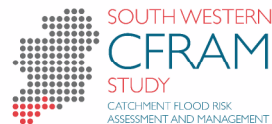
Flood Defence Walls



Flood Defence Embankments



Possible Flood Areas



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Castleisland Flood Defences	
Map Type:	Preliminary Options
Source:	Fluvial Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-CD-203-P1
Sheet:	3 of 5
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012




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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

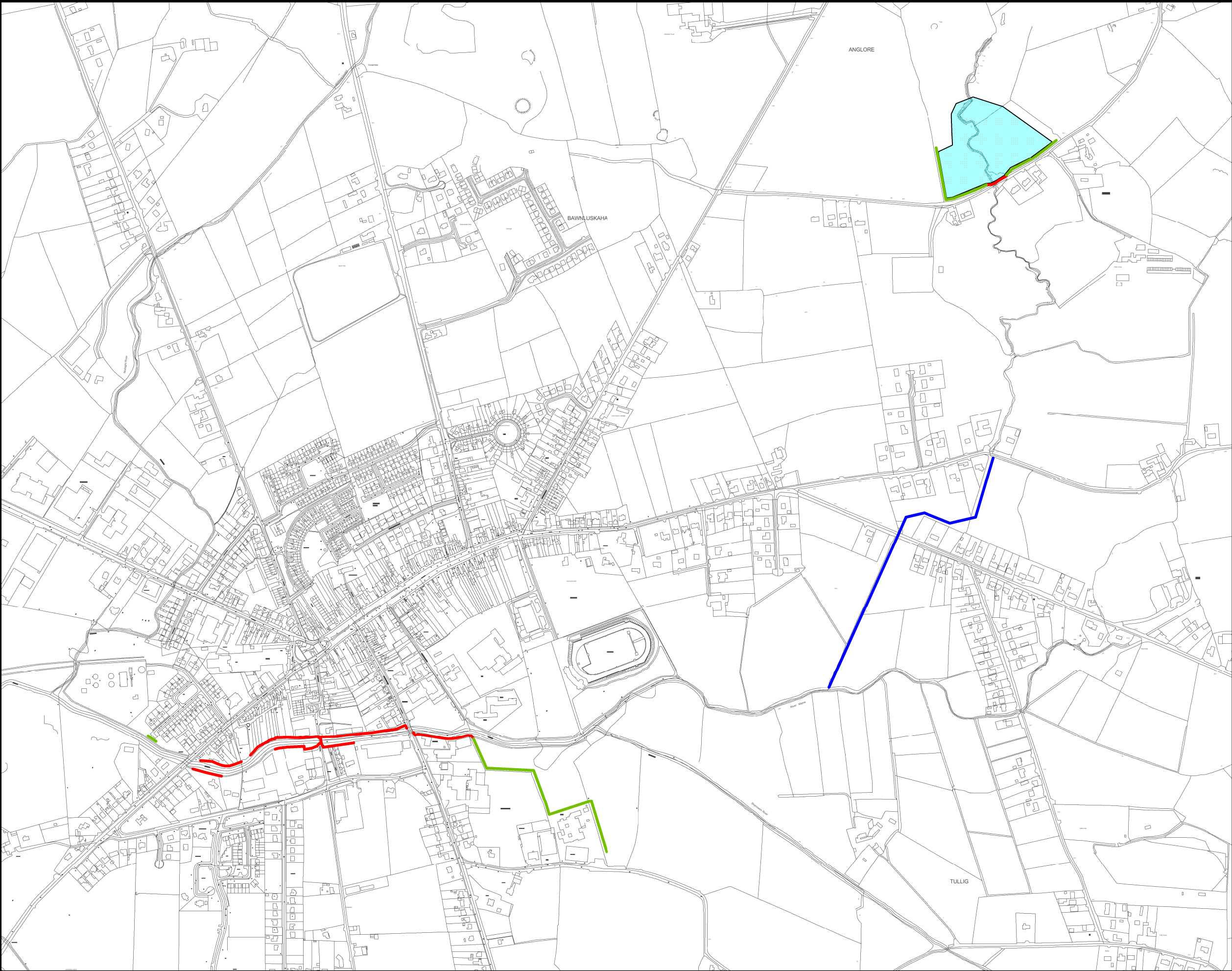


©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012

- 
- SOUTH WESTERN
CFRAM
STUDY**
CATCHMENT FLOOD RISK
ASSESSMENT AND MANAGEMENT



Drawing Scale: NTS Plot Scale: 1:1 @ A3



Flood Defence Walls

Flood Defence Embankments

Possible Flood Areas

Flow Diversion Channel



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Castleisland - Overview (excl. Crag) Flow Diversion & Flood Defences	
Map Type:	Preliminary Options
Source:	Fluvial Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-CD-206-P1
Sheet:	1 of 5
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3




IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012

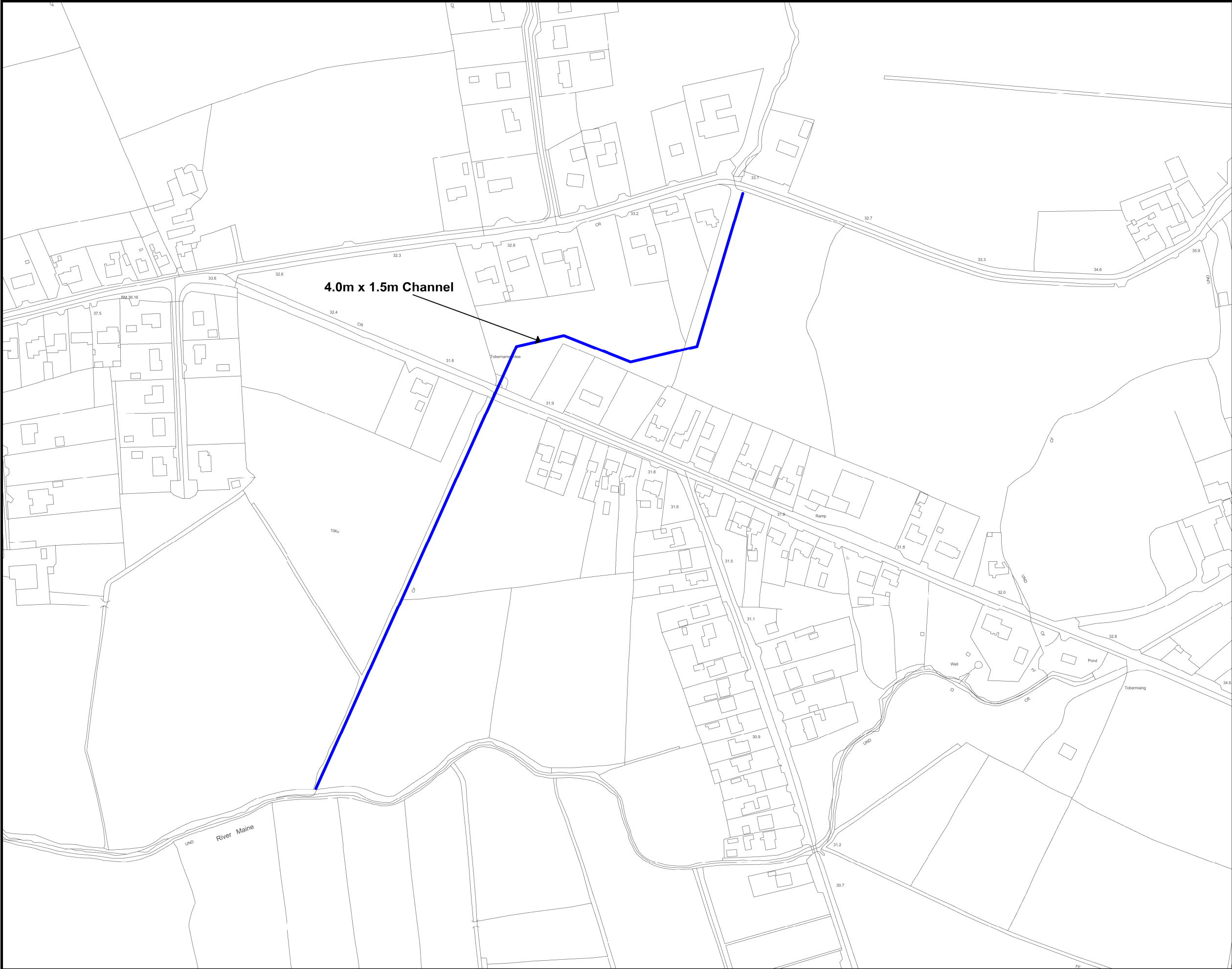


©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012

- 
- SOUTH WESTERN
CFRAM
STUDY**
CATCHMENT FLOOD RISK
ASSESSMENT AND MANAGEMENT



Drawing Scale: NTS Plot Scale: 1:1 @ A3



- Flood Defence Walls
- Flood Defence Embankments
- Possible Flood Areas
- Flow Diversion Channel



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project :
South Western CFRAM Study

Map : Castleisland
Flow Diversion & Flood Defences

Map Type: Preliminary Options

Source: Fluvial Flooding

Map Area: Urban Area

Scenario: Current

Drawn by: Tony Donovan

Checked by: Barry O'Connor

Approved by: Fintan McGivern

Map No.: MMD-296235-E-DR-22-CD-208-P1

Sheet: 3 of 5

Revision: P1

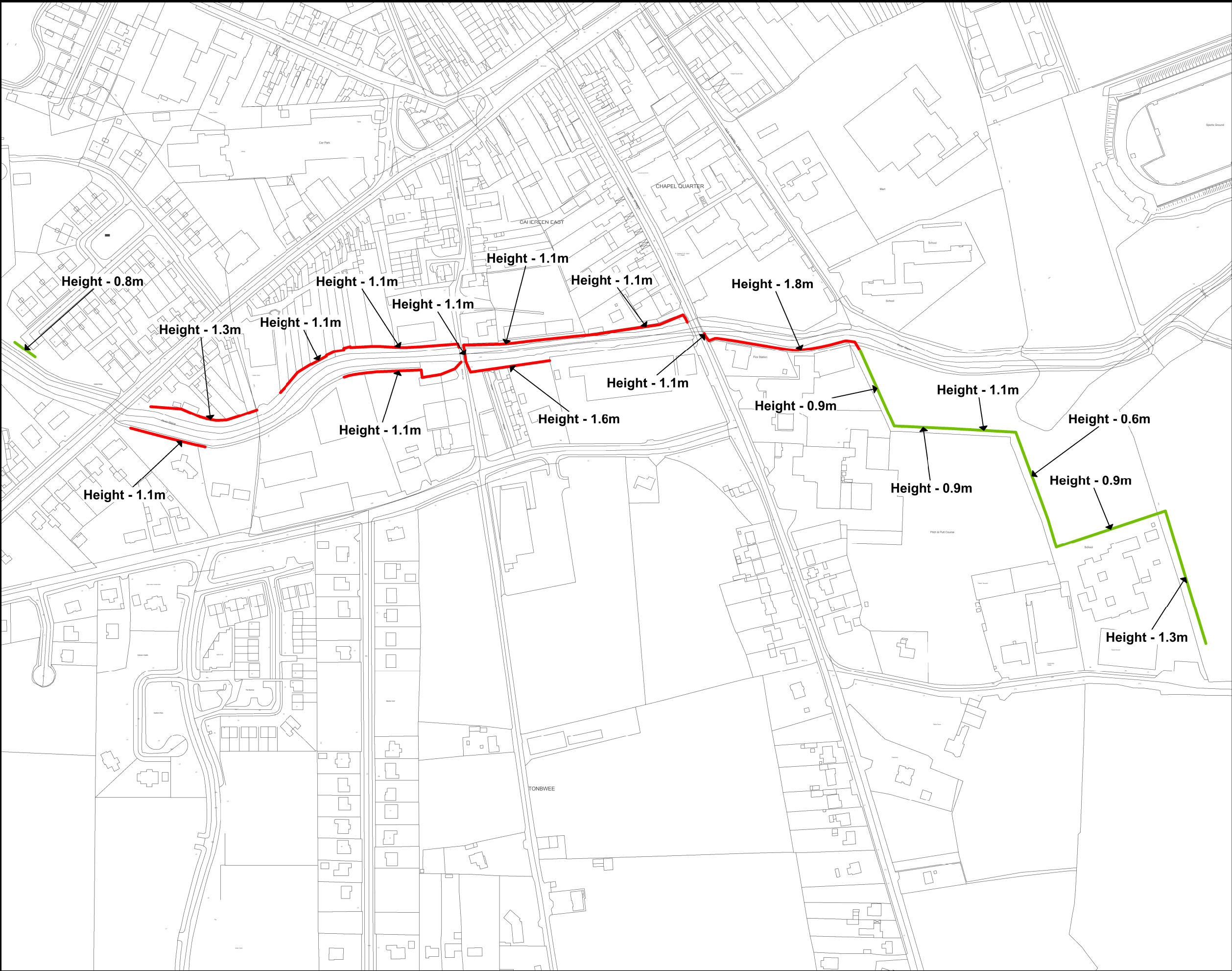
Drawing Scale: NTS

Plot Scale: 1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankments

Possible Flood Areas

Flow Diversion Channel



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



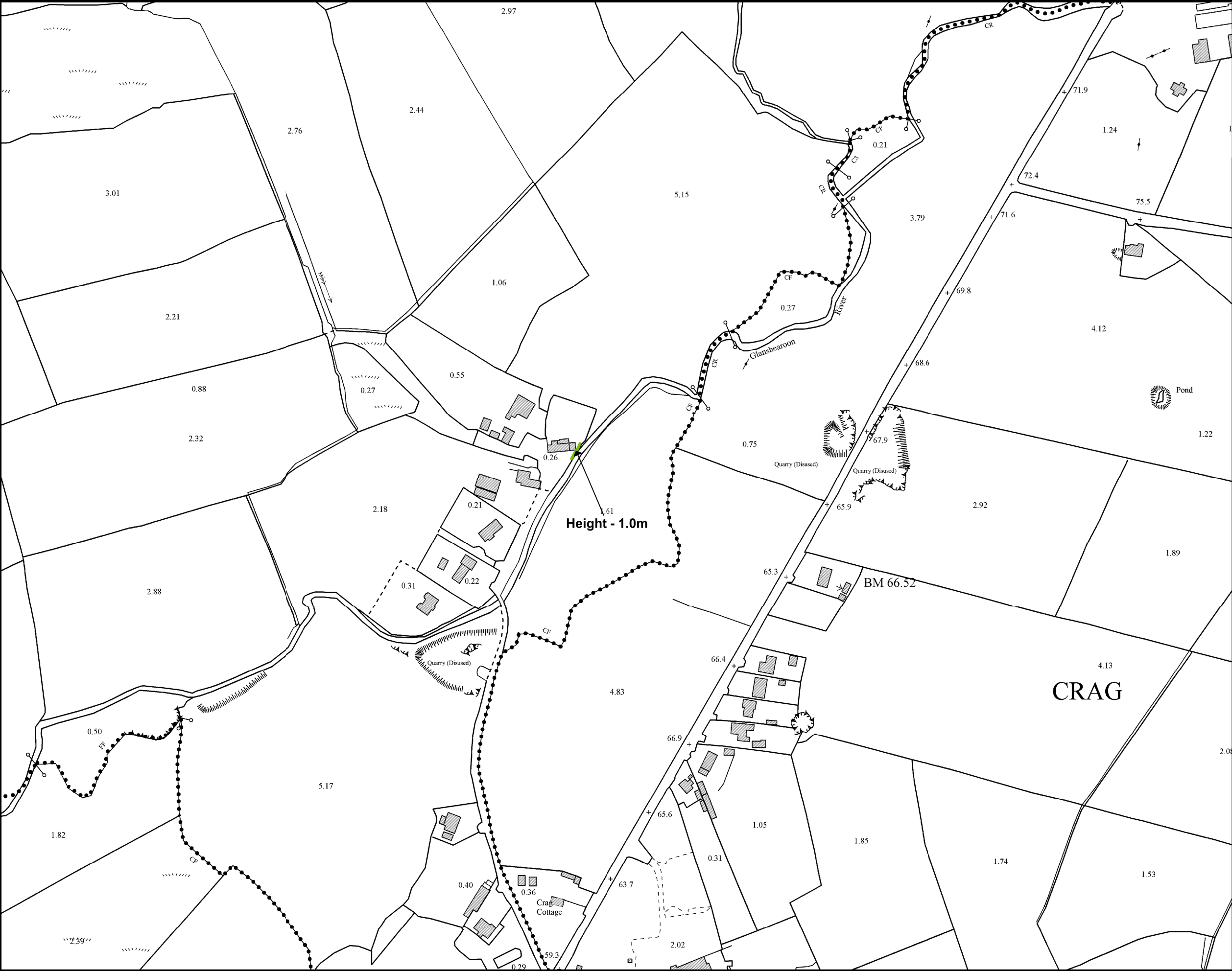
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Castleisland Flow Diversion & Flood Defences	
Map Type:	Preliminary Options
Source:	Fluvial Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-CD-209-P1
Sheet:	4 of 5
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



- Flood Defence Walls
- Flood Defence Embankments
- Possible Flood Areas
- Flow Diversion Channel



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project :
South Western CFRAM Study

Map : Castleisland
Flow Diversion & Flood Defences - Crag

Map Type: Preliminary Options

Source: Fluvial Flooding

Map Area: Urban Area

Scenario: Current

Drawn by: Tony Donovan

Checked by: Barry O'Connor

Approved by: Fintan McGivern

Map No.: MMD-296235-E-DR-22-CD-210-P1

Sheet: 5 of 5

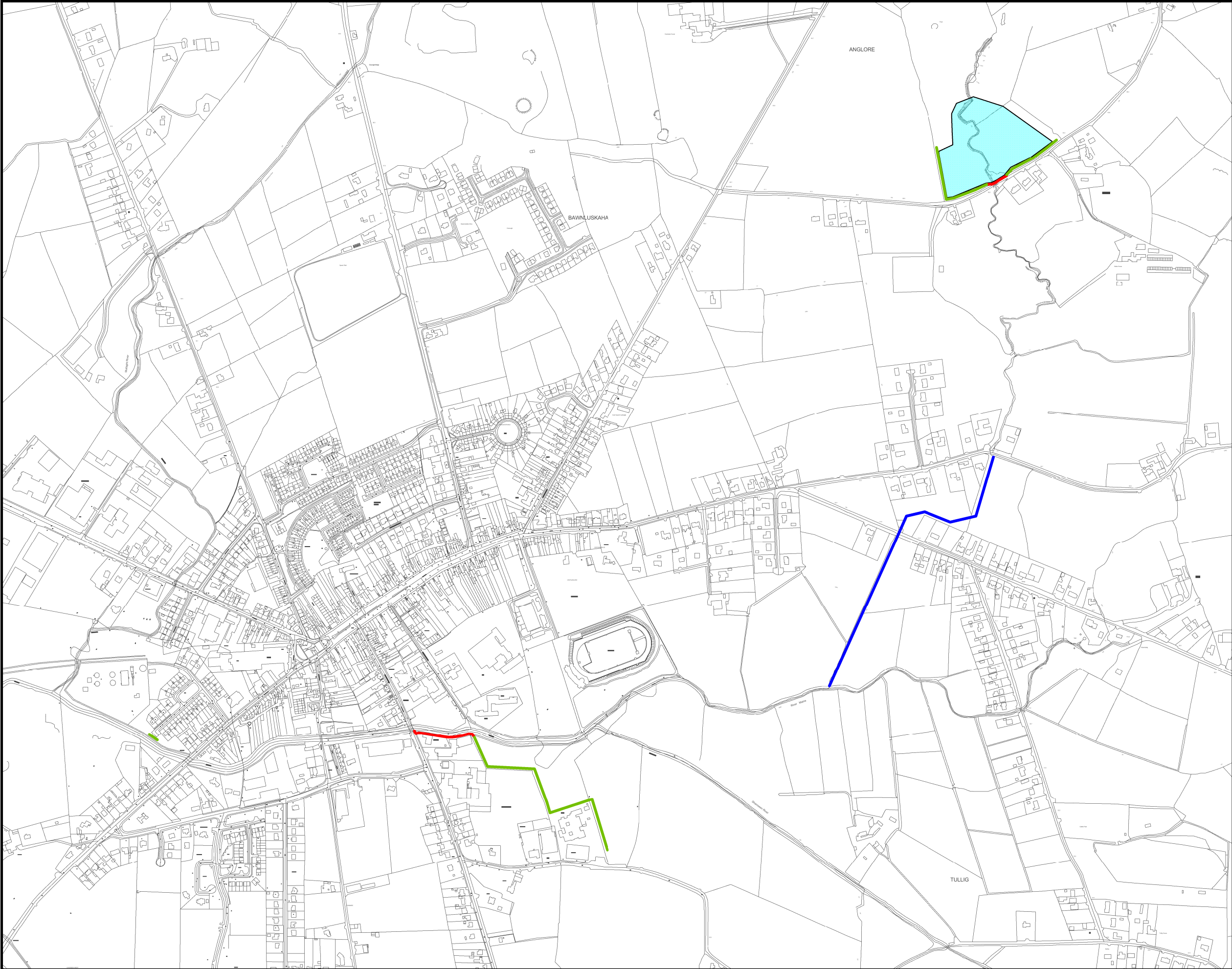
Revision: P1

Drawing Scale: NTS

Plot Scale: 1:1 @ A3

IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankments

Possible Flood Areas

Flow Diversion Channel



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



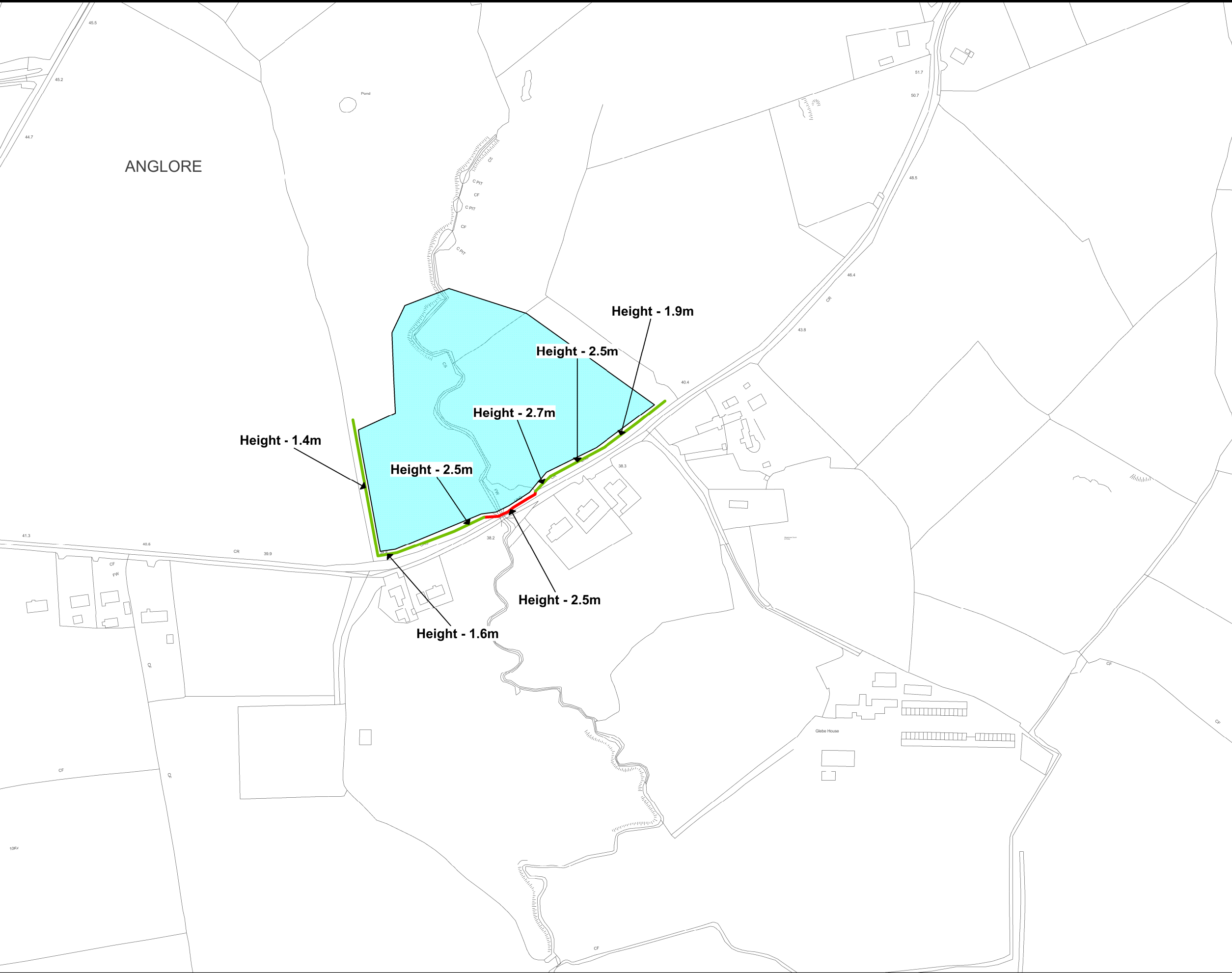
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Castleisland - Overview Flow Diversion & Western Flood Defences	
Map Type:	Preliminary Options
Source:	Fluvial Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-CD-211-P1
Sheet:	1 of 4
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls
—

Flood Defence Embankments
—

Possible Flood Areas
■

Flow Diversion Channel
—



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



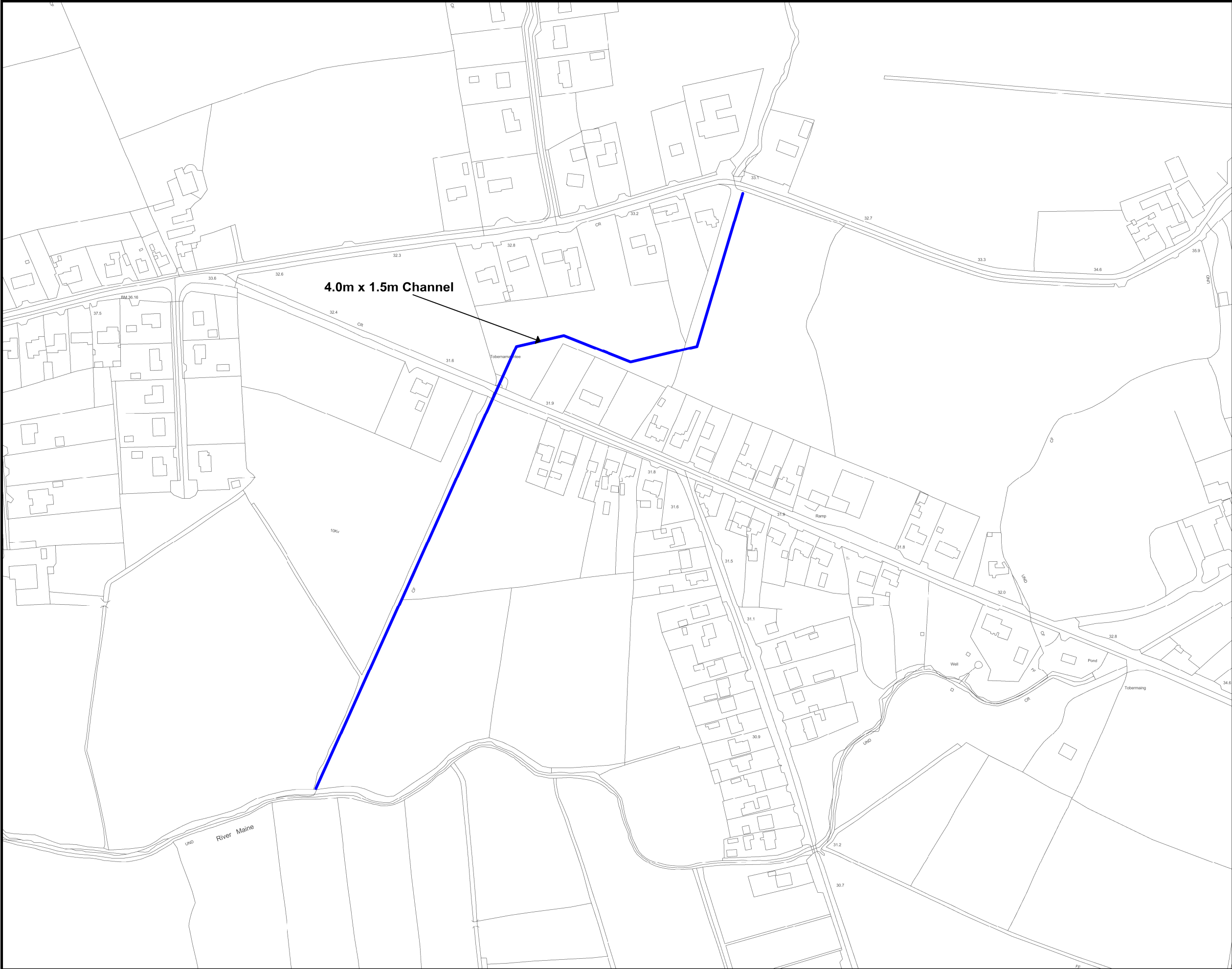
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Castleisland Flow Diversion & Western Flood Defences	
Map Type:	Preliminary Options
Source:	Fluvial Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-CD-212-P1
Sheet:	2 of 4
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



- Flood Defence Walls
- Flood Defence Embankments
- Possible Flood Areas
- Flow Diversion Channel



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project :

South Western CFRAM Study

Map : Castleisland
Flow Diversion & Western Flood Defences

Map Type: Preliminary Options

Source: Fluvial Flooding

Map Area: Urban Area

Scenario: Current

Drawn by: Tony Donovan

Checked by: Barry O'Connor

Approved by: Fintan McGivern

Map No.: MMD-296235-E-DR-22-CD-213-P1

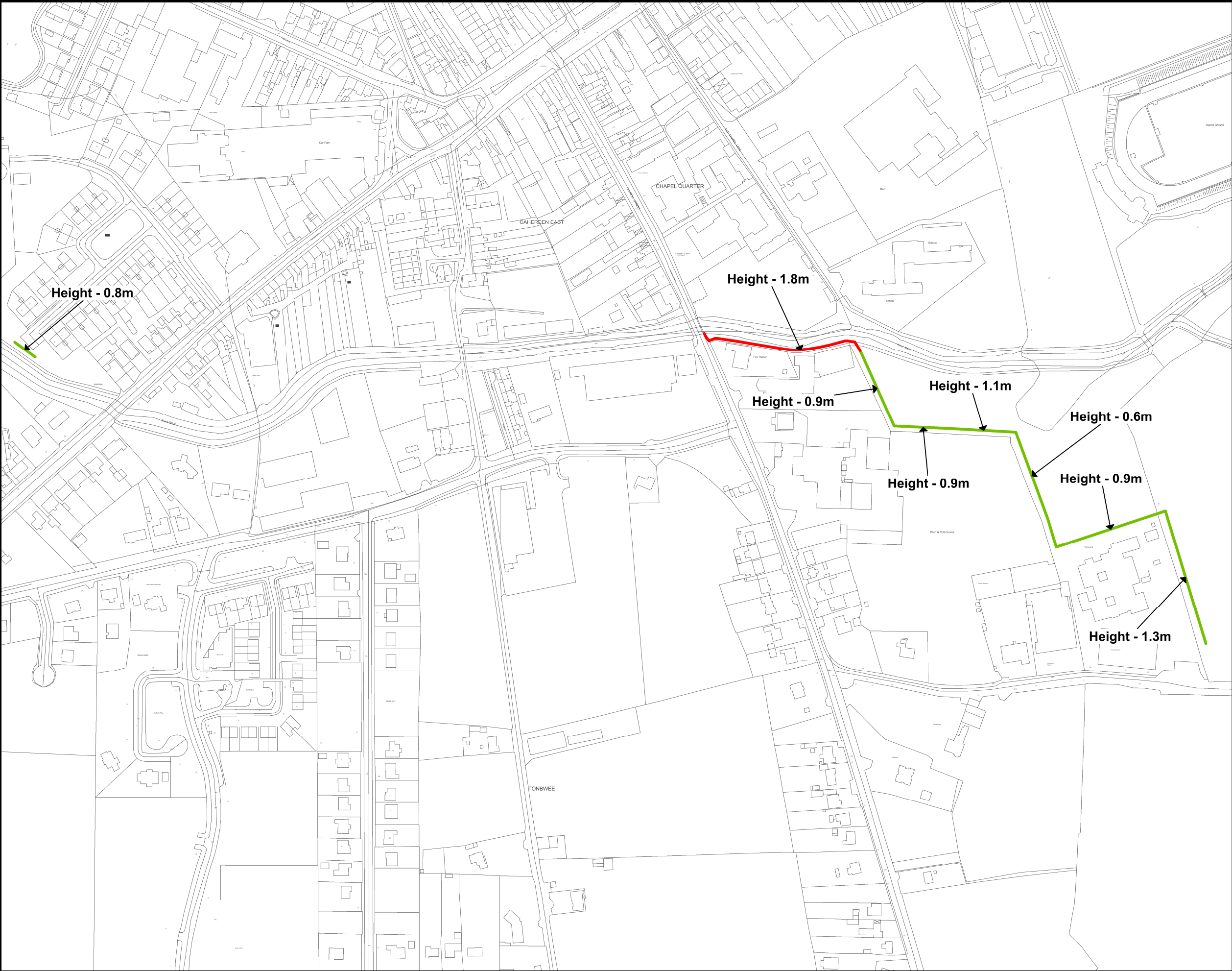
Sheet: 3 of 4 Revision: P1

Drawing Scale: NTS Plot Scale: 1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankments

Possible Flood Areas

Flow Diversion Channel



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Castleisland Flow Diversion & Western Flood Defences	
Map Type:	Preliminary Options
Source:	Fluvial Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-CD-214-P1
Sheet:	4 of 4
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



- Storage**
- Storage Embankment
 - Area
- Flood Defence Walls**
- Flood Defence Embankment**
- Pump Station**



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



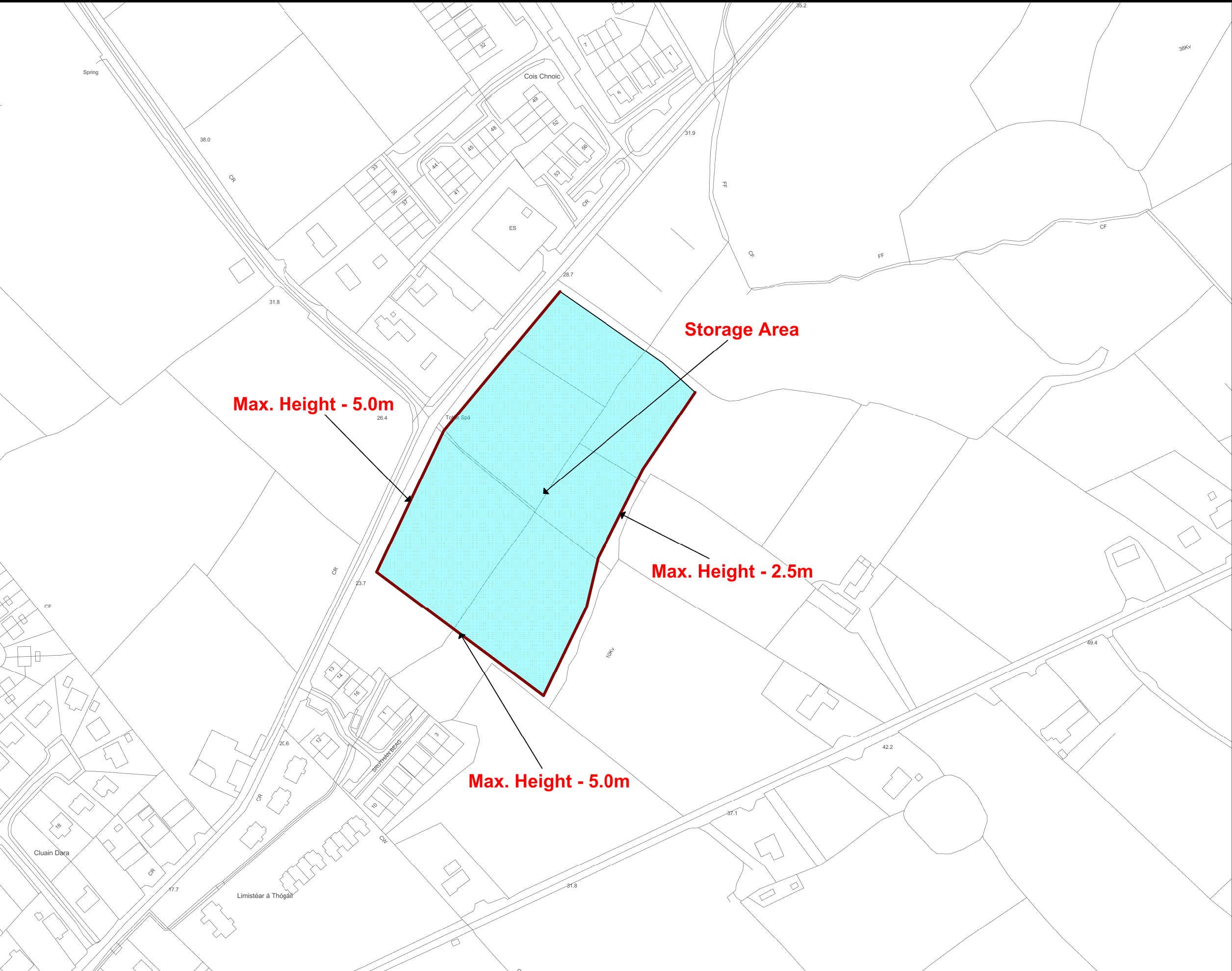
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Dingle Storage and Flood Defences - Overview	
Map Type:	Preliminary Options
Source:	Fluvial & Tidal Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-DE-201-P1
Sheet:	1 of 4
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Storage

Storage Embankment

Area

Flood Defence Walls

Flood Defence Embankment

Pump Station



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



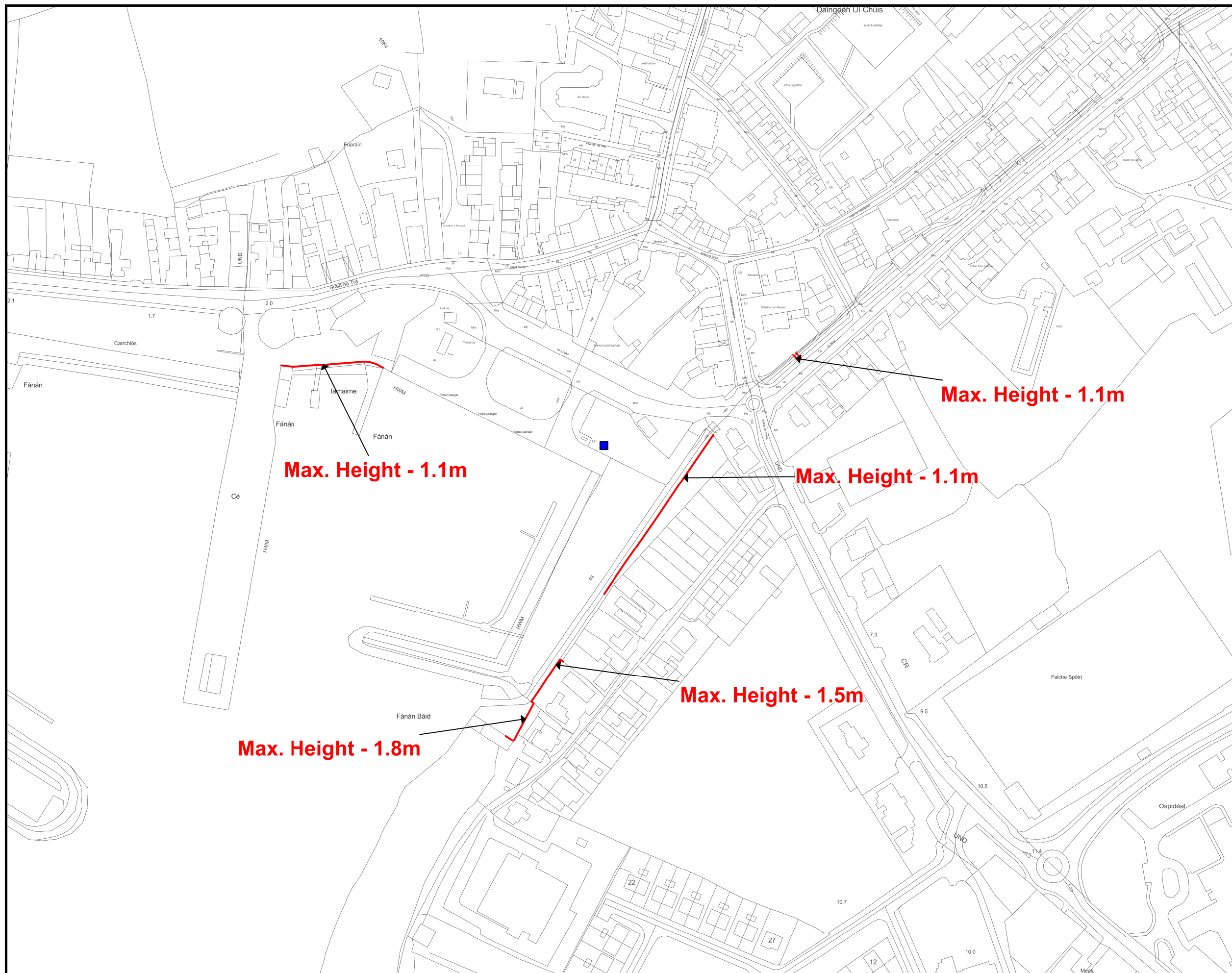
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Dingle Storage and Flood Defences	
Map Type:	Preliminary Options
Source:	Fluvial & Tidal Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-DE-202-P1
Sheet:	2 of 4
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Storage

Storage Embankment



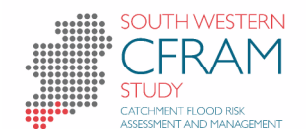
Flood Defence Walls



Flood Defence Embankment



Pump Station



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project :
South Western CFRAM Study

Map : **Dingle**
Storage and Flood Defences

Map Type: Preliminary Options

Source:	Fluvial & Tidal Flooding
---------	--------------------------

Map Area:	Urban Area
-----------	------------

Scenario:	Current
-----------	---------

Drawn by: Tony Donovan

Checked by: Barry O'Connor

Approved by:	Fintan McGivern
--------------	-----------------

Map No.: MMD-296235-E-DR-22-DE-203-P1

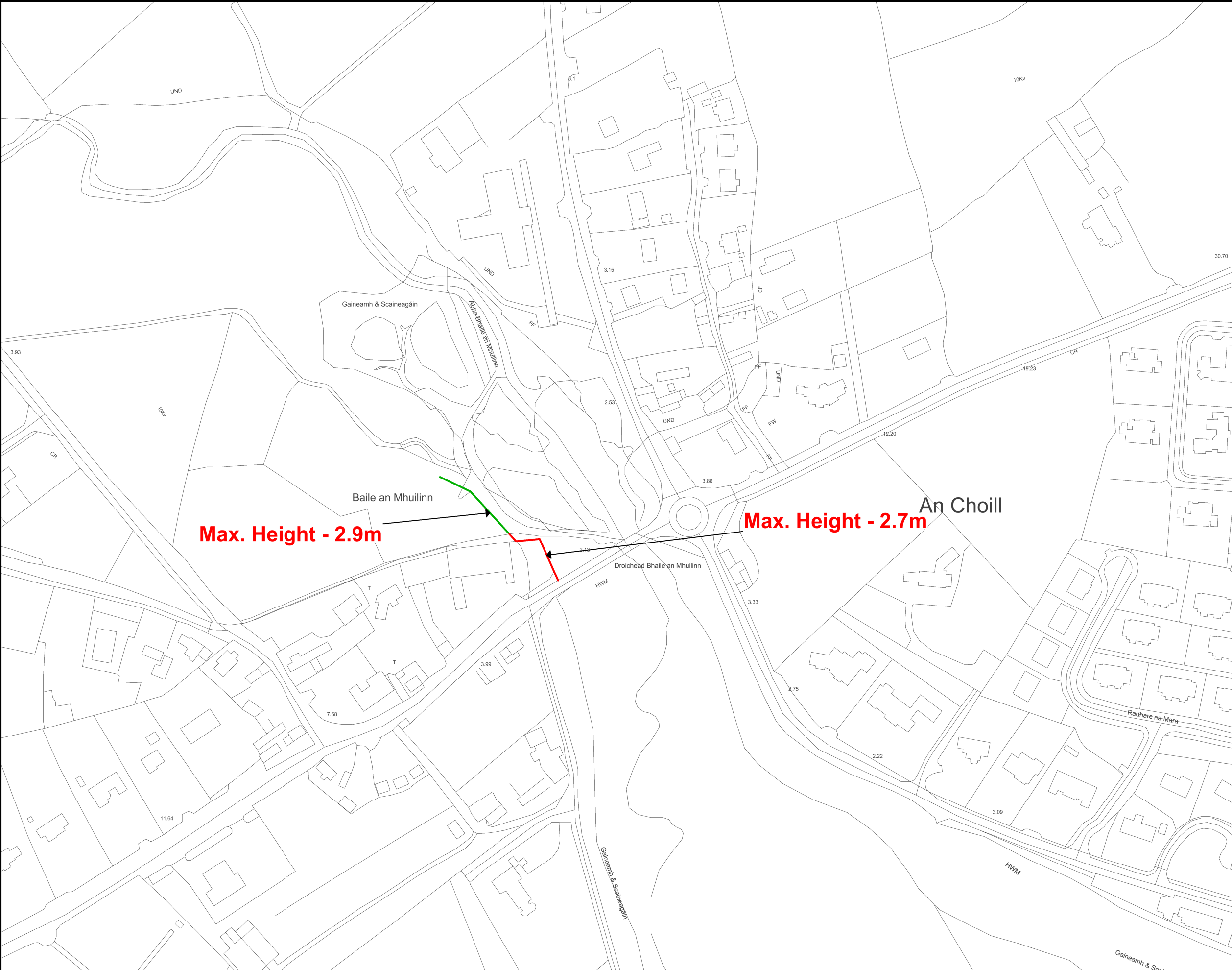
Sheet: 3 of 4 Revision: P1

Drawing Scale: NTS	Plot Scale: 1:1 @ A3
--------------------	----------------------



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



- Storage**
- Storage Embankment
 - Area
- Flood Defence Walls**
- Flood Defence Embankment**
- Pump Station**



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



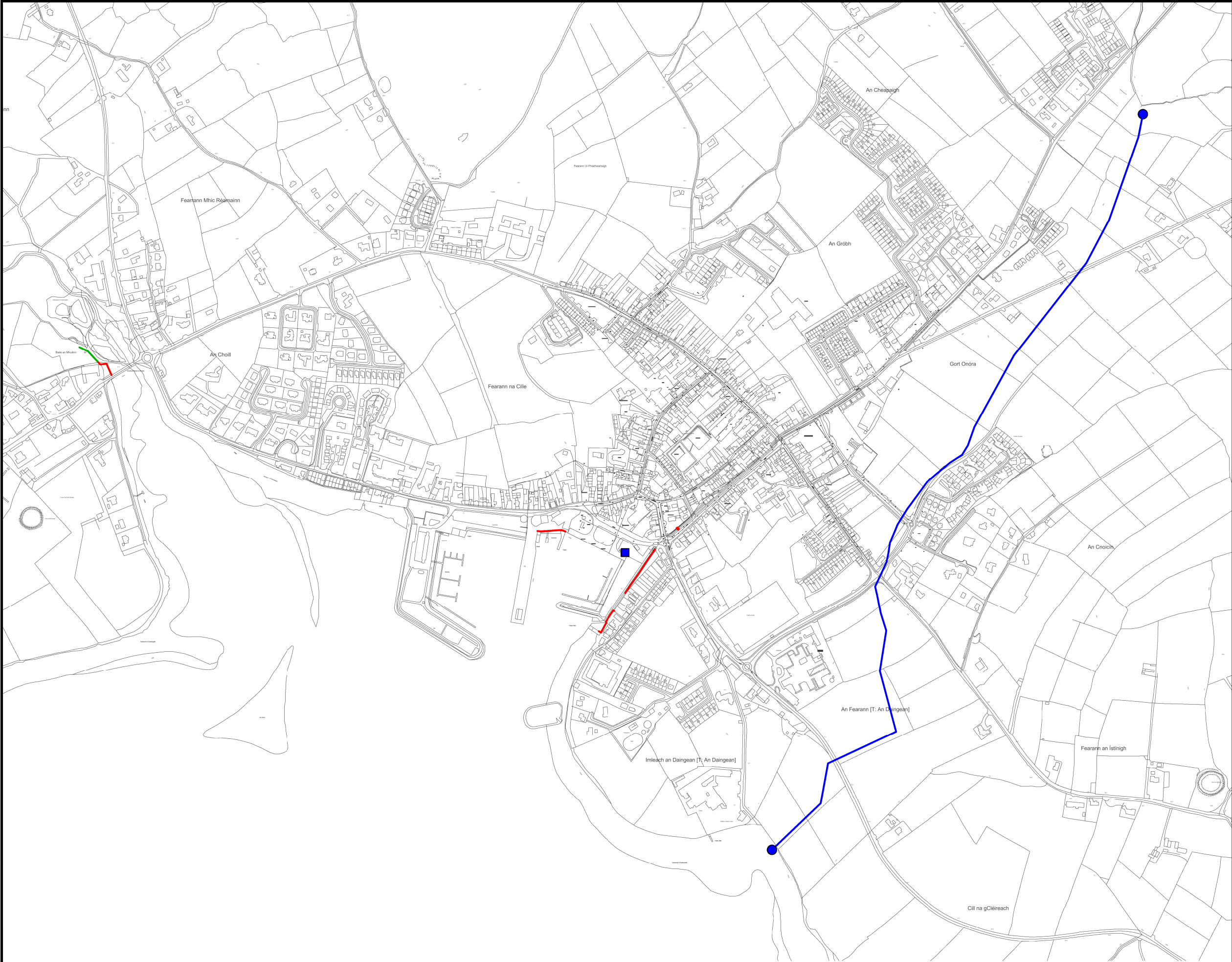
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Dingle Storage and Flood Defences	
Map Type:	Preliminary Options
Source:	Fluvial & Tidal Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-DE-204-P1
Sheet:	4 of 4
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



- Flow Diversion
- Flood Defence Walls
- Flood Defence Embankment
- Pump Station



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



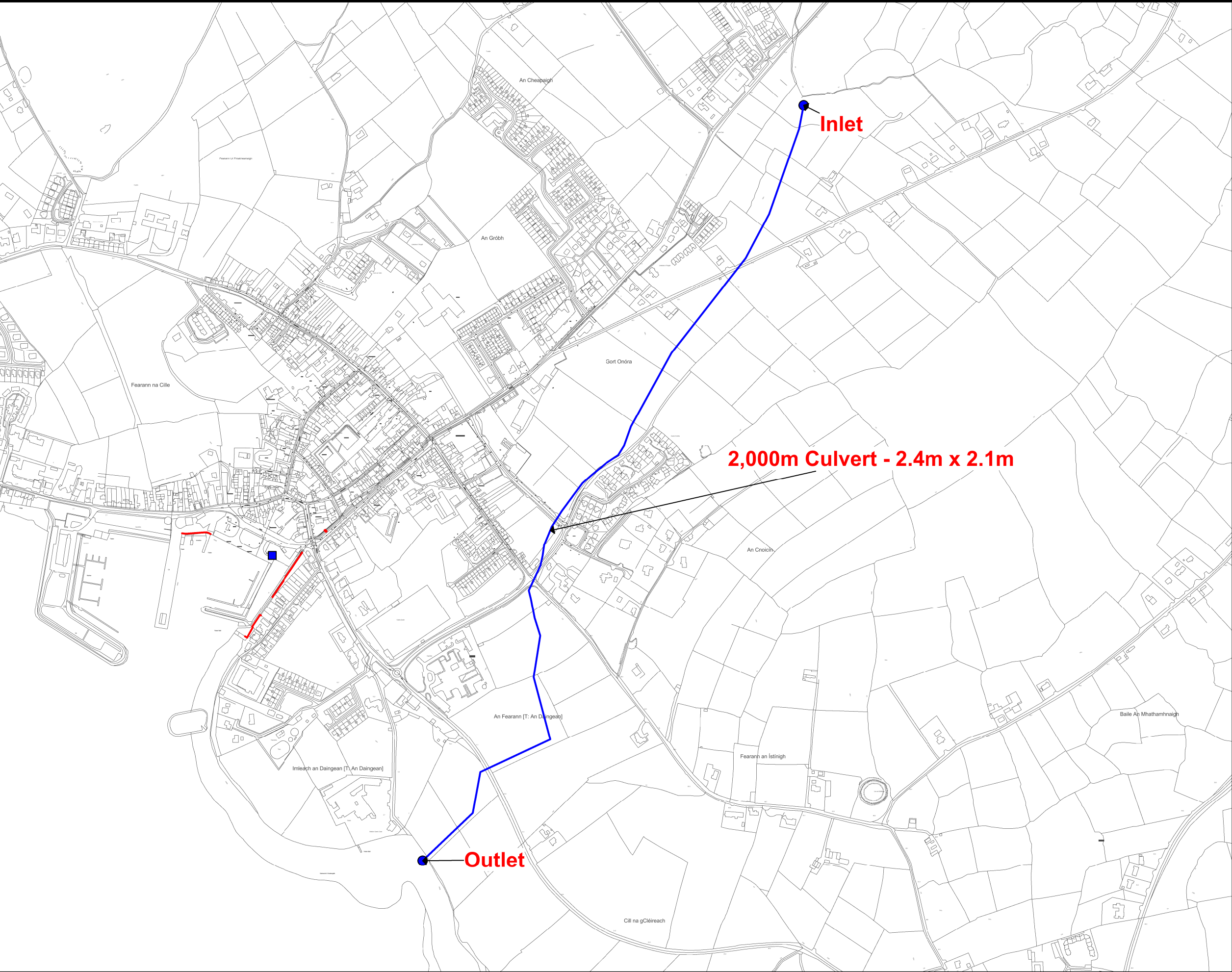
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Dingle Flow Diversion and Flood Defences - Overview	
Map Type:	Preliminary Options
Source:	Fluvial & Tidal Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-DE-205-P1
Sheet:	1 of 4
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



- Flow Diversion
- Flood Defence Walls
- Flood Defence Embankment
- Pump Station



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

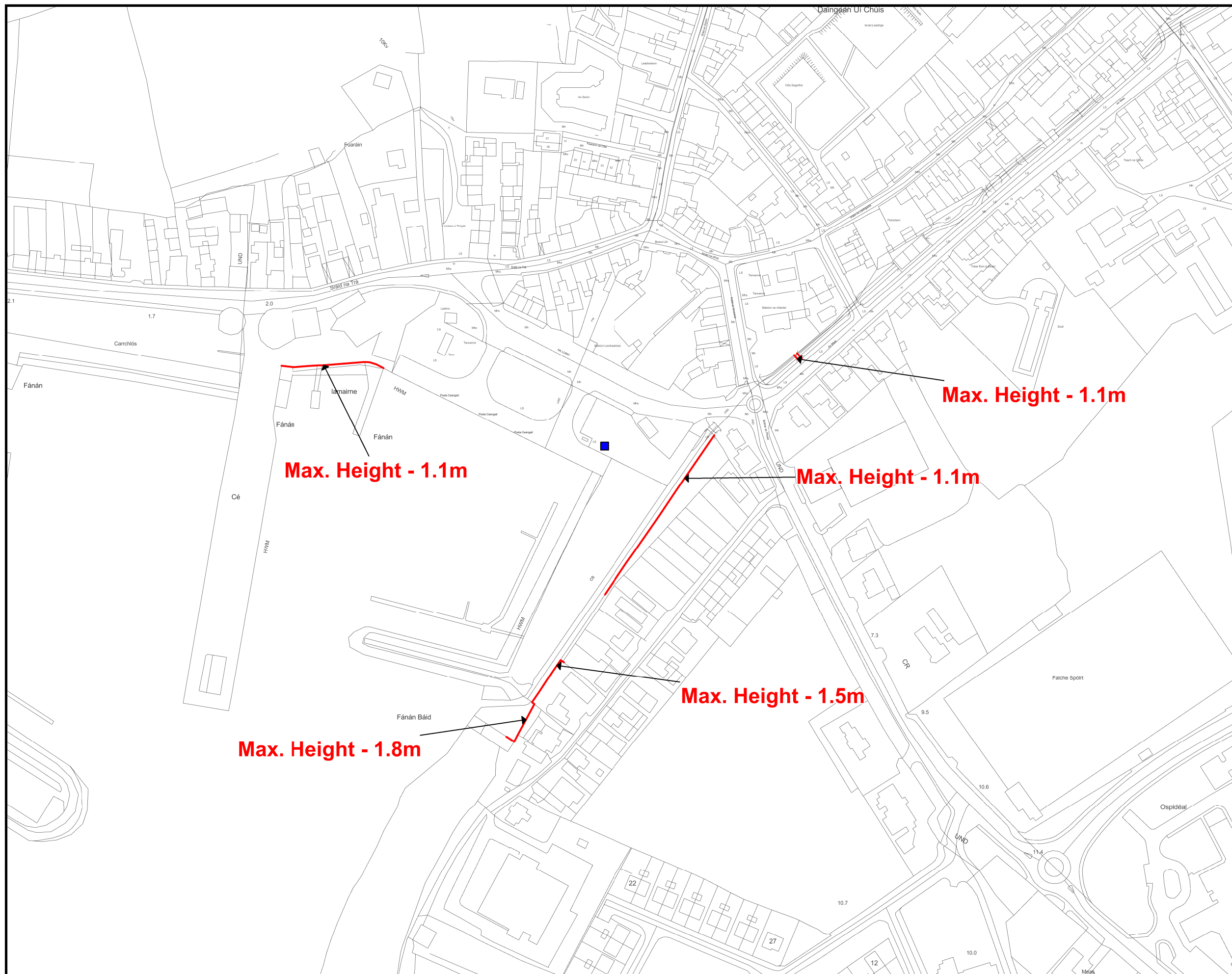


Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Dingle Flow Diversion and Flood Defences	
Map Type:	Preliminary Options
Source:	Fluvial & Tidal Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-DE-206-P1
Sheet:	2 of 4
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3

IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



- Flow Diversion
Flood Defence Walls
Flood Defence Embankment
Pump Station



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



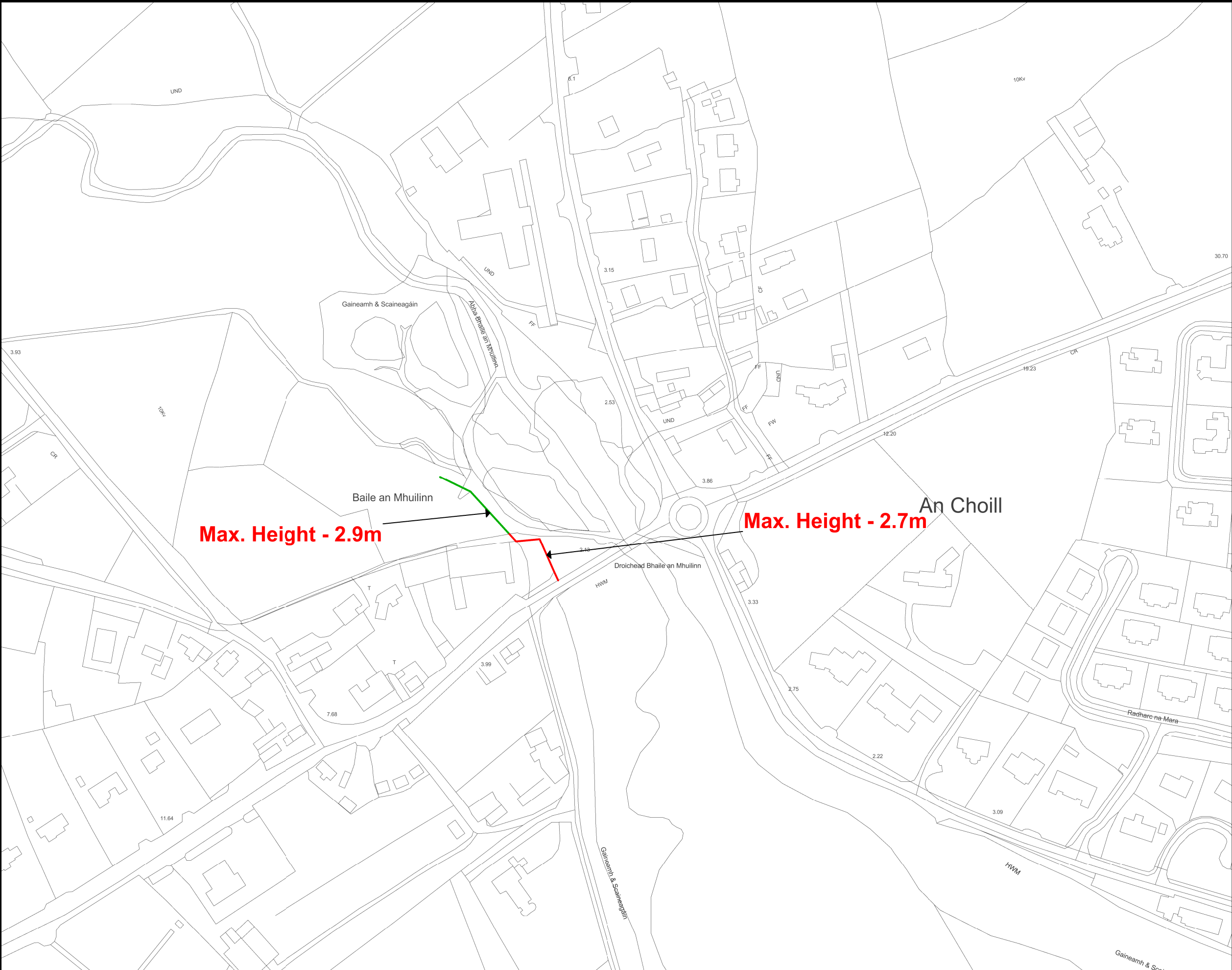
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study			
Map : Dingle Flow Diversion and Flood Defences			
Map Type:	Preliminary Options		
Source:	Fluvial & Tidal Flooding		
Map Area:	Urban Area		
Scenario:	Current		
Drawn by:	Tony Donovan		
Checked by:	Barry O'Connor		
Approved by:	Fintan McGivern		
Map No.:	MMD-296235-E-DR-22-DE-207-P1		
Sheet:	3 of 4	Revision:	P1
Drawing Scale:	NTS	Plot Scale:	1:1 @



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



- Flow Diversion
- Flood Defence Walls
- Flood Defence Embankment
- Pump Station



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



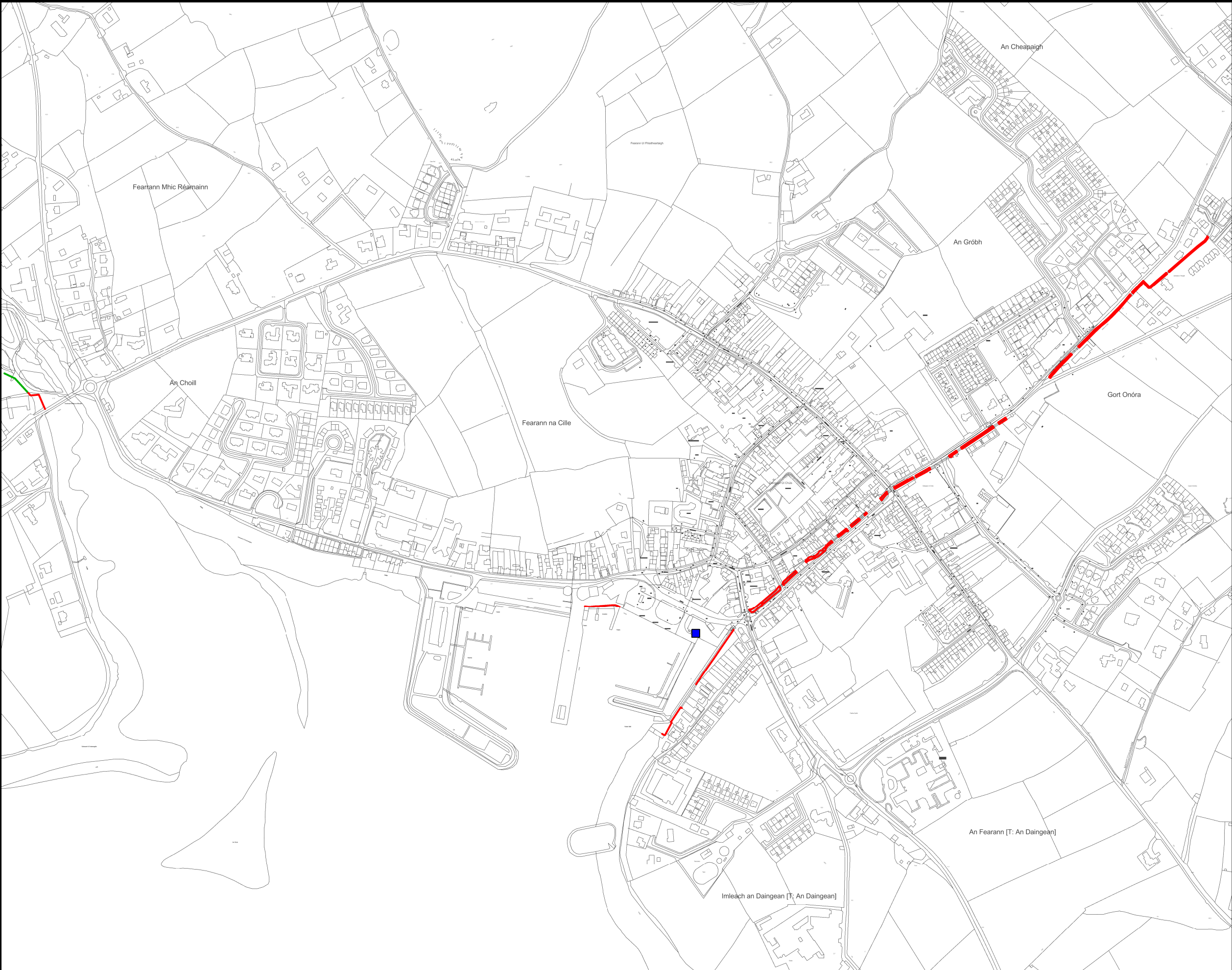
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Dingle Flow Diversion and Flood Defences	
Map Type:	Preliminary Options
Source:	Fluvial & Tidal Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-DE-208-P1
Sheet:	4 of 4
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

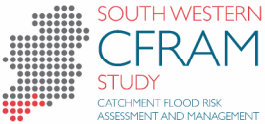
©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankment

Pump Station



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



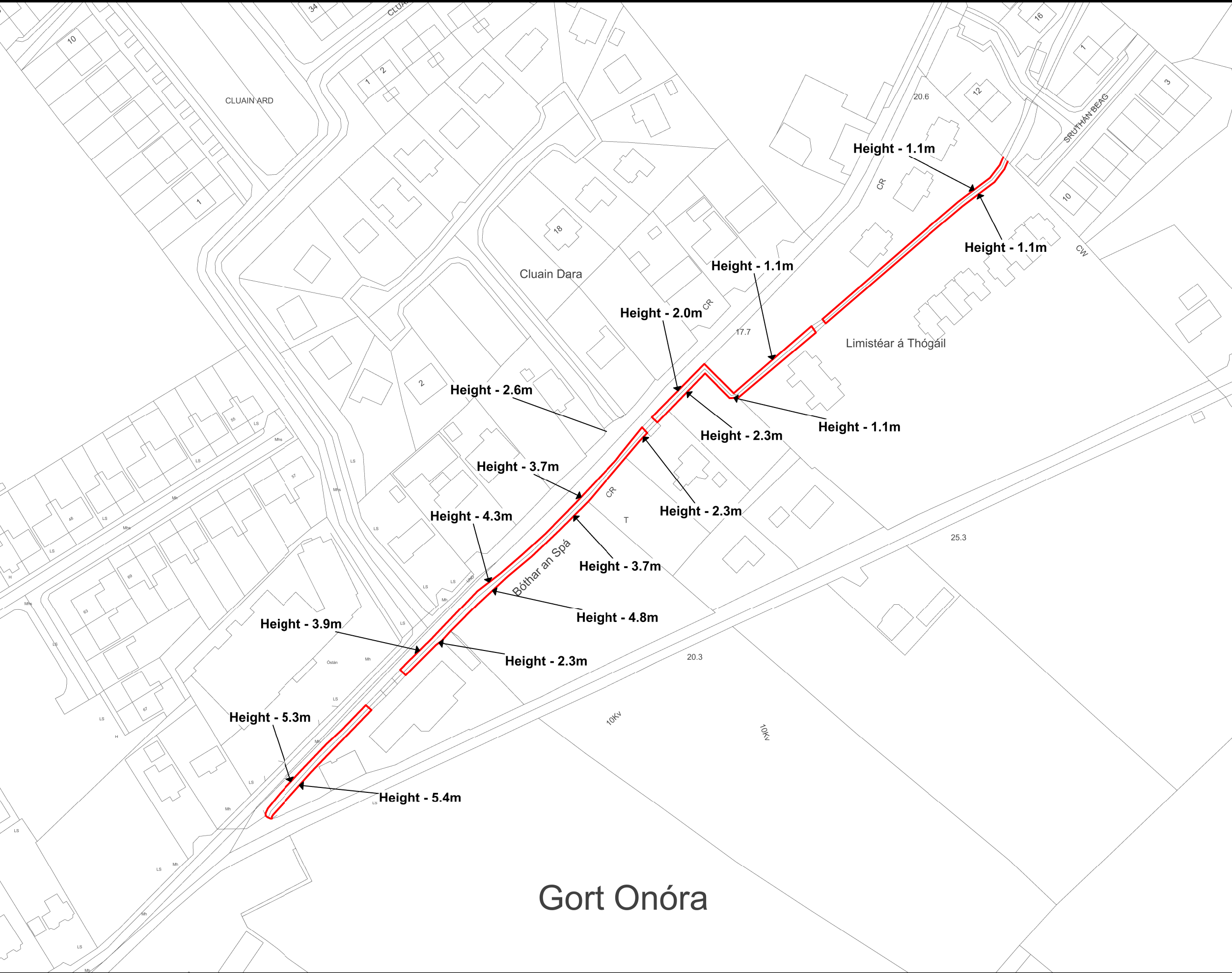
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Dingle Flood Defences - Overview	
Map Type:	Preliminary Options
Source:	Fluvial & Tidal Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-DE-210-P1
Sheet:	1 of 5
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankment

Pump Station



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project :

South Western CFRAM Study

Map : Dingle

Flood Defences - Overview

Map Type:

Preliminary Options

Source:

Fluvial & Tidal Flooding

Map Area:

Urban Area

Scenario:

Current

Drawn by:

Tony Donovan

Checked by:

Barry O'Connor

Approved by:

Fintan McGivern

Map No.:

MMD-296235-E-DR-22-DE-211-P1

Sheet:

2 of 5

Revision:

P1

Drawing Scale:

NTS

Plot Scale:

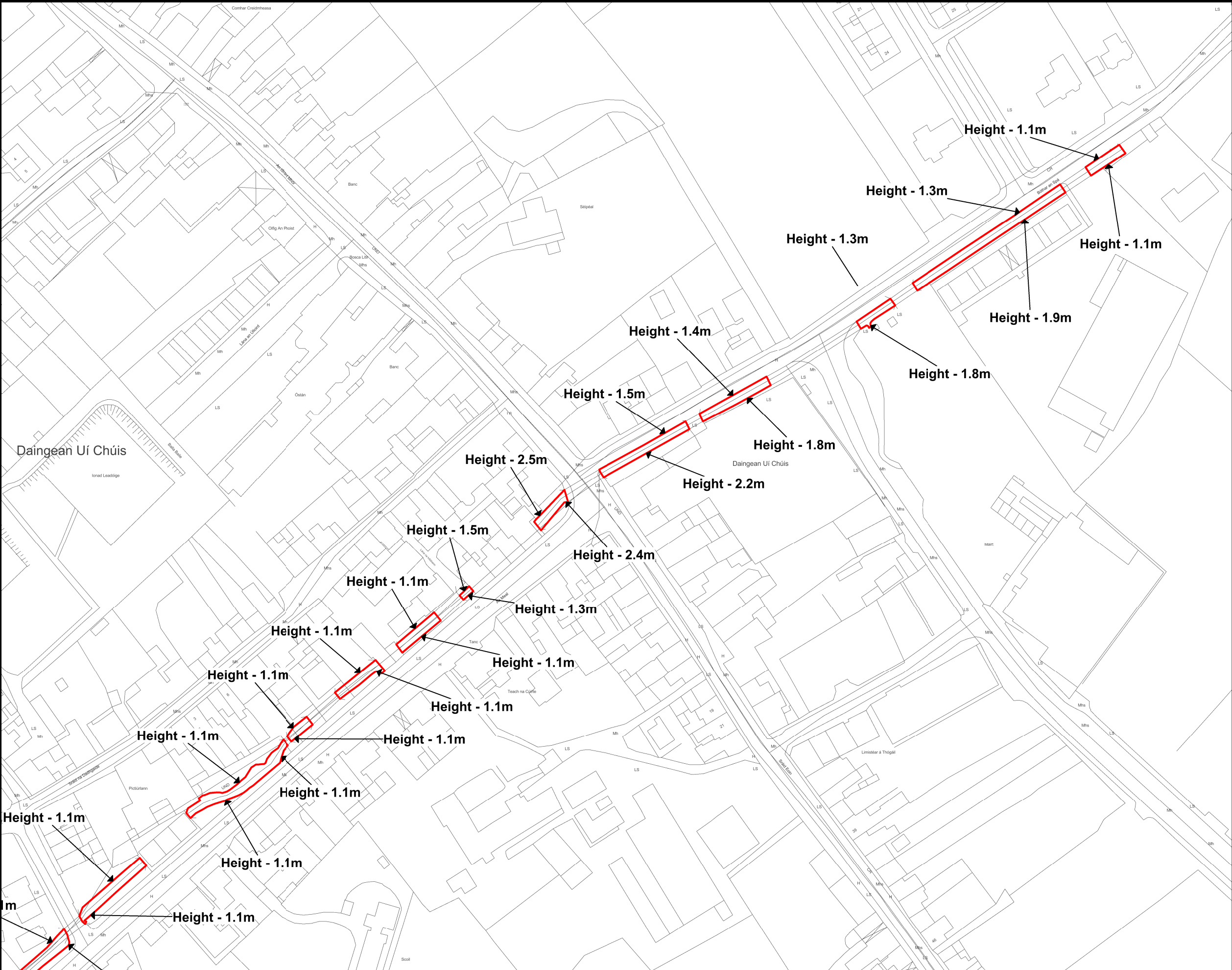
1:1 @ A3

Gort Onóra



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankment

Pump Station



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project :

South Western CFRAM Study

Map : Dingle

Flood Defences - Overview

Map Type:

Preliminary Options

Source:

Fluvial & Tidal Flooding

Map Area:

Urban Area

Scenario:

Current

Drawn by:

Tony Donovan

Checked by:

Barry O'Connor

Approved by:

Fintan McGivern

Map No.:

MMD-296235-E-DR-22-DE-212-P1

Sheet:

3 of 5

Revision:

P1

Drawing Scale:

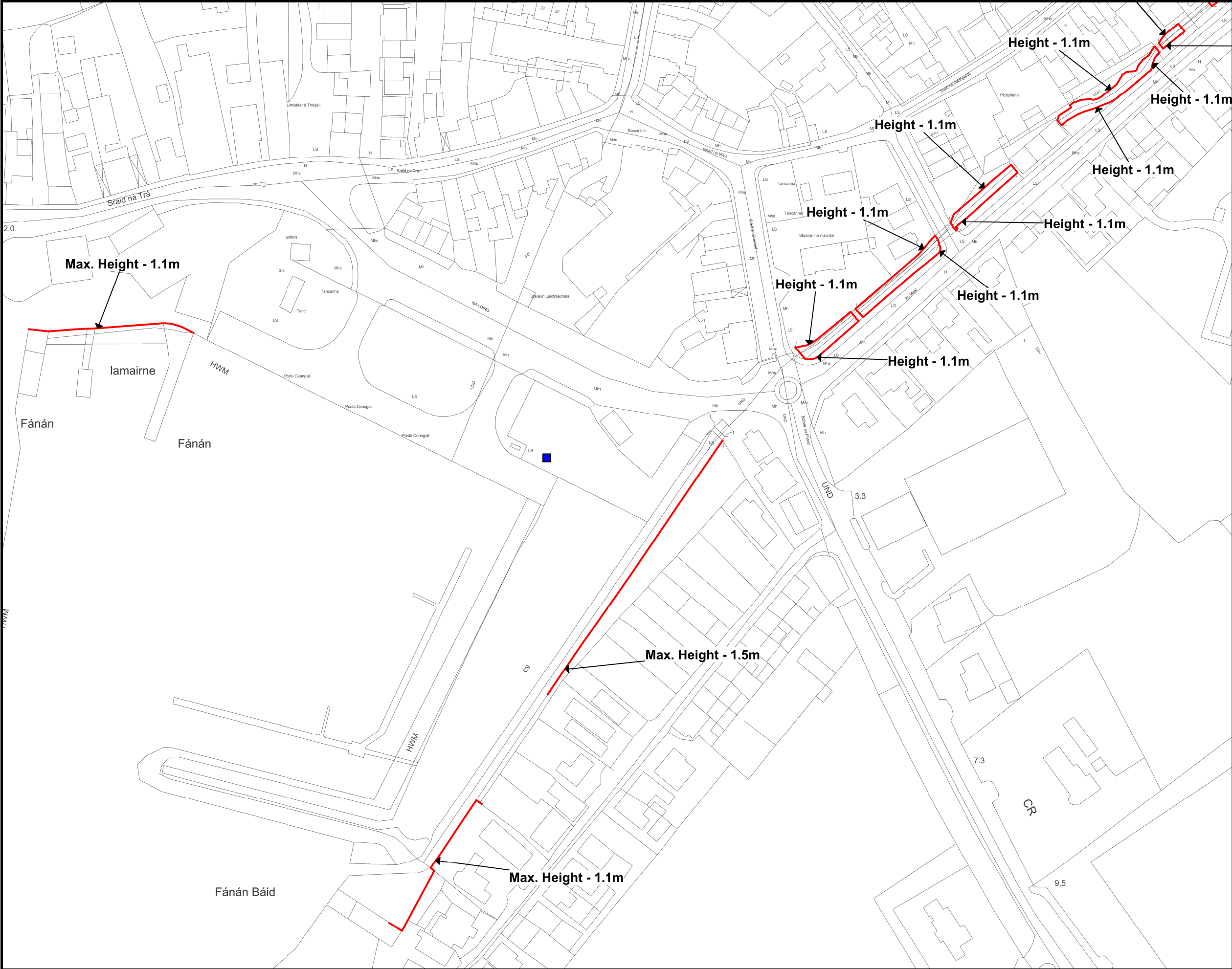
NTS

Plot Scale:

1:1 @ A3

IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankment

Pump Station



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project :

South Western CFRAM Study

Map : Dingle
Flood Defences - Overview

Map Type: Preliminary Options

Source: Fluvial & Tidal Flooding

Map Area: Urban Area

Scenario: Current

Drawn by: Tony Donovan

Checked by: Barry O'Connor

Approved by: Fintan McGivern

Map No.: MMD-296235-E-DR-22-DE-213-P1

Sheet:

4 of 5

Revision:

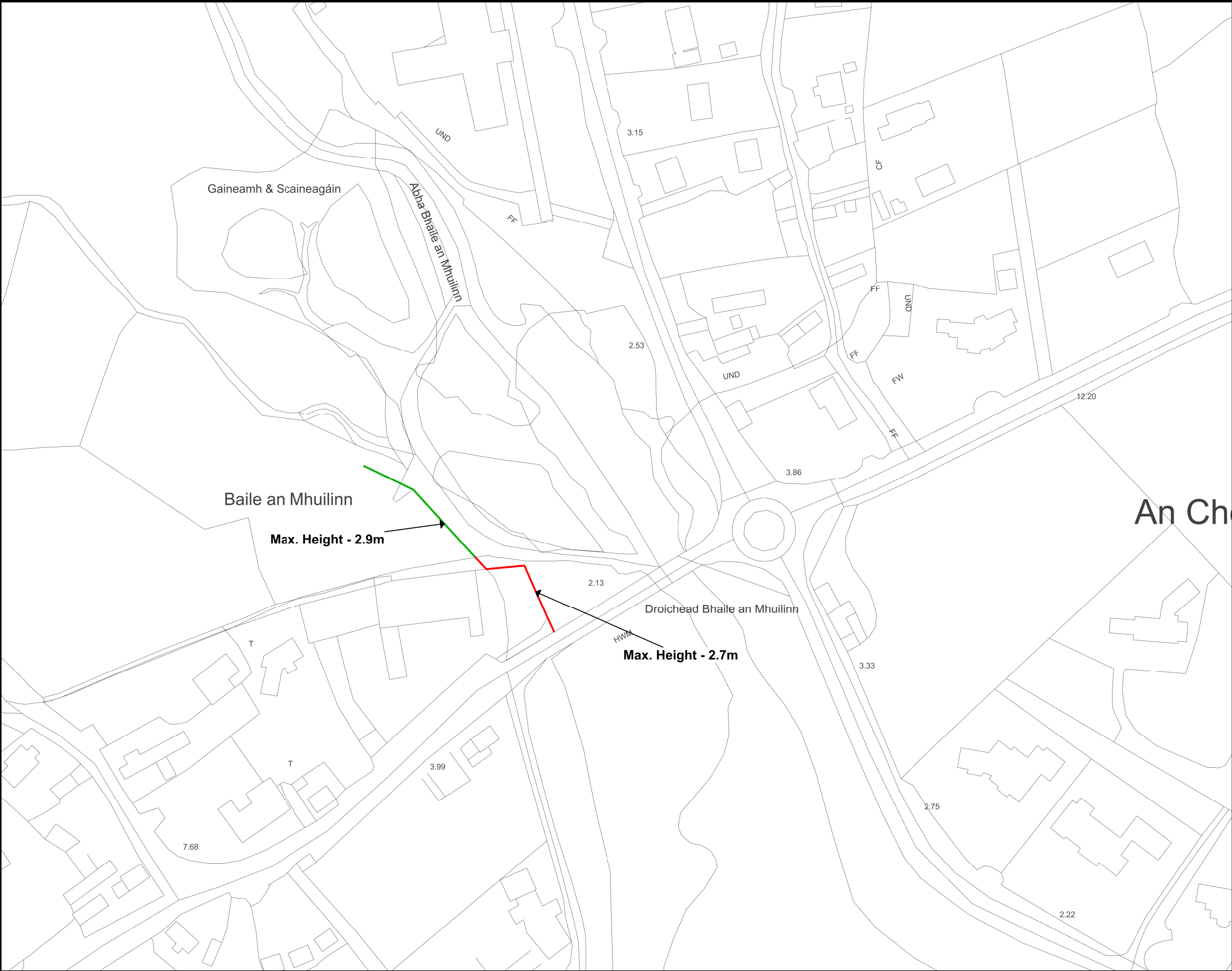
P1

Drawing Scale: NTS

Plot Scale: 1:1 @ A3

IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



- Flood Defence Walls
- Flood Defence Embankment
- Pump Station



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



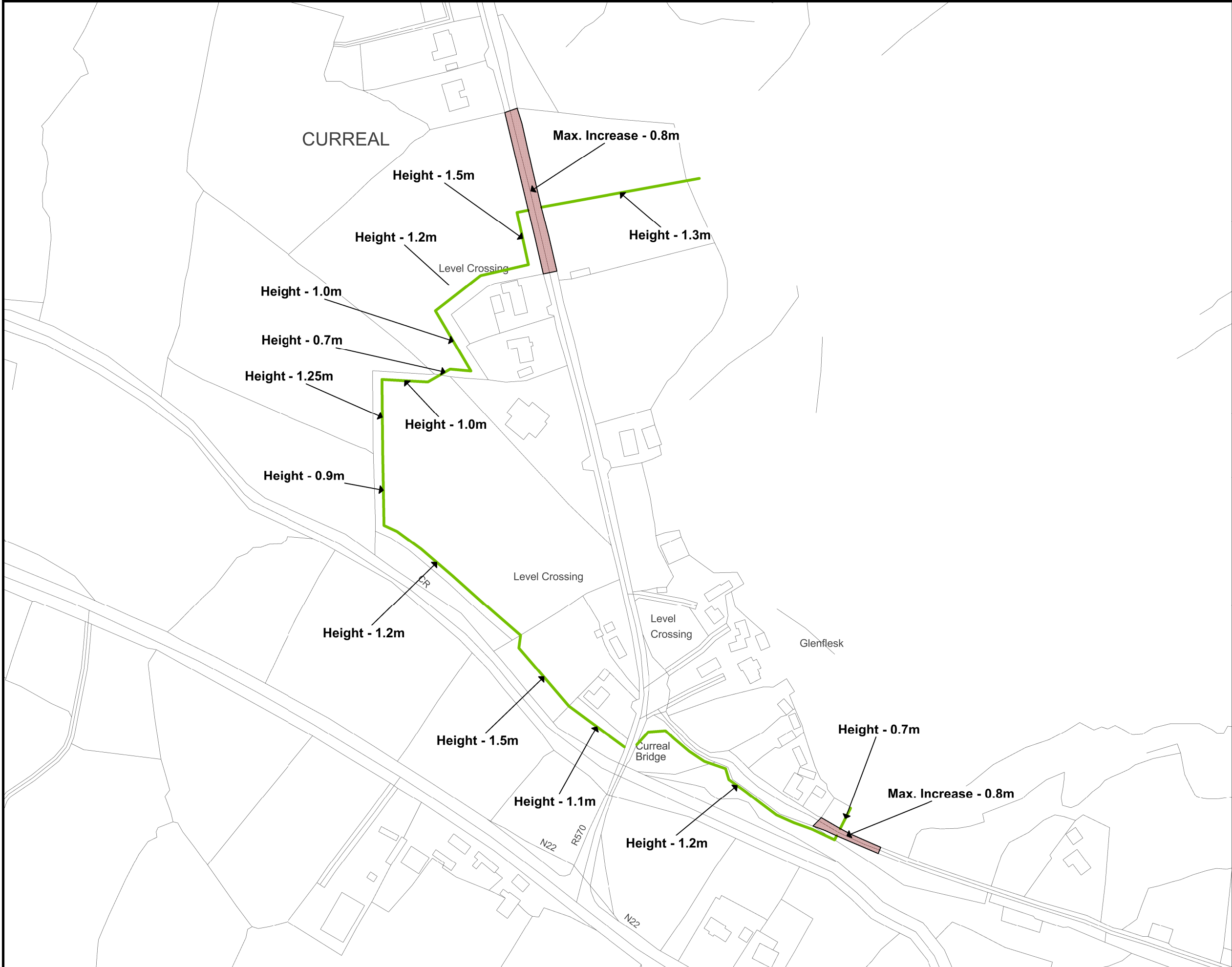
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Dingle Flood Defences - Overview	
Map Type:	Preliminary Options
Source:	Fluvial & Tidal Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-DE-214-P1
Sheet:	5 of 5
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Embankments

Road Raising



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project :
South Western CFRAM Study

Map : Glenflesk
Flood Defences

Map Type: Preliminary Options

Source: Fluvial Flooding

Map Area: Urban Area

Scenario: Current

Drawn by: Tony Donovan

Checked by: Barry O'Connor

Approved by: Fintan McGivern

Map No.: MMD-296235-E-DR-22-GK-201-P1

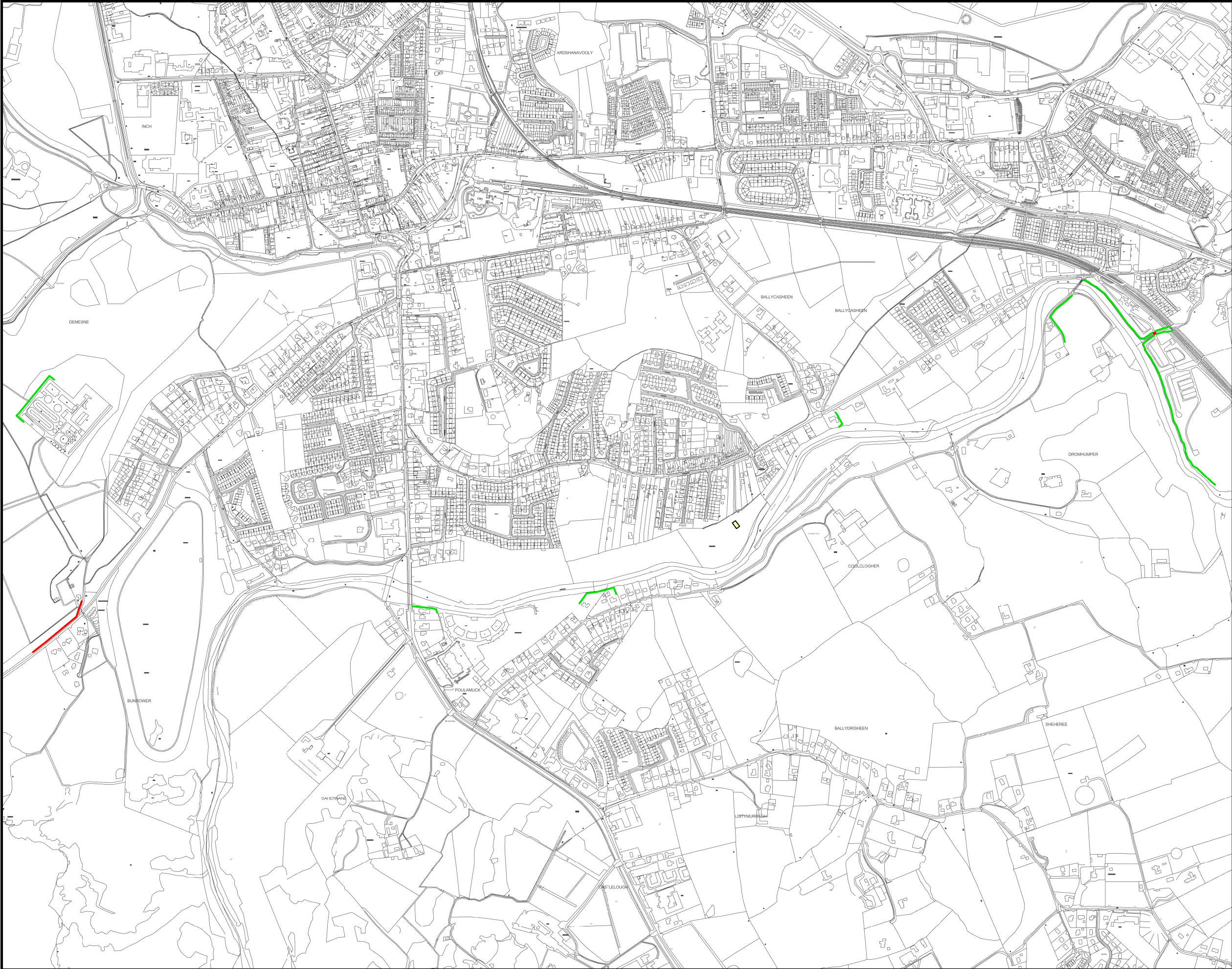
Sheet: 1 of 1 Revision: P1

Drawing Scale: NTS Plot Scale: 1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

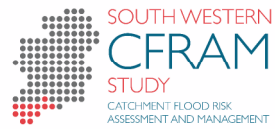
©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankments

Flood Resilience



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



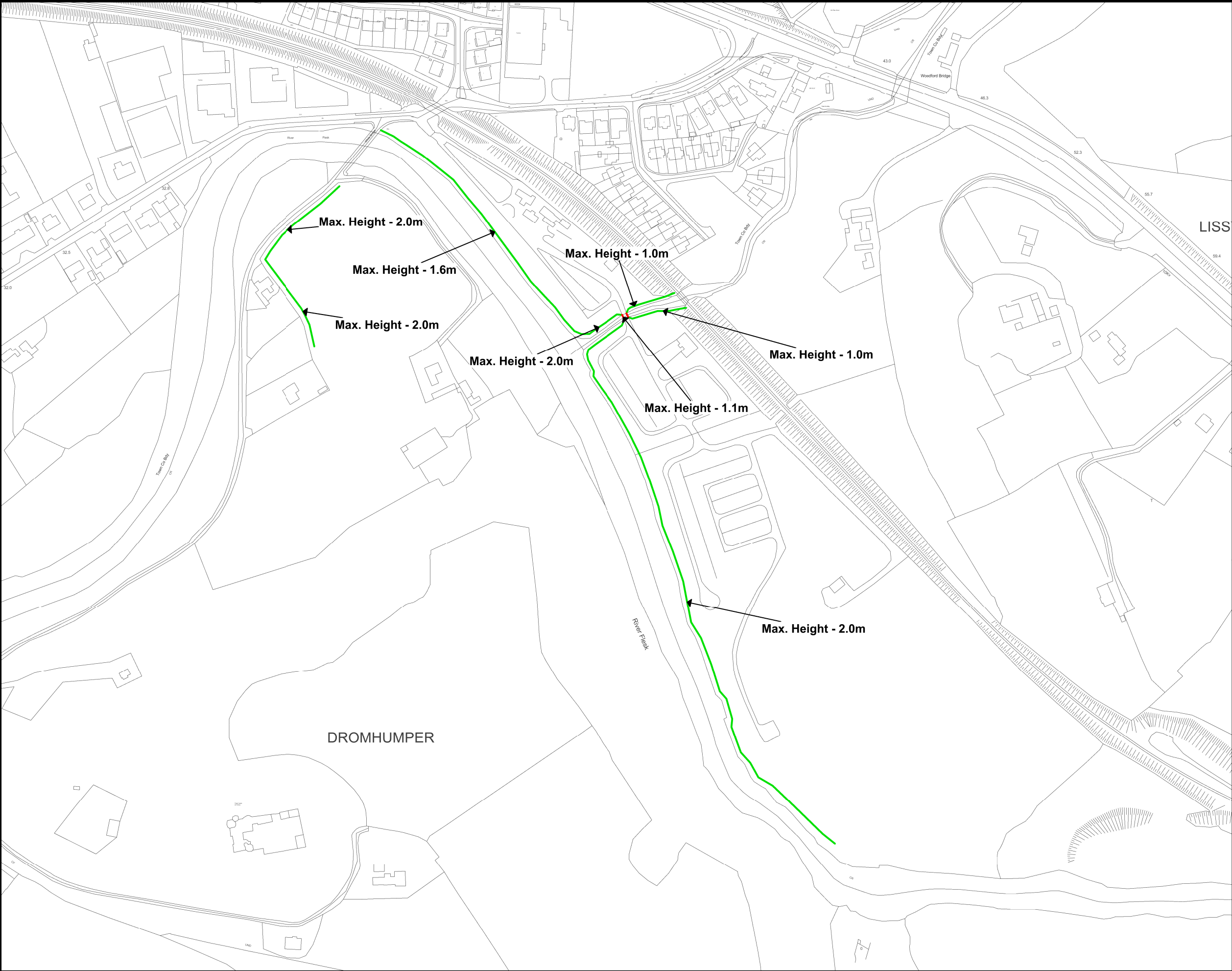
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Killarney - Emerging Preferred Option Fluvial Flood Defences - Overview	
Map Type:	Preliminary Options
Source:	Fluvial Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-KY-200-P1
Sheet:	1 of 1
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

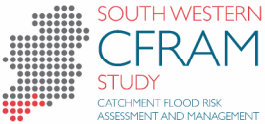
©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankments

Flood Resilience



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Killarney - Emerging Preferred Option Fluvial Flood Defences	
Map Type:	Preliminary Options
Source:	Fluvial Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-KY-202-P1
Sheet:	1 of 4
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankments

Flood Resilience



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



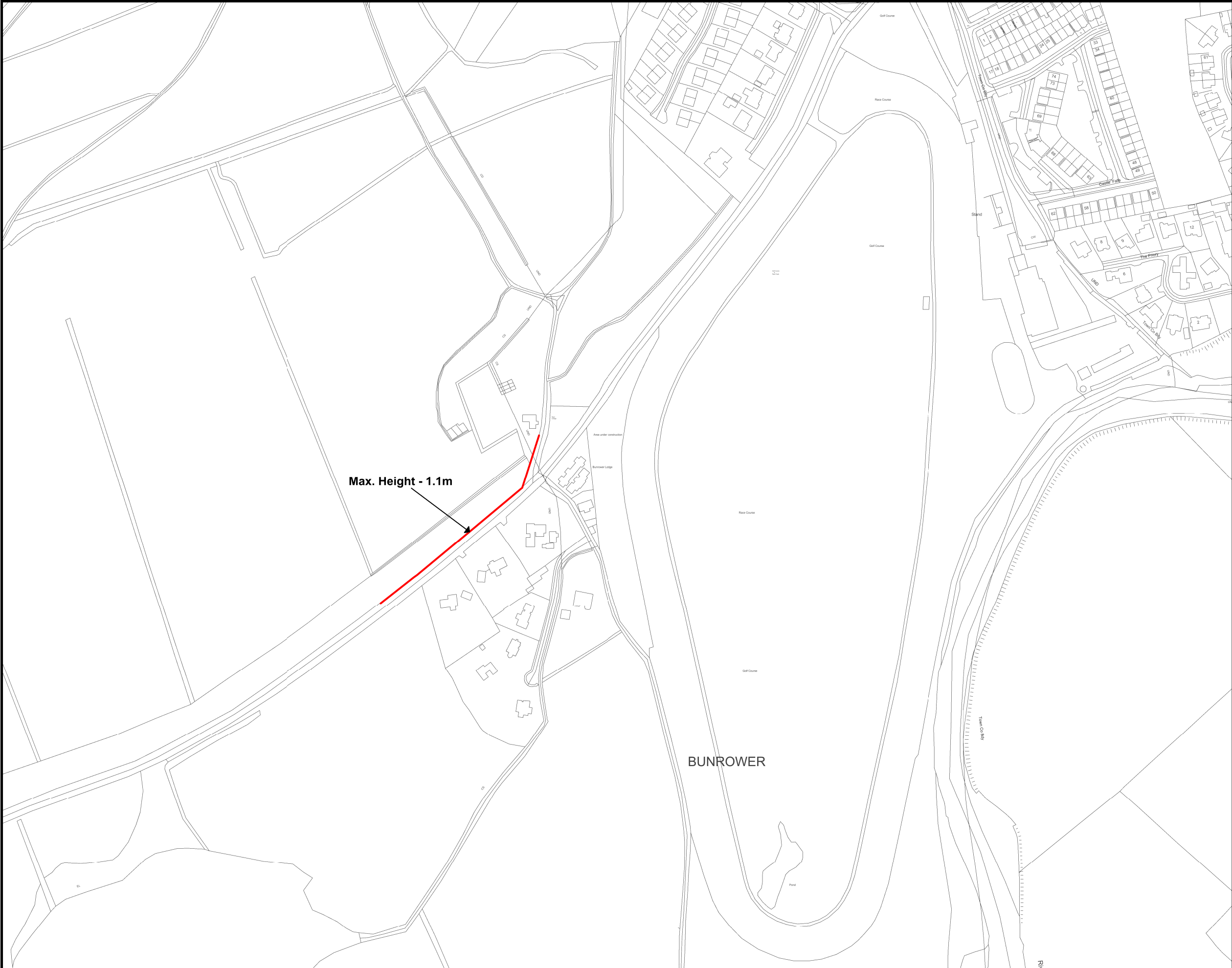
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Killarney - Emerging Preferred Option Fluvial Flood Defences	
Map Type:	Preliminary Options
Source:	Fluvial Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-KY-202-P2
Sheet:	2 of 4
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankments

Flood Resilience



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



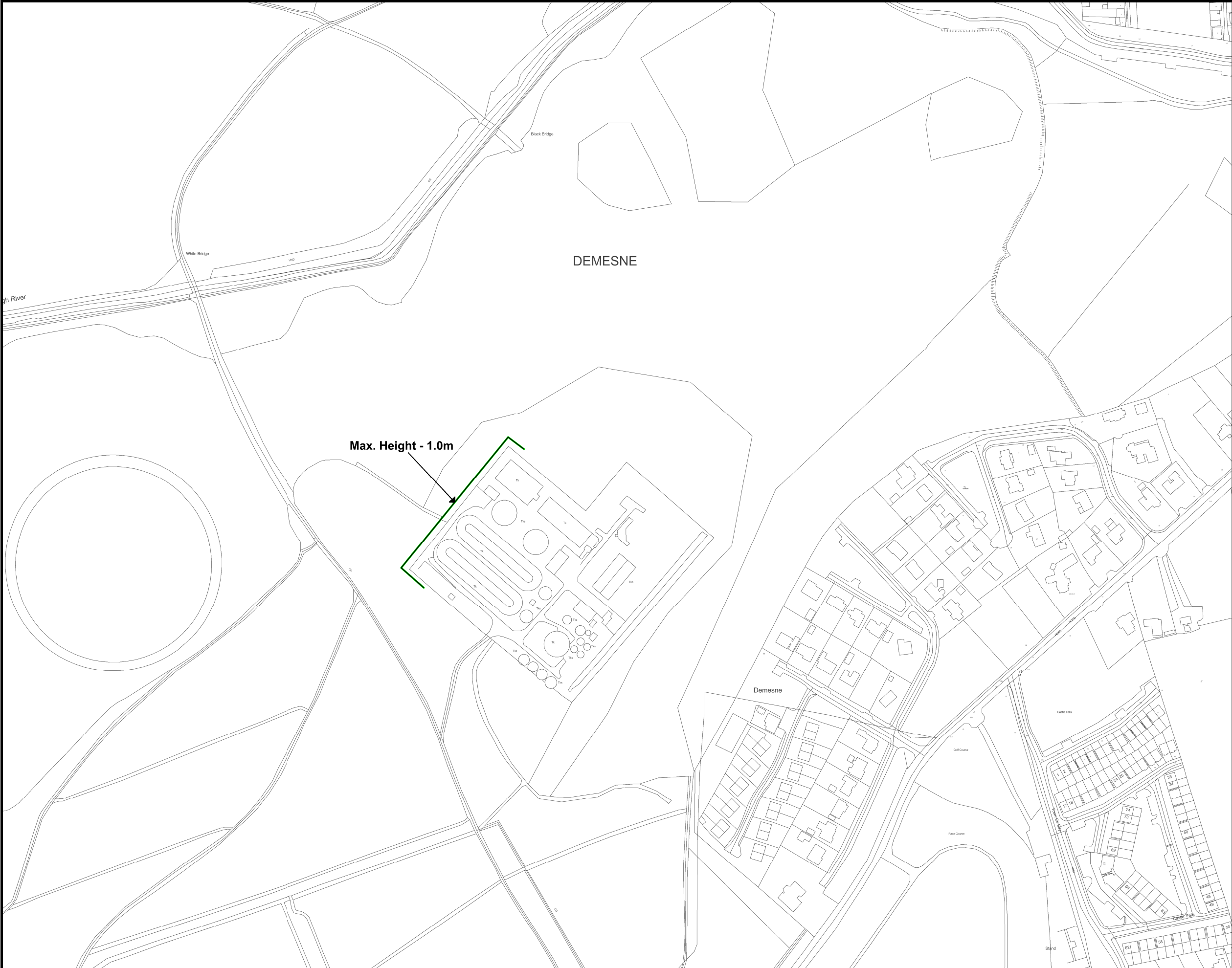
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Killarney - Emerging Preferred Option Fluvial Flood Defences	
Map Type:	Preliminary Options
Source:	Fluvial Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-KY-203-P2
Sheet:	3 of 4
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankments

Flood Resilience



Max. Height - 1.0m



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project :

South Western CFRAM Study

Map : Killarney - Emerging Preferred Option
Fluvial Flood Defences

Map Type: Preliminary Options

Source: Fluvial Flooding

Map Area: Urban Area

Scenario: Current

Drawn by: Tony Donovan

Checked by: Barry O'Connor

Approved by: Fintan McGivern

Map No.: MMD-296235-E-DR-22-KY-204-P2

Sheet: 4 of 4

Revision: P1

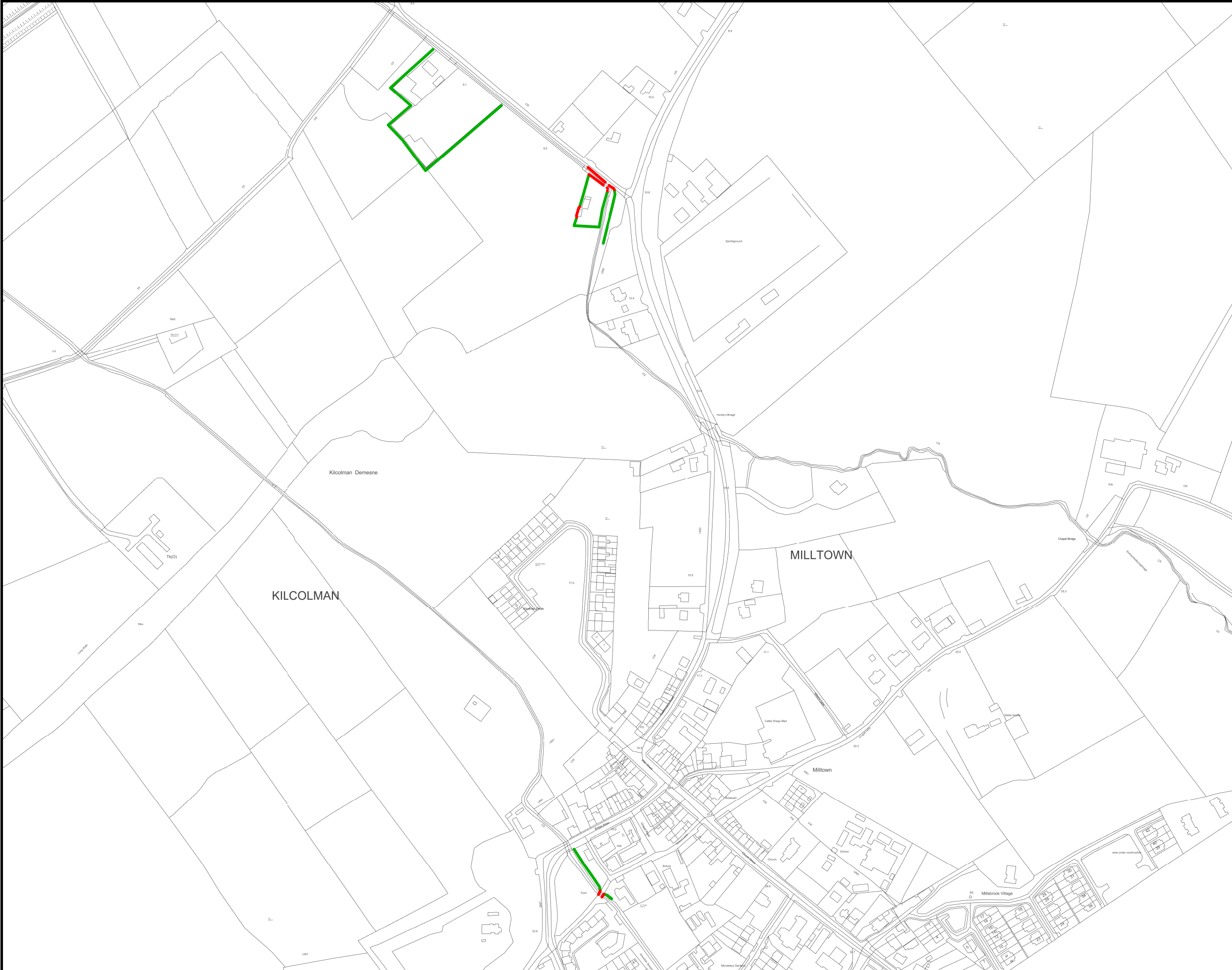
Drawing Scale: NTS

Plot Scale: 1:1 @ A3



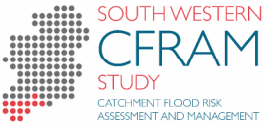
IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankments



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project :
South Western CFRAM Study

Map : **Milltown - Overview
Fluvial Flood Defences**

Map Type: Preliminary Options

Source: Fluvial Flooding

Map Area: Urban Area

Scenario: Current

Drawn by: Tony Donovan

Checked by: Barry O'Connor

Approved by: Fintan McGivern

Map No.: MMD-296235-E-DR-22-MN-201-P1

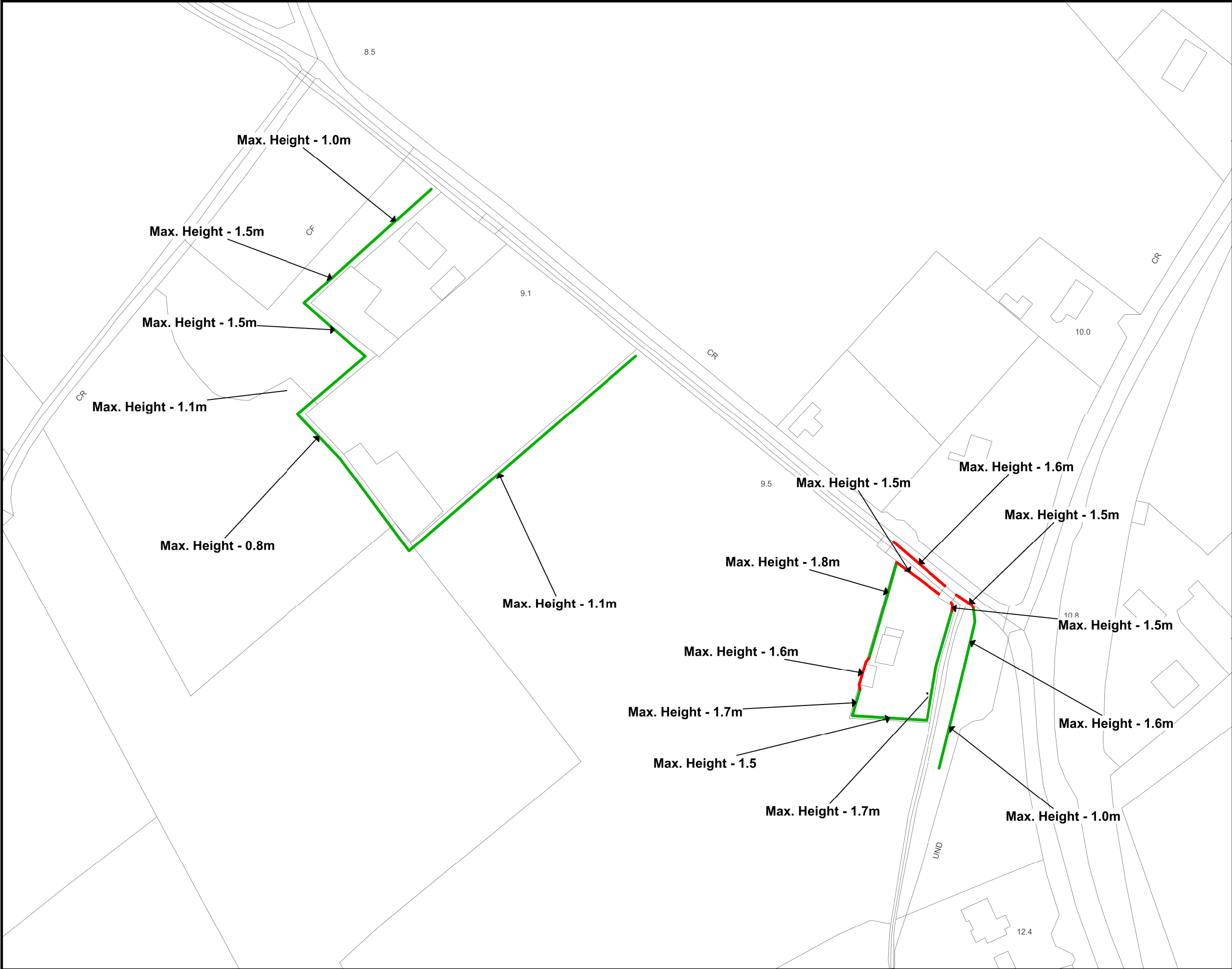
Sheet: 1 of 1 Revision: P1

Drawing Scale: NTS Plot Scale: 1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls

Flood Defence Embankments



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project :
South Western CFRAM Study

Map : **Milltown**
Fluvial Flood Defences

Map Type: Preliminary Options

Source: Fluvial Flooding

Map Area: Urban Area

Scenario: Current

Drawn by: Tony Donovan

Checked by: Barry O'Connor

Approved by: Fintan McGivern

Map No.: MMD-296235-E-DR-22-MN-202-P1

Sheet: 1 of 2

Revision: P1

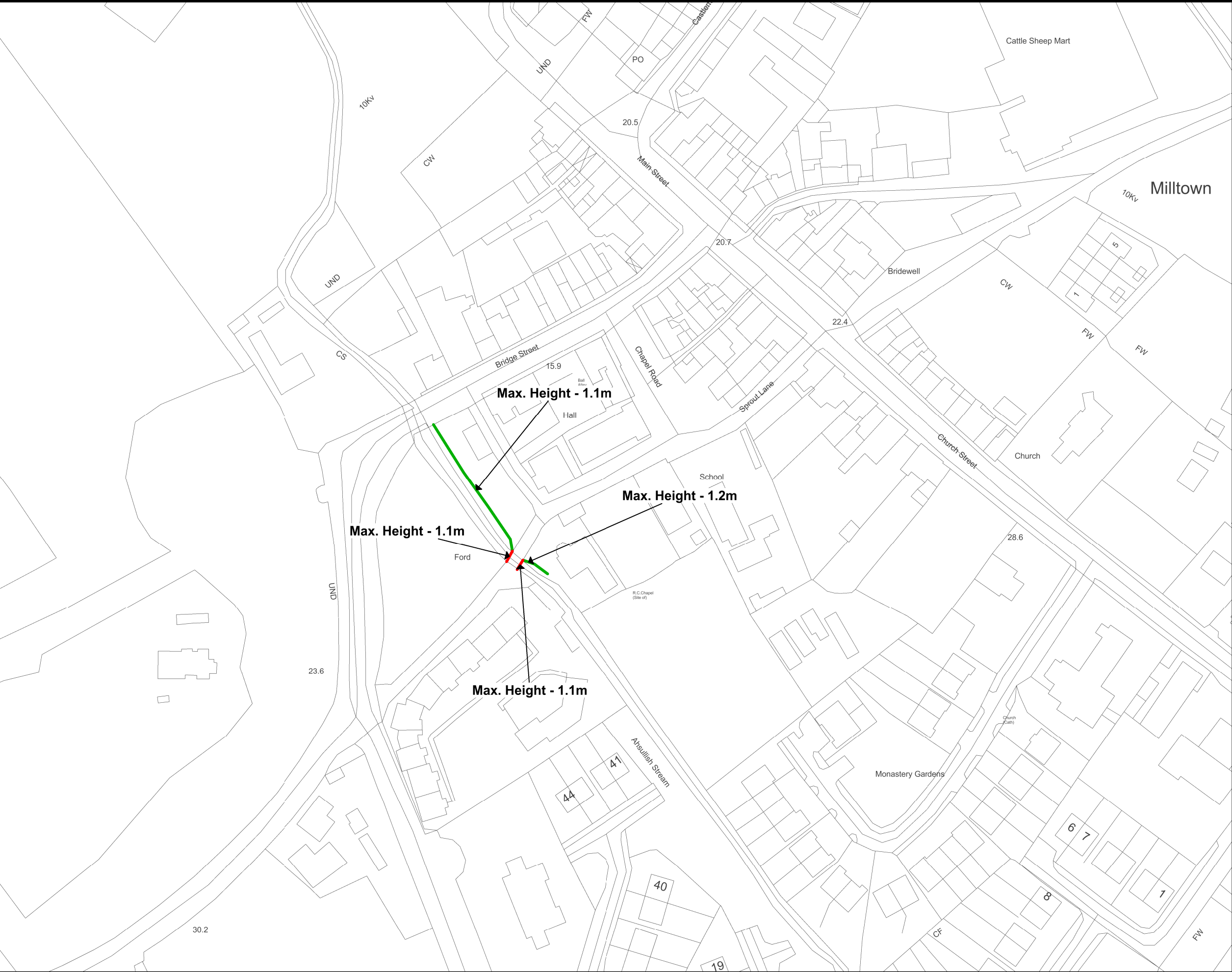
Drawing Scale: NTS

Plot Scale: 1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flood Defence Walls
Flood Defence Embankments



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



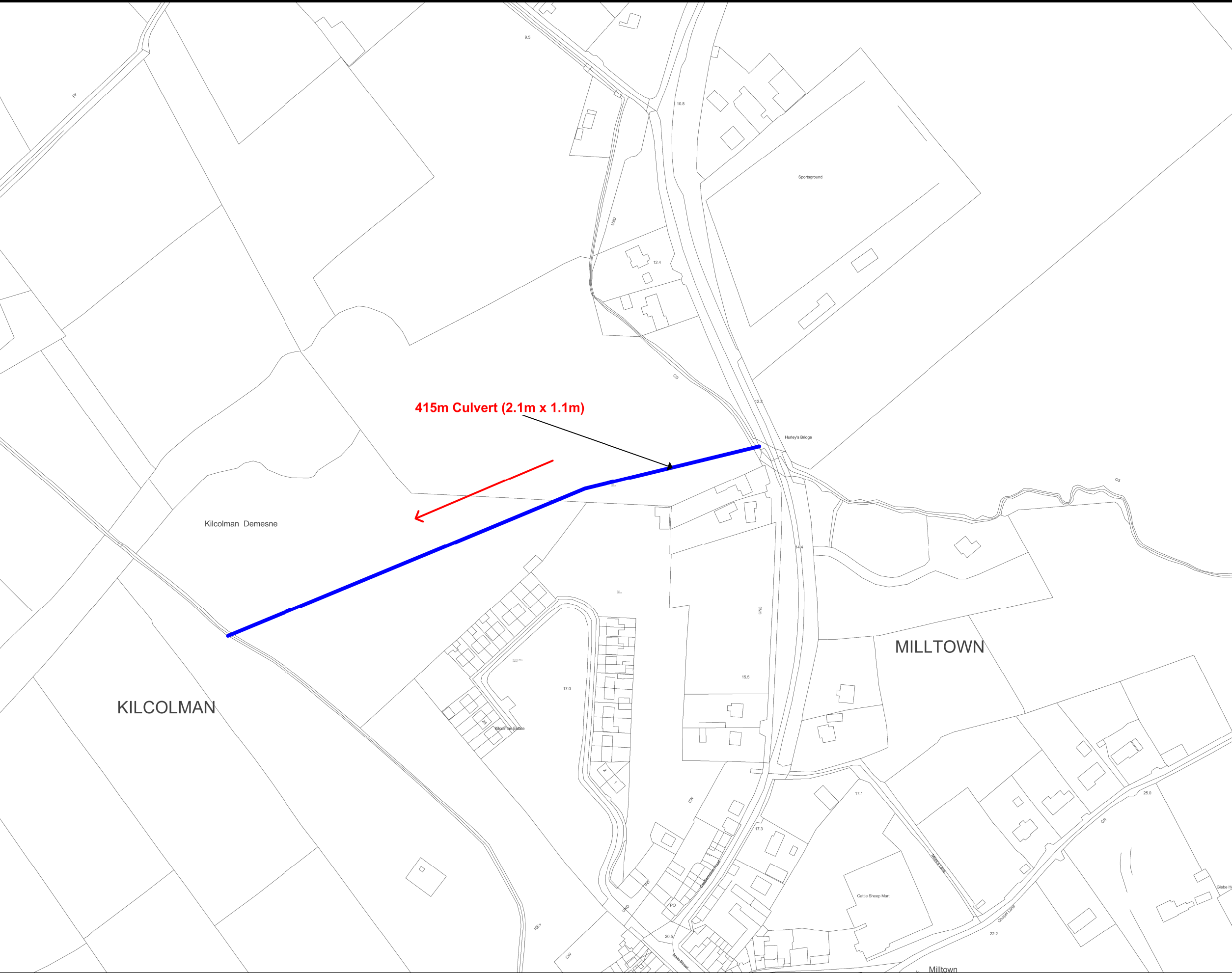
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Milltown Fluvial Flood Defences	
Map Type:	Preliminary Options
Source:	Fluvial Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-22-MN-203-P1
Sheet:	2 of 2
Drawing Scale:	NTS
Revision:	P1
Plot Scale:	1:1 @ A3

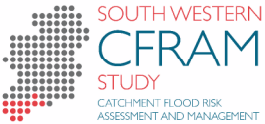


IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012



Flow Diversion



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



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project :
South Western CFRAM Study

Map : Milltown
Flow Diversion

Map Type: Preliminary Options

Source: Fluvial Flooding

Map Area: Urban Area

Scenario: Current

Drawn by: Tony Donovan

Checked by: Barry O'Connor

Approved by: Fintan McGivern

Map No.: MMD-296235-E-DR-22-MN-204-P1

Sheet: 1 of 1

Revision: P1

Drawing Scale: NTS

Plot Scale: 1:1 @ A3



IMPORTANT USER NOTICE: THE VIEWER OF THIS MAP SHOULD REFER TO THE
DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS
MAP.
THIS DRAFT MAP IS FOR CONSULTATION PURPOSES ONLY AND SHOULD NOT BE USED
FOR ANY OTHER PURPOSE.

©Ordnance Survey Ireland. All rights reserved. Licence No. EN002-1012