

Natura Impact Statement

Boyne

2018

Natura Impact Statement

For

River Basin (07) Boyne Flood Risk Management Plan

Areas for Further Assessment included in the Plan:

<i>Baile Átha Buí</i>	<i>Athboy</i>
<i>Baile Trá</i>	<i>Baltray</i>
<i>Baile Íomhair</i>	<i>Ballivor</i>
<i>Droichead Átha</i>	<i>Drogheda</i>
<i>Éadan Doire</i>	<i>Edenderry</i>
<i>Droichead Mhic Eoin</i>	<i>Johnstown Bridge</i>
<i>Maigh Deartháí</i>	<i>Longwood</i>
<i>Baile Uí Mhornaín</i>	<i>Mornington</i>
<i>An Uaimh</i>	<i>Navan</i>
<i>Baile Átha Troim</i>	<i>Trim</i>

Flood Risk Management Plans prepared by the Office of Public Works 2018

In accordance with

European Communities (Assessment and Management of Flood Risks) Regulations 2010 and 2015

Purpose of this Report

As part of the National Catchment-based Flood Risk Assessment & Management (CFRAM) programme, the Commissioners of Public Works have commissioned expert consultants to prepare Strategic Environmental Assessments, Appropriate Assessment Screening Reports and, where deemed necessary by the Commissioners of Public Works, Natura Impacts Assessments, associated with the national suite of Flood Risk Management Plans.

This is necessary to meet the requirements of both S.I. No. 435 of 2004 European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (as amended by S.I. No. 200/2011), and S.I. No. 477/2011 European Communities (Birds and Natural Habitats) Regulations 2011.

Expert Consultants have prepared these Reports on behalf of the Commissioners of Public Works to inform the Commissioners' determination as to whether the Plans are likely to have significant effects on the environment and whether an Appropriate Assessment of a plan or project is required and, if required, whether or not the plans shall adversely affect the integrity of any European site.

The Report contained in this document is specific to the Flood Risk Management Plan as indicated on the front cover.

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The OPW also acknowledges the participation of members of the public, representative organisations and other groups throughout each stage of consultation.



Eastern CFRAM Study

UoM 07 Flood Risk Management Plan

Natura Impact Statement

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- Louth County Council
- Meath County Council
- Offaly County Council
- South Dublin County Council
- Westmeath County Council
- Wexford County Council
- Wicklow county Council
- Mid-East Regional Authority
- Dublin and Mid-Eastern Regional Authority
- The Environmental Protection Agency
- Met Éireann
- All members of the National CFRAM Steering and Stakeholder Groups

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LIST OF ABBREVIATIONS

AA	Appropriate Assessment
AFA	Area for Further Assessment
CAFE	Clean Air for Europe [Directive]
CBA	Cost Benefit Analysis
CFRAM	Catchment Flood Risk Assessment and Management
CJEU	Court of Justice of the European Union
DAFM	Department of Agriculture, Food and the Marine
DAHG	Department of Arts, Heritage and the Gaeltacht
DARD	Department of Agriculture and Rural Development (Northern Ireland)
DCENR	Department of Communications, Energy and Natural Resources
DD	Drainage District
DECLG	Department of Environment, Community and Local Government
DEHLG	Department of Environment, Heritage and Local Government
EC	European Commission
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
ERBD	Eastern River Basin District
FEMFRAM	Fingal East Meath Flood Risk Assessment and Management Study
FPM	Freshwater Pearl Mussel
FRA	Flood Risk Assessment
FRM	Flood Risk Management
FRMP	Flood Risk Management Plan
GIS	Geographical Information System
GSI	Geological Survey Ireland
HA	Hydrometric Area
HPW	High Priority Watercourse
IFI	Inland Fisheries Ireland
IPP	Individual Property Protection
IRBD	International River Basin District
IROPI	Imperative Reasons of Overriding Public Interest
LA	Local Authority
LAP	Local Area Plan
MCA	Multi-Criteria Analysis
MIDA	Marine Irish Digital Atlas
MPA	Marine Protected Area
MPW	Medium Priority Watercourse
NBIRBD	Neagh Bann International River Basin District
NHA	Natural Heritage Area
NIEA	Northern Ireland Environment Agency
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
NWIRBD	North Western International River Basin District
NWNB	North Western – Neagh Bann
OD	Ordnance Datum
OPW	Office of Public Works

OSi	Ordnance Survey Ireland
OSPAR	(Oslo Paris) Convention for the Protection of the Marine Environment of the North-East Atlantic
P/P	Plan or Programme
PFRA	Preliminary Flood Risk Assessment
RBD	River Basin District
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SERBD	South Eastern River Basin District
SI	Statutory Instrument
SOP	Standard Operating Procedure
SoP	Standard of Protection
SPA	Special Protection Area
SSA	Spatial Scale of Assessment
SuDS	Sustainable Drainage Systems
SWRBD	South Western River Basin District
UNESCO	United Nations Educational, Scientific and Cultural Organization
UoM	Unit of Management
WFD	Water Framework Directive
WHO	World Health Organisation
WRBD	Western River Basin District

1 INTRODUCTION AND BACKGROUND

1.1 THE FLOODS DIRECTIVE

The Floods Directive is being implemented in Ireland through the European Communities (Assessment and Management of Flood Risks) Regulations 2010 [S.I.122/2010] (as amended by S.I.495/2015). These Regulations appoint the Office of Public Works (OPW) as the Competent Authority for the Flood Risk Management Plans (FRMPs), which set out the measures and policies that should be pursued to achieve the most cost effective and sustainable management of flood risk. The Statutory Instrument also identifies roles for other organisations; such as the Local Authorities, Waterways Ireland, the Electricity Services Board (ESB) and Irish Water, to undertake certain duties with respect to flood risk within their existing areas of responsibility.

In Ireland, the approach to implementing the Directive has focused on a national Catchment-based Flood Risk Assessment and Management programme. This was developed to meet the requirements of the Floods Directive, as well as to deliver on core components of the 2004 report of the Flood Policy Review Group (OPW, 2004). Pilot Catchment-based Flood Risk Assessment and Management (CFRAM) studies have been undertaken since 2006 in the Dodder and Tolka catchments, the Lee Catchment, the Suir Catchment and in the Fingal / East Meath area.

The national CFRAM programme is being progressed via six engineering consultancy projects which are based at the scale of the Water Framework Directive (WFD) River Basin Districts (RBDs). Collectively these six projects will focus on 300 Areas for Further Assessment¹ (AFAs) countrywide.

The Eastern CFRAM Study was the second CFRAM Study to be commissioned. The Study area covers approximately 6,250 km² and includes four Units of Management (UoM); each comprised of a single Hydrometric Area (HA). They are UoM07 (Boyne), UoM08 (Nanny – Delvin), UoM09 (Liffey-Dublin Bay) and UoM10 (Avoca-Vartry). Additional information on each UoM is presented in Chapter 3.1.2.

At the completion of the national CFRAM programme, each UoM will have its own Flood Risk Management Plan (FRMP).

Chapters 1-3 of this document describe the process that was undertaken to identify and screen the European sites that could be impacted by the FRMP within the context of the overall Eastern CFRAM Study. This information was used to help inform the environmental screening aspect of the Preliminary Screening stage of the Options Assessment (discussed in more detail in Chapter 3.1.1).

Chapter 4 presents a summary of the measures that are proposed for inclusion in the FRMP for UoM07 and Chapter 5 presents the appropriate assessment of the Preferred Options that have been put forward at the AFA-scale in the draft FRMP. Avoidance and mitigation measures are included in Chapter 6.

¹ AFAs are settlement areas which were defined as a result of the first phase of implementation of the Floods Directive, the Preliminary Flood Risk Assessment (PFRA), completed in 2011. The PFRA identified areas of existing or foreseeable future potentially significant flood risk (originally referred to as 'Areas of Potential Significant Risk', or 'APSRs') and these areas are what are now referred to in the FRMPs as 'Areas for Further Assessment', or 'AFAs'.

1.1.1 The Eastern Catchment-based Flood Risk Assessment and Management Study

The CFRAM Studies and their product – the Flood Risk Management Plans – are at the core of the national policy for flood risk management and the strategy for its implementation. The methodology featured in each CFRAM Study includes the collection of survey data and the assembly and analysis of meteorological, hydrological and tidal data, which are used to develop a suite of hydraulic computer models. Flood maps are one of the main outputs of the Study and are the way in which the model results are communicated to end users. The studies have assessed a range of potential options to manage the flood risk and have determined which, if any, is preferred for each area and has been recommended for implementation within the draft FRMPs. The CFRAM Studies focus on areas where the risk is understood to be most significant, namely the AFAs, which are listed in Table 3.1.1 and shown in Figure 3.4.1.

The FRMPs arising from the Eastern CFRAM Study are strategic plans and as described below in Chapter 2.1 are subject to the provisions of Article 6(3) of the EU Habitats Directive via the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) ('the 2011 Regulations'). The 2011 Regulations transpose the provisions of the Habitats Directive 92/43/EEC into Irish law and consolidate the European Communities (Natural Habitats) Regulations 1997 to 2005 and the European Communities (Birds and Natural Habitats) (Control of Recreational Activities) Regulations 2010, as well as addressing transposition failures identified in judgements of the Court of Justice of the European Union (CJEU).

As with Strategic Environmental Assessment (SEA), it is accepted best-practice for the Appropriate Assessment of strategic planning documents, in the context of the 2011 Regulations, to be run as an iterative process alongside the Plan development, with the emerging proposals or options continually assessed for their possible effects on European sites and modified or abandoned (as necessary) to ensure that the subsequently adopted Plan is not likely to result in significant adverse effects on any European sites, either alone or 'in combination' with other plans.

It is therefore important to recognise that the assessment of strategic plans is an important aspect in guiding the development of the Plan (and demonstrating that this has been done) as it is about (ultimately) assessing its effects.

1.2 LEGISLATIVE CONTEXT

The 'Habitats Directive' (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora) provides legal protection for habitats and species of European importance. The main aim of the Habitats Directive is *"to contribute towards ensuring biodiversity through the conservation of natural habitats of wild fauna and flora in the European territory of the Member States to which the treaty applies"*. Actions taken in order to fulfil the Directive must be designed to: *"maintain or restore, at a favourable conservation status, natural habitats and species of wild fauna and flora of Community interest"*.

A key outcome of the Habitats Directive is the establishment of Natura 2000, an ecological infrastructure developed throughout Europe for the protection of sites that are of particular importance for rare, endangered or vulnerable habitats and species. In Ireland, Special Areas of Conservation (SACs), together with Special Protection Areas (SPAs) designated under the 'Birds Directive' (Council Directive 2009/147/EC - codified version of Directive 79/409/EEC on the

Conservation of Wild Birds, as amended), are included in the Natura 2000 network², and are hereafter referred to as ‘European sites’.

A central protection mechanism of the Habitats Directive is the requirement of competent authorities to undertake Appropriate Assessment³ (AA), also known as a Habitats Directive Assessment (HDA) to consider the possible nature conservation implications of any plan or project on European sites before any decision is made to allow the plan or project to proceed.

The 2011 Regulations provide the following definition of a plan: *“subject to the exclusion, except where the contrary intention appears, of any plan that is a land use plan within the meaning of the Planning Acts 2000 to 2011, includes-*

- (a) *any plan, programme or scheme, statutory or non-statutory, that establishes public policy in relation to land use and infrastructural development in one or more specified locations or regions, including any development of land or on land, the extraction or exploitation of mineral resources or of renewable energy resources and the carrying out of land use activities, that is to be considered for adoption authorisation or approval or for the grant of a licence, consent, permission, permit, derogation or other authorisation by a public authority, or*
- (b) *a proposal to amend or extend a plan or scheme referred to in subparagraph (a)”*

Not only is every new plan or project captured by the requirements of the 2011 Regulations, but each plan or project, when being considered for approval at any stage, must take into consideration the possible effects it may have in combination with other plans and projects.

Article 6(3) of the Habitats Directive states: *“Any plan or project not directly connected with or necessary to the management of the [European] 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 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.”*

Article 6(4) is the procedure for allowing derogation from this strict protection, in certain restricted circumstances:

Article 6(4) of the Habitats Directive states: *“If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of social or economic nature,*

² Natura 2000 sites are protected by Article 6(3) of the Habitats Directive. Protection is given to SACs from the point at which the European Commission and the Government agree the site as a ‘Site of Community Importance’ (SCI). Article 6(3) of the Habitats Directive and Article 4(4) of the Birds Directive also apply (respectively) to any other site or area that the Commission believes should be considered as an SAC or SPA, until their status is determined. Under the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) the term ‘European site’ applies to any designated SAC or SPA; any SCI; any candidate SCI (cSCI); any candidate SAC (cSAC); and any candidate or proposed SPA (pSPA).

³ ‘Appropriate Assessment’ has been historically used as an umbrella term to describe the process of assessment in its entirety from screening to IROPI (Imperative Reasons of Overriding Public Interest). The assessment process is now more commonly divided into distinct stages, one of which (Stage 2) is the ‘appropriate assessment’ stage. The overall process is often referred to as an ‘Article 6 Assessment’ or ‘Habitats Directive Assessment’ for convenience, although these terms are not included within the legislation.

the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted."

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures. First, the plan should aim to avoid any impacts on European sites by identifying possible impacts early in the plan-making process and writing the plan in order to avoid such impacts. Second, mitigation measures should be applied, if necessary, during the AA process to the point where no adverse impacts on the site(s) remain. If the plan is still likely to result in impacts on European sites, and no further practicable mitigation is possible, then it must be rejected. If no alternative solutions are identified and the plan is required for imperative reasons of overriding public interest (IROPI test) under Article 6(4) of the Habitats Directive, then compensation measures are required for any remaining adverse effect.

2 APPROACH

2.1 GUIDANCE

The European Commission (EC) has produced non-mandatory methodological guidance (EC, 2000, 2002, 2007) in relation to the process of AA which suggests a four-stage process, although not all steps may necessarily be required. The process recommends an initial “test of likely significance”, or “screening” followed, if necessary, by appropriate assessment. The Department of Environment, Heritage & Local Government⁴ (DEHLG) has transposed the principles of the European Commission guidance into a document specific to Ireland entitled ‘*Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities*’ (DEHLG, 2010).

A summary of the stages is given below and additional detail on the iterative process by which each of the stages is reached and concluded is given overleaf in Figure 2.1.1.

Stage One: Screening or ‘Test of Likely Significance’ - the process which identifies the likely impacts upon a European site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant;

Stage Two: Appropriate Assessment - the consideration of the impact on the integrity of the European 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;

Stage Three: Assessment of Alternative Solutions - Where adverse effects remain after the inclusion of mitigation, this Stage examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of European Sites;

Stage Four: Assessment Where Adverse Impacts Remain - an assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed that the project or plan should proceed.

⁴ Since 2011 known as the Department of Community, Environment and Local Government (DECLG)

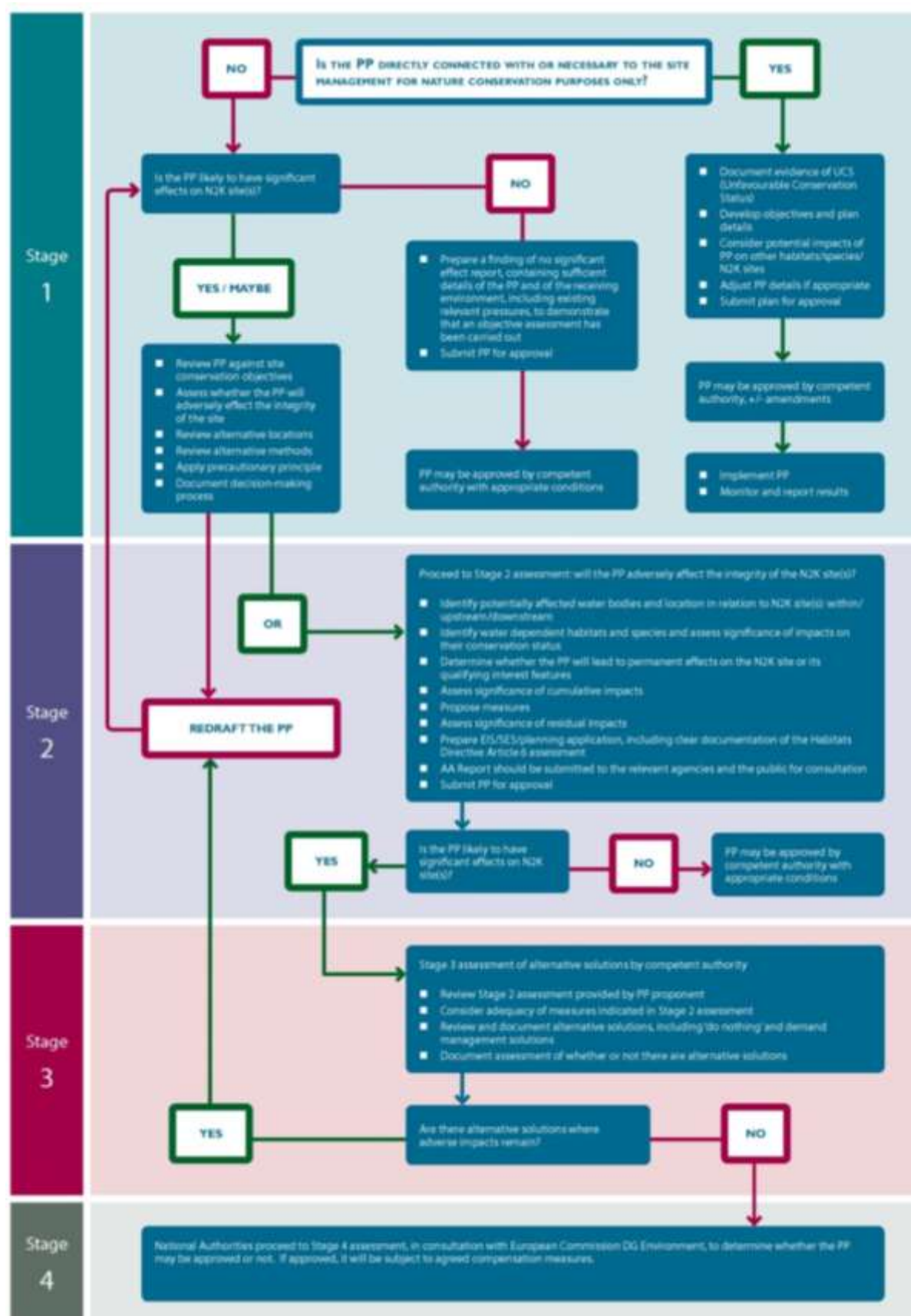


Figure 2.1.1: Schematic of the stages of Appropriate Assessment

The following guidance has been used during the preparation of this Screening Report in support of the Eastern CFRAM Study FRMPs:

- DEHLG (2009 –rev. 2010) Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities
- EC (2002) 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 (2000) Managing Natura 2000 sites: the provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC
- EC (2011) Guidelines on the Implementation of the Birds and Habitats Directives in Estuaries and Coastal Zones
- EC (2007) Guidance Document on Article 6(4) of the Habitats Directive 92/43/EEC
- EC (2013) Guidelines on Climate Change and Natura 2000 Dealing with the impact of climate change on the management of the Natura 2000 Network of areas of high biodiversity value
- EPA (2012) Integrated Biodiversity Impact Assessment best practice guidance; Streamlining AA, SEA and EIA Processes, Best Practice Guidance
- NPWS (2014) The Status of EU Protected Habitats and Species in Ireland 2013 – Overview Report
- Scottish Natural Heritage (2015) Habitats Regulation Appraisal of Plans, Guidance for Plan-Making Bodies in Scotland (version 3).

The staged approach summarised above and in Figure 2.1.1 works well at the project-level where the scheme/project design is established and possible effects on European sites can be quantitatively assessed with the benefit of detailed survey data. In contrast, the nature of the Eastern CFRAM Study and each of its FRMPs presents a number of distinct challenges for a ‘strategic’ AA; in particular, every possible outcome of each FRMP cannot always be identified and assessed in detail, since it is not within the remit of the FRMPs to develop detailed designs for individual risk management measures.

It is emphasised that the Draft FRMP sets out the proposed strategy, actions and measures that are considered to be the most appropriate at this stage of assessment. The observations and views submitted as part of the consultation on the Draft Plan will be reviewed and taken into account before the Plan is submitted for comment, amendment or approval by the Minister. Some changes may arise as a result of the consultation process.

Further, once the FRMP is finalised, 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 can not 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 Draft 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 AA Screening, including any particular issues such as knowledge gaps or mitigation measures that are expected to be necessary, are set out in the Natura Impact Statement as relevant.

It is also important to note that the safeguards set out in Article 6(3) and (4) of the Habitats Directive are triggered not by certainty, but by the possibility of significant effects and that the precautionary approach to identifying the potential impacts of the plan is maintained at all levels. Chapter 3.1.3 discusses these aspects in more detail.

The processes for progression of measures involving physical flood relief works are described in section 8.1.2 of the FRMP. EIA and/or AA Screening, and, where so concluded from the screening, Environmental Impact Assessment and / or Appropriate Assessment, must be undertaken in accordance with the relevant legislation where relevant as part of the progression of measures that involve physical works. The body responsible for implementation of such measures, typically either the OPW or the relevant local authority is required to ensure that these requirements will be complied with.

Project-level assessment will take account of the potentially viable measures identified in the Plan, but will involve the consideration of alternatives at the project-level and, as appropriate, EIA and AA, including the definition of necessary mitigation measures at the project-level. Only schemes/measures confirmed to be viable following project level assessment will be brought forward for Exhibition/Planning and detailed design.

3 STAGE 1: SCREENING FOR APPROPRIATE ASSESSMENT

Screening is the process of deciding whether or not an Appropriate Assessment is required for a plan or project. It addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3) of the Habitats Directive, i.e.

- Whether a plan or project is directly connected to or necessary for the management of the site; and
- Whether a plan or project, alone or in-combination with other plans and projects, is likely to have significant effects on a European site in view of its Qualifying Interest Features and their corresponding Conservation Objectives.

The Screening Stage includes:

- Site location and description of the plan or project;
- Identification and initial screening of European sites for potential negative effects;
- Screening conclusion.

The assessment of likely significant effects is based on the likelihood and significance of any effects of the proposed plan or project on each European site's qualifying interests, particularly with reference to the relevant conservation objectives. In this context, the likelihood depends on whether there is the opportunity and pathway for the effect to occur, and the significance is regarded as the effect on the susceptible qualifying interests of the site(s). If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 Appropriate Assessment.

3.1 DESCRIPTION OF THE PLAN

3.1.1 The Eastern CFRAM Study and its associated FRMPs

The Eastern CFRAM Study is not directly connected with or necessary to the management of any European site.

The objectives of the Eastern CFRAM Study are to:

- Identify and map the existing and potential future flood hazard⁵ within the Study area;
- Assess and map the existing and potential future flood risk⁶ within the Study area;
- Identify viable structural and non-structural options and measures for the effective and sustainable management of flood risk in the AFAs and within the Study area as a whole, and

⁵ Potential future flood hazards and risk include those that might foreseeably arise (over the long-term) due to the projected effects of climate change, future development and other long-term developments.

⁶ Flood risk is defined as a combination of probability and degree of flooding and the adverse consequences of flooding on human health, people and society, the environment, cultural heritage and economic activity and infrastructure.

- Prepare a set of FRMPs for the Study area, and undertake associated Strategic Environmental Assessment and, as necessary, Appropriate Assessment, that sets out the 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 requirements.

It is not an objective of the FRMPs to develop detailed designs for individual flood risk management measures.

3.1.2 Site Location

As outlined earlier in Chapter 1.1 the Eastern CFRAM Study area includes four Units of Management (UoM), each of which has its own FRMP. The UoMs constitute major catchments / river basins (typically greater than 1,000km²) and their associated coastal areas, or conglomerations of smaller river basins and their associated coastal areas. Within the Eastern CFRAM Study area each UoM boundary matches the boundary of a corresponding Hydrometric Area (HA). HAs are areas comprising a single large river catchment, or a group of smaller ones, that have been delineated across Ireland and Northern Ireland for the purposes of hydrological activities. This Natura Impact Statement (NIS) is for the UoM07 FRMP only.

3.1.2.1 UoM07

UoM07 is a predominantly rural catchment with the major urbanised areas being Drogheda and Navan. Within UoM07 the OPW has implemented and maintains the Boyne arterial drainage scheme, which has resulted in significant alteration of the natural river channels in some areas to improve conveyance capacity and reduce flooding of agricultural land. Whilst not intended as a flood alleviation scheme, the arterial drainage works have undoubtedly reduced the fluvial flood risk in certain parts of UoM07.

Within UoM07 there are ten Areas for Further Assessment (AFA). The principal source of flood risk in UoM07 is fluvial flooding, with all ten AFAs being subject to varying degrees of fluvial flood risk. Tidal flood risk within UoM07 is limited to the Boyne Estuary, in which three AFAs, Baltray, Mornington and Drogheda have a considerable element risk from coastal flooding. The location of the UoMs and the AFAs in the Eastern CFRAM Study area are shown in Figure 3.1.

3.1.2.2 Projects running in Parallel with the Eastern CFRAM Study

The Mornington Flood Relief Scheme is the only parallel project with the FRMP in UoM07. Some of the other UoMs in the Eastern CFRAM Study area have had projects involving the implementation of FRM methods prioritised and consequently these are at a more advanced stage than other AFAs in the RBD. Examples include the River Tolka and River Dodder as well as Sandymount and Clontarf in UoM09 for which Dublin City Council have undertaken the Optioneering and also AFAs on the Camac, Poddle and Morrell rivers. Wicklow County Council is progressing schemes for the Dargle in Bray and for Arklow (UoM10). These projects are outside UoM07 and will not influence the FRMP, but will be reviewed for any potential in combination or cumulative effects.

3.1.3 Methodology for the Appropriate Assessment

Although the AA is being carried out on activities occurring within the functional area of the UoM07 FRMP, the likely significance of the effects of the FRMP will also be assessed on European sites in adjacent river basins. The likely significance of effects of the proposed plan on the European sites identified and their conservation objectives have been assessed taking into account the source-pathway-receptor model. The source is defined as the individual element of the plan that has the potential to impact on a European site, its qualifying interests and its conservation objectives. The pathway is defined as the means or route by which a source can migrate to the receptor. The receptor is defined as the European site and its qualifying interests. Each element of the model may exist independently, however a potential impact is only created where there is a linkage between the source, pathway and receptor. This NIS will also review and incorporate the conclusions of the other CFRAM FRMPs, where appropriate, for in-combination and cumulative impacts.



Figure 3.1.1: Eastern CFRAM Study Area and Associated Units of Management

Figure 3.1.1 shows the extent of each UoM, for which each of the FRMPs will be prepared in the Eastern CFRAM Study area, and also the distribution of AFAs within each UoM.

Figure 3.1.2 illustrates the structure and spatial scales of assessment of the National CFRAM programme, the Eastern CFRAM Study, the FRMPs and the individual AFAs and HPWs within each UoM.

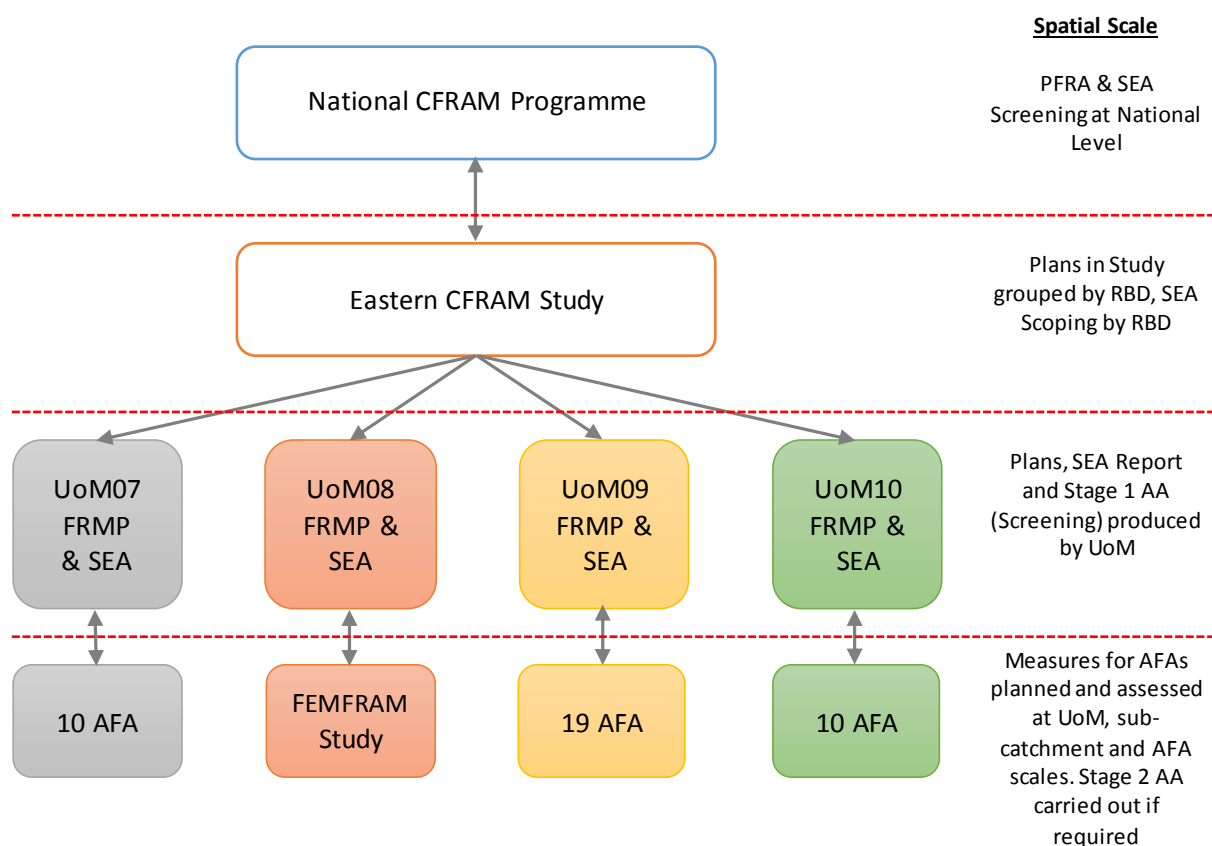


Figure 3.1.2: Spatial Scales of Assessment in the Eastern CFRAM Study, FRMPs, SEAs and AA

The list of the AFAs that have been investigated as part of the Eastern CFRAM Study is given in Table 3.1.1. It should be noted that the Dublin City AFA has been subdivided into eight discrete areas: the High Priority Watercourses (HPWs) of the Camac, Carysfort/Maretimo, Lower Liffey, Poddle and Santry Rivers (collectively shown on mapping and in this assessment as “Dublin City HPWs”) while Clontarf, Raheny and Sandymount are coastal sub-AFA districts within the Dublin City AFA and have been assessed as discrete sites. In addition to the Santry River being a HPW, Santry is also an AFA. Where alternate nomenclature may be in use for AFAs in this report, this is shown in *italics*.

Table 3.1.1: List of AFAs in the UoM07 FRMP

County	AFA	Flood Source
Meath	Athboy	Fluvial
Meath	Ballivor	Fluvial
Louth	Baltray	Fluvial & Coastal
Louth & Meath	Drogheda	Fluvial & Coastal
Kildare	Johnstown Bridge	Fluvial
Meath	Navan	Fluvial
Meath	Trim	Fluvial
Offaly	Edenderry & Environs	Fluvial
Meath	Mornington (<i>reported under UoM07</i>)	Fluvial & Coastal
Meath	Longwood	Fluvial

As illustrated in Figure 3.1.2, a draft FRMP has been produced for each UoM. For each FRMP produced there is an associated SEA Environmental Report and NIS. In accordance with the 2011 Regulations, the NIS is a report comprising the scientific examination of the Plan (the FRMP) and the relevant European site (or sites), to identify and characterise any possible implications of the plan either individually or in combination with other plans or projects, in view of the conservation objectives of the site or sites. It will also include any further information including but not limited to, plans, maps or drawings, scientific data or information or data required to enable the carrying out of an appropriate assessment.

Each NIS has fed into and influenced the related SEA Environmental Report and both environmental reports have fed into and influenced the draft FRMPs as they have evolved. Following completion of all three documents, there will be a consultation period to allow statutory and non-statutory consultees, along with the public, to comment on the Plans and Reports produced.

Under the 2011 Regulations, an appropriate assessment carried out shall “include a determination by the public authority, pursuant to Article 6(3) of the Habitats Directive as to whether or not the plan...⁷ would adversely affect the integrity of a European site... before a decision is made to approve, undertake or adopt a plan”.

Figure 3.1.3 gives an overview of the iterative process being undertaken as part of the CFRAM Study to develop the final Flood Risk Management (FRM) measures. Within each FRMP the proposed FRM *Methods* necessary at an AFA Spatial Scale of Assessment (SSA)⁸ have been considered. At this scale, methods benefitting only the particular AFA in question are considered, even if the implementation of a given method included works or activities outside of the AFA, i.e., elsewhere in the sub-catchment or UoM. Examples of where this might apply would be storage options upstream of the AFA, or flood forecasting and warning systems, that provide benefits to no other AFAs than the AFA under consideration.

For each AFA to be assessed, the starting point was to look at a long list of FRM methods that could be implemented. This long list of FRM methods was specified by OPW as being the policy, soft engineering and hard engineering methods to manage flood risk in Ireland.

⁷ (or project)

⁸ The AFA SSA refers to an individual AFA; such areas would include towns, villages, areas where significant development is anticipated and other areas or structures for which the risk that could arise from flooding is understood to be significant.

If a FRM method was found to be technically feasible, i.e. it could completely or partially manage flood risk for an area, it was then screened for its economic viability. If the method was found to be economically viable it was then screened for potentially detrimental environmental and social impacts.

The environmental considerations in the FRMP screening were based on the potential for high level impacts on designated European sites in the first instance, with national and regional nature conservation designations also taken into consideration during the MCA. High level impacts are a generic and conservative description of potential impacts, taking into account plan-level FRM measures insofar as they are defined.

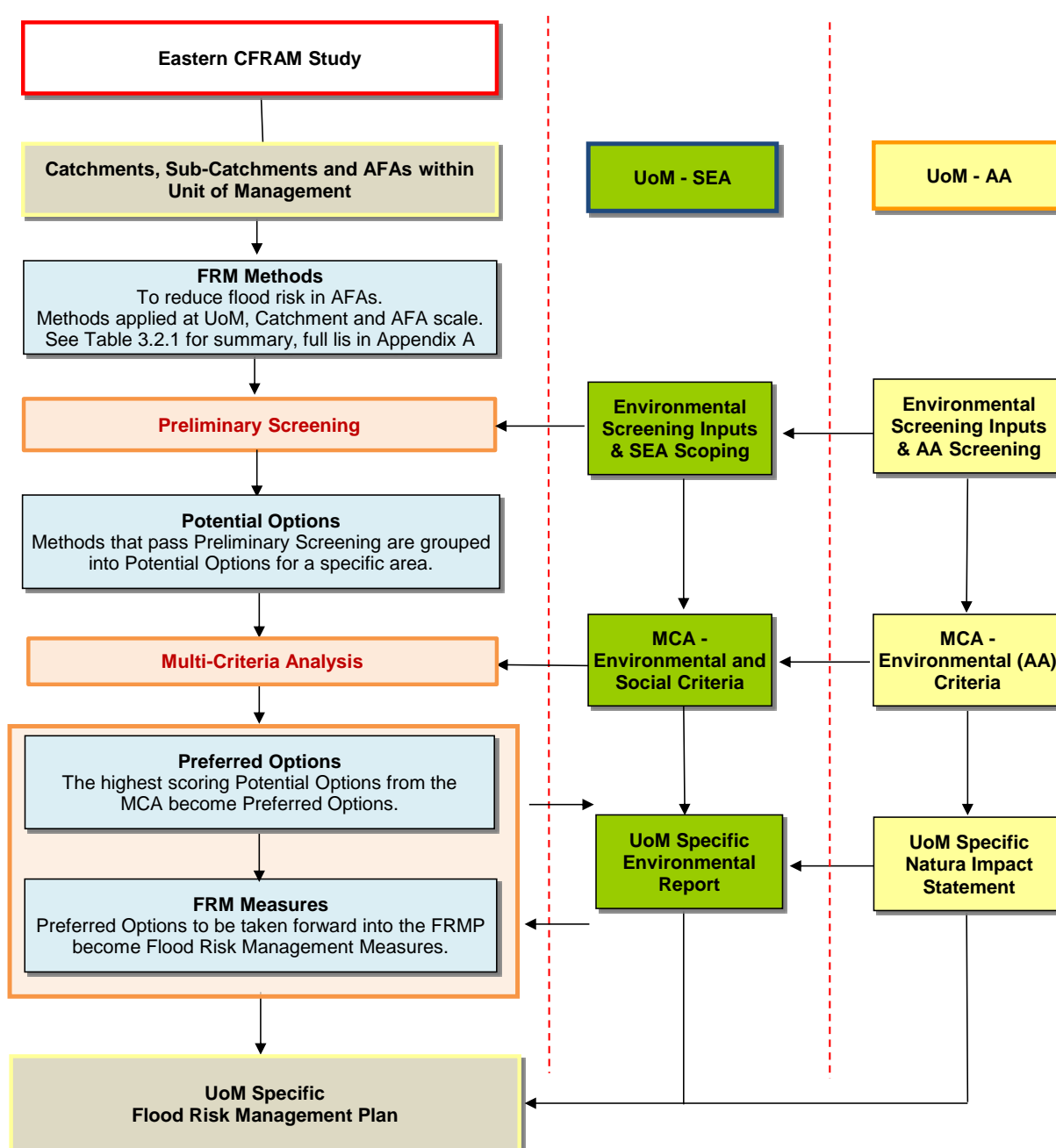


Figure 3.1.3: Environmental Assessment Inputs into the FRMP

Methods that were found to be technically, economically, socially and environmentally acceptable in the preliminary screening were then combined into groups of *Options*, which were subjected to detailed Multi-Criteria Analysis (MCA), looking at technical, economic, social and environmental criteria. The highest scoring *Option* for each AFA, while also taking into consideration feedback from public and stakeholder consultation, has been put forward into the draft FRMP for consultation as the *Preferred Option*. The SEA and NIS were critical for the MCA, as they provided necessary information for the environmental and social inputs.

The observations and views submitted as part of the consultation on the Draft Plan will be reviewed and taken into account before the Plan is submitted for comment, amendment or approval by the Minister. Some changes may arise as a result of the consultation process.

It should be noted that, once the FRMP is finalised, 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 can not 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. The measures set out in the Draft FRMP may therefore be subject to some amendment prior to implementation. However, the degree of detail of the assessment undertaken to date would give confidence that such amendments should generally not be significant.

3.2 ELEMENTS OF THE FRMP WITH POTENTIAL TO CAUSE ADVERSE IMPACTS ON EUROPEAN SITES

Table 3.2.1 below summarises the long list of FRM methods that were screened for potential implementation within FRMPs. Screening was undertaken at UoM, sub-catchment, AFA (and potentially sub-AFA) level.

The methods highlighted in green are non-structural policy and administrative based and currently do not include physical works. The methods highlighted in red are considered structural methods, wherein there will be an engineered scheme with works required on the ground at a specific geographic location.

The non-structural and structural options have, in general, been retained through the screening process, even though they cannot manage flood risk as a stand-alone method. These will be incorporated later in the process to complement other methods that could manage flood risk. The 'Do Nothing' Method would have generally been screened out, as it is likely to increase the flood risk to an area, through abandonment of all FRM activities, and would therefore not be feasible on technical grounds.

A description of high-level environmental impacts that may arise from implementation of each method is provided in Appendix A. These high level impacts were provided to the statutory SEA consultees, progress and steering group members and stakeholders, for consultation as part of the Eastern CFRAM Study SEA scoping in September / October 2015.

Table 3.2.1: Summary of Flood Risk Management Methods

Method	Description	
Do Nothing	Implement no new flood risk management measures and abandon any existing practices.	Non-structural Methods
Maintain 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, includes channel or flood defence maintenance works / programme.	
Planning and Development Control	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.	
Building Regulations	Regulations relating to floor levels, flood-proofing, flood resilience, sustainable drainage systems, prevention of reconstruction or redevelopment in flood-risk areas, etc.	
Catchment Wide Sustainable Drainage Systems (SuDS)	Implement SuDS on a catchment wide basis.	
Land Use Management (NFM)	Creation of wetlands, riparian buffer zones, etc.	

Method	Description	
Strategic Development Management	Necessary floodplain development (proactive integration of structural measures into development designs and zoning, regulation on developer-funded communal retention, drainage and / or protection systems, etc.)	
Flood Warning / Forecasting	Installation of a flood forecasting and warning system and development of emergency flood response procedures.	
Public Awareness Campaign	Targeted public awareness and preparedness campaign.	
Upstream Storage	Single or multiple site flood water storage, flood retardation, etc.	Structural Methods
Improvement of Channel Conveyance	In-channel works, floodplain earthworks, removal of constraints / constrictions, channel / floodplain clearance, etc.	
Hard Defences	Construct walls, embankments, demountable defences, Rehabilitate and / or improve existing defences, etc.	
Relocation of Properties	Relocation of properties away from flood risk.	
Diversion of Flow	Full diversion / bypass channel, flood relief channel, etc.	
Other works	Minor raising of existing defences / levels, infilling gaps in defences, site specific localised protection works, etc.	
Individual Property Flood Resistance	Protection / flood-proofing and resilience.	

3.3 RELATIONSHIP WITH OTHER RELEVANT PLANS AND PROGRAMMES

The Eastern CFRAM Study is set in a flood risk management planning context, where plans, projects and activities and their associated SEA and AA requirements are all linked.

Further examination of the UoM07 FRMP in this NIS will take account of the OPW's obligation to comply with all environmental legislation and align with and cumulatively contribute towards – in combination with other users and bodies – the achievement of the objectives of the regulatory framework for environmental protection and management led by the WFD and implemented by the River Basin Management Plans (RBMPs).

Table 3.3.1 identifies the main significant environmental plans, programmes and legislation, adopted at International, European Community or Member State level, which would be expected to influence, or be influenced by, the Eastern CFRAM Study's FRMPs. While it is recognised that there are many plans, programmes and legislation that will relate to the FRMPs, it is considered appropriate to only deal with those significant texts, to keep the assessment at a strategic level.

Table 3.3.1: List of Other Plans and Projects with potential for in-Combination Effects

Level	Plan / Programme / Legislation
EU Level	<ul style="list-style-type: none"> ▪ EU Floods Directive [2007/60/EC] ▪ A Blueprint to Safeguard Europe's Water Resources [COM(2012)673] ▪ Bathing Water Directive [2006/7/EC] ▪ Birds Directive [2009/147/EC] ▪ Bonn Convention [L210, 19/07/1982 (1983)] ▪ Drinking Water Directive [98/83/EC] ▪ EIA Directive [85/337/EEC] [2014/52/EU] ▪ Environmental Liability Directive [2004/35/EC] ▪ Environmental Quality Standards Directive [2008/105/EC] ▪ EU Biodiversity Strategy to 2020 [COM(2011)244] ▪ European Landscape Convention [ETS No. 176] ▪ Groundwater Directive [80/68/EEC] and Daughter Directive [2006/118/EC] ▪ Habitats Directive [92/43/EEC] ▪ Marine Strategy Framework Directive [2008/56/EC] ▪ Nitrates Directive [91/676/EEC] ▪ Renewable Energy Directive [2009/28/EC] ▪ SEA Directive [2001/42/EC] ▪ Second European Climate Change Programme [ECCP II] 2005. ▪ Sewage Sludge Directive [86/278/EEC] ▪ Soils Thematic Strategy [COM(2006) 231] ▪ Urban Wastewater Treatment Directive [91/271/EEC] ▪ Water Framework Directive [2000/60/EC] ▪ World Heritage Convention [WHC-2005/WS/02]
National Level	<ul style="list-style-type: none"> ▪ Arterial Drainage Maintenance and High Risk Designation Programme 2016-2021 (OPW, 2016) ▪ Fisheries Acts 1959 to 2007 (S.I. No. 14 of 1959 and No. 17 of 2007) ▪ Food Harvest 2020 (DAFM, 2010) ▪ Food Wise 2025 (DAFM, 2015) ▪ Capital Investment Programme 2014-2016 (Irish Water, 2014) ▪ Grid 25 Implementation Plan 2011-2016 (EIRGIRD, 2010) ▪ Harnessing Our Ocean Wealth: An Integrated Marine Plan for Ireland (Inter-Departmental Marine Coordination Group 2012) ▪ Irish Geological Heritage (IGH) Programme (GSI 1998-) ▪ Lead in Drinking Water Mitigation Plan (Irish Water, 2016) ▪ National Biodiversity Plan (2nd Revision 2011-2016) (DAHG, 2011) ▪ National Climate Change Adaptation Framework (DEHLG, 2012) ▪ National Climate Change Strategy 2007-2012 (DEHLG, 2007) ▪ National (Climate) Mitigation Plan (DECLG, 2012) ▪ National Development Plan 2007-2013 (DECLG, 2007) ▪ National Forestry Programme 2014-2020 (DAFM, 2015) ▪ National Forest Policy Review (DAFM, 2014) ▪ National Landscape Strategy for Ireland (Draft) 2014 – 2024 (DAHG, 2014) ▪ National Monuments Acts (1930 to 2004) (S.I. No. 2 of 1930 & No. 22 of 2004) ▪ National Renewable Energy Action Plan (DCENR, 2010) ▪ National Secondary Road Needs Study 2011 (NRA, 2011) ▪ National Spatial Strategy 2002-2020 (DELG, 2002) ▪ National Sludge Wastewater Sludge Management Plan (Draft) (Irish Water, 2015) ▪ National Strategic Plan for Sustainable Aquaculture Development (DAFM, 2015) ▪ Offshore Renewable Energy Development Plan (DCENR, 2014) ▪ Planning System and Flood Risk Management (OPW, 2009) ▪ Raised Bog SAC Management Plan (Draft) (DAHG, 2014), ▪ National Peatland Strategy (Draft) (NPWS, 2014) ▪ Review of Raised Bog Natural Heritage Area Network (NPWS, 2014) ▪ Report of the Flood Policy Review Group (OPW, 2004)

Level	Plan / Programme / Legislation
	<ul style="list-style-type: none"> Rural Development Programme 2014-2020 (DAFM, 2015) Water Services Strategic Plan (Irish Water, 2014)
Regional Level	<ul style="list-style-type: none"> UoM07 Flood Risk Management Plan (OPW, 2016) Eastern River Basin District Management Plan 2009-2015 (DEHLG, 2010) Draft Transport Strategy for the Greater Dublin Area 2016-2035 (NTA, 2015) Midlands BAU (Business Area Unit) 2016-2020 (Coillte, 2016) Regional Planning Guidelines for the Border Region 2010-2022, Regional Planning Guidelines Office, 2010) Regional Planning Guidelines for the Greater Dublin Area 2010-2022, (Regional Planning Guidelines Office, 2010) Regional Planning Guidelines for the Midland 2010-2022, (Regional Planning Guidelines Office, 2010)
Sub-Regional	<ul style="list-style-type: none"> Cavan County Development Plan 2014-2020 (Cavan County Council, 2014) Kildare County Development Plan 2011-2017 (Kildare County Council, 2011) Louth County Development Plan 2015-2021 (Louth County Council, 2015) Meath County Development Plan 2013-2019 (Meath County Council, 2013) Offaly County Development Plan 2014-2020 (Offaly County Council, 2014) Westmeath County Development Plan 2014-2020 (Westmeath County Council, 2014) Drogheda Borough Council Development Plan 2011-2017 (Louth County Council, 2011) Navan Development Plan 2009-2015 (Meath County Council, 2009) Trim Development Plan 2008-2014 (Meath County Council, 2008) Louth County Council Landscape Character Assessment (LCC, 2002) The Geological Heritage of Cavan (GSI, 2013) Offaly Historic Landscape Characterisation (Offaly County Council, 2006) County Offaly Wind Strategy (Offaly County Council, 2009) Cavan Economic Plan 2009-2012 (Cavan County Council, 2009) Kildare Local and Economic & Community Plan 2016-2021 (Kildare County Council, 2015) Meath Economic Development Strategy 2014-2022 (Meath County Council, 2014) Offaly Local and Economic & Community Plan 2016-2021 (Offaly County Council, 2015) County Cavan Groundwater Protection Scheme (GSI, 2008) Couth Offaly Groundwater Protection Scheme (GSI and Offaly County Council, 1998) County Kildare Groundwater Protection Scheme (GSI and Kildare County Council, 2002) County Meath Groundwater Protection Scheme (GSI and Meath County Council, 1996) Ballmakenny Group Water Scheme (GSI and Louth County Council, 2011) Cavan Draft Heritage Plan 2016-2021 (Cavan County Council, 2015) Kildare Heritage Plan 2014-2018 (Kildare County Council, 2013) Louth Heritage Plan 2015-2020 (Louth County Council, 2014) Draft County Meath Heritage Plan 2016-2021 (Meath County Council, 2015) Offaly Heritage Plan 2012-2016 (Offaly County Council, 2011) Westmeath Heritage Plan 2010-2015 (Westmeath County Council, 2009) Housing Strategy for County Cavan 2008-2014 (Appendix 26) (Cavan County Council, 2007) Offaly Housing Strategy 2008-2015 (Offaly County Council, 2007) Athboy Local Area Plan 2009-2015 (Meath County Council, 2009) East Meath Local Area Plan 2014-2020 (Meath County Council, 2014) Edenderry Local Area Plan 2011-2017 (Offaly County Council, 2011) Longwood Local Area Plan 2009-2015 (Meath County Council, 2009) Local Biodiversity Action Plan Louth (Louth County Council, 2014) (Draft) County Meath Biodiversity Action Plan 2015-2021 (Meath County Council, 2015) Westmeath Biodiversity Action Plan 2014-2020 (Westmeath County Council, 2013) Kildare Biodiversity Plan 2009-2014 (Kildare County Council, 2008)

3.4 EUROPEAN SITES

Special Areas of Conservation (SACs) are prime wildlife conservation areas, considered to be important on a European as well as Irish level. Most SACs are in rural areas, although a few sites reach into town or city landscapes, such as Dublin Bay and Cork Harbour.

SACs are selected under the Habitats Directive for the conservation of a number of habitat types, which in Ireland includes raised bogs, blanket bogs, turloughs, sand dunes, machair (flat sandy plains on the north and west coasts), heaths, lakes, rivers, woodlands, estuaries and sea inlets. There are 25 species of flora and fauna, including Salmon, Otter, Freshwater Pearl Mussel, Bottlenose Dolphin and Killarney Fern that are also afforded protection. These are known as Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds).

The areas chosen as SAC in Ireland cover an area of approximately 13,500km². Roughly 53% is land, the remainder being marine or large lakes. Across the EU, over 12,600 sites have been identified and proposed, covering 420,000km² of land and sea, an area the size of Germany.

Special Protection Areas, (SPAs) are conservation areas which are important sites for rare and vulnerable birds (as listed on Annex I of the Birds Directive), and/or for regularly occurring migratory species. SPAs are designated under the 'Birds Directive' (Council Directive 2009/147/EC - codified version of Directive 79/409/EEC on the Conservation of Wild Birds, as amended).

Ireland's SPA Network encompasses over 5,700km² of marine and terrestrial habitats. The marine areas include some of the productive intertidal zones of bays and estuaries that provide vital food resources for several wintering wader species. Marine waters adjacent to breeding seabird colonies and other important areas for seaducks, divers and grebes are also included in the network. The remaining areas of the SPA network include inland wetland sites important for wintering waterbirds and extensive areas of blanket bog and upland habitats that provide breeding and foraging resources for species including Merlin and Golden Plover. Agricultural land also represents a share of the SPA network, ranging from the extensive farmland of upland areas where its hedgerows, wet grassland and scrub offer feeding and/or breeding opportunities for Hen Harrier to the intensively farmed coastal polderland where internationally important numbers of swans and geese occur. Coastal habitats including Machair are also represented in the network, which are of high importance for Chough and breeding Dunlin.

3.4.1 Initial Screening Exercise

3.4.1.1 Capture of Sites for Screening – RBD/Study Scale

As recommended in the *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities* (DEHLG, 2010), all European sites within the Eastern CFRAM Study area and within a 15 kilometre buffer of the Study area were included in the initial capture for AA screening.

The DEHLG Guidance also recommends that sites beyond this distance should also be considered where there are hydrological linkages or other pathways that extend beyond 15 km thereby ensuring that all potentially affected European sites are included in the screening process.

It is acknowledged that as the nature of the FRMPs includes the potential to impact water quality and/or quantity, there is thus the potential for ecological receptors (particularly those that are water dependent) to experience potential impacts at distances even greater than 15km from the source. In the Eastern CFRAM Study, each Unit of Management represents a single Hydrometric Area, each of which, generally speaking, has its river sources rising in an upland area and terminating at the coastline. The boundary of the Hydrometric Area represents a defined watershed, beyond which watercourses drain into a different river basin and to a different part of the coastline. The limit of the CFRAM Study Area therefore incorporates a tangible boundary for hydraulic and hydrological impacts. The OPW recognises that there are other potential impact pathways other than hydraulic/hydrological pathways for ecological receptors, such as groundwater, land and air and that mobile species, in particular birds, may range for distances beyond 15km.

As discussed in 3.1.3, for the CFRAM Study, desktop information and information received during the consultation was used in an iterative process with the AA and SEA to inform the preliminary screening of *Methods* which examines technical, economic, social and environmental aspects before subjecting the selected *Options* to detailed Multi-Criteria Analysis (MCA). In this way, *Methods* or *Options* which pose a high risk of significant adverse impacts can be ruled out in the earliest stages of *Option* development, therefore ensuring that, using the information available at plan level, *Options* which were considered likely to generate impacts that extend their influence more than 15km beyond the limits of the Eastern CFRAM Study area were not taken forward for MCA and to the FRMPs. Thus it was not considered necessary at Study or Plan level to include sites further than 15km from the source.

The potential physical flood relief works or 'Schemes' set out in the Plans that have been developed through the CFRAM Programme are to an outline design, and are not at this point ready for construction. Further option design through a project-level of assessment will be required for such works before implementation.

At the project level, where physical measures are to be developed, local information that can not be captured at the Plan-level of assessment, such as project-level environmental surveys and assessments, will be used to inform the Appropriate Assessment of the potential physical flood relief works or 'Schemes'. The capture of additional local information may result in the identification of European sites within the Scheme's Zone of Influence that were not apparent during the plan screening process.

The initial site selection exercise was carried using the ESRI ArcMap GIS package, into which was loaded the most recently issued boundary shapefiles for all SACs and SPAs in Ireland, each respectively downloaded from the NPWS⁹ website. These were cross-referenced against the boundary shapefile for the Eastern CFRAM Study area. A search area of 15km from the boundary of the Eastern CFRAMs Study area was applied and all European sites either wholly or partially within this search area were captured. This exercise is illustrated in Figure 3.4, which shows the extents of the preliminary search area and the outlines of all the SAC and SPA areas within and adjacent to the Eastern CFRAM Study area.

The initial selection exercise for the Eastern CFRAM Study resulted in a total of 78 European sites being captured for screening.

⁹<http://www.npws.ie/maps-and-data/designated-site-data/download-boundary-data> SPA_ITM_2015_11a.zip and SAC_ITM_WGS84_2015_11a.zip (accessed 17 November 2015)

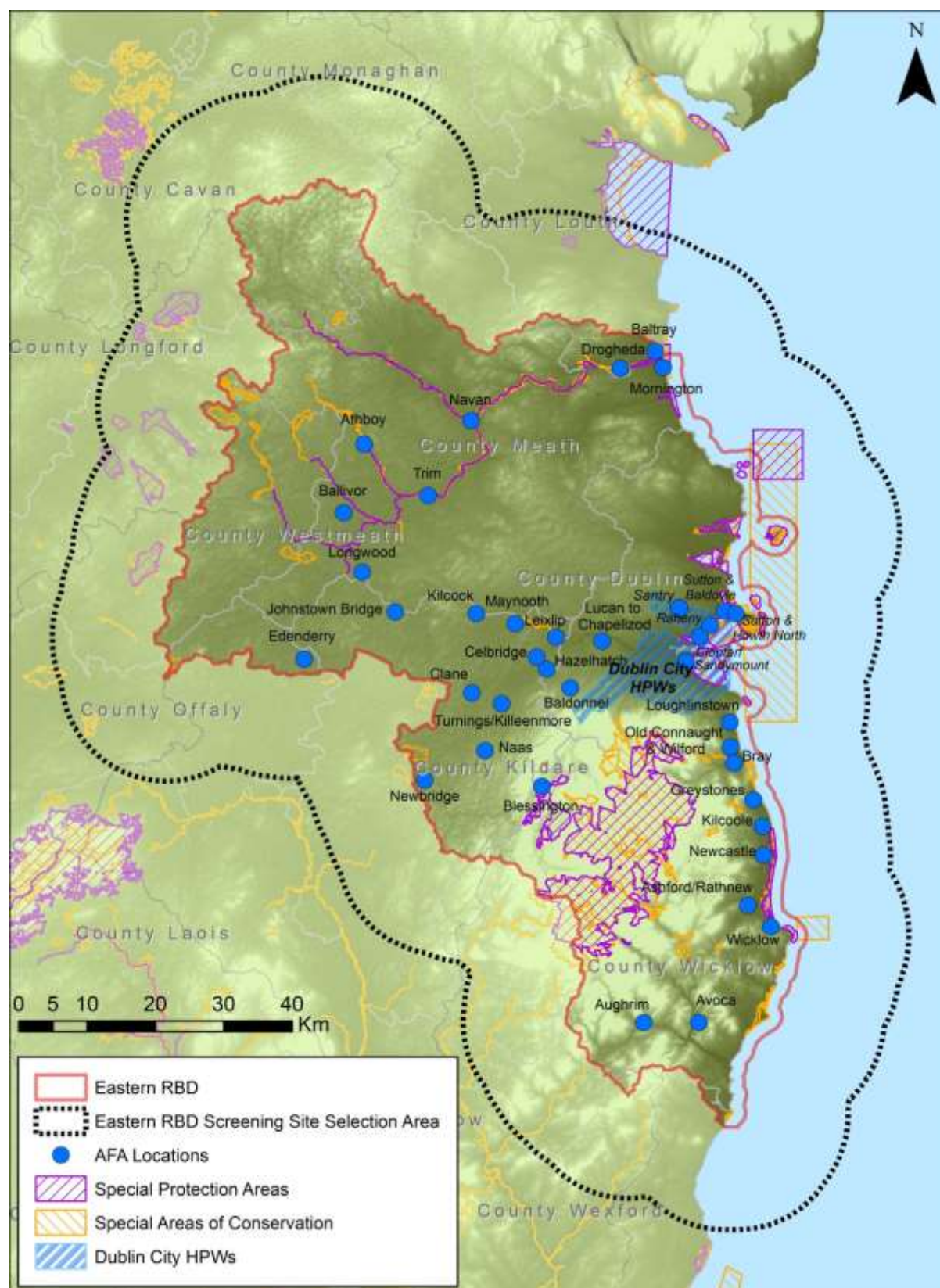


Figure 3.4.1: Eastern CFRAM Study Area, showing AFAs and Study-Scale Search Area for European Sites

3.4.1.2 European Site Screening – Plan Scale

The UoM SSA refers to a full hydrometric area. At this scale, methods that could provide benefits to multiple, often all, AFAs within the Unit of Management and other areas were considered, along with the spatial and temporal coherence of methods being considered at smaller SSAs.

As discussed above in Chapter 3.1.3, each UoM has its own draft FRMP and thus the screening of European sites was grouped by UoM in the overall Study Scale AA Screening Report (IBE0600Rp0036, 2016).

The capture of sites to be screened for each FRMP area was carried out the same way as the methodology for capturing the sites to be screened in the overall CFRAM Study, described above in 3.4.1.1. Each FRMP coverage area (i.e. each Unit of Management) was queried against the shapefiles for all Irish SACs and SPAs in ESRI ArcMap and all sites within 15km of each FRMP coverage area were captured for screening. The rationale for limiting the scope of the FRMP-scale capture area to 15km has been previously discussed in 3.4.1.1.

3.4.1.3 European Site Screening – Establishment of the ‘Zone of Influence’

For each UoM/FRMP area, every European site captured by the GIS exercise described in 3.4.1.2 above was examined individually.

A ‘Zone of Influence’ was established for each European site. The ‘Zone of Influence’ for each site automatically comprised all areas within 15km of the European site. As hydrological impacts are a possibility, it also included all catchment areas located upstream of the European site to the top of the catchment and any watercourses downstream of the European site. This was achieved by manually examining hydraulic data, specifically EPA datasets for WFD catchment areas, sub-basin catchments and watercourses.

For the reasons listed above in 3.4.1.1, it was not considered necessary at plan level to extend the ‘Zone of Influence’ for coastal sites beyond 15km. At project level, additional data capture such as hydrographic field surveys and hydrodynamic modelling will be used in identifying the extent of the influence of any coastal Scheme and informing the project level AA.

Every AFA (regardless of distance) located within the Zone of Influence for each European site was examined for potential connectivity pathways (both hydraulic and ecological) with the European site.

For purposes of reporting, distances were calculated using the ‘near table’ tool in ArcMap which measured the distance between each European site and the nearest point of each AFA (note: not the nearest point of the AFA’s catchment, but as the AFA itself is likely to be the focus of any FRM activity this was gauged to be the most appropriate site for initiating measurements). The tool produced a spreadsheet listing the distance between each European site and each AFA boundary. All distances quoted in the screening tables have been derived from the “near table” tool.

3.4.1.4 European Sites–Selection for Preliminary Screening of Methods & Options

The risk of adverse impact on the European sites was evaluated by examining their location in relation to the AFA boundaries and, in the case of those AFAs at risk of fluvial flooding, the entire extents of their upstream catchments and downstream watercourses.

The relationship between the AFAs (including their upstream catchments and downstream reaches) and each of the European sites was individually reviewed by an experienced assessor. Consideration was given to whether any potential impact pathway between the AFA and the European Site could be identified, either by a hydraulic connection or by virtue of an ecological stepping stone or biodiversity corridor.

As this exercise took place during the ‘Preliminary Screening’ phase of development of the draft FRMP (see Figure 3.1.3 on page 14), the selection of European sites to be considered for assessment took into account all of the potential FRM methods included in the “long list” of FRM methods shown earlier in Table 3.2.1 (also discussed in more detail in Appendix A) and the potential for *any* of these methods to result in impacts to any of the European sites, either alone or in combination with other methods. The assessment reviewed the potential for:

- Direct Impacts, examples of which include (but are not limited to):
 - A construction footprint within the boundary of a European site, or
 - A construction footprint outside a European site but which may obstruct the passage of a qualifying interest in accessing a European Site.
- Indirect Impacts, example of which include (but are not limited to):
 - Short term water quality impacts associated with construction works, for example, suspended sediment and sedimentation impacts;
 - Changes to existing hydrological and morphological regimes.

It should be noted that the FRMP is a strategic-level study, and the exact location and design of FRM measures at each AFA has not been decided. Further assessment and quantification of potential impacts will be made at the project stage.

The likely significance of effects on the European sites from the implementation of FRM measures at each of the AFAs, or in their catchments/sub catchments, taking into account their qualifying interests and conservation objectives, was assessed taking into account the source-pathway-receptor model. Site-specific conservation objectives for designated habitats/species, which are included in Appendix C, were taken into account insofar as plan-level details allowed. The project-level assessment will be undertaken based on fully-developed outline designs and site surveys to further consider the attributes and targets of site specific conservation objectives.

The source is defined as the individual element of the plan (at this stage, the source is each/any of the *Methods*, but when each FRMP has been developed, the source will be each of the chosen *Measures*) that has the potential to impact on a European site, its qualifying interests and its conservation objectives. The pathway is defined as the means or route by which a source can migrate to the receptor. For the Eastern CFRAM Study the pathways for potential impacts are primarily hydraulic, i.e. via watercourses and hydrological catchments, but the potential for linkages by other means (e.g. via an ecological stepping stone or biodiversity corridor) was also examined

during the screening process. The receptor is defined as the European site and its qualifying interests. Each element can exist independently, however a potential impact is created where there is a linkage between the source, pathway and receptor.

NPWS guidance recommends that appropriate assessment screening is informed by the conservation condition of the qualifying interest/s of a European site, however as this screening covered an entire plan area rather than individual projects within the plan, the condition of the qualifying interest was not considered to be relevant at this stage, as the purpose of the screening was to identify which European sites may be at risk of experiencing impacts and not, at that stage, assessing the potential significance of any potential impacts.

Each European site was individually reviewed to identify whether there were potential impact pathways, via surface water, groundwater, land or air, evident from FRM methods to be employed at any of the AFAs (or in the catchment of any AFAs) in the Eastern CFRAM Study area. This included analysing river and stream network, topographic and catchment datasets to ascertain the presence or absence of hydraulic linkages between AFAs and European sites and also examining the potential for impacts on other areas of biodiversity value, such as NHAs (or pNHAs), wildfowl reserves or nature reserves, which may provide a stepping stone between European sites, or wider areas where mobile qualifying interests (e.g. migratory fish or birds) may be affected by changes, outside the boundary of the designated area.

A total of 51 SACs and 27 SPAs were identified as being within, or within 15km of, the Eastern CFRAM Study area. Of these, 36 European sites (24 SACs and 12 SPAs) were identified within the Screening Search Area of UoM07 (see Figure 3.5.1). All these sites were included in the screening process for the UoM07 FRMP.

Where no apparent linkages or relationships were found between the European site and the AFA or its modelled catchment, a conclusion of “no identifiable impact pathway” was drawn and the site was eliminated from the screening process. Where a connectivity or linkage was possible, the precautionary principle was applied and the site was retained in the screening and was recommended for further assessment (which may include appropriate assessment) at the draft FRMP stage.

The Preliminary Options Reports for each UoM were used to help define the upstream limits of the AFA’s influence. As part of the Optioneering process for each FRMP, Spatial Scales of Assessment (SSAs) have been developed for each UoM (see Chapter 4.2). For some UoMs, the upstream/upcatchment storage FRM method has already been ruled out at this stage and therefore it was possible to rule out potential impacts on European sites from upcatchment FRM methods during the AA screening. In UoMs where upstream/upcatchment FRM methods have not been ruled out, all upcatchment areas were retained in the screening process.

No specific distance limit was applied to downstream impacts and these were reviewed on a case-by-case basis.

The more detailed summaries of the preliminary screening exercise carried out for the European sites considered to be potentially influenced by FRM methods used in UoM07 are presented in Appendix B.

The 'Natura 2000 Standard Data Form', 'Conservation Objectives' and 'Site Synopsis' documents for each of the European sites can be found on the National Parks & Wildlife Service website¹⁰, along with other relevant survey information and documents for each site. For each of the European Sites identified in the screening process these documents were downloaded and were used to inform the screening.

¹⁰ <http://www.npws.ie/protectedsites/> (accessed 5th and 6th October 2015)

3.5 PRELIMINARY SCREENING RESULTS FOR UOM07

There were 36 European sites (24 SACs and 12 SPAs) found within the Screening Search Area of UoM07 (see Figure 3.5.1).

All European sites in the search area were screened for possible impacts from all FRM methods at all AFAs in UoM07. The results of the screening exercise are summarised in Table 3.5.1 and Table 3.5.2.

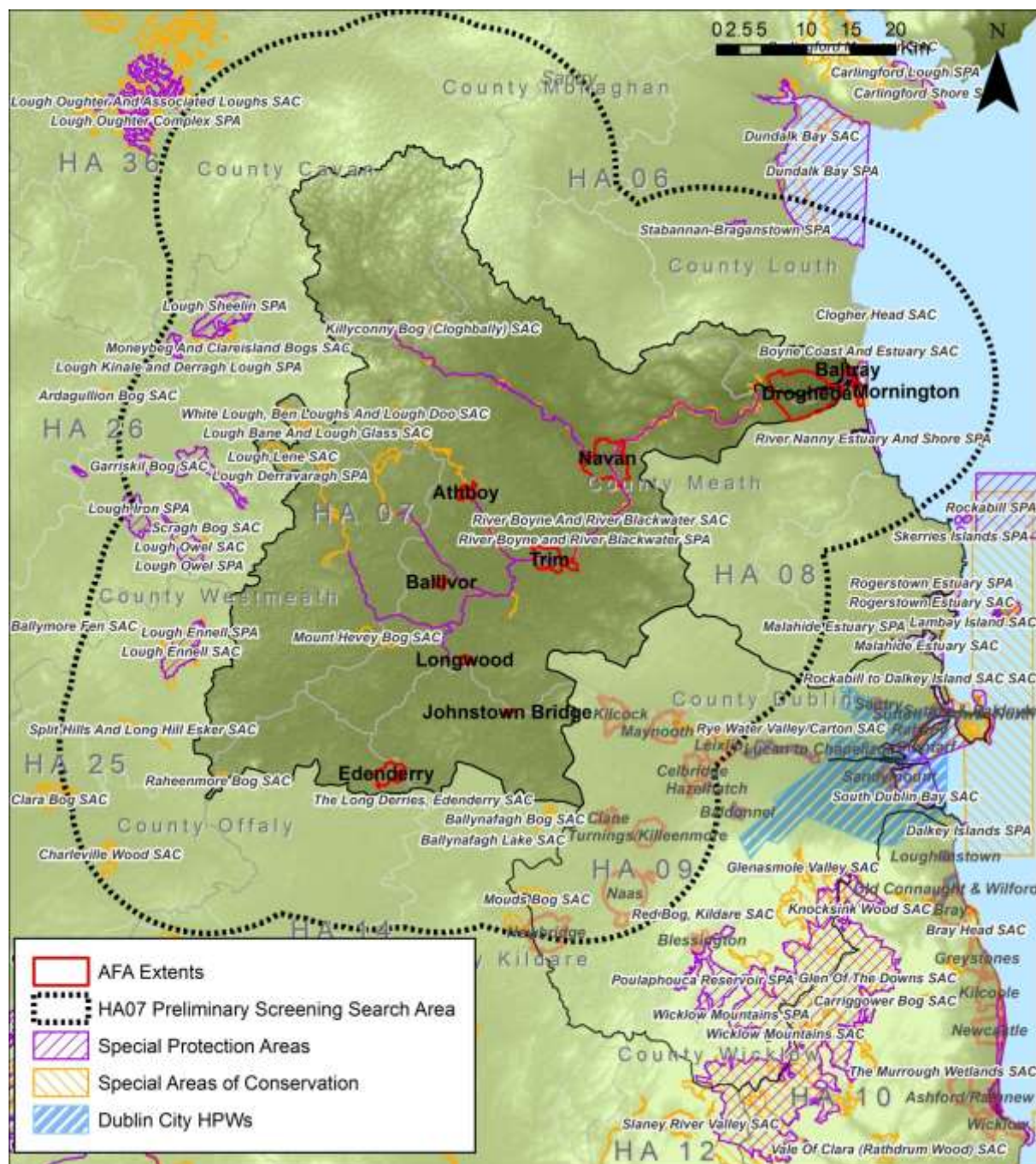


Figure 3.5.1: UoM07 European Sites incorporated in the Preliminary Screening of Methods & Options for the FRMP

Table 3.5.1: European Sites screened for UoM07

	Site Name	Site Code	County	UoM	Water Dependent	AFAs within Zone of Influence of European Site	AFAs that have an Identifiable Impact Pathway to European Site	Screened Out of UoM07 FRMP?
1	Ballynafagh Bog SAC	000391	Kildare	outside UoM	Yes	Johnstown Bridge (11.9km) (also Celbridge (14.2km), Clane (3.8km), Hazelhatch (15.8km), Kilcock (10.1km), Maynooth (13.3km), Naas (8.2km), Newbridge (9.9km) and Turnings/Killeenmore (7.9km) in UoM09)	None	Yes
2	Ballynafagh Lake SAC	001387	Kildare	outside UoM	Yes	Edenderry (15.8km), Johnstown Bridge (11.1km), (also Celbridge (14.9km), Clane (5.0km), Kilcock (9.8km), Maynooth (13.4km), Naas (7.5km), Newbridge (8.1km), Turnings/Killeenmore (8.9km) in UoM09)	None	Yes
3	Boyne Coast And Estuary SAC	001957	Louth, Meath	07, 08	Yes	Athboy (40km), Ballivor (47.4km), Baltray (0.0 km), Drogheda (0.0 km), Edenderry (63km), Johnstown Bridge (50km), Longwood (50km), Mornington (0.0 km), Navan (23.4 km), Trim (34km)	Athboy, Ballivor, Baltray, Drogheda, Edenderry, Johnstown Bridge, Longwood, Mornington, Navan, Trim	No
4	Boyne Estuary SPA	004080	Louth, Meath	07,08	-	Athboy (40km), Ballivor (47.4km), Baltray (0.0 km), Drogheda (0.0 km), Edenderry (63km), Johnstown Bridge (50km), Longwood (50km), Mornington (0.0 km), Navan (23.4 km), Trim (34km)	Athboy, Ballivor, Baltray, Drogheda, Edenderry, Johnstown Bridge, Longwood, Mornington, Navan, Trim	No
5	Charleville Wood SAC	000571	Offaly	outside UoM	Yes	None from UoM07	None	Yes
6	Clara Bog SAC	000572	Offaly	outside UoM	Yes	None from UoM07	None	Yes
7	Clogher Head SAC	001459	Louth	outside UoM	Yes	Baltray (5.9km), Drogheda (7.9km), Mornington (6.7km)	None	Yes

	Site Name	Site Code	County	UoM	Water Dependent	AFAs within Zone of Influence of European Site	AFAs that have an Identifiable Impact Pathway to European Site	Screened Out of UoM07 FRMP?
8	Dundalk Bay SAC	000455	Louth	outside UoM	Yes	Baltray (15.5km) Drogheda (15.3km).	None	Yes
9	Dundalk Bay SPA	004026	Louth	outside UoM	-	Baltray (13.6km), Drogheda (14.9km), Mornington (14.5km)	None	Yes
10	Garriskil Bog SAC	000679	Westmeath	outside UoM	Yes	None from UoM07	None	Yes
11	Garriskil Bog SPA	004102	Westmeath	outside UoM	-	None from UoM07	None	Yes
12	Killyconny Bog (Cloghbally) SAC	000006	Meath, Cavan	07	Yes	None from UoM07	None	Yes
13	Lough Bane And Lough Glass SAC	002120	Meath, Westmeath	07	Yes	Athboy (15.9km)	None	Yes
14	Lough Derravaragh SPA	004043	Westmeath	outside UoM	-	None from UoM07	None	Yes
15	Lough Ennell SAC	000685	Westmeath	outside UoM	Yes	None from UoM07	None	Yes
16	Lough Ennell SPA	004044	Westmeath	outside UoM	-	None from UoM07	None	Yes
17	Lough Iron SPA	004046	Westmeath	outside UoM	-	None from UoM07	None	Yes
18	Lough Kinale and Derragh Lough SPA	004061	Cavan, Longford, Westmeath	outside UoM	-	None from UoM07	None	Yes
19	Lough Lene SAC	002121	Westmeath	07	Yes	None from UoM07	None	Yes
20	Lough Owel SAC	000688	Westmeath	outside UoM	Yes	None from UoM07	None	Yes
21	Lough Owel SPA	004047	Westmeath	outside UoM	-	None from UoM07	None	Yes

	Site Name	Site Code	County	UoM	Water Dependent	AFAs within Zone of Influence of European Site	AFAs that have an Identifiable Impact Pathway to European Site	Screened Out of UoM07 FRMP?
22	Lough Sheelin SPA	004065	Cavan, Meath, Westmeath	outside UoM	-	None from UoM07	None	Yes
23	Moneybeg And Clareisland Bogs SAC	002340	Meath, Westmeath	outside UoM	Yes	None from UoM07	None	Yes
24	Mouds Bog SAC	002331	Kildare	09	Yes	None from UoM07	None	Yes
25	Mount Hevey Bog SAC	002342	Meath, Westmeath	07	Yes	Ballivor (6.9km), Edenderry (12.7km), Johnstown Bridge (13.8km), Longwood (6.3km) Trim (17.0km), Navan (27.7km), Drogheda (49km), Baltray (57km), Mornington (57km).	None	Yes
26	Pollardstown Fen SAC	000396	Kildare	outside UoM	Yes	None from UoM07	None	Yes
27	Raheenmore Bog SAC	000582	Offaly	07	Yes	None	None	Yes
28	River Boyne And River Blackwater SAC	002299	Cavan, Louth, Meath, Westmeath	07	Yes	Athboy (0.0km), Ballivor (1.0km), Baltray (2.6km), Drogheda (0.0km), Edenderry (12.5km), Johnstown Bridge (8.7km), Kilcock (13.3km), Longwood (1.1km), Mornington (2.8km), Navan (0.0km) Trim (0.0km)	Athboy, Ballivor, Baltray, Drogheda, Edenderry, Johnstown Bridge, Longwood, Mornington, Navan and Trim	No
29	River Boyne and River Blackwater SPA	004232	Cavan, Louth, Meath, Westmeath	07	-	Athboy (0.0km), Ballivor (1.0km), Baltray (8.2km), Drogheda (0.0km), Edenderry (12.5km), Johnstown Bridge (8.7km), Kilcock (15.1km), Longwood (1.1km), Mornington (8.8km), Navan (0.0km) Trim (0.0km)	Athboy, Ballivor, Baltray, Drogheda, Edenderry, Johnstown Bridge, Longwood, Mornington Navan and Trim	No
30	River Nanny Estuary and Shore SPA	004158	Meath	08	-	Baltray (5.5km), Drogheda (3.8km), Mornington (1.7km)	Baltray, Drogheda, Mornington	No

	Site Name	Site Code	County	UoM	Water Dependent	AFAs within Zone of Influence of European Site	AFAs that have an Identifiable Impact Pathway to European Site	Screened Out of UoM07 FRMP?
31	Rye Water Valley/Carton SAC	001398	Meath, Kildare	09	Yes	None from UoM07	None	Yes
32	Scragh Bog SAC	000692	Westmeath	outside UoM	Yes	None	None	Yes
33	Split Hills And Long Hill Esker SAC	001831	Westmeath	outside UoM	-	None	None	Yes
34	Stabannan-Braganstown SPA	004091	Louth	outside UoM	-	Drogheda (15.7km)	None	Yes
35	The Long Derries, Edenderry SAC	000925	Offaly	outside UoM	-	Edenderry (2.9km), Johnstown Bridge (12.9km), Longwood (15.7km)	None	Yes
36	White Lough, Ben Loughs And Lough Doo SAC	001810	Meath, Westmeath	07	Yes	None	None	Yes

3.5.1 Conclusion of UoM07 Preliminary Screening Results

The likely significant effects that may arise from the UoM07 FRMP were examined in the context of all factors that could potentially affect the integrity of the European sites within the plan area and beyond.

On the basis of the findings of the Screening for Appropriate Assessment, it was concluded that the FRMP for UoM07:

- i. Is not directly connected with or necessary to the management of a European site; and
- ii. May have significant impacts on a European site

There were a total of 36 European sites (24 SACs and 12 SPAs) which were within the identified screening search area for UoM07 and which were used to inform the preliminary options assessment of the draft UoM07 FRMP.

A total of 31 European sites, including 22 SACs and nine SPAs were found to have no identifiable impact pathway associated with the implementation of FRM methods within the AFAs and were thus not at any risk of impacts. These were therefore scoped out as not requiring any further assessment in the NIS. Details of each site and the consideration of potential impacts from FRM methods are presented in Appendix B.

From the information available at the preliminary options assessment stage, it could not be concluded following screening that the UoM07 FRMP would not have significant effects on the European sites identified, as sufficient uncertainty remained due to gaps in information.

Five European sites (two SACs and three SPAs) were assessed as having the potential to experience an impact from the implementation of FRM methods in the catchments of one or more of the ten AFAs in UoM07 - see Table 3.5.2. Further assessment was recommended to assess the significance of these impacts including, where relevant, Stage 2 Appropriate Assessment, following the establishment of the Preferred Option for the draft FRMP.

Table 3.5.2: UoM07 AFAs requiring further Assessment (Appropriate Assessment) at FRMP stage

AFA with Identifiable Impact Pathway to European Site	European Site	Site Code
*Athboy	River Boyne And River Blackwater SAC	002299
	River Boyne and River Blackwater SPA	004232
	Boyne Coast And Estuary SAC	001957
	Boyne Estuary SPA	004080
*Ballivor	River Boyne And River Blackwater SAC	002299
	River Boyne and River Blackwater SPA	004232
	Boyne Coast And Estuary SAC	001957
	Boyne Estuary SPA	004080

AFA with Identifiable Impact Pathway to European Site	European Site	Site Code
Baltray	Boyne Coast And Estuary SAC	001957
	Boyne Estuary SPA	004080
	River Boyne And River Blackwater SAC	002299
	River Boyne and River Blackwater SPA	004232
	River Nanny Estuary and Shore SPA	004158
Drogheda	Boyne Coast And Estuary SAC	001957
	Boyne Estuary SPA	004080
	River Boyne And River Blackwater SAC	002299
	River Boyne and River Blackwater SPA	004232
	River Nanny Estuary and Shore SPA	004158
*Edenderry & Environs	River Boyne And River Blackwater SAC	002299
	River Boyne and River Blackwater SPA	004232
	Boyne Coast And Estuary SAC	001957
	Boyne Estuary SPA	004080
*Johnstown Bridge	River Boyne And River Blackwater SAC	002299
	River Boyne and River Blackwater SPA	004232
	Boyne Coast And Estuary SAC	001957
	Boyne Estuary SPA	004080
*Longwood	River Boyne And River Blackwater SAC	002299
	River Boyne and River Blackwater SPA	004232
	Boyne Coast And Estuary SAC	001957
	Boyne Estuary SPA	004080
Mornington	Boyne Coast And Estuary SAC	001957
	Boyne Estuary SPA	004080
	River Boyne And River Blackwater SAC	002299
	River Boyne and River Blackwater SPA	004232
	River Nanny Estuary and Shore SPA	004158
Navan	River Boyne And River Blackwater SAC	002299
	River Boyne and River Blackwater SPA	004232
	Boyne Coast And Estuary SAC	001957
	Boyne Estuary SPA	004080
*Trim	River Boyne And River Blackwater SAC	002299
	River Boyne and River Blackwater SPA	004232
	Boyne Coast And Estuary SAC	001957
	Boyne Estuary SPA	004080

*subsequently determined during CFRAM Study as an AFA of Zero or Very Low Risk and/or where FRM measures have not been pursued within the Eastern CFRAM Study (see 4.3.1)

4 SUMMARY OF PROPOSED MEASURES

This Chapter provides a summary of the measures that are proposed for inclusion in the FRMP for UoM07.

4.1 UOM-SCALE FLOOD MANAGEMENT MEASURES

There are certain prevention and preparedness measures related to flood risk management that form part of wider Government policy. These measures should be applied across the whole UoM, including all AFAs. These methods are summarised below and described in 4.1.1 to 4.1.13. These strategic alternatives that will be implemented on a national scale are non-structural, with no actual physical action to take place in a specific geographic location following implementation of the FRMP.

Those non-structural/policy-based measures shown below will have no physical outcome or are an existing process and so they cannot be assessed for impacts in this NIS. The next stage of development of these future plans and policies would be environmentally neutral, however in some cases they may need taken into account for in-combination and cumulative impacts.

- Sustainable Planning and Development Management - Proper application of the Guidelines on the Planning System and Flood Risk Management by the planning authorities;
- Sustainable Urban Drainage Systems (SuDS);
- Voluntary Home Relocation;
- Local Adaptation Planning;
- Land Use Management and Natural Flood Risk Management Measures;
- Maintenance of Arterial Drainage Schemes;
- Maintenance of Drainage Districts;
- Flood Forecasting and Warning;
- Review of Emergency Response Plans for Severe Weather;
- Promotion of Individual and Community Resilience;
- Individual Property Protection;
- Flood-Related Data Collection, and
- Minor Works Scheme.

As described in Chapter 3.2 the 'Do-Nothing' scenario was considered from the outset as one of the FRM methods considered. Each area to be assessed from UoM to AFA scale has therefore had the Do-Nothing method assessed as a potential alternative to the Plan. In general, this has been ruled out as an option however, as it would not achieve the stated objectives of the FRMP to manage flood risk within the UoM.

4.1.1 Sustainable Planning and Development Management

The proper application of the Guidelines on the Planning System and Flood Risk Management 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. The Planning Authorities will ensure proper application of the Guidelines on the Planning System and Flood Risk Management (DECLG/OPW, 2009) in all planning and development management processes and decisions in order to support

sustainable development. In UoM07 this option is considered environmentally neutral as it is a policy option to prevent inappropriate development. This policy cannot be assessed for impacts.

4.1.2 Sustainable Urban Drainage Systems (SuDS)

Sustainable Urban Drainage Systems (SuDS) can play a role in reducing and managing run-off from new developments to surface water drainage systems, reducing the impact of such developments on flood risk downstream, as well as improving water quality and contributing to local amenity. In accordance with the Guidelines on the Planning System and Flood Risk Management (DECLG/OPW, 2009), planning authorities should seek to reduce the extent of hard surfacing and paving and require the use of sustainable drainage techniques. In UoM07 this option is considered environmentally neutral as it is a policy option to improve the sustainability of future development. This policy cannot be assessed for impacts.

4.1.3 Voluntary Home Relocation

In extreme circumstances, the flood risk to an area where there is already some development may be such that continuing to live in the area is not acceptable to the owners, and it may not be viable or acceptable to take measures to reduce the flooding of the area. The home-owner may choose to relocate out of such areas will remove the risk.

The Inter-Departmental Flood Policy Coordination Group will consider the policy options around voluntary home relocation for consideration by Government.

This method is applicable throughout UoM07. This option is considered environmentally neutral as it is a potential assessment of policy options. This policy cannot be assessed for impacts in the NIS.

4.1.4 Local Adaptation Planning

The consultation document on the NCCAF recognises that local authorities also have an important role to play in Ireland's response to climate adaptation. Given the potential impacts of climate change on flooding and flood risk, the local authorities should take fully into account these potential impacts in the performance of their functions, in particular in the consideration of spatial planning and the planning and design of infrastructure. Local authorities should take into account the potential impacts of climate change on flooding and flood risk in their planning for local adaptation, in particular in the areas spatial planning and the planning and design of infrastructure.

This method is applicable throughout UoM07. The option is considered environmentally neutral as it is a policy option to prepare Adaptation Plans at local scale. This option is therefore not included in the appropriate assessment. This policy cannot be assessed for impacts in the NIS.

4.1.5 Land Use Management and Natural Flood Risk Management Measures

The OPW is liaising with the EPA on the potential impact of WFD measures on flood risk, which are typically neutral (no impact), or may have some benefit in reducing runoff rates and volumes (e.g., through agricultural measures such as minimising soil compaction, contour farming or planting, or the installation of field drain interception ponds). The OPW will continue to work with the EPA and

other agencies implementing the WFD to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives, such as natural water retention measures, and also biodiversity and potentially other objectives. It is anticipated that this is most likely to be achieved in areas where phosphorous loading is a pressure on ecological status in a sub-catchment where there is also an identified potentially significant flood risk (i.e., an AFA). This coordination will also address measures that may otherwise cause conflict between the objectives of the two Directives.

This method is applicable throughout UoM07. The option has the potential for both positive and negative environmental impacts; however the next stage of implementation of land use management and natural flood management following from the FRMP will be further assessment and feasibility studies. At this early stage in its development the policy cannot be assessed for impacts in the NIS.

4.1.6 Maintenance of Arterial Drainage Schemes

Within UoM07 the OPW has implemented and maintains the Boyne Arterial Drainage Scheme which was undertaken by the OPW between 1967 and the mid-1980s, under the 1945 Arterial Drainage Act. The OPW continues to have statutory responsibility for inspection and maintenance of the Scheme, which includes much of the main Boyne channel and a large number of designated tributaries. The primary focus of arterial drainage schemes is not for flood relief but for the improvement of agricultural land. Whilst not intended as a flood alleviation scheme, the arterial drainage works have undoubtedly reduced the fluvial flood risk in certain parts of UoM07.

The OPW have undertaken separate environmental and appropriate assessments of the maintenance of their arterial drainage schemes. Where relevant, the appropriate assessment for the maintenance of arterial drainage schemes in the UoM has been taken into account for cumulative or in-combination impacts with the FRMP.

4.1.7 Maintenance of Drainage Districts

Drainage Districts represent areas where the Local Authorities have responsibilities to maintain watercourse channels and therefore contribute to maintaining the existing regime. There are six Drainage Districts located within UoM07:

- Owenroe & Moynalty DD
- Lough Crew DD
- Ballycowan DD
- Carbury Hill Stream DD
- Foranwell DD
- Garr DD.

None of these Drainage Districts are located directly on the key watercourses where fluvial and coastal flood risk is being investigated. As such, the activities within Drainage Districts are not considered to significantly contribute to UoM07's flood risk management, whilst they do contribute to the maintenance of the existing flow regime in other parts of UoM07. The Local Authorities have a statutory duty to maintain the Drainage Districts, and the Draft FRMP does not amend these responsibilities. The local authorities shall maintain the Drainage Districts in their jurisdictional area in accordance with legislation. Where relevant, the maintenance of drainage districts in the UoM

will be taken into consideration for cumulative or in combination impacts with measures proposed in the FRMP in the appropriate assessment.

4.1.8 Flood Forecasting and Warning

A Government decision was taken on the 5th January 2016 to establish a national flood forecasting and warning service. Flood Forecasting and Warning was assessed as a method of flood risk management throughout UoM07. This method would utilise data from the existing hydrometric and meteorological networks to develop predictive models enabling alerts/warnings to be issued in sufficient time to flood prone receptors for action to be taken to manage the consequences of the flood event.

The FRMP recommends progression of a Flood Forecasting and Warning System, comprising a forecasting model system and the use of gauging stations, to project-level development and assessment for refinement and preparation for planning / Exhibition and, as appropriate, implementation. This policy cannot be assessed for impacts in the NIS.

4.1.9 Review of Emergency Response Plans for Severe Weather

The local authorities should review their severe weather emergency response plans with respect to flood events, making use of the information on flood hazards and risks provided through the CFRAM Programme and this FRMP, once finalised, and then regularly review the plans taking account of any changes or additional information, as appropriate. The local authorities should update and then regularly review their severe weather emergency response plans with respect to flood events, making use of all available information on flood hazards and risks.

This method is applicable throughout UoM07. The option is considered environmentally neutral as it is a policy option to review Emergency Response Plans. This policy cannot be assessed for impacts in the NIS.

4.1.10 Promotion of Individual and Community Resilience

While the State, through the OPW, local authorities and other public bodies can take certain actions to reduce and manage the risk of flooding, individual home-owners, businesses and farmers also have a responsibility to manage the flood risk to themselves and their property and other assets to reduce damages and the risk to personal health in the event of a flood. All people at flood risk should make themselves aware of the potential for flooding in their area, and take long-term and short-term preparatory actions to manage and reduce the risk to themselves and their properties and other assets.

This method is applicable throughout UoM07. The option is considered environmentally neutral as it is a policy option to promote resilience to flooding. This policy cannot be assessed for impacts in the NIS.

4.1.11 Individual Property Protection

Individual Property Protection can be effective in reducing the damage to the contents, furniture and fittings in a house or business, but are not applicable in all situations (for example, they may not be suitable in areas of deep or prolonged flooding, or for some types of property with pervious foundations and flooring). Property owners considering the use of such method should seek the advice of an appropriately qualified expert on the suitability of the measures for their property. The Inter-Departmental Flood Policy Review Group will consider the policy options around installation of Individual Property Protection measures for consideration by Government.

The draft FRMP does not specifically address the management of local flood problems outside of the AFAs. Where this option is applicable within an AFA, appropriate assessment has been carried out.

4.1.12 Flood-Related Data Collection

Ongoing collection of hydrometric and meteorological data, and data on flood events as they occur, will help us to continually improve our preparation for, and response, to flooding. The OPW, local authorities / EPA and other organisations collecting hydro-meteorological data should continue to do so, and post-event event flood data should continue to be collected, to improve future flood risk management.

At this early stage in its development the policy cannot be assessed for impacts in the NIS. Best practice must be undertaken in the planning and installation of new gauges including, where relevant, appropriate assessment of new gauge installations at the project planning stage.

4.1.13 Minor Works Scheme

The Minor Flood Mitigation Works and Coastal Protection Scheme (the 'Minor Works Scheme') is an administrative scheme operated by the OPW under its general powers and functions to support the local authorities through funding of up to €500k to address qualifying local flood problems with local solutions. The OPW will continue the Minor Works Scheme until such time as it is deemed no longer necessary or appropriate.

This method is applicable throughout UoM07. This option has the potential for both positive and negative environmental impacts; however the next stage of implementation of minor works will be outside the FRMP and the CFRAM studies. Where available, information on projects being currently progressed on the minor works scheme will be taken into consideration for cumulative or in combination impacts with measures proposed in the FRMP in the appropriate assessment. Where relevant, future schemes undertaken under the Minor Works Scheme during the lifetime of the FRMP should be assessed for cumulative or in-combination impacts with the FRMP.

4.2 SUB-CATCHMENT MEASURES

The sub-catchment spatial scale of assessment refers to the catchment of the principal river on which multiple AFAs sit. Two sub-catchment SSA were identified in UoM07, the Boyne (upper reach) sub-catchment, incorporating the AFA catchments of Johnstown Bridge, Trim, Navan and Longwood and the Boyne (lower reach) sub-catchment incorporating the AFA catchments of Drogheda, Baltray and Mornington (Figure 4.2.1).

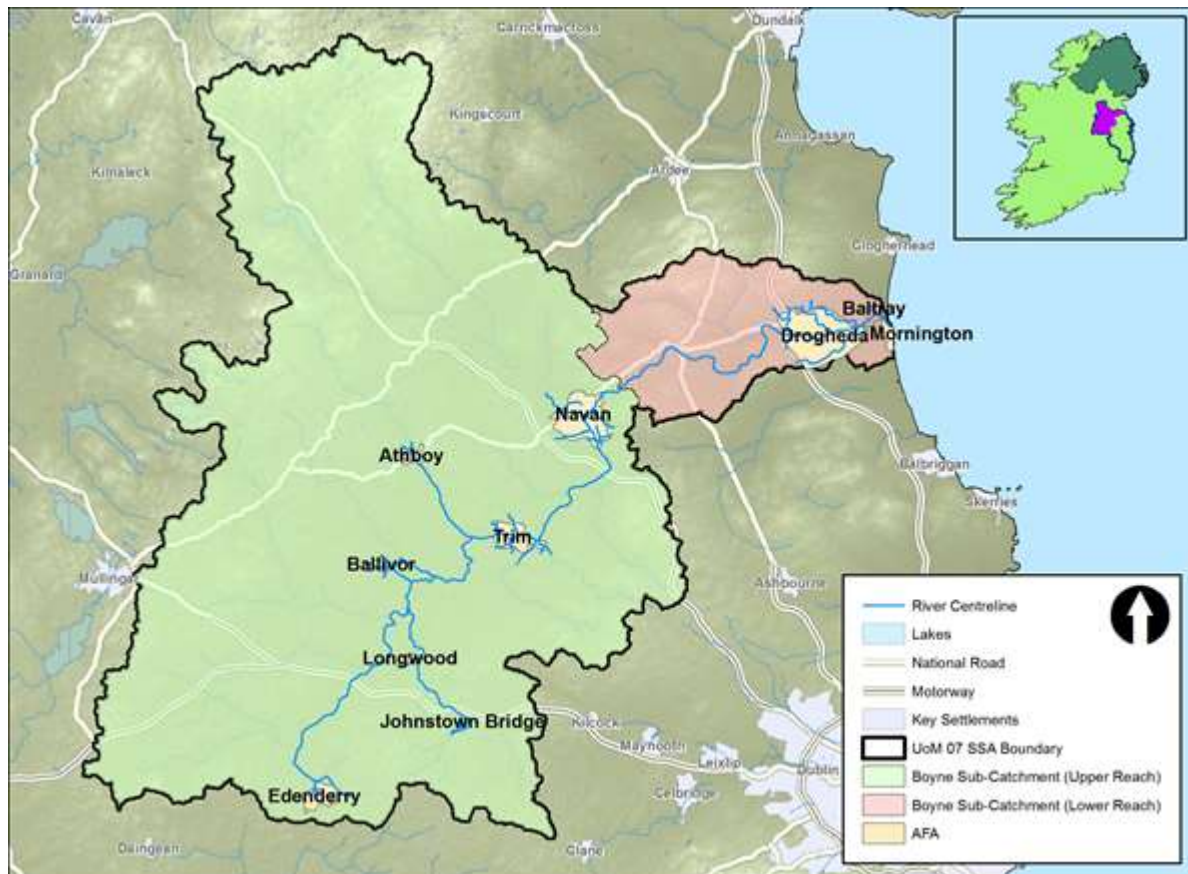


Figure 4.2.1: UoM07 Spatial Scales of Assessment showing Boyne Upper and Lower Reach Sub-Catchments

Sub-Catchment screening was carried out, which looked at ‘Storage’ and ‘Improvement of Channel Conveyance’. Both methods were found to be feasible on technical grounds however they were not found to be economically viable. Consequently as no feasible Catchment/Sub-Catchment methods were identified, no identification of measures or MCA appraisal has taken place for the FRMP. For additional detail on the Sub-Catchment SSA screening please refer to Appendix E of the FRMP.

4.3 AFA-SCALE MEASURES

4.3.1 Communities (AFAs) of Zero or Very Low Risk

The AFAs in each UoM were originally determined through the Preliminary Flood Risk Assessment (PFRA), as described in Chapter 1.1.1. The flood hazard and risk analysis undertaken through the Eastern CFRAM Project has been significantly more detailed than the analysis undertaken for the

PFRA. For certain AFAs, this more detailed analysis has determined that there is in fact currently zero or a very low level of flood risk from rivers and/or the sea. In such cases, the development of flood risk management measures aimed specifically at managing the risk in such AFAs has not been pursued. The UoM-level measures will however typically still be relevant and applicable.

During the CFRAM study it was determined that the level of risk is zero or very low at five AFAs in UoM07. As a consequence, Optioneering was not carried out for these AFAs and no preferred measures have been put forward in the draft FRMP. Consequently, it is not necessary to conduct an appropriate assessment for these AFAs. The AFAs that have not been taken forward in the FRMP are summarised in Chapter 4.3.1.1 to 4.3.1.5.

It should be noted that the level of risk in the AFAs where the CFRAM process has determined that there is currently zero or a very low level of flood risk will be reviewed, along with all areas, as part of the review of the PFRA (see Chapter 1.1.1). This includes AFAs where the current level of risk may be zero or very low, but where the level of risk may increase in the future due to the potential impacts of climate change and so action in the future may be required to manage such impacts.

4.3.1.1 Athboy

During the 1% AEP event, fluvial flooding occurs on the floodplain and a local road upstream of properties within Athboy AFA; there are no properties at flood risk during this event. Therefore this AFA has been agreed as a no/very low risk AFA and optioneering has not been undertaken, consequently, the existing regime should continue in order to maintain the current standard of protection.

4.3.1.2 Ballivor

During the 1% AEP event, fluvial flooding occurs within the AFA from Ballivor River with a small number of local roads in the floodplain affected. There is no risk to residential or non-residential properties during this flood event and has therefore been agreed as a no/very low risk AFA. Consequently, optioneering has not been undertaken and the existing regime should continue in order to maintain the current standard of protection.

4.3.1.3 Edenderry & Environs

During the 1% AEP event, fluvial flooding occurs and a local road which crosses Weavers Drain is within the floodplain. There are no properties at risk during this event, therefore this AFA has been identified as no/low risk and consequently optioneering has not been undertaken. The existing regime should continue in order to maintain the current standard of protection.

4.3.1.4 Johnstown Bridge

During the 1% AEP event, fluvial flooding occurs at two discrete locations within the AFA. At each location there are a couple of properties within the floodplain affected due to the insufficient channel capacity of a tributary of the River Blackwater, the Fear English Stream. There are also a few local roads affected within these local areas in Johnstown Bridge. This AFA has been agreed as a low risk AFA and optioneering has not been undertaken, consequently, the existing regime should continue in order to maintain the current standard of protection.

4.3.1.5 Longwood

Flooding occurs at a discrete location in Longwood from the River Blackwater during a 1% AEP event due to insufficient channel capacity inundating the floodplain. During the same 1% AEP flood event this out of bank flood water would be met by flood water coming from the Longwood River caused by an undersized culvert. A non-residential property is affected during this event along with social infrastructure assets. This AFA has been agreed as a no/very low risk AFA and optioneering has not been undertaken, consequently, the existing regime should continue in order to maintain the current standard of protection.

4.3.2 AFAs with no viable FRM options at AFA Scale

4.3.2.1 Trim

Trim AFA is affected by fluvial flooding; therefore the AFA was screened for all FRM methods. During the screening process, a number of methods including Individual Property Protection, Flood Forecasting and Warning and Hard Defences were thought to be potentially viable. On conclusion of screening, one potential option was identified for the Trim AFA, which consists of individual property protection accompanied by flood forecasting and warning. However, as there is low risk to properties in the AFA during the 1% AEP fluvial flood event and hence a small value of benefit to achieve, no economically viable solution could be found at the AFA scale and as such it was concluded that no FRM Option would be pursued for this AFA under the Eastern CFRAM Study. Works could instead be advanced separately under the Minor Works Scheme; however that scheme is outside the scope of this NIS (see Section 4.1.13 above).

4.3.3 AFAs with Measures Put Forward in the FRMP

In total, four AFAs have had FRM measures incorporating physical works proposed in the UoM07 FRMP. These are summarised in Table 4.3.1 below and the preferred methods described in Chapter 4.3.2. Full details can be found in Chapter 7.4 and Appendix G of the UoM07 FRMP.

It should be noted that for Navan AFA no economically viable measure (i.e., a measure with a benefit - cost ratio of greater than 1.0) was found through the analysis undertaken to date, but a technically viable measure has been identified with a benefit - cost ratio of between 0.5 and 1.0. This AFA has therefore been assessed in the NIS as there is the potential for physical works to be progressed; however, as further discussed in the FRMP this AFA will require a more detailed assessment of the costs to be carried out before it is able to progress to full project-level assessment.

Table 4.3.1: Summary of FRM Options advanced in draft FRMP for UoM07

Spatial Scale	Name	Option Number	Description
Sub-Catchment	Boyne	0	No Options Technically and Economically feasible.
AFA	Athboy	0	No Options Technically and Economically feasible.
AFA	Ballivor	0	No Options Technically and Economically feasible
AFA	Baltray	1	Hard Defences (Improve existing)

AFA	Baltray	2	Hard Defences (New)
AFA	Drogheda	1	Hard Defences and Flow Diversion
AFA	Drogheda	2	Hard Defences, Flow Diversion and Improving Channel Conveyance
AFA	Drogheda	3	Hard defences, flow diversion and storage
AFA	Edenderry	0	No Options Technically and Economically feasible
AFA	Johnstown Bridge	0	No Options Technically and Economically feasible
AFA	Longwood	0	No Options Technically and Economically feasible
AFA	Mornington	1	Hard Defences
AFA	Navan	1	Hard Defences and Do Minimum
AFA	Trim	0	No Options Technically and Economically feasible

4.3.3.1 Baltray

Preferred Measure: Option 2: Hard defences (new line)

Description: At risk properties would be protected from a series of flood embankments and walls, largely constructed along a new line set back from the existing line of Hard Defences (Figure 4.3.1). These hard defences would protect to the 1% AEP fluvial event and the 0.5% AEP coastal event with an average height of 1.33m and a total length of 1.05km not impinging on the qualifying habitat of an SPA / SAC but not protecting the recreational area.

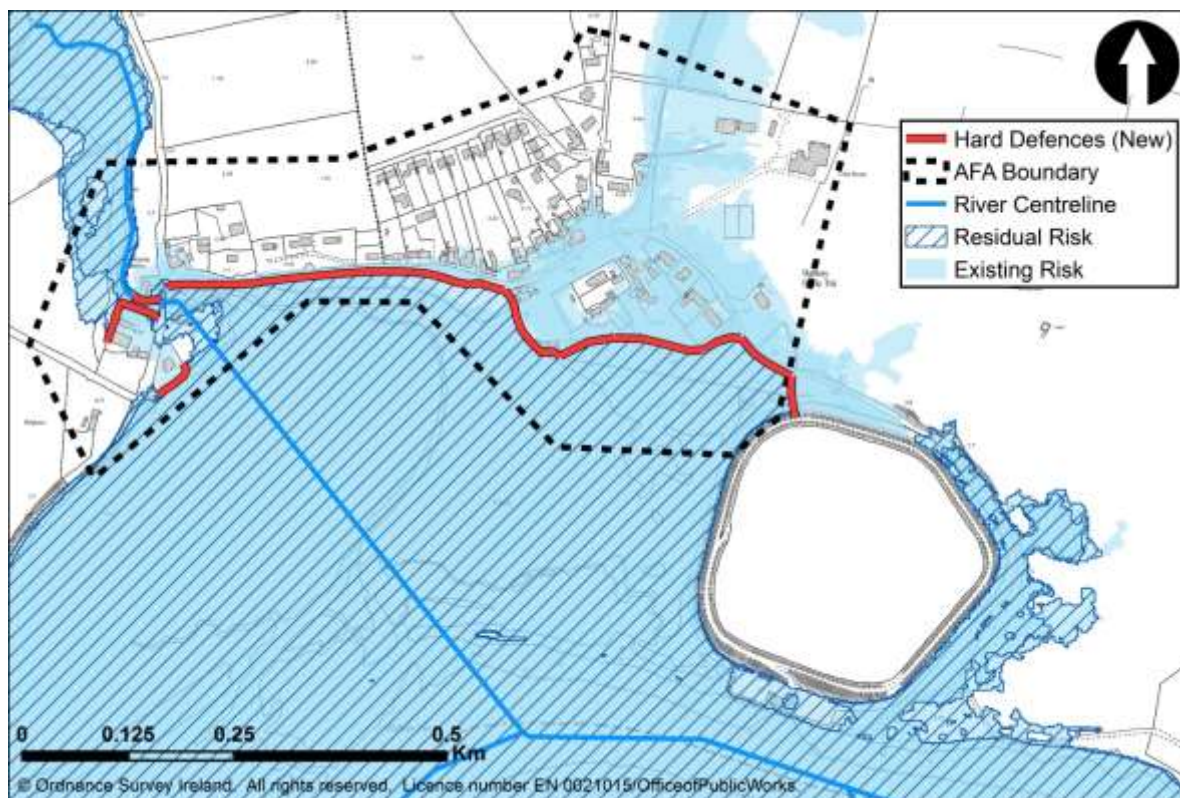


Figure 4.3.1: Baltray Preferred Measures

4.3.3.2 Drogheda

Preferred Measure: Option 2: Hard defences, Flow Diversion and Improvement of Channel Conveyance

Description: At risk properties would be protected by a series of flood embankments and walls, improvement of conveyance at Boyne Mill and Newfoundwell Mill, and a Flow Diversion channel at Waterunder Bridge. The Hard Defences would protect to the 1% AEP flood event with an average height of 1.53m and a total length of 4.4km. 164m of Hard Defences within Drogheda Port would be automatic flood barriers. The Hard Defences would also require some sealing of manholes and localised raising of roads to provide continuous defence in places. The Improvement of Channel Conveyance consists of 215m of additional 1.5m diameter twin culvert at flood cell 2 and 91m of dredged and widened channel at Newfoundwell Mill.

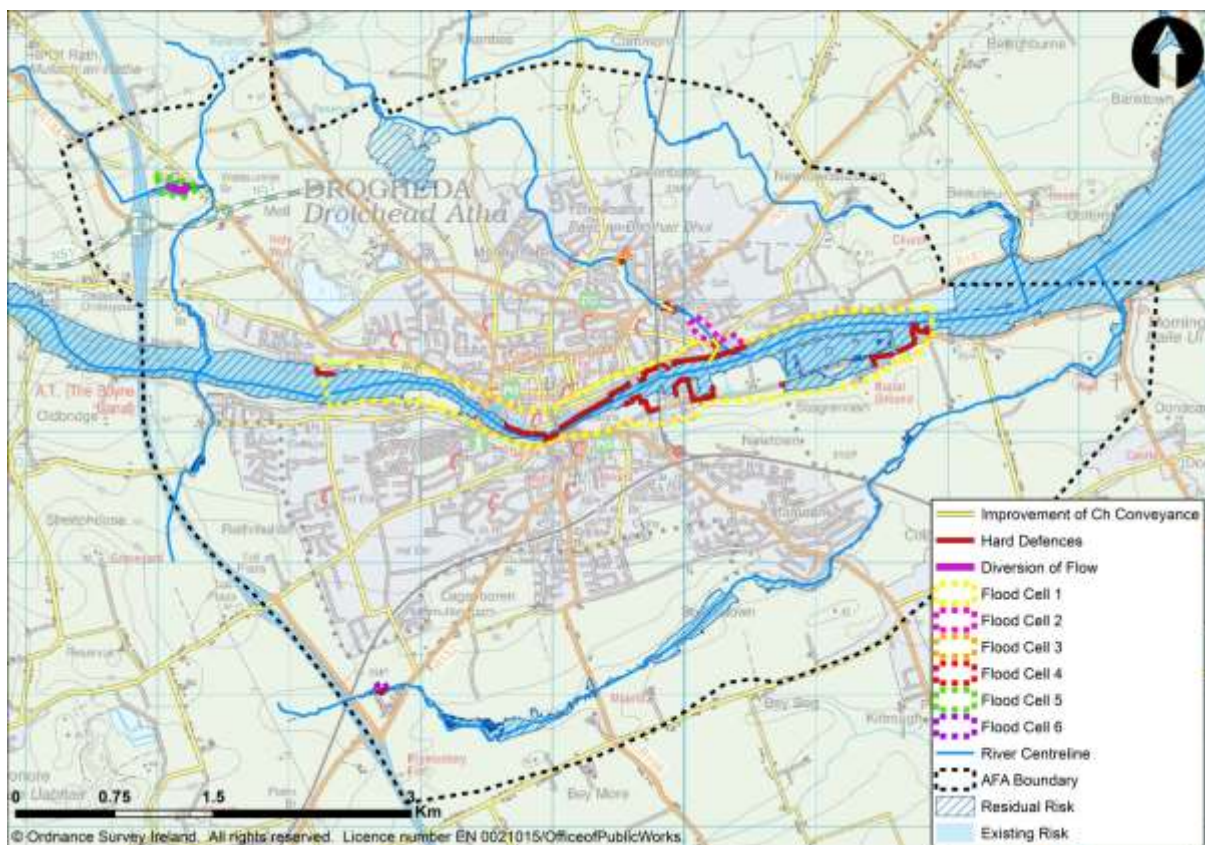


Figure 4.3.2: Drogheda Preferred Measures

4.3.3.3 Mornington

Preferred Measure: Option 1: Hard defences

Description: At risk properties would be protected by a series of flood embankments and walls (Figure 4.3.3). These hard defences would protect to the 1% AEP fluvial flood event to the 0.5% AEP coastal flood event with an average height of 1.04m and a total length of approximately 530m.

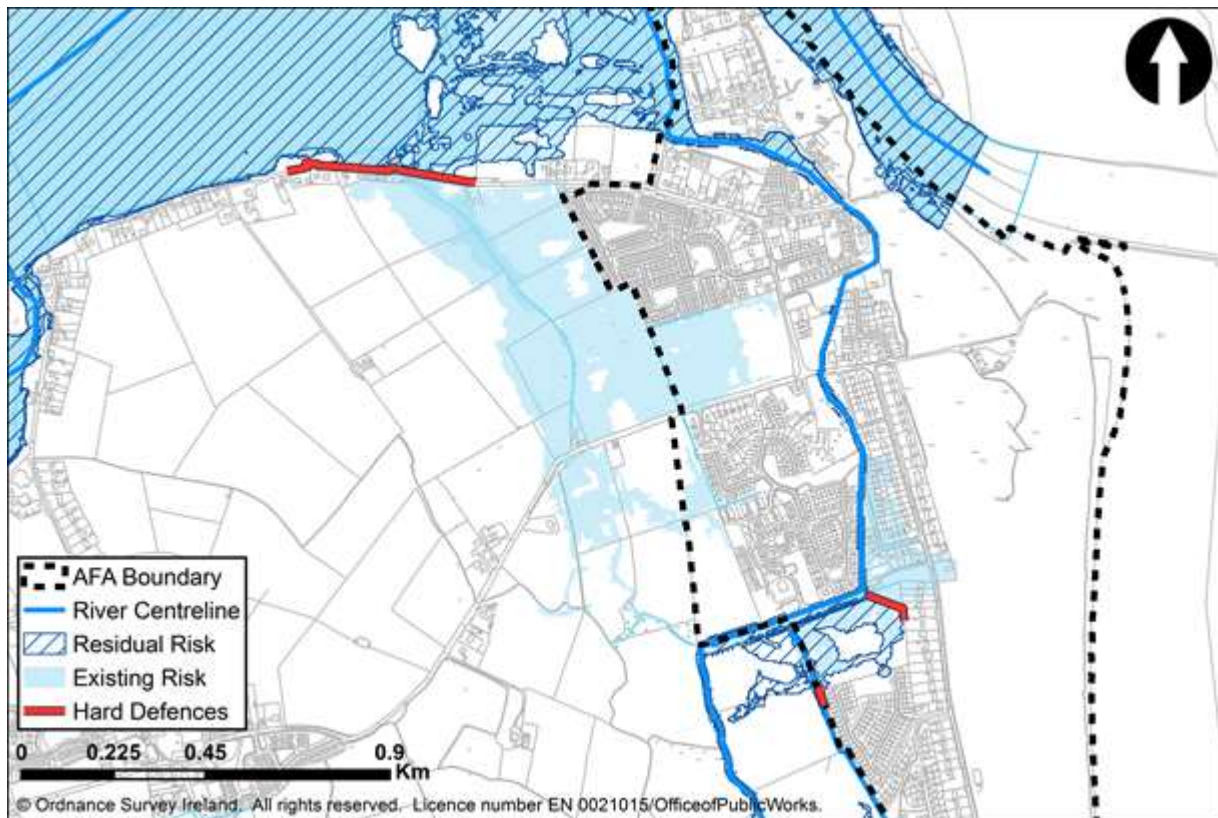


Figure 4.3.3: Mornington Preferred Measures

4.3.3.4 Navan

Preferred Measure: Hard defences, Do Minimum.

Description: At risk properties would be protected by a series of flood embankments, walls, road raising and clearance of a 500m reach of the Abbeylands Tributary (Figure 4.3.4). The hard defences would protect to the 1% AEP flood event with a total wall length of 889m, a total embankment length of 340 m and a total length of 986m of road to be raised.



Figure 4.3.4: Navan Preferred Measures

5 APPROPRIATE ASSESSMENT of AFA-SCALE MEASURES

5.1 BALTRAY AFA

All European sites in the zone of influence of Baltray AFA were screened for possible impacts from FRM methods (see Chapter 3.5). Screening assessed the potential for impact at eight European sites; Boyne Coast and Estuary SAC (001957), Boyne Estuary SPA (004080), Clogher Head SAC (001459), Dundalk Bay SAC (000455), Dundalk Bay SPA (004026), River Boyne and River Blackwater SAC (002299), River Boyne and River Blackwater SPA (004232), and River Nanny Estuary and Shore SPA (004158) (see Figure 5.1.1). Three sites were found to have no identifiable impact pathway arising from the implementation of FRM methods within the Baltray catchment and were therefore screened out as not requiring any further assessment. Five European sites were identified as potentially being impacted upon through FRM activities at Baltray AFA; Boyne Coast and Estuary SAC (001957), Boyne Coast and Estuary SPA (004080), River Boyne and River Blackwater SAC (002299), River Boyne and River Blackwater SPA (004232), and River Nanny Estuary and Shore SPA (004158). The following section assesses the proposed FRM measures described in Chapter 4.3.3.1 in relation to the screened-in European sites.

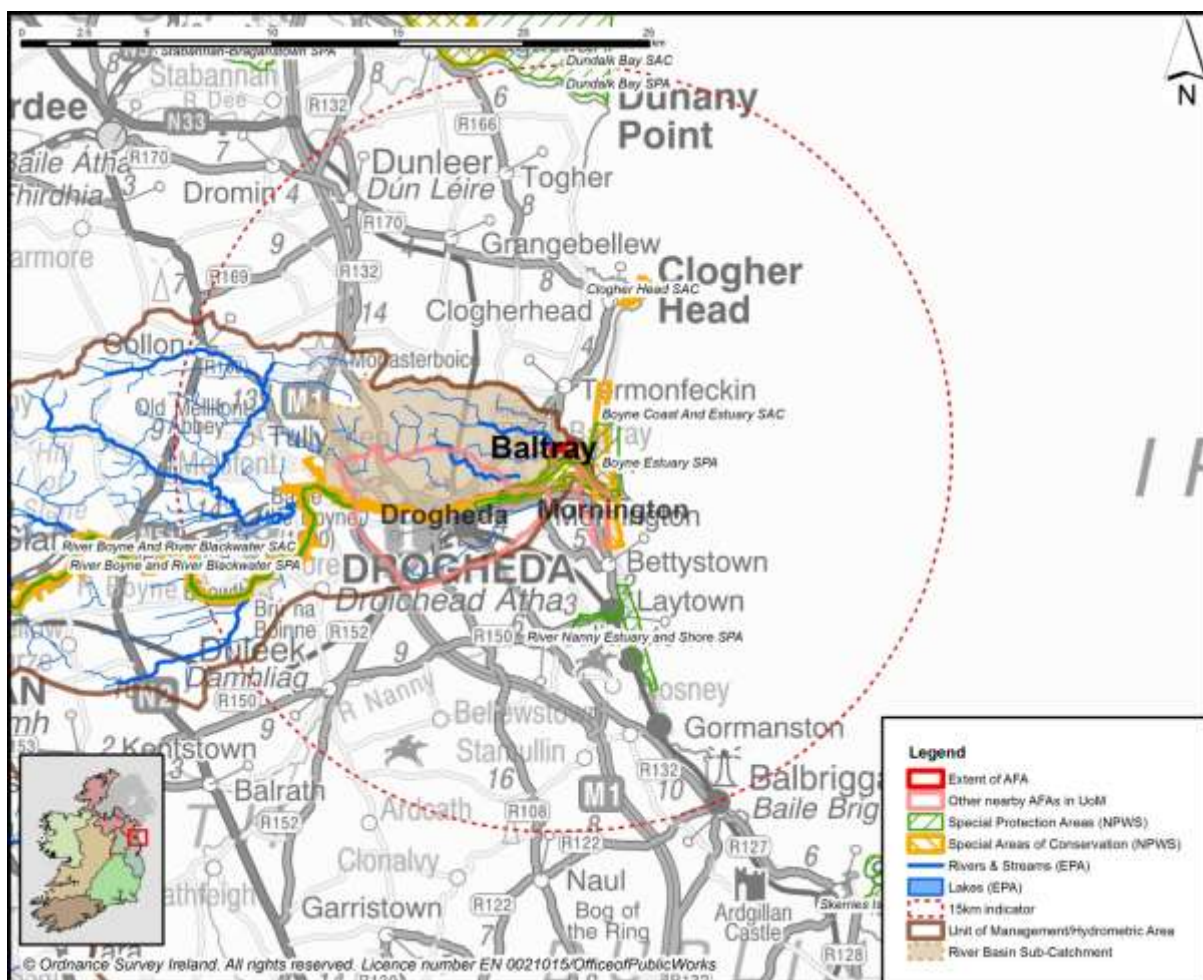


Figure 5.1.1: Baltray AFA in context of catchment and surrounding European sites

5.1.1 Identification of Potential Sources of Impact

This Chapter further examines the source > pathway > receptor linkages that could potentially result in adverse impacts arising from FRM measures at Baltray AFA on the screened-in European sites.

The qualifying interest(s) of these sites at risk from surface water pathways are identified in Table 5.1.1 and from land and air pathways in Table 5.1.2. Additional detail on the attributes and targets of the qualifying interests has been included in Appendix C. These have been consulted in order to assess the potential impacts of the proposed flood relief measures on the designated habitats and species insofar as plan-level details allowed.

5.1.1.1 Potential Sources of Impact via Surface Water Pathways

Four European sites were identified as potentially being impacted upon via surface water pathways; Boyne Coast and Estuary SAC, Boyne Estuary SPA, River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. The River Nanny and Shore SPA is located at a distance of 5.5km from Baltray AFA and no surface water pathways are expected to impact upon this site. Qualifying interests/ special conservation interests at risk from surface water pathways are identified in Table 5.1.1. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.1.1: Qualifying Interests of the screened-in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Baltray AFA.

European Site (Site code)	Qualifying Interests
Boyne Coast and Estuary SAC (001957)	Estuaries [1130], Mudflats and sandflats not covered by seawater at low tide [1140] Salicornia and other annuals colonizing mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]
Boyne Estuary SPA (004080)	Wetlands and waterbirds habitat [A999] Shelduck (<i>Tadorna tadorna</i>) [A048] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Lapwing (<i>Vanellus vanellus</i>) [A142] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Redshank (<i>Tringa tetanus</i>) [A162] Turnstone (<i>Arenaria interpres</i>) [A169] Little Tern (<i>Sterna albifrons</i>) [A195]
River Boyne and River Blackwater SAC (002299)	River Lamprey (<i>Lampetra fluviatilis</i>) [1099] Salmon (<i>Salmo salar</i>) [1106] Otter (<i>Lutra lutra</i>) [1355]
River Boyne and River Blackwater SPA (004232)	Kingfisher (<i>Alcedo atthis</i>) [A229]

The following sources of impact arising from FRM measures at Baltray AFA could potentially impact upon the European sites detailed above through surface water pathways:

- **Suspended sediments** – There may be indirect negative impacts from sedimentation during construction. Construction activities within or adjacent to surface waters can result in the release of suspended sediments into those waters. This could occur during construction of new flood walls/embankments, deconstruction and removal of existing flood walls and along access routes. Suspended sediments could also be released into surface waters during the process of coastal reclamation of land behind the existing hard defences that is currently used as amenity grassland. This increase in suspended sediments can lead to increased turbidity of surface waters, and an associated reduction in photosynthesis, which can impact on surface water dependent habitats. Impacts on aquatic species can occur through loss of suitable habitat, changes to or reduction in food supply (e.g. aquatic invertebrate density or diversity).
- **Changes in nutrient levels/pollutants** – Construction activities in or adjacent to surface waters can result in the release of nutrients into those waters, and can lead to reduced water quality and eutrophication. Nutrients could also be released into surface waters during the process of coastal reclamation of land behind the existing hard defences that is currently used as amenity grassland. Spillages of hydrocarbons or other contaminants during FRM works can also result in a reduction in water quality. Reduced water quality and eutrophication can adversely impact on surface water dependent habitats, and on aquatic species through loss of suitable habitat or changes to/reduction in food supply.
- **Changes in water levels/channel morphology** – Changes to channel morphology through the use of flood walls and embankments can lead to changes in capacity and flow of surface waters. This can lead to hydrological impacts on surface water dependent habitats and to aquatic species through habitat loss or changes to/reduction in food supply.

5.1.1.2 Potential Sources of Impact via Land and Air Pathways

Four European sites were identified as potentially being impacted upon via land and air pathways; Boyne Coast and Estuary SAC, Boyne Estuary SPA, River Boyne and River Blackwater SAC and River Nanny Estuary and Shore SPA.

The River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA are located at a distance of 2.6km and 8.2km respectively from the FRM works at Baltray AFA. There is not considered to be any land or air pathways that are expected to impact upon attributes used to define conservation status of the qualifying interest of the SPA. Otter is one of the qualifying interests of the SAC and as a mobile species it may be influenced by construction activities. The River Nanny and Shore SPA is located at a distance of 5.5km from Baltray AFA, however wintering birds for which this site is designated may at times use habitats situated in ecologically connected areas such as the Boyne Coast and Estuary SAC (001957) and the Boyne Estuary SPA (004080), therefore impacts at these sites have the potential to impact upon attributes used to define conservation status of designated species at these sites. Qualifying interests/ special conservation interests of these sites at risk from land and air pathways are identified in

Table 5.1.2. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.1.2: Qualifying Interests of the screened-in European sites likely to be impacted upon via land and air pathways from FRM measures undertaken at Baltray AFA.

European Site (Site code)	Qualifying Interests
Boyne Coast and Estuary SAC (001957)	Estuaries [1130], Mudflats and sandflats not covered by seawater at low tide [1140] Salicornia and other annuals colonizing mud and sand [1310]
Boyne Estuary SPA (004080)	Wetlands and waterbirds habitat [A999] Shelduck (<i>Tadorna tadorna</i>) [A048] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Lapwing (<i>Vanellus vanellus</i>) [A142] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Redshank (<i>Tringa tetanus</i>) [A162] Turnstone (<i>Arenaria interpres</i>) [A169] Little Tern (<i>Sterna albifrons</i>) [A195]
River Boyne and River Blackwater SAC (002299)	Otter (<i>Lutra lutra</i>) [1355]
River Nanny Estuary and Shore SPA (004158)	Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Herring Gull (<i>Larus argentatus</i>) [A184]

The following sources of impact arising from FRM measures at Baltray AFA could potentially impact upon the European sites detailed above through land and air pathways:

- **Physical habitat disturbance** – There is likely to be a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences. Construction of flood walls and embankments adjacent to surface waters can result in a direct loss of or disturbance to aquatic, marginal and riparian habitats. This can indirectly impact on species through loss of habitat or changes in food supply, thereby negatively affecting conservation objectives (population size and range).
- **Noise and visual disturbance** – The use of construction machinery and the presence of construction and maintenance workers can result in avoidance of suitable habitat by sensitive species.

5.1.2 Impact Assessment

Table 5.1.3 assesses the screened-in European sites in more detail and examines the ways in which the identified sources and pathways could adversely impact on habitats or species. Avoidance and mitigation measures are proposed to mitigate any significant adverse impacts.

5.1.2.1 In-combination Effects

Appropriate Assessment requires consideration of the impacts of FRM measures at Baltray AFA on European sites, in combination with other plans or projects that may impact on the sites resulting in cumulative negative impacts. The potential for cumulative impacts was considered throughout the process of option development. Engagement with stakeholders ensured that the potential for in-combination and cumulative impacts at plan level was minimised. In combination and cumulative effects will be re-assessed at the project stage when project-specific information has been captured.

Potential sources of in-combination effects identified as part of this assessment include:

- Drainage maintenance activities in the Boyne Arterial Drainage Scheme. The OPW carry out regular maintenance on those channels altered through schemes implemented following the 1945 Arterial Drainage Act. In this area, maintenance activities are carried out on the River Boyne, Athlumney House tributary, Athlumney tributary, Bailis tributary and River Blackwater. These activities could potentially result in adverse cumulative impacts on habitats or species. Ongoing maintenance activities that result in the release of suspended sediments are currently adversely impacting on salmon spawning grounds, therefore these activities could potentially result in adverse cumulative impacts on this species. It is recommended that no arterial maintenance is carried out on the lower reaches of the Boyne River while FRM work is being undertaken during the construction phase.
- Local landowners and farmers carry out agricultural activities in areas adjacent to this FRM work that could result in similar impacts and disturbance. These activities have been ongoing for many decades and are likely to be periodic and local in nature, therefore the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- In-combination effects may occur with FRM works, or parallel projects (see section 3.1.2.2), carried out at other AFAs or locations in the UoM. FRM measures have been proposed at the nearby sites of Drogheda, Mornington and Navan. There may be cumulative impacts on habitats or species from measures taken at all four sites. Generic mitigation and monitoring measures have been developed in the FRMP, including the avoidance of undertaking FRM work on adjoining reaches of rivers for different AFAs or other parallel projects simultaneously. Provided the timing of FRM works is planned and managed correctly, no significant in-combination impacts are anticipated.
- In -combination effects may occur with schemes in other neighbouring FRMPs, in particular Termonfeckin (UoM06) and Laytown, Bettystown and Coastal areas (UoM08). Following the precautionary principle it is also recommended that in accordance with the mitigation outlined above, works are not carried out simultaneously in these sites so as to ensure there are no significant in-combination effects.

There are no other plans/projects ongoing or proposed (at the time of this study) which may give rise to any form of cumulative impact on the European sites.

Table 5.1.3: Impact assessment for FRM measures Baltray AFA (new hard defences and maintenance of existing regime)

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
Boyne coast and estuary SAC (001957)	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] <i>Salicornia</i> and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	<p>Construction will take place close to the boundary of the SAC. Construction activities could result in the release of suspended sediments and associated nutrients or in pollution incidents from machinery. This could occur during construction of new flood walls/embankments, deconstruction and removal of existing flood walls within the boundaries of the SAC and along access routes. Suspended sediments could also be released into surface waters during the process of coastal reclamation of land behind the existing hard defences that is currently used as amenity grassland. This could lead to a reduction in water quality, adversely affecting the wetland habitats.</p> <p>Ongoing maintenance activities, including maintenance of the flood wall/embankments and dredging of the main channel to maintain access could also result in the release of suspended sediments and nutrients and to pollution incidents, cumulatively impacting upon these wetland habitats.</p> <p>There are likely to be indirect, negative impacts from sedimentation during construction. These impacts are expected to be short-term and local in scale, and are therefore unlikely to impact significantly on attributes used to define conservation status. Land reclamation will be a slow and gradual process; therefore sediment released in this manner is not likely to have a significant impact.</p>	<p>Coastal defences will be set back from the shoreline, inland from the existing defences.</p> <p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6.</p>	No
		Water level changes	Surface water	<p>The habitats for which this site is designated are dependent on specific hydrological regimes. Changes to the location, height or structure of flood walls/embankments could alter hydrological</p>	<p>Coastal defences will be set back from the shoreline.</p> <p>Strictly adhere to best</p>	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
				<p>regimes, thereby impacting upon wetland habitats and their conservation objectives (composition and area).</p> <p>However, significant changes to the hydrological regime are highly unlikely, as the hard defences will be set further back from the estuary and therefore are not expected to adversely alter the level of inundation of habitat.</p> <p>In the long-term, this may have a positive effect, as repositioning of the hard defences will allow inundation of the land currently behind hard defences, and potentially lead to an increase in the extent of mudflat and sandflat habitat.</p>	<p>practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	
		Physical habitat disturbance	Land and air	<p>Construction will take place close to the boundary of the SAC. Physical disturbance by machinery and workers could lead to a loss of habitat adjacent to the hard defences and along access routes. Deconstruction and removal of existing flood walls within the boundaries of the SAC and along access routes could also lead to a loss of mudflat and sandflat habitat.</p> <p>Ongoing maintenance activities, including maintenance of the flood wall/embankments and dredging of the main channel to maintain access could also result in physical disturbance of adjacent habitats or along access routes.</p> <p>There is likely to be a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences. . These impacts are expected to be short-term and local in scale, and are therefore unlikely to impact significantly on attributes used to define conservation status.</p> <p>Construction of coastal defences has the potential</p>	<p>Coastal defences will be set back from the shoreline.</p> <p>Strictly adhere to best practice protocols and SOPs during construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p> <p>Survey by a qualified ecologist to inform option design and design-specific mitigation prior to commencement of the FRM work.</p> <p>Design will be subjected to hydrodynamic testing to establish nature and scale of effects and confirm that</p>	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
				to alter coastal processes which may result in indirect impacts to intertidal sediments and estuarine habitats. Coastal flood walls and embankments must be designed and constructed such that they do not alter coastal processes in a significant manner.	no significant effects will occur.	
		Suspended sediments Changes to nutrient levels/pollutant release	Surface water	<p>The birds for which the coincident SPA is designated are dependent on a number of habitats within the site, including estuaries, mudflats, sandflats and saltmeadows. Construction activities within the boundaries of the SAC could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could occur during construction of new flood walls/ embankments, deconstruction and removal of existing flood walls within the boundaries of the SAC and along access routes. Suspended sediments could also be released into surface waters during the process of coastal reclamation of land behind the existing hard defences that is currently used as amenity grassland. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply of waterbirds. This could negatively impact on the conservation objectives of the species, through changes in population size and/or distribution and range.</p> <p>Ongoing maintenance activities, including maintenance of the flood wall/embankments and dredging of the main channel to maintain access could also result in the release of suspended sediments and nutrients and to pollution incidents, adversely affecting these wetland habitats.</p> <p>There are likely to be indirect, negative impacts from sedimentation during construction. These</p>	<p>Coastal defences will be set back from the shoreline.</p> <p>Strictly adhere to best practice protocols and SOPs during design construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
				impacts are expected to be short-term and local in scale, and are therefore unlikely to impact significantly on attributes used to define conservation status.		
		Introduction or spreading of alien invasive species	Land and surface water	Invasive species can spread rapidly through habitats, form dense thickets which can out-compete native plants and cause problems with soil erosion	Carry out invasive species surveys and follow SOPs (see Table 6.1.1) See general mitigation in Chapter 6	No
River Boyne and River Blackwater SAC (002299)	<p>Alkaline fens [7230]</p> <p>Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0]</p> <p>River Lamprey (<i>Lampetra fluviatilis</i>) [1099]</p> <p>Salmon (<i>Salmo salar</i>) [1106]</p> <p>Otter (<i>Lutra lutra</i>) [1355]</p> <p>Special conservation interest – Whooper swan <i>Cygnus cygnus</i></p>	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction activities in or adjacent to the water could result in a release of suspended sediments and associated nutrients and/or pollution incidents from machinery. This could lead to a reduction in water quality, and result in adverse effects on the designated habitats and species of this site through loss of habitat or changes to food supply.</p> <p>There are likely to be indirect, negative downstream impacts from sedimentation during construction. These impacts are expected to be short-term and local in scale.</p> <p>The site is approximately 2.5km upstream of Baltray and therefore adverse impacts on qualifying habitats are unlikely. However otter, salmon and lamprey are mobile species and are likely to range beyond the boundaries of the designated area.</p> <p>Otter may be indirectly influenced by changes to prey distribution.</p> <p>Lamprey and salmonids may be influenced if works occur during migratory / spawning periods..</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the channel, wherever possible to minimise sediment loss into the channel.</p> <p>Undertake surveys for otter to inform option design and design-specific mitigation. Follow lamprey and otter SOPs.</p> <p>Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation.</p> <p>See also general mitigation</p>	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
					in Chapter 6	
		Physical habitat disturbance Noise and visual disturbance	Land and air	Construction activities that remove vegetation or otherwise disturb habitats could adversely affect foraging areas for otter.	Carry out otter survey by a qualified ecologist to inform option design and design-specific mitigation prior to commencement of the FRM work. No in-channel or bankside works to be conducted within 50m of a known or potential Otter holt/ resting site. See also general mitigation in Chapter 6	No
River Boyne and River Blackwater SPA (004232)	Kingfisher (<i>Alcedo atthis</i>) [A229]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	Kingfisher populations are dependent on river channels and their associated marginal and riparian habitats. The site is approximately 2.5km upstream of Baltray and therefore direct impacts on the qualifying interest are unlikely. Construction activities in or adjacent to the water and clearance of in-channel vegetation could result in a release of suspended sediments and associated nutrients and/or pollution incidents from machinery. This could lead to a reduction in water quality, affecting the habitats and food supply (macroinvertebrates and fish) of the Kingfisher and adversely affecting the distribution of the species within the SPA and long-term population trends.	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance. Set hard defences back from the shore, wherever possible to minimise sediment loss into the channel. Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation.	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
				<p>There are likely to be indirect, negative downstream impacts from sedimentation during construction. These impacts are expected to be short-term and local in scale, and are unlikely to extend upstream to the SPA.</p> <p>Further site-specific information should be captured to ensure that potential extent of impacts is understood.</p>	<p>Avoid arterial drainage maintenance works while FRM works are being undertaken.</p> <p>See also general mitigation in Chapter 6</p>	
Boyne Estuary SPA (004080)	Shelduck <i>Tadorna tadorna</i> [A048] Oystercatcher <i>Haematopus ostralegus</i> [A130] Golden Plover <i>Pluvialis apricaria</i> [A140] Grey Plover <i>Pluvialis squatarola</i> [A141] Lapwing <i>Vanellus vanellus</i> [A142] Knot <i>Calidris canutus</i> [A143] Sanderling <i>Calidris alba</i> [A144] Black-tailed Godwit <i>Limosa limosa</i> [A156] Redshank <i>Tringa tetanus</i> [A162] Turnstone <i>Arenaria interpres</i> [A169] Little Tern <i>Sterna albifrons</i> [A195] Additional Special Conservation Interests	Water level changes	Surface water Land and air	<p>The habitats that support these species are dependent on specific hydrological regimes. Changes to the height or structure of flood walls/embankments could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species that they support (population size, distribution and range).</p> <p>However, significant changes to the hydrological regime are highly unlikely, as the hard defences will be set further back from the estuary and therefore are not expected to adversely alter the level of inundation of habitat.</p> <p>In the long-term, this may have a positive effect, as repositioning of the hard defences will allow inundation of the land currently behind hard defences, and may lead to an increase in the extent of mudflat and sandflat habitat, and potentially an increase in the range of waterbirds.</p>	<p>Coastal defences will be set back from the shoreline.</p> <p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	No
		Physical habitat disturbance		<p>The habitats that support these species are likely to be vulnerable to physical disturbance arising from construction activities within the boundaries of the SAC. Physical disturbance by machinery and workers</p>	<p>Coastal defences will be set back from the shoreline.</p> <p>Strictly adhere to best</p>	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
				<p>could lead to a loss of habitat adjacent to the hard defences and along access routes. Deconstruction and removal of existing flood walls within the boundaries of the SAC and along access routes could also lead to a loss of mudflat and sandflat habitat. This could reduce the available habitat and alter or reduce food sources for the protected bird species, negatively impacting on their conservation objectives (reduction in population size and/or distribution and range).</p> <p>There is likely to be a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences. . These impacts are expected to be short-term and local in scale, and are therefore unlikely to impact significantly on attributes used to define conservation status.</p> <p>If coastal processes are altered due to the proposed measures at Baltray, there could be impacts on the intertidal sediments and estuarine habitats as well as impacts on the nesting area at Baltray for Little Terns.</p> <p>Coastal flood walls and embankments must be designed and constructed in a manner ensuring that adverse impacts to breeding and nesting habitat do not occur.</p>	<p>practice protocols and SOPs during construction and maintenance during design, construction and maintenance.</p> <p>Survey by a qualified ecologist /ornithologist to inform option design and design-specific mitigation prior to commencement of the FRM work.</p> <p>Design will be subjected to hydrodynamic testing to establish nature and scale of effects and ensure that these are such that no significant impacts occur.</p> <p>See also general mitigation in Chapter 6</p>	
		Noise and visual disturbance		<p>These waterbird species will be sensitive to disturbance from machinery and workforces during construction of new flood walls and embankments, deconstruction and removal of existing hard defences and during maintenance activities. This disturbance could cause displacement of populations which can require significant energy expenditure for the birds, which, if undertaken during winter months, could have an adverse</p>	<p>Strictly adhere to best practice protocols and SOPs during construction and maintenance.</p> <p>Surveys should be carried out for the presence of breeding Terns. If found to be present, avoid carrying</p>	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
				impact on population trend and distribution.	<p>out construction work in the Tern roosting season (July- September).</p> <p>Where adverse effects are likely on wintering bird populations, avoid carrying out construction work in the over-wintering period (September - March).</p> <p>See also general mitigation in Chapter 6</p>	
		<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>		<p>Several of the listed waterbird species, as well as other overwintering birds (Additional Special Conservation Interests) may at times use habitats situated in ecologically connected areas such as the Boyne Coast and Estuary SAC (001957) and the Boyne Estuary SPA (004080).</p> <p>Significant habitat change or increased levels of disturbance within these areas could result in the displacement of one or more of the listed waterbird species from areas within the SPA, and/or a reduction in their numbers i.e. negatively affecting the range and/or population of the species.</p> <p>There are likely to be indirect, negative impacts in Boyne Coast and Estuary SAC and SPA from sedimentation during construction. These impacts are expected to be short-term and local in scale, and are therefore unlikely to impact significantly on attributes used to define conservation status of these designated waterbirds.</p>	<p>Coastal defences will be set back from the shoreline.</p> <p>Strictly adhere to best practice protocols and SOPs during construction and maintenance during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	No
River Nanny Estuary and Shore SPA (004158)	Wetland and Waterbirds [A999]	Water level changes	Surface water Land and air	These waterbirds may at times use habitats situated in ecologically connected areas such as the Boyne Coast and Estuary SAC (001957) and the Boyne	Strictly adhere to best practice protocols and SOPs during construction	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
	Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Herring Gull (<i>Larus argentatus</i>) [A184]			Estuary SPA (004080). Changes to habitat at those sites as a result of hydrological alteration following construction activities could result in the displacement of one or more of the listed waterbird species from areas within the SPA, and/or a reduction in their numbers i.e. negatively affecting the range and/or population of the species. However, significant changes to the hydrological regime at Boyne Coast and Estuary SAC and SPA are highly unlikely, as the hard defences will be set further back from the estuary and therefore are not expected to alter the level of inundation of habitat. Therefore no significant impacts are expected on attributes used to define conservation status of these designated waterbirds.	and maintenance during design, construction and maintenance. See also general mitigation in Chapter 6	
		Physical habitat disturbance	Surface water Land and air	Disturbance or destruction of waterbird habitat at nearby sites (Boyne Coast and Estuary SAC and Boyne Estuary SPA) during construction or maintenance of hard defences could result in the displacement of one or more of the listed waterbird species from areas within the SPA, and/or a reduction in their numbers i.e. negatively affecting the range and/or population of the species. There is likely to be a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences at Boyne Coast and Estuary SAC/SPA. These impacts are expected to be short-term and local in scale, and are therefore unlikely to impact significantly on attributes used to define conservation status of these designated waterbirds.	Strictly adhere to best practice protocols and SOPs during construction and maintenance during design, construction and maintenance. See also general mitigation in Chapter 6	No
		Physical habitat disturbance	Land and air Surface water	Construction of coastal defences has the potential to alter coastal processes which may result in	Survey by a qualified ecologist/ ornithologist to	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
				indirect impacts to intertidal sediments and estuarine habitats. Coastal flood walls and embankments must be designed and constructed in a manner ensuring that adverse impacts to breeding and nesting habitat do not occur.	inform option design and design-specific mitigation prior to commencement of the FRM work. Design will be subjected to hydrodynamic testing to establish nature and scale of effects and confirm that no significant effects will occur.	

5.1.3 Conclusions

This NIS details the findings of the Stage 2 Appropriate Assessment conducted to further examine the potential direct and indirect impacts of proposed FRM works at Baltray AFA on the following European sites:

- Boyne Coast and Estuary SAC (001957)
- Boyne Coast and Estuary SPA (004080)
- River Boyne and River Blackwater SAC (002299)
- River Boyne and River Blackwater SPA (004232)
- River Nanny Estuary and Shore SPA (004158)

The Appropriate Assessment investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above European sites, alone and in-combination with other plans and projects, taking into account the sites' structure, function and conservation objectives. Where potentially significant adverse impacts were identified, a range of mitigation and avoidance measures have been suggested to help offset them. As a result of this Appropriate Assessment it has been concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Baltray AFA will not have a significant adverse impact on the above European sites.

Project level assessments will be undertaken based on option designs and site surveys to further consider the attributes and targets of site specific conservation objectives.

5.2 DROGHEDA AFA

All European sites in the zone of influence of Drogheda AFA were screened for possible impacts from FRM methods (see Chapter 3.5). Screening assessed the potential for impact at nine European sites; Boyne Coast and Estuary SAC (001957), Boyne Estuary SPA (004080), Clogher Head SAC (001459), Dundalk Bay SAC (000455), Dundalk Bay SPA (004026), River Boyne and River Blackwater SAC (002299), River Boyne and River Blackwater SPA (004232), River Nanny Estuary and Shore SPA (004158), and Stabannan-Braganstown SPA (004091) (see Figure 5.2.1). Four sites were found to have no identifiable impact pathway arising from the implementation of FRM methods within the Drogheda catchment and were therefore screened out as not requiring any further assessment. Five sites were identified as potentially being impacted upon through FRM activities at Drogheda AFA; Boyne Coast and Estuary SAC (001957), Boyne Estuary SPA (004080), River Boyne and River Blackwater SAC (002299), River Boyne and River Blackwater SPA (004232) and River Nanny Estuary and Shore SPA (004158). The following section assesses the proposed FRM measures described in Chapter 4.3.3.2 in relation to the screened-in European sites.

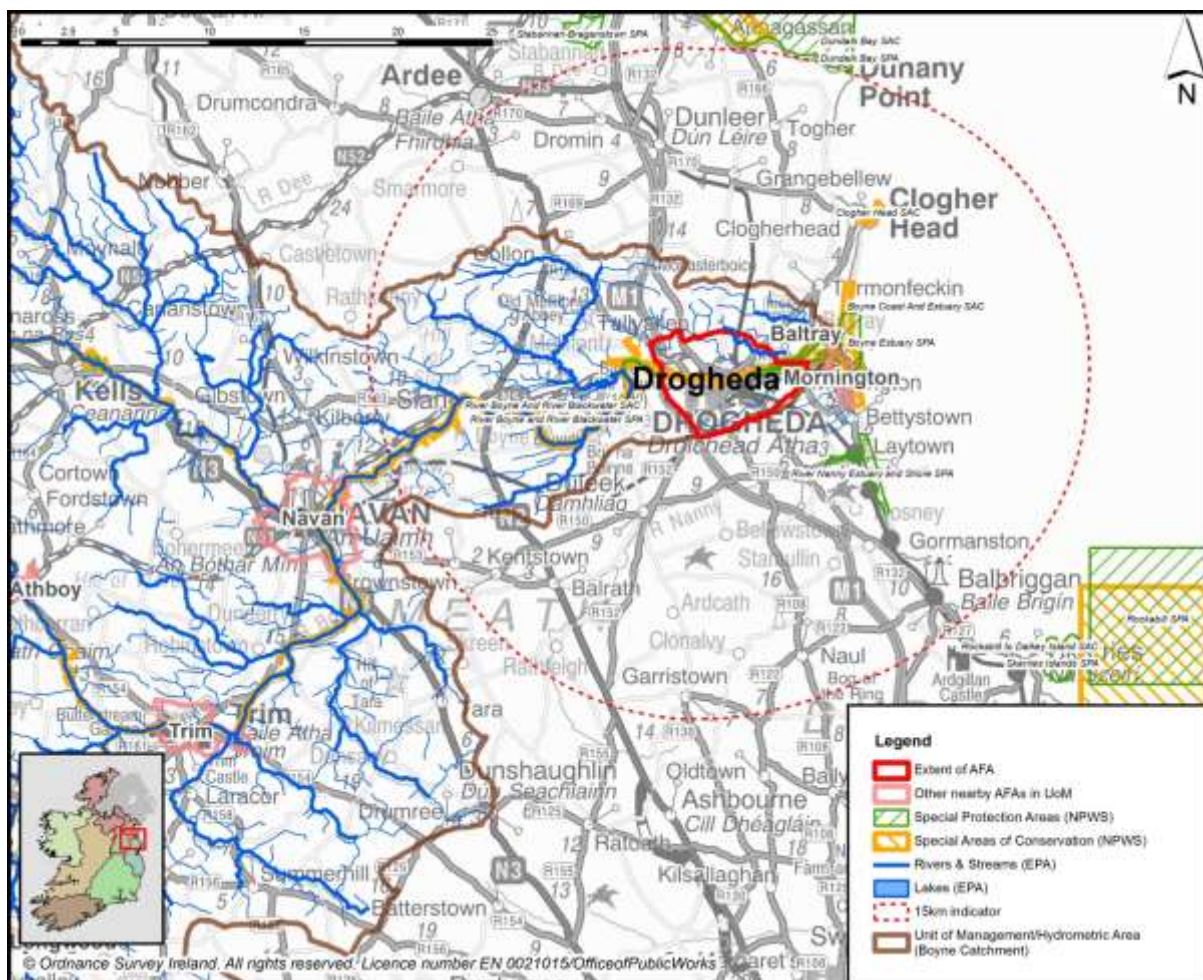


Figure 5.2.1: Drogheda AFA in context of catchment and surrounding European sites

5.2.1 Identification of Potential Sources of Impact

This section further examines the source > pathway > receptor linkages that could potentially result in adverse impacts arising from FRM measures at Drogheda AFA on the screened in European sites.

The qualifying interest(s) of these sites at risk from surface water pathways are identified in Table 5.2.1 and from land and air pathways in Table 5.2.2. Additional detail on the attributes and targets of the qualifying interests has been included in Appendix C. These have been consulted in order to assess the potential impacts of the proposed flood relief measures on the designated habitats and species insofar as plan-level details allowed.

5.2.2 Potential Sources of Impact via Surface Water Pathways

Four European sites were identified as potentially being impacted upon via surface water pathways; Boyne Coast and Estuary SAC (001957), Boyne Estuary SPA (004080), River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. Qualifying interests/ special conservation interests at risk from surface water pathways are identified in Table 5.2.1. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.2.1: Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Drogheda AFA.

European Site (Site code)	Qualifying interests
Boyne Coast and Estuary SAC (001957)	Estuaries [1130], Mudflats and sandflats not covered by seawater at low tide [1140] Salicornia and other annuals colonizing mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]
Boyne Estuary SPA (004080)	Wetlands and waterbirds habitat [A999] Shelduck (<i>Tadorna tadorna</i>) [A048] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Lapwing (<i>Vanellus vanellus</i>) [A142] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Redshank (<i>Tringa totanus</i>) [A162] Turnstone (<i>Arenaria interpres</i>) [A169] Little Tern (<i>Sterna albifrons</i>) [A195]
River Boyne and River Blackwater SAC (002299)	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0] River Lamprey (<i>Lampetra fluviatilis</i>) [1099] Salmon (<i>Salmo salar</i>) [1106] Otter (<i>Lutra lutra</i>) [1355]
River Boyne and River Blackwater SPA (004232)	Kingfisher (<i>Alcedo atthis</i>) [A229]

The following sources of impact arising from FRM measures at Drogheda AFA could potentially impact upon the European sites detailed above through surface water pathways:

- **Suspended sediments** – There may be indirect negative downstream impacts from sedimentation during construction. Construction of flood walls and embankments within or adjacent to surface waters, increasing conveyance capacity and creation of flow diversion channels can result in the release of suspended sediments into those waters. This can lead to increased turbidity of surface waters, and an associated reduction in photosynthesis, which can impact on surface water dependent habitats. Impacts on aquatic species can occur through loss of suitable habitat (e.g. salmon spawning habitat), changes to or reduction in food supply (e.g. aquatic invertebrate density or diversity), or increased difficulty in feeding (e.g. otters will find greater difficulty hunting in turbid surface waters).
- **Changes in nutrient levels/pollutants** – Construction activities in or adjacent to surface waters and clearance of in-stream vegetation can result in the release of nutrients into those waters, and can lead to reduced water quality and eutrophication. Hard defences can interfere with natural process, by causing some or all of the floodplain to be disconnected from the river, which can lead to the loss of natural habitat to capture, filter and recycle nutrients or pollutants. This can lead to a reduction in water quality. Spillages of hydrocarbons or other contaminants during FRM works can also result in a reduction in water quality. Reduced water quality and eutrophication can adversely impact on surface water dependent habitats, and on aquatic species through loss of suitable habitat, changes to or reduction in food supply, or increased difficulty in feeding.
- **Changes in water levels/channel morphology** – Changes to channel morphology through the use of flood walls, embankments, channel widening or culverting and diversion of flow can lead to changes in capacity and flow of surface waters. This can lead to hydrological impacts on surface water dependent habitats and to aquatic species through habitat loss and changes to or reduction in food supply. Erosion may also increase either side of the defences due to changes in river processes.

5.2.3 Potential Sources of Impact via Land and Air Pathways

Four European sites were identified as potentially being impacted upon via land and air pathways; Boyne Estuary SPA (004080), River Boyne and River Blackwater SAC, River Boyne and River Blackwater SPA and River Nanny Estuary and Shore SPA (004158). Qualifying interests/ special conservation interests of these sites at risk from land and air pathways are identified in Table 5.2.2. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.2.2: Qualifying Interests of the screened in European sites likely to be impacted upon via land and air pathways from FRM measures undertaken at Drogheda AFA.

European Site (Site code)	Qualifying interests
Boyne Estuary SPA (004080)	Wetlands and waterbirds habitat [A999] Shelduck (<i>Tadorna tadorna</i>) [A048] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141]

European Site (Site code)	Qualifying interests
	Lapwing (<i>Vanellus vanellus</i>) [A142] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Redshank (<i>Tringa totanus</i>) [A162] Turnstone (<i>Arenaria interpres</i>) [A169] Little Tern (<i>Sterna albifrons</i>) [A195]
River Boyne and River Blackwater SAC (002299)	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion, Alnion incanae, Salicion albae</i>) [91E0] River Lamprey (<i>Lampetra fluviatilis</i>) [1099] Salmon (<i>Salmo salar</i>) [1106] Otter (<i>Lutra lutra</i>) [1355]
River Boyne and River Blackwater SPA (004232)	Kingfisher (<i>Alcedo atthis</i>) [A229]
River Nanny Estuary and Shore SPA (004158)	Wetland and Waterbirds [A999] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Herring Gull (<i>Larus argentatus</i>) [A184]

The following sources of impact arising from FRM measures at Drogheda AFA could potentially impact upon the European sites detailed above through land and air pathways:

- **Physical habitat disturbance and loss of woody vegetation cover** – There is likely to be a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences. Construction of flood walls and embankments adjacent to surface waters, increasing conveyance and creation of flow diversion channels can result in a direct loss of or disturbance to aquatic, marginal and riparian habitats. This can indirectly impact on species through loss of habitat or changes in food supply, thereby negatively affecting conservation objectives (population trends or range).
- **Noise and visual disturbance** – The use of construction machinery and the presence of construction and maintenance workers can result in avoidance of suitable habitat by sensitive species.

5.2.4 Impact Assessment

Table 5.2.3 assesses the screened in European sites in more detail and examines the ways in which the identified sources and pathways could adversely impact on habitats or species. Avoidance and mitigation measures are proposed to mitigate any significant adverse impacts.

5.2.4.1 In-combination Effects

Appropriate Assessment requires consideration of the impacts on European sites of FRM measures at Drogheda AFA, in combination with other plans or projects that may impact on the sites resulting in cumulative negative impacts. The potential for cumulative impacts was considered throughout the process of option development. Engagement with stakeholders ensured that the potential for in-combination and cumulative impacts at plan level was minimised. In combination and cumulative effects will be undergo re-assessment at the project stage when project-specific information has been captured.

Potential sources of in-combination effects identified as part of this assessment include:

- Drainage maintenance activities in the Boyne Arterial Drainage Scheme. The OPW carry out regular maintenance on those channels altered through schemes implemented following the 1945 Arterial Drainage Act. In this area, maintenance activities are carried out on the River Boyne, Athlumney House tributary, Athlumney tributary, Bailis tributary and River Blackwater. Ongoing maintenance activities that result in the release of suspended sediments are currently adversely impacting on salmon spawning grounds, therefore these activities could potentially result in adverse cumulative impacts on this species. It is recommended that no arterial maintenance is carried out in the channels where FRM work is being undertaken during the construction phase.
- Local landowners and farmers carry out agricultural activities in areas adjacent to this FRM work that could result in similar impacts and disturbance. These activities have been ongoing for many decades and are likely to be periodic and local in nature, therefore the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- Aquatic habitat enhancement is planned within the Boyne catchment through the EREP (Environmental River Enhancement Programme) of Inland Fisheries Ireland, with the aim of enhancing the spawning, nursery and adult habitat within the channel for Salmonids. Negative in-combination effects are unlikely, provided timing of physical works are correctly planned and managed.
- The Louth County Development Plan 2015-2021 has the potential for impacts in relation to planned new infrastructure and amenity policies. No significant in-combination effects with the FRMP are predicted at plan level; additional detail on potential interactions between infrastructure and FRA schemes will be captured and assessed at project level.
- In-combination effects may occur with FRM works, or parallel projects, carried out at other AFAs or locations in the UoM (see section 3.1.2.2). FRM measures have been proposed at the nearby sites of Drogheda, Mornington and Navan. There may be cumulative impacts on habitats or species from measures taken at all four sites. Generic mitigation and monitoring measures have been developed in the FRMP, including the avoidance of undertaking FRM work on adjoining reaches of rivers for different AFAs or other parallel projects simultaneously. Provided the timing of physical works is correctly planned and managed, no significant in-combination impacts are anticipated.

- In -combination effects may occur with schemes in other neighbouring FRMPs, in particular Termonfeckin (UoM06) and Laytown, Bettystown and Coastal areas (UoM08). Following the precautionary principle it is also recommended that in accordance with the mitigation outlined above, works are not carried out simultaneously in these sites so as to ensure there are no significant in-combination effects.

There are no other plans/projects ongoing or proposed (at the time of this study) which may give rise to any form of cumulative impact on the European sites.

Table 5.2.3: Impact assessment for FRM measures at Drogheda AFA (Hard defences, flow diversion and Improvement of Channel Conveyance)

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
River Boyne and River Blackwater SAC (002299)	Alkaline fens [7230]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	The habitats and species for which the River Boyne and Blackwater SAC was designated require particular water quality conditions. The favourable conservation condition of Salmon is directly measured by water quality attributes, and the conservation status of other species are measured by attributes indirectly linked to water quality and sediment loadings, such as the extent and distribution of spawning habitats and the extent of freshwater habitat.	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.	No
	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0]			Construction activities in or adjacent to the water and creation of a flow diversion channel could result in a release of suspended sediments and associated nutrients and/or pollution incidents from machinery. This could lead to a reduction in water quality, and result in adverse effects on the designated habitats and species of this site through loss of habitat or changes to food supply. Disconnecting areas of floodplain from the river can lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. Ongoing maintenance activities related to arterial drainage could exacerbate any sediment or nutrient/pollutant impacts.	Follow lamprey and otter SOPs.	
	River Lamprey (<i>Lampetra fluviatilis</i>) [1099]				Avoid working in-channel to ensure lamprey or salmon habitat is not disturbed.	
	Salmon (<i>Salmo salar</i>) [1106]				Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.	
	Otter (<i>Lutra lutra</i>) [1355]				Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation.	
	Special conservation interest – Whooper swan <i>Cygnus cygnus</i>			There are likely to be indirect, negative downstream impacts from sedimentation during construction. These impacts are expected to be short-term and local in scale.	Avoid arterial drainage maintenance works while FRM works are being undertaken. See also general mitigation in Chapter 6	

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
		Water level changes		<p>The designated habitats and species depend on specific hydrological regimes. Construction of flood walls and embankments and creation of a flow diversion channel can result in changes in channel hydrology, by increasing capacity and flow rates. This could lead to a reduction of suitable habitat and adverse effects on the conservation objectives for the species (population size and range).</p> <p>There is potential for impacts on the priority habitat of alluvial forests [91E0], which is recorded at the western (upstream) boundary of Drogheda AFA.</p> <p>As a general rule Hard Defences will be kept as far back from the river channel or coast line as possible allowing the floodplain function to remain active. At Drogheda Port, defences are proposed to be set back at the buildings and existing accesses protected using automated flood barriers. Significant changes to the hydrological regime are therefore unlikely, as the proposed hard defences are in a built-up urban environment where hard defences are already in place.</p>	<p>Habitat and hydrological studies will be carried out at project level to inform the FRM design.</p> <p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	No
		Physical habitat disturbance	Land and air	<p>Construction activities that remove vegetation or otherwise disturb habitats could adversely affect the habitat area, vegetation structure and composition of designated habitats.</p> <p>Destruction or alteration of aquatic or riparian habitats could adversely affect designated species through loss of cover for otter or damage to lamprey and salmon habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs including Lamprey and Otter SOPs during design, construction and maintenance in order to minimise physical disturbance.</p> <p>Avoid working in-channel unless essential.</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
					<p>Survey by a qualified ecologist to inform option design and design-specific mitigation prior to commencement of the FRM work, to identify any important salmon or lamprey habitat, or otter resting sites/holts in the vicinity of FRM works.</p> <p>No in-channel or bankside works to be conducted within 50m of a known or potential Otterholt/ resting site.</p> <p>See also general mitigation in Chapter 6</p>	
		Noise and visual disturbance		The use of construction machinery and the presence of construction and maintenance workers can result in avoidance of suitable habitat by sensitive species.	<p>Strictly adhere to best practice protocols and SOPs including Otter SOPs during design, construction and maintenance in order to minimise physical disturbance.</p> <p>Avoid working in-channel unless essential.</p> <p>No in-channel or bankside works to be</p>	

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
					conducted within 50m of a known or potential otter holt/ resting site. See also general mitigation in Chapter 6	
		Introduction or spreading of alien invasive species	Land and surface water	Invasive species can spread rapidly through habitats, form dense thickets which can out-compete native plants and cause problems with soil erosion	Carry out invasive species surveys and follow SOPs (see Table 6.1.1) See general mitigation in Chapter 6	No
River Boyne and River Blackwater SPA (004232)	Kingfisher (<i>Alcedo atthis</i>)[A229]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	Kingfisher populations are dependent on river channels and their associated marginal and riparian habitats. Construction activities in or adjacent to the water and clearance of in-channel vegetation could result in a release of suspended sediments and associated nutrients and/or pollution incidents from machinery. This could lead to a reduction in water quality, affecting the habitats and food supply (macroinvertebrates and fish) of the Kingfisher and adversely affecting the distribution of the species within the SPA and long-term population trends. There are likely to be indirect, negative downstream impacts from sedimentation during construction. These impacts are expected to be short-term and local in scale, and are unlikely to impact significantly on attributes used to define conservation status.	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance. Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel. Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation. Avoid arterial drainage maintenance works while FRM works are being	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
					undertaken. See also general mitigation in Chapter 6	
		Water level changes		<p>The habitats on which Kingfisher populations depend require specific hydrological regimes. Construction of flood walls and embankments, as well as in-channel vegetation clearance can result in changes in channel hydrology, by increasing capacity and flow rates. This can adversely impact on Kingfisher populations through habitat loss and changes to/reduction in food supply, possibly affecting distribution of the species within the SPA and long-term population trends.</p> <p>However, significant changes to the hydrological regime are unlikely, as the proposed hard defences are in a built-up urban environment where hard defences are already in place.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	No
		<p>Physical habitat disturbance</p> <p>Noise and visual disturbance</p>	Land and air	<p>Kingfisher populations are dependent on marginal and riparian habitats of river channels, and nest in burrows on vertical river banks. Construction of flood walls and embankments and associated removal of vegetation and disturbance of banks could adversely affect the range area, foraging/perching habitat and distribution of the species within the SPA as well as long-term population trends.</p> <p>Kingfishers are sensitive to disturbance by maintenance workers and noise from machinery and may avoid areas where works are being undertaken. This could adversely affect its distribution within the SPA.</p>	<p>Survey by a qualified ecologist to inform option design and design-specific mitigation prior to commencement of the FRM work, to assess use of the channel by kingfisher in the vicinity of FRM works and presence of burrows.</p> <p>Avoid disturbance of Kingfisher burrows from March-September.</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
					<p>Avoid in-channel or bankside vegetation removal within 30m of Kingfisher burrows</p> <p>If burrows in vertical banks are discovered during the works, works must stop immediately and the burrows be inspected by a suitably qualified ecologist.</p> <p>Leave bankside vegetation intact wherever possible.</p> <p>See also general mitigation in Chapter 6</p>	
Boyne coast and estuary SAC (001957)	<p>Estuaries [1130]</p> <p>Mudflats and sandflats not covered by seawater at low tide [1140]</p> <p>Salicornia and other annuals colonising mud and sand [1310]</p> <p>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]</p>	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction activities upstream of this site could result in the release of suspended sediments and associated nutrients or in pollution incidents from machinery. This could occur during construction of new flood walls/embankments, and creation of a flow diversion channel. This could lead to a reduction in water quality, adversely affecting the wetland habitats. Ongoing maintenance activities, including maintenance of the flood walls/embankments, and dredging of the main Boyne could also result in the release of suspended sediments and nutrients and to pollution incidents, cumulatively impacting upon these wetland habitats.</p> <p>There is potential for indirect, negative impacts from sedimentation during construction. These impacts</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Avoid working in-channel whenever possible.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
	Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]			are expected to be short-term and local in scale, and are therefore not expected to impact significantly on attributes used to define conservation status.	Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation. Avoid arterial drainage maintenance works while FRM works are being undertaken. See also general mitigation in Chapter 6	
		Water level changes		The habitats for which this site is designated are dependent on specific hydrological regimes. Construction of flood walls/embankments could alter hydrological regimes, thereby impacting upon wetland habitats and their conservation objectives (composition and area). As a general rule Hard Defences will be kept as far back from the river channel or coast line as possible allowing the floodplain function to remain active. At Drogheda Port, defences are proposed to be set back at the buildings and existing accesses protected using automated flood barriers. However, significant changes to the hydrological regime are unlikely, as the proposed hard defences are in a built-up urban environment where hard defences are already in place.	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance. See also general mitigation in Chapter 6	No
Boyne Estuary SPA (004080)	Shelduck <i>Tadorna tadorna</i> [A048] , Oystercatcher <i>Haematopus ostralegus</i> [A130] Golden Plover <i>Pluvialis</i>	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	The birds for which this SPA is designated are dependent on a number of habitats within the site, including estuaries, mudflats, sandflats and saltmeadows. Construction activities upstream of the SAC could impact on these habitats through the release of suspended sediments and associated	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
	<i>apricaria</i> [A140] Grey Plover <i>Pluvialis squatarola</i> [A141] Lapwing <i>Vanellus vanellus</i> [A142] Knot <i>Calidris canutus</i> [A143] Sanderling <i>Calidris alba</i> [A144] Black-tailed Godwit <i>Limosa limosa</i> [A156] Redshank <i>Tringa totanus</i> [A162] Turnstone <i>Arenaria interpres</i> [A169] Little Tern <i>Sterna albifrons</i> [A195] Additional Special Conservation Interests			<p>nutrients or through pollution incidents from machinery. This could occur during construction of new flood walls/embankments and creation of a flow diversion channel. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply of waterbirds. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or range.</p> <p>There is potential for indirect, negative impacts from sedimentation during construction. These impacts are expected to be short-term and local in scale, and are therefore not expected to impact significantly on attributes used to define conservation status.</p>	<p>Avoid working in-channel whenever possible.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation.</p> <p>Avoid arterial drainage maintenance works while FRM works are being undertaken.</p> <p>See also general mitigation in Chapter 6</p>	
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of flood walls/embankments and creation of a flow diversion channel could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species that they support (population trends or range).</p> <p>However, significant changes to the hydrological regime are unlikely, as the proposed hard defences</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
				are in a built-up urban environment where hard defences are already in place.		
		Noise and visual disturbance	Land and Air	<p>These waterbird species will be sensitive to disturbance from machinery and workforces during construction of new flood walls and embankments and during maintenance activities. This disturbance could cause displacement of populations which can require significant energy expenditure for the birds, which, and could have an adverse impact on population trends and distribution.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Surveys should be carried out for the presence of breeding Terns. If found to be present, avoid carrying out construction work in the Tern roosting season (July- September).</p> <p>Where adverse effects are likely, avoid carrying out construction work in the over-wintering period (September - March).</p> <p>See also general mitigation in Chapter 6</p>	No
River Nanny Estuary and Shore SPA (004158)	<p>Wetland and Waterbirds [A999]</p> <p>Oystercatcher (<i>Haematopus ostralegus</i>) [A130]</p> <p>Ringed Plover (<i>Charadrius hiaticula</i>) [A137]</p> <p>Golden Plover (<i>Pluvialis</i>)</p>	Noise and visual disturbance	Land and Air	<p>Several of the listed waterbird species, as well as other overwintering birds (Additional Special Conservation Interests) may at times use habitats situated in ecologically connected areas such as the Boyne Coast and Estuary SAC (001957) and the Boyne Estuary SPA (004080). Significant habitat change or increased levels of disturbance within these areas could result in the displacement of one or more of the listed waterbird species from areas</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Where adverse effects are likely, avoid carrying out construction work in</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
	<i>apricaria</i> [A140] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Herring Gull (<i>Larus argentatus</i>) [A184] Additional Special Conservation Interests			within the SPA, and/or a reduction in their numbers i.e. negatively affecting the range and/or population trends of the species.	the over-wintering period (September - March). See also general mitigation in Chapter 6	

5.2.5 Conclusions

This NIS details the findings of the Stage 2 Appropriate Assessment conducted to further examine the potential direct and indirect impacts of proposed FRM works at Drogheda AFA on the following European sites:

- Boyne Coast and Estuary SAC (001957)
- Boyne Estuary SPA (004080)
- River Boyne and River Blackwater SAC (002299)
- River Boyne and River Blackwater SPA (004232)
- River Nanny Estuary and Shore SPA (004158)

The Appropriate Assessment investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above European sites, alone and in-combination with other plans and projects, taking into account the sites' structure, function and conservation objectives. Where potentially significant adverse impacts were identified, a range of mitigation and avoidance measures have been suggested to help offset them (see also Chapter 6). As a result of this Appropriate Assessment it has been concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Drogheda AFA will not have a significant adverse impact on the above European sites.

Project level assessments will be undertaken based on option designs and site surveys to further consider the attributes and targets of site specific conservation objectives.

5.3 MORNINGTON AFA

All European sites in the zone of influence of Mornington AFA were screened for possible impacts from FRM methods (see Chapter 3.5). Screening assessed the potential for impact at seven European sites; Boyne Coast and Estuary SAC (001957), Boyne Estuary SPA (004080), Clogher Head SAC (001459), Dundalk Bay SPA (004026), River Boyne and River Blackwater SAC (002299), River Boyne and River Blackwater SPA (004232), and River Nanny Estuary and Shore SPA (004158) (See Figure 5.3.1). Two sites were found to have no identifiable impact pathway arising from the implementation of FRM methods within the Mornington catchment and were therefore screened out as not requiring any further assessment. Five European sites were identified as potentially being impacted upon through FRM activities at Mornington AFA; Boyne Coast and Estuary SAC (001957), Boyne Coast and Estuary SPA (004080), River Boyne and River Blackwater SAC (002299), River Boyne and River Blackwater SPA (004232), and River Nanny Estuary and Shore SPA (004158). The following section assesses the proposed FRM measures described in Section 4.3.3.3 in relation to the screened-in European sites.

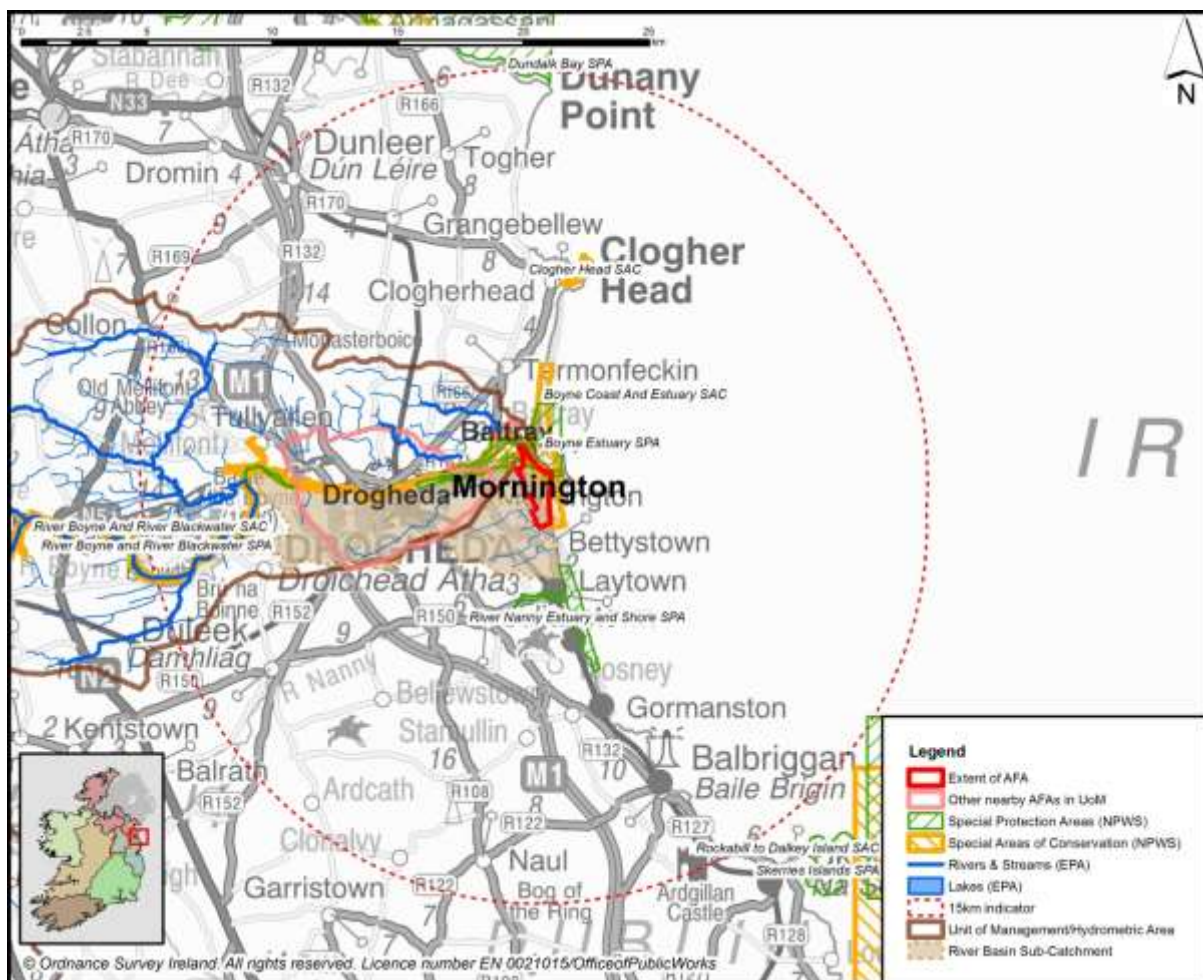


Figure 5.3.1: Mornington AFA in context of catchment and surrounding European sites

5.3.1 Identification of Potential Sources of Impact

Screening of potential FRM methods for Mornington AFA identified the preferred option to be assessed as 'Hard Defences'. At risk properties would be protected from a series of flood

embankments and walls. This Chapter further examines the source > pathway > receptor linkages that could potentially result in adverse impacts arising from FRM measures at Mornington AFA on the screened-in European sites.

The qualifying interest(s) of these sites at risk from surface water pathways are identified in Table 5.3.1 and from land and air pathways in Table 5.3.2. Additional detail on the attributes and targets of the qualifying interests has been included in Appendix C. These have been consulted in order to assess the potential impacts of the proposed flood relief measures on the designated habitats and species insofar as plan-level details allowed.

5.3.1.1 Potential Sources of Impact via Surface Water Pathways

Four European sites were identified as potentially being impacted upon via surface water pathways; Boyne Coast and Estuary SAC and Boyne Estuary SPA. The River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA are located approximately 2.6km upstream of Mornington AFA. As these sites have a number of mobile species as their qualifying interests there exists the potential for effects on either the species themselves or indirectly through changes to prey distribution arising from impacts on water quality in the estuary. The River Nanny and Shore SPA is located at a distance of 1.7km from Mornington AFA and no surface water pathways are expected to impact upon this site. Qualifying interests/ special conservation interests at risk from surface water pathways are identified in Table 5.3.1. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.3.1: Qualifying Interests of the screened-in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Mornington AFA.

European Site (Site code)	Qualifying Interests
Boyne Coast and Estuary SAC (001957)	Estuaries [1130], Mudflats and sandflats not covered by seawater at low tide [1140] Salicornia and other annuals colonizing mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]
Boyne Estuary SPA (004080)	Wetlands and waterbirds habitat [A999] Shelduck (<i>Tadorna tadorna</i>) [A048] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Lapwing (<i>Vanellus vanellus</i>) [A142] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Redshank (<i>Tringa tetanus</i>) [A162] Turnstone (<i>Arenaria interpres</i>) [A169] Little Tern (<i>Sterna albifrons</i>) [A195]
River Boyne and River Blackwater SAC (002299)	River Lamprey (<i>Lampetra fluviatilis</i>) [1099] Salmon (<i>Salmo salar</i>) [1106] Otter (<i>Lutra lutra</i>) [1355]
River Boyne and River Blackwater SPA (004232)	Kingfisher (<i>Alcedo atthis</i>) [A229]

The following sources of impact arising from FRM measures at Mornington AFA could potentially impact upon the European sites detailed above through surface water pathways:

- **Suspended sediments** – There may be indirect negative impacts from sedimentation during construction. Construction activities within or adjacent to surface waters can result in the release of suspended sediments into those waters. This could occur during construction of new flood walls/embankments, and along access routes. This increase in suspended sediments can lead to increased turbidity of surface waters, and an associated reduction in photosynthesis, which can impact on surface water dependent habitats. Impacts on aquatic species can occur through loss of suitable habitat, changes to or reduction in food supply (e.g. aquatic invertebrate density or diversity).
- **Changes in nutrient levels/pollutants** – Construction activities in or adjacent to surface waters can result in the release of nutrients into those waters, and can lead to reduced water quality and eutrophication. Disconnecting areas of floodplain from the river can impact on water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. Spillages of hydrocarbons or other contaminants during FRM works can also result in a reduction in water quality. Reduced water quality and eutrophication can adversely impact on surface water dependent habitats, and on aquatic species through loss of suitable habitat, changes to or reduction in food supply.
- **Changes in water levels/channel morphology** – Changes to channel morphology through the use of flood walls and embankments can lead to changes in capacity and flow of surface waters. This can lead to hydrological impacts on surface water dependent habitats and to aquatic species through habitat loss and changes to/reduction in food supply.

5.3.1.2 Potential Sources of Impact via Land and Air Pathways

Four European sites were identified as potentially being impacted upon via land and air pathways; Boyne Coast and Estuary SAC, Boyne Estuary SPA and River Nanny Estuary and Shore SPA.

The River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA are located at a distance of 2.8km and 8.8km respectively from the FRM works at Mornington AFA. There is not considered to be any land or air pathways that are expected to impact upon attributes used to define conservation status of the qualifying interest of the SPA. Otter is one of the qualifying interests of the SAC and as a mobile species it may be influenced by construction activities. The River Nanny and Shore SPA is located at a distance of 1.7km from Mornington AFA and wintering birds for which this site is designated may at times use habitats situated in ecologically connected areas such as the Boyne Coast and Estuary SAC (001957) and the Boyne Estuary SPA (004080), therefore impacts at these sites have the potential to impact upon attributes used to define conservation status of designated species at these sites. Qualifying interests/ special conservation interests of these sites at risk from land and air pathways are identified in Table 5.3.2.

Table 5.3.2: Qualifying Interests of the screened-in European sites likely to be impacted upon via land and air pathways from FRM measures undertaken at Mornington AFA.

European Site (Site code)	Qualifying Interests
Boyne Coast and Estuary SAC (001957)	Estuaries [1130], Mudflats and sandflats not covered by seawater at low tide [1140] Salicornia and other annuals colonizing mud and sand [1310]
Boyne Estuary SPA (004080)	Wetlands and waterbirds habitat [A999] Shelduck (<i>Tadorna tadorna</i>) [A048] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Lapwing (<i>Vanellus vanellus</i>) [A142] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Redshank (<i>Tringa tetanus</i>) [A162] Turnstone (<i>Arenaria interpres</i>) [A169] Little Tern (<i>Sterna albifrons</i>) [A195]
River Boyne and River Blackwater SAC (002299)	Otter (<i>Lutra lutra</i>) [1355]
River Nanny Estuary and Shore SPA (004158)	Wetland and Waterbirds [A999] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Herring Gull (<i>Larus argentatus</i>) [A184]

The following sources of impact arising from FRM measures at Mornington AFA could potentially impact upon the European sites detailed above through land and air pathways:

- **Physical habitat disturbance and loss of woody vegetation cover** – There is likely to be a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences. Construction of flood walls and embankments adjacent to surface waters can result in a direct loss of or disturbance to aquatic, marginal and riparian habitats. This can indirectly impact on species through loss of habitat or changes in food supply, thereby negatively affecting conservation objectives (population size and range).
- **Noise and visual disturbance** – The use of construction machinery and the presence of construction and maintenance workers can result in avoidance of suitable habitat by sensitive species.

5.3.2 Impact Assessment

Table 5.3.3 assesses the screened-in European sites in more detail and examines the ways in which the identified sources and pathways could adversely impact on habitats or species. Avoidance and mitigation measures are proposed to mitigate any significant adverse impacts.

5.3.2.1 In-combination Effects

Appropriate Assessment requires consideration of the impacts on European sites of FRM measures at Mornington AFA, in combination with other plans or projects that may impact on the sites resulting in cumulative negative impacts. The potential for cumulative impacts was considered throughout the process of option development. Engagement with stakeholders ensured that the potential for in-combination and cumulative impacts at plan level was minimised. In combination and cumulative effects will be re-assessed at the project stage when project-specific information has been captured. Potential sources of in-combination effects identified as part of this assessment include:

- Drainage maintenance activities in the Boyne Arterial Drainage Scheme. The OPW carry out regular maintenance on those channels altered through schemes implemented following the 1945 Arterial Drainage Act. In this area, maintenance activities are carried out on the River Boyne, Athlumney House tributary, Athlumney tributary, Bailis tributary and River Blackwater. These activities could potentially result in adverse cumulative impacts on habitats or species. Ongoing maintenance activities that result in the release of suspended sediments are currently adversely impacting on salmon spawning grounds, therefore these activities could potentially result in adverse cumulative impacts on this species. It is recommended that no arterial maintenance is carried out on the lower reaches of the Boyne River while FRM work is being undertaken during the construction phase.
- Local landowners and farmers carry out agricultural activities in areas adjacent to this FRM work that could result in similar impacts and disturbance. These activities have been ongoing for many decades and are likely to be periodic and local in nature, therefore the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- FRM measures have been proposed at the nearby sites of Baltray and Navan. There may be cumulative impacts on habitats or species from measures taken at all three sites. FRM measures at these sites are expected to have local- rather than catchment-scale impacts, however it is recommended that FRM measures at these three AFAs are not carried out simultaneously, in order to ensure there are no significant in-combination effects.
- Mornington River and its tributaries are subject to a flood alleviation scheme. These activities could potentially result in adverse cumulative impacts on habitats or species. Generic mitigation and monitoring measures have been developed in the FRMP, including the avoidance of undertaking FRM work on adjoining reaches of rivers for different AFAs or other parallel projects simultaneously. Provided the timing of FRM works is correctly planned and managed, no significant in-combination impacts are anticipated.
- In -combination effects may occur with schemes in other neighbouring FRMPs, in particular Termonfeckin (UoM06) and Laytown, Bettystown and Coastal areas (UoM08). Following the precautionary principle it is also recommended that in accordance with the mitigation outlined

above, works are not carried out simultaneously in these sites so as to ensure there are no significant in-combination effects.

There are no other plans/projects ongoing or proposed (at the time of this study) which may give rise to any form of cumulative impact on the European sites.

Table 5.3.3: Impact assessment for FRM measures Mornington AFA (hard defences – flood walls and embankments)

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
Boyne coast and estuary SAC (001957)	<p>Estuaries [1130]</p> <p>Mudflats and sandflats not covered by seawater at low tide [1140]</p> <p><i>Salicornia</i> and other annuals colonising mud and sand [1310]</p> <p>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330]</p> <p>Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]</p>	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction will take place adjacent to the SAC and along the Mornington River. Construction activities could result in the release of suspended sediments and associated nutrients or in pollution incidents from machinery. This could occur during construction of new flood walls/embankments, and along access routes. This could lead to a reduction in water quality, adversely affecting the wetland habitats. Disconnecting areas of floodplain from the Mornington river can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants</p> <p>Ongoing maintenance activities, including maintenance of the flood walls/embankments, dredging of the main Boyne channel to maintain access and flood alleviation measures in the Mornington River could also result in the release of suspended sediments and nutrients and to pollution incidents, cumulatively impacting upon these wetland habitats.</p> <p>There are likely to be indirect, negative impacts from sedimentation during construction. Only a short section of the new hard defences are bordering estuarine habitat, and defences in the Mornington River are confined to short stretches and are located a distance upstream of its convergence with the Boyne estuary. These impacts are expected to be short-term and local in scale, and are therefore unlikely to impact significantly on attributes used to define conservation status.</p>	<p>Coastal defences will be set back from the shoreline, inland from the existing defences.</p> <p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	No
		Water level changes		The habitats for which this site is designated are dependent on specific hydrological regimes. Construction of flood walls/embankments could	Strictly adhere to best practice protocols and SOPs during design,	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
				<p>alter hydrological regimes, thereby impacting upon wetland habitats and their conservation objectives (composition and area).</p> <p>However, significant changes to the hydrological regime are unlikely, as only a short section of hard defences will be adjacent to estuarine habitat and therefore are not expected to adversely alter the level of inundation of habitat. New hard defences in the Mornington River are confined to short stretches and are therefore not expected to negatively impact on attributes used to define conservation status of protected habitats in the Boyne estuary.</p>	<p>construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	
		Physical habitat disturbance	Land and air	<p>Some construction will take place along the edge of the SAC. Physical disturbance by machinery and workers could lead to a loss of habitat adjacent to the hard defences and along access routes.</p> <p>Ongoing maintenance activities, including maintenance of the flood walls/embankments and dredging of the main channel to maintain access could also result in physical disturbance of adjacent habitats or along access routes.</p> <p>There is likely to be a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences. These impacts are expected to be short-term and local in scale, and are therefore unlikely to impact significantly on attributes used to define conservation status.</p> <p>Construction of coastal defences has the potential to alter coastal processes which may result in indirect impacts to intertidal sediments and estuarine habitats. Coastal flood walls and</p>	<p>Coastal defences will be set back from the shoreline.</p> <p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Habitat survey by a qualified ecologist to inform option design and design-specific mitigation prior to commencement of the FRM work.</p> <p>Design will be subjected to hydrodynamic testing to establish nature and scale of effects and confirm that no significant effects will occur.</p>	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
				embankments must be designed and constructed such that they do not alter coastal processes in a significant manner.	See also general mitigation in Chapter 6	
		Introduction or spreading of alien invasive species	Land and surface water	Invasive species can spread rapidly through habitats, form dense thickets which can out-compete native plants and cause problems with soil erosion	Carry out invasive species surveys and follow SOPs (see Table 6.1.1) See general mitigation in Chapter 6	No
Boyne Estuary SPA (004080)	<p>Shelduck <i>Tadorna tadorna</i> [A048] , Oystercatcher <i>Haematopus ostralegus</i> [A130] Golden Plover <i>Pluvialis apricaria</i> [A140] Grey Plover <i>Pluvialis squatarola</i> [A141] Lapwing <i>Vanellus vanellus</i> [A142] Knot <i>Calidris canutus</i> [A143] Sanderling <i>Calidris alba</i> [A144] Black-tailed Godwit <i>Limosa limosa</i> [A156] Redshank <i>Tringa tetanus</i> [A162] Turnstone <i>Arenaria interpres</i> [A169] Little Tern <i>Sterna albifrons</i> [A195] Additional Special Conservation Interests</p>	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>The birds for which this SPA is designated are dependent on a number of habitats within the site, including estuaries, mudflats, sandflats and saltmeadows. Construction activities at the edge of the SAC could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could occur during construction of new flood walls/embankments and along access routes. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply of waterbirds. Disconnecting areas of floodplain from the Mornington river can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants</p> <p>This could negatively impact on the conservation objectives of the species, through changes in population size and/or distribution and range.</p> <p>Ongoing maintenance activities, including maintenance of the flood walls/embankments, dredging of the main channel to maintain access and flood alleviation measures in the Mornington River could also result in the release of suspended sediments and nutrients and to pollution incidents, adversely affecting these wetland habitats.</p>	<p>Coastal defences will be set back from the shoreline.</p> <p>Habitat survey and ornithological survey by qualified person(s) to inform option design and design-specific mitigation prior to commencement of the FRM work.</p> <p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
				While there are likely to be indirect, negative impacts from sedimentation during construction, these impacts are expected to be short-term and local in scale, as only a short section of the new hard defences borders the SAC. Any impacts are therefore highly unlikely to impact significantly on attributes used to define conservation status.		
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of flood walls/embankments could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species that they support (population size, distribution and range).</p> <p>However, significant changes to the hydrological regime are unlikely, as only a short section of hard defences will be adjacent to estuarine habitat and therefore are not expected to adversely alter the level of inundation of habitat. New hard defences in the Mornington River are confined to short stretches and are therefore not expected to negatively impact on attributes used to define conservation status of protected habitats in the Boyne estuary.</p>	<p>Coastal defences will be set back from the shoreline</p> <p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	No
		Physical habitat disturbance	Land and air	<p>The habitats that support these species are likely to be vulnerable to physical disturbance arising from construction activities at the edge of the SAC. Physical disturbance by machinery and workers could lead to a loss of habitat adjacent to the hard defences and along access routes. This could reduce the available habitat and alter or reduce food sources for the protected bird species, negatively impacting on their conservation objectives (reduction in population size and/or distribution</p>	<p>Coastal defences will be set back from the shoreline.</p> <p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation</p>	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
				and range). There is likely to be a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences. These impacts are expected to be short-term and local in scale, and are therefore unlikely to impact significantly on attributes used to define conservation status.	in Chapter 6	
		Noise and visual disturbance		These waterbird species will be sensitive to disturbance from machinery and workforces during construction of new flood walls and embankments and during maintenance activities. This disturbance could cause displacement of populations which can require significant energy expenditure for the birds, which, if undertaken during winter months, could have an adverse impact on population trend and distribution.	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance. Ornithological surveys should include surveys for the presence of breeding Terns. If found to be present, avoid carrying out construction work in the Tern roosting season (July-September). Where adverse effects are likely, avoid carrying out construction work in the over-wintering period (September - March).	No
River Nanny Estuary and Shore SPA (004158)	Wetland and Waterbirds [A999] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius</i>	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	These waterbirds may at times use habitats situated in ecologically connected areas such as the Boyne Coast and Estuary SAC (001957) and the Boyne Estuary SPA (004080). Disturbance or destruction of waterbird habitat at these sites during construction or maintenance of hard defences could result in the displacement of	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
	<i>hiaticula</i>) [A137] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Herring Gull (<i>Larus argentatus</i>) [A184] Additional Special Conservation Interests			<p>one or more of the listed waterbird species from areas within the SPA, and/or a reduction in their numbers i.e. negatively affecting the range and/or population of the species.</p> <p>There are likely to be indirect, negative impacts in Boyne Coast and Estuary SAC and SPA from sedimentation during construction. These impacts are expected to be short-term and local in scale, and are therefore unlikely to impact significantly on attributes used to define conservation status of these designated waterbirds.</p>		
		Water level changes		<p>These waterbirds may at times use habitats situated in ecologically connected areas such as the Boyne Coast and Estuary SAC (001957) and the Boyne Estuary SPA (004080).</p> <p>Changes to habitat at those sites as a result of hydrological alteration following construction activities could result in the displacement of one or more of the listed waterbird species from areas within the SPA, and/or a reduction in their numbers i.e. negatively affecting the range and/or population of the species.</p> <p>However, significant changes to the hydrological regime at Boyne Coast and Estuary SAC and SPA are highly unlikely, as only a short section of the hard defences will be located adjacent to the estuary and therefore are not expected to alter the level of inundation of habitat. Therefore no significant impacts are expected on attributes used to define conservation status of these designated waterbirds.</p>	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
		Physical habitat disturbance	Land and air	<p>Several of the listed waterbird species, as well as other overwintering birds (Additional Special Conservation Interests) may at times use habitats situated in ecologically connected areas such as the Boyne Coast and Estuary SAC (001957) and the Boyne Estuary SPA (004080).</p> <p>Significant habitat change or increased levels of disturbance within these areas could result in the displacement of one or more of the listed waterbird species from areas within the SPA, and/or a reduction in their numbers i.e. negatively affecting the range and/or population of the species.</p> <p>There is likely to be a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences at Boyne Coast and Estuary SAC/SPA. These impacts are expected to be short-term and local in scale, and are therefore unlikely to impact significantly on attributes used to define conservation status of these designated waterbirds.</p>	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.	No
River Boyne and River Blackwater SAC (002299)	<p>Alkaline fens [7230]</p> <p>Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0]</p> <p>River Lamprey (<i>Lampetra fluviatilis</i>) [1099]</p> <p>Salmon (<i>Salmo salar</i>) [1106]</p> <p>Otter (<i>Lutra lutra</i>) [1355]</p>	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction activities in or adjacent to the water could result in a release of suspended sediments and associated nutrients and/or pollution incidents from machinery. This could lead to a reduction in water quality, and result in adverse effects on the designated habitats and species of this site through loss of habitat or changes to food supply.</p> <p>There are likely to be indirect, negative downstream impacts from sedimentation during construction. These impacts are expected to be short-term and local in scale.</p> <p>The site is approximately 2.5km upstream of Baltray and therefore adverse impacts on qualifying habitats are unlikely. However otter, salmon and</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the channel, wherever possible to minimise sediment loss into the channel.</p> <p>Undertake surveys for otter to inform option design and design-specific mitigation. Follow lamprey</p>	

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
River Boyne and River Blackwater SPA (004232)	Special conservation interest – Whooper swan <i>Cygnus cygnus</i>			<p>lamprey are mobile species and are likely to range beyond the boundaries of the designated area.</p> <p>Otter may be indirectly influenced by changes to prey distribution.</p> <p>Lamprey and salmonids may be influenced if works occur during migratory / spawning periods..</p>	<p>and otter SOPs.</p> <p>Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation.</p> <p>See also general mitigation in Chapter 6</p>	
		Physical habitat disturbance Noise and visual disturbance	Land and air	Construction activities that remove vegetation or otherwise disturb habitats could adversely affect foraging areas for otter.	<p>Carry out otter survey by a qualified ecologist to inform option design and design-specific mitigation prior to commencement of the FRM work.</p> <p>No in-channel or bankside works to be conducted within 50m of a known or potential Otter holt/ resting site.</p> <p>See also general mitigation in Chapter 6</p>	
	Kingfisher (<i>Alcedo atthis</i>) [A229]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	<p>Kingfisher populations are dependent on river channels and their associated marginal and riparian habitats.</p> <p>The site is approximately 2.5km upstream of Baltray and therefore direct impacts on the qualifying interest are unlikely.</p> <p>Construction activities in or adjacent to the water</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the shore, wherever possible to minimise</p>	

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/ Mitigation measures	Residual impact
				<p>and clearance of in-channel vegetation could result in a release of suspended sediments and associated nutrients and/or pollution incidents from machinery. This could lead to a reduction in water quality, affecting the habitats and food supply (macroinvertebrates and fish) of the Kingfisher and adversely affecting the distribution of the species within the SPA and long-term population trends.</p> <p>There are likely to be indirect, negative downstream impacts from sedimentation during construction. These impacts are expected to be short-term and local in scale, and are unlikely to extend upstream to the SPA.</p> <p>Further site-specific information should be captured to ensure that potential extent of impacts is understood.</p>	<p>sediment loss into the channel.</p> <p>Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation.</p> <p>Avoid arterial drainage maintenance works while FRM works are being undertaken.</p> <p>See also general mitigation in Chapter 6</p>	

5.3.3 Conclusions

This NIS details the findings of the Stage 2 Appropriate Assessment conducted to further examine the potential direct and indirect impacts of proposed FRM works at Mornington AFA on the following European sites:

- Boyne Coast and Estuary SAC (001957)
- Boyne Coast and Estuary SPA (004080)
- River Boyne and River Blackwater SAC (002299)
- River Boyne and River Blackwater SPA (004232)
- River Nanny Estuary and Shore SPA (004158)

The Appropriate Assessment investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above European sites, alone and in-combination with other plans and projects, taking into account the sites' structure, function and conservation objectives. Where potentially significant adverse impacts were identified, a range of mitigation and avoidance measures have been suggested to help offset them. As a result of this Appropriate Assessment it has been concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Mornington AFA will not have a significant adverse impact on the above European sites.

Project level assessments will be undertaken based on option designs and site surveys to further consider the attributes and targets of site specific conservation objectives.

5.4 NAVAN AFA

All European sites in the zone of influence of Navan AFA were screened for possible impacts from FRM methods (see Chapter 3.5). Screening assessed the potential for impact at four European sites; Boyne Coast and Estuary SAC (001957), Boyne Estuary SPA (004080), River Boyne and River Blackwater SAC (002299), and River Boyne and River Blackwater SPA (004232) (see Figure 5.4.1). Two of these sites were identified as potentially being impacted upon through FRM activities at Navan AFA; River Boyne and River Blackwater SAC (002299) and River Boyne and River Blackwater SPA (004232). The following section assesses the proposed FRM measures described in Chapter 4.3.3.4 in relation to the screened-in European sites.

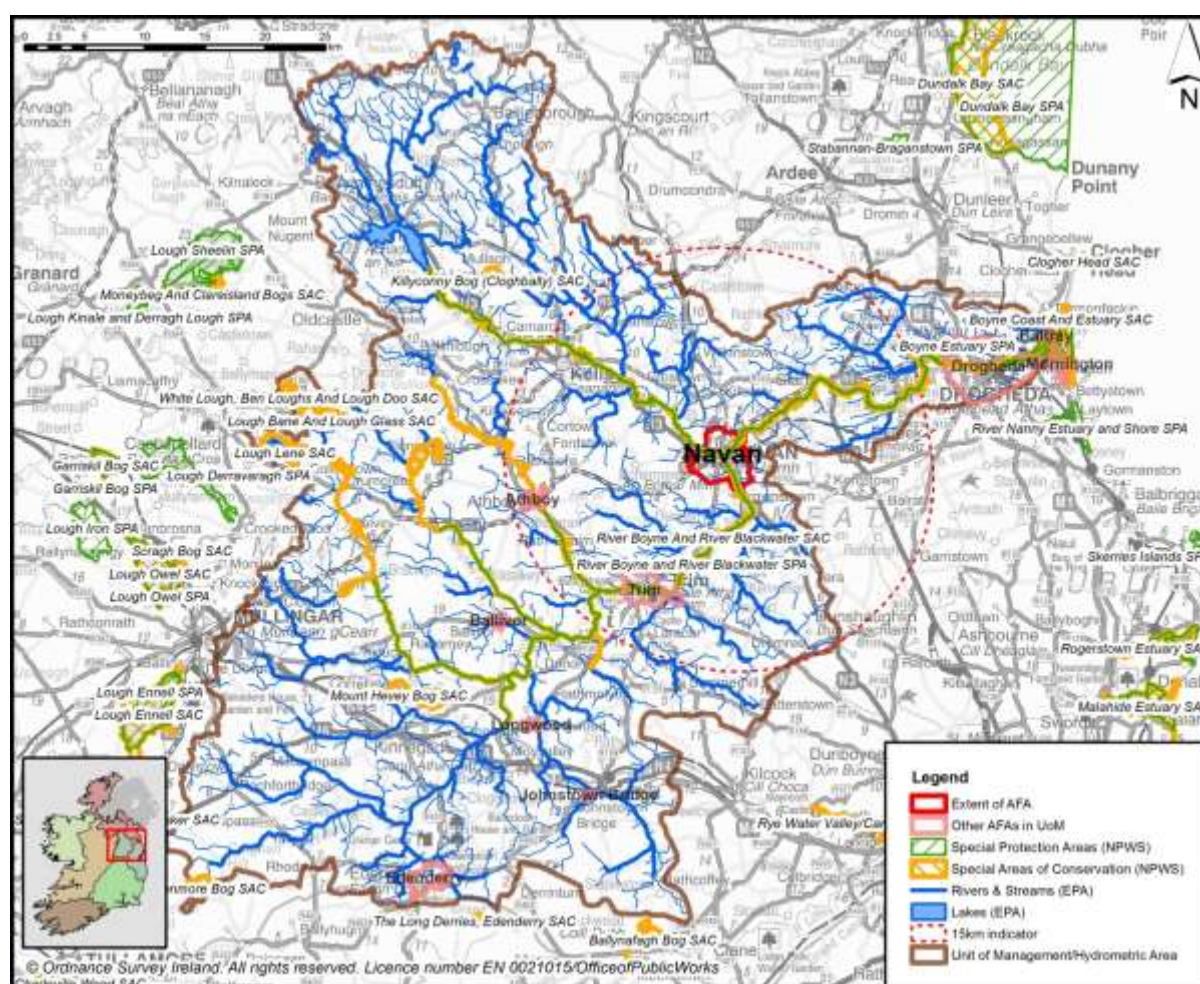


Figure 5.4.1: Navan AFA in context of catchment and surrounding European sites

5.4.1 Identification of Potential Sources of Impact

This Chapter further examines the source > pathway > receptor linkages that could potentially result in adverse impacts arising from FRM measures at Navan AFA on the screened-in European sites.

The qualifying interest(s) of these sites at risk from surface water pathways are identified in Table 5.4.1, from land and air pathways in Table 5.4.2 and from groundwater pathways in Table 5.4.3. Additional detail on the attributes and targets of the qualifying interests has been included in

Appendix C. These have been consulted in order to assess the potential impacts of the proposed flood relief measures on the designated habitats and species insofar as plan-level details allowed.

5.4.1.1 Potential Sources of Impact via Surface Water Pathways

Two European sites were identified as potentially being impacted upon via surface water pathways; River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. Qualifying interests/ special conservation interests at risk from surface water pathways are identified in Table 5.4.1. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.4.1 Qualifying Interests of the screened-in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Navan AFA.

European Site (Site code)	Qualifying Interests
River Boyne and River Blackwater SAC (002299)	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0] River Lamprey (<i>Lampetra fluviatilis</i>) [1099] Salmon (<i>Salmo salar</i>) [1106] Otter (<i>Lutra lutra</i>) [1355]
River Boyne and River Blackwater SPA (004232)	Kingfisher (<i>Alcedo atthis</i>) [A229]

The following sources of impact arising from FRM measures at Navan AFA could potentially impact upon the European sites detailed above through surface water pathways:

- **Suspended sediments** – There may be indirect negative downstream impacts from sedimentation during construction. Construction activities within or adjacent to surface waters and clearance of in-channel vegetation can result in the release of suspended sediments into those waters. This can lead to increased turbidity of surface waters, and an associated reduction in photosynthesis, which can impact on surface water dependent habitats. Impacts on aquatic species can occur through loss of suitable habitat (e.g. salmon spawning habitat), changes to or reduction in food supply (e.g. aquatic invertebrate density or diversity), or increased difficulty in feeding (e.g. otters will find greater difficulty hunting in turbid surface waters).
- **Changes in nutrient levels/pollutants** – Construction activities in or adjacent to surface waters and clearance of in-stream vegetation can result in the release of nutrients into those waters, and can lead to reduced water quality and eutrophication. Hard defences can interfere with natural process, by causing some or all of the floodplain to be disconnected from the river, which can lead to the loss of natural habitat to capture, filter and recycle nutrients or pollutants. This can lead to a reduction in water quality. Spillages of hydrocarbons or other contaminants during FRM works can also result in a reduction in water quality. Reduced water quality and eutrophication can adversely impact on surface water dependent habitats, and on aquatic species through loss of suitable habitat, changes to or reduction in food supply, or increased difficulty in feeding.
- **Changes in water levels/channel morphology** – Removal of in-stream and marginal vegetation, and changes to channel morphology through the use of flood walls and embankments can lead to changes in capacity and flow of surface waters. This can lead to hydrological impacts on

surface water dependent habitats and to aquatic species through habitat loss and changes to or reduction in food supply. Erosion may also increase either side of the defences due to changes in river processes.

5.4.1.2 Potential Sources of Impact via Land and Air Pathways

Two European sites were identified as potentially being impacted upon via land and air pathways; River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA. Qualifying Interests/ special conservation interests of these sites at risk from land and air pathways are identified in Table 5.4.2. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.4.2: Qualifying Interests of the screened-in European sites likely to be impacted upon via land and air pathways from FRM measures undertaken at Navan AFA.

European Site (Site code)	Qualifying Interests
River Boyne and River Blackwater SAC (002299)	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0] River Lamprey (<i>Lampetra fluviatilis</i>) [1099] Salmon (<i>Salmo salar</i>) [1106] Otter (<i>Lutra lutra</i>) [1355]
River Boyne and River Blackwater SPA (004232)	Kingfisher (<i>Alcedo atthis</i>) [A229]

The following sources of impact arising from FRM measures at Navan AFA could potentially impact upon the European sites detailed above through land and air pathways:

- **Physical habitat disturbance and loss of woody vegetation cover** – There is likely to be a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences. Construction of flood walls and embankments adjacent to surface waters and clearance of in-channel vegetation can result in a direct loss of or disturbance to aquatic, marginal and riparian habitats. This can indirectly impact on species through loss of habitat or changes in food supply, thereby negatively affecting conservation objectives (population size and range).
- **Noise and visual disturbance** – The use of construction machinery and the presence of construction and maintenance workers can result in avoidance of suitable habitat by sensitive species.

5.4.1.3 Potential Sources of Impact via Groundwater Pathways

Two European sites were identified as potentially being impacted upon via groundwater pathways; River Boyne and River Blackwater SAC and River Boyne and Blackwater SPA. Qualifying interests/ special conservation interests of these sites at risk from groundwater pathways are identified in Table 5.4.3. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.4.3: Qualifying Interests of the screened-in European sites likely to be impacted upon via groundwater pathways from FRM measures undertaken at Navan AFA.

European Site (Site code)	Qualifying Interests
River Boyne and River Blackwater SAC (002299)	Alkaline fens [7230] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0]

The following sources of impact arising from FRM measures at Navan AFA could potentially impact upon the European sites detailed above through groundwater pathways:

- **Changes in nutrient levels/pollutants** – Construction activities in or adjacent to surface waters and clearance of in-stream vegetation can result in the release of nutrients into those waters, and can lead to reduced water quality and eutrophication. Spillages of hydrocarbons or other contaminants during FRM works can also result in a reduction in water quality. Reduced water quality and eutrophication can adversely impact on groundwater dependent habitats through aquifer recharge.
- **Changes in water levels/channel morphology** – Removal of in-stream and marginal vegetation, and changes to channel morphology through the use of flood walls and embankments can lead to changes in capacity and flow of surface waters. This can lead to hydrological impacts on groundwater dependent habitats (e.g. changes in groundwater levels or flow paths) and to aquatic species through habitat loss and changes to or reduction in food supply.

5.4.2 Impact Assessment

Table 5.4.4 assesses the screened-in European sites in more detail and examines the ways in which the identified sources and pathways could adversely impact on habitats or species. Avoidance and mitigation measures are proposed to mitigate any significant adverse impacts.

5.4.2.1 In-combination Effects

Appropriate Assessment requires consideration of the impacts on European sites of FRM measures at Navan AFA, in combination with other plans or projects that may impact on the sites resulting in cumulative negative impacts. The potential for cumulative impacts was considered throughout the process of option development. Engagement with stakeholders ensured that the potential for in-combination and cumulative impacts at plan level was minimised. In combination and cumulative effects will be re-assessed at the project stage when project-specific information has been captured.

Potential sources of in-combination effects identified as part of this assessment include:

- In-combination effects with FRM works, or parallel projects being carried out at other AFAs or locations in the UoM. Generic mitigation and monitoring measures have been developed, including the avoidance of undertaking FRM work on adjoining reaches of rivers for different AFAs or other parallel projects simultaneously. Provided the FRM works are timed correctly, no significant in-combination impacts are anticipated.
- Drainage maintenance activities in the Boyne Arterial Drainage Scheme. The OPW carry out regular maintenance on those channels altered through schemes implemented following the

1945 Arterial Drainage Act. In this area, maintenance activities are carried out on the River Boyne, Athlumney House tributary, Athlumney tributary, Bailis tributary and River Blackwater. Ongoing maintenance activities that result in the release of suspended sediments are currently adversely impacting on salmon spawning grounds, therefore these activities could potentially result in adverse cumulative impacts on this species. It is recommended that no arterial maintenance is carried out in the channels where FRM work is being undertaken during the construction phase.

- Local landowners and farmers carry out agricultural activities in areas adjacent to this FRM work that could result in similar impacts and disturbance. These activities have been ongoing for many decades and are likely to be periodic and local in nature, therefore the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- Aquatic habitat enhancement is planned within the Boyne catchment through the EREP (Environmental River Enhancement Programme) of Inland Fisheries Ireland, with the aim of enhancing the spawning, nursery and adult habitat within the channel for Salmonids. Negative in-combination effects are unlikely, provided timing of physical works are correctly planned and managed.

There are no other plans/projects ongoing or proposed (at the time of this study) which may give rise to any form of cumulative impact on the European sites.

Table 5.4.4: Impact assessment for FRM measures at Navan AFA (new hard defences and maintenance of existing regime)

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
River Boyne and River Blackwater SAC (002299)	<p>Alkaline fens [7230]</p> <p>Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0]</p> <p>River Lamprey (<i>Lampetra fluviatilis</i>) [1099]</p> <p>Salmon (<i>Salmo salar</i>) [1106]</p> <p>Otter (<i>Lutra lutra</i>) [1355]</p> <p>Special conservation interest – Whooper swan <i>Cygnus cygnus</i></p>	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>The habitats and species for which the River Boyne and Blackwater SAC was designated require particular water quality conditions. The favourable conservation condition of Salmon is directly measured by water quality attributes, and the conservation status of other species are measured by attributes indirectly linked to water quality and sediment loadings, such as the extent and distribution of spawning habitats and the extent of freshwater habitat.</p> <p>Construction activities in or adjacent to the water and clearance of in-channel vegetation could result in a release of suspended sediments and associated nutrients and/or pollution incidents from machinery. This could lead to a reduction in water quality, and result in adverse effects on the designated habitats and species of this site through loss of habitat or changes to food supply. Salmon spawning grounds will be particularly susceptible to adverse impacts from the release of suspended solids. Disconnecting areas of floodplain from the river can lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. Ongoing maintenance activities related to arterial drainage could exacerbate any sediment or nutrient/pollutant impacts.</p> <p>There are likely to be indirect, negative downstream impacts from sedimentation during construction. These impacts are expected to be short-term and local in scale but may have long-term impacts if</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Follow Lamprey and Otter SOPs.</p> <p>Avoid arterial drainage maintenance works while FRM works are being undertaken.</p> <p>Avoid working in-channel to ensure salmon and lamprey habitat is not disturbed.</p> <p>Survey by a qualified ecologist prior to commencement of the FRM work, to identify any important salmon habitat in the vicinity of FRM works or directly downstream to inform option design and design-specific mitigation.</p> <p>See also general</p>	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
				salmon spawning beds are present at the construction site or directly downstream.	mitigation in Chapter 6	
		Water level changes		<p>The designated habitats and species depend on specific hydrological regimes. Construction of flood walls and embankments, as well as in-channel vegetation clearance can result in changes in channel hydrology, by increasing capacity and flow rates. This could lead to a reduction of suitable habitat and adverse effects on the conservation objectives for the species (population size and range).</p> <p>However, significant changes to the hydrological regime are unlikely, as the works will be local in nature, and are therefore unlikely to impact significantly on attributes used to define conservation status.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	No
		Physical habitat disturbance/loss of woody vegetation cover	Land and air	<p>Construction activities that remove vegetation or otherwise disturb habitats could adversely affect the habitat area, vegetation structure and composition of designated habitats.</p> <p>Destruction or alteration of aquatic or riparian habitats could adversely affect designated species through loss of cover for otter or damage to lamprey or salmon spawning areas.</p> <p>Construction activities may result in introduction or spreading of alien invasive species. Invasive species can spread rapidly through habitats, form dense thickets which can out-compete native plants and cause problems with soil erosion.</p>	<p>Strictly adhere to best practice protocols and SOPs including Lamprey and Otter SOPs during design, construction and maintenance in order to minimise physical disturbance.</p> <p>Avoid working in-channel unless essential.</p> <p>Survey by a qualified ecologist prior to commencement of the</p>	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
					<p>FRM work, to identify any important salmon or lamprey habitat, or otter resting sites/holts in the vicinity of FRM works to inform option design and design-specific mitigation.</p> <p>No in-channel working where a suitable sand/gravel Lamprey spawning habitat exists from April-May (King et al, 2008), subject to adjustment owing to local knowledge of IFI.</p> <p>No in-channel working during the salmonid spawning season. Instream works should only be carried out during the period July to September inclusive, following consultation and agreement with IFI.</p> <p>No in-channel or bankside works to be conducted within 50m of a known or potential Otterholt/ resting site.</p> <p>Carry out invasive species</p>	

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
					surveys and follow SOPs (see Table 6.1.1) See also general mitigation in Chapter 6	
		Noise and visual disturbance		The species for which this SAC is designated are sensitive to disturbance by maintenance workers and noise from machinery and may avoid areas where works are being undertaken. This could adversely affect habitat use by otter, who require lying up areas throughout their territory.	Strictly adhere to best practice protocols and SOPs including Lamprey and Otter SOPs during design, construction and maintenance in order to minimise physical disturbance. Avoid working in-channel unless essential. No in-channel or bankside works to be conducted within 50m of a known or potential otter holt/ resting site. See also general mitigation in Chapter 6	No
		Changes to nutrient levels/pollutant release	Groundwater	The habitats and species for which the River Boyne and Blackwater SAC was designated require particular water quality conditions. Construction activities in or adjacent to surface waters and clearance of in-stream vegetation can result in the release of nutrients into those waters, and can lead to reduced water quality and eutrophication. Spillages of hydrocarbons or other contaminants	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance. See also general	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
				<p>during FRM works can also result in a reduction in water quality. Reduced water quality and eutrophication can adversely impact on groundwater dependent habitats through aquifer recharge, and on aquatic species through loss of suitable habitat, or changes to/reduction in food supply.</p> <p>Hard defences will only impact upon alkaline fens and alluvial forest habitats through groundwater pathways as these are the only groundwater dependent habitats within the site. Significant impacts on these habitats are highly unlikely to occur via groundwater pathways, owing to their distance from the FRM works being undertaken.</p>	mitigation in Chapter 6	
		Water level changes		<p>The designated habitats and species depend on specific hydrological regimes. Construction of flood walls and embankments, as well as in-channel vegetation clearance can result in changes in channel hydrology, by increasing capacity and flow rates. This can lead to hydrological impacts on groundwater dependent habitats (e.g. changes in groundwater levels or flow paths) and to aquatic species through habitat loss and changes to/reduction in food supply.</p> <p>Hard defences will only impact upon alkaline fens and alluvial forest habitats through groundwater pathways as these are the only groundwater dependent habitats within the site. However, significant changes to the hydrogeological regime are unlikely owing to the scale and location of the works; therefore FRM works are unlikely to impact significantly on attributes used to define conservation status of these habitats.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
River Boyne and River Blackwater SPA (004232)	Kingfisher (<i>Alcedo atthis</i>) [A229]	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Kingfisher populations are dependent on river channels and their associated marginal and riparian habitats. Construction activities in or adjacent to the water and clearance of in-channel vegetation could result in a release of suspended sediments and associated nutrients and/or pollution incidents from machinery. This could lead to a reduction in water quality, affecting the habitats and food supply (macroinvertebrates and fish) of the Kingfisher and adversely affecting the distribution of the species within the SPA and long-term population trends.</p> <p>There are likely to be indirect, negative downstream impacts from sedimentation during construction. These impacts are expected to be short-term and local in scale, and are unlikely to impact significantly on attributes used to define conservation status.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	No
		Water level changes		<p>The habitats on which Kingfisher populations depend require specific hydrological regimes. Construction of flood walls and embankments, as well as in-channel vegetation clearance can result in changes in channel hydrology, by increasing capacity and flow rates. This can adversely impact on Kingfisher populations through habitat loss and changes to/reduction in food supply, possibly affecting distribution of the species within the SPA and long-term population trends.</p> <p>However, significant changes to the hydrological regime are unlikely, as the works will be very local in nature, and are therefore unlikely to impact significantly on attributes used to define conservation status.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6</p>	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
		Physical habitat disturbance Noise and visual disturbance	Land and air	<p>Kingfisher populations are dependent on marginal and riparian habitats of river channels, and nest in burrows on vertical river banks. Construction of flood walls and embankments and associated removal of vegetation and disturbance of banks could adversely affect the range area, foraging/perching habitat and distribution of the species within the SPA as well as long-term population trends.</p> <p>Kingfishers are sensitive to disturbance by maintenance workers and noise from machinery and may avoid areas where works are being undertaken. This could adversely affect its distribution within the SPA.</p>	<p>Survey by a qualified ecologist prior to commencement of the FRM work, to assess use of the channel by kingfisher in the vicinity of FRM works and presence of burrows to inform option design and design-specific mitigation.</p> <p>Avoid disturbance of Kingfisher burrows from March-September.</p> <p>Avoid in-channel or bankside vegetation removal within 30m of Kingfisher burrows</p> <p>If burrows in vertical banks are discovered during the works, works must stop immediately and the burrows be inspected by a suitably qualified ecologist.</p> <p>Leave bankside vegetation intact wherever possible.</p>	No

Site name (site code)	Qualifying Interests	Potential source of impact	Pathway	Potential Impact	Avoidance/mitigation measures	Residual impact
					See also general mitigation in Chapter 6	

5.4.3 Conclusions

This NIS details the findings of the Stage 2 Appropriate Assessment conducted to further examine the potential direct and indirect impacts of proposed FRM works at Navan AFA on the following European sites:

- River Boyne and River Blackwater SAC (002299)
- River Boyne and River Blackwater SPA (004232)

The Appropriate Assessment investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above European sites, alone and in-combination with other plans and projects, taking into account the sites' structure, function and conservation objectives. Where potentially significant adverse impacts were identified, a range of mitigation and avoidance measures have been suggested to help offset them. As a result of this Appropriate Assessment it has been concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Navan AFA will not have a significant adverse impact on the above European sites.

Project level assessments will be undertaken based on option designs and site surveys to further consider the attributes and targets of site specific conservation objectives.

6 AVOIDANCE AND MITIGATION MEASURES

6.1 GENERAL MITIGATION

General mitigation measures have been included in Chapter 6 of the FRMP. Mitigation measures are recommended where the preferred options are predicted to have negative effects (whether minor, moderate or major). In some cases where positive effects are identified, actions may be recommended to maximise the potential benefit.

The principal mitigation recommendation is that the predicted negative effects should be considered further during the next stage of option development, when details of the option (e.g. alignment and footprint of flood defences) can be optimised through detailed feasibility studies and design in order to limit identified impacts on sensitive receptors.

Further environmental studies to inform the detailed design and construction methodology should be undertaken as appropriate. These studies may involve, but are not limited to, aquatic and terrestrial habitat surveys, ornithological, ground mammal and bat surveys and fish surveys. At project level, the preferred option design and construction methodology will be subject to a further screening for Appropriate Assessment and, where necessary, Appropriate Assessment carried out.

Before any works are carried out, detailed method statements and management plans (construction and environmental) should be prepared, including timing of works and information on the specific mitigation measures to be employed for each works area. These should be completed in the option design stage and should be subject to further Appropriate Assessment where potential impacts have been identified in this NIS for the FRMP. Works should only be carried out once the method statements have been agreed with relevant authorities such as the NPWS and Inland Fisheries Ireland (IFI). At the project level it will not be sufficient to defer the production of construction method statements.

Consideration will be given to the planning and timing of construction and maintenance works. FRM works on adjoining reaches of rivers in different AFAs should not be scheduled to occur simultaneously with each other, or with other parallel projects.

Direct instream works such as culvert upgrades or proposed measures along the riverbank have the greatest potential for negative impacts during spawning / breeding and early nursery periods for aquatic protected species. No instream or potentially significantly damaging out of river works should occur during restricted periods for relevant species and consultation should be undertaken with Inland Fisheries Ireland (IFI) in this regard.

A designated environmental officer should be appointed for environmental management of each scheme. Monitoring of project level mitigation measures should be undertaken during and after works, to ensure effectiveness.

All works and planning of works will be undertaken with regard to the OPW Environmental Management Protocols (EMP) and Standard Operating Procedures (SOP), all relevant legislation, licensing and consent requirements, and recommended best practice guidelines at the time of construction or maintenance.

Table 6.1.1: General Mitigation recommended in the FRMP

Potential Impact	Proposed Mitigation
Temporary disturbance and destruction of existing habitats and flora, and the displacement of fauna, along the river corridors.	Good planning and timing of works to minimise footprint impacts. Where applicable, prior to any vegetation clearance an appropriately qualified ecologist should be contracted to undertake a 'pre-vegetation clearance' survey for signs of nesting birds and protected and important species e.g. otters, kingfisher etc. Should important species be found during surveys the sequential approach of avoid, reduce or mitigate should be adopted to prevent significant impacts with advice from appropriately qualified professional. Vegetation and tree clearance should be minimised and only occur outside the main bird nesting season. If this seasonal restriction cannot be accommodated, a suitably qualified ecologist with experience in nest-finding will be required to check all vegetation for nests (under licence from NPWS to permit potential disturbance to nesting birds) prior to removal/trimming. At sites where there are populations of over-wintering birds, to avoid disturbance, works should not be undertaken between September and March. Following construction, replanting and landscaping, or natural revegetating, should be undertaken in line with appropriate guidelines that aim to improve local biodiversity and wildlife, therefore will give medium and long term benefits to the biodiversity, flora and fauna of the working areas. Where possible, original sediment/soil should be reinstated to original levels to facilitate natural restoration and recolonisation of habitat. Adhere to OPW EMP and SOP or other relevant best practice at the time of development and consider integration of design as part of blue/green infrastructure plans and habitat enhancement where possible
Temporary displacement of otters, birds, fish and other fauna during the construction period.	Good planning, good timing of works and sensitive construction methods are essential. Adherence to best practice at the time of construction or maintenance, e.g. NRA construction guidelines on Crossing of Watercourses, on Treatment of Otters etc., Eastern Regional Fisheries Board Requirements for 'Protection of Fisheries Habitat during Construction and Development Works at River Sites' and IFI 'Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters'. Proposed measures should be designed to minimise impact on otter habitat and shall include otter passes and fishways/ ladders where possible. Pre-construction otter survey on all watercourses and any derogation licences applied for, where necessary. Adhere to OPW EMP and SOP or other relevant best practice at the time of development and maintenance.
Impact on European sites, habitats and species from construction or operation of FRM scheme.	Good planning and timing of works, and good construction and management practices to keep impacts to a minimum. Site and species specific mitigation provided in NIS for the FRMP including site specific surveys, timing of works etc. Provide local, connected, compensatory habitat if loss of area of Natura site is unavoidable. Adhere to OPW EMP and SOP or other relevant best practice at the time of development and maintenance.
Spread of invasive species during construction.	Pre-construction survey for alien invasive species along all watercourses and adjoining lands where necessary, eg. for Himalayan balsam and Japanese knotweed. Cleaning of equipment and machinery along with strict management protocols to combat the spread of invasive species. Preparation of invasive species management plan for construction and maintenance-related activities, if invasive species are recorded during the pre-construction surveys. Any imported materials will need to be free from alien invasive species. Post-construction survey for invasive species. Adhere to OPW EMP and SOP or other relevant best practice at the time of development and maintenance.

Potential Impact	Proposed Mitigation
Culverting impacts on faunal passage, where applicable.	Ledges and adequate access may be required for some culverts to allow continued passage of fauna. Consideration will be given to setting back walls from the river bank as an alternative to culverts where feasible. Adhere to OPW EMP and SOP or other relevant best practice at the time of development and maintenance.
Impacts on Freshwater Pearl Mussel	Where freshwater pearl mussels may be impacted, an appropriate FPM expert should be consulted for surveys and in planning, scheme design and project level mitigation. Any relevant FPM Management Plans and SOPs should be adhered to and relevant best practice adhered to.
Dredging impacts on biodiversity, flora and fauna.	Minimise requirement for in-stream works through good planning. Good dredging practices should be implemented, along with consultation with environmental bodies e.g. IFI, on methodology and appropriate timing to cause the least amount of damage, habitat loss, and sedimentation. Dredging works should be carried out during low flow conditions and should cease during heavy rainfall and flood conditions, to reduce suspended solids in the river. Spoil and removed vegetation material from the river should be stored back from the river and a vegetation buffer zone is to be retained, in order to reduce the run-off of suspended solids back into the watercourse. In stream works should be phased to leave undamaged refugia to maintain aquatic macroinvertebrates populations within the river channel. No machinery should be allowed to operate within the river flow without full consultation and approval of the methodology of the proposed works by the relevant statutory bodies. Scoping or relevant specialist ecological surveys during the planning stage and prior to any construction works. Adhere to OPW EMP and SOP or other relevant best practice at the time of development and maintenance.
Removal of soil and rock material via dredging and excavation works during construction.	Re-use material where possible on site for either embankments or landscaping. Consideration for use of material such as geojute or coir mesh on embankments above rivers or streams to hold the soil allowing time for vegetation to establish, while avoiding erosion. Where applicable it is recommended that coarse aggregates (cobble and gravel) removed from the river channel should be stockpiled for replacement and rehabilitation in the reformed river bed. Such material will be stored away from the river bank to ensure that runoff from the material does not affect water quality in the river in the form of increased suspended solids.
Temporary disturbances of water quality during the construction phase	Good management and planning to keep water quality disturbance to a minimum. Any potential water quality issues from construction should be contained and treated to ensure no damage to natural waterbodies. Dredging and construction will have to be planned appropriately, using Best Available Techniques / Technology (BAT) at all times, to ensure water quality issues are kept to a minimum, with no significant adverse effects. Guidelines such as CIRIA Document C532 - Control of Water Pollution from Construction Sites and CIRIA documents C521 - SUDS -Design manual for Scotland and NI, and C523 - SUDS -Best Practice Manual to be adhered to. Development and consenting of environmental management plan prior to commencement of works. Adhere to OPW EMP and SOP or other relevant best practice at the time of development and maintenance.
Potential for pollution incidents during the construction phase.	Minimise requirement for in-stream works through good planning. Strict management and regulation of construction activities. Provision of good facilities in construction areas to help prevent pollution incidents. Preparation of emergency response plans. Good work practices including; channelling of discharges to settlement ponds, construction of silt traps, construction of cut-off ditches to prevent run-off from entering watercourse, hydrocarbon

Potential Impact	Proposed Mitigation
	interceptors installed at sensitive outfalls, appropriate storage of fuel, oils and chemicals, refuelling of plant and vehicles on impermeable surfaces away from drains / watercourses, provision of spill kits, installation of wheelwash and plant washing facilities, implementation of measures to minimise waste and ensure correct handling, storage and disposal of waste and regular monitoring of surface water quality. Adhere to OPW EMP and SOP or other relevant best practice at the time of development and maintenance.
Potential requirement for maintenance dredging as siltation of the channel and excess vegetative growth will naturally occur.	Design should aim to ensure WFD objectives are not compromised and all options will be subject to a WFD Assessment. Any negative impact on the status of a water body will only be permitted under the WFD if the strict conditions set out in WFD Article 4 are met. Where appropriate, watercourses affected by a scheme should be subjected to a River Hydromorphology Assessment Technique survey (RHAT) for pre and post scheme scenarios. Adhering to good work practices including; diversion of discharges to settlement ponds, construction of silt traps, construction of cut-off ditches to prevent run-off from entering excavations, granular materials placed over bare soils. If a channel is maintained on an as required basis, using good planning, timing and BAT, there should be only minimal temporary disturbance to the local water quality. Adhere to OPW EMP and SOP or other relevant best practice at the time of development and maintenance.
Alterations to coastal processes	Detailed surveys and hydrodynamic modelling to inform detailed design of coastal works to ensure no negative impacts on coastal processes.
Culverting, dredging and impoundment impacts on fisheries and potential to impede fish passage.	Instream works including any culverting, provision of sluice gates, penstocks and dredging operations to be undertaken during the period July to September inclusive, following consultation and agreement with IFI. All works affecting any watercourse both temporary and permanent will be agreed with the relevant drainage and fishery authorities. Project level aquatic ecology and fisheries surveys and assessment, based on option design, to be undertaken prior to consenting. Where possible bottomless culverts should be used so the natural stream bed can be retained. Proposed measures should be designed to minimise impact on fish spawning grounds, migration and habitats. Adhere to OPW EMP and SOP or other relevant best practice at the time of development and maintenance.

6.1.1 Avoidance of Impacts by Selecting Alternative Options and/or Design Solutions

This has been undertaken for all locations and options through the option development and integrated multi-criteria assessment process. Environmental constraints and opportunities highlighted through the SEA and AA processes were used to screen out environmentally unacceptable flood risk management measures in each location and then inform the identification and development of options, prior to the detailed option assessment process. This process, described in detail in Chapter 3.1.3, ensures that the options selected from the multi-criteria option assessment process were generally those that had a lower risk of significant negative impacts on European sites and that the likely impacts of the preferred flood risk management options could potentially be minimised.

6.1.2 Avoid, or Reduce the Scale of, Identified Impacts through Option Development

The outline measures identified for the preferred options following the option assessment process have been reviewed in order to identify and recommend mitigation to avoid, or reduce, significant effects. Further avoidance of impacts will be achieved through careful design at the next stage of detailed option development as required.

Specific mitigation measures, other than those within the individual impact assessment sections in Chapter 5 include:

- Where possible, defences should be set back from the waterbodies and sensitive environmental habitats and species.
- Utilise environmentally sensitive techniques;
- Consideration of potential negative impacts associated with future developments at the planning stage, before development is allowed to proceed;
- Generally, areas to be coffer dammed and de-watered should be kept to the minimum required;
- Except where absolutely necessary, machinery should operate from the bankside/shore, i.e. “in the dry”;
- The contents and objectives of the Eastern River Basin Management Plan should be considered during the option design phase;
- A full work methodology should be developed prior to the commencement of any on site works;
- Works should only be carried out after a method statement, detailed plans and timing of works have been agreed with the National Parks & Wildlife Service and Inland Fisheries Ireland; and
- Timing of works in environmentally sensitive areas should be a key consideration, e.g. carrying out construction outside of the main breeding/wintering seasons as appropriate.

6.1.2.1 Mitigation of loss of Habitats and Species

- Avoid unnecessary vegetation clearance, particularly trees. Where possible, retain vegetated buffer strips. Ensure that reinstatement of appropriate, local riparian vegetation is carried out once works are completed.
- Undertake surveys and ecological assessments in relation to biodiversity, flora and fauna;
- If scope is present for applying basic instream enhancement techniques to develop suitable spawning and nursery habitats for fish, this should be pursued. The IFI Guidelines referenced below in 6.4 should be consulted in this regard during option design.
- To prevent the spread of invasive aquatic / riparian species, all plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) must be thoroughly cleaned down using a power washer unit and washed into a dedicated and contained area, prior to arrival on site. A sign off sheet must be maintained by the contractor to confirm cleaning. Imported materials must be free from alien invasive species.

6.1.2.2 Mitigation in relation to Lamprey & Salmonids

- Surveys should be carried out for lamprey, salmonids and other aquatic species of conservation concern, e.g. white-clawed crayfish.
- Before any area is de-watered, suitable juvenile lamprey habitat, and suitable salmonid nursery habitat in adjacent areas of river should be identified if present.

- Following installation of coffer dams, the enclosed waters should be electrofished. Fish removal must be completed by IFI or persons authorised under Section 14 of the Fisheries Consolidation Acts 1959 (as amended).
- Pumps used for de-watering should be provided with mesh screens to avoid taking in fish.

6.2 MITIGATION OF SUSPENDED SOLIDS POLLUTION

The construction method statement should indicate what measures will be taken to avoid sediment or soil loss associated with all aspects of the construction and how these will be monitored for effectiveness. These mitigation measures in combination with an appropriate considerable buffer area between the works and the river will serve to reduce the likelihood of silt mobilisation. Measures to mitigate against suspended solids pollution should include (but not be limited to):

- The amount of bare ground created by excavation and vegetation removal should be minimised to prevent run-off;
- Works should be carried out ideally during a period of settled weather with no flood risk which will allow sufficient time for construction materials to settle;
- The construction method statement should include planning / contingency measures to be undertaken in the event of the risk of a flood event;
- [Where relevant] embankment material should be selected that has low silt content;
- Where construction of flood defences poses a significant risk of suspended solids and other pollution, the area of the proposed works should be isolated using coffer dams. If de-watering is necessary to allow works to proceed, water pumped from the contained area should be passed through a settlement pond or pre-fabricated settlement tanks with oil interceptor before being discharged to the river;
- For construction activities close to the river bank, eroded sediments should be retained on site with erosion and sediment control structures such as sediment traps, silt fences and sediment control ponds. Sediment ponds and grit/oil interceptors should be placed at the end of drainage channels. Sediment control measures should be regularly monitored for effectiveness.

6.3 MITIGATION OF OTHER POLLUTION

The construction Method Statement should indicate what measures will be taken to avoid pollution associated with all aspects of the construction and how these will be monitored for effectiveness. Measures to mitigate against pollutants being discharged may include (but not be limited to):

- Raw or uncured waste concrete should be disposed of by removal from the site;
- Washing out of truck mixers, concrete pumps, skips and other items of plant and equipment needing to be cleaned of concrete after use must only take place at a designated area, away from watercourses.
- Direct discharges of waste water onsite to watercourses, ditches or roadside drains will not be permitted. Waste water will be directed to a suitable treatment area within the site and treated to an appropriate standard prior to discharge by an approved method.
- Biodegradable fuels and lubricants should be used where possible;
- All fuels, lubricants and hydraulic fluids will be kept in secure bunded areas at a minimum of 10m from the river. The bunded area will accommodate 110% of the total capacity of the containers within it. Containers will be properly secured to prevent unauthorised access and misuse.

- The Contractor shall indicate designated areas for fuel transfer away from any watercourses or drainage channels. The refuelling of mobile plant in the working area will be undertaken well away from any drains or water bodies. Vehicles will not be left unattended during refuelling
- Any waste oils or hydraulic fluids will be collected, stored in appropriate containers and disposed of offsite in an appropriate manner;
- Spill kits will be made available and an effective spillage procedure will be put in place with all staff properly briefed.
- All plant shall be well maintained with any fuel or oil drips attended to on an ongoing basis.
- Foul drainage from site offices etc. should be connected to a local sewer or removed to a suitable treatment facility or discharged to a septic tank system constructed in accordance with EPA guidelines;
- Tools and equipment are not to be cleaned in rivers;
- Chemicals shall be stored in sealed containers in the site lockup;
- Any chemicals shall be applied in such a way as to avoid any spillage or leakage;
- If temporary toilet facilities are used, the location of these facilities must be suitable and they must be maintained by a licensed contractor.

6.4 GUIDELINES

The following guidelines should be consulted during the detailed planning of the works phase.

- Guidelines on Protection of Fisheries during Construction Works in or adjacent to Waters, Inland Fisheries Ireland (2016).
- Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites', Eastern Regional Fisheries Board (2003).
- Best practice toolkit of freshwater morphology measures developed by the Freshwater Morphology Programmes of Measures and Standards (POMS) study under the Shannon International River Basin District (ShIRBD) project.
- Good Practice Guidelines on the Control of Water Pollution from Construction Sites developed by the Construction Industry Research and Information Association (CIRIA).
- Pollution prevention guidelines (PPGs) in relation to a variety of activities developed by the Environmental Agency (EA), the Scottish Environmental Protection Agency (SEPA) and the Northern Ireland Environment Agency (NIEA).

The OPW's Environmental Management Protocols and Standard Operating Procedures (OPW, 2011) set out how regional management staff manage a range of environmental aspects, including programming of works to accommodate certain environmental windows or restrictions on timing of works, and recording of data. A total of 7 No. Standard Operating Procedures (SOPs) are applied during operational works. These SOPs set out actions designed to eliminate, or substantially reduce likely impacts to identified species and their associated habitats. These include:

- Environmental Drainage Maintenance Guidance Notes (10 Steps to Environmentally Friendly Maintenance)
- Lamprey SOP
- Crayfish SOP
- Otter SOP
- Mussel SOP
- Invasive Species SOP
- Zebra Mussel SOP
- Bank Protection.
- Bush Cutting / Branch Trimming.

7 CONCLUSIONS

This NIS details the findings of the Stage 2 Appropriate assessment conducted to further examine the potential direct and indirect impacts of the FRM Options advanced in the draft FRMP for UoM07 incorporating the AFAs of Baltray, Drogheda, Mornington and Navan on the following European sites:

- Boyne Coast And Estuary SAC
- Boyne Estuary SPA
- River Boyne And River Blackwater SAC
- River Boyne and River Blackwater SPA
- River Nanny Estuary and Shore SPA

These sites were identified by a screening exercise (see Chapter 3.5) that determined the risk of significant effects in relation to the above sites. The screening exercise was conducted using the source – pathway –receptor method, examining surface water, groundwater, land and air pathways.

The Appropriate Assessment (Chapter 5) has investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above European sites for each of the AFAs where FRM Options have been proposed in the draft FRMP.

The Appropriate Assessment investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above European sites, alone and in-combination with other plans and projects, taking into account the sites' structure, function and conservation objectives.

Where potentially significant adverse impacts were identified, a range of mitigation and avoidance measures have been suggested to help eliminate them by design or reduce them to acceptable levels (see Chapter 6).

The potential physical flood relief works or 'Schemes' set out in the FRMP that have been developed through the CFRAM Programme are to an outline design, and are not at this point ready for construction. The potential routes for the implementation of physical works are set out in Section 8.1 of the FRMP. Project-level assessment will take account of the potentially viable measures identified in the Plan, but will involve the consideration of alternatives at the project-level and, as appropriate, EIA and AA, including the definition of necessary mitigation measures at the project-level. Only schemes/measures that are confirmed to be viable following project level assessment will be brought forward for Exhibition/Planning and detailed design.

As a result of this Appropriate Assessment it has been concluded that, provided the avoidance and mitigation measures suggested are adopted at the project stage, the proposed draft FRM measures in the UoM07 FRMP will not have a significant adverse impact on the above European sites.

To confirm this conclusion, the following checklist, taken from DEHLG (2009) has been completed.

Figure 7.1.1: Integrity of Site Checklist (from DEHLG, 2009)

Conservation objectives: does the project or plan have the potential to:	Y/N
Cause delays in progress towards achieving the conservation objectives of the sites?	N - Following mitigation, no significant adverse residual impacts have been identified that will prevent achievement of the conservation objectives of the assessed sites.
Interrupt progress towards achieving the conservation objectives of the sites?	N - Following mitigation, no significant adverse residual impacts have been identified that will prevent achievement of the conservation objectives of the assessed site.
Disrupt those factors that help to maintain the favourable conditions of the site?	N - Potential adverse impacts via surface water; land and air; and groundwater pathways identified during the screening process can be mitigated against.
Interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	N - Potential adverse impacts on the habitats and species of the two SACs and three SPAs are not expected as impacts can be avoided by implementing the mitigation and avoidance measures detailed.

Other objectives: does the project or plan have the potential to:	Y/N
Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem?	N - Potential adverse impacts from suspended solid and nutrient release are not expected as measures can be included within working protocols to ensure potential impacts are effectively mitigated.
Change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	N - Potential adverse impacts relating to hydrological status and water quality have been identified which could impact on the functioning and dynamics of the site, however, these are not expected to be significant given the mitigation measures detailed to ensure potential impacts are effectively mitigated.
Interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	N - Potential adverse impacts from changes to the hydrological regime and suspended solid/nutrient/pollutant release are not expected, as measures can be included within working protocols to ensure potential impacts are effectively mitigated.
Reduce the area of key habitats?	N - Potential adverse impacts on the habitats of the two SACs and three SPAs are not expected given the mitigation measures that have been detailed.
Reduce the population of key species?	N - Potential impacts to the habitats supporting the aquatic, riparian and marine species for which the SACs and SPAs are designated, are not expected as impacts can be avoided by implementing the mitigation measures detailed.

Change the balance between key species?	N - Potential impacts on the aquatic, riparian and marine species for which the SACs and SPAs are designated, are not expected as impacts can be avoided by implementing the mitigation measures detailed.
Reduce diversity of the site?	N - The identified mitigation measures to protect designated habitats and species will ensure that the current diversity of the sites is maintained.
Result in disturbance that could affect population size or density or the balance between key species?	N - Potential impacts to the aquatic, riparian and marine species for which the SACs and SPAs are designated, are not expected as impacts can be avoided by implementing the mitigation measures detailed.
Result in fragmentation	N - The identified mitigation measures to protect designated habitats and species will ensure that no fragmentation of habitats will occur.
Result in loss or reduction of key features (e.g. tree cover, tidal exposure, annual flooding etc.)?	N - Potential adverse impacts on SAC and SPA habitats are not expected as impacts can be avoided by implementing the mitigation measures detailed so there will be no loss of, or reduction of, key features.

8 REFERENCES

Council Directive 2001/42/EC *on the Assessment of the Effects of Certain Plans and Programmes on the Environment*

Council Directive 92/43/EEC *on the Conservation of Natural Habitats and of Wild Fauna and Flora*

Council Directive 2009/147/EC *on the Conservation of Wild Birds*

DEHLG (2009 –rev. 2010) *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities*

EC (2000) *Managing Natura 2000 sites: the provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC*

EC (2002) *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*

EC (2011) *Guidelines on the Implementation of the Birds and Habitats Directives in Estuaries and Coastal Zones with particular attention to port development and dredging*

EC (2013) *Guidelines on Climate Change and Natura 2000 Dealing with the impact of climate change on the management of the Natura 2000 Network of areas of high biodiversity value*

EPA (2012) *Integrated Biodiversity Impact Assessment best practice guidance; Streamlining AA, SEA and EIA Processes, Best Practice Guidance*

NPWS (2014) *The Status of EU Protected Habitats and Species in Ireland 2013 – Overview Report*

OPW (2004) *Report of the Flood Policy Review Group*

OPW (2011) *Environmental Management Protocols & Standard Operating Procedures*

Scottish Natural Heritage (2015) *Habitats Regulation Appraisal of Plans, Guidance for Plan-Making Bodies in Scotland (version 3)*

APPENDIX A

SUMMARY OF FLOOD RISK MANAGEMENT METHODS AND THEIR HIGH LEVEL IMPACTS

APPENDIX A:

TABLE OF FLOOD RISK MANAGEMENT METHODS AND THEIR HIGH LEVEL IMPACTS

FRM Method	Likely Positive Impacts (+)	Likely Negative Impacts (-)
Do Nothing No new flood risk management measures and abandon existing defences and maintenance		
<i>Do Nothing</i>	<ul style="list-style-type: none"> □ Unlikely to be significant positive impacts at a strategic level, however there is the potential for local improvements to habitats and biodiversity in the vicinity of previously maintained defences. 	<ul style="list-style-type: none"> □ Potential for significantly increased flood risk to human health, properties and infrastructure.
Existing Regime Continue existing flood risk management practices		
<i>Existing Regime</i>	<ul style="list-style-type: none"> □ Unlikely to be significant positive impacts at a strategic level. 	<ul style="list-style-type: none"> □ Potential for increased flood risk to human health, properties and infrastructure due to climate change. □ Existing defence works may be interfering or causing deterioration to the ecological requirements of species and habitats and the relevant conservation objectives.
Do Minimum Additional minimum measures to reduce flood risk in specific areas. Includes channel or flood defence maintenance works / programme.		
<i>Do Minimum</i>	<ul style="list-style-type: none"> □ Unlikely to be significant positive impacts at a strategic level. 	<ul style="list-style-type: none"> □ Unlikely to be significant negative impacts at a strategic level. However method is non-specific.
<i>Maintenance Programme</i>	<ul style="list-style-type: none"> □ Unlikely to be significant positive impacts at a strategic level. 	<ul style="list-style-type: none"> □ Unregulated maintenance of existing flood defence measures has the potential to result in impacts such as pollution, changes in sedimentation, disturbance, deterioration, damage and other impacts on species distribution arising from maintenance activities. It is therefore assumed that maintenance programmes already in place recognise the requirements of the 2011 Regulations and that ongoing or future planned maintenance of existing flood defence measures incorporates any necessary mitigation measures such as conducting works out of season in sensitive areas and

		<p>implementing pollution prevention measures. Having regard to this is therefore considered that maintenance is unlikely to have significant negative environmental impacts upon designated sites.</p> <ul style="list-style-type: none"> □ Unlikely to be significant negative impacts at a strategic level.
Planning and Development Zoning of land for flood risk appropriate development, prevention of inappropriate development, and / or review of Local Areas Plan (LAP).		
<i>Planning and Development</i>	<ul style="list-style-type: none"> □ Unlikely to be significant positive impacts at a strategic level, however will prevent future additional flood risk from being created. 	<ul style="list-style-type: none"> □ Unlikely to be significant negative impacts at a strategic level, however will prevent some developments which may curtail economic growth in certain areas.
Building Regulations Regulations on finished floor levels, flood proofing, flood resilience and SuDS.		
<i>Building Regulations</i>	<ul style="list-style-type: none"> □ Unlikely to be significant positive impacts at a strategic level, however will prevent future additional flood risk from being created. 	<ul style="list-style-type: none"> □ Unlikely to be significant negative impacts at a strategic level.
Catchment Wide Sustainable Drainage Systems (SuDS) Recommendations for future development drainage systems.		
<i>SuDS</i>	<ul style="list-style-type: none"> □ Slight direct positive impacts through reduction of flood risk and impacts to property and infrastructure. 	<ul style="list-style-type: none"> □ Likely to be temporary negative impacts through disturbance and inconvenience to the local population during construction.
Land Use Management (NFM) Runoff Control – Overland flow management through changes in land use and / or agricultural practices. River / Floodplain Restoration - Creation of wetlands, restoration of meanders, in-channel flow retardation, floodplain flow retardation and riparian buffer zones. Coastal Restoration - Attenuation waves and coastal surge through the creation and restoration of natural habitats.		
<i>Runoff Control</i>	<ul style="list-style-type: none"> □ Implementation of runoff control would slow down and store some potential flood waters, which will benefit the downstream population through reduction of flood risk and impacts to property and infrastructure during high frequency flood events. □ Done correctly in the appropriate locations, non-structural land use management has the potential to have positive environmental benefits through habitat creation, increased biodiversity and natural flood 	<ul style="list-style-type: none"> □ If misplaced, non-structural land use management has the potential to be either ineffective or actually detrimental to the local environment, through loss or displacement of native species. □ Some areas of productive agricultural land may be lost. □ An increase in the wetness of cultivated land and semi-natural grassland ecosystems may increase the prevalence of some livestock pests.

	<p>management.</p> <ul style="list-style-type: none"> □ The creation of habitat and / or land management practices can help to improve attenuation of nutrients and reduce the loss of sediments, leading to improvements in water quality. □ By increasing habitats such as woodland and wetland, there is potential to increase carbon storage. □ Enhancing and restoring wetlands may lead to benefits to habitats and species. □ Runoff control may enhance the productivity of cultivated land and semi natural grassland by protecting soils from erosion and loss of nutrients, and through providing a more diverse habitat for pollinators and biological control of pests and disease. □ Run off control in drinking water catchments may help to reduce treatment requirements for drinking water. □ There may be benefits to freshwater fisheries from improved water quality and reduced sedimentation. □ The effects on recreation, wildlife watching and landscape are generally likely to be positive, as runoff control should improve habitat diversity and biodiversity. □ The introduction of riparian buffer zones is unlikely to have negative impacts on habitats and species. 	
<i>River / Floodplain Restoration</i>	<ul style="list-style-type: none"> □ Reconnection of the river with the floodplain will enhance the natural storage capacity and provide slight direct positive social impacts through reduction of flood risk and impacts to property and infrastructure during high frequency flood events. □ Restoration of habitat within the river and floodplain, and reduced erosion of the river bed and banks can help to filter nutrients and reduce sediments; which can lead to improved water quality. □ There is the potential for improved fish habitats. □ Greater areas of river and floodplain wetland habitat will provide increased biodiversity. □ River and floodplain restoration in drinking water catchments may help to reduce treatment requirements for drinking water. 	<ul style="list-style-type: none"> □ There is the potential for the direct loss of agricultural land with this method. □ The existing ecosystems in the area for restoration will be directly impacted in the short term through a potential change of land use, habitat and hydromorphology. These impacts could be positive or negative in the long term. □ If parkland areas are used the land could become unsuitable for some types of recreation, temporarily during a flood event or in the medium to long term through changing the wetness of the land. □ There could be reduced seasonal access to riparian areas for recreational activities from floodplain re-connection. □ In-stream works can release fine sediments which adversely affect fish

	<ul style="list-style-type: none"> □ The effects on recreation, wildlife watching and landscape are generally likely to be positive, with improved habitat diversity and biodiversity. □ With improvements to biodiversity and water quality, this method may help to improve WFD status. □ With wetland enhancement there may be benefits to the connectivity and health of wetland ecosystems, and there may be benefits to carbon storage. □ There may be local improvements in recreational fishing in the area with a more natural river course and improved water quality. 	<p>spawning gravels.</p> <ul style="list-style-type: none"> □ There is the potential for impacts on the local landscape from this; however these could be positive or negative, depending on the finished look of established vegetation.
<i>Coastal Restoration</i>	<ul style="list-style-type: none"> □ Coastal restoration can attenuate waves and coastal surge through the creation and restoration of natural habitats, reducing the potential flood risk. □ Enhancement of coastal natural habitats can help to protect from coastal erosion, provide carbon storage, and help to adapt to future climate change. □ Restoration and creation of intertidal areas may help to provide nurseries for fish. □ By improving the coastal environment there is likely to be benefits to recreation, amenity and wildlife experience. 	<ul style="list-style-type: none"> □ Works could cause disturbance to feeding and breeding birds. □ Restoration and creation of intertidal areas could lead to some loss of productive land. □ Works could restrict or alter access to coastal areas which could cause short or long term, local negative effects. □ In areas of longshore drift, works in one location can have implications for sediment distribution in others. □ Beach re-charge could affect sediment sources for offshore sand banks.
Strategic Development Management For necessary floodplain development, with integration of structural measures into development design and zoning.		
<i>Strategic Development</i>	<ul style="list-style-type: none"> □ Unlikely to be significant positive impacts at a strategic level, however will reduce flood risk to human health. 	<ul style="list-style-type: none"> □ Unlikely to be significant negative impacts at a strategic level.
Upstream Storage Online or offline, single or multiple storage areas, with potential for embankments / engineered walls. Online storage refers to creating a dam and reservoir across the floodplain of a river, often with an outlet control structure such as an undershot culvert or sluices, to control outlet flow, and with an overflow weir and spillway. Offline storage is an area of floodplain that is embanked to prevent or control flooding within the storage area or wash-land during minor events.		
<i>Storage</i>	<ul style="list-style-type: none"> □ There will be slight direct positive social impacts through the regulation of flow and reduction of flood risk and impacts to property and infrastructure. □ Recreational access to the waterway for some activities could be improved with sensitive scheme design. □ Offline storage areas should ideally be located away from the existing 	<ul style="list-style-type: none"> □ Online storage dams should not be placed in areas of high biodiversity or on migratory routes, therefore not within SACs or SPAs. However if the normal discharge volume is to be maintained they should be able to be placed upstream of an SAC or SPA. □ Offline storage areas should not be developed within an SAC or SPA where the designated habitat and / or species are vulnerable to flooding. This

	<p>riparian zone and can then provide environmental benefits through the creation of high biodiversity wetlands.</p> <ul style="list-style-type: none"> □ Prolonged flooding in offline storage could increase the sediment store in the floodplain and reduce sediments stored in rivers, reducing downstream sedimentation and potential flood risk. 	<p>method could be further investigated within designated areas that require or are not sensitive to periodic inundation.</p> <ul style="list-style-type: none"> □ Storage is likely to cause or exacerbate the disconnection between the river and the floodplain. □ There is the potential for disruption to natural processes, loss of habitat and potentially negative effects on water quality (due to loss of habitat to filter nutrients) and carbon storage. □ Erosion can be exacerbated upstream and / or downstream of storage areas with potentially significant negative effects. □ There is the potential for a reduction in pollinating services and pest and disease control due to the loss of natural habitat from direct footprint impacts. □ Embankment of rivers to create storage areas can result in the loss of natural riparian habitat that filters and removes nutrients from agriculture. □ There is the potential for long term changes to land use from direct footprint impacts. □ Loss of natural habitat and reduced biodiversity can impact recreational activities like angling and wildlife watching. □ Some storage areas may use parkland and recreational grounds which could render the land unsuitable for some types of activities, either temporarily during a flood event, or in the medium to long term through changing accessibility to the area. □ Changes to river flow and water levels could affect navigation channels. □ Prolonged flooding in offline storage could increase the sediment store in the floodplain and reduce sediments stored in rivers, disrupting the natural sediment regime. □ Drinking water quantity may be negatively impacted if using reservoirs for flood storage, as retaining lower water levels could affect water supply. □ There is likely to be temporary negative impacts through disturbance and inconvenience to the local population during construction of storage areas.
<p>Improvement of Channel Conveyance</p> <p>Deepening channel, widening channel, realigning long section, removing constraints and / or lining smoothing channel.</p>		

<p><i>Increase Conveyance</i></p>	<ul style="list-style-type: none"> □ There will be slight direct positive social impacts from increasing conveyance through the regulation of flow and reduction of flood risk and impacts to property and infrastructure. □ Removal of channel constraints provides the opportunity to remove barriers to fish migration. This could improve production of salmon when combined with other river restoration actions. The design of the new structures should build in requirements for migratory fish and to diversify in-stream habitat where possible. □ Daylighting culverts may reduce barriers to fish barriers and improve habitats. 	<ul style="list-style-type: none"> □ It may be possible to use this method within some designated areas depending on the species and habitats present. Short sections of increased channel conveyance are unlikely to have significant impacts upon species and habitats, however over long sections of river where there may be significant in-channel losses of protected vegetation and habitat this may be unacceptable. Culverting may interfere with the hydrology of a river and its structure and function and thus may have implications for habitats where natural hydrological processes need to be maintained and/or restored. The SAC and SPA designation criteria will need to be investigated in this instance for important in-channel habitats and species. □ Culverting of an entire AFA has the potential for significant negative environmental impacts within a designated site, as it replaces the natural hydrological and ecological regime with an artificial bypass. Culverting is unlikely to be an acceptable standalone method within a designated site. Culverting however should have no hydraulic impacts upstream of a designated site. □ Increasing conveyance modifies the storage and flow of water, causing or exacerbating disconnection between the river and the floodplain. There can be disruption to natural processes, the loss of habitat and potentially negative effects on water quality, due to loss of habitat to filter nutrients, and reduced carbon storage. □ There is the potential for increased downstream flood risk. □ Erosion can be exacerbated upstream and / or downstream of modified conveyance areas with potentially significant negative effects. □ There is likely to be the direct loss of habitat and displacement of species in the vicinity of works, however these may re-establish in the medium to long term. □ There is the potential for a reduction in pollinating services and pest and disease control due to the loss of natural habitat from direct footprint impacts. □ There is the potential for long term changes to land use from direct footprint impacts. □ Loss of natural habitat and reduced biodiversity can impact recreational activities like angling and wildlife watching. □ There is the potential for reduced water quality during construction from
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		<p>increased sediments.</p> <ul style="list-style-type: none"> □ There may be temporary negative visual impacts during in-channel works.
Hard Defences Fluvial flood walls or flood embankments. Rehabilitate and / or improve existing defences Tidal Barrages Coastal Flood walls		
<i>Fluvial flood walls or flood embankments</i>	<ul style="list-style-type: none"> □ Hard river defences can deliver benefits by regulating water flow and reducing flood risk; therefore protecting human health, properties and infrastructure. □ Depending on their design, some defences can improve access for some types of recreation. 	<ul style="list-style-type: none"> □ Hard defences can interfere with natural process, by causing some or all of the floodplain to be disconnected from the river, which can lead to the loss of natural habitat to capture, filter and recycle nutrients or pollutants. This can lead to a reduction in water quality. □ There is likely to be a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences. There may be indirect negative downstream impacts from sedimentation during construction. □ Erosion may also increase either side of the defences due to changes in river processes. □ Defences could impact negatively on river morphology and sediment dynamics, and affect WFD status and classification. □ Loss of natural habitat and biodiversity can reduce the quality of the environment for recreation and wildlife watching. □ Within the urban landscape, direct defences have potentially negative effects through disrupting the setting and view of the river and floodplain. □ Defences may alter the setting of heritage sites. □ There is the potential for downstream increased flood risk. □ Direct defences have the potential for negative effects on freshwater fisheries due to the loss of in river and riparian habitat and sedimentation. □ There may be temporary negative impacts through disturbance and inconvenience to the local population during engineering works. □ Flood walls and embankments are unlikely to have negative impacts upon designated sites, unless the footprint of the structure is directly on the designated feature, or if they cause a greater flood hazard downstream of the feature in a vulnerable designated area.

<i>Tidal Barriers</i>	<ul style="list-style-type: none"> □ Tidal barrages can deliver benefits by regulating water flow and reducing flood risk, therefore protecting human health, properties and infrastructure. 	<ul style="list-style-type: none"> □ Tidal barrages should ideally not be placed within a designated site, however probably all estuaries where a tidal barrage could be incorporated within Ireland are designated European sites. This measure has the potential to have significant ecological impacts, particularly on migratory fish and other water dependent species. □ New tidal barriers could have potentially significant negative effects on water quality (including morphology) and erosion. □ Tidal barriers could impede fish passage and impact on upstream protected sites.
<i>Coastal Flood walls</i>	<ul style="list-style-type: none"> □ Hard coastal defences can deliver benefits by regulating water flow and reducing flood risk, therefore protecting human health, properties and infrastructure. 	<ul style="list-style-type: none"> □ New hard coastal defences on undeveloped shoreline or tidal barriers could have potentially significant negative effects on water quality, coastal morphology and erosion. □ In areas of longshore drift, defences in one location can have implications for sediment distribution in other areas. □ Coastal defences may reduce access for recreational activities. □ There are potential negative visual effects on urban and coastal landscapes. □ There are potential negative visual effects on the seascape from artificial structures offshore or on the beach. □ Flood walls and embankments on coastal areas should not be on protected habitats and cannot alter coastal processes where a protected habitat requires inundation.
<i>Rehabilitation of Existing Defences</i>	<ul style="list-style-type: none"> □ Changes to existing defences could potentially deliver significant positive environmental effects, for example, by setting back defences from the shoreline or river. □ Sensitively rehabilitated defences may help to improve amenity, particularly if the shoreline is already modified. 	<ul style="list-style-type: none"> □ Although existing defences have an established footprint and have an established hydraulic impact, rehabilitation of existing flood defence measures has the potential to result in impacts such as pollution, changes in sedimentation, disturbance, deterioration, damage and other impacts on species distribution arising from construction or repair activities. Regard must therefore be undertaken for the planning and implementation of such activities.
Relocation Abandoning existing properties and relocating to existing or new properties outside the floodplain.		
<i>Relocation</i>	<ul style="list-style-type: none"> □ Reduced flood risk to human health and properties. 	<ul style="list-style-type: none"> □ Potential for direct, significant, long term social impacts to those required to relocate. These impacts could however be positive or negative depending on

		<p>the occupant's attitude to relocating. There is the potential for indirect, significant social impacts to residents through fragmentation of neighbourhoods. There is the potential for indirect, significant social impacts to relocated commercial properties if old customers do not frequent the new premises.</p> <ul style="list-style-type: none"> □ There are unlikely to be any significant impacts on the environment from the relocation of properties/infrastructure away from flood risk areas, provided the new properties / infrastructure are not relocated to environmentally sensitive areas.
Flow Diversion Diversion of Flow - Realignment of entire river, diversion channel out of river basin and/or bypass channel to return flow downstream. Overland Floodways - Using roads or linear floodways to convey flow to a determined discharge point.		
<i>Diversion of Flow</i>	<ul style="list-style-type: none"> □ There will be direct positive social impacts from diversion of flow through the reduction of flood risk and impacts to property and infrastructure. 	<ul style="list-style-type: none"> □ Flow diversion includes realigning the entire river or creating by-pass channels. They are usually implemented in the immediate vicinity of the AFA and any impacts are likely to be localised. There will however be direct negative impacts on local existing habitats in the footprint of the diversion channel. □ Flow diversions have the potential to interfere with the hydrology of a river and its structure and function and thus may have implications for habitats where natural hydrological processes need to be maintained and/or restored and also in habitats where flooding is an important constituent element. □ Full diversion of a watercourse should not be proposed within a designated site, as is likely to impact upon the designation criteria. □ There should be limited impact from bypass channels if the normal flow in the original channel is maintained and the bypass channel is not created in a habitat that is sensitive to flooding. □ Diversion of flow may just transfer the flood risk to another location.
<i>Overland Floodways</i>	<ul style="list-style-type: none"> □ There will be direct positive social impacts from using overland floodways through the reduction of flood risk and impacts to property and infrastructure. 	<ul style="list-style-type: none"> □ Overland floodways should not be proposed within designated sites where the designated habitat and / or species are vulnerable to flooding, as there is the potential for significant negative environmental impacts during a flood event. This measure may be further investigated within designated areas that require or are not sensitive to periodic inundation.

		<input type="checkbox"/> Overland floodways may just transfer the flood risk to another location.
Other Works Minor raising of existing defences / levels, infilling gaps in defences, site specific localised protection works, etc.		
<i>Other Works</i>	<input type="checkbox"/> Unknown	<input type="checkbox"/> Unknown
<i>Site Specific Protection Works</i>	<input type="checkbox"/> Unlikely to be significant positive impacts at a strategic level.	<input type="checkbox"/> Unlikely to be significant negative impacts at a strategic level. However method is non-specific.
Flood Forecasting Monitoring rain and flows and alerting relevant recipients of flood risk likely to occur.		
<i>Flood Forecasting</i>	<input type="checkbox"/> Unlikely to be significant positive impacts at a strategic level, however will reduce flood risk to human health.	<input type="checkbox"/> Unlikely to be significant negative impacts at a strategic level.
Public Awareness Make public aware of risk and advice on measures to protect themselves and properties.		
<i>Public Awareness</i>	<input type="checkbox"/> Unlikely to be significant positive impacts at a strategic level, however will reduce flood risk to human health.	<input type="checkbox"/> Unlikely to be significant negative impacts at a strategic level.
Individual Property Protection Flood proofing, flood gates, capping vents and / or resilience measures.		
<i>Individual Property Protection</i>	<input type="checkbox"/> Property level protection may provide positive impacts to those provided with protective equipment by giving them more peace of mind. There will be positives for the public that can protect themselves from small flood events, reducing or even eliminating damages that would otherwise cause disturbance and inconvenience.	<input type="checkbox"/> Unlikely to be significant negative impacts at a strategic level, provided property protection does not impact on protected structures or monuments and their setting.

APPENDIX B

SCREENING OF EUROPEAN SITES WITH POTENTIAL TO BE IMPACTED BY THE EASTERN CFRAM STUDY

APPENDIX B:

UoM07 SCREENING TABLES

Name: Ballynafagh Bog SAC		Site Code: (IE00000391)
Qualifying Interest(s)	Annex I Habitat: Active raised bogs [7110], Degraded raised bogs still capable of natural regeneration [7120] and Depressions on peat substrates of the <i>Rhynchosporion</i> [7150]	
Proximity to AFA(s) and Linkage	<p>Ballynafagh Bog is a raised bog situated about 1 km west of Prosperous in Co. Kildare. The site comprises a relatively small core of uncut high bog (approx. 70ha), which is surrounded by a more extensive area of cutover bog (approx. 90 ha). The high bog area can be divided into a wet core of active bog which covers an area of 23 ha, surrounded by approximately 44 ha of degraded raised bog which is experiencing drying-out at present. Ballynafagh Bog is of conservation importance as it contains examples of the Annex 1 habitats active raised bog, degraded raised bog and <i>Rhynchosporion</i> vegetation. Of particular note is that the bog is one of the most easterly examples of a relatively intact raised bog in Ireland and, together with Mouds bog, is one of only two such systems in Co. Kildare.</p> <p>Ballynafagh Bog SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening. There are 8 AFAs within approximately 15km of Ballynafagh Bog SAC, one of which is in UoM07 and the remainder in UoM09.</p> <p>Johnstown Bridge AFA is situated 11.9 km from Ballynafagh Wood SAC, but is in a separate hydrometric area and river catchment from the SAC. There is no apparent hydraulic connectivity between Johnstown Bridge AFA and Ballynafagh Wood SAC, nor is connectivity evident via an ecological stepping stone or corridor. There is no possibility of potential impacts on the qualifying interests or conservation objectives of the SAC arising from FRM methods at this AFA.</p>	
Potential Impacts	As there is no potential impact pathway between the qualifying interests of Ballynafagh Bog SAC and the AFAs in UoM07, it has been concluded that the European site will not be impacted by any of the FRM methods proposed in the UoM07 FRMP. Consequently this site has been removed from any further screening.	

Name: Ballynafagh Lake SAC		Site Code: (IE00001387)
Qualifying Interest(s)	Annex I Habitat: Alkaline fens [7230] Annex II species <i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016] and <i>Euphydryas aurinia</i> (Marsh Fritillary) [1065]	
Proximity to AFA(s) and Linkage	<p>Ballynafagh Lake is located about 2 km north-west of Prosperous in Co. Kildare. It is a shallow alkaline lake with some emergent vegetation. The Blackwood Feeder, which connects Ballynafagh Lake to the Grand Canal, is also included in the site. Though originally a reservoir, Ballynafagh Lake has developed a very natural vegetation with some interesting plant communities, including alkaline fen, a habitat that is listed on Annex I of the E.U. Habitats Directive. The site supports a high diversity of molluscan species, with some rare species recorded, including <i>Vertigo moulinsiana</i>, a species that is listed on Annex II of the E.U. Habitats Directive. The site is also of ornithological importance.</p> <p>Ballynafagh Lake SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 (and UoM09) and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening. There are 9 AFAs within approximately 15km of Ballynafagh Lake SAC; two of which are in UoM07 and the remainder in UoM09.</p> <p>Johnstown Bridge and Edenderry AFAs are situated 11.1 km and 15.8km respectively from Ballynafagh Wood SAC. The AFAs are in a separate hydrometric area and river catchment from the SAC. There is no apparent hydraulic connectivity between Johnstown Bridge or</p>	

	Edenderry AFA and Ballynafagh Wood SAC, nor is connectivity evident via an ecological stepping stone or corridor. There is no possibility of potential impacts on the qualifying interests or conservation objectives of the SAC arising from FRM methods at these AFAs.
Potential Impacts	As there is no potential impact pathway between the qualifying interests of Ballynafagh Lake SPA and the AFAs in UoM07, it has been concluded that the European site will not be impacted by any of the FRM methods proposed in the UoM07 FRMP. Consequently this site has been removed from any further screening.

Name: Boyne Coast And Estuary SAC		Site Code: (IE00001957)
Qualifying Interest(s)	Annex I Habitat: 1130 Estuaries, 1140 Mudflats and sandflats not covered by seawater at low tide, 1310 Salicornia and other annuals colonizing mud and sand, 1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>), 1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>) 2110 Embryonic shifting dunes, 2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes') and the priority habitat 2130 Fixed coastal dunes with herbaceous vegetation ('grey dunes').	
Proximity to AFA(s) and Linkage	<p>Boyne Coast and Estuary SAC is a coastal site which includes most of the tidal sections of the River Boyne, intertidal sand-and mudflats, saltmarshes, marginal grassland, and the stretch of coast from Bettystown to Termonfeckin that includes the Mornington and Baltray sand dune systems. The site is of considerable conservation interest as a coastal complex that supports good examples of eight habitats that are listed on Annex I of the E.U. Habitats Directive, including one which is listed with priority status, and for the important bird populations that it supports.</p> <p>The AFAs of Baltray, Drogheda and Mornington, which are subject to both fluvial and coastal flooding, immediately border the Boyne Coast And Estuary SAC. Some areas of these AFAs are within the SAC boundary and therefore FRM methods may have a footprint within the SAC. There exists the potential for direct impacts from the implementation of FRM methods at these AFAs on the qualifying interests of the SAC.</p> <p>The AFAs of Athboy (40km), Ballivor (47.4km), Edenderry (63km), Johnstown Bridge (50km), Longwood (50km), Navan (23.4 km) and Trim (34km) are all in the River Boyne catchment, with upstream distances of between 32km (Navan) and 94km (Johnstown Bridge). Potential impacts of FRM methods at these AFAs are unlikely, but not impossible and as uncertainty remains, further assessment is recommended.</p>	
Potential Impacts	There exists the potential for direct impacts on the qualifying interests of Boyne Coast And Estuary SAC from the implementation of FRM methods at Baltray, Drogheda and Mornington AFAs. There is the potential for indirect impacts on the qualifying interests from FRM methods at Athboy, Ballivor, Edenderry, Johnstown Bridge, Longwood, Navan and Trim. Appropriate Assessment is required to assess the significance of these impacts.	

Name: Boyne Estuary SPA		Site Code: (IE00004080)
Qualifying Interest(s)	"Wetlands" habitat supporting populations of Annex I species Shelduck <i>Tadorna tadorna</i> , Oystercatcher <i>Haematopus ostralegus</i> , Golden Plover <i>Pluvialis apricaria</i> , Grey Plover <i>Pluvialis squatarola</i> , Lapwing <i>Vanellus vanellus</i> , Knot <i>Calidris canutus</i> , Sanderling <i>Calidris alba</i> , Black-tailed Godwit <i>Limosa limosa</i> , Redshank <i>Tringa totanus</i> , Turnstone <i>Arenaria interpres</i> and Little Tern <i>Sterna albifrons</i> .	
Proximity to AFA(s) and Linkage	<p>The Boyne Estuary SPA comprises most of the estuary of the Boyne River, a substantial river which drains a large catchment. The linear stretches of intertidal flats to the north and south of the river mouth are mainly composed of sand. The Boyne Estuary is the second most important estuary for wintering birds on the Louth-Meath coastline. It has a total of ten species with populations of national importance.</p> <p>The AFAs of Baltray, Drogheda and Mornington, which are subject to both fluvial and coastal</p>	

	<p>flooding, immediately border the Boyne Coast And Estuary SPA. Some areas of these AFAs are within the SPA boundary and therefore FRM methods may have a footprint within the SPA. There exists the potential for direct impacts from the implementation of FRM methods at these AFAs on the qualifying interests of the SPA.</p> <p>The AFAs of Athboy (40km), Ballivor (47.4km), Edenderry (63km), Johnstown Bridge (50km), Longwood (50km), Navan (23.4 km) and Trim (34km) are all in the River Boyne catchment, with upstream distances from the SPA of between approx. 32km (Navan) and approx. 94km (Johnstown Bridge). Potential impacts on the qualifying interests of FRM methods at these AFAs are unlikely, but not impossible and as uncertainty remains, further assessment is recommended.</p>
Potential Impacts	<p>There exists the potential for indirect impacts on the qualifying interests of Boyne Coast And Estuary SPA from the implementation of FRM methods at Baltray, Drogheda and Mornington AFAs. Appropriate Assessment is required to assess the significance of these impacts.</p>

Name: Charleville Wood SAC Site Code: (IE00000571)	
Qualifying Interest(s)	<p>Annex I Habitat: Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]</p> <p>Annex II species: <i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]</p>
Proximity to AFA(s) and Linkage	<p>Charleville Wood is a large Oak woodland surrounded by estate parkland and agricultural grassland located about 3 km south-west of Tullamore in Co. Offaly. Charleville Wood is one of the most important ancient woodland sites in Ireland. The woodland has a varied age structure and is relatively intact with areas of both closed and open canopy, with regenerating saplings present in the latter. The understorey and ground layers are also well-represented. Old oak woodland is a habitat listed on Annex I of the E.U. Habitats Directive, while the rare snail species, <i>Vertigo moulinsiana</i>, is listed on Annex II of this Directive. The wetland areas, with their associated bird populations, rare insect and <i>Myxomycete</i> species, contribute further to the conservation significance of the site.</p> <p>Charleville Wood SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>The nearest AFA to Charleville Wood SAC is Edenderry, c. 30km away. Although the sites are connected via the Grand Canal, it is considered that the distance between Edenderry AFA and Charleville Wood SAC is sufficiently great that no potential impact pathway exists between the AFA and the qualifying interests of the SAC.</p>
Potential Impacts	<p>As there is no potential impact pathway between the qualifying interests of Charleville Wood SAC and the AFAs in UoM07, it has been concluded that the European site will not be impacted by any of the FRM methods proposed in the UoM07 FRMP. Consequently this site has been removed from any further screening.</p>

Name: Clara Bog SAC Site Code: (IE00000572)	
Qualifying Interest(s)	<p>Annex I Habitat: Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210], Active raised bogs [7110], Degraded raised bogs still capable of natural regeneration [7120], Depressions on peat substrates of the Rhynchosporion [7150] and Bog woodland [91D0]</p> <p>Annex II species: <i>Euphydryas aurinia</i> (Marsh Fritillary) [1065]</p>
Proximity to AFA(s) and Linkage	<p>Clara Bog is situated some 2 km south of Clara village in Co. Offaly. Much of it is State-owned and designated a statutory Nature Reserve. Clara Bog supports breeding Merlin (1-2 pairs), a scarce species in Ireland and one that is listed on Annex I of the E.U. Birds Directive. Red Grouse also breeds, along with other common bogland species such as Meadow Pipit and Skylark.</p>

	<p>Clara Bog SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>The nearest AFA to Clara Bog SAC is Edenderry, c. 33km away. Although the sites are connected via the Grand Canal, it is considered that the distance between Edenderry AFA and Clara Bog SAC is sufficiently great that no potential impact pathway exists between the AFA and the qualifying interests of the SAC.</p>
Potential Impacts	<p>As there is no potential impact pathway between the qualifying interests of Clara Bog SAC and the AFAs in UoM07, it has been concluded that the European site will not be impacted by any of the FRM methods proposed in the UoM07 FRMP. Consequently this site has been removed from any further screening.</p>

Name: Clogher Head SAC Site Code: (IE00001459)	
Qualifying Interest(s)	<p>Annex I Habitat: Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] and European dry heaths [4030]</p>
Proximity to AFA(s) and Linkage	<p>Clogher Head is a promontory of Silurian quartzite, located approximately 10 km north-east of Drogheda in Co. Louth. The rocks are covered with a thin layer of soil that, in places, supports a coastal heath community. Areas of sea cliff, bedrock shore and dry grassland also occur within the site. This headland supports one of the best known examples of coastal heath in Co. Louth. It contains two habitats listed on Annex I of the E.U. Habitats Directive and supports a good diversity of coastal heath plants.</p> <p>Clogher Head SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are three AFAs within 15km of Clogher Head SAC - Baltray (5.9km), Drogheda (7.9km), and Mornington (6.7km). All three AFAs are subject to both coastal and fluvial flooding. The River Boyne discharges into the Irish Sea approximately 6.5km south of the SAC boundary.</p> <p>The qualifying interests for the SAC are not intertidal or water-dependent and therefore no impacts from the implementation of FRM methods in Baltray, Drogheda or Mornington AFAs are predicted to occur on the qualifying interests of the SAC as they are not susceptible to any potential alterations of flow from the River Boyne, alterations to the sediment regime at the mouth of the River Boyne, nor from the implementation of coastal flood defences.</p>
Potential Impacts	<p>As there is no potential impact pathway between the qualifying interests of the Clogher Head SAC and any of the AFAs in UoM07, it has been concluded that the SAC will not be impacted by the UoM07 FRMP. Consequently, the SAC has been removed from any further screening.</p>

Name: Dundalk Bay SAC Site Code: (IE00000455)	
Qualifying Interest(s)	<p>Annex I habitats 1130 Estuaries, 1140 Mudflats and sandflats not covered by seawater at low tide, 1220 Perennial vegetation of stony banks, 1310 Salicornia and other annuals colonizing mud and sand, 1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) and 1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>).</p>
Proximity to AFA(s) and Linkage	<p>Dundalk Bay, Co. Louth, is a very large open, shallow sea bay with extensive saltmarshes and intertidal sand/mudflats, extending some 16 km from Castletown River on the Cooley Peninsula in the north, to Annagassan/Salterstown in the south. The extensive sandflats and mudflats (over 4,000 ha) occur and are comprised of ecological communities such as muddy fine sand communities and fine sand community complexes. These habitats host a rich fauna of bivalves molluscs, marine worms and crustaceans and are the main food resource of the tens of thousands of waterfowl (including waders and gulls) which feed in the intertidal area of Dundalk Bay.</p>

	<p>Dundalk Bay SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are no AFAs within 15km of the SAC boundary; the nearest AFAs are Baltray (15.5km) and Drogheda (15.3km), both of which are subject to both fluvial and coastal flooding. These AFAs are separated from Dundalk Bay SAC by Clogher Head.</p> <p>Due to the separation distance, across coastal waters, no impacts from the implementation of FRM methods in Baltray or Drogheda are predicted to occur on the qualifying interests of the Dundalk Bay SAC, either from the alteration of flows within the affected watercourses, from alterations to the sediment regime where those watercourses discharge into the sea or from the implementation of coastal flood defences.</p>
Potential Impacts	<p>As there is no potential impact pathway between the qualifying interests of the Dundalk Bay SAC and any of the AFAs in UoM07, it has been concluded that the SAC will not be impacted by the UoM07 FRMP. Consequently, the SAC has been removed from any further screening.</p>

Name: Dundalk Bay SPA		Site Code: (IE00004026)
Qualifying Interest(s)	<p>The qualifying interests are for “wetlands and waterbirds” including wintering populations of the bird species Great Crested Grebe <i>Podiceps cristatus</i>, Greylag Goose <i>Anser anser</i>, Light-bellied Brent Goose <i>Branta bernicla hrota</i>, Shelduck <i>Tadorna tadorna</i>, Teal <i>Anas crecca</i>, Mallard <i>Anas platyrhynchos</i>, Pintail <i>Anas acuta</i>, Common Scoter <i>Melanitta nigra</i>, Red-breasted Merganser <i>Mergus serrator</i>, Oystercatcher <i>Haematopus ostralegus</i>, Ringed Plover <i>Charadrius hiaticula</i>, Golden Plover <i>Pluvialis apricaria</i>, Grey Plover <i>Pluvialis squatarola</i>, Lapwing <i>Vanellus vanellus</i>, Knot <i>Calidris canutus</i>, Dunlin <i>Calidris alpina</i>, Black-tailed Godwit <i>Limosa limosa</i>, Bar-tailed Godwit <i>Limosa lapponica</i>, Curlew <i>Numenius arquata</i>, Redshank <i>Tringa totanus</i>, Black-headed Gull <i>Chroicocephalus ridibundus</i>, Common Gull <i>Larus canus</i>, and Herring Gull <i>Larus argentatus</i>.</p>	
Proximity to AFA(s) and Linkage	<p>Dundalk Bay is a large open shallow sea bay with extensive saltmarshes and intertidal sand/mudflats, extending some 16 km from Castletown River on the Cooley Peninsula, in the north, to Annagassan/Salterstown in the south. The outer part of the bay provides excellent shallow-water habitat for divers, grebes, and sea duck. In summer, it is thought to be a major feeding area for auks from the Dublin breeding colonies. At night the wintering Greylag and Greenland White-fronted Geese, and Whooper Swans, from Stabannan/Braganstown (inland from Castlebelligham) and other inland sites roost in Dundalk Bay. The site is internationally important for waterfowl on the basis that it regularly holds over 20,000 birds. In the same period it also qualifies as a site of international importance for supporting populations of the Annex I species Brent Goose, Black-tailed Godwit and Bar-tailed Godwit.</p> <p>Dundalk Bay SPA is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are three AFAs within 15km of Dundalk Bay SPA: Baltray (13.6km), Drogheda (14.9km) and Mornington (14.5km), all of which are subject to both coastal and fluvial flooding. These AFAs are separated from Dundalk Bay SPA by Clogher Head.</p> <p>Due to the separation distance, across coastal waters, no impacts from the implementation of FRM methods in Baltray, Drogheda or Mornington are predicted to occur on the qualifying interests of the Dundalk Bay SPA, either from the alteration of flows within the affected watercourses, from alterations to the sediment regime where those watercourses discharge into the sea or from the implementation of coastal flood defences</p>	
Potential Impacts	<p>As there is no potential impact pathway between the qualifying interests of the Dundalk Bay SPA and any of the AFAs in UoM07, it has been concluded that the SPA will not be impacted by the UoM07 FRMP. Consequently, the SPA has been removed from any further screening.</p>	

Name: Garriskil Bog SAC	Site Code: (IE00000679)
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Qualifying Interest(s)	Annex I Habitat: Active raised bogs [7110], Degraded raised bogs still capable of natural regeneration [7120] and Depressions on peat substrates of the Rhynchosporion [7150]
Proximity to AFA(s) and Linkage	<p>This raised bog site lies 3 km west of Lough Derravaragh and 3 km east of Rathowen in Co. Westmeath. It is bounded to the south - east and south - west by the rivers Inny and Riffey. It is considered an excellent example of a midland raised bog. Garriskil bog is a site of high conservation value as it contains good examples of the Annex I habitats active raised bog, degraded raised bog and depressions on peat substrates (Rhynchosporion).</p> <p>Garriskil Bog SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are no AFAs within 15km of the SAC boundary; the nearest AFAs are Ballivor and Athboy, more than 50 km from the site. There is no potential pathway for impacts on the qualifying interests of the site from any AFA in the Eastern CFRAM Study.</p>
Potential Impacts	Garriskil Bog SAC will not be impacted by any of the FRM methods proposed in the Eastern CFRAM Study. Consequently it has been removed from any further screening.

Name: Garriskil Bog SPA Site Code: (IE00004102)	
Qualifying Interest(s)	Annex I bird species Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395]
Proximity to AFA(s) and Linkage	<p>Garriskil Bog SPA is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are no AFAs within 15km of the SPA boundary; the nearest AFAs are Ballivor and Athboy, more than 50 km from the site. There is no potential pathway for impacts on the qualifying interests of the site from any AFA in the Eastern CFRAM Study.</p>
Potential Impacts	Garriskil Bog SPA will not be impacted by any of the FRM methods proposed in the Eastern CFRAM Study. Consequently it has been removed from any further screening.

Name: Killyconny Bog (Cloghbally) SAC Site Code: (IE00000006)	
Qualifying Interest(s)	Annex I Habitat: Active raised bogs [7110] and Degraded raised bogs still capable of natural regeneration [7120]
Proximity to AFA(s) and Linkage	<p>Killyconny Bog is a raised bog situated approximately half way between Virginia and Kells on the Cavan/Meath border and some 8 km from each. It is underlain by Lower Palaeozoic shales and consists of two small basins which have coalesced over a low drumlin ridge. There are few raised bogs in the north-east region and Killyconny Bog seems to be one of the best developed. Though some marginal drainage and cutting has taken place, the central part of the bog is relatively intact.</p> <p>Killyconny Bog (Cloghbally) SAC is located in the north-western portion of UoM07. There are no are no AFAs within 15km of the SAC boundary; the nearest AFAs are Athboy and Navan, which are 16.9km and 21.3km respectively from the site. The site has an indirect hydraulic link with Navan AFA via small tributaries which drain into the River Blackwater and Moynally River upstream of Navan. However, given the upstream distances involved, there is considered to be no there is no potential pathway for impacts on the qualifying interests of the site from any AFA in the Eastern CFRAM Study.</p>
Potential Impacts	As there is no potential impact pathway between the qualifying interests of the Killyconny Bog (Cloghbally) SAC and any of the AFAs in UoM07, it has been concluded that the SPA will not be impacted by the UoM07 FRMP. Consequently, the SPA has been removed from any further screening.

Name: Lough Bane And Lough Glass SAC		Site Code: (IE00002120)
Qualifying Interest(s)	Annex I Habitat: Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140] Annex II species <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092]	
Proximity to AFA(s) and Linkage	<p>This site is located on the Meath/Westmeath border, about 10 km south of Oldcastle. It comprises three lakes situated in a shallow valley. Lough Bane is by far the largest of the group, with the much smaller Lough Glass occurring immediately to the east and Lough Glass North to the north-west. The lakes and fringing wetlands support a varied avifauna, including Little Grebe, Cormorant, Lapwing, Curlew and Snipe. Overall, this is a fine example of a hard water marl lake system with good <i>Chara</i> communities. Such systems are becoming scarce in Europe.</p> <p>Lough Bane And Lough Glass SAC is located in the western portion of UoM07. There are no AFAs within 15km of the SAC boundary; the nearest AFAs is Athboy, which is 15.9km from the site.</p> <p>On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and Athboy AFA. It is therefore concluded that no potential impact pathway exists between Athboy AFA and the SAC, nor between the site and any other AFA in the Eastern CFRAM Study.</p> <p>The site has an indirect hydraulic link with Trim AFA via small tributaries which drain into the River Deel (a tributary of the River Boyne). However, given the upstream distances involved (>50km), there is considered to be no there is no potential pathway for impacts on the qualifying interests of the site from this or any other AFA in the Eastern CFRAM Study.</p>	
Potential Impacts	As there is no potential impact pathway between the qualifying interests of the Lough Bane And Lough Glass SAC and any of the AFAs in UoM07, it has been concluded that the SAC will not be impacted by the UoM07 FRMP. Consequently, the SAC has been removed from any further screening.	

Name: Lough Derravaragh SPA		Site Code: (IE00004043)
Qualifying Interest(s)	Wetlands and Waterbirds [A999] habitat supporting Bird Species: A038 Whooper Swan <i>Cygnus cygnus</i> , A059 Pochard <i>Aythya farina</i> , A061 Tufted Duck <i>Aythya fuligula</i> and A125 Coot <i>Fulica atra</i>	
Proximity to AFA(s) and Linkage	<p>Lough Derravaragh is located approximately 12 km north of Mullingar town. It is a medium- to large-sized lake of relatively shallow water (maximum depth 23 m). The lake extends along a south-east/north-west axis for approximately 8 km. Lough Derravaragh is of major ornithological importance as it regularly supports nationally important populations of five species, and at times is used by the internationally important population of Greenland White-fronted Goose which is based in the region.</p> <p>Lough Derravaragh SPA is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are no AFAs within 15km of the SPA boundary; the nearest AFAs are Athboy and Ballivor, c. 23km from the site. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and the AFAs of Athboy or Ballivor. It is therefore concluded that no potential impact pathway exists between the AFAs of Athboy and Ballivor and the SPA, nor between the site and any other AFA in the Eastern CFRAM Study.</p>	
Potential Impacts	Lough Derravaragh SPA will not be impacted by any of the FRM methods proposed in the Eastern CFRAM Study. Consequently it has been removed from any further screening.	

Name: Lough Ennell SAC		Site Code: (IE00000685)
Qualifying Interest(s)	Annex I Habitat: Alkaline fens [7230]	

Proximity to AFA(s) and Linkage	<p>Lough Ennell is a large, open, steep-sided lake, located 3 km south of Mullingar in Co. Westmeath. The lake bottom is of limestone with a marl deposit. The water is markedly alkaline and mesotrophic, possibly owing to effluents received from Mullingar town and to fertilizer inputs from farmland surrounding the lake. Lough Ennell is of significance as a highly productive lake which supports a rich variety of lower plant and invertebrate species. Its lakeshore habitats, which include alkaline fen, a habitat listed on Annex I of the E.U. Habitats Directive, support a diverse flora.</p> <p>Lough Ennell SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are no AFAs within 15km of the SAC boundary; the nearest AFA is Athboy, c. 23km from the site. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and Athboy AFA. It is therefore concluded that no potential impact pathway exists between Athboy AFA and the SAC, nor between the site and any other AFA in the Eastern CFRAM Study.</p>
Potential Impacts	Lough Ennell SAC will not be impacted by any of the FRM methods proposed in the Eastern CFRAM Study. Consequently it has been removed from any further screening.

Name: Lough Ennell SPA Site Code: (IE00004044)	
Qualifying Interest(s)	Wetland and Waterbirds [A999] supporting bird species Pochard (<i>Aythya ferina</i>) [A059], Tufted Duck (<i>Aythya fuligula</i>) [A061], Coot (<i>Fulica atra</i>) [A125]
Proximity to AFA(s) and Linkage	<p>Lough Ennell is a large, limestone lake. It has a length of approximately 6.5 km along its long axis and is mostly c. 2 km wide. Lough Ennell is of ornithological significance for wintering waterfowl, with four species having populations of national importance. The occurrence of a further two species in the vicinity of the lake, Greenland White-fronted Goose and Golden Plover, is of particular note as these are listed on Annex I of the E.U. Birds Directive.</p> <p>Lough Ennell SPA is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are no AFAs within 15km of the SPA boundary; the nearest AFA is Athboy, c. 23km from the site. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and Athboy AFA. It is therefore concluded that no potential impact pathway exists between Athboy AFA and the SAC, nor between the site and any other AFA in the Eastern CFRAM Study.</p>
Potential Impacts	Lough Ennell SPA will not be impacted by any of the FRM methods proposed in the Eastern CFRAM Study. Consequently it has been removed from any further screening.

Name: Lough Iron SPA Site Code: (IE00004046)	
Qualifying Interest(s)	Wetland and Waterbirds [A999] supporting populations of Whooper Swan (<i>Cygnus cygnus</i>) [A038], Wigeon (<i>Anas penelope</i>) [A050], Teal (<i>Anas crecca</i>) [A052], Shoveler (<i>Anas clypeata</i>) [A056], Coot (<i>Fulica atra</i>) [A125], Golden Plover (<i>Pluvialis apricaria</i>) [A140], Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) [A395]
Proximity to AFA(s) and Linkage	<p>Lough Iron is a small- to moderately-sized midland lake, located some 12 km north-west of Mullingar. Lough Iron SPA is of high ornithological importance primarily as it supports an Internationally Important population of Greenland White-fronted Geese, with both feeding and roosting areas available to the birds. n Internationally Important population of Whooper Swans sometimes occurs. The site also supports a notable diversity of other waterfowl.</p> <p>Lough Iron SPA is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening. There are no AFAs within 15km of the SPA boundary; the</p>

	nearest AFA is Ballivor, c. 32km from the site. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and Ballivor AFA. It is therefore concluded that no potential impact pathway exists between Ballivor AFA and the SPA, nor between the site and any other AFA in the Eastern CFRAM Study.
Potential Impacts	Lough Iron SPA will not be impacted by any of the FRM methods proposed in the Eastern CFRAM Study. Consequently it has been removed from any further screening.

Name: Lough Kinale and Derragh Lough SPA Site Code: (IE00004061)	
Qualifying Interest(s)	Wetland and Waterbirds supporting bird species [A999] Pochard (<i>Aythya ferina</i>) [A059] and Tufted Duck (<i>Aythya fuligula</i>) [A061]
Proximity to AFA(s) and Linkage	<p>Lough Kinale is a relatively small lake that is situated immediately downstream of Lough Sheelin, both lakes being near the top of the catchment of the Inny River, a main tributary of the River Shannon. Whilst relatively small in area and subject to a number of damaging activities, this site retains national importance for two duck species.</p> <p>Lough Kinale and Derragh Lough SPA is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are no AFAs within 15km of the SPA boundary; the nearest AFA is Athboy, c. 35km from the site. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and Athboy AFA. It is therefore concluded that no potential impact pathway exists between Athboy AFA and the SPA, nor between the site and any other AFA in the Eastern CFRAM Study.</p>
Potential Impacts	Lough Kinale and Derragh Lough SPA will not be impacted by any of the FRM methods proposed in the Eastern CFRAM Study. Consequently it has been removed from any further screening.

Name: Lough Lene SAC Site Code: (IE00002121)	
Qualifying Interest(s)	Annex I Habitat: Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140] Annex II species <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092]
Proximity to AFA(s) and Linkage	<p>This lake is situated 4 km north-east of Castlepollard in Co. Westmeath. It is a deep (20 m maximum depth), clear, hard-water lake with marl deposition (especially noticeable on the margins). Unpolluted hard-water lakes such as Lough Lene are becoming increasingly rare in Ireland and in Europe, and are of a type that is listed on Annex I of the E.U. Habitats Directive. This site is thus of conservation importance.</p> <p>There are no AFAs within 15km of the SPA boundary; the nearest AFA is Athboy, c. 17km from the site. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and Athboy AFA. It is therefore concluded that no potential impact pathway exists between Athboy AFA and the SPA, nor between the site and any other AFA in the Eastern CFRAM Study.</p>
Potential Impacts	Lough Lene SAC will not be impacted by any of the FRM methods proposed in the Eastern CFRAM Study. Consequently it has been removed from any further screening.

Name: Lough Owel SAC		Site Code: (IE00000688)
Qualifying Interest(s)	<p>Annex I habitats Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140], Transition mires and quaking bogs [7140] and Alkaline fens [7230]</p> <p>Annex II species <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092]</p>	
Proximity to AFA(s) and Linkage	<p>Lough Owel is a large hard water lake located approximately 4 km north-west of Mullingar in Co. Westmeath. It is a relatively shallow lake with a rocky, marl-covered bottom. With the exception of Lough Carra in Co. Mayo, Lough Owel is the best example of a large, spring-fed calcareous lake in the country. The site is of major conservation significance and contains three habitats that are listed on Annex I of the E.U. Habitats Directive, i.e. alkaline fens, transition mires and hard water lakes. Additionally, the site supports bird populations of conservation significance.</p> <p>Lough Owel SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are no AFAs within 15km of the SAC boundary; the nearest AFA is Ballivor, c. 26km from the site. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and Ballivor AFA. It is therefore concluded that no potential impact pathway exists between Ballivor AFA and the SAC, nor between the site and any other AFA in the Eastern CFRAM Study.</p>	
Potential Impacts	<p>Lough Owel SAC will not be impacted by any of the FRM methods proposed in the Eastern CFRAM Study. Consequently it has been removed from any further screening.</p>	

Name: Lough Owel SPA		Site Code: (IE00004047)
Qualifying Interest(s)	<p>Wetland and Waterbirds [A999] supporting populations of bird species Shoveler (<i>Anas clypeata</i>) [A056] and Coot (<i>Fulica atra</i>) [A125]</p>	
Proximity to AFA(s) and Linkage	<p>Lough Owel is one of the most important Midland lakes for wintering waterfowl. Lough Owel has very significant populations of two species, Shoveler and Coot. It is also a notable site as it is used on occasions by the internationally important Midlands Greenland White-fronted Goose flock.</p> <p>Lough Owel SPA is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are no AFAs within 15km of the SPA boundary; the nearest AFA is Ballivor, c. 26km from the site. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and Ballivor AFA. It is therefore concluded that no potential impact pathway exists between Ballivor AFA and the SPA, nor between the site and any other AFA in the Eastern CFRAM Study.</p>	
Potential Impacts	<p>Lough Owel SPA will not be impacted by any of the FRM methods proposed in the Eastern CFRAM Study. Consequently it has been removed from any further screening.</p>	

Name: Lough Sheelin SPA		Site Code: (IE00004065)
Qualifying Interest(s)	<p>Wetland and Waterbirds [A999] supporting populations of bird species Great Crested Grebe (<i>Podiceps cristatus</i>) [A005], Pochard (<i>Aythya ferina</i>) [A059], Tufted Duck (<i>Aythya fuligula</i>) [A061] and Goldeneye (<i>Bucephala clangula</i>) [A067]</p>	
Proximity to AFA(s) and Linkage	<p>Lough Sheelin is a medium- to large-sized lake, with a maximum length of 7 km. The lake lies near the top of the catchment of the Inny River, a main tributary of the River Shannon. It is a typical limestone lake and is fairly shallow. Lough Sheelin is a nationally important site for four species of wintering wildfowl and is one of the main Midlands lakes sites for wintering</p>	

	<p>birds. An improvement in water quality would probably result in higher numbers of birds frequenting the site.</p> <p>Lough Sheelin SPA is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are no AFAs within 15km of the SPA boundary; the nearest AFA is Athboy, c. 30km from the site. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and Athboy AFA. It is therefore concluded that no potential impact pathway exists between Athboy AFA and the SPA, nor between the site and any other AFA in the Eastern CFRAM Study.</p>
Potential Impacts	Lough Sheelin SPA will not be impacted by any of the FRM methods proposed in the Eastern CFRAM Study. Consequently it has been removed from any further screening.

Name: Moneybeg And Clareisland Bogs SAC Site Code: (IE00002340)	
Qualifying Interest(s)	Annex I Habitat: Active raised bogs [7110], Degraded raised bogs still capable of natural regeneration [7120] and Depressions on peat substrates of the Rhynchosporion [7150]
Proximity to AFA(s) and Linkage	<p>This site is located on the border of Counties Meath and Westmeath, 9 km east of the town of Granard. The Moneybeg and Clareisland Bogs site is of considerable conservation significance as it comprises two raised bogs with semi-natural lake margins. These are found at the north-eastern extreme of the range of raised bogs in Ireland.</p> <p>Moneybeg And Clareisland Bogs SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are no AFAs within 15km of the SAC boundary; the nearest AFA is Athboy, c. 30km from the site. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and Athboy AFA. It is therefore concluded that no potential impact pathway exists between Athboy AFA and the SAC, nor between the site and any other AFA in the Eastern CFRAM Study.</p>
Potential Impacts	Moneybeg And Clareisland Bogs SAC will not be impacted by any of the FRM methods proposed in the Eastern CFRAM Study. Consequently it has been removed from any further screening.

Name: Mouds Bog SAC Site Code: (IE00002331)	
Qualifying Interest(s)	Annex I Habitat: Active raised bogs [7110], Degraded raised bogs still capable of natural regeneration [7120], Depressions on peat substrates of the Rhynchosporion [7150]
Proximity to AFA(s) and Linkage	<p>Mouds Bog comprises a raised bog that includes both areas of high bog and cutover bog. Much of the margins of the site are bounded by trackways. Mouds Bog is significant in terms of its high bog area and geographical location as it is at the eastern extreme of the range of raised bogs in Ireland. It is a site of considerable conservation significance comprising a large raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. This site supports a good diversity of raised bog microhabitats including hummock/hollow complexes, pools and flushes, and cutover, all of which add to the diversity and scientific value of the site.</p> <p>Mouds Bog SAC is located in UoM09, but it is also located within 15km of UoM07 and therefore has been included in the screening.</p> <p>There are no AFAs from UoM07 within 15km of the SAC boundary. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and any of the AFAs in UoM07.</p>

Potential Impacts	Mouds Bog SAC will not be impacted by any of the FRM methods proposed in UoM07. Further consideration is given to potential impacts from AFAs in UoM09 in that section.
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Name: Mount Hevey Bog SAC Site Code: (IE00002342)	
Qualifying Interest(s)	Annex I Habitat: Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] and Depressions on peat substrates of the Rhynchosporion [7150]
Proximity to AFA(s) and Linkage	<p>Mount Hevey Bog is situated approximately 4 km north-east of Kinnegad. The site comprises a raised bog that includes both areas of high bog and cutover bog. The Dublin-Sligo railway runs through the northern part of the bog isolating two northern lobes. The northern lobes are adjacent to the Royal Canal. Mount Hevey Bog is a site of considerable conservation significance as it comprises a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland.</p> <p>There are four AFAs in UoM07 within 15km of Mount Hevey Bog SAC. These are: Ballivor (6.9km), Edenderry (12.7km), Johnstown Bridge (13.8km) and Longwood (6.3km).</p> <p>On reviewing the available data, it can be seen that there is no direct hydraulic connectivity between the Mount Hevey Bog SAC and the AFAs of Ballivor, Edenderry, Johnstown Bridge and Longwood. Mount Hevey Bog drains into the Deel and Kilwarden Rivers, which are tributaries of the Boyne. Ballivor, Edenderry, Johnstown Bridge and Longwood are all located on separate tributaries of the Boyne system. The Royal Canal provides a corridor between the SAC and the AFA of Longwood, however when the qualifying interests of the SAC are taken into context, there is no potential impact pathway.</p> <p>The AFAs of Trim, Navan, Mornington, Drogheda and Baltray are located on the River Boyne, downstream of the European site. Of these, the nearest AFA, Trim, is 32km downstream.</p>
Potential Impacts	As there is no potential impact pathway between the qualifying interests of Mount Hevey Bog SAC and any of the AFAs in UoM07, it has been concluded that the SAC will not be impacted by the UoM07 FRMP. Consequently, the SAC has been removed from any further screening.

Name: Pollardstown Fen SAC Site Code: (IE00000396)	
Qualifying Interest(s)	<p>Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> [7210], Petrifying springs with tufa formation (Cratoneurion) [7220] and Alkaline fens [7230]</p> <p>Annex II Species <i>Vertigo geyeri</i> (Geyer's Whorl Snail) [1013], <i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014] and <i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]</p>
Proximity to AFA(s) and Linkage	<p>Pollardstown Fen is situated on the northern margin of the Curragh of Kildare, approximately 3 km north-west of Newbridge. It lies in a shallow depression, running in a north-west/south-east direction. About 40 springs provide a continuous supply of water to the fen. These rise chiefly at its margins, along distinct seepage areas of mineral ground above the fen level. The continual inflow of calcium-rich water from the Curragh, and from the limestone ground to the north, creates waterlogged conditions which lead to peat formation. Pollardstown fen is the largest spring-fed fen in Ireland and has a well-developed and specialised flora and fauna. Owing to the rarity of this habitat and the numbers of rare organisms found there, the site is rated of international importance.</p> <p>Pollardstown Fen SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 (and UoM09) and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are no AFAs from UoM07 within 15km of the SAC boundary. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and any of the AFAs in UoM07.</p>
Potential Impacts	Pollardstown Fen SAC will not be impacted by any of the FRM methods proposed in UoM07. Further consideration is given to potential impacts from AFAs in UoM09 in that section.

Name: Raheenmore Bog SAC		Site Code: (IE00000582)
Qualifying Interest(s)	Annex I Habitat: Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] and Depressions on peat substrates of the Rhynchosporion [7150]	
Proximity to AFA(s) and Linkage	<p>Raheenmore Bog is a classic example of a midland raised bog and the deepest remaining in Ireland. It is of high conservation importance as it contains good examples of the priority Annex I habitat active raised bog, and the non-priority habitats degraded raised bog and depressions on peat substrates (Rhynchosporion). Most of the site is owned by the NPWS and there has been considerable research and restoration work carried out on the site over the past 15 years. Of particular notes is that this is one of the few raised bogs where restoration of the lagg zone remains feasible.</p> <p>Raheenmore Bog SAC is located at the south western corner of UoM07. Watercourses from the bog drain into the Big River, which becomes the Yellow River, an upstream tributary of the River Boyne. The nearest AFA is Edenderry, 16.2km from the SAC boundary. There is no hydraulic connectivity between Raheenmore Bog SAC and Edenderry AFA, nor any connectivity by virtue of a biodiversity stepping stone or corridor.</p> <p>The downstream distances between the European site and other AFAs on the River Boyne (the closest of which is Trim, over 50km downstream) is such that there is not considered to be any potential impact pathway between the AFAs and the SAC.</p>	
Potential Impacts	Raheenmore Bog SAC will not be impacted by any of the FRM methods proposed in the Eastern CFRAM Study. Consequently it has been removed from any further screening.	

Name: River Boyne And River Blackwater SAC		Site Code: (IE00002299)
Qualifying Interest(s)	<p>Annex I habitats : Alkaline fens [7230] and Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0]</p> <p>Annex II Species <i>Lampetra fluviatilis</i> (River Lamprey) [1099], <i>Salmo salar</i> (Salmon) [1106] and <i>Lutra lutra</i> (Otter) [1355]</p>	
Proximity to AFA(s) and Linkage	<p>This site comprises the freshwater element of the River Boyne as far as the Boyne Aqueduct, the Blackwater as far as Lough Ramor and the Boyne tributaries including the Deel, Stoneyford and Tremblestown Rivers. The main areas of alkaline fen in this site are concentrated in the vicinity of Lough Shesk, Freehan Lough and Newtown Lough. The hummocky nature of the local terrain produces frequent springs and seepages which are rich in lime. The dominant habitat along the edges of the river is freshwater marsh.</p> <p>There are 11 AFAs within the zone of influence of the River Boyne And River Blackwater SAC. These are: Athboy (0.0km), Ballivor (1.0km), Baltray (2.6km), Drogheda (0.0km), Edenderry (12.5km), Johnstown Bridge (8.7km), Kilcock (13.3 km – (in UoM09)), Longwood (1.1km), Mornington (2.8km), Navan (0.0km) and Trim (0.0km).</p> <p>One AFA, Kilcock, is in UoM09. There is no hydraulic connectivity between Kilcock AFA and the River Boyne And River Blackwater SAC, nor is there evidence of any connectivity by virtue of a biodiversity stepping stone or corridor. It is concluded that there is no potential impact pathway between the SAC and this AFA.</p> <p>Four AFAs; Athboy, Drogheda, Navan and Trim, are located on the SAC-designated rivers and all have potential to cause direct impacts on the SAC from the implementation of FRM methods at these AFAs.</p> <p>Two AFAs; Baltray and Mornington, are a short distance downstream of the SAC. There exists the potential for direct impacts to the Annex II species present as a qualifying interest of the River Boyne and River Blackwater SAC from the implementation of FRM methods at these AFAs.</p> <p>The AFAs of Edenderry and Johnstown Bridge are both c. 12km upstream (by river) of the River Boyne and River Blackwater SAC. Indirect impacts from the implementation of FRM methods are considered unlikely but cannot be ruled out, therefore further assessment is</p>	

	recommended. The AFAs of Ballivor and Longwood are less than 2km upstream by river from the SAC. There is the potential for the implementation of FRM methods to have both direct and indirect impacts on Annex II species that are qualifying interests of the SAC.
Potential Impacts	There exists the potential for direct impacts on the qualifying interests of the River Boyne and River Blackwater SAC from the implementation of FRM methods at Athboy, Baltray, Drogheda, Mornington, Navan and Trim AFAs. There is the potential for indirect impacts arising from the implementation of FRM methods at Ballivor, Edenderry, Johnstown Bridge and Longwood AFAs; Appropriate Assessment is required to assess the significance of these impacts

Name: River Boyne and River Blackwater SPA Site Code: (IE00004232)	
Qualifying Interest(s)	Annex I species Kingfisher <i>Alcedo atthis</i> .
Proximity to AFA(s) and Linkage	<p>The River Boyne and River Blackwater SPA is a long, linear site that comprises stretches of the River Boyne and several of its tributaries. The River Boyne and River Blackwater Special Protection Area is of high ornithological importance as it supports a nationally important population of Kingfisher, a species that is listed on Annex I of the E.U. Birds Directive.</p> <p>There are 11 AFAs within the zone of influence of the River Boyne and River Blackwater SPA. These are: Athboy (0.0km), Ballivor (1.0km), Baltray (8.2km), Drogheda (0.0km), Edenderry (12.5km), Johnstown Bridge (8.7km), Kilcock (15.1 km (in UoM09)), Longwood (1.1km), Mornington (8.8km), Navan (0.0km) and Trim (0.0km).</p> <p>One AFA, Kilcock, is in UoM09. There is no hydraulic connectivity between Kilcock AFA and the River Boyne And River Blackwater SPA, nor is there evidence of any connectivity by virtue of a biodiversity stepping stone or corridor. It is concluded that there is no potential impact pathway between the SPA and this AFA.</p> <p>Four AFAs; Athboy, Drogheda, Navan and Trim, are located on the SPA-designated rivers and all have potential to cause direct impacts on the SPA from the implementation of FRM methods at these AFAs.</p> <p>The AFAs of Edenderry and Johnstown Bridge are both c. 12km upstream (by river) of the River Boyne and River Blackwater SPA. Indirect impacts on the qualifying interest of the SPA from the implementation of FRM methods are considered unlikely but cannot be ruled out, therefore further assessment is recommended.</p> <p>The AFAs of Ballivor and Longwood are less than 2km upstream by river from the SPA. There is the potential for the implementation of FRM methods to have indirect impacts on the qualifying interest of the SPA.</p> <p>The AFAs of Baltray and Mornington are approximately 8km downstream of the SPA. There is potential for upstream / upcatchment FRM methods being adopted for Baltray or Mornington AFA that could have an impact on the qualifying interest of the River Boyne and River Blackwater SPA.</p>
Potential Impacts	There exists the potential for direct impacts on the qualifying interests of the River Boyne and River Blackwater SPA from the implementation of FRM methods at Athboy, Drogheda, Navan and Trim AFAs. There is the potential for indirect impacts arising from the implementation of FRM methods at Ballivor, Baltray, Edenderry, Johnstown Bridge, Longwood and Mornington AFAs; Appropriate Assessment is required to assess the significance of these impacts

Name: River Nanny Estuary and Shore SPA Site Code: (IE00004158)	
Qualifying Interest(s)	Wetland and Waterbirds [A999] supporting populations of Oystercatcher (<i>Haematopus ostralegus</i>) [A130], Ringed Plover (<i>Charadrius hiaticula</i>) [A137], Golden Plover (<i>Pluvialis apricaria</i>) [A140], Knot (<i>Calidris canutus</i>) [A143], Sanderling (<i>Calidris alba</i>) [A144] and Herring Gull (<i>Larus argentatus</i>) [A184]

Proximity to AFA(s) and Linkage	<p>The site comprises the estuary of the River Nanny and sections of the shoreline to the north and south of the estuary (c. 3 km in length). The estuarine channel, which extends inland for almost 2km, is narrow and well sheltered. Sediments are muddy in character and edged by saltmarsh and freshwater marsh/wet grassland. This site is of ornithological importance as it supports five species of wintering waterbirds in numbers of national significance. Two species using the site, Golden Plover and Bar-tailed Godwit, are listed on Annex I of the E.U. Birds Directive.</p> <p>There are three AFAs within 15km of the River Nanny Estuary and Shore SPA: Baltray (5.5km), Drogheda (3.8km) and Mornington (1.7km). All three AFAs are on the River Boyne and are subject to both fluvial and coastal flooding. The distance from the river mouth to the SPA is 3.7km. FRM methods at all three AFAs which have the potential to impact on water quality or sedimentation may affect the prey distribution of species on which the qualifying interests of the River Nanny Estuary and Shore SPA may feed, and therefore may have potential impacts on the site's qualifying interests.</p>
Potential Impacts	There exists the potential for indirect impacts on the qualifying interests of the River Nanny Estuary and Shore SPA from the implementation of FRM methods at Drogheda, Baltray and Mornington AFAs. Appropriate Assessment is required to assess the significance of these impacts.

Name: Rye Water Valley/Carton SAC Site Code: (IE00001398)	
Qualifying Interest(s)	Annex I Habitat: Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220], Annex II species <i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014] and <i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]
Proximity to AFA(s) and Linkage	<p>Rye Water Valley/Carton SAC is located between Leixlip and Maynooth, in Counties Meath and Kildare, and extends along the Rye Water, a tributary of the River Liffey. The Rye Water in Carton Estate is dammed at intervals, creating a series of lakes. The conservation importance of the site lies in the presence of several rare and threatened plant and animal species, and the presence of petrifying springs, a habitat type listed on Annex I of the E.U. Habitats Directive. The woods found on Carton Estate and their birdlife are of additional interest.</p> <p>Rye Water Valley/Carton SAC is located in UoM09, but it is also located within 15km of UoM07 and therefore has been included in the screening.</p> <p>There are no AFAs from UoM07 within 15km of the SAC boundary. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and any of the AFAs in UoM07.</p>
Potential Impacts	Rye Water Valley/Carton SAC will not be impacted by any of the FRM methods proposed in UoM07. Further consideration is given to potential impacts from AFAs in UoM09 in that section.

Name: Scragh Bog SAC Site Code: (IE00000692)	
Qualifying Interest(s)	Annex I Habitat: Transition mires and quaking bogs [7140] and Alkaline fens [7230] Annex II species: <i>Euphydryas aurinia</i> (Marsh Fritillary) [1065] and <i>Drepanocladus vernicosus</i> (Slender Green Feather-moss) [1393]
Proximity to AFA(s) and Linkage	<p>Scragh Bog lies approximately 10 km north-west of Mullingar, Co. Westmeath. This site comprises a wet transition fen with a floating root mat which has developed in a small oval-shaped depression. The fen is fed by weak surface springs and drains by an artificially defined outlet. The fen becomes open carr in the central area and in places grades into ombrotrophic bog. Scragh Bog contains excellent examples of two habitats listed on Annex I of the E.U. Habitats Directive -alkaline fen and transition mire. These habitats support a number of rare plants, notably <i>Drepanocladus vernicosus</i>, and also play host to a well-developed invertebrate fauna.</p>

	<p>Scragh Bog SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>The nearest AFA to Scragh Bog SAC is Ballivor, c. 25km away. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and any of the AFAs in UoM07.</p>
Potential Impacts	<p>As there is no potential impact pathway between the qualifying interests of the Scragh Bog SAC and any of the AFAs in the Eastern CFRAMS Study area, it has been concluded that the SAC will not be impacted by the UoM07 FRMP. Consequently, the SAC has been removed from any further screening.</p>

Name: Split Hills And Long Hill Esker SAC Site Code: (IE00001831)	
Qualifying Interest(s)	<p>Annex I Habitat: Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210]</p>
Proximity to AFA(s) and Linkage	<p>Split Hills and Long Hill Esker is a 5 km long site which crosses the main Galway-Dublin road mid-way between Kilbeggan and Tyrrellspass in Co. Westmeath. Split Hill and Long Hill Esker is one of the finest and longest wooded eskers in the country. It is also one of the few woodlands in the area and a fine geomorphological feature of great scenic value. The trees are particularly well-grown and impressive, and much of the woodland has developed naturally on its steep slopes. The presence of a species-rich ground flora, which includes a rare and legally protected plant species at its only known Irish location, makes this site of great botanical and ecological importance. The site also supports some excellent examples of calcareous grassland which is rich in orchids.</p> <p>Split Hills And Long Hill Esker SAC outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>The nearest AFA to Split Hills And Long Hill Esker SAC is Edenderry, c. 22km away. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and any of the AFAs in UoM07.</p>
Potential Impacts	<p>As there is no potential impact pathway between the qualifying interests of the Split Hills And Long Hill Esker SAC and any of the AFAs in the Eastern CFRAMS Study area, it has been concluded that the SAC will not be impacted by the UoM07 FRMP. Consequently, the SAC has been removed from any further screening.</p>

Name: Stabannan-Braganstown SPA Site Code: (IE00004091)	
Qualifying Interest(s)	<p>Annex I species Greylag Goose (<i>Anser anser</i>) for which the site supports an internationally important wintering population (35% of national total).</p>
Proximity to AFA(s) and Linkage	<p>Stabannan-Braganstown SPA, situated approximately 4 km inland from Dundalk Bay in Co. Louth, is a small, very flat alluvial plain adjacent to the River Glyde. It is bounded to the north and south by low, rolling hills. Much of the site was formerly marshland or wet grassland, but is now drained and agriculturally improved. It is farmed intensively for grass, cereals and root crops. The site is of most importance as the largest Greylag Goose site in the country, but it also regularly supports three species which are listed on Annex I of the E.U. Birds Directive – Greenland White-fronted Goose, Whooper Swan and Golden Plover.</p> <p>Stabannan-Braganstown SPA is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>The nearest AFA to Stabannan-Braganstown SPA is Drogheda, 15.7 km away. The SPA is in a separate catchment from Drogheda AFA and has no hydraulic connectivity with the site, nor any connectivity by virtue of a biodiversity stepping stone or corridor</p>

Potential Impacts	As there is no potential impact pathway between the qualifying interests of the Stabannan-Braganstown SPA and any of the AFAs in the Eastern CFRAMS Study area, it has been concluded that the SPA will not be impacted by the UoM07 FRMP. Consequently, the SPA has been removed from any further screening.
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Name: The Long Derries, Edenderry SAC		Site Code: (IE00000925)
Qualifying Interest(s)	Annex I Habitat: Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites) [6210]	
Proximity to AFA(s) and Linkage	<p>The Long Derries a low esker ridge running from Edenderry to Rathdangan. It consists primarily of glacial gravels interspersed with loam and peat soil. The Long Derries is of botanical importance due to the presence of good quality dry, calcareous grassland, an interesting gravel pit flora and the presence of three rare plant species, two of which are legally protected. The presence of an interesting transition habitat from esker to peatland, and a varied bird population, including the rare Nightjar and Partridge, adds to the importance of the site.</p> <p>The Long Derries, Edenderry SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM07 and therefore has the potential to be influenced by the Eastern CFRAM Study. As such, it has been included in the screening.</p> <p>There are three AFAs within approximately 15km of the Long Derries, Edenderry SAC. These are: Edenderry (2.9km), Johnstown Bridge (12.9km) and Longwood (15.7km).</p> <p>Johnstown Bridge and Longwood AFAs are on the River Blackwater catchment and there is no hydraulic connectivity between these sites and the SAC, nor any connectivity by virtue of a biodiversity stepping stone or corridor.</p> <p>In reviewing the EPA watercourse datasets it appears that Long Derries, Edenderry SAC has a watercourse passing through it which passes through the boundary of the Hydrometric Area and provides connectivity with Edenderry AFA, via the Grand Canal. However, when the site's qualifying interests and conservation objectives are taken into consideration, there is no possibility of any upstream / upcatchment FRM methods being adopted at Edenderry AFA that would have any adverse impacts on these interests and it is concluded that no potential impact pathway exists between the AFAs and the European site.</p>	
Potential Impacts	As there is no potential impact pathway between the qualifying interests of the Long Derries, Edenderry SAC and any of the AFAs in UoM07, it has been concluded that the SAC will not be impacted by the UoM07 FRMP. Consequently, the SAC has been removed from any further screening.	

Name: White Lough, Ben Loughs And Lough Doo SAC		Site Code: (IE00001810)
Qualifying Interest(s)	Annex I Habitat: Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. [3140], Annex II species: <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092]	
Proximity to AFA(s) and Linkage	<p>White Lough, Ben Loughs and Lough Doo SAC is comprised of four hard water lakes in a small, poorly-drained valley, 4 km east of Castlepollard, Co. Westmeath. This site is of considerable conservation significance for its hard water lakes and for the occurrence of White-clawed Crayfish. The variety of habitats within this valley and the contrasting vegetation types add further to its interest.</p> <p>White Lough, Ben Loughs And Lough Doo SAC is in the north-eastern corner of UoM07. The nearest AFA is Athboy, 19.4km from the European site. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and Athboy AFA. It is therefore concluded that no potential impact pathway exists between Athboy AFA and the SAC, nor between the site and any other AFA in the Eastern CFRAM Study.</p>	

Potential Impacts	As there is no potential impact pathway between the qualifying interests of the White Lough, Ben Loughs And Lough Doo SAC and any of the AFAs in UoM07, it has been concluded that the SAC will not be impacted by the UoM07 FRMP. Consequently, the SAC has been removed from any further screening.
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APPENDIX C:

Table C1 – Qualifying interests, key environmental conditions supporting site integrity and conservation objectives for European sites in UoM07.

Site Name and Code	Qualifying interests	Key environmental conditions supporting site integrity	Conservation Objectives	Water-dependent
Boyne Coast and Estuary SAC (001957)	1130 Estuaries	Supply of riverine freshwater; Unimpeded tidal flow; Shelter from open coasts; Diverse invertebrate Communities.	Maintain favourable conservation condition, defined by the following attributes and targets: Habitat Area – The permanent habitat area is stable or increasing, subject to natural processes. Community Distribution – Conserve the following community types in a natural condition: intertidal estuarine mud and fine sand with <i>Hediste diversicolor</i> and <i>Corophium volutator</i> community; and Subtidal fine sand dominated by polychaetes community.	Yes
	1140 Mudflats and sandflats not covered by seawater at low tide.	Silt deposits in sheltered estuaries.	Maintain favourable conservation condition, defined by the following attributes and targets: Habitat Area – The permanent habitat area is stable or increasing, subject to natural processes. Community Distribution – Conserve the following community types in a natural condition: Intertidal estuarine mud and fine sand with <i>Hediste diversicolor</i> and <i>Corophium volutator</i> community; and Fine sand dominated by bivalves community complex.	
	1310 Salicornia and other annuals colonizing mud and sand	Frequency of tidal Submergence.	Restore the favourable conservation condition, defined by the following attributes and targets: Habitat Area – Area stable or increasing, subject to natural processes, including erosion and succession. Habitat Distribution – No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply – Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions. Physical structure: creeks and pans – Maintain creek and pan structure, subject to natural processes, including erosion and succession. Physical structure: flooding regime – Maintain natural tidal regime. Vegetation structure: zonation – Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession. Vegetation structure: vegetation height – Maintain structural variation within sward. Vegetation structure: vegetation cover – Maintain more than 90% of area outside creeks vegetated.	

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			<p><u>Vegetation composition: typical species and sub-communities –</u></p> <p>Maintain the presence of species-poor communities with typical species listed in the Saltmarsh Monitoring Project (McCorry and Ryle, 2009).</p> <p><u>Vegetation structure: negative indicator species <i>Spartina anglica</i> -</u> No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1%.</p>	
1330 Atlantic salt meadows (Glauco-Puccinellietalia maritima)	Frequency of tidal submergence.		<p><u>Maintain</u> favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Habitat Area</u> – Area stable or increasing, subject to natural processes, including erosion and succession.</p> <p><u>Habitat Distribution</u> – No decline or change in habitat distribution, subject to natural processes.</p> <p><u>Physical structure: sediment supply</u> – Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions.</p> <p><u>Physical structure: creeks and pans</u> – Maintain creek and pan structure, subject to natural processes, including erosion and succession.</p> <p><u>Physical structure: flooding regime</u> – Maintain natural tidal regime.</p> <p><u>Vegetation structure: zonation</u> - Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.</p> <p><u>Vegetation structure: vegetation height</u> – Maintain structural variation within sward.</p> <p><u>Vegetation structure: vegetation cover</u> - Maintain more than 90% of area outside creeks vegetated.</p>	
1410 Mediterranean salt meadows (Juncetalia maritimi)	Frequency of tidal submergence.		<p><u>Maintain or restore</u> the favourable conservation status.</p> <p>Favourable conservation status of a habitat is achieved when:</p> <ul style="list-style-type: none"> • its natural range, and area it covers within that range, are stable or increasing, and • 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 • the conservation status of its typical species is favourable. 	
2110 Embryonic shifting dunes	Dune-building grasses <i>Elytrigia juncea</i> and <i>Leymus arenarius</i> ; Supply of windblown sand.		<p><u>Restore</u> the favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Habitat Area</u> - Area stable or increasing, subject to natural processes, including erosion and succession.</p> <p><u>Habitat Distribution</u> - No decline or change in habitat distribution, subject to natural processes.</p> <p><u>Physical structure: functionality and sediment supply</u> – Maintain the natural circulation of sediment and organic matter, without any physical obstructions.</p> <p><u>Vegetation structure: zonation</u> - Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.</p> <p><u>Vegetation composition: plant health of foredune grasses</u> - More than 95% of sand couch (<i>Elytrigia</i></p>	

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			<p><i>juncea</i>) and/or lymegrass (<i>Leymus arenarius</i>) should be healthy (i.e. green plant parts above ground and flowering heads present).</p> <p>Vegetation composition: Typical species and sub-communities - Maintain the presence of species-poor communities with typical species: sand couch (<i>Elytrigia juncea</i>) and/or lyme-grass (<i>Leymus arenarius</i>).</p> <p>Vegetation composition: negative indicator species – Negative indicator species (including non-natives) to represent less than 5% cover.</p>	
	2120 – Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes')	Supply of wind-blown sand.	<p>Restore the favourable conservation condition, defined by the following attributes and targets:</p> <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: functionality and sediment supply – Maintain the natural circulation of sediment and organic matter, without any physical obstructions.</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 composition: plant health of dune grasses - More than 95% of marram (<i>Ammophila arenaria</i>) and/or lyme-grass (<i>Leymus arenarius</i>) should be healthy (i.e. green plant parts above ground and flowering heads present).</p> <p>Vegetation composition: Typical species and sub-communities – Maintain the presence of species-poor communities dominated by marram (<i>Ammophila arenaria</i>) and/or lyme-grass (<i>Leymus arenarius</i>).</p> <p>Vegetation composition: negative indicator species – Negative indicator species (including non-natives) to represent less than 5% cover.</p>	
	2130 – Fixed coastal dunes with herbaceous vegetation ('grey dunes')	<p>Low wind;</p> <p>Weakly saline conditions;</p> <p>In shelter of <i>Ammophila arenaria</i> dunes;</p> <p>Grazing.</p>	<p>Restore the favourable conservation condition, defined by the following attributes and targets:</p> <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: functionality and sediment supply – Maintain the natural circulation of sediment and organic matter, without any physical obstructions.</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: bare ground - Bare ground should not exceed 10% of fixed dune habitat, subject to natural processes.</p> <p>Vegetation composition: sward height - Maintain structural variation within sward.</p> <p>Vegetation composition: typical species and sub-communities – Maintain range of sub-communities</p>	

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			<p>with typical species listed in Ryle et al. (2009).</p> <p><u>Vegetation composition: negative indicator species</u> – Negative indicator species (including non-natives) to represent less than 5% cover.</p> <p><u>Vegetation composition: scrub/trees</u> – No more than 5% cover or under control.</p>	
Boyne Estuary SPA (004080)	A048 - Shelduck (<i>Tadorna tadorna</i>)	<p>Food availability (intertidal flora and fauna/pasture/cereal);</p> <p>Undisturbed coastal roosting sites close to feeding sites.</p>	<p><i>Maintain</i> the favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Population trend</u> – Long-term population trend stable or increasing.</p> <p><u>Distribution</u> – No significant decrease in the range, timing or intensity of use of areas by shelduck, other than that occurring from natural patterns of variation.</p>	-
	O130 – Oystercatcher (<i>Haematopus ostralegus</i>)	<p>Food availability (intertidal fauna/pasture);</p> <p>Flooding regime of coastal grasslands;</p> <p>Undisturbed coastal roosting sites close to feeding areas.</p>	<p><i>Maintain</i> the favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Population trend</u> – Long-term population trend stable or increasing.</p> <p><u>Distribution</u> – No significant decrease in the range, timing or intensity of use of areas by oystercatcher, other than that occurring from natural patterns of variation.</p>	
	A140 – Golden Plover (<i>Pluvialis apricaria</i>)	<p>Food availability (intertidal fauna/pasture);</p> <p>Flooding regime of coastal grasslands;</p> <p>Undisturbed coastal roosting sites close to feeding areas.</p>	<p><i>Maintain</i> the favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Population trend</u> – Long-term population trend stable or increasing.</p> <p><u>Distribution</u> – No significant decrease in the range, timing or intensity of use of areas by golden plover, other than that occurring from natural patterns of variation.</p>	
	A141 Grey Plover (<i>Pluvialis squatarola</i>)	<p>Food availability (intertidal fauna/pasture);</p> <p>Flooding regime of coastal grasslands;</p> <p>Undisturbed coastal roosting sites close to feeding areas.</p>	<p><i>Maintain</i> the favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Population trend</u> – Long-term population trend stable or increasing.</p> <p><u>Distribution</u> – No significant decrease in the range, timing or intensity of use of areas by grey plover, other than that occurring from natural patterns of variation.</p>	
	A142 Lapwing (<i>Vanellus vanellus</i>)	<p>Food availability (intertidal fauna/pasture);</p> <p>Flooding regime of coastal grasslands;</p> <p>Undisturbed coastal roosting</p>	<p><i>Maintain</i> the favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Population trend</u> – Long-term population trend stable or increasing.</p> <p><u>Distribution</u> – No significant decrease in the range, timing or intensity of use of areas by lapwing, other than that occurring from natural patterns of variation.</p>	

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		sites close to feeding areas.		
	A143 Knot (<i>Calidris canutus</i>)	Food availability (intertidal fauna/pasture); Flooding regime of coastal grasslands; Undisturbed coastal roosting sites close to feeding areas.	<p>Maintain the favourable conservation condition, defined by the following attributes and targets:</p> <p>Population trend – Long-term population trend stable or increasing.</p> <p>Distribution – No significant decrease in the range, timing or intensity of use of areas by knot, other than that occurring from natural patterns of variation.</p>	
	A144 Sanderling (<i>Calidris alba</i>)	Food availability (intertidal fauna/pasture); Flooding regime of coastal grasslands; Undisturbed coastal roosting sites close to feeding areas.	<p>Maintain the favourable conservation condition, defined by the following attributes and targets:</p> <p>Population trend – Long-term population trend stable or increasing.</p> <p>Distribution – No significant decrease in the range, timing or intensity of use of areas by sanderling, other than that occurring from natural patterns of variation.</p>	
	A156 Black-tailed Godwit (<i>Limosa limosa</i>)	Food availability (intertidal fauna/pasture); Flooding regime of coastal grasslands; Undisturbed coastal roosting sites close to feeding areas.	<p>Maintain the favourable conservation condition, defined by the following attributes and targets:</p> <p>Population trend – Long-term population trend stable or increasing.</p> <p>Distribution – No significant decrease in the range, timing or intensity of use of areas by black-tailed godwit, other than that occurring from natural patterns of variation.</p>	
	A162 Redshank (<i>Tringa tetanus</i>)	Food availability (intertidal fauna/pasture); Flooding regime of coastal grasslands; Undisturbed coastal roosting sites close to feeding areas.	<p>Maintain the favourable conservation condition, defined by the following attributes and targets:</p> <p>Population trend – Long-term population trend stable or increasing.</p> <p>Distribution – No significant decrease in the range, timing or intensity of use of areas by redshank, other than that occurring from natural patterns of variation.</p>	
	A169 Turnstone (<i>Arenaria interpres</i>)	Food availability (intertidal fauna/pasture); Flooding regime of coastal grasslands; Undisturbed coastal roosting sites close to feeding areas.	<p>Maintain the favourable conservation condition, defined by the following attributes and targets:</p> <p>Population trend – Long-term population trend stable or increasing.</p> <p>Distribution – No significant decrease in the range, timing or intensity of use of areas by turnstone, other than that occurring from natural patterns of variation.</p>	
	A195 Little Tern	Sea level;	Maintain the favourable conservation condition, defined by the following attributes and targets:	

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	(<i>Sterna albifrons</i>)	Natural/artificial nest site availability; Undisturbed breeding sites; Regularity of extreme weather events; Marine prey availability (sand eel); Predation.	Breeding population abundance: apparently occupied nests (AONs) – No significant decline. Productivity rate: fledged young per breeding pair – No significant decline. Distribution: breeding colonies – No significant decline. Prey biomass available - No significant decline. Barriers to connectivity - No significant increase. Disturbance at the breeding site - Human activities should occur at levels that do not adversely affect the breeding little tern population.	
	A999 Wetlands and Waterbirds	-	Maintain the favourable conservation condition, defined by the following attribute and target: Habitat area – The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 594ha, other than that occurring from natural patterns of variation.	
River Boyne and River Blackwater SAC (002299)	7230 Alkaline fens	High water table; Ground -surface water supply; Calcium-rich conditions.	Maintain or restore the favourable conservation status. Favourable conservation status of a habitat is achieved when: <ul style="list-style-type: none"> • its natural range, and area it covers within that range, are stable or increasing, and • 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 • the conservation status of its typical species is favourable. 	Yes
	91EO Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i>	Riparian/lacustrine habitat prone to flooding.	Maintain or restore the favourable conservation status. Favourable conservation status of a habitat is achieved when: <ul style="list-style-type: none"> • its natural range, and area it covers within that range, are stable or increasing, and • 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 • the conservation status of its typical species is favourable. 	
	1099 River Lamprey (<i>Lampetra fluviatilis</i>)	Riverine habitat; Water quality; Riverbed breeding gravels and silt nursery substrate; Unhindered migratory channels.	Maintain or restore the favourable conservation status. The favourable conservation status of a species is achieved when: <ul style="list-style-type: none"> • 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 • the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and • there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. 	

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	1106 Salmon (<i>Salmo salar</i>)	Riverine habitat; Water quality (Q4-5); Riverbed breeding gravels; Quality riparian vegetation; Unhindered migratory routes.	Maintain or restore the favourable conservation status. The favourable conservation status of a species is achieved when: <ul style="list-style-type: none"> • 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 • the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and • there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. 	
	1355 Otter (<i>Lutra lutra</i>)	Prey availability; Water quality; Riparian vegetation for breeding sites; Unhindered passage along waterways.	Maintain or restore the favourable conservation status. The favourable conservation status of a species is achieved when: <ul style="list-style-type: none"> • 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 • the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and • there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. 	
River Boyne and River Blackwater SPA (004232)	A229 Kingfisher (<i>Alcedo atthis</i>)	Marine/freshwater food availability; Undisturbed soft substrate riparian nest sites; Regularity of extreme weather; Water quality.	Maintain or restore the favourable conservation status. The favourable conservation status of a species is achieved when: <ul style="list-style-type: none"> • 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 • the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and • there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. 	-
River Nanny Estuary and Shore SPA (004158)	A130 Oystercatcher (<i>Haematopus ostralegus</i>)	Food availability (intertidal fauna/pasture); Flooding regime of coastal grasslands; Undisturbed coastal roosting sites close to feeding areas.	Maintain the favourable conservation condition, defined by the following attributes and targets: Population trend – Long-term population trend stable or increasing. Distribution – No significant decrease in the range, timing or intensity of use of areas by oystercatcher, other than that occurring from natural patterns of variation.	-
	A137 Ringed Plover (<i>Charadrius hiaticula</i>)	Food availability (intertidal fauna/pasture); Flooding regime of coastal	Maintain the favourable conservation condition, defined by the following attributes and targets: Population trend – Long-term population trend stable or increasing.	

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		grasslands; Undisturbed coastal roosting sites close to feeding areas.	<u>Distribution –</u> No significant decrease in the range, timing or intensity of use of areas by ringed plover, other than that occurring from natural patterns of variation.	
	A140 Golden Plover (<i>Pluvialis apricaria</i>)	Food availability (intertidal fauna/pasture); Flooding regime of coastal grasslands; Undisturbed coastal roosting sites close to feeding areas.	<u>Maintain</u> the favourable conservation condition, defined by the following attributes and targets: <u>Population trend –</u> Long-term population trend stable or increasing. <u>Distribution –</u> No significant decrease in the range, timing or intensity of use of areas by golden plover, other than that occurring from natural patterns of variation.	
	A143 Knot (<i>Calidris canutus</i>)	Food availability (intertidal fauna/pasture); Flooding regime of coastal grasslands; Undisturbed coastal roosting sites close to feeding areas.	<u>Maintain</u> the favourable conservation condition, defined by the following attributes and targets: <u>Population trend –</u> Long-term population trend stable or increasing. <u>Distribution –</u> No significant decrease in the range, timing or intensity of use of areas by Knot, other than that occurring from natural patterns of variation.	
	A144 Sanderling (<i>Calidris alba</i>)	Food availability (intertidal fauna/pasture); Flooding regime of coastal grasslands; Undisturbed coastal roosting sites close to feeding areas.	<u>Maintain</u> the favourable conservation condition, defined by the following attributes and targets: <u>Population trend –</u> Long-term population trend stable or increasing. <u>Distribution –</u> No significant decrease in the range, timing or intensity of use of areas by sanderling, other than that occurring from natural patterns of variation.	
	A184 Herring Gull (<i>Larus argentatus</i>)	Food availability (intertidal fauna/pasture); Flooding regime of coastal grasslands; Undisturbed coastal roosting sites close to feeding areas.	<u>Maintain</u> the favourable conservation condition, defined by the following attributes and targets: <u>Population trend –</u> Long-term population trend stable or increasing. <u>Distribution –</u> No significant decrease in the range, timing or intensity of use of areas by herring gull, other than that occurring from natural patterns of variation.	
	A999 Wetlands	-	<u>Maintain</u> the favourable conservation condition, defined by the following attribute and target: <u>Wetland Habitat –</u> The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 230ha, other than that occurring from natural patterns of variation.	

GLOSSARY OF TERMS

Annual Exceedance Probability Or AEP	The probability, typically expressed as a percentage, of a flood event of a given magnitude being equalled or exceeded in any given year. For example, a 1% AEP flood event has a 1%, or 1 in a 100, chance of occurring or being exceeded in any given year.
Appropriate Assessment	An assessment of the effects of a plan or project on Natura 2000 sites (European Sites). European Sites comprise Special Protection Areas under the Birds Directive and Special Areas of Conservation under the Habitats Directive.
Area for Further Assessment or AFA	Areas where, based on the Preliminary Flood Risk Assessment, the risks associated with flooding are considered to be potentially significant. For these areas further, more detailed assessment is required to determine the degree of flood risk, and develop measures to manage and reduce the flood risk. The AFAs are the focus of the CFRAM Studies.
Arterial Drainage Scheme	Works undertaken under the Arterial Drainage Act (1945) to improve the drainage of land. Such works were undertaken, and are maintained on an ongoing basis, by the OPW.
Biodiversity	Word commonly used for biological diversity and defined as assemblage of living organisms from all habitats including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part.
Birds Directive	European Union Council Directive 2009/147/EC - codified version of Directive 79/409/EEC on the Conservation of Wild Birds, as amended
Catchment	The area of land draining to a particular point on a river or drainage system, such as an Area for Further Assessment (AFA) or the outfall of a river to the sea.
Catchment Flood Risk Assessment and Management Study Or CFRAM Study	A study to assess and map the flood hazard and risk, both existing and potential future, from fluvial and coastal waters, and to define objectives for the management of the identified risks and prepare a Plan setting out a prioritised set of measures aimed at meeting the defined objectives.
Consequences	The impacts of flooding, which may be direct (e.g., physical injury or damage to a property or monument), a disruption (e.g., loss of electricity supply or blockage of a road) or indirect (e.g., stress for affected people or loss of business for affected commerce)
Drainage	Works to remove or facilitate the removal of surface or sub-surface water, e.g., from roads and urban areas through urban storm-water drainage systems, or from land through drainage channels or watercourses that have been deepened or increased in capacity.
Drainage District	Works across a specified area undertaken under the Drainage Acts to facilitate land drainage.
Estuary	A semi-enclosed coastal body of water with one or more rivers or streams flowing into it, and with an open connection to the sea.
Flood	The temporary covering by water of land that is not normally covered by water.

‘Floods’ Directive	The European Union ‘Floods’ Directive [2007/60/EC] is the Directive that came into force in November 2007 requiring Member States to undertake a PFRA to identify Areas for Further Assessment (AFAs), and then to prepare flood maps and Plans for these areas.
Flood Extent	The extent of land that has been, or might be, flooded. Flood extent is often represented on a flood map.
Flood Risk	Refers to the potential adverse consequences resulting from a flood hazard. The level of flood risk is the product of the frequency or likelihood of flood events and their consequences (such as loss, damage, harm, distress and disruption).
Flood Risk Management Method	Structural and non-structural interventions that modify flooding and flood risk either through changing the frequency of flooding, or by changing the extent and consequences of flooding, or by reducing the vulnerability of those exposed to flood risks.
Flood Risk Management Option	Can be either a single flood risk management method in isolation or a combination of more than one method to manage flood risk.
Flood Risk Management Plan (Plan)	A Plan setting out a prioritised set of measures within a long-term sustainable strategy aimed at achieving defined flood risk management objectives. The Plan is developed at a River Basin (Unit of Management) scale, but is focused on managing risk within the AFAs.
Floodplain	The area of land adjacent to a river or coastal reach that is prone to periodic flooding from that river or the sea.
Fluvial	Riverine, often used in the context of fluvial flooding, i.e., flooding from rivers, streams, etc.
Groundwater	All water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil. This zone is commonly referred to as an aquifer which is a subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow a significant flow of groundwater or the abstraction of significant quantities of groundwater.
Habitats Directive	The Habitats Directive [92/43/EEC] on the Conservation of Natural Habitats and of Wild Flora and Fauna aims at securing biodiversity through the provision of protection for animal and plant species and habitat types deemed to be of European conservation importance.
Hazard	Something that can cause harm or detrimental consequences. In this context, the hazard referred to is flooding.
Hydraulics	The science of the behaviour of fluids, often used in this context in relation to estimating the conveyance of flood water in river channels or structures (such as culverts) or overland to determine flood levels or extents.
Hydrology	The science of the natural water cycle, often used in this context in relation to estimating the rate and volume of rainfall flowing off the land and of flood flows in rivers.
Hydrometric Area	Hydrological divisions of land, generally large catchments or a conglomeration of small catchments, and associated coastal areas. There are 40 Hydrometric Areas in the island of Ireland.

Hydromorphology	The physical characteristics of the shape, boundaries and content of a water body. For rivers, this includes river depth and width variation, structure and substrate of the river bed and structure of the riparian zone. For lakes it includes lake depth variation, quantity, structure & substrate of the lake bed and structure of the lake shore.
Individual Risk Receptor Or IRR	A single receptor (see below) that has been determined to represent a potentially significant flood risk (as opposed to a community or other area at potentially significant flood risk AFA).
Inundation Measure	Another word for flooding or a flood (see 'Flood') A measure (when used in the context of a flood risk management measure) is a set of works, structural and / or non-structural, aimed at reducing or managing flood risk.
Mitigation Measures	Measures to avoid/prevent, minimise/reduce, or as fully as possible, offset/compensate for any significant adverse effects on the environment, as a result of implementing a plan or project.
Morphology / Morphological National CFRAM Programme	See 'hydromorphology' above. The programme developed by the OPW to implement key aspects of the EU 'Floods' Directive in Ireland, which includes the CFRAM Studies, and builds on the findings of the PFRA.
Natura 2000	European network of protected sites ('European sites') which represent areas of the highest value for natural habitats and species of plants and animals which are rare, endangered or vulnerable in the European Community. The Natura 2000 network includes two types of area: Special Areas of Conservation (SAC) where they support rare, endangered or vulnerable natural habitats and species of plants or animals (other than birds) and Special Protection Areas (SPA) where areas support significant numbers of wild birds and their habitats. SACs are designated under the Habitats Directive and SPAs are classified under the Birds Directive. Certain sites may be designated as both SAC and SPA.
Natural Heritage Area	An area of national nature conservation importance, designated under the Wildlife Act 1976 (as amended), for the protection of features of high biological or earth heritage value or for its diversity of natural attributes.
Non Structural Options	Include flood forecasting and development control to reduce the vulnerability of those currently exposed to flood risks and limit the potential for future flood risks.
Pluvial	Refers to rainfall, often used in the context of pluvial flooding, i.e., flooding caused directly from heavy rainfall events (rather than over-flowing rivers).
Preliminary Flood Risk Assessment Or PFRA	An initial, high-level screening of flood risk at the national level to determine where the risks associated with flooding are potentially significant, to identify the AFAs. The PFRA is the first step required under the EU 'Floods' Directive.
Ramsar Site	Wetland site of international importance designated under the Ramsar Convention on Wetlands of International Importance 1971, primarily because of its importance for waterfowl. All Ramsar sites hold the European designation of SAC or SPA (or both).

Receptor	Something that might suffer harm or damage as a result of a flood, such as a house, office, monument, hospital, agricultural land or environmentally designated sites.
Return Period	A term that was used to describe the probability of a flood event, expressed as the interval in the number of years that, on average over a long period of time, a certain magnitude of flood would be expected to occur. This term has been replaced by 'Annual Exceedance Probability, as Return Period can be misleading.
Riparian	River bank. Often used to describe the area on or near a river bank that supports certain vegetation suited to that environment (Riparian Zone).
Risk	The combination of the probability of flooding, and the consequences of a flood.
River Basin	An area of land (catchment) draining to a particular estuary or reach of coastline.
River Basin District Or RBD	A hydrological division of land defined for the purposes of the Water Framework Directive. There are eight RBDs in the island of Ireland; each comprising a group of River Basins.
Riverine	Related to a river.
Runoff	The flow of water over or through the land to a waterbody (e.g., stream, river or lake) resulting from rainfall events. This may be overland, or through the soil where water infiltrates into the ground.
Screening [or Test of Likely Significance]	The process which identifies the likely impacts upon a European site [Natura 2000 site] of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant.
SEA Directive	European Directive 2001/42/EC on the Assessment of the Effects of certain Plans and Programmes on the Environment – 'Strategic Environmental Assessment'.
Sedimentation	The accumulation of particles (of soil, sand, clay, peat, etc.) in the river channel.
Significant Risk	Flood risk that is of particular concern nationally. The PFRA Main Report (see www.cfam.ie) sets out how significant risk is determined for the PFRA, and hence how Areas for Further Assessment have been identified.
Spatial Scale(s) of Assessment	Defines the spatial scale at which flood risk management options are assessed. Assessment Units are defined on four spatial scales ranging in size from largest to smallest as follows: catchment scale, Assessment Unit (AU) scale, Areas for Further Assessment (APSR) and Individual Risk Receptors (IRR).
Special Area of Conservation	A Special Area of Conservation (SAC) is an internationally important site, protected for its habitats and non-bird species. It is designated, as required, under the EC Habitats Directive. A candidate SAC (cSAC) is a candidate site, but is afforded the same status as if it were confirmed.
Special Protection Area	A Special Protection Area (SPA) is a site of international importance for breeding, feeding and roosting habitat for bird species. It is designated, as required, under the EC Birds Directive.
Standard of Protection Or SoP	The magnitude of flood, often defined by the annual probability of that flood occurring being exceeded (the Annual Exceedance Probability, or 'AEP'), that a measure / works is designed to protect the area at risk against.

Strategic Environmental Assessment Or SEA	A SEA is an environmental assessment of plans (such as the Plans) and programmes to ensure a high level consideration of environmental issues in the plan preparation and adoption, and is a requirement provided for under the SEA directive [2001/42/EC]
Structural Options	Involve the application of physical flood defence measures, such as flood walls and embankments, which modify flooding and flood risk either through changing the frequency of flooding, or by changing the extent and consequences of flooding.
Surface Water	Water on the surface of the land. Often used to refer to ponding of rainfall unable to drain away or infiltrate into the soil.
Surge	The phenomenon of high sea levels due to meteorological conditions, such as low pressure or high winds, as opposed to the normal tidal cycles
Sustainability	The capacity to endure. Often used in an environmental context or in relation to climate change, but with reference to actions people and society may take.
Tidal	Related to the tides of the sea / oceans, often used in the context of tidal flooding, i.e., flooding caused from high sea or estuarine levels.
Topography	The shape of the land, e.g., where land rises or is flat.
Transitional Water	The estuarine or inter-tidal reach of a river, where the water is influenced by both freshwater river flow and saltwater from the sea.
Unit of Management Or UoM	A hydrological division of land defined for the purposes of the Floods Directive. One Plan will be prepared for each Unit of Management, which is referred to within the Plan as a River Basin.
Vulnerability	The potential degree of damage to a receptor (see above), and the degree of consequences that would arise from such damage.
Water Framework Directive Or WFD	The Water Framework Directive [2000/60/EC] aims to protect surface, transitional, coastal and ground waters to protect and enhance the aquatic environment and ecosystems and promote sustainable use of water resources
Waterbody	A term used in the Water Framework Directive (see below) to describe discrete section of rivers, lakes, estuaries, the sea, groundwater and other bodies of water.
Watercourse	Any flowing body of water including rivers, streams, drains, ditches etc.
Zone of Influence	The area over which ecological features may be subject to significant effects as a result of the proposed Plan and associated activities. This may extend beyond the Plan area, for example where there are ecological or hydrological links beyond the Plan boundary. The zone of influence may vary for different ecological features depending on their sensitivity to an environmental change.



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