

South Western CFRAM Study

Screening for Appropriate Assessment: Munster
Blackwater Catchment (UoM 18)

August 2017

Office of Public Works

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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:

- i Identify areas of existing or foreseeable future potentially significant flood risk (referred to as Areas for Further Assessment - AFAs);
- i Prepare flood hazard and risk maps for the AFAs;
- i 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:

- 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). 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.

Munster Blackwater Catchment (UoM18)

The Munster Blackwater UoM covers an area of approximately 3,295 km². The large majority of the area is in North County Cork with parts in County Waterford but also includes small parts of Limerick, Kerry and Tipperary. The UoM has only a few kilometres of coastline at Youghal Bay. UoM 18 comprises three major river catchments: the Blackwater and its tributaries the Allow and the Bride.

The Munster Blackwater UoM contains nine Areas for Further Assessment (AFAs): Aglish, Ballyduff, Fermoy, Freemount, Kanturk, Mallow, Rathcormac, Tallow, Youghal.

Flood risk management options for the Munster Blackwater UoM were provisionally identified through options appraisal as:

AFA	Viable Options
Freemount	<ul style="list-style-type: none"> No measures are proposed.
Kanturk	<ul style="list-style-type: none"> Option 1 - Fluvial flood defence of the town using walls and embankments on the banks of the Rivers Dalua and Allow, ranging in height from 0.8m to 2.6m. Option 2 - Flood Storage on the Dalua River (330,000m² in area) combined with fluvial flood defence of the town using walls and embankments on the banks of the Rivers Dalua and Allow, ranging in height from 0.5m to 1.9m. Option 3 - Removal of the weirs at the Church Street Footbridge on the River Dalua combined with fluvial flood defence of the town using walls and embankments on the banks of the Rivers Dalua and Allow, ranging in height from 0.5m to 2.5m. Non-structural flood forecasting gauge within Allow River.
Mallow	<ul style="list-style-type: none"> There is an existing and functioning flood alleviation scheme in place for Mallow
Fermoy	<ul style="list-style-type: none"> There is an existing and functioning flood alleviation scheme in place for Fermoy
Ballyduff	<ul style="list-style-type: none"> Option 1 - Embankments of varying height (ranging between 1m and 2.5m) within the town in proximity to properties near the Blackwater River. A flood wall, 2m high, at the rear of the farm holding next to the church. Raising the roads north and south of the Ballyduff Bridge by between 1m and 1.5m.
Youghal	<ul style="list-style-type: none"> Option 1- Tidal flood defence of the town using low lying walls on the quays, ranging in height from 1.1m to 1.4m. Option 2 - Tidal Barrage (a) at the narrowest part of the estuary within the Blackwater River SAC. The barrage is approximately 715m in length. To maximise the potential storage area for fluvial flows the barrage will be closed at the low tide preceding a tidal event. The barrage will remain closed until the tide level outside is lower than the maximum water level within the barrage. Option 3- This option includes the construction of a tidal barrage (b) outside the SAC boundary. The barrage will be approximately 1.4km in length. To maximise the potential storage area for fluvial flows the barrage will be closed at the low tide preceding a tidal event. The barrage will remain closed until the tide level outside is lower than the maximum water level within the barrage.
Rathcormac	<ul style="list-style-type: none"> Option 1 - Storm attenuation of flood waters on the Kilbrien Stream through construction of a storage area of 23,270m². This work will involve stream realignment, construction of embankments to contain flood waters and installation of a sluice gate to control flow from the storage area.

AFA	Viable Options
	<ul style="list-style-type: none"> Option 2 - Divert flow from the Kilbrien stream to the Shanowen River through the construction of a 582m culvert (1200mm diameter pipe) north of the town. Option 3 - Flood Walls within the town along the Kilbrien stream to keep the flows in channel. Wall height ranges from 0.8m to 1.6m.
Tallow	<ul style="list-style-type: none"> No measures are proposed.
Aglish	<ul style="list-style-type: none"> Option 1- Fluvial flood defence of the town using walls and embankments along the Ballynaparka River, 1.1m in height.

Natura 2000 Sites

Flood risk management options in Kanturk are proposed for both the Dalua and Allow Rivers. These watercourses are tributaries of the Blackwater River and are within the Blackwater River SAC (002170).

Flood risk management options in Ballyduff are proposed for the Blackwater River within the boundaries of the Blackwater River SAC (002170) and the Blackwater Callows SPA (004094).

Flood risk management options in Rathcormac are proposed for the Kilbrien stream and the Shanowen River. These waterbodies are tributaries of the River Bride which is part of the Blackwater River SAC (002170). The Shanowen River flows into the River Bride approximately 500m downstream of Rathcormac town.

Flood risk management options in Aglish are proposed for the Aglish stream. The Aglish stream is a tributary of the Goish River which discharges into the Blackwater River SAC (002170).

Flood risk management options in Youghal are proposed for Youghal Estuary which is part of the Blackwater River SAC (002170) and downstream of the Blackwater Estuary SPA (004028).

Potential Impacts on Qualifying Features

Flood risk management options will involve the use of construction machinery and materials which can impact on protected species and habitats. Construction work can result in disturbance to protected species through the generation of noise, the use of flood lighting or lighting from construction plant, and the physical presence and movement of the plant and personnel. Machinery movement between sites can also result in the translocation of invasive species. Construction works can also result in the destruction of protected habitats whereby vegetation removal is required to allow access. The removal of river substrate can also result in the loss of important aquatic habitat for protected species or can result in the excavation of protected species from the watercourse. There is also potential for pollution of the environment through for example accidental spillages when laying foundations for demountable defences or from site drainage to a watercourse.

The construction activities for the tidal flood risk management measure have the potential to re-suspended sediments which could be transported outside the works area by tidal currents and subsequently settle out and impact on benthic habitats and species in other locations within the estuary. Tidal flood risk measures at Youghal include the construction of two variants of tidal barrage- tidal barrage option (a) occurs within the boundary of the Blackwater SAC, and tidal barrage option (b) occurs outside the SAC boundary.

The barrage could alter tidal regime landward of the barrage and could therefore alter habitat type and tidal range resulting in temporary influx of freshwaters. Changes in tidal inundation may result at Annex I habitats and at lands upstream of the barrage due to alteration of tidal inundation. These may include changes to the intertidal range of the estuary. A change in the influx of freshwater (i.e. when the barrage is closed freshwater will build up behind it) could alter in the nutrient loading and water salinity during the flood event. This in combination with changes in suspended sediments (caused by changes in tidal inundation when the barrage is in operation) may alter the biodiversity and species range for the *Salicornia* and other annuals colonising mudflats and sandflats. The closure of the barrage will result in the temporary impediment of migration and out migration of sea lamprey and salmon. This may impede the reproductive success of Freshwater Pearl Mussels upstream in the Blackwater River catchment.

Significance of Impacts

Significant impacts on the Natura 2000 network from flood risk management options in Rathcormac and Aglish were assessed as extremely unlikely.

Significant impacts on the Blackwater river SAC have been determined for flood risk management measures in the Youghal AFA, Kanturk AFA and Ballyduff AFA.

Screening Statement

This Screening for Appropriate Assessment was carried out in conjunction with the preliminary option appraisal process, (Document Ref: Preliminary Options Report for UoM 18). The option appraisal assessed each viable flood risk management option in terms of potential technical, social and environmental impacts. The option appraisal stage identified preferred options for each AFA in UoM18 as follows:

Table 1.1: Preferred Flood Risk Management for UoM18

AFA	Preferred Option
Ballyduff	Flood Defences
Kanturk	Storage and Flood Defences
Rathcormac	Flow Diversion
Aglish	Flood Defences
Youghal	Flood Defences

This screening for Appropriate Assessment has determined that there are no likely significant effects on the Natura 2000 Network from the implementation of flood risk management options in Rathcormac or Aglish, which includes the preferred flood risk management option.

The preferred flood risk management option for Youghal has been assessed as having no likely significant effects on the Natura 2000 Network, while the tidal barrage options (a) and (b) are assessed as having likely significant effects.

All options (including the preferred flood risk management options) for Kanturk and Ballyduff have been assessed as likely to have significant effects on the Natura 2000 Network, i.e. assessment of impacts of

flood risk management options in UoM 18 on Natura 2000 sites has determined that **significant effects are likely or uncertain** for the Blackwater River SAC and Blackwater Callow SPA and Blackwater Estuary SPA associated with the preferred flood risk management options for the Kanturk and Ballyduff AFA's.

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 achievement of environmental objectives laid down in Community legislation.

The programme for the delivery of flood risk management in Ireland comprised of 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 2017;
- i Flood Risk Management Plans were produced for each CFRAM study in 2017;
- i 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 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 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.

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.

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;

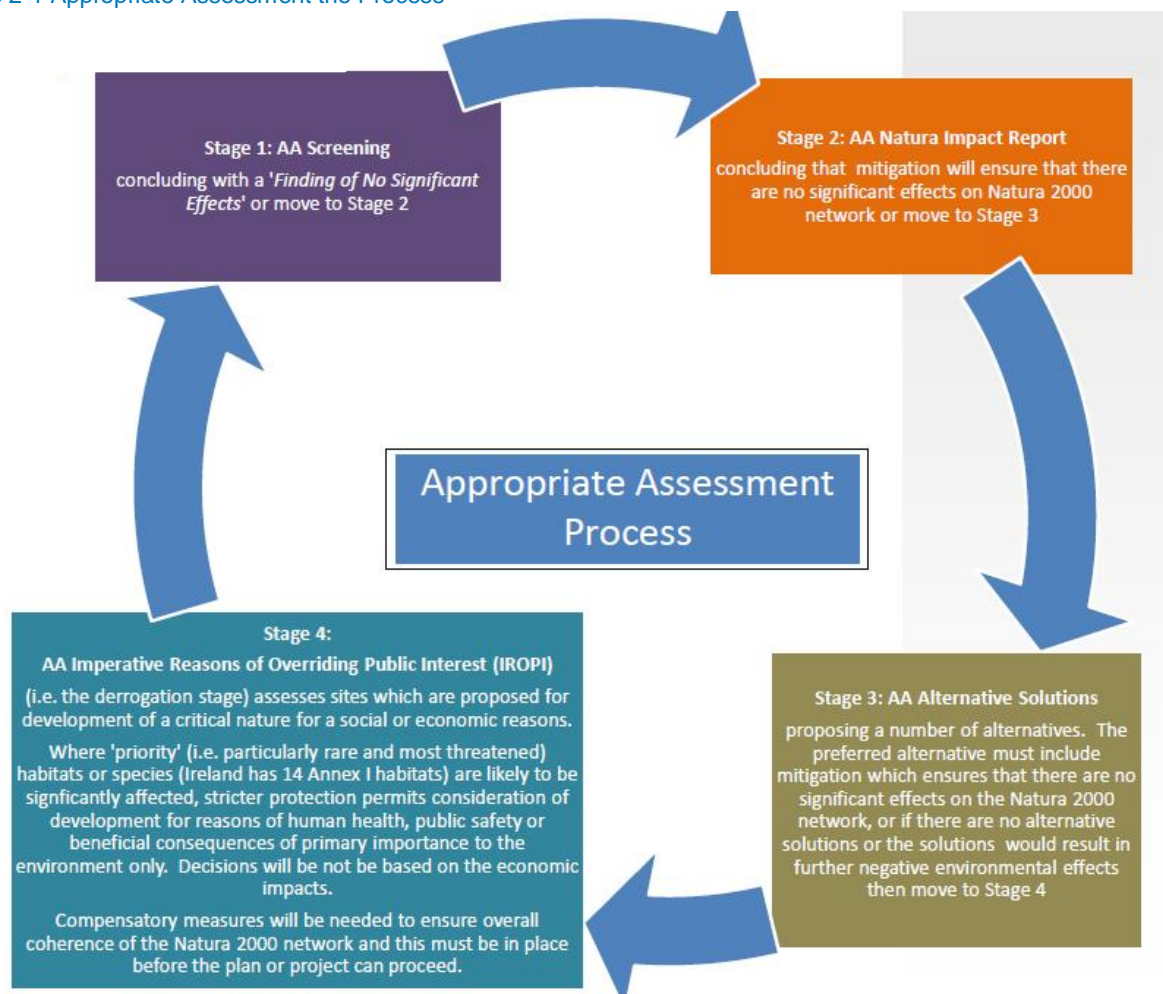
Stage 3 – Assessment of alternative solutions: The process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site (where mitigation cannot be achieved); and

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;

- | the areas likely to be significantly affected by the plan;
- | 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;
- | 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;
- | the likely significant effects on the Natura 2000 sites, such as impacts on biodiversity, fauna, flora, soil, water, etc.
- | the measures envisaged to mitigate against any significant adverse effects on the designated sites of implementing the plan; and
- | 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:

- | European Communities (Birds and Natural Habitats) Regulations 2011;
- | NPWS (2012) Marine Natura Impact Statements in Irish Special Areas of Conservation. A Working Document.
- | DEHLG (2009) Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities [revised, February 2010];
- | 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;
- | 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:

- | Conservation Status Assessment Reports⁴ (CSARs), Backing Documents and Maps prepared in accordance with Article 17 of the Habitats Directive;
- | Natura 2000 Site Synopsis, Data Forms and Conservation Objective Reports available from NPWS;
- | Published and unpublished NPWS reports on protected habitats and species including Irish Wildlife Manual reports, Species Action Plans and Conservation Management Plans;
- | 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

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 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/>

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 plans, the guidance recommends that a distance of 15km be considered. However, 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. Plans have the potential to impact on European sites beyond the confines of the individual sites themselves.

The Zone of Influence of a plan 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 plan. 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 was 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'.

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;

- | Any mitigation prescribed in the NIS should be specific and should be demonstrated to be achievable and effective;
- | Consideration should be given the construction impacts at Plan level;
- | Appropriate Assessment must be based on scientific evidence;
- | 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;
- | 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:

- i Minimise health and safety risk of flood risk management options;
- i Manage risk to agricultural land;
- i Minimise risk to social amenity;
- i Minimise the risk of environmental pollution;
- i 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.

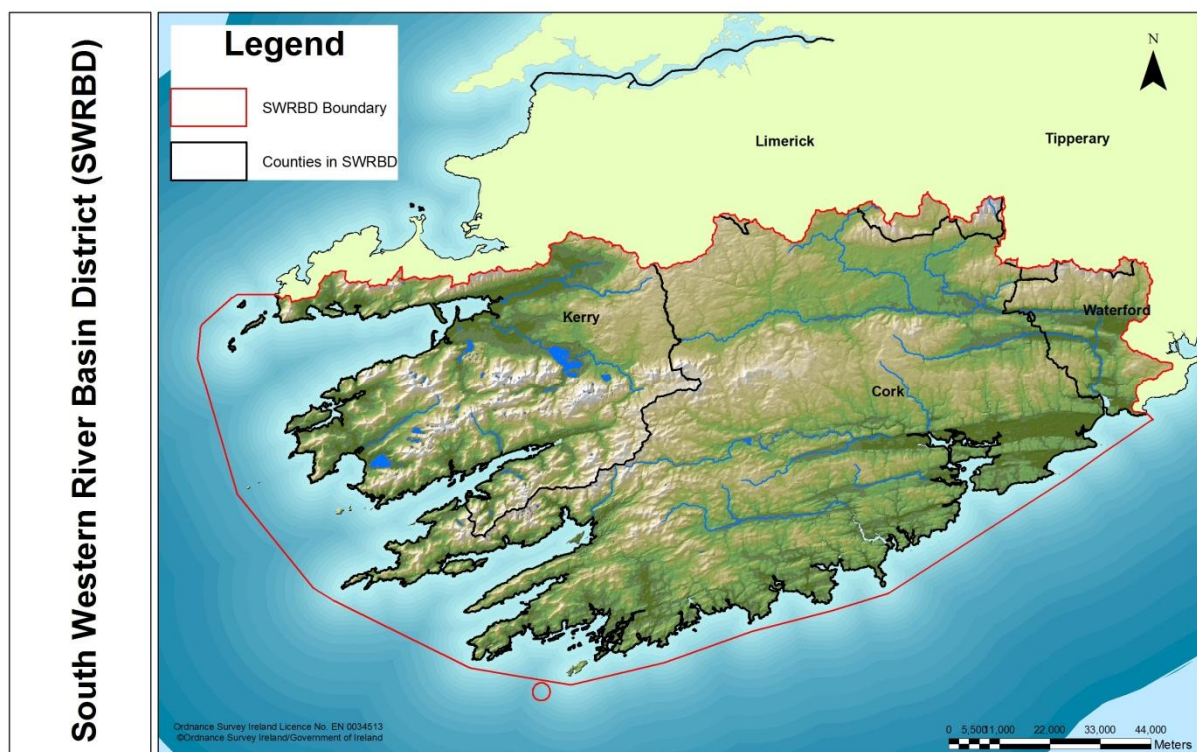
The Flood Risk Management Plans demonstrate the indicative costs and benefits of the preferred actions and measures, the robust reasoning for the identification of a measure as a preferred option and the priority each measure should be afforded. The plans also recommend a programme of work (including 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)



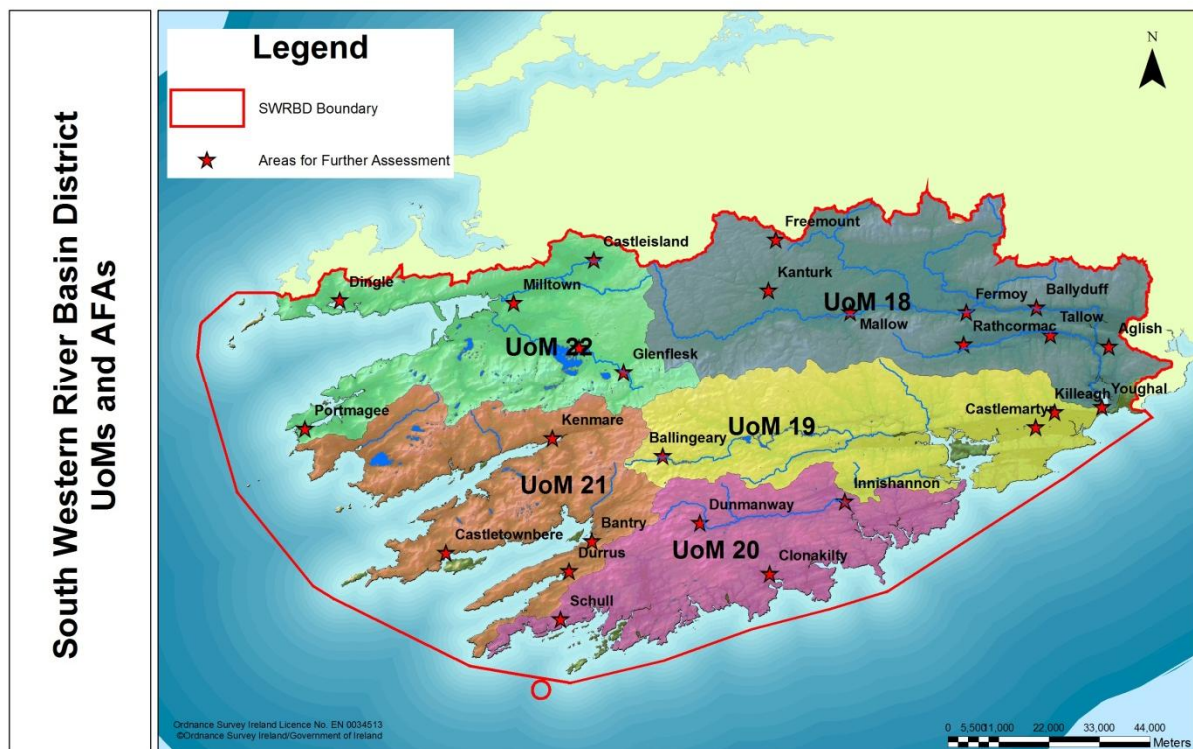
3.2.1 Units of Management in the SWRBD

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 in to 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:

- i Units of Management (UoM) – i.e. at river basin catchment level;

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 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 Munster Blackwater UoM 18

The Munster Blackwater UoM covers an area of approximately 3,295 km². The large majority of the area is in North County Cork with parts in County Waterford but also includes small parts of Limerick, Kerry and Tipperary. The UoM has only a few kilometres of coastline at Youghal Bay. UoM 18 comprises three major river catchments: the Blackwater and its tributaries the Allow and the Bride (refer to Figure 3-3).

Blackwater River Catchment

The River Blackwater rises near Glenatipple flowing southwards to Rathmore, before flowing eastwards to Banteer where it is joined by the River Allow from the north. The River Blackwater continues eastwards where it is joined by the Glen River from the south and Awbeg Minor from the north before flowing into Mallow. Within Mallow, there is an existing flood defence scheme that protects the town (completed between 2005 and 2012). There are a number of smaller urbanised tributaries that join with the River Blackwater in Mallow. The most significant of these are the Clyda River which joins from the south upstream of Quartertown and Spa Glen which joins from the north at Mallow Bridge.

The River Blackwater continues to flow east downstream of Mallow towards Killavullen some 10km downstream before being joined by the Awbeg Major from the north downstream of Castletownroche and flowing eastwards into Fermoy (the Fermoy flood defence scheme was completed in 2008). The River Blackwater is then joined by the River Funshion and Araglin River from the north, 2km and 2.7km downstream of Fermoy.

The gradient of the River Blackwater continues to reduce as it flows eastwards through Ballyduff to Lismore. Downstream of Lismore, the River Blackwater is considered fully tidal. The river channel continues eastwards for another 6km before turning to flow southwards at the confluence with the Glenshealan River. The River Blackwater flows southwards through Villerstown Gap before being joined by the River Bride from the west and River Licky from the east. The River Blackwater then continues to flow southwards to outfall into the Celtic Sea at Youghal.

The town of Aglish is situated in a minor sub-catchment of the lower Blackwater on the Ballynaparka River. The Ballynaparka River rises 2km upstream of the town flowing north-west along the main street through Aglish before joining with the tributary immediately downstream of Ballynaparka Bridge. Downstream of the confluence, the river flows west through Bleach to join the tidal Goish River and the river Blackwater 1km further downstream.

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.

Allow River Catchment:

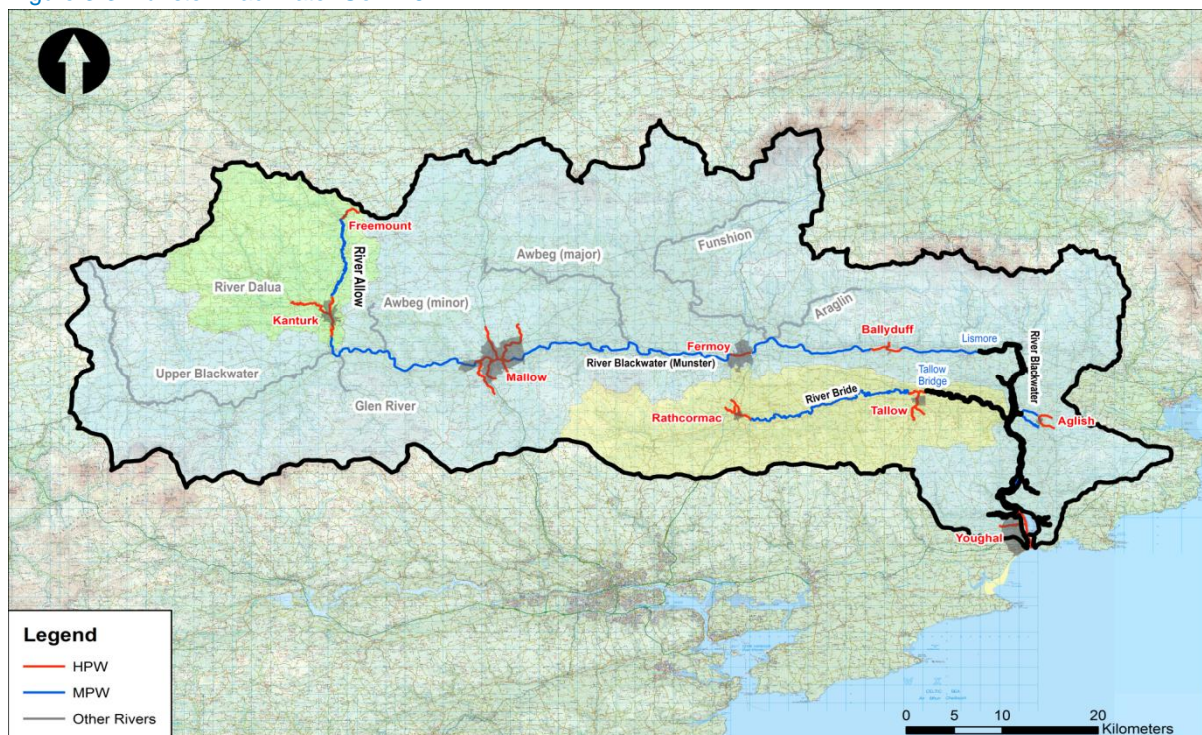
The Allow sub-catchment comprises of 25km of the River Allow from Freemount to its confluence with the River Blackwater near Banteer. The River Allow/Glashawee River rises near the Mullaghereirk Mountains and flows in a south-easterly direction towards Freemount where is joined by the Freemount Stream at Allow Bridge. The River Allow then flows southwards towards Kanturk where is joined by the similarly sized River Dalua immediately downstream of Greenane Bridge in the town. The Allow continues to flow southwards where is joined by minor tributaries such as the Brogeen Stream before it flows through Riverview gauge to its confluence with the Blackwater at Leaders Bridge.

Bride River Catchment:

The River Bride rises from the Nagles Mountains and flows eastwards under the N8 road to Rathcormac, where it is joined by the Shanowen River from Rathcormac and the River Flesk from the south.

The River Bride continues to meander eastwards where it is joined by a number of smaller tributaries before reaching Mogeely. Downstream of Mogeely, the Bride continues east towards Tallow Bridge where it becomes fully tidal, before joining the River Blackwater some 12km downstream. The Glenaboy River flows from the south through Tallow before joining the River Bride upstream of Tallow Bridge.

Figure 3-3 Munster Blackwater UoM 18



3.4.1 Areas for Further Assessment in UoM 18

The Munster Blackwater UoM contains nine Areas for Further Assessment (AFAs). There is 80km of high priority watercourse and 158km of medium priority watercourse Associated with the AFA's.

Table 3.2: List of AFAs in the Munster Blackwater UoM

AFA Name	Unique ID	Fluvial Flooding	Coastal Flooding	County	Easting	Northing
Aglish	180247	Yes	No	Waterford	212250	91500
Ballyduff	180248	Yes	No	Waterford	196500	99500
Fermoy	180252	Yes	No	Cork	182750	99500
Freemount	180253	Yes	No	Cork	139500	114250
Kanturk	180254	Yes	No	Cork	138250	102750
Mallow	180262	Yes	No	Cork	155250	98500
Rathcormac	180265	Yes	No	Cork	181750	91000
Tallow	180266	Yes	No	Waterford	199750	93750
Youghal	180267	Yes	Yes	Cork	210250	78750

3.5 Flood Risk Management Options for the Munster Blackwater UoM

Flood risk management options for the Munster Blackwater 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 18 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 Kanturk, Ballyduff and Youghal AFAs. The infrastructure required for flood forecasting in these AFAs are listed in Table 3.3.

Table 3.3: Flood Forecasting Infrastructure required

AFA	Infrastructure
Kanturk	River Level Gauges
	Rain Gauges
	Hydraulic flood forecasting model
	Flood warning system
Ballyduff	Add to Fermoy flood warning system
Youghal	Existing tidal flood forecasting system

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:

- i Hazard Identification
- i Mitigation
- i Preparedness
- i Response

i 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 Munster Blackwater UoM are shown in Table 3.4. Options are presented in terms of the viable options considered for each AFA. Drawings showing the viable flood risk management options are included in Appendix A. 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 18

AFA	Viable Options
Freemount	<ul style="list-style-type: none"> No measures are proposed.
Kanturk	<ul style="list-style-type: none"> Option 1 - Fluvial flood defence of the town using walls and embankments on the banks of the Rivers Dalua and Allow, ranging in height from 0.8m to 2.6m. Option 2 - Flood Storage on the Dalua River (330,000m² in area) combined with fluvial flood defence of the town using walls and embankments on the banks of the Rivers Dalua and Allow, ranging in height from 0.5m to 1.9m. Option 3 - Removal of the weirs at the Church Street Footbridge on the River Dalua combined with fluvial flood defence of the town using walls and embankments on the banks of the Rivers Dalua and Allow, ranging in height from 0.5m to 2.5m. Non-structural flood forecasting gauge within Allow River.
Mallow	<ul style="list-style-type: none"> There is an existing and functioning flood alleviation scheme in place for Mallow
Fermoy	<ul style="list-style-type: none"> There is an existing and functioning flood alleviation scheme in place for Fermoy
Ballyduff	<ul style="list-style-type: none"> Option 1 - Embankments of varying height (ranging between 1m and 2.5m) within the town in proximity to properties near the Blackwater River. A flood wall, 2m high, at the rear of the farm holding next to the church. Raising the roads north and south of the Ballyduff Bridge by between 1m and 1.5m.
Youghal	<ul style="list-style-type: none"> Option 1- Tidal flood defence of the town using low lying walls on the quays, ranging in height from 1.1m to 1.4m.

AFA	Viable Options
	<ul style="list-style-type: none"> Option 2 - Tidal Barrage (a) at the narrowest part of the estuary within the Blackwater River SAC. The barrage is approximately 715m in length. To maximise the potential storage area for fluvial flows the barrage will be closed at the low tide preceding a tidal event. The barrage will remain closed until the tide level outside is lower than the maximum water level within the barrage. Option 3- This option includes the construction of a tidal barrage (b) outside the SAC boundary. The barrage will be approximately 1.4km in length. To maximise the potential storage area for fluvial flows the barrage will be closed at the low tide preceding a tidal event. The barrage will remain closed until the tide level outside is lower than the maximum water level within the barrage.
Rathcormac	<ul style="list-style-type: none"> Option 1 - Storm attenuation of flood waters on the Kilbrien Stream through construction of a storage area of 23,270m². This work will involve stream realignment, construction of embankments to contain flood waters and installation of a sluice gate to control flow from the storage area. Option 2 - Divert flow from the Kilbrien stream to the Shanowen River through the construction of a 582m culvert (1200mm diameter pipe) north of the town. Option 3 - Flood Walls within the town along the Kilbrien stream to keep the flows in channel. Wall height ranges from 0.8m to 1.6m.
Tallow	<ul style="list-style-type: none"> No measures are proposed.
Aglish	<ul style="list-style-type: none"> Option 1- Fluvial flood defence of the town using walls and embankments along the Ballynaparka River, 1.1m in height.

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 18 are characterised hereunder.

3.6.1 Potential Impacts of Non-Structural Options in UoM 18

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 Increased 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 18

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

It should be noted that all of the options will have the effect of reducing the flood extents. Certain habitats have a dependence on flooding e.g. alluvial woodlands, a priority habitat protected under the Habitats Directive. Alteration of flood regime can negatively impact the distribution of flood dependent habitats and species.

Also, all options will involve the use of machinery which is a potential source of environmental pollution through oil and fuel leaks.

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:

- i Kanturk (on the Dalua River), comprising an area of 330,000m² within agricultural lands; and
- i Rathcormac (on the Kilbrien Stream), comprising an area of 23,270m² within agricultural lands.

Construction of the flood storage areas in Kanturk and Rathcormac 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 Dalua River and the Kilbrien Stream. Sediment deposition in a watercourse can cause a temporary to short term reduction the quality of fishery habitat by infilling interstitial spaces in gravel beds. 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 Dust deposition in proximity to the works due to wind blow from the earth used in embankment construction. Dust deposition on the foliage of protected flora or habitats can inhibit effective photosynthesis and transpiration. Dust deposition within a watercourse or on soil can affect the chemical composition and therefore potentially the ecology of the habitat.
- i Permanent fragmentation of linear riparian features by construction of very large embankments (e.g. 8m embankment in Kanturk) which may deter commuting protected species from using an area;
- i Temporary disturbance of species protected under Annex II of the Habitats Directive by noise and physical presence on site;
- 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 river bed and river bank within the footprint of the control structure;
- i Damage to river bed and bank due to machinery movement in-stream;
- i Release of sediment in to the watercourse during installation caused by disturbance to river bed and banks (sedimentation effects are discussed in relation to the embankments above);
- i Obstruction to fish / lamprey passage within the river channel when the control structure is restricting flows;
- i Isolation of fish / lamprey within the flooded storage area in the event that flood waters subside rapidly;
- i Creation of temporary wetland habitat within the storage area during flooding;

The Kilbrien Stream will need to be realigned to facilitate the construction of the storage area in Rathcormac. Stream realignment can impair the biological function of the waterbody through:

- i permanent loss of fishery habitat within the diverted section of the watercourse;
- i temporary release of sediment to the watercourse during construction;
- i impairment to fish passage during construction.

Conveyance Measures

Conveyance Measures involve the physical alteration of a river channel or floodplain to improve flood flow throughput. Examples of conveyance measures include:

- i Reduction of hydraulic resistance to flow through improvement works to structures in the river channel (including replacement or removal of bridges / weirs / culvert), and clearance of debris from the channel.
- i Increase in the river's cross-sectional area through, for example, channel regrading (by excavating some material from the river bed).

Conveyance measures have been identified as a viable option for Kanturk. Removal of the weirs at the Church Street Footbridge on the River Dalua will result in a reduction in flood extent within the town by facilitating better throughput of water within the river. Potential environmental effects of removing the weir on the Dalua River include:

- i Resuspension of silt which has built up behind the weirs. If weir removal was to take place during migration / spawning season for lamprey / fish, release of sediment in to the watercourse would act as a barrier to migration. Also, deposition in downstream spawning areas could inhibit spawning with subsequent effects on population dynamics;
- i The silt which has built up behind the weirs may be suitable habitat for juvenile lamprey. Resuspension of this silty material could result in a permanent loss of suitable juvenile lamprey habitat;
- i Bank erosion / slippage upstream of the weirs is likely as the removal of flow control will alter river hydrology upstream. This will stabilise over time.

- i The weirs are a potential barrier to fish / lamprey migration. Removal of the weirs is likely to positively impact fishery populations in the Dalua River in the long term by permitting access to upstream habitats.

Flow Diversion

Flow diversion involves the interception of flood flows within a watercourse and diverting these flows through an artificial channel 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 for the Kilbrien stream in Rathcormac. Flood flows are proposed to be diverted from the stream into the Shanowen River via a 582m culvert (1200mm diameter pipe) through agricultural lands north of the town. Potential environmental effects of flow diversion from the Kilbrien Stream to the Shanowen River include:

- i Increased flow volume and velocity in the Shanowen River during storm events. This can cause bankside erosion and associated loss of habitat (note the river has been assessed as having the capacity to physically accommodate the increased volume without overtopping its banks);
- i Scouring of the bed of the Shanowen River at the culvert discharge point resulting in possible loss of fishery habitat and sedimentation of the watercourse;
- i Attraction of fish into the culvert and ultimately into the Kilbrien stream when the culvert is in operation. The Kilbrien stream is of lower value in terms of the availability of suitable fishery habitat than the Shanowen River. This could influence fish / lamprey populations in the Shanowen River;

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 Rathcormac, Ballyduff, Kanturk, Aglish and Youghal. The physical implementation of these structural measures can have the following impacts on protected habitats and species:

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

Tidal Barrage

A tidal barrage is a viable option for Youghal. The barrage will be a solid structure with a gate / sluice system approximately 50m wide to allow tidal conditions to operate as normal except in times of tidal flooding where the sluice gate would close and the barrage would become impermeable. The barrage will be closed at low tide preceding a tidal event. This will facilitate adequate storage for fluvial flows from the River Blackwater.

The barrage should remain closed for approx. 7 hours. Allowing for the 50% AEP fluvial event ($543.6\text{m}^3/\text{s}$) to coincide with the 0.5% AEP tidal event, the tidal barrage must be able to store approx. 13.5Mm^3 of fluvial flow. Based on the average depth of available storage of 2.49m, the tidal barrage should have an inside area of approx. $5,497,078.65\text{m}^2$ and a minimum barrage height of 3.63m. Potential impacts of constructing a barrage in Youghal Estuary include:

- i Damage to Annex I habitat within the footprint of the barrage;
- i Alteration of tidal inundation within the barrage during flooding (because barrage is closed) and change in salinity due to stronger fluvial influence when barrage is closed;
- i Restriction of fish movement during barrage closure;
- i Disturbance of estuary bed causing sediment plumes during construction;
- i Noise impacts during construction.

4 Characteristics of Natura 2000 Sites

4.1 Natura 2000 Sites within the Zone of Impact

Viable flood risk management options have been determined for the AFAs of Kanturk, Ballyduff, Rathcormac, Aglish and Youghal. Natura sites which are located within 15km of UoM 18, 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. The locations of these areas in relation to the Natura Sites is illustrated in Figures 4.1-4.5.

Table 4.1: Natura Sites Within 15km of UoM 18 AFAs

Natura 2000 site	Distance from proposed works (km)	Source-Pathway-Receptor Identification
Special Areas of Conservation (SAC)		
Blackwater River (Cork/Waterford) SAC (002170)	0.0km	<p>Flood risk management options in Ballyduff are proposed for the Blackwater River within the boundaries of the Blackwater River SAC (002170)</p> <p>Tidal flood risk management options in Youghal are proposed for the Youghal Estuary. The estuary at Youghal is part of the Blackwater River SAC (002170)</p> <p>Flood risk management options in Rathcormac are proposed for the Kilbrien stream and the Shanowen River. These waterbodies are tributaries of the River Bride which is part of the Blackwater River SAC (002170). The Shanowen River flows into the River Bride approximately 500m downstream of Rathcormac town.</p> <p>Flood risk management options in Kanturk are proposed for both the Dalua and Allow Rivers. These watercourses are tributaries of the Blackwater River</p> <p>Flood risk management option in Aglish is proposed for the Ballynaparka River. This watercourse is a tributary of the River Blackwater.</p>
Ballymacoda (Clonpriest And Pillmore) SAC (000077)	2.6km	No viable source pathway receptor identified
Ardmore Head SAC (002123)	8.3km	No viable source pathway receptor identified
Great Island Channel SAC (001058)	12.0km	No viable source pathway receptor identified
Lower River Suir SAC (002137)	12.9km	No viable source pathway receptor identified
Lower River Shannon SAC (002165)	14.8km	No viable source pathway receptor identified
Special Protection Areas (SPA)		
Blackwater Estuary SPA (004028)	0.0km	Tidal flood risk management options in Youghal are proposed for the Youghal Estuary. The estuary at Youghal is downstream of the Blackwater Estuary SPA (004028)
Blackwater Callows SPA (004098)	0.0km	Flood risk management options in Ballyduff are proposed for the Blackwater River within

Natura 2000 site	Distance from proposed works (km)	Source-Pathway-Receptor Identification
		the boundaries of the Blackwater Callows SPA (004094).
Ballymacoda Bay SPA (004023)	1.3km	No viable source pathway receptor identified
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)	8.4km	No viable source pathway receptor identified
Kilcolman Bog SPA (004095)	9.5km	No viable source pathway receptor identified
Helvick Head to Ballyquin SPA (004192)	10.7km	No viable source pathway receptor identified
Dungarvan Harbour SPA (004032)	10.8km	No viable source pathway receptor identified
Cork Harbour SPA (004030)	12.0km	No viable source pathway receptor identified
Ballycotton Bay SPA (004022)	14km	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 the Blackwater River SAC and the Blackwater Callows SPA and Blackwater Estuary SPA.

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

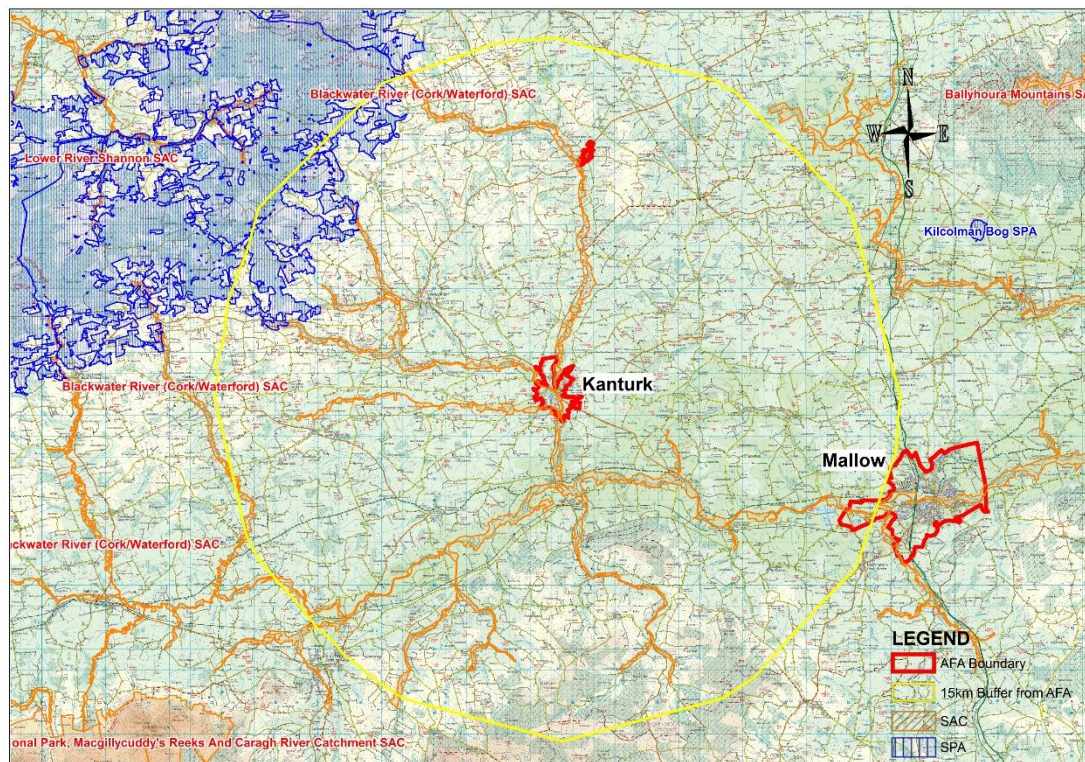


Figure 4.2: Ballyduff AFA Boundary in Relation to EU (Natura 2000) Sites



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

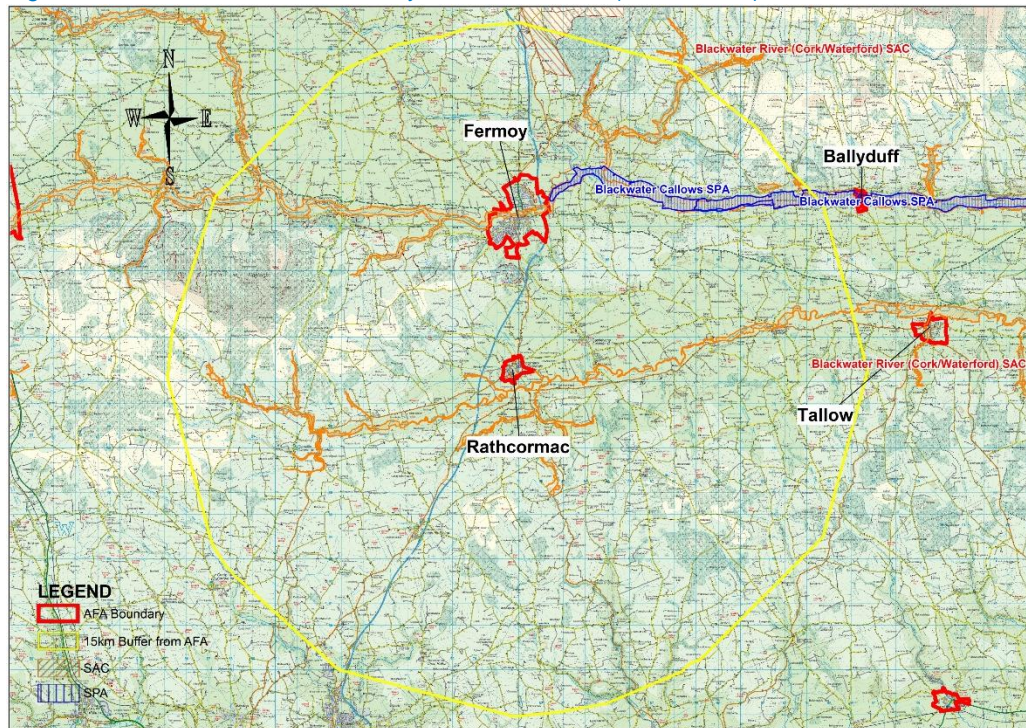


Figure 4.4: Aglish AFA Boundary in Relation to EU (Natura 2000) Sites

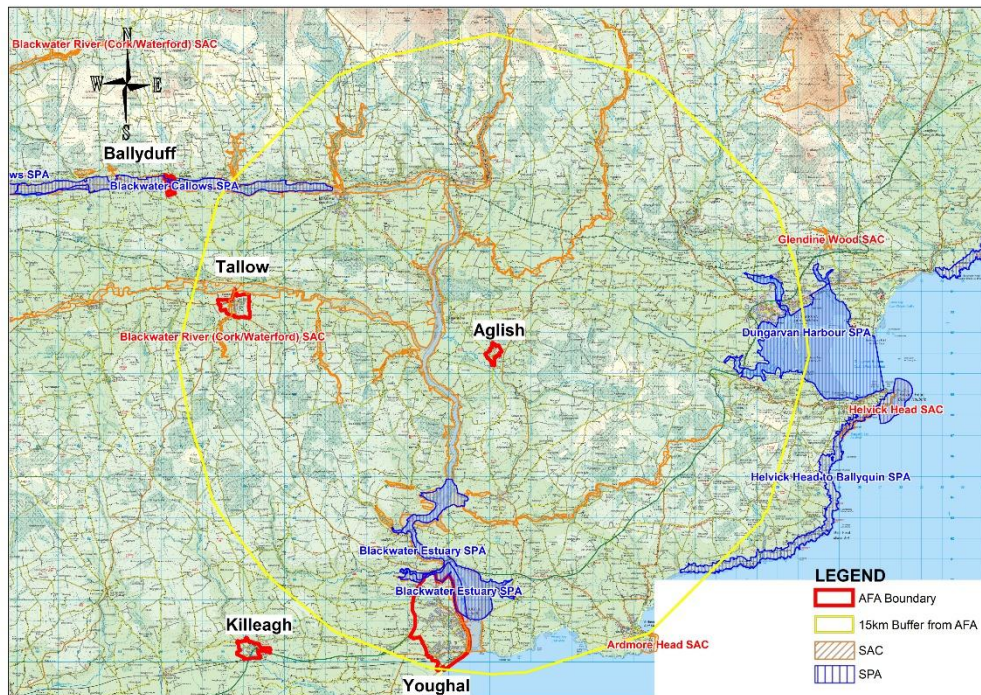
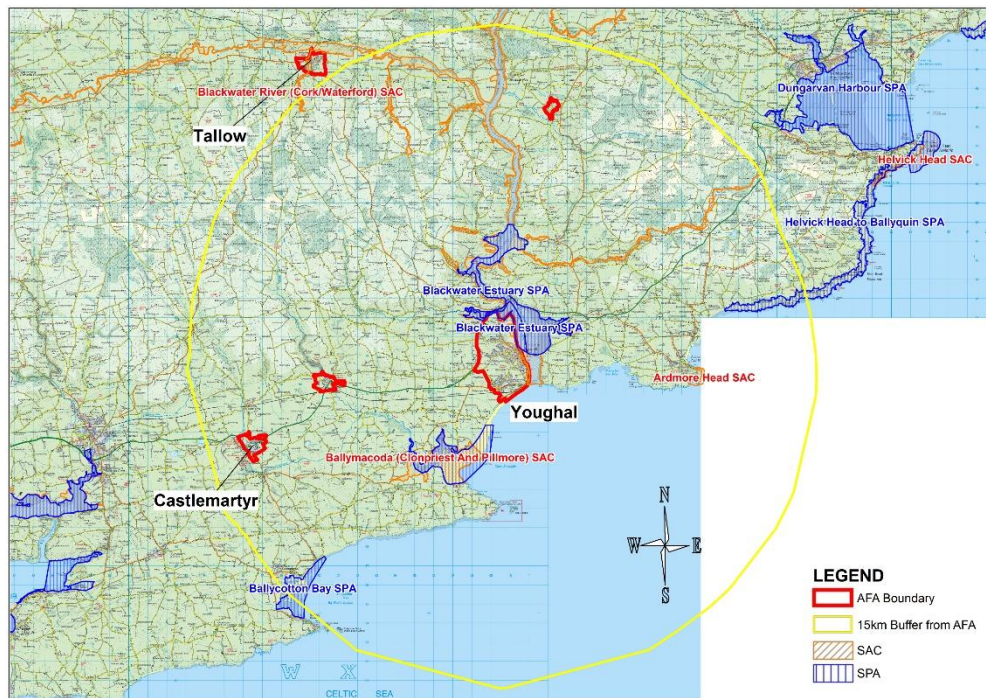


Figure 4.5: Youghal AFA Boundary in Relation to EU (Natura 2000) Sites



The Blackwater River SAC

The River Blackwater is one of the largest rivers in Ireland, draining a major part of Co. Cork and parts of Counties Kerry, Limerick, Tipperary and Waterford. The site consists of most of the freshwater stretches of the system as well as the estuarine component at Youghal.

- i Annex I habitats occurring within the site include estuaries, intertidal mudflats and sandflats, perennial vegetation of stony banks, salt meadows, floating river vegetation, alluvial forests, yew woodland and oak woodlands.
- i Aquatic species include: lamprey (*Lampetra planeri*, *L. fluviatilis*, *Petromyzon marinus*) twaite shad (*Alosa fallax fallax*), and Atlantic salmon (*Salmo salar*). Substantial populations of freshwater pearl mussel (*Margaritifera margaritifera*) occur. White-clawed crayfish (*Austropotamobius pallipes*) are confined to the Awbeg River.
- i Otter (*Lutra lutra*) is widespread throughout the SAC.
- i Killarney fern (*Trichomanes speciosum*) occurs near Lismore.

The Blackwater Callows SPA

The site comprises a 23 km stretch of the River Blackwater, running in a west to east direction between Fermoy and Lismore. It includes the river channel and strips of seasonally flooded grassland within the flood plain.

The site is of high importance for wintering waterfowl. It supports an internationally important population of whooper swan (*Cygnus Cygnus*) and nationally important populations of wigeon (*Anas Penelope*), teal (*Anas crecca*) and black-tailed godwit (*Limosa limosa*). The population of black-tailed godwit has exceeded the threshold for international importance at times. Little Egret (*Egretta garzetta*) also uses the site.

The Blackwater Estuary SPA

The Blackwater Estuary SPA is a relatively small, sheltered south-facing estuary, which extends from below Youghal Bridge to the Ferry Point peninsula. It comprises a section of the main channel of the River Blackwater. At low tide, intertidal flats are exposed. The intertidal sediments are mostly muds or sandy muds. Salt marshes occur along the sheltered inlets. A low-lying field which provides an important roost is included. The Blackwater Estuary is of high ornithological importance for wintering waterfowl, providing good quality feeding areas for a diversity of waterfowl species. At high tide, the birds roost along the shoreline and salt marsh fringe.

The site supports an internationally important population of black-tailed godwit (*Limosa limosa*) (over 5% of the national total). It supports a further eight species in numbers of national importance: wigeon (*Anas Penelope*), golden plover (*Pluvialis apricaria*), lapwing (*Vanellus vanellus*), dunlin (*Calidris alpine*), curlew (*Numenius arquata*), and redshank (*Tringa totanus*). A population of bar-tailed godwit (*Limosa lapponica*) exceeds the threshold for national importance in some winters. Little egret (*Egretta garzetta*) breeds locally and the Blackwater Estuary is a main feeding area.

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 Blackwater River SAC and the Blackwater Callows SPA is determined through Source-Pathway-Receptor assessment.

A review of available data was carried out to determine the presence of qualifying features of the Blackwater River SAC, the Blackwater Callows SPA, and the Blackwater Estuary SPA within the environs of Kanturk, Ballyduff, Rathcormac, Aglish and Youghal. Data reviewed included:

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

- | Near-certain: >95% chance of occurring as predicted
- | Probable: 50-95% chance of occurring as predicted
- | Unlikely: 5-50% chance of occurring as predicted

i Extremely unlikely: <5% chance of occurring as predicted

4.2.1 Ballyduff AFA

Flood Walls and Embankments

The likelihood of potential impacts of constructing Flood Walls and Embankments in Ballyduff on the qualifying features of the Blackwater River SAC and the special conservation interests of the Blackwater Callows SPA are discussed hereunder.

Lamprey have been recorded within the River Blackwater near Ballyduff: Sea lamprey have been observed spawning downstream of Ballyduff and juvenile lamprey (sea and brook/river) have been recorded upstream of Ballyduff. Impacts on lamprey from sedimentation associated with flood embankment construction are probable given the close proximity of spawning gravels downstream of the AFA.

Atlantic salmon and lamprey require the same qualities in spawning habitat. Impacts on Atlantic Salmon from sedimentation are therefore probable.

The Munster Blackwater Freshwater Pearl Mussel Sub-Basin Plan (Anon, 2010) identifies pearl mussels at Ballyduff. Impacts from sedimentation associated with flood embankment construction are probable.

White-clawed crayfish are confined to the Awbeg River. Impacts on white-clawed crayfish are extremely unlikely.

Twaite shad have been recorded as far inland as Cappoquin on the Blackwater River. Shad spawn at the upper tidal reaches of the estuary and do not generally enter freshwater habitat. Impacts on Shad are extremely unlikely given the distance from the estuary.

Otter has been recorded at Ballyduff Bridge. Damage to otter resting places (couch orholt) by the construction of flood walls and embankments in Ballyduff is extremely unlikely given that the proposed locations for these structures are principally confined towards the rear of properties along the Glounagad Stream (which flows into the Blackwater River at Ballyduff). The Glounagad Stream is suboptimal habitat for otter due to its size. Embankments are proposed south of Ballyduff Bridge in proximity to the Blackwater River. Damage to otter resting places is extremely unlikely here also given that the embankment will be set back from the river bank for most of its length. Disturbance of otter commuting and foraging is extremely unlikely during construction activities given that otter are crepuscular animals, i.e. most active at dawn and dusk (which are outside of the hours of a typical working day).

Floating river vegetation is poorly surveyed in Ireland. Article 17 reporting suggests an almost national distribution of this habitat type. This Annex I habitat type is likely to occur extensively on the Blackwater River. Impacts of sedimentation on floating river vegetation are probable.

Killarney fern occurs near Lismore in proximity to the Ownenashad River (a tributary of the Blackwater River). Impacts on Killarney fern are extremely unlikely given that this qualifying feature is on a separate watercourse to Ballyduff. There is therefore no direct connectivity between the site of the Killarney Fern and the flood management measures.

White Well Wood is an alluvial woodland located c.1km east of Ballyduff. The National Survey of Native Woodlands 2003-2008 identifies this woodland as *Acer pseudoplatanus* – *Crataegus monogyna* type vegetation and notes that it has no major correspondence to Annex I type habitats described in the *Interpretation Manual of European Union Habitats - EUR28*. There are no records of Annex I alluvial woodlands in proximity to Ballyduff. Impacts on this qualifying feature of the SAC are therefore extremely unlikely.

Old sessile oak woods (Annex I habitat code 91A0) occurs further downstream of Ballyduff (approximately 6.5km) towards Lismore (The Grove Woodlands). Modelling carried out as part of the assessment of viable options shows that flood management measures in Ballyduff will not affect river flows downstream at the Grove Woodlands. Impacts on oak woodlands are extremely unlikely.

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

A number of wetland waterbirds have been recorded on the River Blackwater near Ballyduff Bridge including Mallard and Mute Swan. However, there are no records for the Special Conservation Interests of the Blackwater Callows SPA in proximity to Ballyduff. Teal and little egret have been recorded within the environs of Fermoy, upstream of Ballyduff. Disturbance during the construction works to waterfowl for which the Blackwater Callows SPA is designated is unlikely.

4.2.2 Kanturk AFA

The likelihood of potential impacts of the construction of viable options in Kanturk on the qualifying features of the Blackwater River SAC are discussed hereunder.

Flood Walls and Embankments

The Dalua River and the Allow River have strong depositional features on approach to Kanturk with numerous meanders and large sediment banks evident. Degradation of fishery habitat due to sediment runoff from embankment material depositing within the watercourse is extremely unlikely given the existing condition of the watercourse.

It is possible that suitable lamprey and Atlantic salmon spawning gravels are present within the upstream reaches of the Dalua and Allow Rivers (although there are no documented records of spawning activity in the Dalua or Allow Rivers). The release of large volumes of sediment to a watercourse can act as a barrier to fish migration. Impacts on movements of lamprey and Atlantic salmon to possible spawning areas upstream due to sediment release are unlikely (given that suitable spawning habitat is poorly represented) but cannot be disqualified.

Freshwater pearl mussel is known to be distributed along the Allow River. Consultation with NPWS concluded no pearl mussel populations in the Dalua River. Impacts on freshwater pearl mussel in the Allow River and Blackwater River are probable due to sedimentation of the watercourses associated with flood wall and embankment construction.

Otter have been recorded in proximity to Kanturk. Otter use riparian habitat as shelter and to commute between foraging and resting habitat. There is limited riparian cover within the town. Much of the riparian habitat has been significantly impacted through the development of the river walkway. Access to the river is restricted in places by walls and railings. The habitat within the town is sub-optimal habitat for otter. However, otter may commute along the watercourse. Noise and site activities associated with the construction of flood protection works within the town may deter otter from commuting through this area. However, given that otter are crepuscular animals, i.e. most active at dawn and dusk, it is extremely unlikely that Otter activity would coincide with site works. Impacts on otter are therefore extremely unlikely.

Habitat within the town comprises narrow riparian treeline (primarily mature trees) bound by built land (Fossitt Code BL3) with small areas of agricultural grassland (Fossitt Code GA1). Much of the riparian habitat has been fragmented by walkways. Stone walls (Fossitt Code BL1) are a prominent feature of the river banks. Annex I habitats have not been documented within Kanturk AFA. Damage to Annex I habitat for which the Blackwater River SAC is designated due to the construction of flood walls and embankments is extremely unlikely.

Storage Area

Juvenile sea lamprey have been recorded in proximity to Allen's Bridge, immediately upstream of the indicative location of the flood storage area on the Dalua River. Juvenile brook / river lamprey have also been recorded on upstream tributaries. Damage to juvenile lamprey habitat is near certain. Excavation of juvenile lamprey from the watercourse to facilitate the installation of the control structure is probable.

Degradation of fishery habitat due to sediment runoff from embankment and construction works is probable.

The control structure for the storage area can act as a barrier to fish / lamprey passage. Impacts on Atlantic salmon passage are extremely unlikely given that suitable spawning habitat is poorly represented in the river and natal fidelity to the Dalua River is therefore unlikely for Atlantic salmon. Adult lamprey migrate to spawning sites in spring. There is a lesser probability that the control structure would be brought into operation (i.e. aligned to provide restricted flow) at this time of year. Barrier to lamprey migration is therefore unlikely. It is probable that young sea lamprey migrating downriver to estuarine waters could be restricted by the control structure as it is more likely to come into operation at this time of year, i.e. in autumn.

Freshwater pearl mussel are absent from the Dalua River, but are present in the River Allow and Blackwater River. Impacts from sedimentation are likely.

Otter have been documented throughout the area, on the Allow River upstream and downstream of Kanturk, and on the Dalua River and its tributaries upstream of Kanturk. Given the distribution of otter upstream and downstream of Kanturk, it is likely that they commute along the rivers to feeding and resting places. An eight metre high embankment will be required at the head of the storage area on the Dalua River. The embankment will have a gradual slope (1:2) and will therefore not act as a barrier to connectivity between otter habitat. The footprint of the 8m embankment at the head of the storage area will be approximately 40m in width and the 2.5m embankment at the rear of the storage area will be approximately 10m in width. Construction of the embankments will require the permanent removal of

approximately 100m of riparian habitat on either side of the Dalua River. Given the high level of otter activity in the area, and the abundance of suitable habitat along the watercourse, it is possible that otter resting places (couches / holts) are present on the Dalua River. It is probable therefore that otter resting places would be damaged by the works. Otter resting / breeding places may be further impacted where they are inundated with flood waters within the outline of the storage area. Additionally, riparian habitat may be degraded due to prolonged inundation within the storage area. There may be an associated loss of suitable habitat for otter.

Aghaneenagh Woods, Annex I habitat Old Oak Woodlands (Habitats Directive Code 91A0), is located within the Blackwater river SAC upstream of Allen's Bridge i.e. upstream of the indicative location of the flood storage area on the Dalua River. Modelling carried out as part of the assessment of viable options for Kanturk shows that flood storage will not affect patterns of inundation upstream at Aghaneenagh Woods. Impacts on Oak Woodlands are extremely unlikely on the basis of the indicative location of the flood storage area.

Floating river vegetation is likely to be present in the Dalua River on the basis of Article 17 reporting on national distribution. Excavation of river bed material in order to install the control structure is extremely likely to result in habitat damage. Also, when the storage area is in flood the depth of inundation will be greater than would traditionally be the case in the absence of the storage area. This will affect light penetration which is near certain to negatively impact habitat structure and species composition.

Weir Removal

Fine silty material has built up behind the weirs on the Dalua River in Kanturk due to the slowdown in flow velocities on approach to the weirs. This is suitable habitat for juvenile lamprey. Removal of the weirs will result in this habitat being disturbed. It is probable that juvenile Lamprey would be displaced.

Floating river vegetation is likely to occur throughout the Blackwater catchment. It is probable that modification of the hydrological regime due to weir removal and alteration of river bed material due to washing out of sediment at the weirs will result in a local change in vegetation composition.

Freshwater pearl mussel are absent from the Dalua River and will not therefore be directly impacted by weir removal. However, freshwater pearl mussel occur on the Allow and Blackwater Rivers, downstream of the Dalua. Sediment which will be released into the watercourse during weir removal is likely to result in degradation of freshwater pearl mussel habitat. Additional, weir removal is likely to alter sediment transfer within the watercourses. This could ultimately lead to a greater deposition of sediment downstream, within freshwater pearl mussel habitat.

The weirs on the Dalua are likely to act as a barrier to the upstream migration of adult lamprey and Atlantic salmon. It is probable that the removal of the weirs will increase access to upstream areas however the presence of potential suitable spawning habitat is uncertain.

Non-structural Flood Forecasting

It is unlikely that gauge support structures will be required along the Dalua River given that there are frequent bridge crossings on the watercourse. Bracketing the gauge housing to a bridge will cause minimal

disturbance to river bed and bank. Impacts on qualifying features of the Blackwater River SAC in proximity to flood forecasting on the Dalua River are extremely unlikely.

Freshwater pearl mussel occur on the Allow River. Any in-stream works or bankside works associated with the installation of river gauges is highly likely to result in sediment release into the watercourse. The Freshwater Pearl Mussel Regulations, 2009 require there to be no artificially elevated levels of siltation present within pearl mussel habitat. Sedimentation of the Allow River is near certain to result in negative impacts on the pearl mussel population.

4.2.3 Rathcormac AFA

The likelihood of potential impacts of constructing viable options in Rathcormac on the qualifying features of the Blackwater River SAC are discussed hereunder.

Flood Walls

Flood walls are identified as a viable option along the Kilbrien Stream. The Kilbrien Stream runs parallel to the local road to Garrynacole for the majority of its path and then diverts into Rathcormac. The stream is surrounded by built land (Fossitt Code BL3) and agricultural lands (Fossitt Code GA1). The stream is heavily channelized and engineered and is culverted in a number of locations. Flood walls will be aligned such that riparian treelines are retained. The footprint of the walls will be on road verges and agricultural grassland. Impacts on the qualifying features of the River Blackwater SAC are extremely unlikely.

Storage Area

Flood storage on the Kilbrien Stream will require realignment of the stream into agricultural lands which will be allowed to flood during storm events.

The Kilbrien stream has no capacity to support the qualifying features of the Blackwater River SAC given its heavy modification (culverting and channelisation) and riparian habitat which is already compromised by adjacent land uses (road and agriculture). The loss of a section of the stream in place of the diverted channel is extremely unlikely to negatively impact the fishery value of the watercourse and subsequently the status of qualifying features within the River Blackwater SAC.

Sediment released into the Kilbrien Stream during realignment may be flushed into the Shanowen River. The Shanowen River is depositional as evidenced by the presence of large sediment banks at meanders. The temporary increase in deposited sediment is extremely unlikely to adversely impact the fishery habitat within the river.

Flow Diversion

Diversion of flood flows from the Kilbrien Stream into the Shanowen River will increase flows in the Shanowen River. Flood modelling carried out as part of the CFRAM study has determined that the Shanowen River has available capacity to accommodate diverted flows from the Kilbrien Stream. Increased flow velocity can result in increased sediment suspension and bank erosion; however, this is likely to be an existing condition during extreme flood events in the Shanowen River. The Shanowen River

has existing high levels of sedimentation as evidenced by the islands which have formed at the confluence with the River Bride. Increased flows from the Kilbrien Stream during extreme flood events may add to the level of sedimentation in the Shanowen River. An overall alteration in fishery habitat quality is extremely unlikely. However, the need for maintenance in the watercourse may be expedited by increased flows from the Kilbrien Stream. It should be noted that maintenance of the river is not included as an option for flood risk management in Rathcormac and would be subject to statutory processes if required, which would include screening for Appropriate Assessment. It is not considered further in this assessment.

The Shanowen River and the River Bride do not support freshwater pearl mussel. Impacts on pearl mussel from sedimentation are extremely unlikely.

Juvenile river / brook lamprey have been recorded in the River Bride. There are no documented records for the Shanowen River. It is unlikely that lamprey would be attracted into the flow diversion channel and ultimately into the Kilbrien stream. Similarly, Atlantic salmon are unlikely to utilise the Shanowen River. Impacts are extremely unlikely.

Damage to Annex I habitat during construction of the flow diversion channel is extremely unlikely. The diversion will be through improved agricultural grasslands which are managed and are of low ecological value. Also, there are no documented records of Annex I habitat along the Shanowen River, possible bank erosion due to increased flow velocities during flood is extremely unlikely to result in loss of Annexed habitat.

Otter are widespread in the area and may be present on the Shanowen River. The Shanowen River is outside of the SAC boundary. It is extremely unlikely that Otter resting places will be impacted given the small section of riparian habitat that would be affected by the diversion channel.

4.2.4 Aglish AFA

There is no potential for the flood risk management works in the Aglish AFA to impact upon Natura 2000 sites, as the Ballynaparka River has no capacity to support qualifying features of the Blackwater River SAC given its heavy modification. Aglish AFA is screened out from further assessment.

4.2.5 Youghal AFA

The likelihood of potential impacts of constructing tidal flood risk management works in the Youghal AFA on the qualifying features of the Blackwater River SAC and Blackwater Estuary SPA are discussed hereunder:

Flood Defences

The proposed flood defence works will be confined to the urban fabric of the town. The Annex I habitats of the Blackwater Estuary include mudflats and sandflats not covered by sea water at low tide and coarse sediments occur within the Blackwater Estuary in proximity to Youghal. Given that the flood defences within Youghal are proposed along the quays, and do not overlap with the NPWS habitat mapping for *Tidal Mudflats and Sandflats*, it is surmised that there will be no requirement for machinery movement or

construction of temporary structures within these Annexed habitats (however if at project design stage it is determined that works cannot be carried out in the absence of a temporary structure(s) within the mudflat habitat, consultation will be necessary with NPWS in parallel with Appropriate Assessment to determine appropriate mitigation). Works can be constructed from the terrestrial area. Impacts on the qualifying features of the River Blackwater SAC are extremely unlikely.

Disturbance to species is extremely unlikely given distance from site. The flight response distance refers to the point at which the bird moves away from a source of disturbance. The flight response 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 construction activities (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. The proposed works occur within Youghal town and are unlikely to be discernible from the existing noise levels typical of the town.

Significant sediment release to the harbour is extremely unlikely given that the walls would be constructing within existing hardstanding areas along the town.

Tidal Barrage

Tidal barrage (a) occurs within the boundary of the SAC. The Annex I habitats: Blackwater Estuary and mudflats and sandflats not covered by sea water at low tide occur within the Blackwater Estuary. Tidal barrage (a) will occur within the Blackwater River SAC boundary. The construction of the barrage will have

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)

direct loss of Annex I habitat (Estuarine, Mudflats and Sandflats habitats). The total area of “Estuarine” habitat is estimated at 1208 Ha while the total area “mudflats and sandflats not covered by seawater at low tide” habitat is estimated at 284 Ha. The works will result in loss of relatively discrete area approximately 0.26 Ha within the footprint of the barrage from the overall of Annex I habitat availability within the Blackwater SAC. Tidal barrage (b) occurs outside the boundary of the SAC, damage to Annex I habitat during construction of the tidal barrage is extremely unlikely.

Perennial vegetation of stony habitats does not occur within the flood risk management zone of influence and as such impacts are extremely unlikely and therefore screened out for further assessment. Marine community types that have been recorded within the proposed zone of influence include; coarse sediment community complex, intertidal estuarine sandy mud community complex, *Mytilus edulis* community, sand and mixed sediment with polychaetes and crustacean community complex, and subtidal estuarine fine sand communities. These are typical marine and coastal communities that occur throughout Ireland.

Youghal is on the estuarine section of the Blackwater River. Freshwater qualifying features of the SAC do not feature within the environs of Youghal. White clawed crayfish, brook lamprey and river lamprey are not known to inhabit saline waters. Impacts are therefore extremely unlikely and so screened out of this assessment.

It is near certain that tidal barrage (a) will result in a direct loss of Annex I habitat. Sediment resuspension and washing out will occur in the estuary during in-channel works to construct the control structure for the tidal barrage. The construction activities of both tidal barrage options (a) and (b) have the potential to re-suspended sediments and pollutants. These could be transported outside the works area by tidal currents and subsequently settle out. This may in turn impact on benthic habitats and species in other locations within the estuary.

To maximise the potential storage area for fluvial flows both barrage, options (a) and (b) will be closed at the low tide preceding a tidal event. The lowest tide level within the bay preceding a 0.5% AEP tidal event is -1.19m OD Malin. The typical low bank level within the harbour is 1.6m OD Malin. The barrage will be mechanically operated depending on flood forecasting. If the barrage is closed at low tide, this gives an average depth of available storage for fluvial flows, within the barrage, of 2.49m less than the fluvial flood extents. The proposed storage area will result in the temporary reoccurring impact due to fluvial inundation of freshwater on the Annex I coastal habitats (estuary, mudflat, sandflat and saltmarsh communities) upstream. *Mytilus edulis* are important indicator species and are known to occur within the estuary. *Mytilus edulis* are tolerant to changes in salinity and will close during any temporary changes resulting from the influx of freshwater during a flood event. Significant impacts on the long-term community structure and distribution of this species are unlikely.

There are several vegetation communities present on the Atlantic saltmarsh (ASM). The main saltmarsh is typically dominated by mid and mid-upper Atlantic Salt marsh communities. These typically occur along the upper intertidal zone. *Salicornia* flats tend to be fringe type communities on saltmarsh habitats, and are typically tolerant to temporary freshwater inundation. Neither tidal barrage (a) nor (b) will have direct impact on the areas of *Salicornia* mud or Mediterranean salt meadows found at the eastern side of the townland of Foxbole above Youghal, at Blackbog, along the Tourig and Kinsalebeg estuaries. The extent of *Salicornia* flats can be very ephemeral and occur at the fringes of the saltmarsh. The extent of *Salicornia* flats and Atlantic Salt Meadows are connected to accretion and the supply of sediment to form

suitable areas for colonisation by this species. Typical lower marsh species such as Sea Arrowgrass and *Salicornia* are saline species, they are less tolerant of freshwater influx during the flood event. The potential impacts on these species are probable.

The proposed measures are designed to accommodate fluvial flows of 2.49m these are less than fluvial flood extents upstream within the Blackwater Estuary. The closure of the tidal barrage will result in indirect impacts on Annex I habitats upstream of the estuary due to alteration of tidal inundation and the influx of freshwater, changes in the nutrient loading and water salinity during the flood event. This in combination with changes in suspended sediments will temporarily alter the biodiversity and species range for the *Salicornia*, and other annuals colonising mudflats and sandflats and saltmarsh communities. The potential impacts on these communities are probable, however recovery will occur and habitat will regenerate itself. The proposed measures will not impact on the intertidal range. The proposed tidal barrage will temporarily change the tidal inundation during 0.5% AEP flood event this will not likely affect the long term population dynamic of the community, the measure provide adequate fluvial storage which is less than the fluvial flood extent. The proposed measure will likely to temporary reoccurring change the composition of the intertidal area during a flood event.

The mudflats provide sheltered feeding grounds for a diversity of wintering waterbirds. When exposed or partially exposed by the tide, intertidal habitats provide important foraging areas for many species of waterbirds, especially wading birds, as well as providing roosting/loafing areas. When the intertidal area is inundated by the tide it becomes available for benthic and surface feeding ducks and piscivorous/other waterbirds. The construction of the tidal barrage may also potentially negatively impact on migratory fish (salmon, lamprey), which are a QI for the SAC, during a flood event. Freshwater pearl mussel does not occur within saline environments. The impediment of migration of host fish upstream during pearl mussel glochidia release will have significant effect on the reproductive success of the freshwater pearl mussel. The tidal barrage is a physical structure with a mechanical sluice control gate approximately 40-50m wide, to accompany fishing vessels commuting in and out of the estuary. The sluice gate will be closed temporarily during a flood event.

The proposed measures, both tidal barrage (a) and (b), occur downstream and outside the boundary of the Blackwater Estuary SPA. The Blackwater Estuary SPA has an estimated intertidal area of 318 ha, and suitable feeding habitat is located upstream of the proposed measures. Temporary recurring impacts on the local conditions of the feeding grounds for waterbirds are probable. During flood events, the barrage will remain closed until the tide level outside is lower than the maximum water level within the barrage (1.6m OD Malin). Therefore, the barrage will remain closed for approx. 7 hours. The tidal barrage is designed to allow sufficient storage below the fluvial flood extent level, and will alter tidal regime landward of the barrage when closed. The barrage will potentially result in a localised impact on feeding habitat for the waterbirds. The closure of the tidal barrage during a 0.5% AEP flood event is extremely unlikely to result in a change in distribution and long term habitat availability for foraging and roosting waterbirds within the SPA.

Construction activities will cause temporary disturbance to birds in the SPA which may cause them to temporarily move to alternative suitable feeding areas. The disturbance to other areas may increase feeding competition in these areas in the short term, however the construction of the flood risk management measures will unlikely impact on the population sizes and success rates and conservation status of the qualifying interests of the SPA in the long term.

4.2.6 Summary of Likely Impacts on the Blackwater River SAC, the Blackwater Callows SPA and Blackwater Estuary SPA

Likely impacts of flood risk management options for the AFAs of Ballyduff, Kanturk and Rathcormac and Youghal are summarised in Table 4.2. Impacts which have been identified as ‘extremely unlikely’ (i.e. <5% chance of occurring) have been screened out from further assessment. All other impacts are considered to be likely and are considered for significance in Section 4.3 of this assessment.

Table 4.2: Summary of Likely Impacts

Qualifying Feature /	Viable Options for the Areas of Further Assessment										
	Youghal			Ballyduff	Kanturk				Rathcormac		
	Flood Walls	Tidal Barrage (a)	Tidal Barrage (b)	Flood Walls and Embankments	Flood Walls and Embankments	Storage Area	Weir Removal	Flood Forecasting	Flood Walls	Storage Area	Flow Diversion
Estuaries	Impacts are extremely unlikely	Near certain direct impacts on the estuary habitat	probable indirect impacts on the coastal Annex I habitat during flood event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mudflats and Sandflats not covered by seawater at low tide	Impacts are extremely unlikely	Near certain direct damage on Annex I habitat probable indirect impact coastal Annex I habitats during flood event	probable indirect impacts on the coastal Annex I habitat during flood event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Perennial Vegetation of stony banks	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Salicornia and other annuals colonising mud and sand	Impacts are extremely unlikely	Probable impact species during flood event	Probable impact species during flood event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Atlantic Salt Meadows	Impacts are extremely unlikely	Probable impact species during flood event	Probable impact species during flood event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lamprey	Impacts are unlikely	Probable impacts from sedimentation during construction Barrier to migration is probable	Probable impacts from sedimentation during construction Barrier to migration is probable	Probable impacts from sedimentation	Unlikely impacts from sedimentation	Damage to Juvenile Lamprey habitat is near certain. Excavation of Juvenile Lamprey is probable Barrier to young Sea Lamprey migration is probable	Displacement of Juvenile Lamprey is probable	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely
Atlantic Salmon	Impacts are extremely unlikely	Probable impacts from sedimentation Barrier to migration is probable	Probable impacts from sedimentation Barrier to migration is probable	Probable impacts from sedimentation	Unlikely impacts from sedimentation	Probable impacts from sedimentation Impacts on fish passage are extremely unlikely	Probable positive impact by removal of barrier	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely
White Clawed Crayfish	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely

Qualifying Feature /	Viable Options for the Areas of Further Assessment										
	Youghal			Ballyduff	Kanturk				Rathcormac		
	Flood Walls	Tidal Barrage (a)	Tidal Barrage (b)	Flood Walls and Embankments	Flood Walls and Embankments	Storage Area	Weir Removal	Flood Forecasting	Flood Walls	Storage Area	Flow Diversion
Twait shad	Impacts are extremely unlikely	Barrier to migration is probable	Barrier to migration is probable	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely
Freshwater pearl mussel	Impacts are extremely unlikely	probable impacts on the migration of host salmon upstream	probable impacts on the migration of host salmon upstream	Probable impacts from sedimentation	Probable impacts from sedimentation	Probable impacts from sedimentation	Probable impacts from sedimentation	Impacts are near certain in the Allow River	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely
Otter	Disturbance of Otter is extremely unlikely	Disturbance of Otter is extremely unlikely	Disturbance of Otter is extremely unlikely	Impacts are extremely unlikely	Disturbance of Otter is extremely unlikely	Impacts on Otter resting places are probable.	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely
Killarney fern	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely
Floating river vegetation	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts of sedimentation are probable	Impacts are extremely unlikely	Impacts are near certain	Local change in habitat is probable	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely
Alluvial forests	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely
Oak woodlands	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely	Impacts are extremely unlikely
Wetland Birds of the Blackwater Callows SPA	N/A	N/A	N/A	Disturbance is unlikely	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wetlands of the Blackwater Callows SPA	N/A	N/A	N/A	Damage to habitat is extremely unlikely	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wetland Birds of the Blackwater Estuary SPA	Local change in habitat is extremely unlikely	Local change in habitat is probable	Local change in habitat is probable	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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 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 Local Area Plans

Waterford County Development Plan 2011 – 2017

The Waterford County Development Plan includes the objective to protect and promote the amenity of the River Blackwater and enhance existing access to the riverbank. There is potential degradation in water quality in association with construction of amenity walkways. However, the Development Plan requires that this objective must be subject to compliance with Articles 6 and 10 of the Habitats Directive.

Particular to Ballyduff, the County Development Plan requires that the flood plain of the River Blackwater within Ballyduff shall be preserved free from development. This objective will limit the potential for habitat degradation within the Blackwater River SAC.

Kanturk-Mallow Municipal District Draft Local Area Plan (LAP), 2017

The draft LAP identifies a number of development objectives for Kanturk (e.g. a new river crossing south of the Town to ease traffic congestion) which could impact the Blackwater River SAC. The combined effect of the measures progressed under the FRMP for Kanturk, coupled with development of Kanturk Town is likely to have a compounded effect on the quality of the aquatic habitat quality (for Lamprey, Atlantic salmon, Freshwater Pearl Mussel and Floating River Vegetation) within the Allow River.

The Screening for Appropriate Assessment produced for the draft Kanturk-Mallow Municipal District LAP has been carried out on the basis that the Conservation Objectives for Freshwater Pearl Mussel within the Blackwater River SAC apply only to the Allow River upstream of Kanturk and to the Licky River (as notified to Cork County Council by DAHRG).

The LAP includes a number of objectives which aim to protect the Blackwater River SAC e.g. rezoning areas within the SAC boundary as Open Spaces such that development within the SAC is prevented, and design of river walkways such that they will not cause damage to sensitive habitats or disturbance to freshwater fauna within the Blackwater River SAC.

Fermoy Municipal District Draft Local Area Plan (LAP), 2017

The draft LAP prescribes objectives for the development of the village of Rathcormac e.g. provision of a riverside walk by the Shanowen River. There is however no potential for in-combination impacts with the flood risk management measures for Rathcormac given that no impact on the Blackwater River SAC have been determined from the FRMP.

East Cork Municipal District Draft Local Area Plan, 2017

The draft LAP identifies a number of Regeneration areas, e.g. Youghal Dockyard, which could impact on the Blackwater Estuary SPA and the Blackwater River SAC. The Plan however includes objectives to avoid disturbance to wintering birds and to only permit development where it is shown to be compatible with the requirements of the Habitats Directive. No direct damage to habitats protected in the Blackwater Estuary are identified in the Screening for Appropriate Assessment of the LAP. No in-combination impacts are anticipated.

4.3.2.2 Existing Flood Relief Schemes and Arterial Drainage Schemes

Existing schemes within UoM18 which are maintained by the Office of Public Works or the Local Authority include the Mallow Flood Relief Scheme, Fermoy Flood Relief Scheme, Freemount Flood Relief Scheme, and the Awbeg and Annalinga Drainage Districts. The maintenance of these schemes must be in accordance with national and European legislation, including the European Communities (Birds and Natural Habitats) Regulations 2011 and the Wildlife Act 1976 (as amended).

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.

The OPW has developed a standardised approach by which the likely effects of proposed drainage maintenance activities (either alone or in combination with other projects or plans) upon Natura 2000 sites can be assessed: *Ryan Hanley (2014b) Stage 1: Appropriate Assessment Screening Methodology for the Maintenance of Arterial Drainage Schemes*. Future proposed maintenance of the above Schemes will be subjected to screening for Appropriate Assessment in accordance with the methodology.

The NIS and SEA also require that a Construction Environmental Management Plan (CEMP) is developed for some of the proposed arterial drainage activities. The OPW have developed a series of Environmental Management Protocols and Standard Operating Procedures for arterial drainage maintenance activities. These are currently under revision and will be adopted for future maintenance activities.

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.

No Minor Works are prescribed for UoM 18 in 2016 or 2017.

4.3.2.3 Other Development

A search was undertaken of Cork 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.

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>

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.

Ireland has determined site-specific conservation objectives for a number of Natura 2000 sites within the State, including the River Blackwater SAC. These site-specific conservation objectives define favourable conservation condition for each of the habitats and species for which the SAC is designated in terms of specific attributes and targets which must be achieved / maintained.

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

5.2 Assessment of Significance

The assessment of the significance of the likely impacts on the conservation objectives / condition of Natura 2000 sites are presented hereunder.

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.

No likely impacts from the implementation of flood risk management options in Rathcormac and Aglish have been identified. The significance of the likely impacts of flood risk management options in Ballyduff and Kanturk and Youghal are assessed hereunder in Tables 5.1 to 5.7.

Table 5.1: Assessment of Significance of Impacts for Flood Walls and Embankments in Ballyduff AFA

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
Sea Brook and River Lamprey	<p><u>Sea lamprey (objective: to restore favourable conservation status)</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 (objective: to maintain favourable conservation status):</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> <p>Juvenile density in fine sediment - at least 2/m²</p> <p>Availability of juvenile habitat - More than 50% of sample sites positive</p>	Sedimentation of spawning gravels	Sedimentation of Sea Lamprey spawning gravels within the River Blackwater downstream of Ballyduff may result in a decline in the extent of spawning beds within the SAC. This would constitute a significant Impact.
Atlantic Salmon (objective: to maintain favourable conservation status):	<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>	Sedimentation of spawning gravels	Sedimentation of Atlantic Salmon spawning gravels within the River Blackwater downstream of Ballyduff may result in a decline in the extent of spawning beds within the SAC. This would constitute a significant Impact.
Freshwater Pearl Mussel (objective: to restore favourable conservation status):	<p>Distribution – Maintain at 161km which equates to 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 - Restore to 35,000 adult Mussels. Current population is estimated at less than 10,000 for the Blackwater main channel.</p> <p>Recruitment - The Blackwater population is believed to be composed entirely of aged adults, with no evidence of recruitment for at least 20 years. 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 - data for the Blackwater and its tributaries is poor. The target is to restore suitable habitat in more than 35km</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 juvenile salmonids to host glochidial larvae.</p>	Sedimentation of the watercourse	Sedimentation of the water course may affect the conservation targets for adult mortality rates, substratum quality, and habitat extent. This would constitute a significant Impact.
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.		
Wetland Birds of the Blackwater Callows SPA	<p>Population - Long term population trend stable or increasing.</p> <p>Distribution - No significant decrease in the numbers or range of areas used by waterbird species.</p>	Noise and physical disturbance	<p>The long term population trend for wintering wetland birds is determined over a 12 year period. The long term population trend for a species can show a pattern of increase and decline, i.e. variation between years. The long term population trend accommodates fluctuations in bird densities year on year and is unlikely to be impacted by temporary displacement of birds from feeding habitat during installation of flood protection measures. There is unlikely to be a significant impact on population trend.</p> <p>Birds may be deterred from the Ballyduff area during construction works due to displacement by noise.</p>

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
			The range of areas used by the birds of the SPA will therefore be reduced. However temporary displacement of birds from such a small proportion of the available foraging habitat within the SPA does not constitute a significant decrease in the numbers or range of areas used by waterbirds. There is unlikely to be significant impacts on distribution.
			No significant impact determined

Table 5.2: Assessment of Significance of Impacts for Flood Walls and Embankments in Kanturk AFA

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
Sea Lamprey (objective: to restore favourable conservation status)	<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>	Sediment release during construction forming a barrier to migration	Sedimentation of the Dalua or Allow can form a physical barrier to lamprey migration. Given the location of Kanturk on the lower reaches of the main channels of the Allow and Dalua Rivers, a barrier to migration at this location would inhibit access to a large proportion of the rivers. The 'Distribution' target that greater than the 75% of the main stem of rivers in the SAC should be accessible would not be met. This would be a significant impact in the event that the temporary release of sediment to the watercourses as to occur during sea lamprey migration to spawning areas in Spring.
Atlantic Salmon (objective: to maintain favourable conservation status):	<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	Physical barrier to migration due to sedimentation may be a temporary impact associated with the construction period only. 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. Also, given the location of Kanturk on the lower reaches of the main channels of the Allow and Dalua Rivers, a barrier to out-migration of salmon smolts at this location could cause a significant decline in the number of smolts reaching the sea.
Freshwater Pearl Mussel (objective: to restore favourable conservation status):	<p>Distribution – Maintain at 161km which equates to 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 - Restore to 35,000 adult Mussels. Current population is estimated at less than 10,000 for the Blackwater main channel.</p> <p>Recruitment - The Blackwater population is believed to be composed entirely of aged adults, with no evidence of recruitment for at least 20 Years. 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 - data for the Blackwater and its tributaries is poor. The target is to restore suitable habitat in more than 35km</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 juvenile salmonids to host glochidial larvae.</p>	Sedimentation of the watercourse	Sedimentation of the water course may affect the conservation targets for adult mortality rates, substratum quality, and habitat extent. This would constitute a significant Impact.

Table 5.3: Assessment of Significance of Impacts for a Storage Area on the Dalua River in Kanturk AFA

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
Lamprey (Sea, Brook and River)	<p><u>Sea Lamprey: (objective: to restore favourable conservation status)</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: (objective: to maintain favourable conservation status):</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> <p>Juvenile density in fine sediment - at least 2/m²</p> <p>Availability of juvenile habitat - More than 50% of sample sites positive</p>	<p>Damage to Juvenile Lamprey habitat during construction of control structure on the watercourse</p> <p>Excavation of Juvenile Lamprey in river bed material within the footprint of the control structure</p> <p>Barrier to young lamprey migration when control structure is restricting flows</p>	<p>The construction of the control structure is likely to result in the permanent loss of juvenile Lamprey habitat. Control structures are sized relative to the river channel width. Channel width at the proposed location is approximately 10m. A structure 40m in length would be necessary for such a channel, equating to a loss of habitat of 400m². Given the availability of suitable juvenile Lamprey habitat within the Dalua River and also within the River Blackwater SAC, the loss of habitat within the footprint of the control structure will not significantly impact the target for the 'Availability of Juvenile Habitat' of more than 50% of sample sites positive.</p> <p>Excavation of juvenile Lamprey may result in a reduction in overall density within the SAC. However given the high prevalence of fine sediment within the Dalua River and within the entire SAC, the excavation of lamprey from a 400m² area is not expected to significantly impact the overall density within the SAC.</p> <p>The control structure may form an artificial barrier to lamprey movement when it is in operation. This would temporarily impede the attainment of the Distribution target for Sea, River and Brook Lamprey. This would be significant where it occurs during upstream migration to spawning habitat however it has been determined that this is not a likely impact.</p> <p>No significant impact determined</p>
Atlantic Salmon (objective: to maintain favourable conservation status):	<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>	Sedimentation of the watercourse	Sedimentation of Atlantic Salmon spawning gravels within the Dalua River, Allow River or River Blackwater may result in a decline in the extent of spawning beds. This would constitute a significant Impact.
Freshwater Pearl Mussel (objective: to restore favourable conservation status):	<p>Distribution – Maintain at 161km which equates to 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 - Restore to 35,000 adult Mussels. Current population is estimated at less than 10,000 for the Blackwater main channel.</p> <p>Recruitment - The Blackwater population is believed to be composed entirely of aged adults, with no evidence of recruitment for at least 20 Years. 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 - data for the Blackwater and its tributaries is poor. The target is to restore suitable habitat in more than 35km</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 juvenile salmonids to host glochidial larvae.</p>	Sedimentation of the watercourse	Sedimentation of the water course may affect the conservation targets for adult mortality rates, substratum quality, and habitat extent This would constitute a significant Impact.
Otter	Distribution - FCS target is 88% in SACs. Current range in south-west estimated at 74.5%	Possible damage to holt / couch and loss of suitable habitat	Otter territories have been documented to range from 1km to 20km and are dependent on the quality of foraging habitat. Otter territories in the Blackwater Catchment are likely to be towards the smaller scale given the quality of fishery habitat in the Blackwater and its tributaries.

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
	<p>Extent of terrestrial habitat - No significant decline. Area mapped and calculated as 1165.7ha along river banks/ around ponds.</p> <p>Extent of freshwater (river) habitat - No significant decline. Length mapped and calculated as 599.54km</p> <p>Extent of freshwater (lake) habitat – No significant decline. Area mapped and calculated as 25.06ha</p> <p>Couching sites and holts - No significant decline</p> <p>Fish biomass available – No significant decline</p> <p>Barriers to connectivity - No significant decline</p>		The removal of resting places from a smaller territory is a more significant impact as it is likely that there will be a lesser number of resting places established in a smaller territory. This would constitute a significant Impact.
Floating River Vegetation	<p>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.</p> <p>Significant Impacts Uncertain</p>		

Table 5.4: Assessment of Significance of Impacts for Weir Removal on the Dalua River in Kanturk AFA

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
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> <p>Juvenile density in fine sediment - at least 2/m²</p> <p>Availability of juvenile habitat - More than 50% of sample sites positive</p>	<p>Damage to Juvenile Lamprey habitat</p> <p>Displacement of Juvenile Lamprey</p>	<p>The removal of the weirs is likely to result in the permanent loss of juvenile Lamprey habitat which will have built up behind the weirs. Given the availability of suitable juvenile Lamprey habitat within the Dalua River and also within the River Blackwater SAC, the loss of habitat from behind the weirs will not significantly impact the target for the 'Availability of Juvenile Habitat' of more than 50% of sample sites positive.</p> <p>Displacement of juvenile Lamprey will not result in a reduction in overall density within the SAC. There is a high prevalence of fine sediment within the Dalua River and within the entire SAC, there is available suitable habitat downstream for displaced lamprey.</p> <p>The weir is an artificial barrier to lamprey movement. This will be removed and would likely have a positive effect on the attainment of the Distribution target for Sea, River and Brook Lamprey.</p> <p>No significant impact determined</p>
Freshwater Pearl Mussel	<p>Distribution – Maintain at 161km which equates to 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 - Restore to 35,000 adult Mussels. Current population is estimated at less than 10,000 for the Blackwater main channel.</p> <p>Recruitment - The Blackwater population is believed to be composed entirely of aged adults, with no evidence of recruitment for at least 20 Years. 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 - data for the Blackwater and its tributaries is poor. The target is to restore suitable habitat in more than 35km</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 juvenile salmonids to host glochidial larvae.</p>	Sedimentation of the watercourse	Sedimentation of the water course may affect the conservation targets for adult mortality rates, substratum quality, and habitat extent. This would constitute a significant Impact.
(objective: to restore favourable conservation status):			
Floating River Vegetation	<p>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.</p> <p>Significant Impacts Uncertain</p>		

Table 5.5: Assessment of Significance of Impacts for Flood Warning in Kanturk AFA

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
Freshwater Pearl Mussel <u>(objective: to restore favourable conservation status):</u>	<p>Distribution – Maintain at 161km which equates to 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 - Restore to 35,000 adult Mussels. Current population is estimated at less than 10,000 for the Blackwater main channel.</p> <p>Recruitment - The Blackwater population is believed to be composed entirely of aged adults, with no evidence of recruitment for at least 20 Years. 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 - data for the Blackwater and its tributaries is poor. The target is to restore suitable habitat in more than 35km</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 juvenile salmonids to host glochidial larvae.</p>	Sedimentation of the watercourse	An escape of sediment into the Allow River during installation of gauge stations could result in deposition of sediment upon adult mussels. There is an associated risk of mussel death through oxygen deprivation or starvation. This would significantly impact the population target and adult mortality target for pearl mussel and also suitability of pearl mussel habitat within the Allow River. This would constitute a significant Impact.

Table 5.6: Assessment of Significance of Impacts for Tidal Barrage (a) in Youghal AFA

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
Estuaries	<p>Habitat area- the permanent habitat area is stable or increasing, subject to natural processes</p> <p>Community extent- maintain the extent of the <i>Mytilus edulis</i>-dominated community subject to natural processes</p> <p>Community structure – conserve the high quality of the <i>Mytilus edulis</i>-dominated community subject to natural processes</p> <p>Community distribution- conserve the following community; intertidal estuarine sandy mud community complex; subtidal estuarine fine sand with <i>Bathyporeia</i> spp. Community complex; sand and mixed sediment with polychaetes and crustacean community complex; coarse sediment community complex</p>	Damage to Annex I habitat Sedimentation of the watercourse during construction phase	<p>The control structure mat result in direct loss of Annex I habitat. This would constitute a significant Impact.</p> <p>The construction activities have the potential to re-suspended sediments which could be transported outside the works area by tidal currents and subsequently settle out and impact on benthic habitats and species in other locations within the estuary</p> <p>The proposed structure may result in short term influx of freshwater upstream of the barrage. <i>Mytilus edulis</i> occur within the estuary, these are tolerant to temporary changes to salinity and the proposed measure will not significantly impact on the population extent or community structure of the species. The proposed measure will likely be a short-term impact on the community distribution of coastal communities however recovery will occur and the measure is not expected to affect the long term community distribution which is derived over 12 year period. No significant impact determined</p>
Mudflats and Sandflats not covered by seawater at low tide	<p>Habitat area- the permanent habitat area is stable or increasing, subject to natural processes</p> <p>Community extent- maintain the extent of the <i>Zostera</i> and <i>Mytilus edulis</i>-dominated community subject to natural processes</p> <p>Community structure – conserve the high quality of the <i>Mytilus edulis</i>-dominated community subject to natural processes</p> <p>Community distribution- the following community types should be conserved in a natural condition; intertidal estuarine sandy mud community complex and sand and mixed sediment with polychaetes and crustaceans community complex.</p>	Damage to Annex I habitat Sedimentation of the watercourse during construction phase	<p>The construction activities have the potential to re-suspended sediments which could be transported outside the works area by tidal currents and subsequently settle out and impact on benthic habitats and species in other locations upstream of the works.</p> <p>The control structure mat result in direct loss of Annex I habitat. This would constitute a significant Impact.</p> <p>The proposed structure may result in short term influx of freshwater upstream of the barrage when its closed during a flood event. <i>Mytilus edulis</i> occur within the estuary, these are tolerant to temporary changes to salinity and the proposed measure will not significantly impact on the population extent or community structure of the species. The proposed measure will likely be a temporary impact on the community distribution of coastal communities however recovery will occur and the measure is not expected to affect the long term community distribution which is derived over a 12 year period. The hydrodynamic response to the closure of the barrage is temporary and may result in temporary influx of freshwater upstream of the measures. The proposed measure will not significantly change the tidal range or community distribution within the estuary No significant impact determined</p>
Salicornia and other annuals colonising mud and sand	<p>Habitat area- area stable or increasing subject to natural processes, including erosion and succession</p> <p>Habitat distribution- no decline, or change in habitat distribution subject to natural processes</p> <p>Physical structure- maintain natural circulation of sediments and organic matter without any physical obstructions</p> <p>Physical structure creeks and pans-maintain creek and pan structure subject to natural processes including erosion and succession</p> <p>Physical structure- flooding regime- maintain natural tidal regime</p> <p>Vegetation structure zonation- maintain the range of coastal habitats including transitional zones subject to natural processes including erosion and succession</p> <p>Vegetation structure vegetation height- maintain structural variation within sward</p> <p>Vegetation structure ; vegetation cover- maintain more than 90% of area outside creek vegetation</p> <p>Vegetation composition ; typical species and sub-communities – maintain the presence of species poor communities with typical species listed in saltmarsh monitoring project</p> <p>Vegetation structure; negative indicator species <i>spartina anglica</i> – no significant expansion of common cordgrass (<i>spartina anglica</i>) with an annual spread of less than 1%</p>	Changes to tidal range and community structure	<p>The proposed measure will not result in direct damage on this Annex I habitat. Salicornia community is known to occur upstream within the Youghal estuary at the eastern side of the townland of Foxhole above Youghal, at Blackbog, along the Tourig and Kinsalebeg estuaries. They are ephemeral and transient in nature. The habitat is mainly associated with bays and estuaries where accretion is on-going. Its distribution can vary considerably from year to year and it can move in response to changing conditions. These species are used to saline conditions during tidal inundation at high tide and less tolerant to freshwater influences. This would constitute a significant Impact.</p> <p>The closure of the tidal barrage may result in indirect impacts on Annex I habitats upstream of the estuary due to alteration of tidal inundation and the influx of freshwater, changes in the nutrient loading and water salinity during the flood event. This in combination with changes in suspended sediments may alter the biodiversity and species range for the Salicornia, and other annuals colonising mudflats and sandflats and saltmarsh communities.</p> <p>This would constitute a significant Impact.</p>
Atlantic salt meadows (<i>Glauco-puccinellietalia Maritimae</i>)	<p>Vegetation composition; typical species and sub communities -maintain range of sub communities with typical species listed in Saltmarsh Monitoring Project</p> <p>Vegetation structure; negative indicator species <i>spartina anglica</i>- no significant expansion of common cordgrass (<i>Spartina anglica</i>) with an annual spread of less than 1%.</p>	Changes to tidal range and community structure	<p>The proposed measure will not result in direct damage on this Annex I habitat. Erosion and accretion affects this habitat. Both of these are natural processes and ASM as a coastal habitat will attempt to adjust or reach equilibrium in response to local changes. Typically Salicornia and sea arrowgrass species occur within the lower marsh and are less tolerant of freshwater influences. The proposed tidal barrage will change the tidal inundation with freshwater influx over a 7 hour period during a flood event. This would constitute a significant Impact.</p>
Freshwater Pearl Mussel	<p>Distribution – Maintain at 161km which equates to 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 - Restore to 35,000 adult Mussels. Current population is estimated at less than 10,000 for the Blackwater main channel.</p> <p>Recruitment - The Blackwater population is believed to be composed entirely of aged adults, with no evidence of recruitment for at least 20 Years. The objective</p>	Barrier to young migration of host fish	Impediment to movement of host fish upstream to pearl mussel populations during glochidia release impacting reproductive success. This is significant impact

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
	<p>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 - data for the Blackwater and its tributaries is poor. The target is to restore suitable habitat in more than 35km</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 juvenile salmonids to host glochidial larvae</p>		
Sea 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>	Barrier to young lamprey migration when control structure is restricting flows.	The control structure may form an artificial barrier to lamprey movement when it is in operation. Whilst the barrage is a permanent structure within the bay it has a gate approximately 50m wide to facilitate passage within the estuary, this measure will not have a considerable permanent obstruction when the gate is open. The barrage may temporarily impede the attainment of the Distribution target for Sea Lamprey during a flood event. Adults sea lamprey begin entering fresh water as early as April but chiefly during late May and early June. This would be significant where it occurs during upstream migration to spawning habitat. This would constitute a significant Impact.
Atlantic Salmon	<p>Distribution – 100% of river channels down to 2nd 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. Currently set at 17 salmon fry/ 5 min sampling</p> <p>Out-migrating smolt abundance = no significant decline</p> <p>structure of juveniles –more than one age class present</p> <p>Water quality – at least Q4 at all sites sampled by EPA</p>	Barrier to young migration and smolt out-migrating when control structure is restricting flows	The control structure may form an artificial barrier to salmon movement when it is in operation. This will temporarily impede the attainment of the Distribution target for salmon and out-migrating smolt abundance. 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 . This would be significant where it occurs during upstream migration to spawning habitat, out migrating of smolts. Whilst the barrage is a permanent structure within the bay, it has a gate approximately 50m wide to facilitate passage within the estuary, this measure will not have a significant permanent obstruction when the gate is open. This would constitute a significant Impact.
Twait Shad	<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 –more than one age class present</p> <p>Water quality oxygen levels- no lower than 5mg/l</p> <p>Spawning habitat quality – maintain stable gravel substrate with very little fine material, free of filamentous algal growth and macrophyte growth</p>	Barrier to young migration and smolt out-migrating when control structure is restricting flows	The control structure may form an artificial barrier to shad movement when it is in operation. This will temporarily impede the attainment of the Distribution target for salmon and out-migrating smolt abundance. This would be significant where it occurs during upstream migration to spawning habitat, out migrating of smolts. This would constitute a significant Impact.
Wetland Birds of the Blackwater Estuary SPA	<p>Population trend- long term population trend stable or increasing</p> <p>Distribution –there should be no significant decrease in the range, timing or intensity of use of areas by qualifying species other than that occurring from natural patterns of variation</p>	<p>Localised changes in available feeding habitat</p> <p>Temporary noise disturbance</p>	Construction activities may cause temporary disturbance to birds in commuting upstream to the SPA which may cause them to temporarily displacement to alternative suitable feeding areas. The disturbance to other areas may temporary increase feeding competition in these areas, however the construction of the flood risk management measures will unlikely impact on the population sizes and success rates and conservation status of the qualifying interests of the SPA in the long term. The long term population trends are derived over 12 year period. The barrage will remain closed until the tide level outside is lower than the maximum water level within the barrage (1.6m OD Malin). Therefore, the barrage should remain closed for approx. 7 hours. The birds will still have availability of roosting areas Barrage will potentially will cause temporary localised impact feeding habitat for the waterbirds for approximately 3 hours. The closure of the barrage will occur during a 0.5% AEP flood event is extremely unlikely to result in change in roosting area distribution fluvial influence is up to high water mark. Birds feed on a mixture of crustaceans and worms there will be temporary reoccurring reduction of biomass availability to the influence of freshwater on infauna on the mudflat habitat (breeding area). However this will not be deemed significant due the temporary nature of the measure. No significant impact determined

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
			Construction activities may cause temporary disturbance to birds in the SPA which may cause them to temporarily move to alternative suitable feeding areas. The disturbance to other areas may increase feeding competition in these areas in the short term, however the construction of the flood risk management measures will unlikely impact on the population sizes and success rates and conservation status of the qualifying interests of the SPA in the long term. No significant impact determined

Table 5.7: Assessment of Significance of Impacts for Tidal Barrage (b) in Youghal AFA

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
Estuaries	<p>Habitat area- the permanent habitat area is stable or increasing, subject to natural processes</p> <p>Community extent- maintain the extent of the <i>Mytilus edulis</i>-dominated community subject to natural processes</p> <p>Community structure – conserve the high quality of the <i>Mytilus edulis</i>-dominated community subject to natural processes</p> <p>Community distribution- conserve the following community; intertidal estuarine sandy mud community complex; subtidal estuarine fine sand with <i>Bathyporeia</i> spp. Community complex; sand and mixed sediment with polychaetes and crustacean community complex; coarse sediment community complex</p>	<p>Damage to Annex I habitat</p> <p>Sedimentation of the watercourse</p> <p>Changes to tidal range within the estuary</p>	<p>The construction activities have the potential to re-suspended sediments which could be transported outside the works area by tidal currents and subsequently settle out and impact on benthic habitats and species in other locations within the estuary. The control structure will not result in direct loss of Annex I habitat. No significant impact determined</p> <p>The proposed structure may result in short term influx of freshwater upstream of the barrage when its closed during a flood event. <i>Mytilus edulis</i> occur within the estuary, these are tolerant to short term changes to salinity and the proposed measure will not significantly impact on the population extent or community structure of the species. The proposed measure will likely be a short term impact on the community distribution of coastal communities however recovery will occur and the measure is not expected to affect the long term community distribution which is derived over 12 year period. The hydrodynamic response to the closure of the barrage is temporary and may result in temporary influx of freshwater upstream of the measures. The proposed measure will not significantly change the tidal range or community distribution within the estuary. No significant impact determined</p>
Mudflats and Sandflats not covered by seawater at low tide	<p>Habitat area- the permanent habitat area is stable or increasing, subject to natural processes</p> <p>Community extent- maintain the extent of the <i>Zostera</i> and <i>Mytilus edulis</i>-dominated community subject to natural processes</p> <p>Community structure – conserve the high quality of the <i>Mytilus edulis</i>-dominated community subject to natural processes</p> <p>Community distribution- the following community types should be conserved in a natural condition; intertidal estuarine sandy mud community complex and sand and mixed sediment with polychaetes and crustaceans community complex.</p>	Damage to Annex I habitat	<p>The construction activities have the potential to re-suspended sediments which could be transported outside the works area by tidal currents and subsequently settle out and impact on benthic habitats and species in other locations upstream of the works.</p> <p>The control structure will not result in direct loss of Annex I habitat. No significant impact determined</p> <p>The proposed structure may result in short term influx of freshwater upstream of the barrage when its closed during a flood event. <i>Mytilus edulis</i> occur within the estuary, these are tolerant to short term changes to salinity and the proposed measure will not significantly impact on the population extent or community structure of the species. The proposed measure will likely be a short term impact on the community distribution of coastal communities however recovery will occur and the measure is not expected to affect the long term community distribution which is derived over 12 year period. The hydrodynamic response to the closure of the barrage is temporary and may result in temporary influx of freshwater upstream of the measures. The proposed measure will not significantly change the tidal range or community distribution within the estuary No significant impact determined</p>
Salicornia and other annuals colonising mud and sand	<p>Habitat area- area stable or increasing subject to natural processes, including erosion and succession</p> <p>Habitat distribution- no decline, or change in habitat distribution subject to natural processes</p> <p>Physical structure- maintain natural circulation of sediments and organic matter without any physical obstructions</p> <p>Physical structure creeks and pans-maintain creek and pan structure subject to natural processes including erosion and succession</p> <p>Physical structure- flooding regime- maintain natural tidal regime</p> <p>Vegetation structure zonation- maintain the range of coastal habitats including transitional zones subject to natural processes including erosion and succession</p> <p>Vegetation structure vegetation height- maintain structural variation within sward</p> <p>Vegetation structure ; vegetation cover- maintain more than 90% of area outside creek vegetation</p> <p>Vegetation composition ; typical species and sub-communities – maintain the presence of species poor communities with typical species listed in saltmarsh monitoring project</p> <p>Vegetation structure; negative indicator species <i>spartina anglica</i> – no significant expansion of common cordgrass (<i>spartina anglica</i>) with an annual spread of less than 1%</p>	Changes to tidal range and community structure	<p>The proposed measure will not result in direct damage on this Annex I habitat. Salicornia community is known to occur upstream within the Youghal estuary at the eastern side of the townland of Foxbole above Youghal, at Blackbog, along the Tourig and Kinsalebeg estuaries. They are ephemeral and transient in nature. The habitat is mainly associated with bays and estuaries where accretion is on-going. They typically occur on the fringes of saltmarsh. Its distribution can vary considerably from year to year and it can move in response to changing conditions. These species are used to saline conditions during tidal inundation at high tide and are less tolerant to freshwater influences. This would constitute a significant Impact.</p> <p>The closure of the tidal barrage may result in indirect impacts on Annex I habitats upstream of the estuary due to alteration of tidal inundation and the influx of freshwater, changes in the nutrient loading and water salinity during the flood event. This in combination with changes in suspended sediments may alter the biodiversity and species range for the Salicornia, and other annuals colonising mudflats and sandflats and saltmarsh communities.</p> <p>This would constitute a significant Impact.</p>

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
Altantic salt meadows (<i>Glauco-puccinellietalia Maritimae</i>)	<p>Vegetation composition; typical species and sub communities -maintain range of sub communities with typical species listed in Saltmarsh Monitoring Project</p> <p>Vegetation structure; negative indicator species spartina anglica- no significant expansion of common cordgrass (<i>Spartina anglica</i>) with an annual spread of less than 1%.</p>	Changes to tidal range and community structure	The proposed measure will not result in direct damage on this Annex I habitat. Erosion and accretion affects this habitat. Both of these are natural processes and ASM as a coastal habitat will attempt to adjust or reach equilibrium in response to local changes. Typically Salicornia and sea arrowgrass species occur within the lower marsh and are less tolerant of freshwater influences. The proposed tidal barrage will change the tidal inundation with freshwater influx over a 7 hour period during a flood event. This would constitute a significant Impact.
Freshwater Pearl Mussel	<p>Distribution – Maintain at 161km which equates to 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 - Restore to 35,000 adult Mussels. Current population is estimated at less than 10,000 for the Blackwater main channel.</p> <p>Recruitment - The Blackwater population is believed to be composed entirely of aged adults, with no evidence of recruitment for at least 20 Years. 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 - data for the Blackwater and its tributaries is poor. The target is to restore suitable habitat in more than 35km</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 juvenile salmonids to host glochidial larvae</p>	Barrier to young migration of host fish	Impediment to movement of host fish upstream to pearl mussel populations during glochidia release impacting reproductive success. This is significant impact
Sea Lamprey Sea	<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>	Barrier to young lamprey migration when control structure is restricting flows.	The control structure may form an artificial barrier to lamprey movement when it is in operation. Whilst the barrage is a permanent structure within the bay it has a gate approximately 50m wide to facilitate passage within the estuary, this measure will not have a considerable permanent obstruction when the gate is open. The barrage will temporarily impede the attainment of the Distribution target for Sea Lamprey during a flood event. Adults sea lamprey begin entering fresh water as early as April but chiefly during late May and early June. This would be significant where it occurs during upstream migration to spawning habitat. This would constitute a significant Impact.
Salmon	<p>Distribution – 100% of river channels down to 2nd 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. Currently set at 17 salmon fry/ 5 min sampling</p> <p>Out-migrating smolt abundance = no significant decline</p> <p>structure of juveniles –more than one age class present</p> <p>Water quality – at least Q4 at all sites sampled by EPA</p>	Barrier to young migration and smolt out-migrating when control structure is restricting flows	The control structure may form an artificial barrier to salmon movement when it is in operation. This will temporarily impede the attainment of the Distribution target for salmon and out-migrating smolt abundance. 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 . This would be significant where it occurs during upstream migration to spawning habitat, out migrating of smolts. Whilst the barrage is a permanent structure within the bay it has a gate approximately 50m wide to facilitate passage within the estuary, this measure will not have a significant permanent obstruction when the gate is open. This would constitute a significant Impact.
Twait Shad	<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 –more than one age class present</p> <p>Water quality oxygen levels- no lower than 5mg/l</p> <p>Spawning habitat quality – maintain stable gravel substrate with very little fine material, free of filamentous algal growth and macrophyte growth</p>	Barrier to young migration and smolt out-migrating when control structure is restricting flows	The control structure may form an artificial barrier to shad movement when it is in operation. This will temporarily impede the attainment of the Distribution target for salmon and out-migrating smolt abundance. This would be significant where it occurs during upstream migration to spawning habitat, out migrating of smolts. This would constitute a significant Impact.

Qualifying Feature	Conservation Targets	Impact Type	Significance of Impact
Wetland Birds of the Blackwater Estuary SPA	Population trend- long term population trend stable or increasing Distribution –there should be no significant decrease in the range, timing or intensity of use of areas by qualifying species other than that occurring from natural patterns of variation.	Localised changes in available feeding habitat	<p>Construction activities may cause temporary disturbance to birds in commuting upstream to the SPA which may cause them to temporarily displacement to alternative suitable feeding areas. The disturbance to other areas may temporary increase feeding competition in these areas, however the construction of the flood risk management measures will unlikely impact on the population sizes and success rates and conservation status of the qualifying interests of the SPA in the long term. The long term population trends are derived over 12 year period. The barrage will remain closed until the tide level outside is lower than the maximum water level within the barrage (1.6m OD Malin). Therefore, the barrage should remain closed for approx. 7 hours. The birds will still have availability of roosting. The barrage will not alter tidal range landward of the barrage, however it potentially will cause temporary localised impact feeding habitat for the waterbirds for approximately 3 hours. The closure of the barrage will occur during a 0.5% AEP flood event is extremely unlikely to result in change in roosting area distribution fluvial influence is up to high water mark. Birds feed on a mixture of crustaceans and worms there will be temporary reduction of biomass availability to the influence of freshwater on infauna on the mudflat habitat (breeding area). However this will not be deemed significant due the temporary nature of the measure. No significant impact determined</p> <p>Construction activities will cause temporary disturbance to birds in the SPA which may cause them to temporarily move to alternative suitable feeding areas. The disturbance to other areas may increase feeding competition in these areas in the short term, however the construction of the flood risk management measures will unlikely impact on the population sizes and success rates and conservation status of the qualifying interests of the SPA in the long term. No significant impact determined</p>

6 Conclusions and Screening Statement

Screening Statement

This Appropriate Assessment Screening is carried out in conjunction with the preliminary option appraisal process, (Document Ref: Preliminary Options Report for UoM 18). The option appraisal assessed each viable flood risk management options in terms of potential technical, social and environmental impacts. The option appraisal stage identified preferred options for each AFA in UoM18 as follows;

Table 6.1: Preferred Flood Risk Management for UoM18

AFA	Preferred Option
Ballyduff	Flood Defences
Kanturk	Storage and Flood Defences
Rathcormac	Flow Diversion
Aglish	Flood Defences
Youghal	Flood Defences

This screening for Appropriate Assessment has determined that there are no likely significant effects on the Natura 2000 Network from the implementation of flood risk management options in Rathcormac or Aglish, which includes the preferred flood risk management option.

The preferred flood risk management option for Youghal has been assessed as having no likely significant effects on the Natura 2000 Network, while the Tidal barrage options (a) and (b) are assessed as having likely significant effects.

All options (including the preferred flood risk management option) for Kanturk and Ballyduff have been assessed as likely to have significant effects on the Natura 2000 Network, i.e. assessment of impacts of flood risk management options in UoM 18 on Natura 2000 sites has determined that **significant effects are likely or uncertain** for the Blackwater River SAC and Blackwater Callow SPA and Blackwater Estuary SPA associated with the preferred flood risk management options for the Kanturk and Ballyduff AFAs.

Further assessment is necessary to determine if the preferred flood risk management options within the Kanturk and Ballyduff AFAs will have adverse effects on the integrity of the Natura 2000 sites, in view of the sites conservation objectives.

Table 6.2: Screening Matrix for UoM18

Screening Matrix	
	Project
Brief description of the project or plan	<p>Ballyduff AFA</p> <p>Option 1 - Flood Defences Works -This option considers the mitigation of flood risk through the construction of fluvial flood defences within the town. These defences include walls, embankments and road raising.</p> <p>Kanturk AFA structural options:</p> <p>Option 1 – Flood Defences/Localised Protection Works- this option considers the mitigation of flood risk through the construction of flood defences and localised protection works. These defences</p>

Screening Matrix

include a combination of walls and embankments on both rivers ranging in height from 0.8m to 2.6m.

Option 2 - Storage and Flood Defences - a viable location for the storage of fluvial flows was identified upstream on the River Dalua. A potential storage area of 330,000m² was identified used in combination with localised defence works within the town ranging in height from 0.5m to 1.9m.

Option 3- Flood Defences & Conveyance - This option would involve the removal of existing constructed weirs within the River Dalua at Church Street Footbridge in combination with localised protection works ranging in height from 0.5m to 2.5m.

Non structural option includes a forecast warning system within the Allow River.

Youghal AFA

Option 1 - Tidal flood defence of the town using low lying walls on the quays, ranging in height from 1.1m to 1.4m.

Option 2 - Tidal Barrage (a) – This option considers the mitigation of tidal flood risk through the construction of a tidal barrage at the narrowest part of the estuary within the Blackwater River SAC . The barrage will be approximately 715m in length. The elevation of the barrage will be 3.63m O.D. Malin.

Option 3 - Tidal Barrage (b)- This option considers the mitigation of tidal flood risk through the construction of a tidal barrage outside the SAC boundary. The barrage will be approximately 1.4km in length. The elevation of the barrage will be 3.63m O.D. Malin.

Natura 2000 Site

Brief description of the Natura 2000 site(s)

The Blackwater River SAC

The River Blackwater is one of the largest rivers in Ireland, draining a major part of Co. Cork and parts of Counties Kerry, Limerick, Tipperary and Waterford. The site consists of most of the freshwater stretches of the system as well as the estuarine component at Youghal.

- i Annex I habitats occurring within the site include estuaries, intertidal mudflats and sandflats, perennial vegetation of stony banks, salt meadows, Floating River Vegetation , alluvial forests, yew woodland and oak woodlands.
- i Aquatic species include: Lamprey (*Lampetra planeri*, *L. fluviatilis*, *Petromyzon marinus*) Twaite shad (*Alosa fallax fallax*), and Atlantic Salmon (*Salmo salar*). Substantial populations of Freshwater pearl mussel (*Margaritifera margaritifera*) occur. White-Clawed Crayfish (*Austropotamobius pallipes*) are confined to the Awbeg River.
- i Otter (*Lutra lutra*) is widespread throughout the SAC.
- i Killarney fern (*Trichomanes speciosum*) occurs near Lismore.

The Blackwater Callows SPA

The site comprises a 23 km stretch of the River Blackwater, running in a west to east direction between Fermoy and Lismore. It includes the river channel and strips of seasonally flooded grassland within the flood plain. The site is of high importance for wintering waterfowl. It supports an internationally important population of Whooper Swan (*Cygnus Cygnus*) and nationally important populations of Wigeon (*Anas Penelope*), Teal (*Anas crecca*) and Black-tailed Godwit (*Limosa*

Screening Matrix

limosa). The population of *Limosa limosa* has exceeded the threshold for international importance at times. Little Egret also uses the site.

The Blackwater Estuary SPA

The Blackwater Estuary SPA is a relatively small, sheltered south-facing estuary, which extends from below Youghal Bridge to the Ferry Point peninsula. It comprises a section of the main channel of the River Blackwater. At low tide, intertidal flats are exposed. The intertidal sediments are mostly muds or sandy muds. Salt marshes occur along the sheltered inlets. A low-lying field which provides an important roost is included. The Blackwater Estuary is of high ornithological importance for wintering waterfowl, providing good quality feeding areas for a diversity of waterfowl species. At high tide, the birds roost along the shoreline and salt marsh fringe. The site supports an internationally important population of Black-tailed Godwit *Limosa limosa* (over 5% of the national total). It supports a further eight species in numbers of national importance: Wigeon (*Anas penelope*), Golden Plover (*Pluvialis apricaria*), Lapwing (*Vanellus vanellus*), Dunlin (*Calidris alpina*), Curlew (*Numenius arquata*), and Redshank (*Tringa totanus*). A population of Bar-tailed Godwit *Limosa lapponica* exceeds the threshold for national importance in some winters. Egretta garzetta breeds locally and the Blackwater Estuary is a main feeding area.

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 flood walls and embankments within Ballyduff AFA within the Blackwater River SAC and the Blackwater Callows SPA.
Construction of flood walls and embankments, construction of storage area and conveyance measure on the Dalua and Allow Rivers, part of the Blackwater River SAC.
Construction of tidal barrage (a) within Youghal AFA which is within Blackwater River SAC and Blackwater Estuary SPA.
Construction of tidal barrage (b) outside Natura 2000 site boundary and hydrologically connected to the Blackwater River SAC and Blackwater Estuary SPA.

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:

Size and scale;

Land-take;

Distance from the Natura 2000 site or key features of the site;

Resource requirements (water abstraction etc);

Emissions (disposal to land, water or air);

Excavation requirements;

Transportation requirements;

Duration of construction, operation, decommissioning etc;

Other.

Sedimentation of the watercourse and pollution by accidental spills and leaks of fuel / oils from machinery.

Sedimentation of spawning gravels

Noise and physical disturbance

Destruction of Annex I habitat due to in-stream works,

Temporary changes in the tidal communities upstream,

Barrier to young migration and smolt out-migrating when control structure is restricting flows and indirect impact on the reproductive success of Freshwater Pearl Mussels

Damage to otter holt/couch

Screening Matrix	
Describe any likely changes to the site arising as a result of: Reduction in habitat area; Disturbance to key species; Habitat or species fragmentation; Reduction in species density; Changes in key indicators of conservation value (water quality etc); Climate change.	<p>Ballyduff AFA- impacts on extent and distribution of lamprey and salmon spawning gravels are possible and possible impact of sedimentation on Floating River Vegetation</p> <p>Kanturk AFA- storage area : possible impacts on otter holts/couch and possible impact of sedimentation on Floating River Vegetation</p> <p>Flood warning system- possible sedimentation and deposition of sediment upon adult Freshwater Pearl Mussels</p> <p>Youghal AFA:</p> <p>Tidal barrage (a)- direct and indirect damage to Annex I habitat possible, sedimentation of the estuary during the works, changes in the tidal inundation during a flood event resulting in an influx of freshwater conditions on lower marsh saltmarsh communities.</p> <p>Barrier to migration upstream and out migration of sea lamprey and salmon and twaite shad during flood event</p> <p>Impediment to movement of host fish upstream to pearl mussel populations during glochidia release due to sedimentation of the watercourse impacting reproductive success</p> <p>Tidal barrage (b)- indirect damage to Annex I habitat possible, sedimentation of the estuary during the works, changes in the tidal inundation during a flood event resulting in an influx of freshwater conditions on lower marsh saltmarsh communities.</p> <p>Barrier to migration upstream and out migration of sea lamprey and salmon and twaite shad during flood event</p> <p>Impediment to movement of host fish upstream to pearl mussel populations during glochidia release due to sedimentation of the watercourse impacting reproductive success .</p>
Describe any likely impacts on the Natura 2000 site as a whole in terms of: Interference with the key relationships that define the structure of the site; Interference with key relationships that define the function of the site.	<p>Sedimentation of the watercourse and pollution by accidental spills and leaks of fuel / oils from machinery.</p> <p>Sedimentation of spawning gravels</p> <p>Noise and physical disturbance</p> <p>Destruction of Annex I habitat due to in-stream works,</p> <p>Temporary changes in the tidal communities upstream,</p> <p>Barrier to young migration and smolt out-migrating when control structure is restricting flows and indirect impact on the reproductive success of Freshwater pearl mussels</p> <p>Damage to otter holt/couch</p>
Provide indicators of significance as a result of the identification of effects set out above in terms of: Loss; Fragmentation; Disruption; Disturbance; Change to key elements of the site.	<p>Ballyduff AFA- impacts on extent and distribution of lamprey and salmon spawning gravels and loss on Floating River Vegetation habitat</p> <p>Kanturk AFA- storage area: loss foraging habitat and disturbance and removal of otter holts/couch loss of Floating River Vegetation</p> <p>Flood warning system- impact on population target and adult mortality of Freshwater Pearl Mussels</p> <p>Youghal AFA- Tidal barrage (a)- direct and indirect damage to Annex I habitat, sedimentation of the estuary during the works, changes in the tidal inundation during a flood event resulting in an</p>

Screening Matrix	
	<p>influx of freshwater conditions on lower marsh saltmarsh communities'.</p> <p>Barrier to migration upstream and out migration of sea lamprey and salmon and twaite shad during flood event</p> <p>Impediment to reproductive success of Freshwater Pearl Mussel</p> <p>Tidal barrage (b)- indirect damage to Annex I habitat possible, sedimentation of the estuary during the works, changes in the tidal inundation during a flood event resulting in an influx of freshwater conditions on lower marsh saltmarsh communities.</p> <p>Barrier to migration upstream and out migration of sea lamprey and salmon and twaite shad during flood event</p> <p>Impediment to reproductive success of Freshwater Pearl Mussel</p>
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>Loss of Annex I habitat , loss of habitat and disruption of Annex II and IV species</p> <p>Floating water vegetation habitat are poorly understood and their typical species in Ireland have not yet been defined. Significance of impact cannot be determined.</p>

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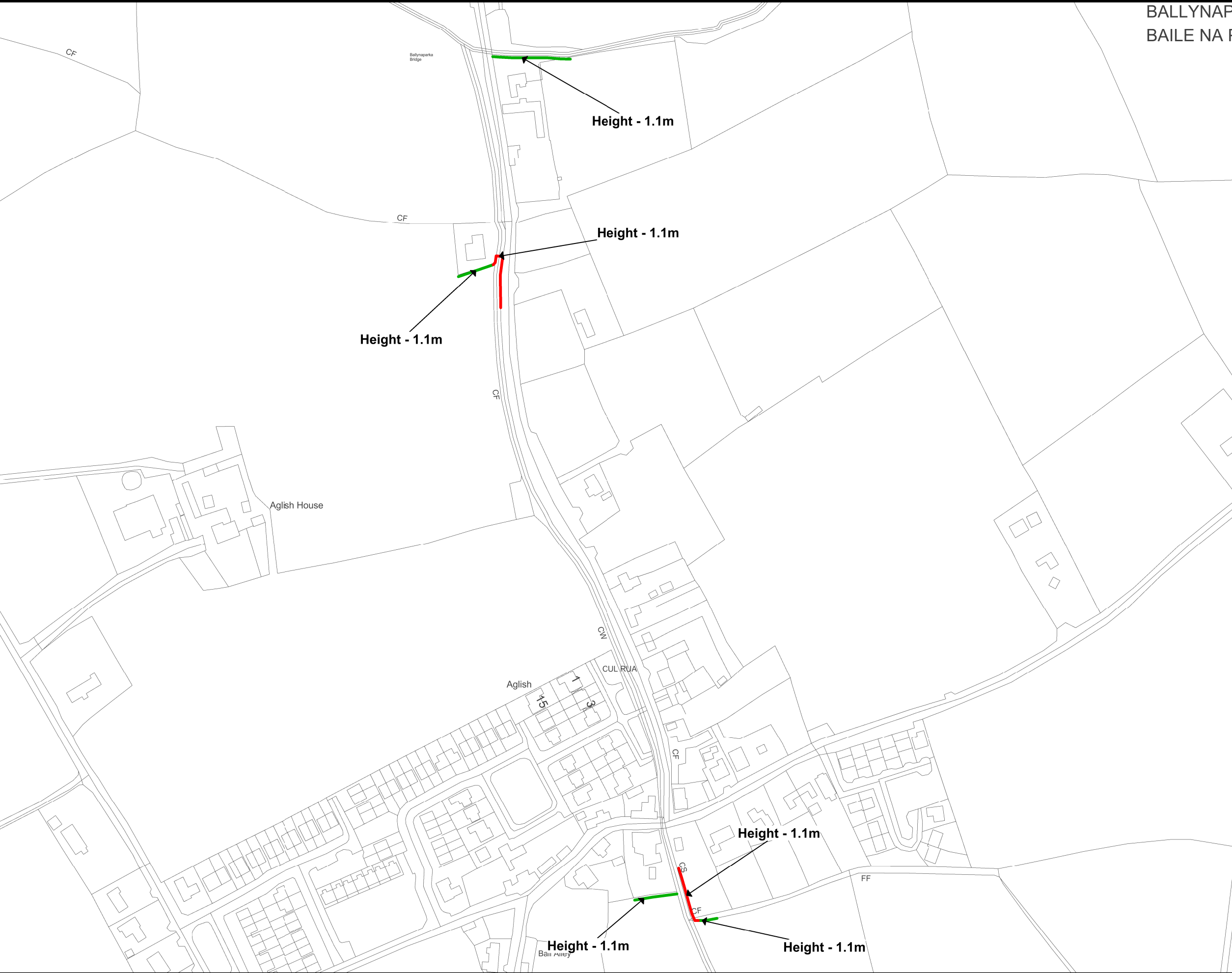
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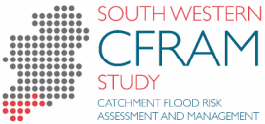
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8 Appendix A



BALLYNAPARKA
BAILE NA R

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 : Aglish
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-18-AH-201-P1

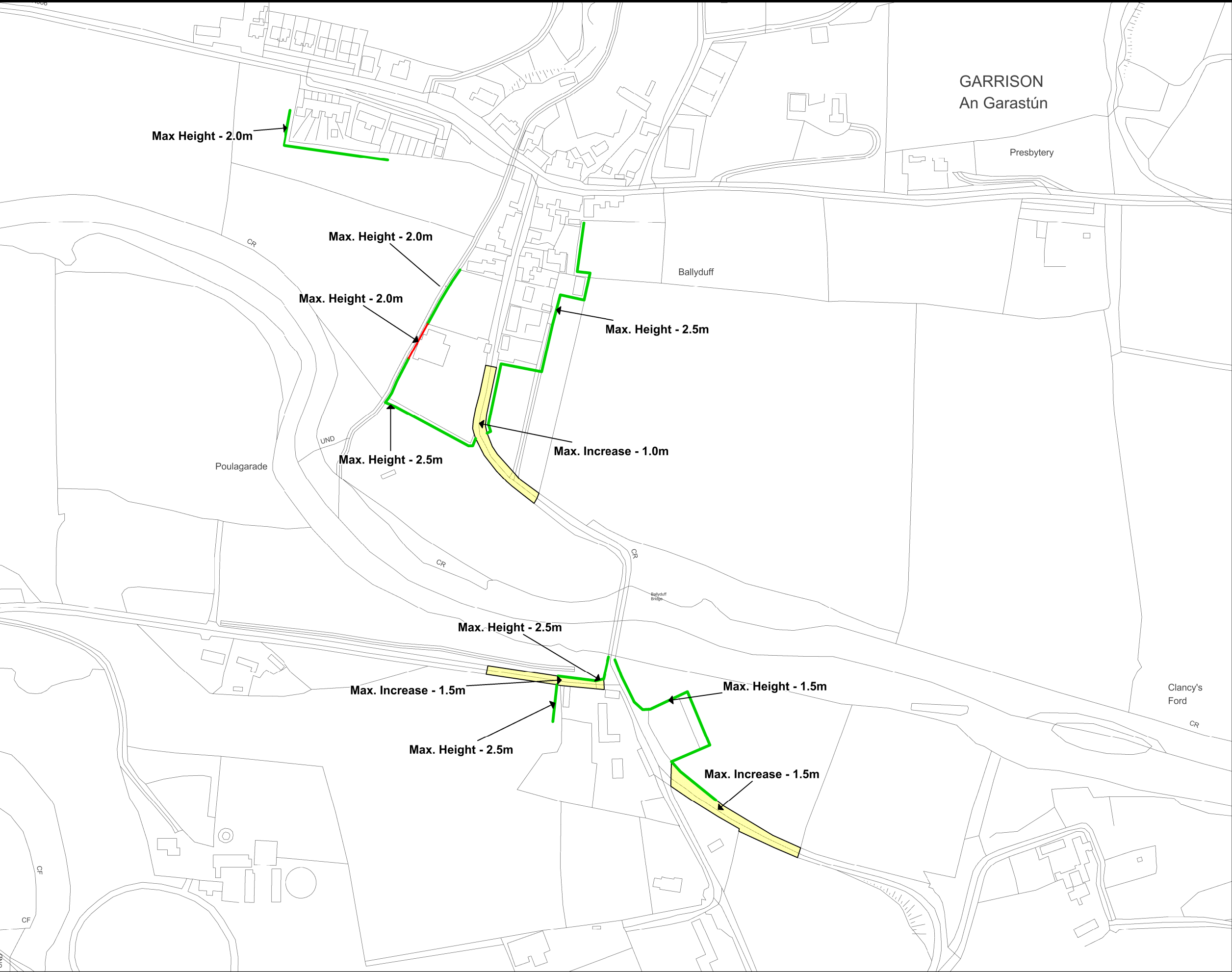
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- Flood Defence Walls
- Flood Defence Embankment
- Road Raising



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Trim, Co. Meath



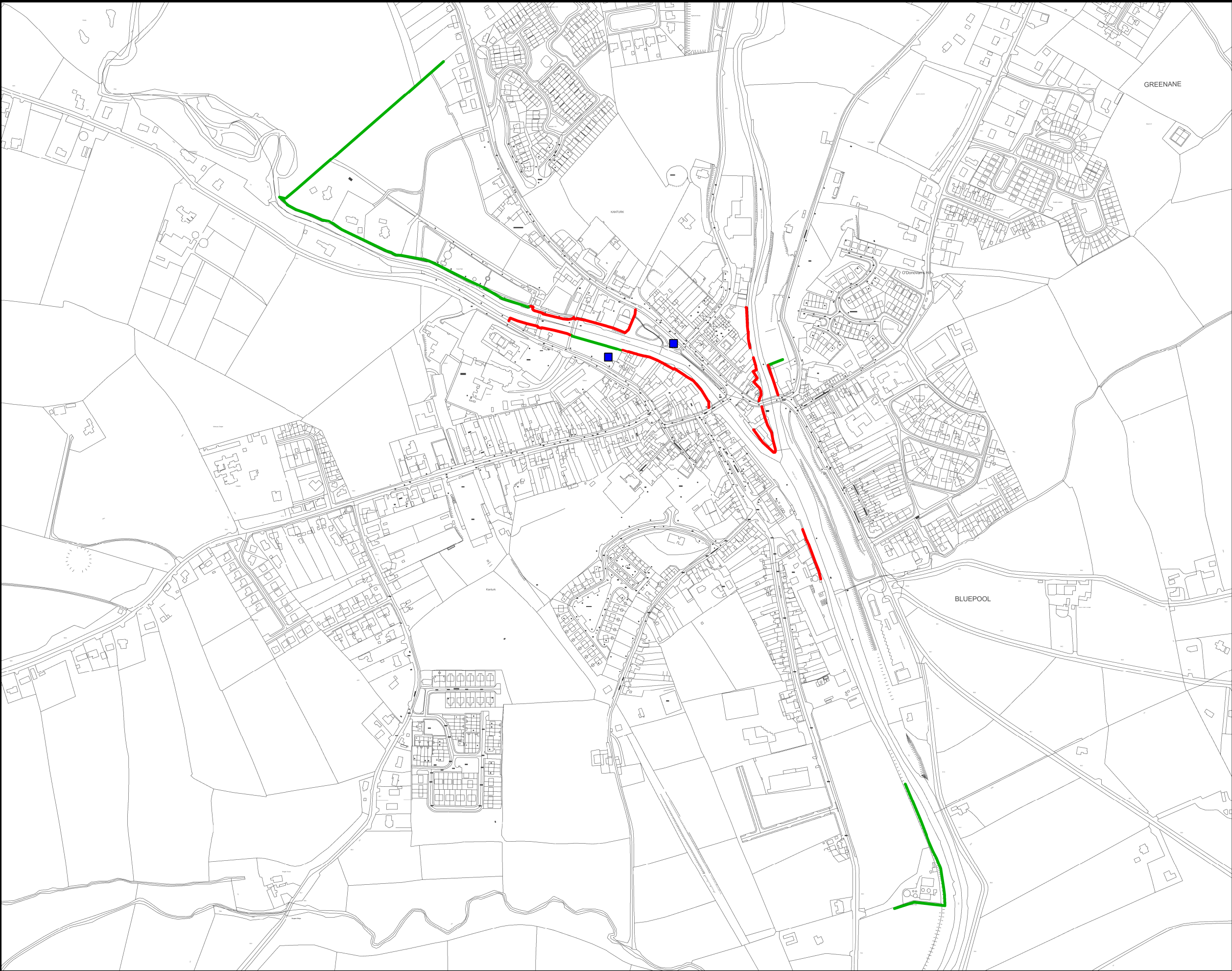
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Little Island, Cork

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Map Area:	Urban Area
Scenario:	Current
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Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
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Flood Defence Walls

Flood Defence Embankments

Pump Stations



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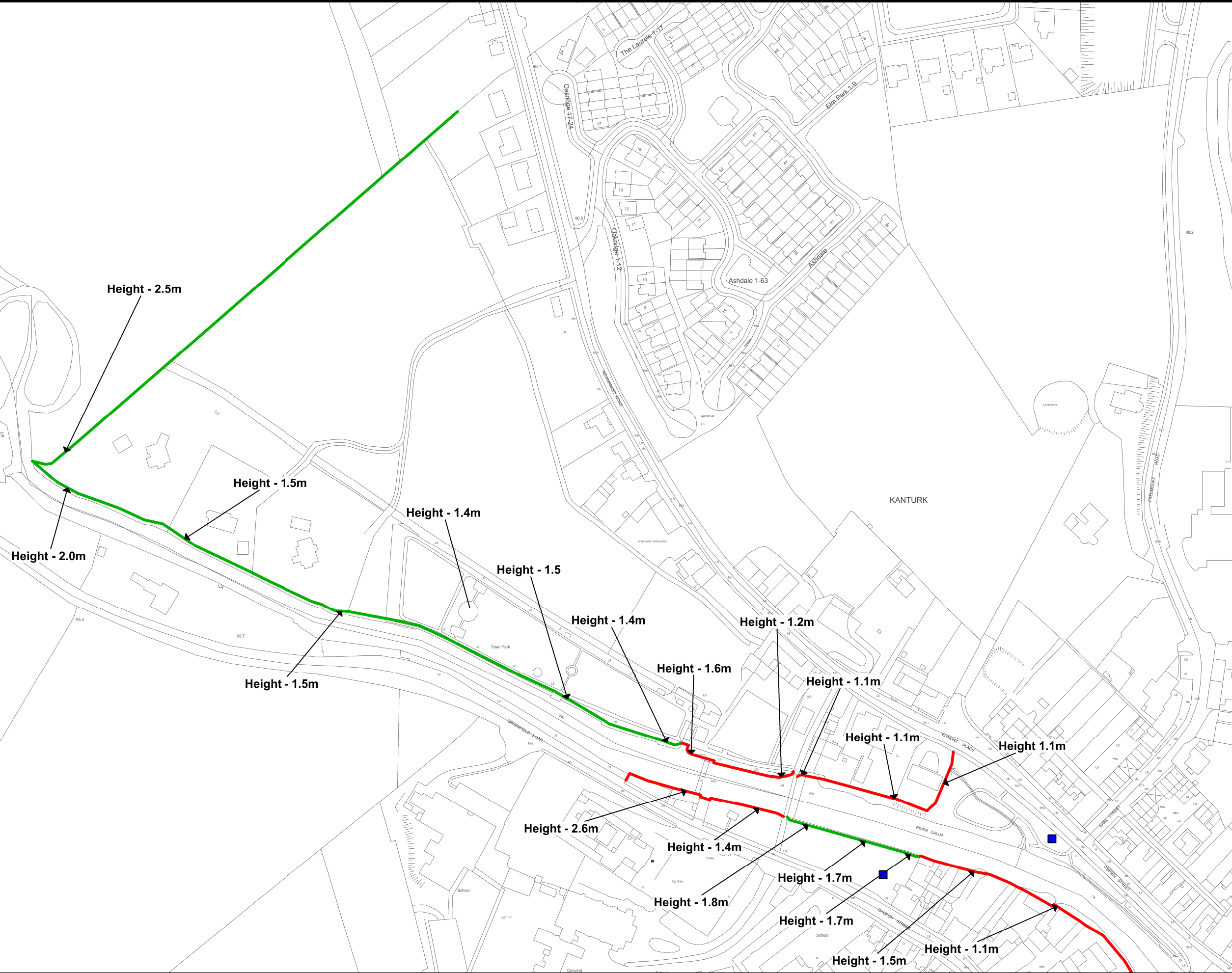
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Scenario:	Current
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Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-18-KK-201-P1
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Flood Defence Walls

Flood Defence Embankments

Pump Stations



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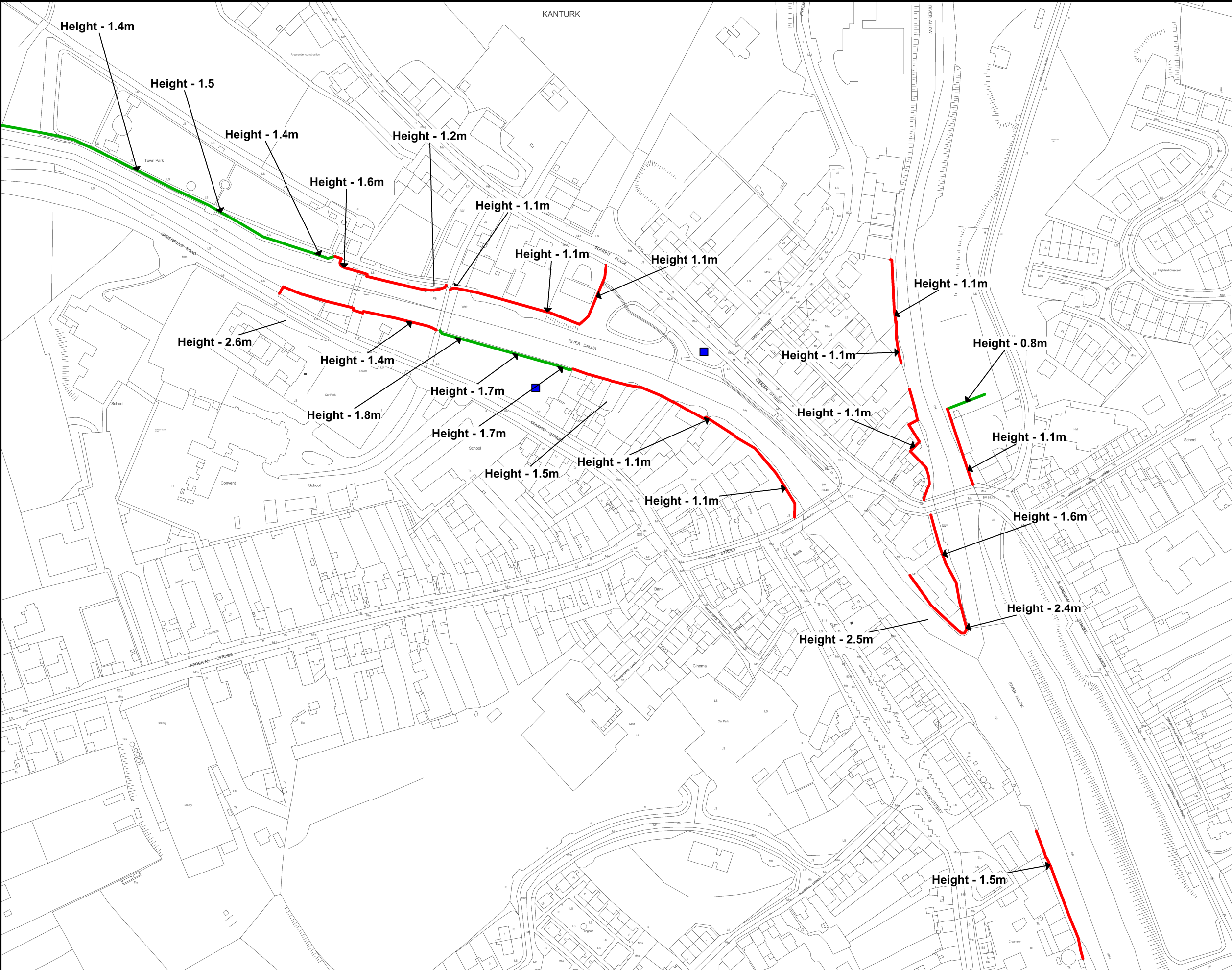
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Flood Defence Walls


Flood Defence Embankments


Pump Stations




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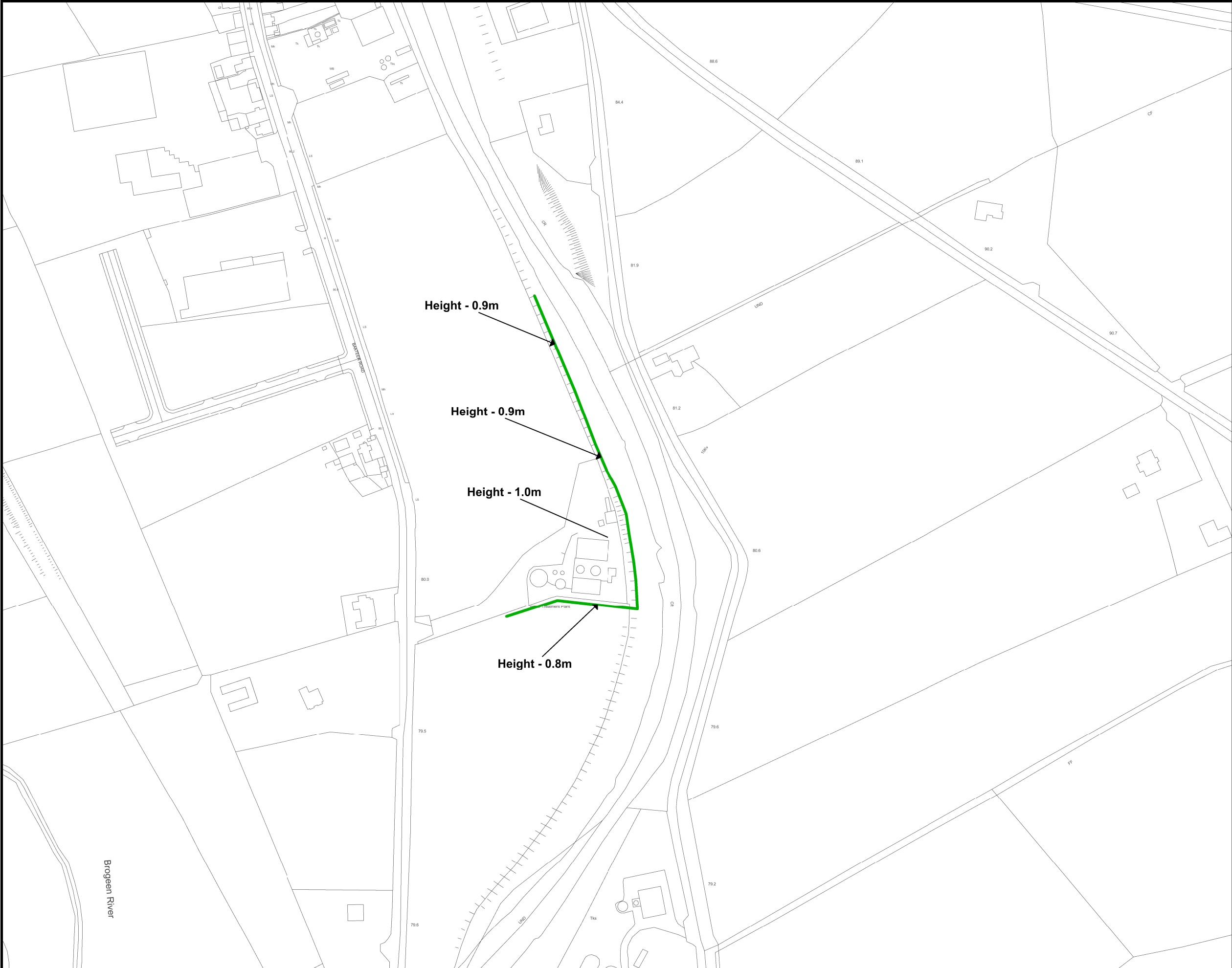
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Checked by:	Barry O'Connor
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Flood Defence Walls

Flood Defence Embankments



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Project : South Western CFRAM Study	
Map : Kanturk 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
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Storage Area

Storage Embankment

Flood Defence Walls

Flood Defence Embankments

Pump Stations



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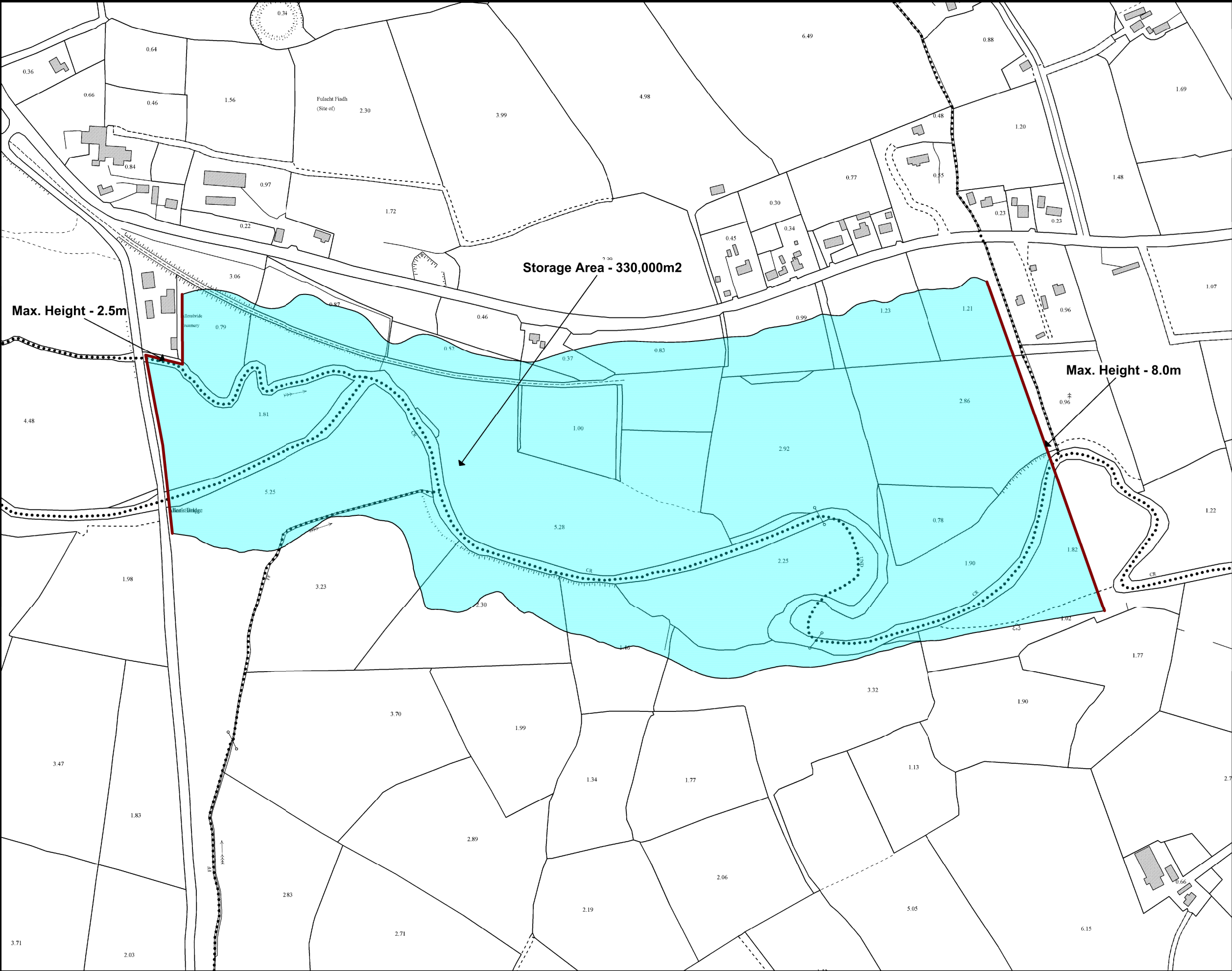
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Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
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- Storage Area
- Storage Embankment
- Flood Defence Walls
- Flood Defence Embankments



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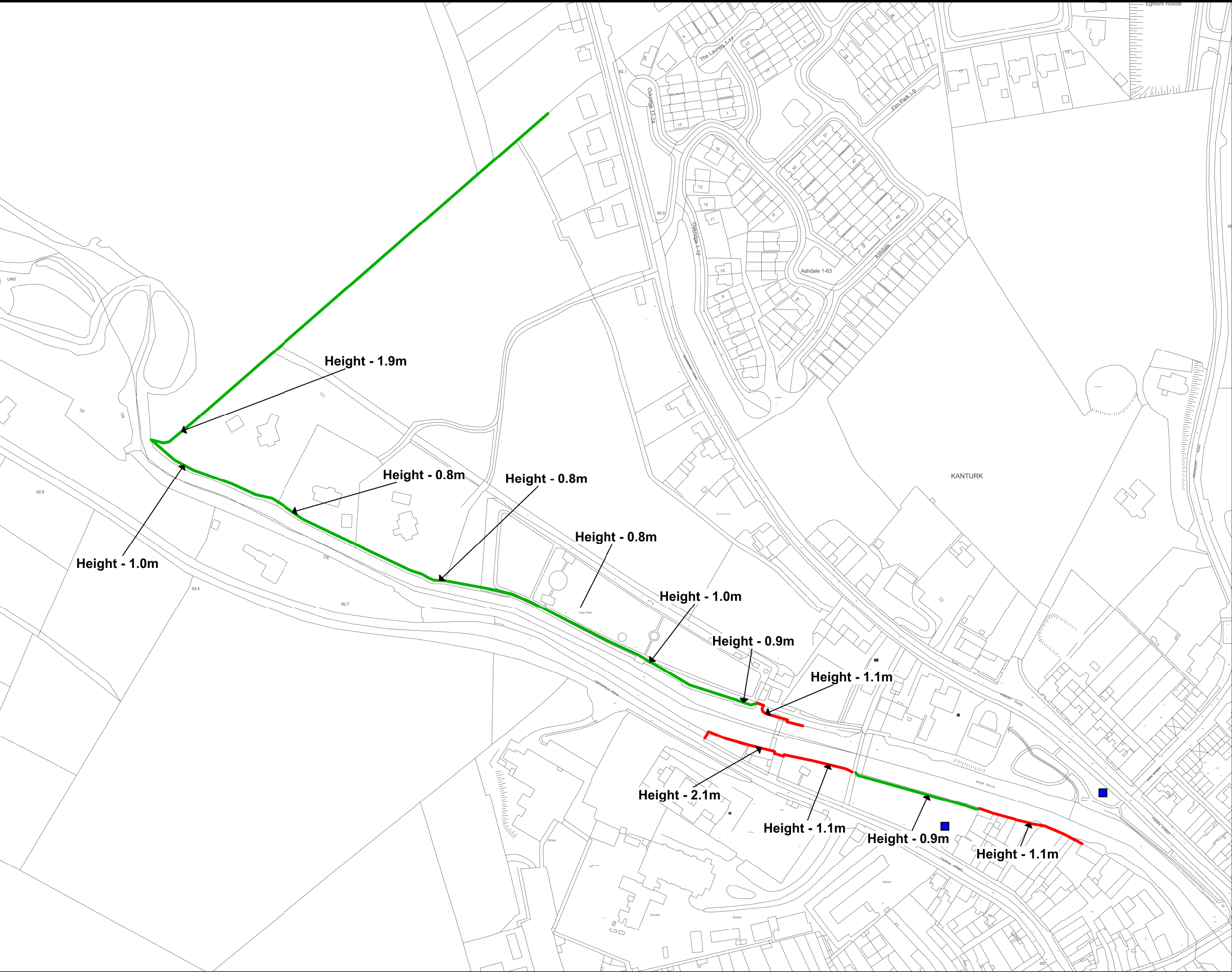
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Storage Area

Storage Area

Storage Embankment

Storage Embankment

Flood Defence Walls

Flood Defence Walls

Flood Defence Embankments

Flood Defence Embankments

Pump Stations

Pump Stations



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Jonathan Swift Street
Trim, Co. Meath



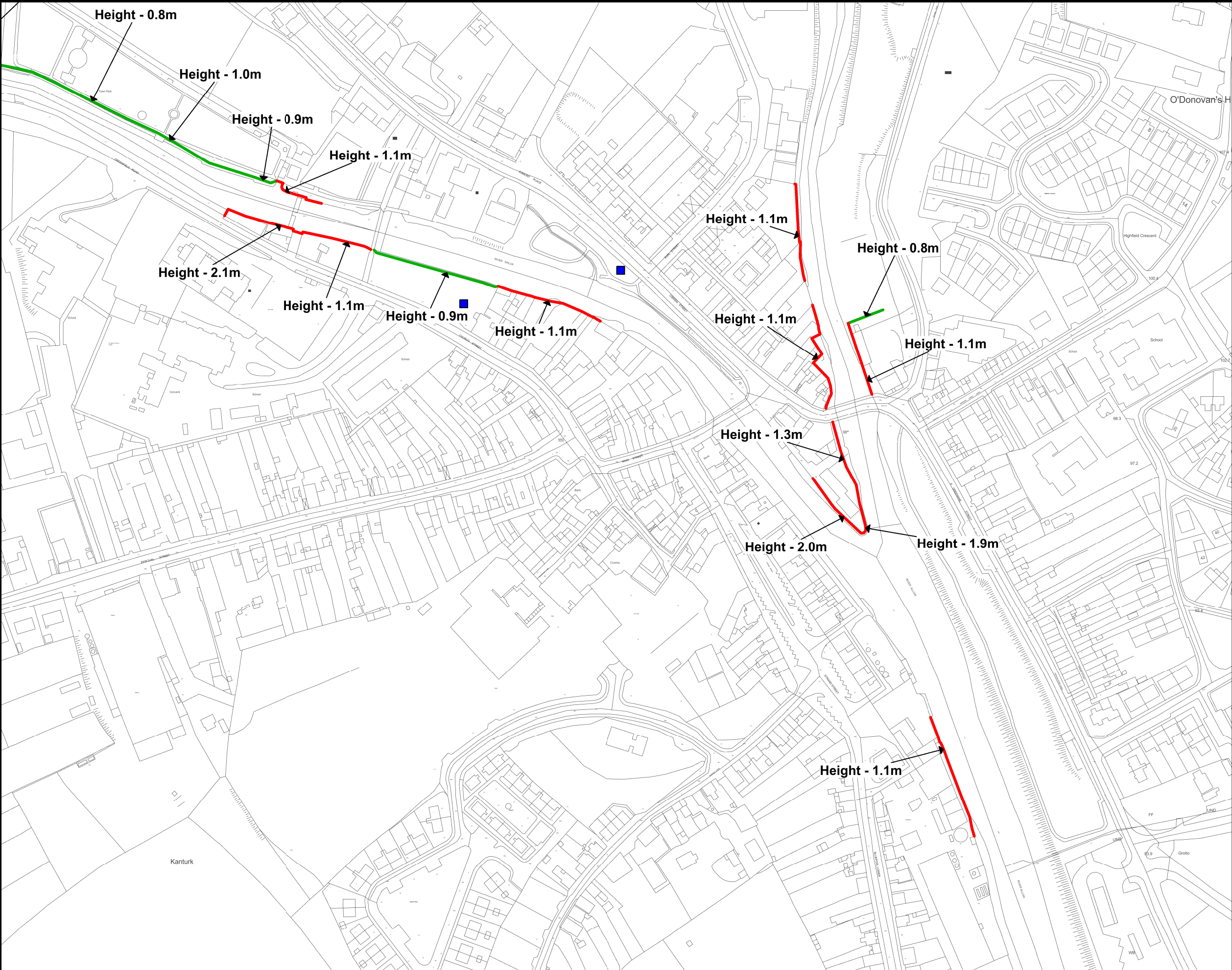
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Storage Area

Storage Embankment

Flood Defence Walls

Flood Defence Embankments

Pump Stations



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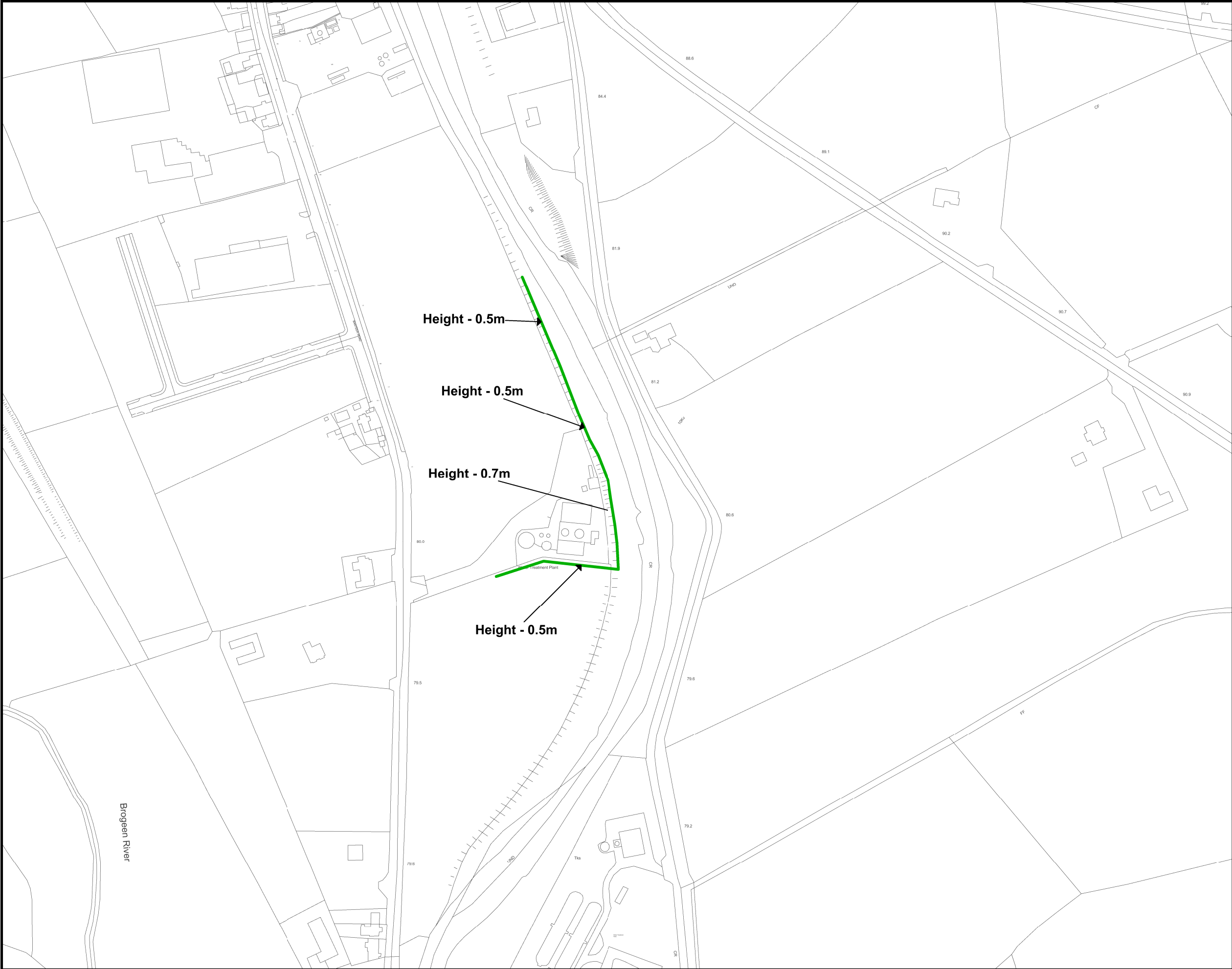
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- Storage Area
- Storage Embankment
- Flood Defence Walls
- Flood Defence Embankments



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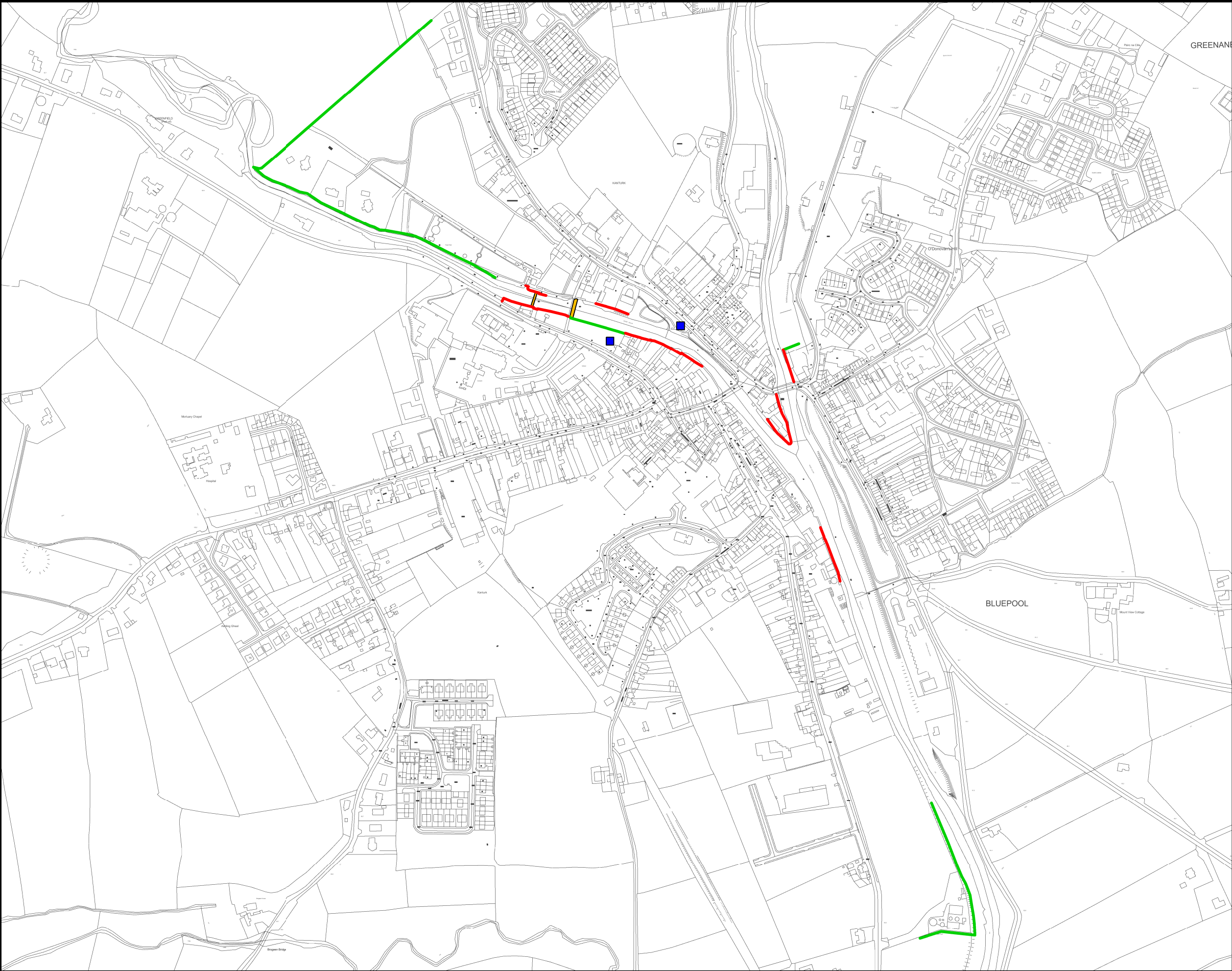
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Flood Defence Walls

Flood Defence Embankments

Remove Weirs

Pump Stations



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



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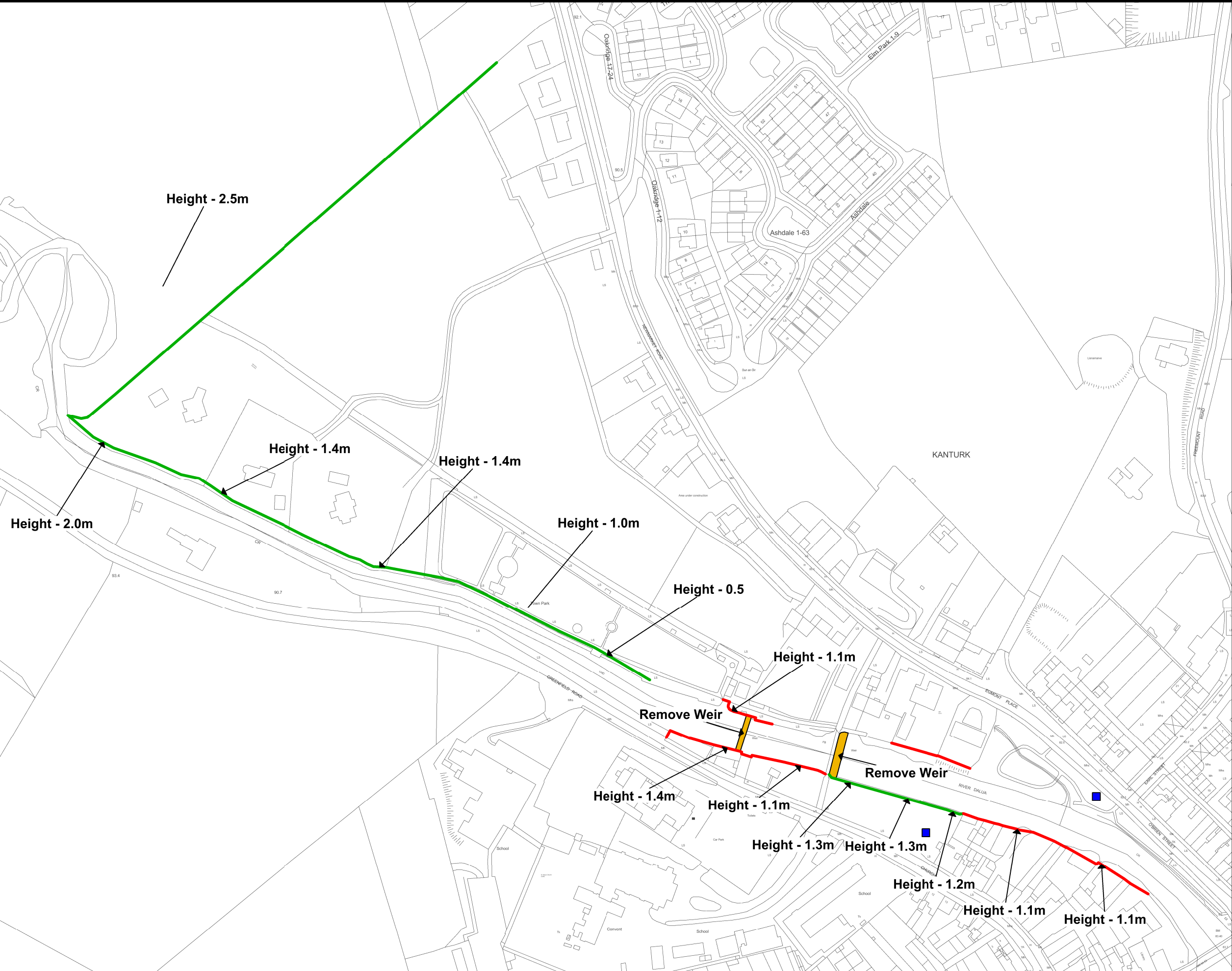


Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Kanturk Flood Defences & Conveyance - Overview	
Map Type:	Preliminary Options
Source:	Fluvial Flooding
Map Area:	Urban Area
Scenario:	Current
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Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
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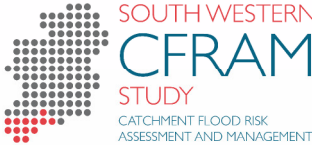
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Flood Defence Walls

Flood Defence Embankments

Remove Weir



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Jonathan Swift Street
Trim, Co. Meath



Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Kanturk Flood Defences & Conveyance	
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
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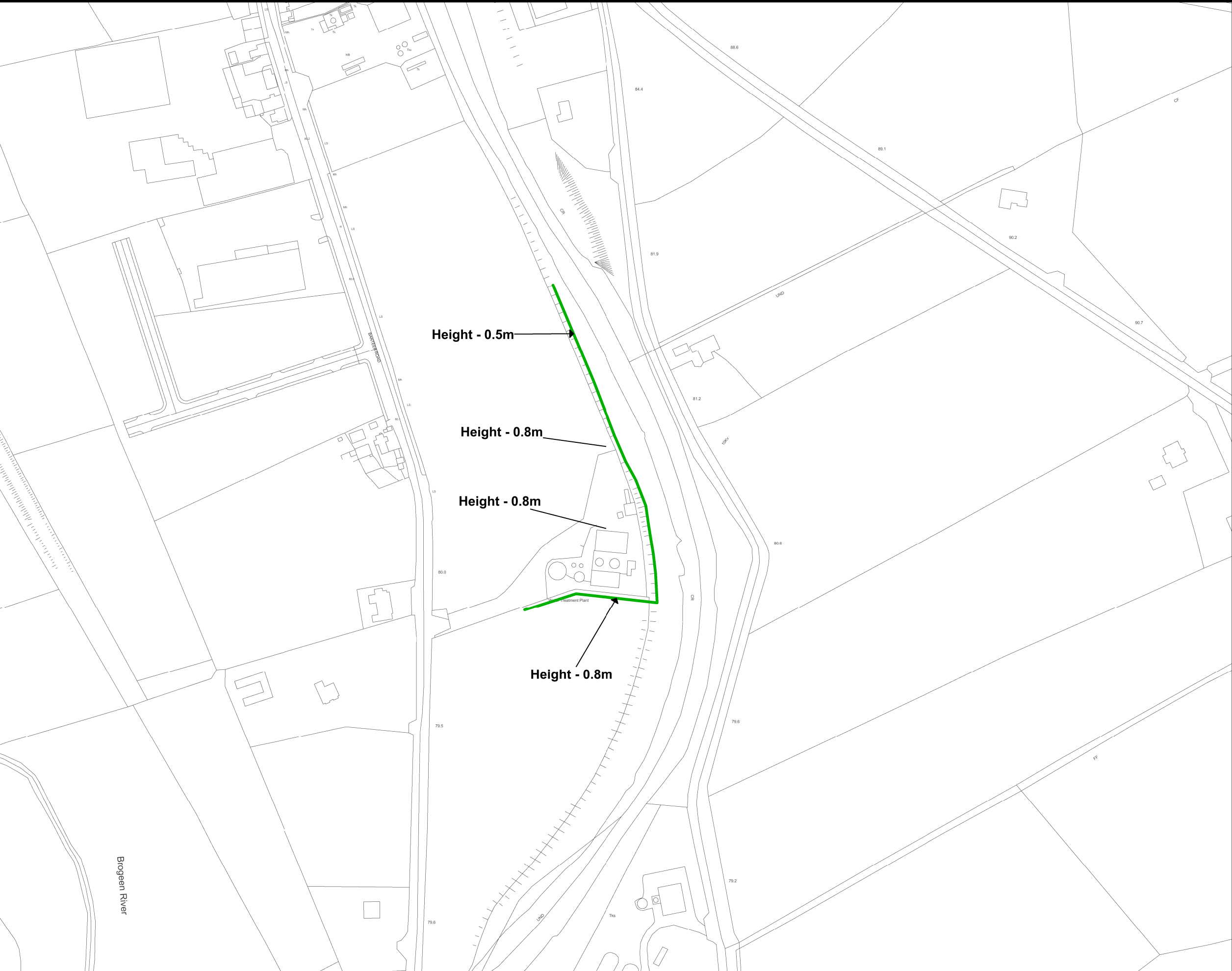
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Project :	
South Western CFRAM Study	
Map :	Kanturk Flood Defences & Conveyance
Map Type:	Preliminary Options
Source:	Fluvial Flooding
Map Area:	Urban Area
Scenario:	Current
Drawn by:	Tony Donovan
Checked by:	Barry O'Connor
Approved by:	Fintan McGivern
Map No.:	MMD-296235-E-DR-18
Sheet:	2 of 3
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Flood Defence Walls

Flood Defence Embankments

Remove Weir



**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 : **Kanturk**

Flood Defences & Conveyance

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

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Revision: P1

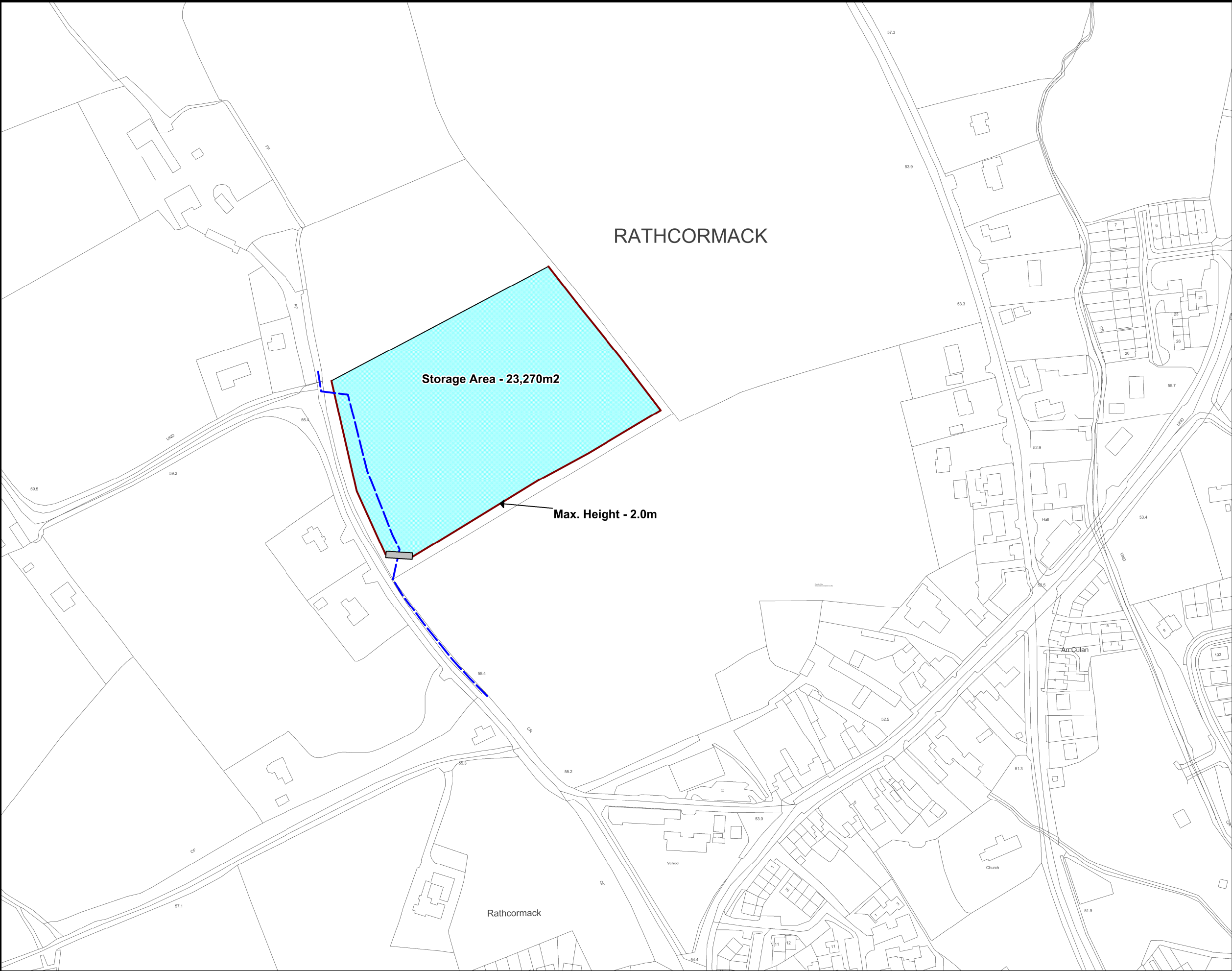
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- Storage Area
- Embankment
- Sluice Gate
- Realigned Watercourse



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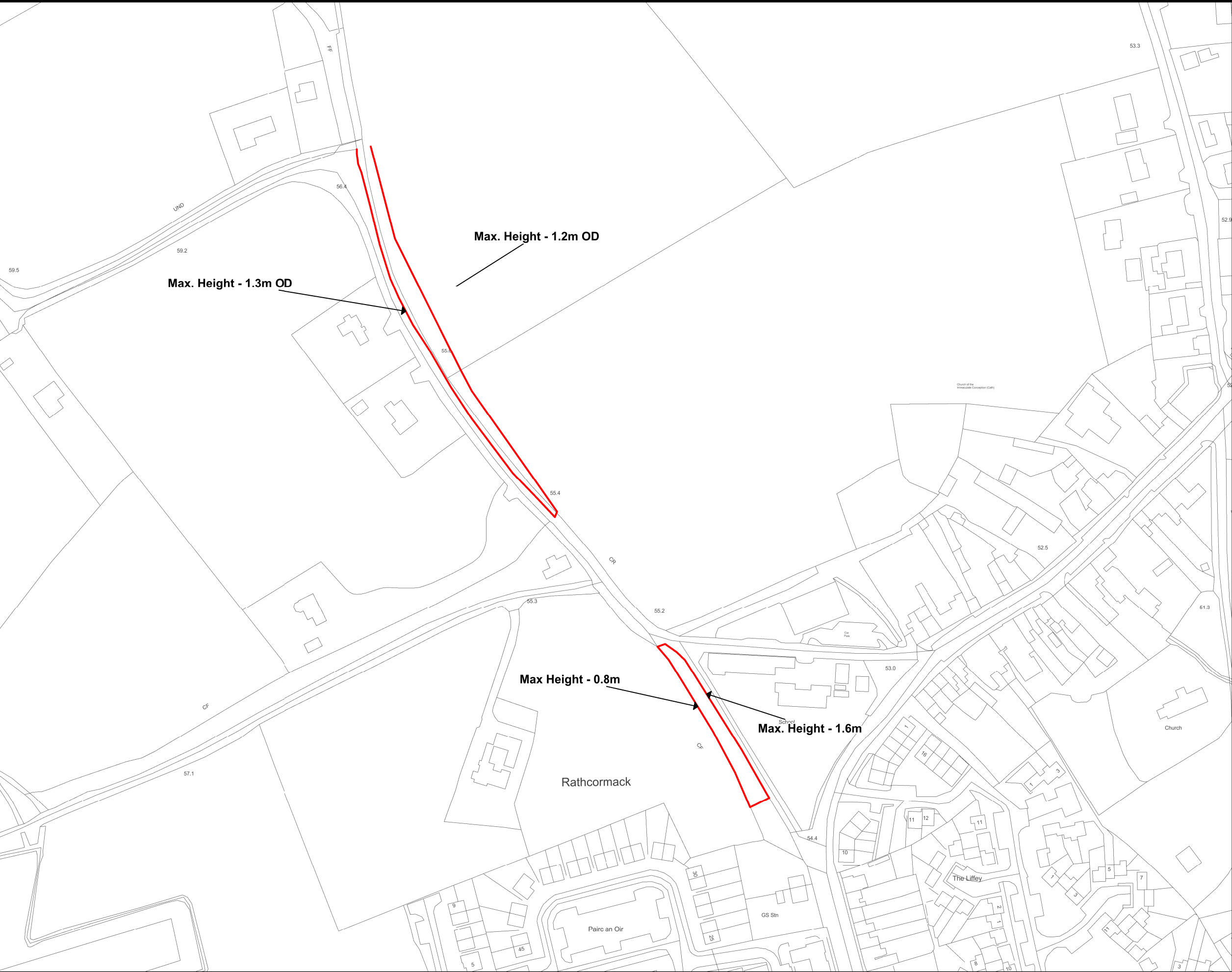
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

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Map : Rathcormac Fluvial Flood Storage	
Map Type:	Preliminary Options
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Map Area:	Urban Area
Scenario:	Current
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Checked by:	Barry O'Connor
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Flood Defence Walls



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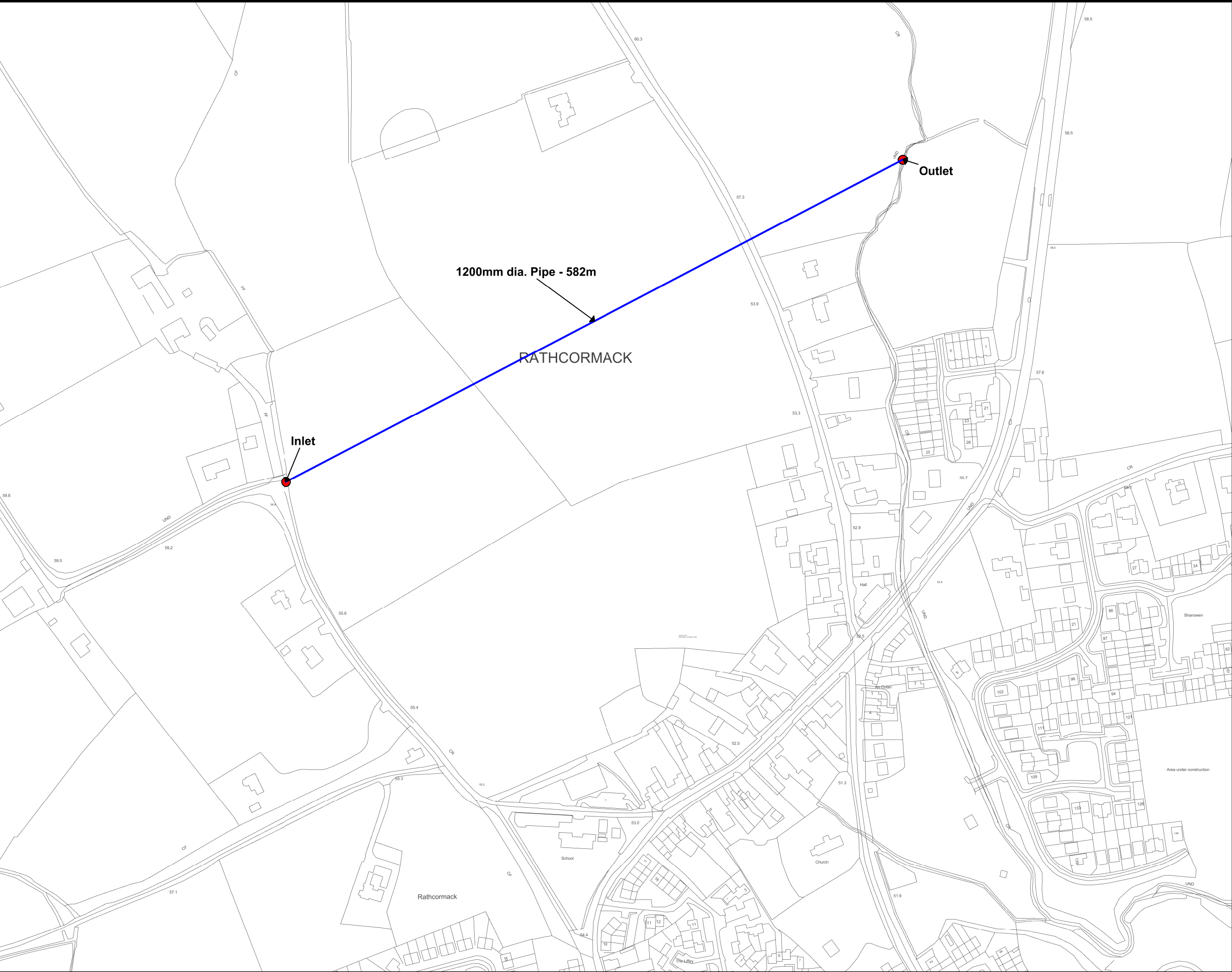


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Little Island, Cork



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Checked by:	Barry O'Connor
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Plot Scale:	1:1 @ A3

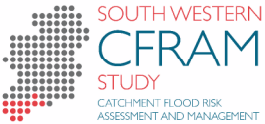
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Flow Diversion

-  Inlet / Outlet
-  Culvert



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 : Rathcormack
Fluvial 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

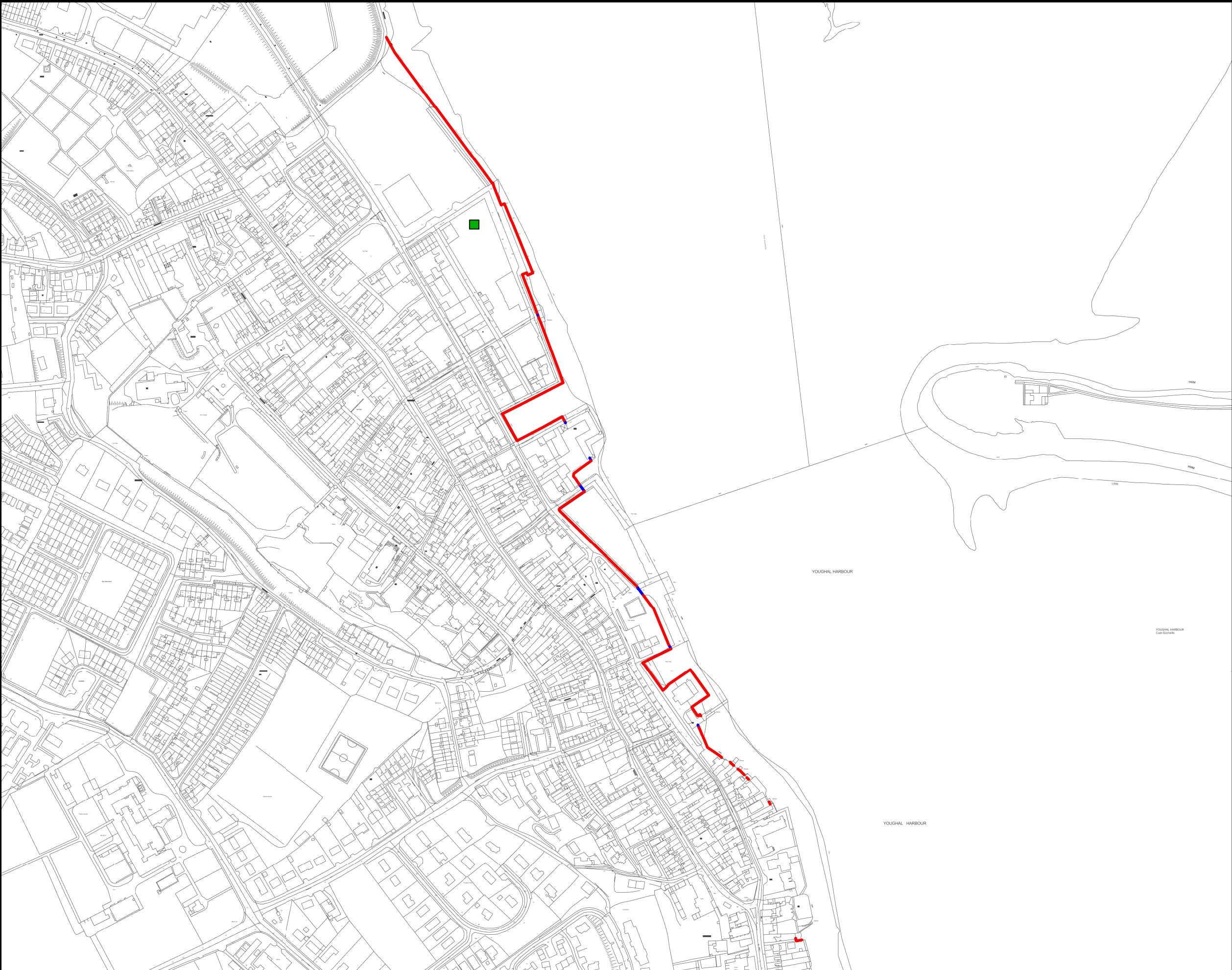
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Sheet: 1 of 1 Revision: P1

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Flood Defence Walls

Removable Flood Defence Barriers

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 : Youghal
Flood Defences - Overview

Map Type: Preliminary Options

Source: 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-18-YL-201-P1

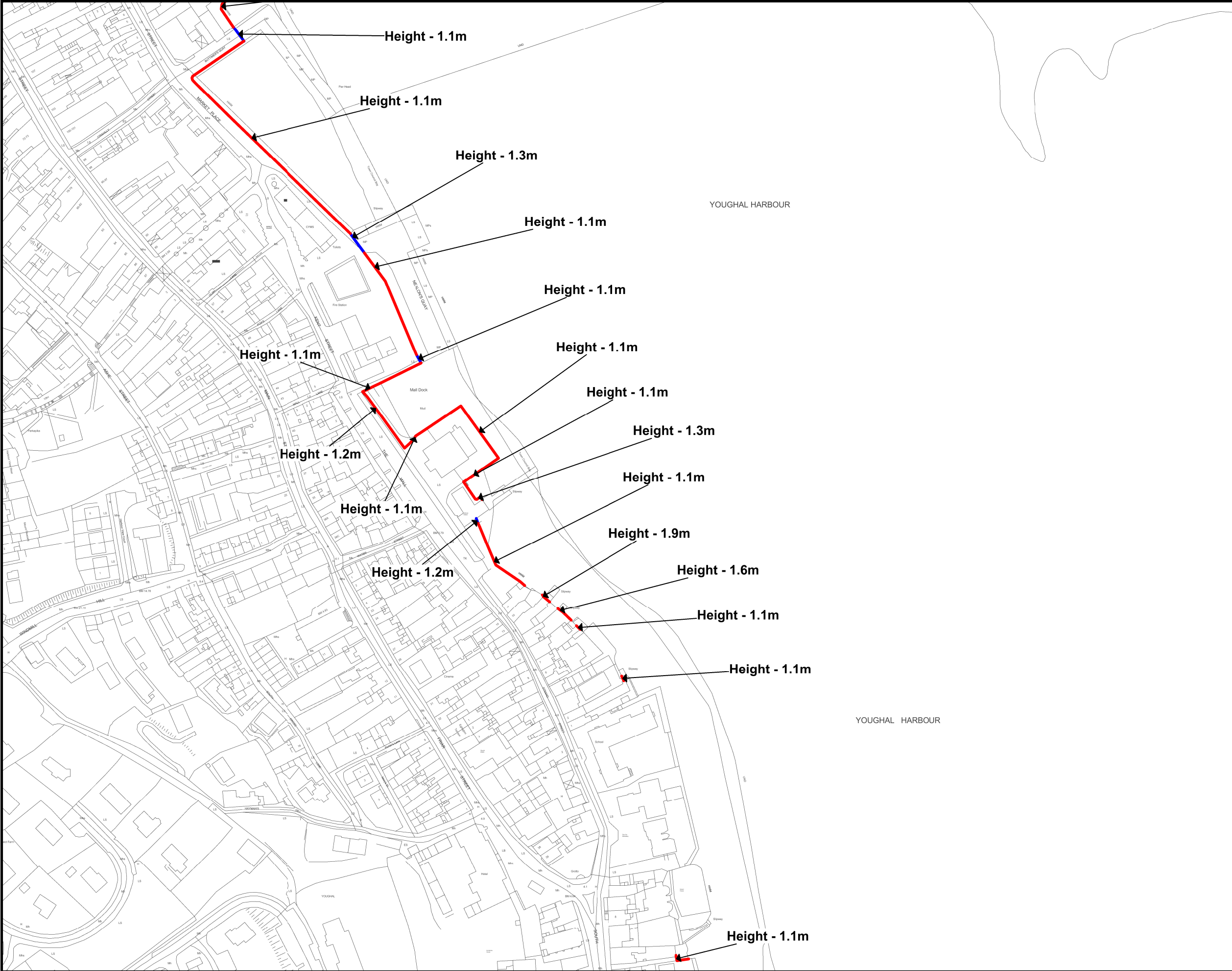
Sheet: 1 of 1 Revision: P1

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



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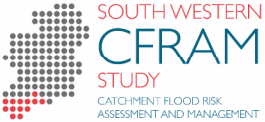
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Flood Defence Walls

Removable Flood Defence Barriers

Pump Station



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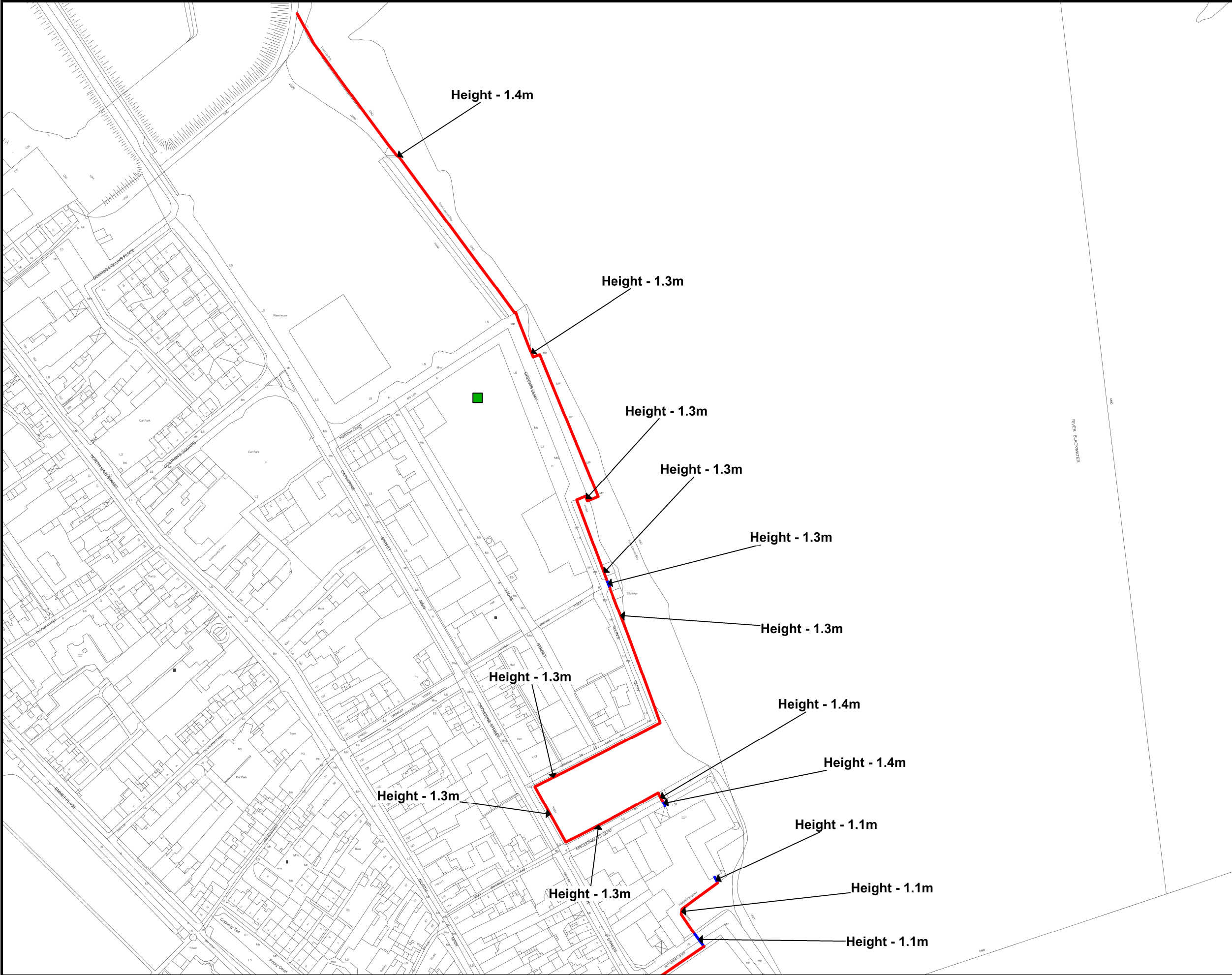
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Youghal Flood Defences	
Map Type:	Preliminary Options
Source:	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-18-YL-202-P1
Sheet:	1 of 2
Revision:	P1
Drawing Scale:	NTS
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- Flood Defence Walls
- Removable Flood Defence Barriers
- Pump Station



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Jonathan Swift Street
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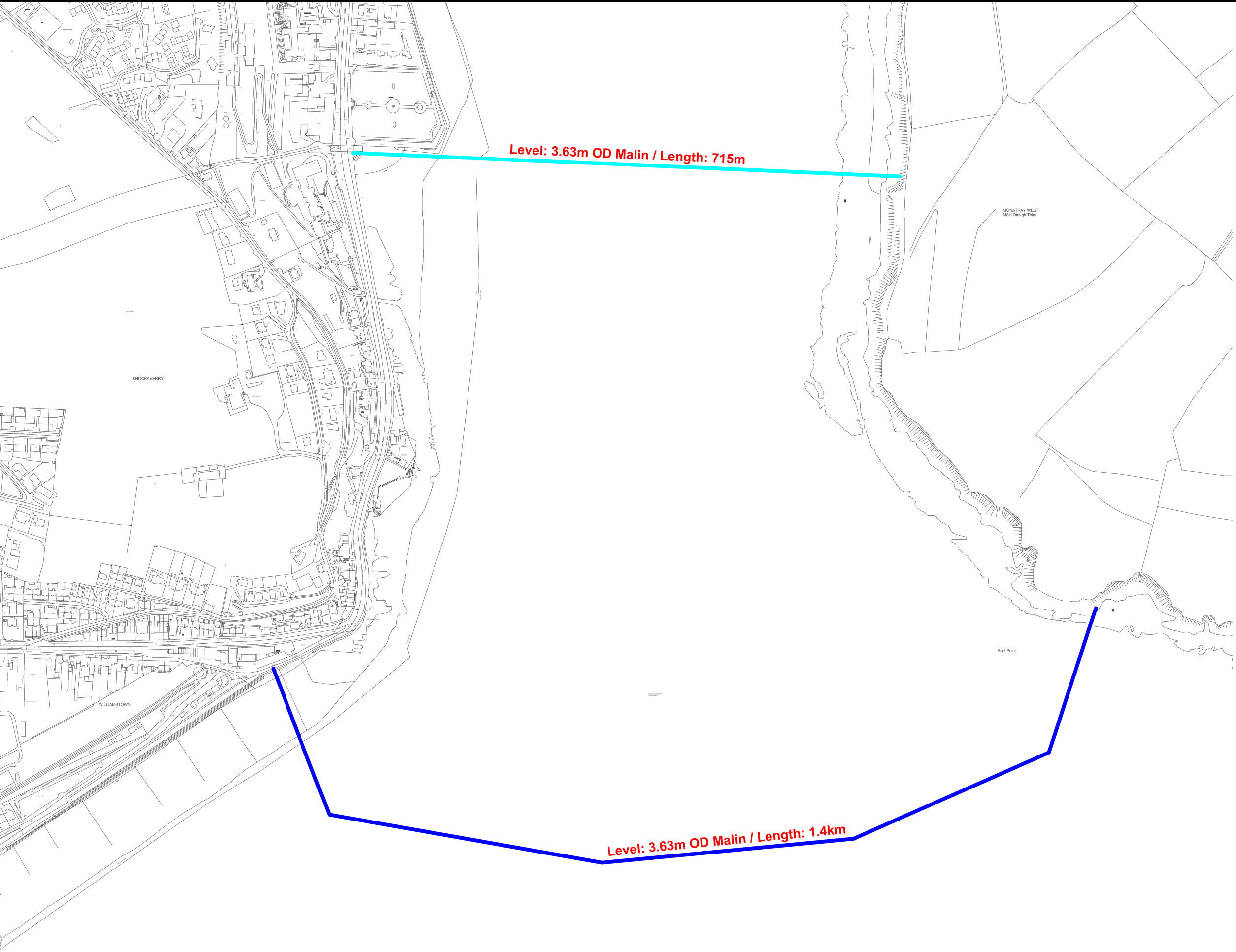
Mott MacDonald Ireland
5 Eastgate Avenue
Little Island, Cork

Project : South Western CFRAM Study	
Map : Youghal Flood Defences	
Map Type:	Preliminary Options
Source:	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-18-YL-203-P1
Sheet:	2 of 2
Drawing Scale:	NTS
Revision:	P1
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Tidal Barrage - Option A

Tidal Barrage - Option B



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Little Island, Cork

Project : South Western CFRAM Study	
Map : Youghal Tidal Barrage	
Map Type:	Preliminary Options
Source:	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-18-YL-204-P1
Sheet:	1 of 1
Drawing Scale:	NTS
Revision:	P1
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