

Natura Impact Statement

Liffey & Dublin Bay

Natura Impact Statement

For

River Basin (09) Liffey & Dublin Bay Flood Risk Management Plan

Areas for Further Assessment included in the Plan:

<i>Cathair Bhaile Átha Cliath</i>	<i>Dublin City</i>
<i>Cluain Aodha</i>	<i>Clonee</i>
<i>Dún Búinne</i>	<i>Dunboyne</i>
<i>Collchoill</i>	<i>Hazelhatch</i>
<i>Páirc Belcamp</i>	<i>Belcamp Park</i>
<i>Baile Dhónaill</i>	<i>Baldonnel</i>
<i>Baile Ghrífin</i>	<i>Balgriffin</i>
<i>Cill Droichid & Collchoill</i>	<i>Celbridge</i>
<i>Baile Coimín</i>	<i>Blessington</i>
<i>Claonadh</i>	<i>Clane</i>
<i>Cionn Sáile</i>	<i>Kinsaley</i>
<i>Cill Choca</i>	<i>Kilcock</i>
<i>Léim an Bhradáin</i>	<i>Leixlip</i>
<i>Mullach Eadrad</i>	<i>Mulhuddart</i>
<i>Leamhcán go Séipéal Iosóid</i>	<i>Lucan to Chapelizod</i>
<i>Mullach Íde</i>	<i>Malahide</i>
<i>Maigh Nuad</i>	<i>Maynooth</i>
<i>An Nás</i>	<i>Naas</i>
<i>Droichead Nua</i>	<i>Newbridge</i>
<i>Cill Fhionntain & Baile Dúill</i>	<i>Sutton & Baldoyle</i>
<i>Cill Fhionntain & Binn Éadair (Thuaidh)</i>	<i>Sutton & Howth North</i>
<i>Sord (Theas)</i>	<i>Swords (South)</i>
<i>Seantrabh</i>	<i>Santry</i>
<i>Toimín & An Cillín Mór</i>	<i>Turnings</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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Eastern CFRAM Study

UoM 09 Flood Risk Management Plan

Natura Impact Statement

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The draft Flood Risk Management Plans are intended **for the purpose of consultation only**. They should not be used or relied upon for any other purpose or decision-making process. They are likely to be updated, refined or changed before finalisation. The Commissioners of Public Works in Ireland reserve the right to change the content and/or presentation of any of the information provided in the draft Flood Risk Management Plans at their sole discretion.

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- Louth County Council
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- Offaly County Council
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- Westmeath County Council
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- Mid-East Regional Authority
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- The Environmental Protection Agency
- Met Éireann
- All members of the National CFRAM Steering and Stakeholder Groups

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TABLE OF CONTENTS

1	INTRODUCTION AND BACKGROUND.....	1
1.1	THE FLOODS DIRECTIVE	1
1.1.1	The Eastern Catchment-based Flood Risk Assessment and Management Study	2
1.2	LEGISLATIVE CONTEXT	2
2	APPROACH.....	5
2.1	GUIDANCE	5
3	STAGE 1: SCREENING FOR APPROPRIATE ASSESSMENT	9
3.1	DESCRIPTION OF THE PLAN	9
3.1.1	The Eastern CFRAM Study and its associated FRMPs.....	9
3.1.2	Site Location.....	10
3.1.2.1	UoM09.....	10
3.1.2.2	Projects running in Parallel with the Eastern CFRAM Study.....	11
3.1.3	Methodology for the Appropriate Assessment.....	11
3.2	ELEMENTS OF THE FRMP WITH POTENTIAL TO CAUSE ADVERSE IMPACTS ON EUROPEAN SITES.....	17
3.3	RELATIONSHIP WITH OTHER RELEVANT PLANS AND PROGRAMMES.....	19
3.4	EUROPEAN SITES	22
3.4.1	Initial Screening Exercise	22
3.4.1.1	Capture of Sites for Screening – RBD/Study Scale	22
3.4.1.2	European Site Screening – Plan Scale	25
3.4.1.3	European Site Screening – Establishment of the ‘Zone of Influence’	25
3.4.1.4	European Sites–Selection for Preliminary Screening of Methods & Options	26
3.5	PRELIMINARY SCREENING RESULTS FOR UOM09.....	28
3.5.1	Conclusion of UoM09 Preliminary Screening Results.....	37
4	SUMMARY OF PROPOSED MEASURES.....	40
4.1	UOM-SCALE FLOOD MANAGEMENT MEASURES.....	40
4.1.1	Sustainable Planning and Development Management	40
4.1.2	Sustainable Urban Drainage Systems (SuDS)	41
4.1.3	Voluntary Home Relocation	41
4.1.4	Local Adaptation Planning.....	41
4.1.5	Land Use Management and Natural Flood Risk Management Measures	41
4.1.6	Maintenance of Arterial Drainage Schemes.....	42
4.1.7	Maintenance of Drainage Districts.....	42
4.1.8	Flood Forecasting and Warning.....	43
4.1.9	Review of Emergency Response Plans for Severe Weather	43
4.1.10	Promotion of Individual and Community Resilience	43
4.1.11	Individual Property Protection	44

4.1.12	Flood-Related Data Collection.....	44
4.1.13	Minor Works Scheme	44
4.2	SUB-CATCHMENT MEASURES	45
4.3	AFA-SCALE MEASURES	46
4.3.1	Communities (AFAs) of Zero or Very Low Risk	46
4.3.1.1	Baldonnell AFA	46
4.3.1.2	Kilcock AFA	46
4.3.1.3	Sutton & Baldoyle AFA.....	47
4.3.1.4	Kinsaley AFA	47
4.3.2	AFAs with Measures Put Forward in the FRMP	48
4.3.2.1	Blessington AFA	50
4.3.2.2	Dublin City AFA - Carysfort Maretimo HPW.....	51
4.3.2.3	Celbridge AFA & Hazelhatch AFA.....	52
4.3.2.4	Clane AFA	53
4.3.2.5	Leixlip AFA	54
4.3.2.6	Lucan to Chapelizod AFA	55
4.3.2.7	Maynooth AFA.....	56
4.3.2.8	Naas AFA	57
4.3.2.9	Newbridge AFA.....	58
4.3.2.10	Santry AFA/HPW.....	59
4.3.2.11	Sutton & Howth North AFA.....	60
5	APPROPRIATE ASSESSMENT OF AFA-SCALE MEASURES	61
5.1	BLESSINGTON AFA	61
5.1.1	Identification of Potential Sources of Impact.....	62
5.1.1.1	Potential Sources of Impact via Surface Water Pathways	62
5.1.1.2	Potential Sources of Impact via Land and Air Pathways	63
5.1.2	Impact Assessment	63
5.1.2.1	In-combination Effects.....	63
5.1.3	Conclusions	67
5.2	DUBLIN CITY AFA - CARYSFORT MARETIMO HPW	68
5.2.1	Identification of Potential Sources of Impact.....	69
5.2.1.1	Potential Sources of Impact via Surface Water Pathways	69
5.2.1.2	Potential Sources of Impact via Land and Air Pathways	70
5.2.2	Impact Assessment	71
5.2.2.1	In-combination Effects.....	71
5.2.3	Conclusions	76
5.3	CELBRIDGE AFA AND HAZELHATCH AFA.....	77
5.3.1	Identification of Potential Sources of Impact.....	78
5.3.1.1	Potential Sources of Impact via Surface Water Pathways	78
5.3.2	Impact Assessment	79

5.3.2.1	<i>In-combination Effects</i>	79
5.3.3	Conclusions	87
5.4	CLANE AFA	88
5.4.1	Identification of Potential Sources of Impact.....	89
5.4.1.1	<i>Potential Sources of Impact via Surface Water Pathways</i>	89
5.4.2	Impact Assessment	90
5.4.2.1	<i>In-combination Effects</i>	90
5.4.3	Conclusions	97
5.5	LEIXLIP AFA	98
5.5.1	Identification of Potential Sources of Impact.....	99
5.5.1.1	<i>Potential Sources of Impact via Surface Water Pathways</i>	99
5.5.1.2	<i>Potential Sources of Impact via Land and Air Pathways</i>	100
5.5.1.3	<i>Potential Sources of Impact via Groundwater Pathways</i>	100
5.5.2	Impact Assessment	102
5.5.2.1	<i>In-combination Effects</i>	102
5.5.3	Conclusions	111
5.6	LUCAN TO CHAPELIZOD AFA	112
5.6.1	Identification of Potential Sources of Impact.....	113
5.6.1.1	<i>Potential Sources of Impact via Surface Water Pathways</i>	113
5.6.2	Impact Assessment	114
5.6.2.1	<i>In-combination Effects</i>	114
5.6.3	Conclusions	122
5.7	MAYNOOTH AFA	123
5.7.1	Identification of Potential Sources of Impact.....	124
5.7.1.1	<i>Potential Sources of Impact via Surface Water Pathways</i>	124
5.7.2	Impact Assessment	125
5.7.2.1	<i>In-combination Effects</i>	125
5.7.3	Conclusions	135
5.8	NAAS AFA	136
5.8.1	Identification of Potential Sources of Impact.....	137
5.8.1.1	<i>Potential Sources of Impact via Surface Water Pathways</i>	137
5.8.2	Impact Assessment	138
5.8.2.1	<i>In-combination Effects</i>	138
5.8.3	Conclusions	145
5.9	NEWBRIDGE AFA	146
5.9.1	Identification of Potential Sources of Impact.....	147
5.9.1.1	<i>Potential Sources of Impact via Surface Water Pathways</i>	147
5.9.2	Impact Assessment	148
5.9.2.1	<i>In-combination Effects</i>	148
5.9.3	Conclusions	155

5.10	SANTRY HPW/AFA	156
5.10.1	Identification of Potential Sources of Impact	157
5.10.1.1	<i>Potential Sources of Impact via Surface Water Pathways</i>	157
5.10.2	Impact Assessment	158
5.10.2.1	<i>In-combination Effects</i>	158
5.10.3	Conclusions	165
5.11	SUTTON AND HOWTH NORTH AFA.....	166
5.11.1	Identification of Potential Sources of Impact	167
5.11.1.1	<i>Potential Sources of Impact via Surface Water Pathways</i>	167
5.11.1.2	<i>Potential Sources of Impact via Land and Air Pathways</i>	168
5.11.2	Impact Assessment	169
5.11.2.1	<i>In-combination Effects</i>	170
5.11.3	Conclusions	181
6	AVOIDANCE AND MITIGATION MEASURES.....	182
6.1	GENERAL MITIGATION	182
6.1.1	Avoidance of Impacts by Selecting Alternative Options and/or Design Solutions	185
6.1.2	Avoid, or Reduce the Scale of, Identified Impacts through Option Development	185
6.1.2.1	<i>Mitigation of loss of Habitats and Species</i>	186
6.1.2.2	<i>Mitigation in relation to Lamprey & Salmonids</i>	186
6.2	MITIGATION OF SUSPENDED SOLIDS POLLUTION	186
6.3	MITIGATION OF OTHER POLLUTION	187
6.4	GUIDELINES	187
7	CONCLUSIONS.....	189
8	REFERENCES.....	192
	APPENDIX A.....	195
	APPENDIX B.....	204
	APPENDIX C.....	231
	GLOSSARY OF TERMS	249

LIST OF FIGURES

Figure 2.1.1:	Schematic of the stages of Appropriate Assessment	6
Figure 3.1.1:	Eastern CFRAM Study Area and Associated Units of Management	12
Figure 3.1.2:	Spatial Scales of Assessment in the Eastern CFRAM Study, FRMPs, SEAs and AA ...	13
Figure 3.1.3:	Environmental Assessment Inputs into the FRMP.....	16
Figure 3.4.1:	Eastern CFRAM Study Area, showing AFAs and Study-Scale Search Area for European Sites	24
Figure 3.5.1:	UoM09 European Sites incorporated in the Preliminary Screening of Methods & Options for the FRMP.....	29
Figure 4.2.1:	UoM09 Spatial Scales of Assessment showing Sub-Catchments.....	45
Figure 4.3.1:	Blessington Preferred Measures.....	50
Figure 4.3.2:	Carysfort Maretimo Preferred Measures	51
Figure 4.3.3:	Celbridge Hazelhatch Preferred Measures	52
Figure 4.3.4:	Clane Preferred Measures	53
Figure 4.3.5:	Leixlip Preferred Measures	54
Figure 4.3.6:	Lucan to Chapelizod AFA Preferred Measures	55
Figure 4.3.7:	Maynooth Preferred Measures	56
Figure 4.3.8:	Naas Option 1 Preferred Measure.....	57
Figure 4.3.9:	Newbridge Preferred Measures.....	58
Figure 4.3.10:	Santry Preferred Measures.....	59
Figure 4.3.11:	Sutton & Howth North Preferred Measures.....	60
Figure 5.1.1:	Blessington AFA in context of catchment and surrounding European sites.....	61
Figure 5.2.1:	Carysfort Maretimo HPW in context of catchment and surrounding European sites..	68
Figure 5.3.1:	Celbridge and Hazelhatch AFAs in the context of catchment and surrounding European sites.....	77
Figure 5.4.1:	Clane AFA in context of catchment and surrounding European sites	88
Figure 5.5.1:	Leixlip AFA in context of catchment and surrounding European sites	98
Figure 5.6.1:	Lucan to Chapelizod AFA in context of catchment and surrounding European sites...	112
Figure 5.7.1:	Maynooth AFA in context of catchment and surrounding European sites	123
Figure 5.8.1:	Naas AFA in context of catchment and surrounding European sites	136
Figure 5.9.1:	Newbridge AFA in context of catchment and surrounding European sites.....	146
Figure 5.10.1:	Santry HPW/AFA in context of catchment and surrounding European sites	156
Figure 5.11.1:	Sutton and Howth North AFA in context of catchment and surrounding European sites	166

LIST OF TABLES

Table 3.1.1:	List of AFAs in the UoM09 FRMP	14
Table 3.2.1:	Summary of Flood Risk Management Methods	18
Table 3.3.1:	List of Other Plans and Projects with potential for in-Combination Effects	19
Table 3.5.1:	European Sites screened for UoM09	30
Table 3.5.2:	UoM09 AFAs requiring further Assessment (Appropriate Assessment) at FRMP stage	37
Table 4.3.1:	Summary of FRM Options advanced in draft FRMP for UoM09.....	48
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 Blessington AFA.....	62
Table 5.1.2:	Qualifying Interests of the screened in European site likely to be impacted upon via land and air pathways from FRM measures undertaken at Blessington AFA.....	63
Table 5.1.3:	Impact assessment for FRM measures at Blessington AFA	65
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 Carysfort Maretimo HPW.	69
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 Carysfort Maretimo HPW.	70
Table 5.2.3:	Impact assessment for FRM measures at Carysfort Maretimo HPW (Hard defences and storage).	73
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 Celbridge and Hazelhatch AFAs.....	78
Table 5.3.2:	Impact assessment for FRM measures at Celbridge and Hazelhatch AFAs (Hard defences, improvement of channel conveyance, and diversion of flow).....	82
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 Clane AFA.	89
Table 5.4.2:	Impact assessment for FRM measures at Clane AFA (Hard defences and improvement of channel conveyance).	92
Table 5.5.1:	Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Leixlip AFA.	99
Table 5.5.2:	Qualifying Interests of the screened in European site likely to be impacted upon via land and air pathways from FRM measures undertaken at Leixlip AFA.	100
Table 5.5.3:	Impact assessment for FRM measures at Leixlip AFA (Hard defences).....	104
Table 5.6.1:	Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Lucan to Chapelizod AFA.	113
Table 5.6.2:	Impact assessment for FRM measures at Lucan to Chapelizod AFA (Hard defences).....	116
Table 5.7.1:	Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Maynooth AFA.	124
Table 5.7.2:	Impact assessment for FRM measures at Maynooth AFA (Hard defences and diversion of flow).	128
Table 5.8.1:	Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Naas AFA.	137
Table 5.8.2:	Impact assessment for FRM measures at Naas AFA (Option 1: Hard defences, Storage, Flow Diversion and Improvement of Channel Conveyance).....	140
Table 5.9.1:	Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Newbridge AFA.	147

Table 5.9.2:	Impact assessment for FRM measures at Newbridge AFA (Hard defences, improvement of channel conveyance, and other works).....	150
Table 5.10.1:	Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Santry HPW/AFA.	157
Table 5.10.2:	Impact assessment for FRM measures at Santry HPW/AFA (Hard defences and improvement of channel conveyance).	160
Table 5.11.1:	Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Sutton and Howth North AFA.	167
Table 5.11.2:	Qualifying Interests of the screened in European sites likely to be impacted upon via land and air pathways from FRM measures undertaken at Sutton and Howth North AFA.	168
Table 5.11.3:	Impact assessment for FRM measures at Sutton and Howth North AFA (Hard defences).....	172
Table 6.1.1:	General Mitigation recommended in the FRMP.....	183
Table 7.1.1:	Integrity of Site Checklist (from DEHLG, 2009)	190

APPENDICES

Appendix A - Summary of Flood Risk Management Methods and their High Level Impacts	195
Appendix B - Screening of European Sites with Potential to be impacted by the UoM09 FRMP	204
Appendix C – Screened-in European sites - Qualifying Interests and Conservation Objectives	231

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
FEMFRA M	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
IROI	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 UoM09 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)

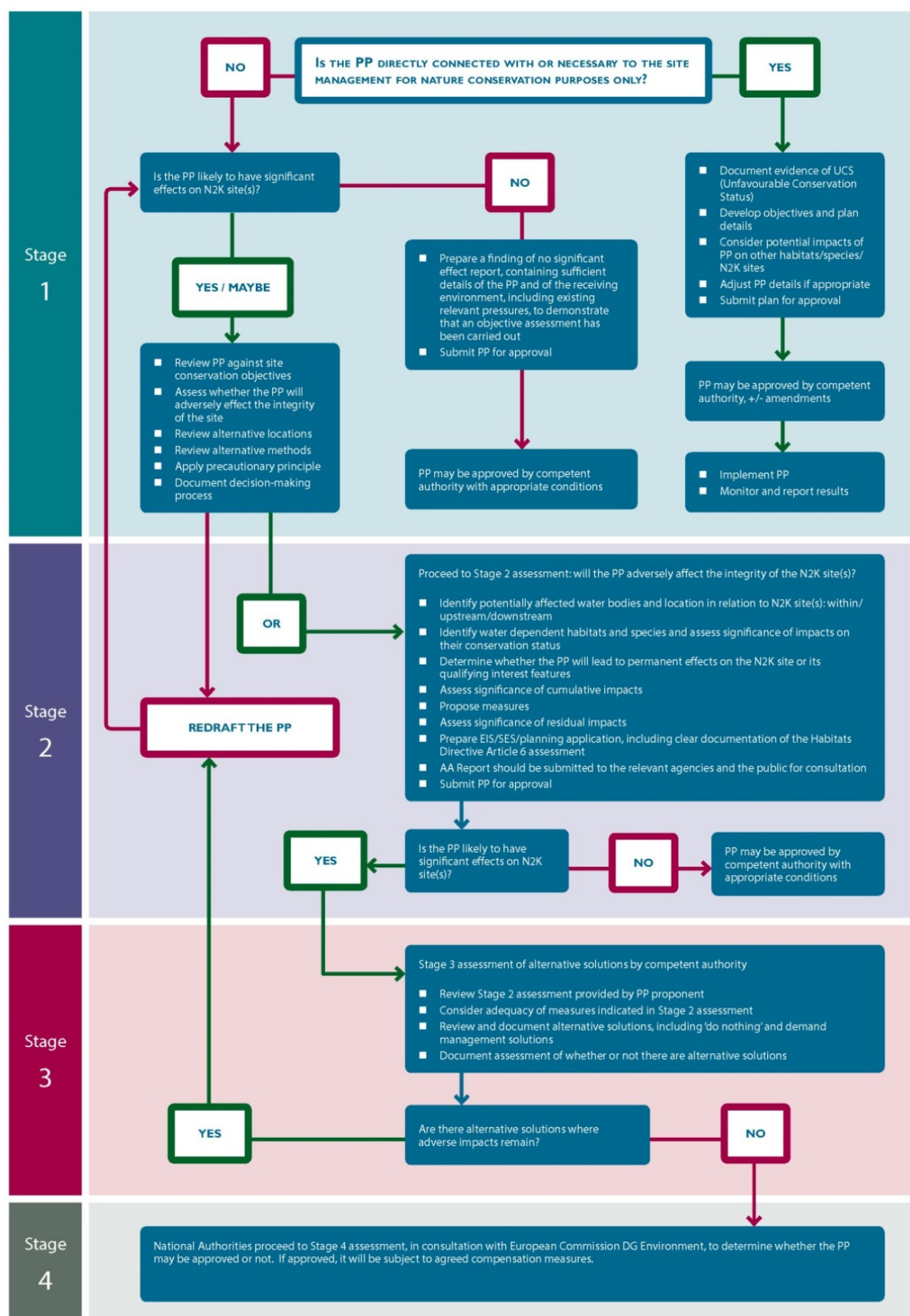


Figure 2.1.1: Schematic of the stages of Appropriate Assessment

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) / Hydrometric Areas (HAs), 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 generally 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 UoM09 FRMP only.

3.1.2.1 UoM09

UoM09 is a relatively urbanised catchment in an Irish context, containing Greater Dublin and its surrounding commuter belt. There are significant towns and developments along the N4 and N7 national road corridors, including Naas, Celbridge and Maynooth. However the upland portions of the catchment are rural in nature hosting agricultural, forestry and power generation land uses and the Wicklow Mountains National Park.

Within UoM09 there are 19 Areas for Further Assessment (AFA), shown in Figure 3.1. Dublin City AFA encompasses several discrete channels which are designated as high priority watercourses (HPWs) and also discrete urban areas which are subject to fluvial flood risk, coastal flood risk or both. All of these discrete elements are listed under the heading of Dublin City AFA but have been analysed and modelled separately.

Part of the area within the UoM09 River Basin was included as part of the River Dodder Pilot CFRAM Project, which covered the Tallaght, Owendoher, Little Dargle, Whitechurch, Dundrum Slang and Dodder catchments. These areas are now contained within the Dublin City AFA.

Part of the UoM09 River Basin was included as part of the Fingal East Meath Flood Risk Assessment and Management (FEM FRAM) Study, which covered the Balgriffin, Belcamp Park, Kinsaley, Malahide and Swords (south) AFAs.

These studies have also been subject to their own AAs, the conclusions of which will also be included in the NIS, where appropriate, for in-combination and cumulative effects.

Details of the Dodder Pilot CFRAM Project and FEM FRAM Study can be found on the National CFRAM Programme website; www.cfram.ie. The UoM09 FRMP includes the measures set out through both Studies, including an update on their current status.

3.1.2.2 Projects running in Parallel with the Eastern CFRAM Study

Some of the AFAs in UoM09 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 (already described above in 3.1.2.1) as well as Sandymount and Clontarf in UoM09 for which Dublin City Council have undertaken the Optioneering. In relation to the UoM09 FRMP, the parallel projects are:

- The Carysfort Maretimo Stream Improvement Scheme
- The Leixlip Flood Relief Scheme
- The Lower Morrell (Straffan) Flood Relief Scheme
- The Morrell Johnstown Flood Relief Scheme
- The Shinkeen (Hazelhatch) Scheme
- The Kilcock Flood Risk Assessment and Management Study
- The Tolka Flood Alleviation Scheme
- The Sandymount Coastal Flood Defence Project, Phase 1 & Phase 2
- The South Campshires Coastal Flood Alleviation Project
- The Clontarf Promenade Flood Alleviation Project
- The Dollymount Cycleway and Flood Alleviation Project
- The Raheny Flood Alleviation Project [The Santry River Flood Protection Project]
- The Wad River Flood Alleviation Project. Phase 1 & Phase 2
- The Dublin Coastal Flood Protection Project.
- The EU-IVB-FloodResilienCity Project
- The SAFER Strategies & Actions for Flood Risk Management
- The River Griffeen Flood Alleviation Scheme
- Griffeen River Flood Relief Works
- Adamstown Link Road Scheme
- Flood Retention Pond at Greenogue Industrial Estate

In addition the flows on the River Liffey are influenced and partly controlled by the Pollaphuca, Golden Falls and Leixlip ESB dams.

In neighbouring UoM10, parallel projects include the River Dargle (Bray) Drainage Scheme and the Avoca River (Arklow) Drainage Scheme, for which Wicklow County Council is progressing schemes.

These projects 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 UoM09 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.

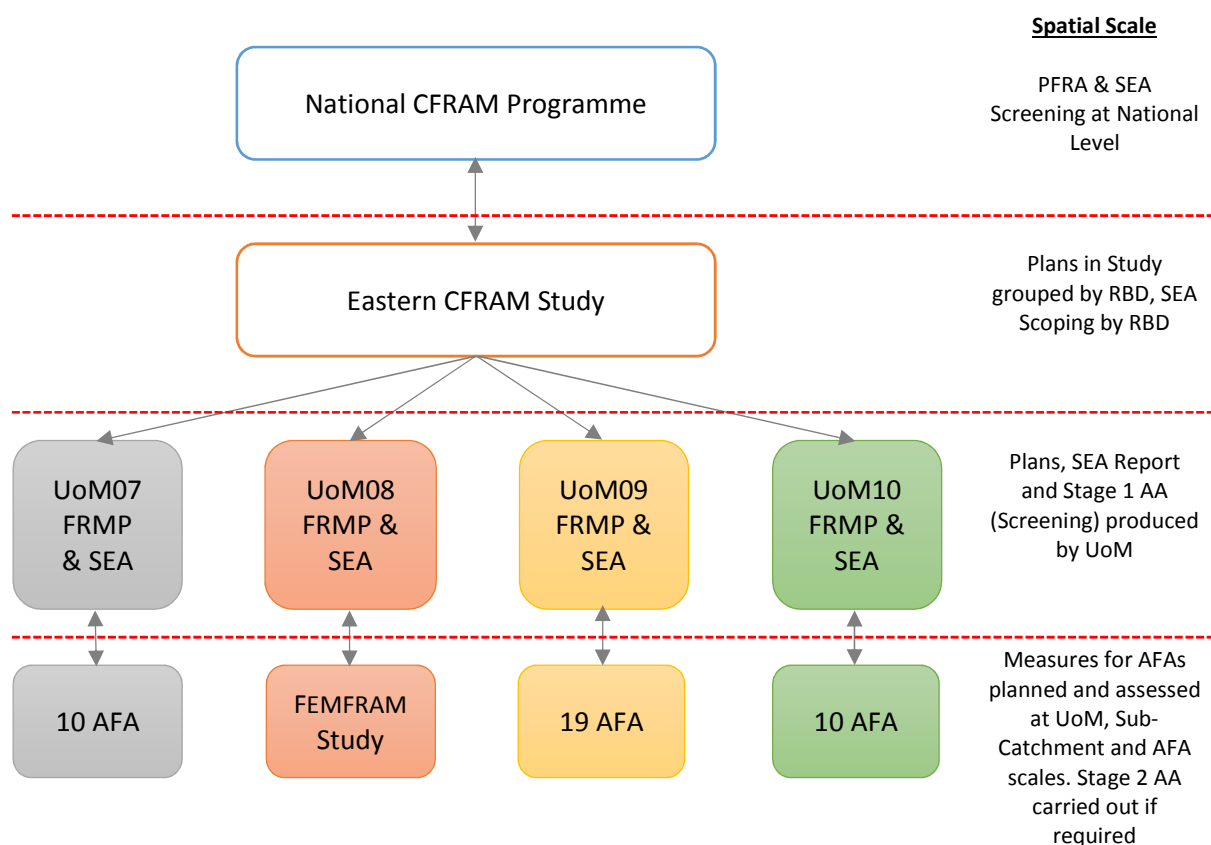


Figure 3.1.2: Spatial Scales of Assessment in the Eastern CFRAM Study, FRMPs, SEAs and AA

A list of the AFAs in UoM09 that have been investigated as part of the Eastern CFRAM Study is given in Table 3.1.1. 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.

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.

Table 3.1.1: List of AFAs in the UoM09 FRMP

AFA	County	Flood Source
Baldonnell	Dublin	Fluvial
<i>Balgriffin⁴</i>	<i>Dublin</i>	<i>Fluvial</i>
<i>Belcamp Park⁴</i>	<i>Dublin</i>	<i>Fluvial</i>
Blessington	Wicklow*	Fluvial
Celbridge ¹	Kildare	Fluvial
Clane	Kildare	Fluvial
<i>Clonee⁵</i>	<i>Dublin</i>	<i>Fluvial</i>
Dublin City ²	Dublin	Fluvial, Coastal, Pluvial
<i>Dunboyne⁵</i>	<i>Dublin</i>	<i>Fluvial</i>
Hazelhatch ¹	Dublin	Fluvial
Kilcock	Kildare	Fluvial
<i>Kinsaley⁴</i>	<i>Dublin</i>	<i>Fluvial</i>
Leixlip	Kildare	Fluvial
Lucan to Chapelizod	Dublin	Fluvial
<i>Malahide⁴</i>	<i>Dublin</i>	<i>Fluvial & Coastal</i>
Maynooth	Kildare	Fluvial
<i>Mulhuddart⁵</i>	<i>Dublin</i>	<i>Fluvial</i>
Naas	Kildare	Fluvial
Newbridge	Kildare	Fluvial
Santry	Dublin	Fluvial
Sutton & Baldoyle	Dublin	Coastal
Sutton & Howth North	Dublin	Coastal
<i>Swords (south)⁴</i>	<i>Dublin</i>	<i>Fluvial</i>
Turnings ³	Kildare	Fluvial

¹Celbridge AFA and the Hazelhatch AFA are reported together throughout this report due to their proximity and hydrological / hydraulic connectivity.

²For the purposes of reporting fluvial and coastal flood risk under the Eastern CFRAM Study, Dublin City AFA includes Carysfort Maretime, Clontarf, Lower Liffey, Raheny and Sandymount AFAs. The Poddle and Camac HPWs are being addressed by specific projects. The Poddle and Camac HPWs are being addressed by specific projects (see Section 3.1.2.2). The Dodder was addressed as a pilot CFRAM study.

³Turnings AFA is being addressed by a specific project (see Section 3.1.2.2).

⁴These AFAs had measures developed under the FEM FRAM Pilot Study.

⁵These AFAs had measures developed under the Tolka Study.

*a small portion of Blessington AFA is in County Kildare

As illustrated in Figure 3.1.3, 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.

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.

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.

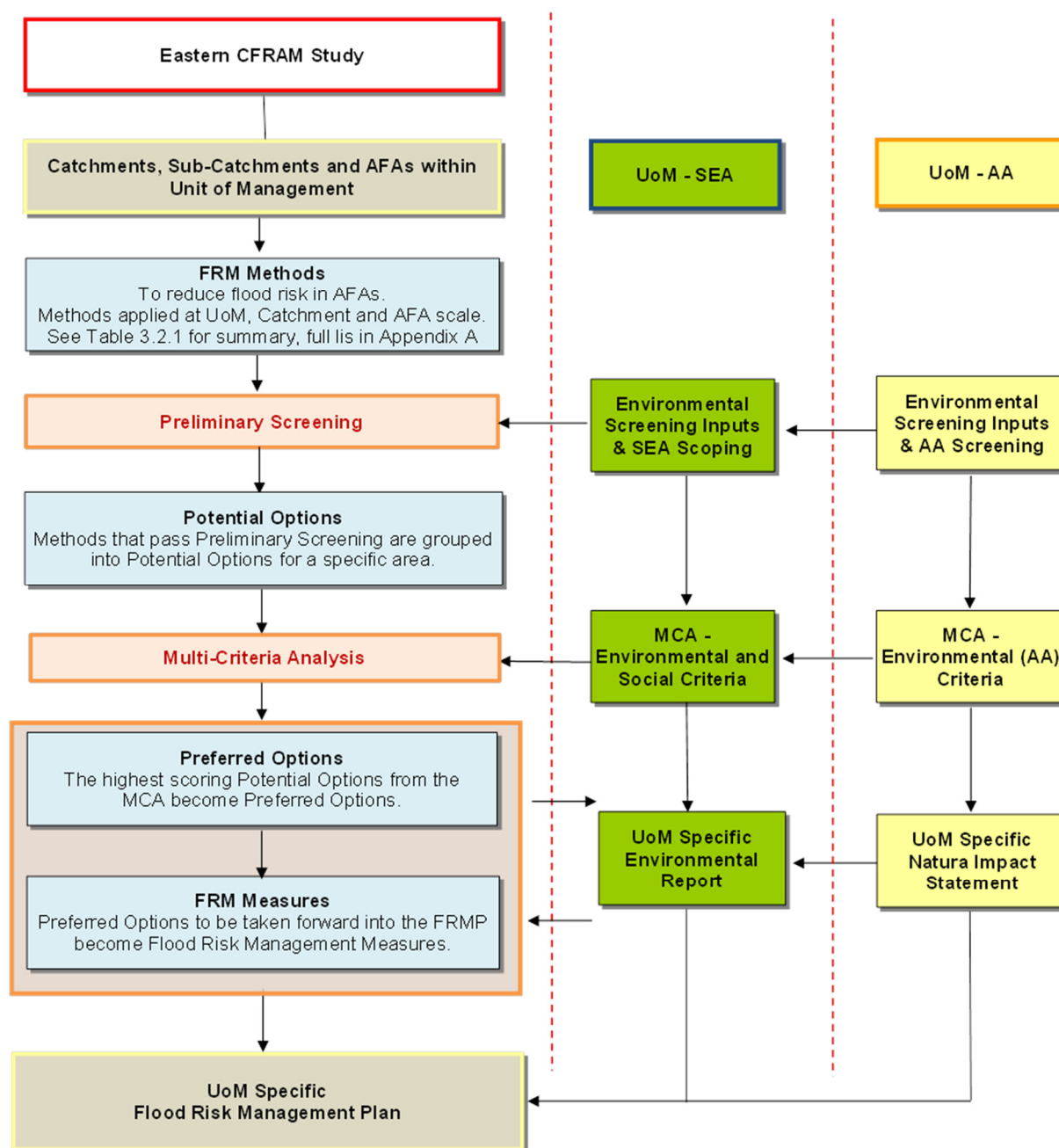


Figure 3.1.3: Environmental Assessment Inputs into the FRMP

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. 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.	
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 UoM09 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)

Level	Plan / Programme / Legislation
	<ul style="list-style-type: none"> ▪ 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) ▪ Rural Development Programme 2014-2020 (DAFM, 2015) ▪ Water Services Strategic Plan (Irish Water, 2014)
Regional Level	<ul style="list-style-type: none"> ▪ UoM09 Flood Risk Management Plan ▪ Eastern RBD River Basin Management Plan 2009-2015 (DEHLG, 2010) ▪ Draft Transport Strategy for the Greater Dublin Area 2016-2035 (NTA, 2015) ▪ South East BAU (Business Area Unit) 2016-2020 (Coillte, 2016) ▪ Regional Planning Guidelines for the Greater Dublin Area 2010-2022, (Regional Planning Guidelines Office, 2010) ▪ Water Supply Project Eastern and Midlands Region (WSP) (Irish Water, 2014) ▪ Greater Dublin Strategic Drainage Strategy (DCC, 2005)
Sub-Regional	<ul style="list-style-type: none"> ▪ Dublin City Development Plan 2016-2022 Draft (Dublin City Council, 2016) ▪ Dún Laoghaire Rathdown County Development Plan 2016 – 2022 (Dun Laoghaire Rathdown County Council, 2015) ▪ Fingal Development Plan 2011-2017 (Fingal County Council, 2011) ▪ Kildare County Development Plan 2011-2017 (Kildare County Council, 2011) ▪ Naas Town Development Plan 2011-2017 (Kildare County Council, 2011) ▪ Wicklow County Development Plan 2016-2022 (Wicklow County Council, 2015) ▪ South Dublin County Council Development Plan 2016-2022 (South Dublin County Council, 2015) ▪ Landscape, Recreation and Amenities Chapter 14 (Kildare County Council, 2011) ▪ Landscape Assessment Guidance (Fingal County Council, 1999) ▪ Landscape Character Areas Appendix F (Dun Laoghaire Rathdown County Council, 2010) ▪ Landscape Character Assessment of South Dublin County (South Dublin County Council, 2015) ▪ Wicklow Landscape Assessment Appendix 5 (Wicklow County Council, 2015) ▪ Dublin City Sustainable Energy Action Plan 2014 (CODEMA, 2014) ▪ Wind Energy Strategy Appendix 6 (Dun Laoghaire Rathdown County Council, 2016) ▪ Wind Energy Strategy (Fingal County Council, 2009) ▪ South Dublin County Sustainable Energy Action Plan 2013 (CODEMA, 2013) ▪ Wicklow County Wind Energy Strategy Appendix 1 (Wicklow County Council, 2008) ▪ Dublin City Local Economic and Community Plan 2016-2021 (Dublin City Council, 2015) ▪ Dun Laoghaire Rathdown Local Economic and Community Plan 2016-2021 (Dun Laoghaire Rathdown County Council, 2015) ▪ Kildare Local Economic & Community Plan 2016-2021 (Kildare County Council, 2015) ▪ Fingal Local Economic and Community Plan 2016-2021 (Fingal County Council, 2015)

Level	Plan / Programme / Legislation
	<ul style="list-style-type: none"> ■ South Dublin Local Economic and Community Plan 2016-2021 (South Dublin County Council, 2015) ■ County Kildare Groundwater Protection Scheme (GSI and Kildare County Council, 2002) ■ Bog of The Ring Groundwater Protection Scheme (GSI and Fingal County Council, 2005) ■ Dún Laoghaire-Rathdown Heritage Plan 2013 – 2019 (Dun Laoghaire Rathdown County Council, 2013) ■ Dublin City Heritage Plan 2002-2006 (Dublin City Council, 2002) ■ Fingal Heritage Plan 2011-2017 (Fingal County Council, 2012) ■ Kildare Heritage Plan 2014-2018 (Kildare County Council, 2013) ■ South Dublin County Heritage Plan 2010 – 2015 (South Dublin County Council, 2010) ■ Wicklow Heritage Plan 2009-2014 (Wicklow County Council, 2009) ■ Dublin City Housing Strategy 2011-2017 Appendix 2 (Dublin City Council, 2011) ■ Dun Laoghaire Rathdown County Council Housing Strategy 2010-2016 Appendix B (Dun Laoghaire Rathdown County Council, 2010) ■ Fingal Housing Strategy 2017-2023 Appendix 1 (Fingal County Council, 2016) ■ Housing Strategy 2016-2022 Appendix 3 (Wicklow County Council, 2015) ■ South Dublin County Council Housing Strategy 2010-2016 (South Dublin County Council, 2010) ■ Airport Local Area Plan (Fingal County Council, 2015) ■ Baldoyle Stapolin Local Area Plan (Fingal County Council, 2013) ■ Celbridge Local Area Plan (Kildare County Council, 2010) ■ Clane Local Area Plan (Kildare County Council, 2009) ■ George's Quay Local Area Plan (Dublin City Council, 2012) ■ Kilcock Local Area Plan 2015-2021 (Kildare County Council, 2015) ■ Leixlip Local Area Plan (Kildare County Council, 2010) ■ Liffey Valley Local Area Plan (South Dublin County Council, 2013) ■ Liberties Local Area Plan (Dublin City Council, 2009) ■ Maynooth Local Area Plan 2013-2019 (Kildare County Council, 2013) ■ Naas Road Lands Local Area Plan (Dublin City Council, 2013) ■ Newbridge Local Area Plan 2013-2019 (Kildare County Council, 2013) ■ Phibsboro/Mountjoy Local Area Plan (Dublin City Council, 2008) ■ Portmarnock South Local Area Plan (Fingal County Council, 2013) ■ County Wicklow Diversity Action Plan 2010-2015 (Wicklow County Council, 2010) ■ Dublin City Biodiversity Action Plan 2015-2020 (Dublin City Council, 2015) ■ Dun Laoghaire Rathdown Biodiversity Plan 2009-2013 (Dun Laoghaire Rathdown, 2009) ■ Malahide Shellfish Pollution Reduction Programme (DEHLG, 2009) ■ Howth Special Amenity Area Order (Fingal County Council, 1999) ■ Liffey Valley Special Amenity Area Order (Fingal County Council, 1990) ■ North Bull Island Special Amenity Area Order (Dublin City Council, 1994) ■ River Dodder Catchment Flood Risk Management Plan (Dublin City Council, 2012) ■ Fingal East Meath Flood Risk Management Plan (FEM FRAMS) (OPW, 2011) ■ Dublin Port Master Plan 2012 -2040 (Dublin Port Company, 2012)

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 3.4.1, 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)

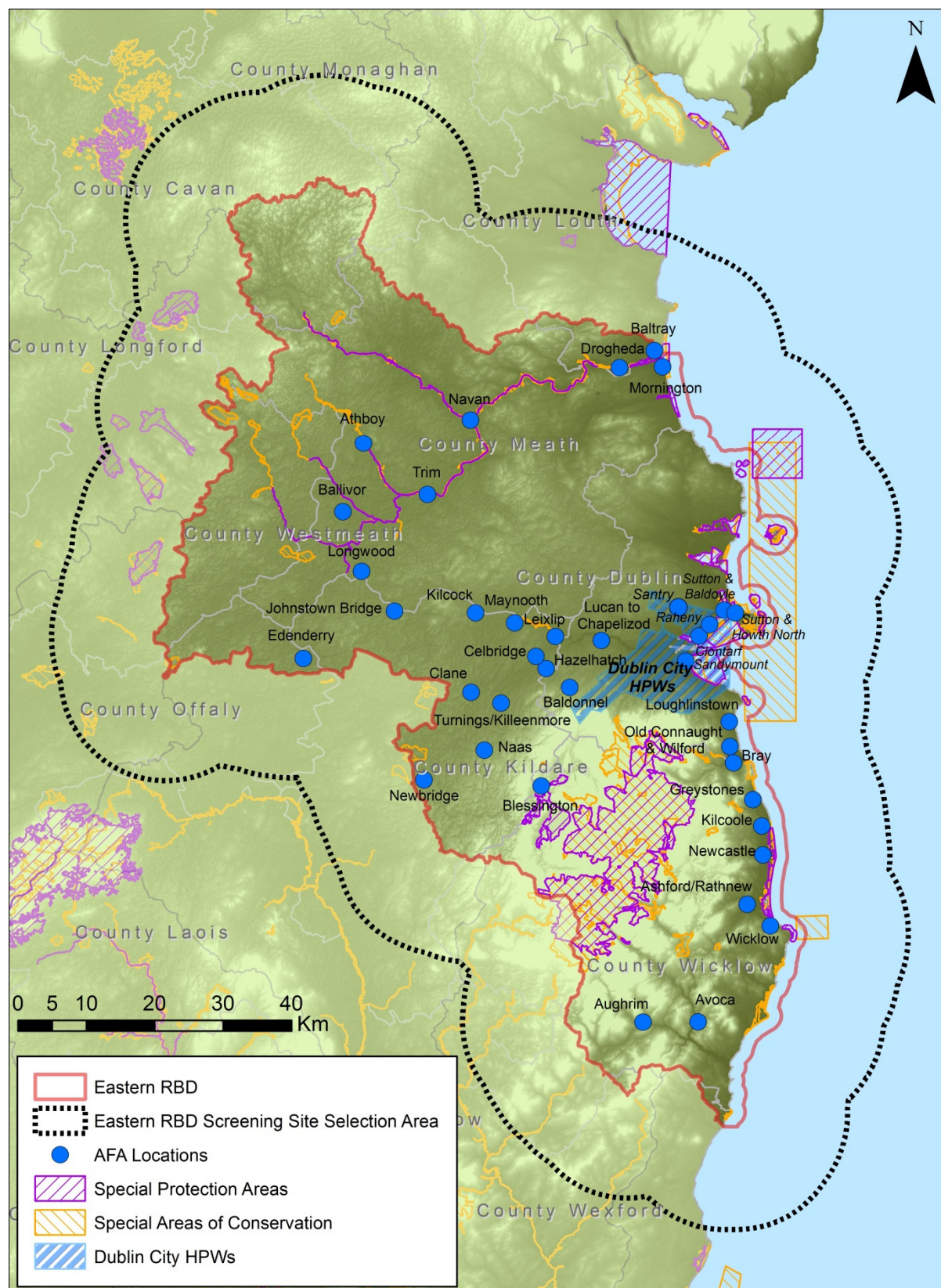


Figure 3.4.1: Eastern CFRAM Study Area, showing AFAs and Study-Scale Search Area for European Sites

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 16), 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, 43 European sites (28 SACs and 15 SPAs) were identified within the Screening Search Area of UoM09 (see Figure 3.5.1). All these sites were included in the screening process for the UoM09 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 UoM09 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.

3.5 PRELIMINARY SCREENING RESULTS FOR UOM09

There were 43 European sites (28 SACs and 15 SPAs) found within the Screening Search Area of UoM09 (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 UoM09. The results of the screening exercise are summarised in Table 3.5.1 and Table 3.5.2

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

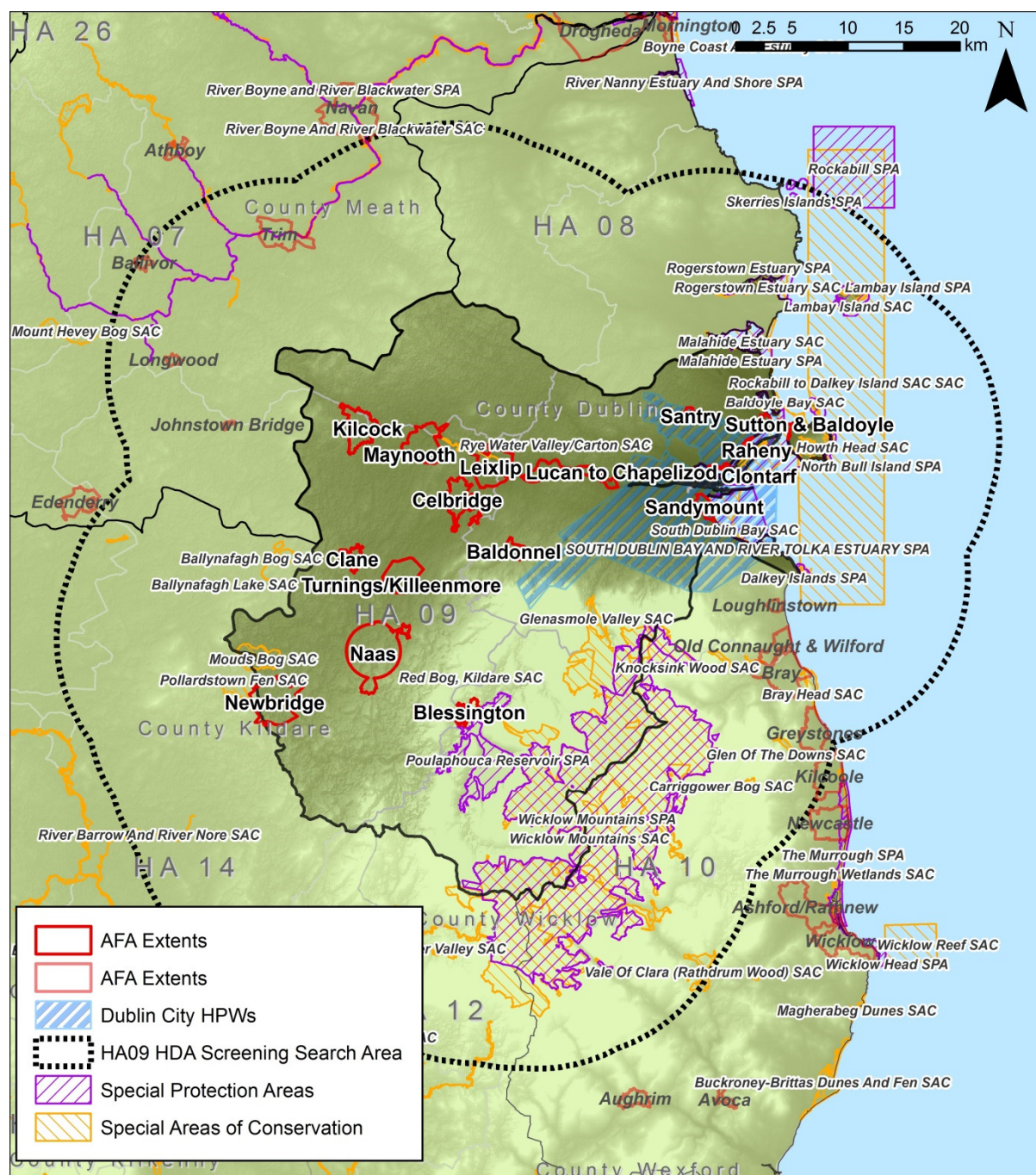


Figure 3.5.1: UoM09 European Sites incorporated in the Preliminary Screening of Methods & Options for the FRMP

Table 3.5.1: European Sites screened for UoM09

	Site Name	Site Code	County	UoM	Water Dependent	AFAs within Zone of potential Influence of European Site	AFAs that have an Identifiable Impact Pathway to European Site	Screened Out of UoM09 FRMP?
1	Baldoyle Bay SAC	000199	Dublin	9	Yes	Clontarf (5.5km), Dublin City HPWs (0.0), Lucan to Chapelizod (14.2km), Raheny (2.3km), Sandymount (9.0km), Santry (5.1km), Sutton & Baldoyle (0.0km), Sutton & Howth North (0.0km)	Dublin City HPWs, Sutton & Baldoyle, Sutton & Howth North	No
2	Baldoyle Bay SPA	004016	Dublin	9	Yes	Clontarf (5.5km), Dublin City HPWs (0.0), Lucan to Chapelizod (14.6km), Raheny (2.3km), Sandymount (9.0km), Santry (5.4km), Sutton & Baldoyle (0.0km), Sutton & Howth North (0.0km)	Dublin City HPWs, Sutton & Baldoyle, Sutton & Howth North	No
3	Ballyman Glen SAC	000713	Dublin, Wicklow	10	Yes	Dublin City HPWs (6.5km), Sandymount (12.3km) <i>[in UoM10: Bray (0.0km), Greystones (5.5km), Kilcoole (10.0km), Loughlinstown (4.5km), Newcastle (13.7km), Old Connaught & Wilford (0.0km)]</i>	None	Yes
4	Ballynafagh Bog SAC	000391	Kildare	Outside ECFRAM area	Yes	Celbridge (14.2km), Clane (3.8km), Hazelhatch (15.8km), Kilcock (10.1km), Maynooth (13.3km), Naas (8.2km), Newbridge (9.9km), Turnings/Killeenmore (7.9km) <i>[in UoM07 Johnstown Bridge (11.9km)]</i>	None	Yes
5	Ballynafagh Lake SAC	001387	Kildare	Outside ECFRAM area	Yes	Edenderry (15.8km), Johnstown Bridge (11.1km)	None	Yes

	Site Name	Site Code	County	UoM	Water Dependent	AFAs within Zone of potential Influence of European Site	AFAs that have an Identifiable Impact Pathway to European Site	Screened Out of UoM09 FRMP?
6	Boyne Coast And Estuary SAC	001957	Louth, Meath	07, 08	Yes	None from UoM09	None	Yes
7	Boyne Estuary SPA	004080	Louth, Meath	07,08	-	None from UoM09	None	Yes
8	Bray Head SAC	000714	Wicklow	10	Yes	Dublin City HPWs (10.2km), Sandymount (15.3km)	None	Yes
9	Broadmeadow/Swords Estuary SPA	004025	Dublin	9,10	Yes	Clontarf (9.6km), Dublin City HPWs (4.4km), Lucan to Chapelizod (15.2km), Raheny (6.7km), Sandymount (13.1km), Santry (6.3km), Sutton & Baldoyle (4.4km), Sutton & Howth North (5.0km)	None	Yes
10	Carriggower Bog SAC	000716	Wicklow	10	Yes	None from UoM09	None	Yes
11	Dalkey Islands SPA	004172	Dublin	OffShore	-	Clontarf (10.7km), Dublin City HPWs (2.4km), Raheny (11.0km), Sandymount (8.4km), Santry (15.5km), Sutton & Baldoyle (12.2km), Sutton & Howth North (11.1km)	Dublin City HPWs, Sandymount	No
12	Glen of The Downs SAC	000719	Wicklow	10	Yes	None from UoM09	None	Yes
13	Glenasmole Valley SAC	001209	Dublin	9	Yes	Baldonnel (7.0km), Blessington (12.6km), Celbridge (13.0km), Dublin City HPWs (2.1km), Hazelhatch (12.0km), Leixlip (12.9km), Lucan to Chapelizod (9.7km), Sandymount (12.0km), Turnings/Killeenmore (14.8km),	None	Yes

	Site Name	Site Code	County	UoM	Water Dependent	AFAs within Zone of potential Influence of European Site	AFAs that have an Identifiable Impact Pathway to European Site	Screened Out of UoM09 FRMP?
14	Howth Head Coast SPA	004113	Dublin	9	Yes	Clontarf (8.5km), Dublin City HPWs (2.6km), Raheny (6.2km), Sandymount (10.9km), Santry (10.9km), Sutton & Baldoyle (4.4km), Sutton & Howth North (2.6km)	Dublin City HPWs	No
15	Howth Head SAC	000202	Dublin	09	Yes	Clontarf (5.8km), Dublin City HPWs (0.8km), Lucan to Chapelizod (15.9km), Raheny (3.6km), Sandymount (8.6km), Santry (8.5km), Sutton & Baldoyle (2.4km), Sutton & Howth North (0.8km).	Dublin City HPWs	No
16	Ireland's Eye SAC	002193	Dublin	OffShore	Yes	Clontarf (9.0km), Dublin City HPWs (2.1km), Raheny (6.0km), Sandymount (12.3km), Santry (9.9km), Sutton & Baldoyle (3.7km), Sutton & Howth North (2.1km)	None	Yes
17	Ireland's Eye SPA	004117	Dublin	OffShore	Yes	Clontarf (8.8km), Dublin City HPWs (1.9km), Raheny (5.8km), Sandymount (12.1km), Santry (9.7km), Sutton & Baldoyle (3.5km), Sutton & Howth North (1.9km)	None	Yes
18	Knocksink Wood SAC	000725	Dublin, Wicklow	10	Yes	Dublin City HPWs (5.3km), Sandymount (11.6km)	None	Yes
19	Lambay Island SAC	000204	Dublin	Offshore	Yes	Dublin City HPWs (10.9km), Raheny (13.8km), Santry (15.5km), Sutton & Baldoyle (11.4km), Sutton & Howth North (10.9km)	None	Yes
20	Lambay Island SPA	004069	Dublin	Offshore	Yes	Dublin City HPWs (10.7km), Raheny (13.6km), Santry (15.5km), Sutton & Baldoyle (11.2km), Sutton & Howth North (10.7km)	None	Yes

	Site Name	Site Code	County	UoM	Water Dependent	AFAs within Zone of potential Influence of European Site	AFAs that have an Identifiable Impact Pathway to European Site	Screened Out of UoM09 FRMP?
21	Malahide Estuary SAC	000205	Dublin	09	Yes	Clontarf (8.9km), Dublin City HPWs (3.6km), Lucan to Chapelizod (15.2km), Raheny (6.0km), Sandymount (12.4km), Santry (6.3km), Sutton & Baldoyle (3.6km), Sutton & Howth North (4.2km)	None	Yes
22	Mouds Bog SAC	002331	Kildare	09	Yes	Clane (9.4km), Naas (5.9km), Newbridge (0.7km), Turnings/Killeenmore (11.3km)	None	Yes
23	North Bull Island SPA	004006	Dublin	09	Yes	Baldonnel (19.7km), Celbridge (23.0km), Clane (32.7km), Clontarf (0.0km), Dublin City HPWs (0.0km), Hazelhatch (22.6km), Kilcock (31.2km), Leixlip (19.3km), Lucan to Chapelizod (10.1km), Maynooth (25.5km), Naas (30.8km), Newbridge (41.4km), Raheny (0.0km), Sandymount (3.5km), Santry (4.5km), Sutton & Baldoyle (0.0km), Sutton & Howth North (0.0km), Turnings/Killeenmore (27.9km)	Baldonnel, Celbridge Clane, Clontarf, Dublin City HPWs, Hazelhatch, Kilcock, Leixlip, Lucan to Chapelizod, Maynooth, Naas, Newbridge, Raheny, Sandymount, Santry, Sutton & Baldoyle, Sutton & Howth North, Turnings/Killeenmore	No
24	North Dublin Bay SAC	000206	Dublin	09	Yes	Baldonnel (19.7km), Celbridge (23.0km), Clane (32.7km), Clontarf (0.0km), Dublin City HPWs (0.0km), Hazelhatch (22.6km), Kilcock (31.2km), Leixlip (19.3km), Lucan to Chapelizod (10.1km), Maynooth (25.5km), Naas (30.8km), Newbridge (41.4km), Raheny (0.0km), Sandymount (3.5km), Santry (4.5km), Sutton & Baldoyle (0.0km), Sutton & Howth North (0.0km), Turnings/Killeenmore (27.9km)	Baldonnel, Celbridge Clane, Clontarf, Dublin City HPWs, Hazelhatch, Kilcock, Leixlip, Lucan to Chapelizod, Maynooth, Naas, Newbridge, Raheny, Sandymount, Santry, Sutton & Baldoyle, Sutton & Howth North, Turnings/Killeenmore	No

	Site Name	Site Code	County	UoM	Water Dependent	AFAs within Zone of potential Influence of European Site	AFAs that have an Identifiable Impact Pathway to European Site	Screened Out of UoM09 FRMP?
25	Pollardstown Fen SAC	000396	Kildare	Outside ECFRAM area	Yes	Clane (13.7km), Naas (9.4km), Newbridge (0.0km), Turnings/Killeenmore (15.6km)	Newbridge	No
26	Poulaphouca Reservoir SPA	004063	Kildare, Wicklow	09	Yes	Baldonnel (11.9km), Blessington (0.0km), Celbridge (14.9km), Dublin City HPWs (7.9km), Hazelhatch (15.2km), Naas (7.5km), Newbridge (13.3km), Turnings/Killeenmore (12.1km)	Blessington	No
27	Red Bog, Kildare SAC	000397	Kildare	09	Yes	Baldonnel (10.8km), Blessington (1.7km), Celbridge (12.6km), Clane (13.3km), Dublin City HPWs (7.6km), Hazelhatch (13.1km), Naas (6.1km), Newbridge (14.3km), Turnings/Killeenmore (9.1km)	None	Yes
28	River Barrow And River Nore SAC	002162	Kildare	Outside ECFRAM area	Yes	Newbridge (10.0km)	None	Yes
29	River Boyne And River Blackwater SAC	002299	Meath	07	Yes	Kilcock (13.3km)	None	Yes
30	River Boyne and River Blackwater SPA	004232	Meath	07	-	Kilcock (15.1km)	None	Yes
31	Rockabill SPA	004014	Dublin	Offshore	-	Mornington (14.8km)	None	Yes
32	Rockabill to Dalkey Island SAC	003000	Dublin	Offshore / 09	-	Clontarf (6.2km), Dublin City HPWs (1.8km), Mornington (15.6km), , Raheny (4.4km), Sandymount (7.6km), Santry (9.3km), Sutton & Baldoyle (3.3km), Sutton & Howth North (1.8km)	None	Yes

	Site Name	Site Code	County	UoM	Water Dependent	AFAs within Zone of potential Influence of European Site	AFAs that have an Identifiable Impact Pathway to European Site	Screened Out of UoM09 FRMP?
33	Rogerstown Estuary SAC	000208	Dublin	08	Yes	Clontarf (14.9km), Dublin City HPWs (10.3km), Raheny (12.7km), Santry (10.4km), Sutton & Baldoyle (10.3km), Sutton & Howth North (10.8km)	None	Yes
34	Rogerstown Estuary SPA	004015	Dublin	08	Yes	Clontarf (15.1km), Dublin City HPWs (10.4km), Raheny (12.4km), Santry (10.7km), Sutton & Baldoyle (10.0km), Sutton & Howth North (10.4km)	None	Yes
35	Rye Water Valley/Cartron SAC	001398	Kildare, Meath	09	Yes	Baldonnel (6.3km), Celbridge (2.2km), Clane (11.7km), Dublin City HPWs (10.9km), Hazelhatch (4.3km), Kilcock (4.9km), Leixlip (0.0km), Lucan to Chapelizod (2.0km), Maynooth (0.0km), Turnings/Killeenmore (10.4km)	Kilcock, Leixlip, Lucan to Chapelizod, Maynooth	No
36	Skerries Islands SPA	004122	Dublin	Offshore	Yes	None	None	Yes
37	Slaney River Valley SAC	000781	Carlow, Wicklow	Outside ECFRAM area	Yes	None from UoM09	None	Yes
38	South Dublin Bay and River Tolka Estuary SPA	004024	Dublin	09	-	Baldonnel (16.7km), Celbridge(19.8km), Clontarf (0.0km), Dublin City HPWs (0.0km), Hazelhatch (19.5km), Leixlip (16.2km), Lucan to Chapelizod (7.0km), Maynooth(22.3km), Raheny (0.9km), Sandymount (0.0km), Santry (3.9km), Sutton & Baldoyle (4.3km), Sutton & Howth North (5.0km)	Baldonnel, Celbridge, Clane, Clontarf, Dublin City HPWs, Hazelhatch, Kilcock, Lucan to Chapelizod, Leixlip, Maynooth, Naas, Newbridge, Raheny, Sandymount, Santry, Sutton & Baldoyle, Sutton & Howth North, Turnings/Killeenmore	No

	Site Name	Site Code	County	UoM	Water Dependent	AFAs within Zone of potential Influence of European Site	AFAs that have an Identifiable Impact Pathway to European Site	Screened Out of UoM09 FRMP?
39	South Dublin Bay SAC	000210	Dublin	9	Yes	Baldonnel (16.8km), Celbridge (20.7km), Clontarf (2.0km), Dublin City HPWs (0.0km), Hazelhatch (20.2km), Leixlip (17.5km), Lucan to Chapelizod (8.0km), Maynooth (24.0km), Raheny (2.9km), Sandymount (0.0km), Santry (6.8km), Sutton & Baldoyle (5.5km), Sutton & Howth North (6.1km)	Baldonnel, Celbridge, Clane, Clontarf, Dublin City HPWs, Hazelhatch, Kilcock, Lucan to Chapelizod, Leixlip, Maynooth, Naas, Newbridge, Raheny, Sandymount, Santry, Sutton & Baldoyle, Sutton & Howth North, Turnings/Killeenmore	No
40	The Long Derries, Edenderry SAC	000925	Offaly	Outside ECFRAM area	Yes	None from UoM09	None	Yes
41	Vale of Clara (Rathdrum Wood) SAC	000733	Wicklow	10	Yes	None from UoM09	None	Yes
42	Wicklow Mountains SAC	002122	Wicklow	9, 10	Yes	Baldonnel (8.1km), Blessington (2.5km), Celbridge (14.2km), Clontarf (14.4km), Dublin City HPWs (3.5km), Hazelhatch (13.1km), Leixlip (14.6km), Lucan to Chapelizod (12.1km), Naas (10.8km), Sandymount (10.1km), Turnings/Killeenmore (14.5km)	None	Yes
43	Wicklow Mountains SPA	004040	Dublin, Wicklow	9,10,12	Yes	Baldonnel (11.6km), Blessington (5.5km), Clontarf (14.7km), Dublin City HPWs (3.5km), Lucan to Chapelizod (12.1km), Naas (13.6km), Sandymount (10.3km)	None	Yes

3.5.1 Conclusion of UoM09 Preliminary Screening Results

The likely significant effects that may arise from the UoM09 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 UoM09:

- 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 43 European sites (28 SACs and 15 SPAs) which were within the identified screening search area for UoM09 and which were used to inform the preliminary options assessment of the draft UoM09 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 UoM09 FRMP would not have significant effects on the European sites identified, as sufficient uncertainty remained due to gaps in information.

12 European sites (six SACs and six 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 nineteen AFAs in UoM09 - 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: UoM09 AFAs requiring further Assessment (Appropriate Assessment) at FRMP stage

AFA with Identifiable Impact Pathway to European Site	European Site	Site Code
**Baldonnel	North Bull Island SPA North Dublin Bay SAC South Dublin Bay and River Tolka Estuary SPA South Dublin Bay SAC	004006 000206 004024 000210
Blessington	Poulaphouca Reservoir SPA	004063
Celbridge	North Bull Island SPA North Dublin Bay SAC South Dublin Bay and River Tolka Estuary SPA South Dublin Bay SAC	004006 000206 004024 000210

AFA with Identifiable Impact Pathway to European Site	European Site	Site Code
Clane	North Bull Island SPA North Dublin Bay SAC South Dublin Bay and River Tolka Estuary SPA South Dublin Bay SAC	004006 000206 004024 000210
Clontarf*	<i>North Bull Island SPA North Dublin Bay SAC South Dublin Bay and River Tolka Estuary SPA South Dublin Bay SAC</i>	<i>004006 000206 004024 000210</i>
Dublin City HPWs	Baldoye Bay SAC Baldoye Bay SPA Dalkey Islands SPA Howth Head Coast SPA Howth Head SAC North Bull Island SPA North Dublin Bay SAC South Dublin Bay and River Tolka Estuary SPA South Dublin Bay SAC	000199 004016 004172 004113 000202 004006 000206 004024 000210
Hazelhatch	North Bull Island SPA North Dublin Bay SAC South Dublin Bay and River Tolka Estuary SPA South Dublin Bay SAC	004006 000206 004024 000210
**Kilcock	North Bull Island SPA North Dublin Bay SAC Rye Water Valley/Carton SAC South Dublin Bay and River Tolka Estuary SPA South Dublin Bay SAC	004006 000206 001398 004024 000210
Leixlip	North Bull Island SPA North Dublin Bay SAC Rye Water Valley/Carton SAC South Dublin Bay and River Tolka Estuary SPA South Dublin Bay SAC	004006 000206 001398 004024 000210
Lucan to Chapelizod	North Bull Island SPA North Dublin Bay SAC Rye Water Valley/Carton SAC South Dublin Bay and River Tolka Estuary SPA South Dublin Bay SAC	004006 000206 001398 004024 000210
Maynooth	North Bull Island SPA North Dublin Bay SAC Rye Water Valley/Carton SAC South Dublin Bay and River Tolka Estuary SPA South Dublin Bay SAC	004006 000206 001398 004024 000210
Naas	North Bull Island SPA North Dublin Bay SAC South Dublin Bay and River Tolka Estuary SPA South Dublin Bay SAC	004006 000206 004024 000210
Newbridge	Pollardstown Fen SAC North Bull Island SPA North Dublin Bay SAC South Dublin Bay and River Tolka Estuary SPA South Dublin Bay SAC	000396 004006 000206 004024 000210
Raheny*	<i>North Bull Island SPA North Dublin Bay SAC South Dublin Bay and River Tolka Estuary SPA</i>	<i>004006 000206 004024</i>

AFA with Identifiable Impact Pathway to European Site	European Site	Site Code
	<i>South Dublin Bay SAC</i>	<i>000210</i>
Sandymount*	<i>Dalkey Islands SPA</i> <i>North Bull Island SPA</i> <i>North Dublin Bay SAC</i> <i>South Dublin Bay and River Tolka Estuary SPA</i> <i>South Dublin Bay SAC</i>	<i>004172</i> <i>004006</i> <i>000206</i> <i>004024</i> <i>000210</i>
Santry	<i>North Bull Island SPA</i> <i>North Dublin Bay SAC</i> <i>South Dublin Bay and River Tolka Estuary SPA</i> <i>South Dublin Bay SAC</i>	<i>004006</i> <i>000206</i> <i>004024</i> <i>000210</i>
**Sutton & Baldoyle	<i>Baldoyle Bay SAC</i> <i>Baldoyle Bay SPA</i> <i>North Bull Island SPA</i> <i>North Dublin Bay SAC</i> <i>South Dublin Bay and River Tolka Estuary SPA</i> <i>South Dublin Bay SAC</i>	<i>000199</i> <i>004016</i> <i>004006</i> <i>000206</i> <i>004024</i> <i>000210</i>
Sutton & Howth North	<i>Baldoyle Bay SAC</i> <i>Baldoyle Bay SPA</i> <i>North Bull Island SPA</i> <i>North Dublin Bay SAC</i> <i>South Dublin Bay and River Tolka Estuary SPA</i> <i>South Dublin Bay SAC</i>	<i>000199</i> <i>004016</i> <i>004006</i> <i>000206</i> <i>004024</i> <i>000210</i>
Turnings/Killeenmore	<i>North Bull Island SPA</i> <i>North Dublin Bay SAC</i> <i>South Dublin Bay and River Tolka Estuary SPA</i> <i>South Dublin Bay SAC</i>	<i>004006</i> <i>000206</i> <i>004024</i> <i>000210</i>

* denotes coastal sub-area of Dublin City AFA

**subsequently determined during CFRAM Studies 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 UoM09.

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 by Local Authorities;
- 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 UoM09 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 UoM09 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 UoM09. 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 UoM09. 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 UoM09. 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

Following the passing of the Arterial Drainage Act, 1945, the OPW began investigations to determine where Arterial Drainage Schemes would be suitable and economically viable. The implementation of the Schemes began in the late-1940s and continued into the early-1990s, and a total of 11,500kms of river channel now form part of the Arterial Drainage Schemes, that also include 800km of embankments.

While new Arterial Drainage Schemes are no longer being undertaken, the OPW has a statutory duty to maintain the completed schemes in proper repair and in an effective condition. The annual maintenance programme is published by the OPW on the OPW website, and typically involves some clearance of vegetation and removal of silt build-up on a five-yearly cycle.

Arterial drainage works have historically been undertaken on the Rye Water affecting the Kilcock, Maynooth and Leixlip AFAs and to a lesser extent the AFAs located downstream on the River Liffey. These works mainly consisted of dredging along the main channel. In-channel works have also been undertaken on the Shinkeen Stream affecting the Celbridge and Hazelhatch AFAs.

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 UoM09.

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 three Drainage Districts located within UoM09, in the Liffey and Dublin Bay catchment:

- Baltracey DD
- Kilcock DD
- Connell DD

Of these, only the Connell Drainage District is located directly on a modelled watercourse – the River Liffey in Newbridge. The activities within Drainage Districts are not considered to significantly contribute to the maintenance of the existing regime affecting the AFAs however they do contribute to the maintenance of the existing regime in other parts of UoM09. 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 UoM09. 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 UoM09. 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 UoM09. 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 UoM09. 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. Three Sub-Catchment SSA were identified in UoM09:

- **Liffey Sub-Catchment Reach 1** (Newbridge, Naas, Clane, Celbridge, Hazelhatch)
- **Liffey Sub-Catchment Reach 2** (Kilcock, Maynooth)
- **Liffey Sub-Catchment Reach 3** (Newbridge, Naas, Clane, Lucan/Chapelizod, Celbridge, Hazelhatch, Maynooth, Leixlip)

Sub-catchment screening was carried out, which looked at 'Storage' and 'Improvement of Channel Conveyance', but these were concluded to be unfeasible on technical grounds. Consequently as no feasible Catchment/Sub-Catchment methods were identified, no Catchment/Sub-Catchment identification of measures or MCA appraisal has taken place for the FRMP.

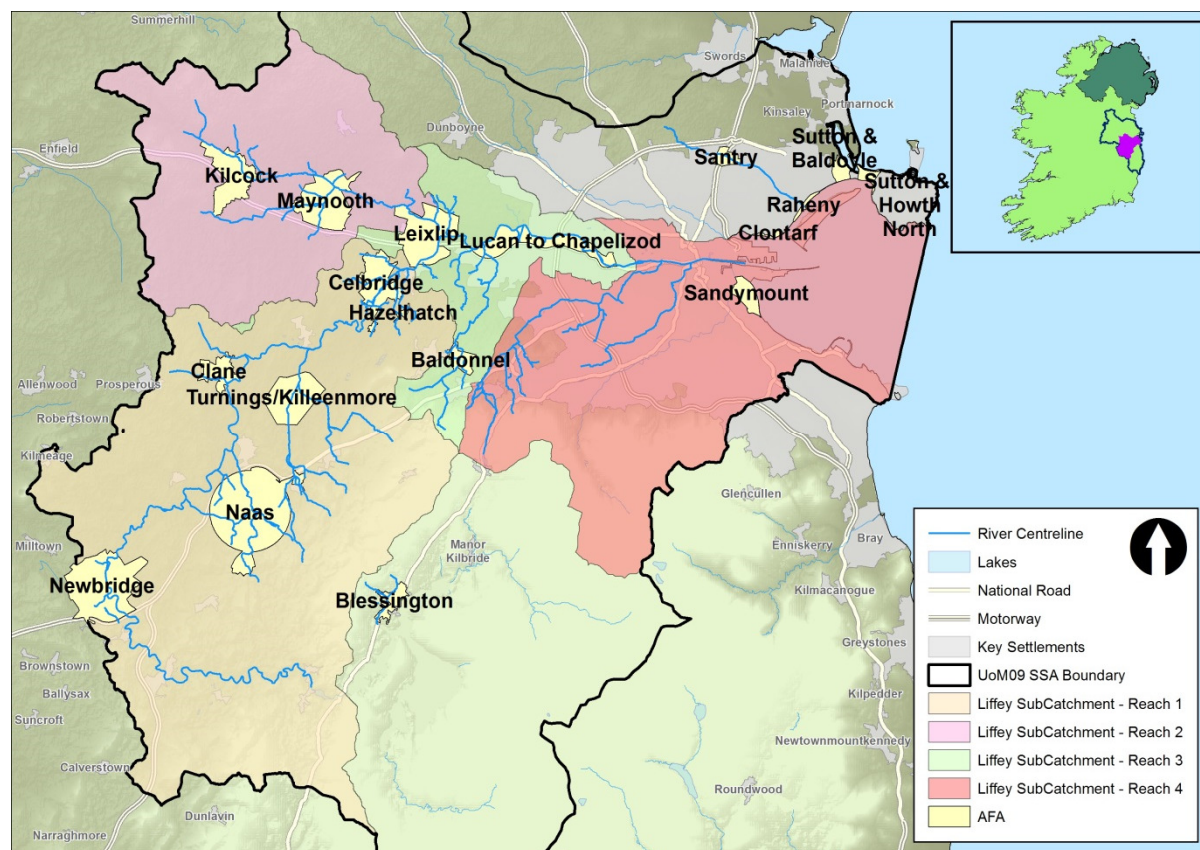


Figure 4.2.1: UoM09 Spatial Scales of Assessment showing Sub-Catchments

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 four AFAs in UoM09. 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 4.3.1.4.

4.3.1.1 Baldonnell AFA

Fluvial flooding occurs within Baldonnell during a 1% AEP event. Receptors are affected within Greenogue Business Park due to insufficient capacity in culverts which cause out of bank flooding. There is also significant cross-catchment flow from the River Camac which can also affect Greenogue Business Park.

A number of business properties are located within the floodplain in Baldonnell AFA. Several local roads are also subject to flooding during a 1% AEP event.

Baldonnell has been agreed as a low/no risk AFA and so optioneering has not been undertaken. Therefore the existing regime should continue in order to maintain the current Standard of protection.

4.3.1.2 Kilcock AFA

Kilcock is subject to fluvial flooding during a 1% AEP event. There are a couple of discrete areas where a few receptors are at risk. Out of bank flooding occurs on the Rye Water due to insufficient channel capacity whilst out of bank flooding also occurs on Dolanstown tributary due to a combination of insufficient channel capacity in the tributary and overland flow from the Rye Water.

A few business properties are affected in each area along with a couple of transport infrastructure assets; a local and a regional road. Kilcock 38Kv Station is also situated within the floodplain.

Kilcock has been agreed as a low/no risk AFA and consequently optioneering has not been undertaken. Therefore the existing regime should continue in order to maintain the current Standard of protection.

4.3.1.3 Sutton & Baldoyle AFA

Sutton and Baldoyle AFA is at risk of flooding during a 0.5% AEP coastal event and a 0.5% AEP wave overtopping event. There are two main areas which are affected, one at Baldoyle at the northern extent of the AFA boundary and one at the eastern extent of the AFA. In the north receptors are at risk during tidal inundation, whilst a couple are also at risk of flooding from wave overtopping. In the east receptors are at risk of flooding during a 0.5% AEP coastal inundation event only.

There are a reasonably large number of residential properties at risk within Sutton and Baldoyle. A few transport infrastructure assets along with a couple of social amenity sites are also located within the floodplain. An environmental asset, Baldoye Bay SAC & SPA, is also at risk.

Sutton and Baldoyle has been agreed as a low/no risk AFA and so the existing regime should continue in order to maintain the current Standard of protection.

4.3.1.4 Kinsaley AFA

Kinsaley AFA, although technically in UoM09, was included in the Fingal East Meath Flood Risk Assessment and Management (FEM FRAM) Study, which covered Dublin Airport, Kinsaley, Malahide, Portmarnock and Swords.

4.3.2 AFAs with Measures Put Forward in the FRMP

In total, eleven AFAs have had FRM measures incorporating physical works proposed in the UoM09 FRMP. These are summarised in Table 4.3.1 below and the preferred methods described in Section 4.3.2.1 to 4.3.2.11. Full details can be found in Chapter 7.4 and Appendix G of the UoM09 FRMP.

It should be noted that for Celbridge Hazelhatch 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 UoM09

Spatial Scale	Name	Option Number	Description
UoM09			
Sub-catchment	Liffey	0	No Options Technically and Economically feasible
AFA	Baldonnell	0	No Options Technically and Economically feasible
AFA	Blessington	1	Hard Defences and Other Works
AFA	Blessington	2	Hard Defences, Other Works and Storage
AFA	Blessington	3	Hard Defences, Other Works and Storage
AFA	Blessington	4	Hard Defences, Other Works and Improvement of Channel Conveyance
AFA	Blessington	5	Hard Defences, Other Works, Storage and Improvement of Channel Conveyance
AFA	Carysfort Maretimo	1	Hard Defences and Improvement of Channel Conveyance
AFA	Carysfort Maretimo	2	Hard Defences and Storage
AFA	Celbridge Hazelhatch	1	Hard Defences, Improvement of Channel Conveyance and Diversion of Flow
AFA	Celbridge Hazelhatch	2	Hard Defences and Improvement of Channel Conveyance
AFA	Celbridge Hazelhatch	3	Hard Defences and Improvement of Channel Conveyance
AFA	Clane	1	Hard Defences
AFA	Clane	2	Hard Defences and Improvement of Channel Conveyance
AFA	Clane	3	Hard Defences and Flow Diversion
AFA	Clontarf	0	No Options Technically and Economically feasible
AFA	Kilcock	0	No Options Technically and Economically feasible
AFA	Liffey	0	No Options Technically and Economically feasible
AFA	Leixlip	1	Hard Defences
AFA	Lucan to Chapelizod	1	Hard Defences
AFA	Lucan to Chapelizod	2	Hard Defences and Improvement of Channel Conveyance
AFA	Lucan to Chapelizod	3	Hard Defences and Improvement of Channel Conveyance
AFA	Lucan to Chapelizod	4	Hard Defences and Improvement of Channel Conveyance

AFA	Maynooth	1	Hard Defences and Improvement of Channel Conveyance
AFA	Maynooth	2	Hard Defences and Diversion of Flow
AFA	Maynooth	3	Hard Defences and Improvement of Channel Conveyance
AFA	Maynooth	4	Hard Defences, Diversion of Flow and Improvement of Channel Conveyance
AFA	Naas	1	Hard Defences, Flow Diversion and Improvement of Channel Conveyance
AFA	Naas	2	Hard Defences, Storage, Flow Diversion and Improvement of Channel Conveyance
AFA	Naas	3	Hard Defences, Storage, Flow Diversion and Improvement of Channel Conveyance
AFA	Newbridge	1	Hard Defences and Other Works
AFA	Newbridge	2	Hard Defences, Improvement of Channel Conveyance and Other Works
AFA	Newbridge	3	Hard Defences, Improvement of Channel Conveyance and Other Works
AFA	Newbridge	4	Hard Defences, Improvement of Channel Conveyance and Other Works
AFA	Raheny	0	No Options Technically and Economically feasible
AFA	Sandymount	0	No Options Technically and Economically feasible
AFA	Santry	1	Storage and Improvement of Channel Conveyance
AFA	Santry	2	Storage and Hard Defences
AFA	Santry	3	Improvement of Channel Conveyance
AFA	Santry	4	Hard Defences and Improvement of Channel Conveyance
AFA	Santry	5	Hard Defences and Improvement of Channel Conveyance
AFA	Santry	6	Hard Defences
AFA	Sutton & Baldoyle	0	No Options Technically and Economically feasible
AFA	Sutton & Howth	1	Hard Defences

4.3.2.1 Blessington AFA

Preferred Measure: Option 1: Hard defences, Other Works

Description: At risk properties would be protected by a series of flood walls and embankments and the sealing of four manholes on the Newtown Park watercourse (Figure 4.3.1). The hard defences will provide a standard of protection of 1% AEP for fluvial flood events with an average height of 1.2m and a total length of 1.5km. A 125m length of road would also have to be raised.



Figure 4.3.1: Blessington Preferred Measures

4.3.2.2 Dublin City AFA - Carysfort Maretimo HPW

Preferred Measure: Option 2: Hard defences, Storage

Description: At risk properties would be protected by 5 offline storage areas along with flood defence walls (Figure 4.3.2). The result is a reduced flow along the Carysfort Maretimo reducing the length and height of any hard defences required. The hard defences provide the additional protection against the 1% AEP flood event with an average required height of 0.4m and a total length of 250m.



Figure 4.3.2: Carysfort Maretimo Preferred Measures

4.3.2.3 Celbridge AFA & Hazelhatch AFA

Preferred Measure: Option 1: Hard defences, Improvement of Channel Conveyance, Diversion of Flow

Description: At risk properties would be protected from an 80m flood embankment, 82m wall and 56m wall, improving the channel conveyance along 646 m of watercourse and removal of a weir, and construction of a flow diversion channel (610m long) (Figure 4.3.3). These methods combine to create an option protecting the properties at risk from the 1% AEP flood event.

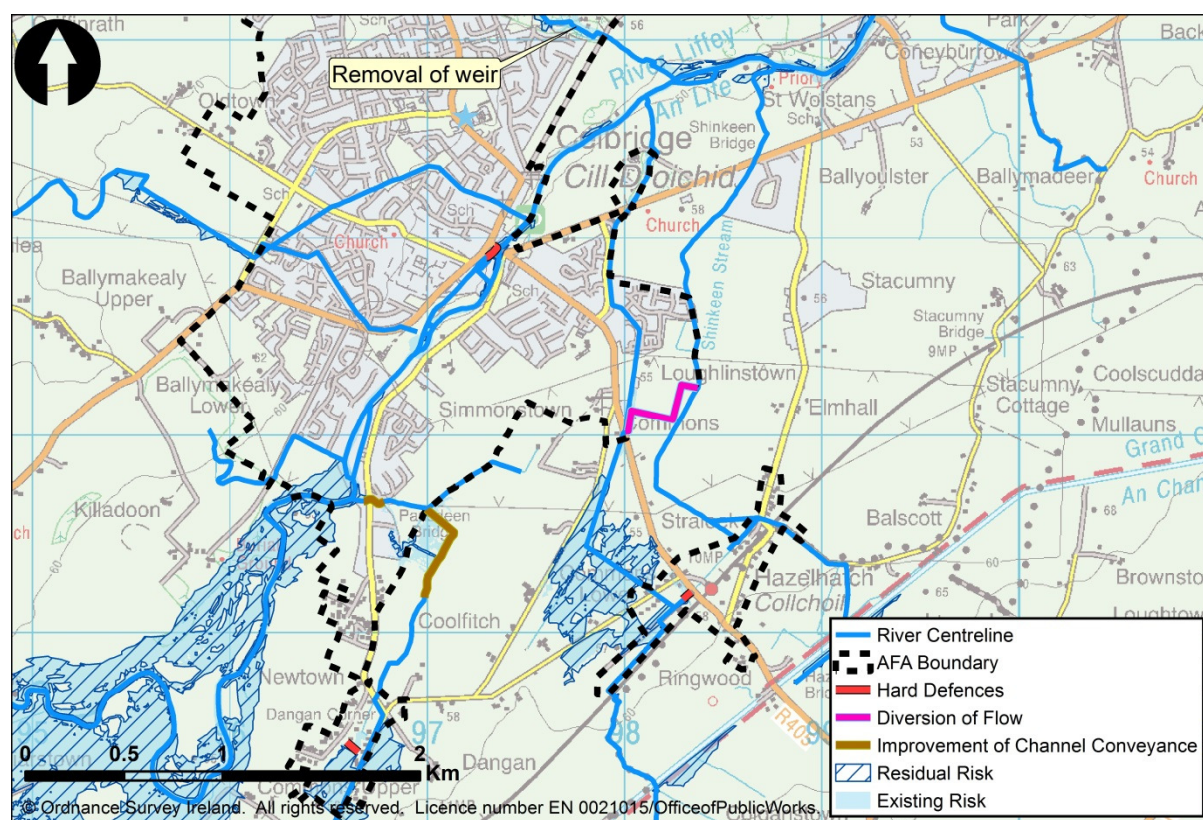


Figure 4.3.3: Celbridge Hazelhatch Preferred Measures

4.3.2.4 Clane AFA

Preferred Measure: Option 2 - Hard defences, Improvement of Channel Conveyance

Description: At risk properties would be protected by series of flood walls and embankments totalling a length of 583m with a height range of 0.4m – 1m, in addition to the removal of a culvert and the upgrade of three access bridges (Figure 4.3.4)

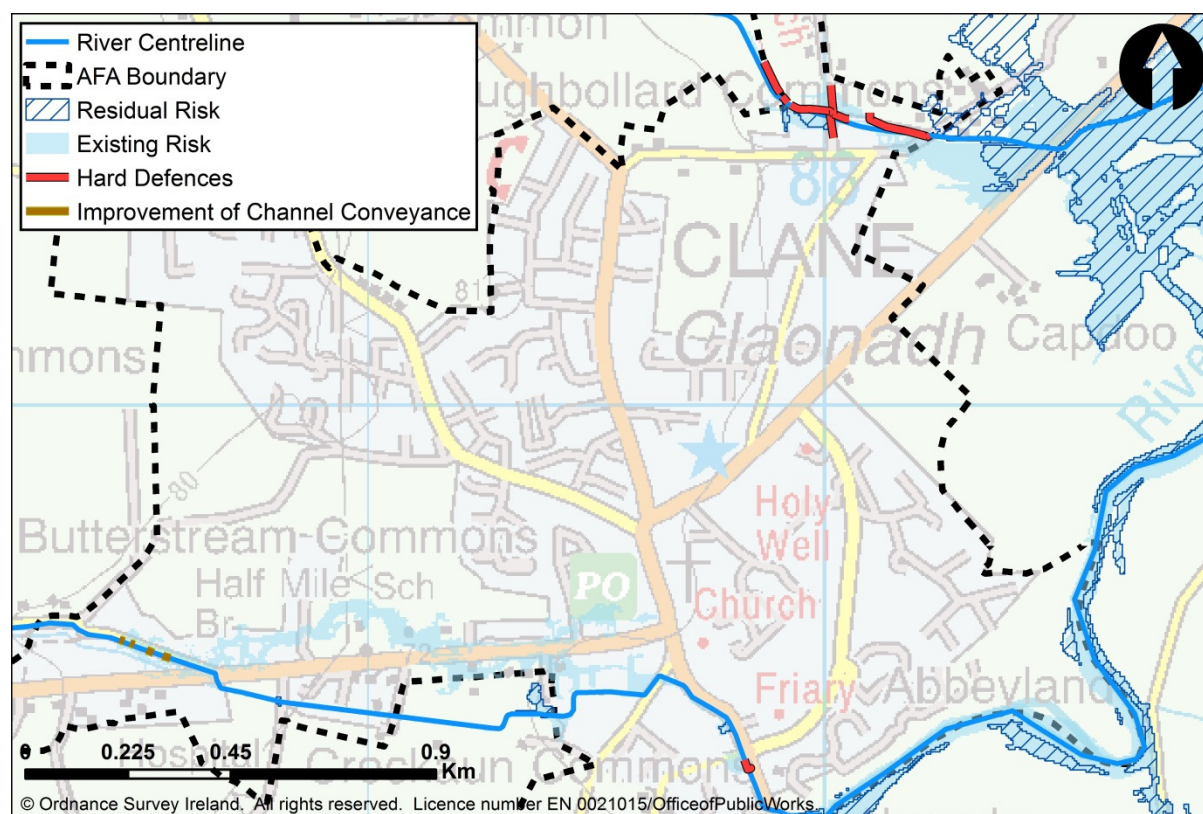


Figure 4.3.4: Clane Preferred Measures

4.3.2.5 Leixlip AFA

Preferred Measure: Option 1: Hard Defences

Description: At risk properties would be protected from a series of flood embankments and walls. These hard defences would protect to the 1% AEP flood event with a total length of 461m (Figure 4.3.5).

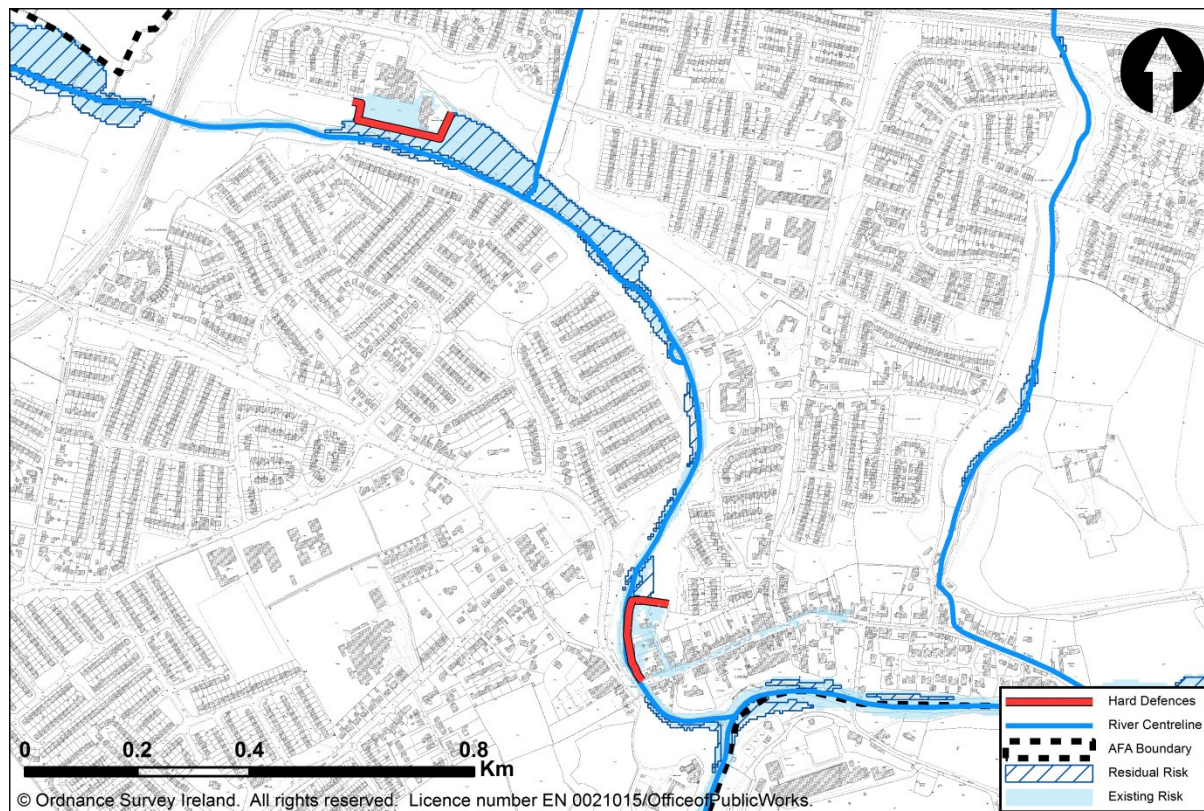


Figure 4.3.5: Leixlip Preferred Measures

4.3.2.6 Lucan to Chapelizod AFA

Preferred Measure: Option 1: Hard Defences.

Description: At risk properties would be protected from a series of flood embankments and walls. These hard defences would protect to the 1% AEP flood event with a total of 3.019km of wall (average height 1.3m high) and a total of 2.103km of embankment (average height 1.1m high) (Figure 4.3.6).

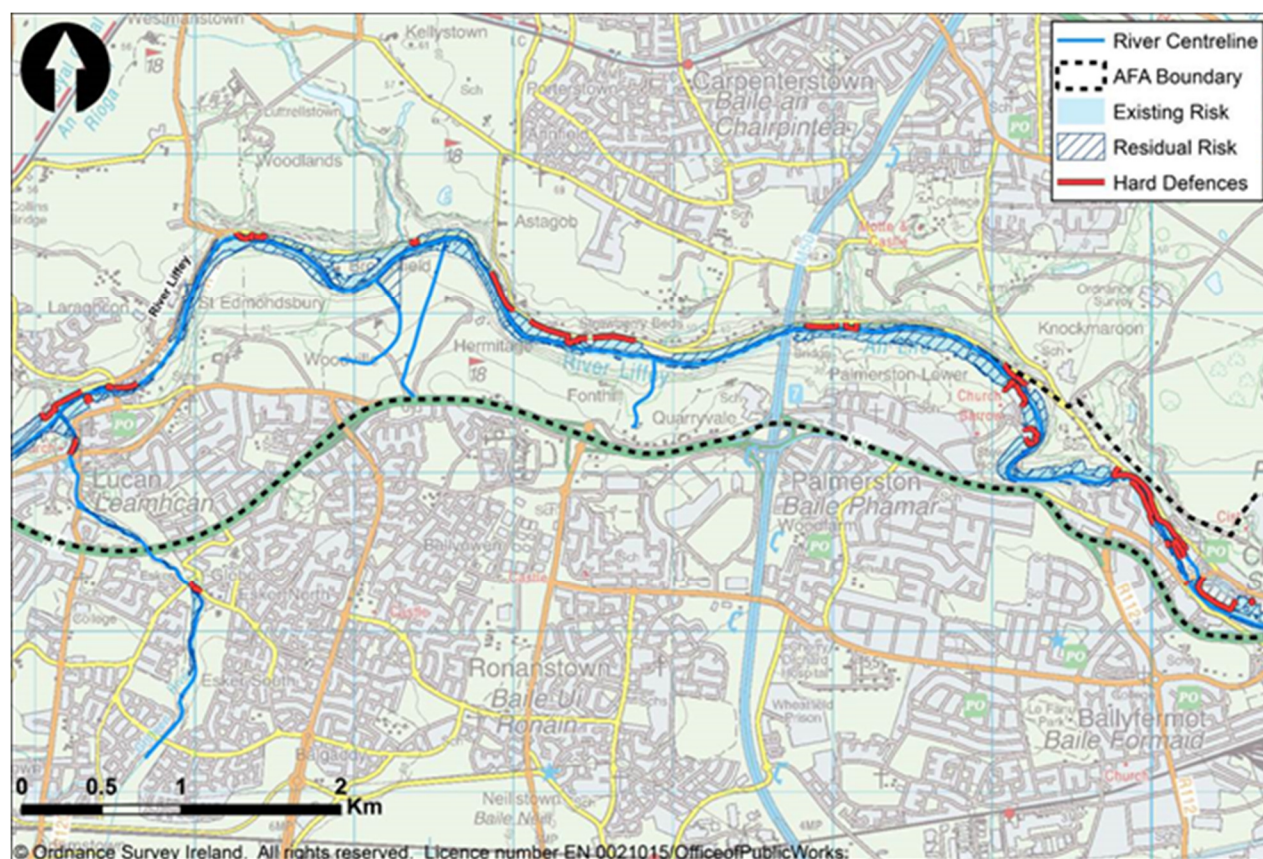


Figure 4.3.6: Lucan to Chapelizod AFA Preferred Measures

4.3.2.7 Maynooth AFA

Preferred Measure: Option 2 - Hard defences, Diversion of Flow

Description: At risk properties would be protected by a series of flood walls and embankments and an overland flow route (Figure 4.3.7). The hard defences will provide a standard of protection of 1% AEP for fluvial flood events with an average height of 1.6m and a total length of 350m. The overland flow route will be defined by 375m of hard defences with an average height of 0.8m.

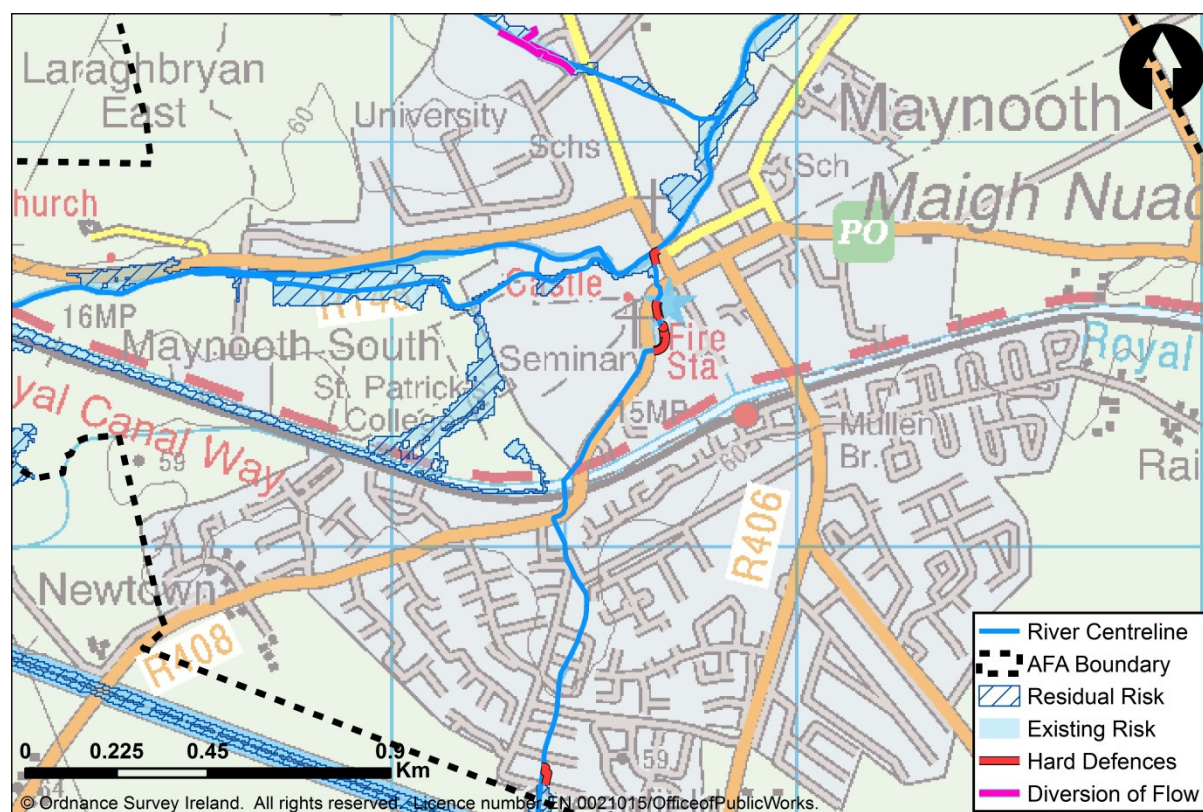


Figure 4.3.7: Maynooth Preferred Measures

4.3.2.8 Naas AFA

Preferred Measure: Option 1: Hard defences, Storage, Flow Diversion and Improvement of Channel Conveyance

Description: Storage can be utilised in the upper catchment to attenuate flow on the Morell, Naas and Broadfield Rivers. A number of storage locations have been identified, some or all of which can be used. Any combination of storage areas result in partial protection to properties and some hard defences are still required to protect all properties to the required standard of protection. The extent and height of the hard defences will depend on the amount of flow attenuation provided by the storage areas in the upstream catchment.

Other at risk properties would be protected by a diversion of flow. This method is the formalisation of an existing flow path and a new culvert to reconnect the flow path back into the river (Figure 4.3.8).

Further at risk properties would be protected by an improvement of channel conveyance. One structure needs upgraded to a 1.5m diameter pipe.

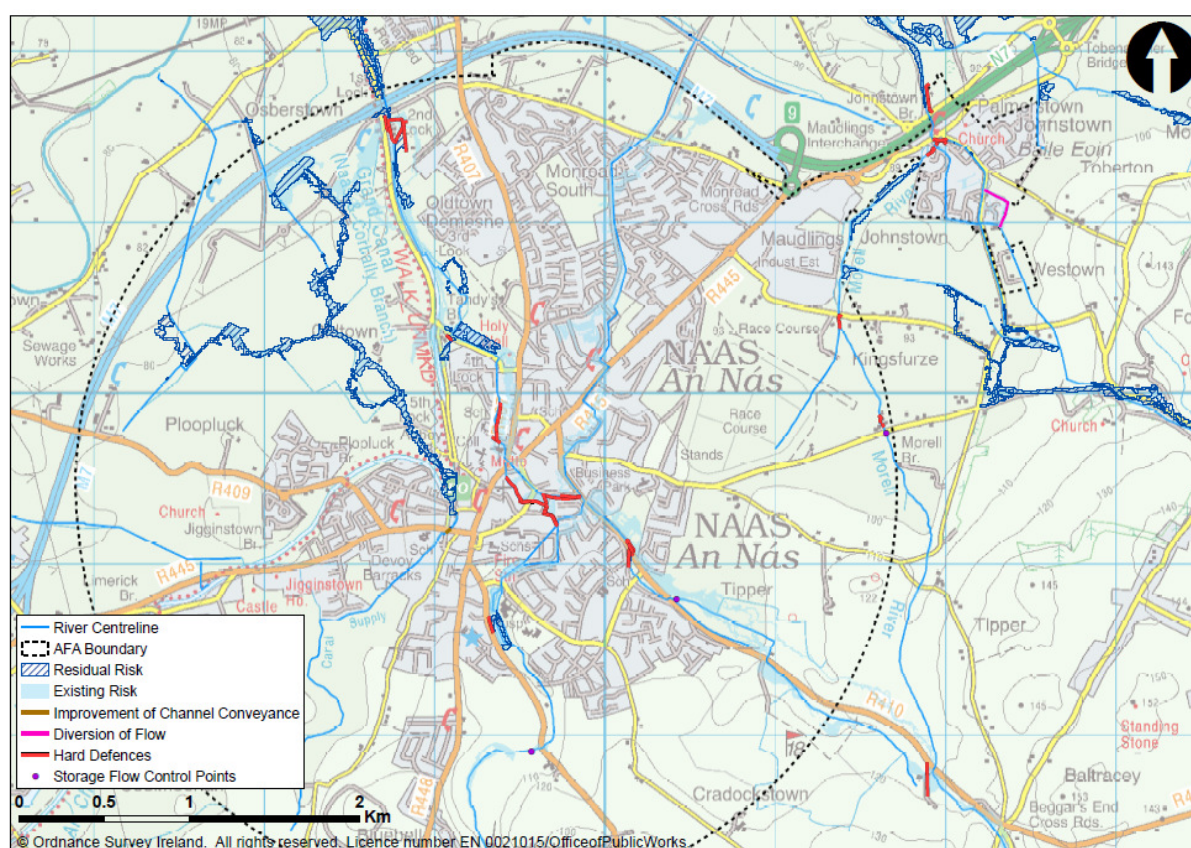


Figure 4.3.8: Naas Option 1 Preferred Measure

4.3.2.9 Newbridge AFA

Preferred Measure: Option 2: Hard defences, Improvement of Channel Conveyance & Other Works.

Description: At risk properties would be protected by 4 new or upgraded trash screens, tanking of 2 existing properties, a series of flood embankments and works to improve channel conveyance including dredging 90m of the Doorfield tributary and upgrading two culverts (Figure 4.3.9). The hard defences will provide a standard of protection of 1% AEP for fluvial flood events with an average height of 1.0m and a total length of 520m. The two culverts will be upgraded to 1.5m diameter pipes in order to convey the 1% AEP fluvial flow within the channel.

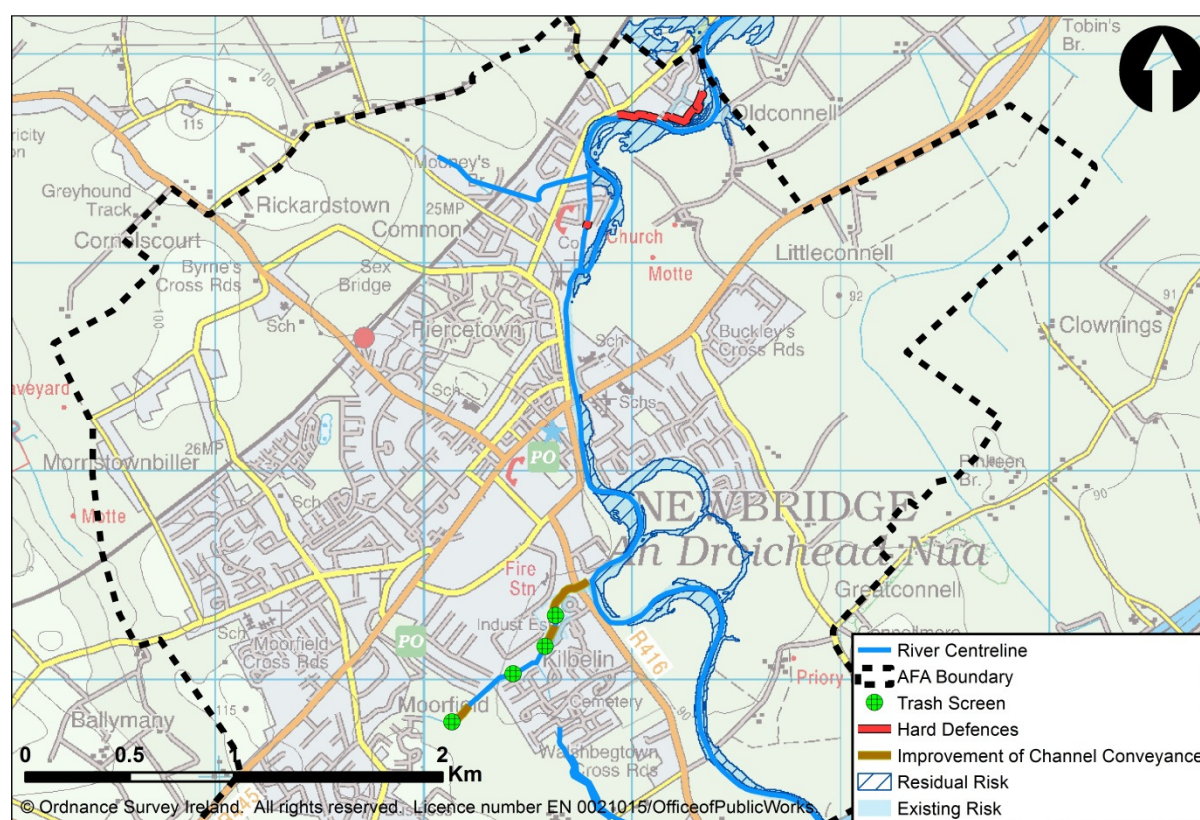


Figure 4.3.9: Newbridge Preferred Measures

4.3.2.10 Santry AFA/HPW

Preferred Measure: Option 4: Hard Defences and Improvement of Channel Conveyance.

Description: At risk properties would be protected by replacing the four existing 600mm diameter pipes at the outlet of Santry Demesne pond with two 2.4m x 1m box culverts (Figure 4.3.10).

Other at risk properties would be protected by hard defences (including defences already in progress) in Raheny Village consisting of 350m of flood wall with an average height of 0.9m and a 30m flood embankment upstream of James Larkin Road.

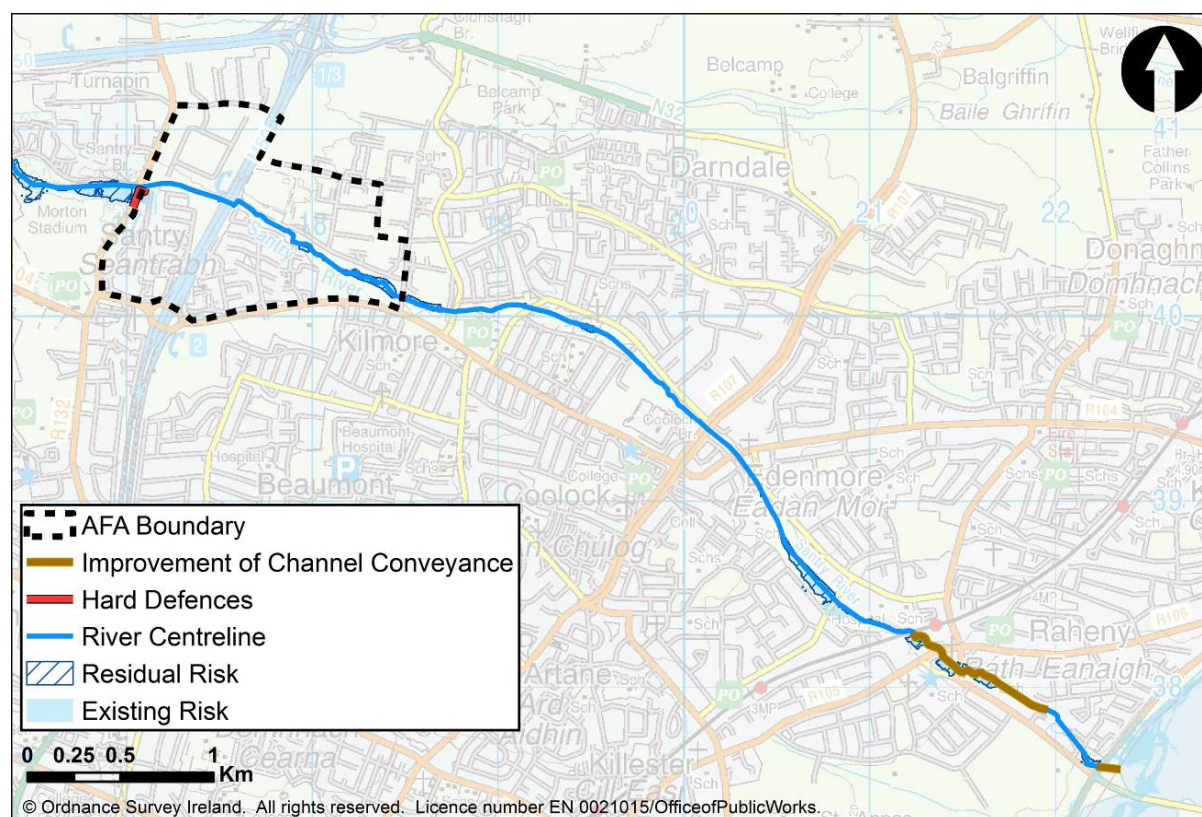


Figure 4.3.10: Santry Preferred Measures

4.3.2.11 Sutton & Howth North AFA

Preferred Measure: Option 1 - Hard defences.

Description: At risk properties would be protected by hard defences made up of a combination of wave return wall and flood defence walls (Figure 4.3.11).



Figure 4.3.11: Sutton & Howth North Preferred Measures

5 APPROPRIATE ASSESSMENT of AFA-SCALE MEASURES

5.1 BLESSINGTON AFA

All European sites in the zone of influence of Blessington AFA were screened for possible impacts from FRM methods (Chapter 3.5). Screening assessed the potential for impact at five European sites; Glenasmole Valley SAC (001209), Poulaphouca Reservoir SPA (004063), Red Bog, Kildare SAC (000397), Wicklow Mountains SAC (002122), and Wicklow Mountains SAP (004040) (Figure 5.1.1). Four sites were found to have no identifiable impact pathway arising from the implementation of FRM methods within the Blessington catchment and were therefore screened out as not requiring any further assessment. One European site was identified as potentially being impacted upon through FRM activities at Blessington AFA; Poulaphouca Reservoir SPA (004063). The following section assesses the proposed FRM measures described in Section 4.3.2.1 in relation to the screened-in European sites.

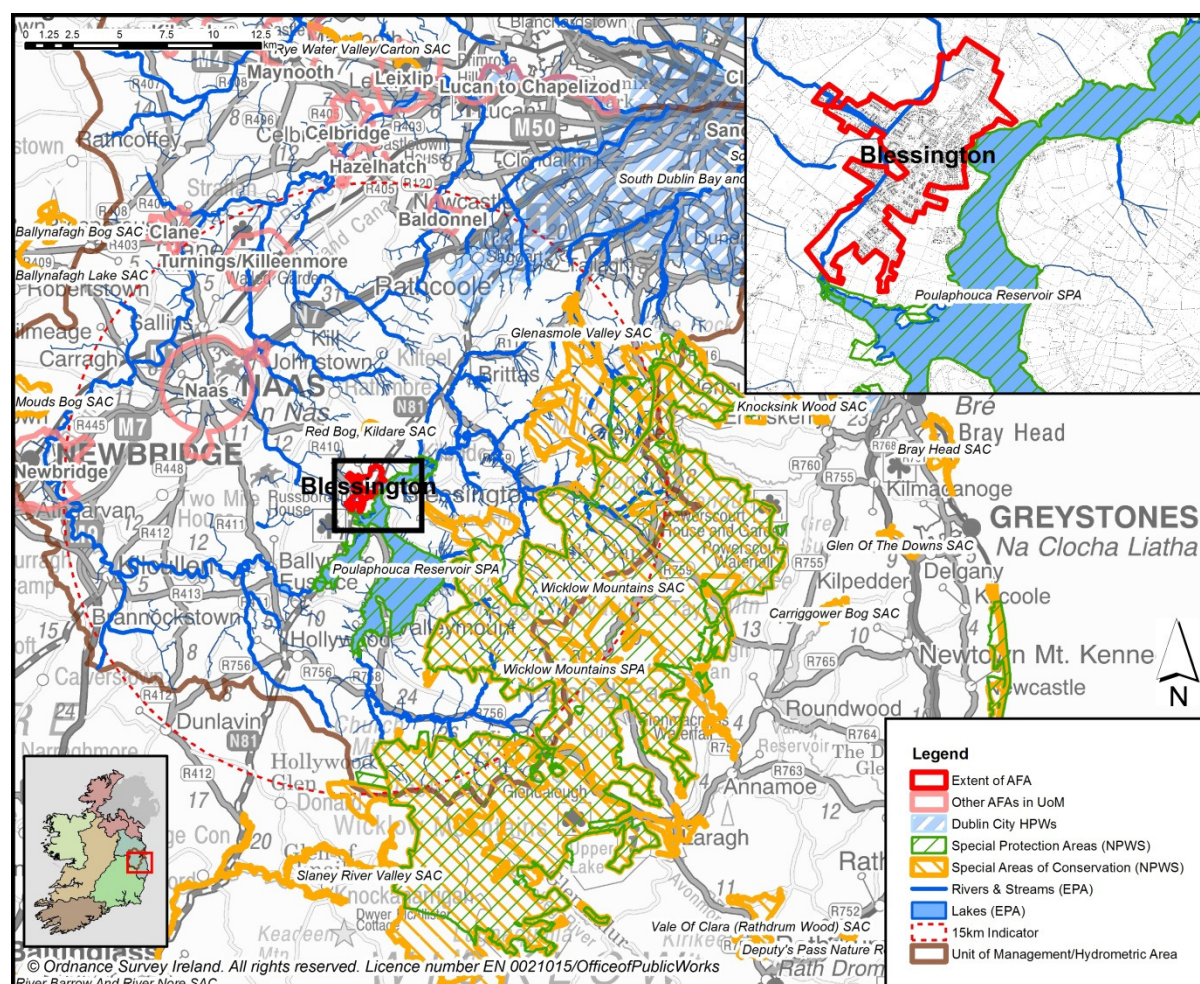


Figure 5.1.1: Blessington AFA in context of catchment and surrounding European sites

5.1.1 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 Blessington AFA on the screened in European sites.

The qualifying interest(s) of the site(s) 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

One European site was identified as potentially being impacted upon via surface water pathways; Poulaphouca Reservoir SPA (004063). Qualifying interests of this site 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 Blessington AFA.

European Site (Site code)	Qualifying interests
Poulaphouca Reservoir SPA (004063)	Greylag Goose (<i>Anser anser</i>) [A043] Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183]

The following sources of impact arising from FRM measures at Blessington 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 of flood walls and embankments 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 downstream.
- **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. 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.
- **Changes in water levels/channel morphology** – Construction of flood walls and embankments can lead to increased capacity and flow rates. This can lead to hydrological impacts on surface water dependent habitats upstream or downstream.

5.1.1.2 Potential Sources of Impact via Land and Air Pathways

One European site was identified as potentially being impacted upon via land and air pathways; Poulaphouca Reservoir SPA (004063). Qualifying interests of this site 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 site likely to be impacted upon via land and air pathways from FRM measures undertaken at Blessington AFA.

European Site (Site code)	Qualifying interests
Poulaphouca Reservoir SPA (004063)	Greylag Goose (<i>Anser anser</i>) [A043] Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183]

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

- **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 waterbird species.

5.1.2 Impact Assessment

Table 5.1.3 assesses the screened in European site in more detail and examines the ways in which the identified sources and pathways could adversely impact on 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 on European sites of FRM measures at Blessington 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. Cumulative effects will be further 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 (see section 3.1.2.2). 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 timing of FRM works is planned and managed correctly, no significant in-combination impacts are anticipated.

- 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. Provided the FRM works are planned and managed correctly, the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- Wicklow County Council and Kildare County Council both carry out inspections and maintenance of watercourses as and when resources are available, however these maintenance activities are likely to be local in nature, and provided the FRM works are planned and managed correctly, are not expected to have significant in-combination impacts with FRM measures.
- The Wicklow County Development Plan 2016-2022 and the Blessington Local Area Plan 2013-2019 have the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The Kildare County Development Plan 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.

The Flood Risk Management Plan UoM09, 2015-2021 contains the types of measures that have potential to impact on European sites. It has been concluded that the proposed works in Blessington AFA will have no significant residual impacts on nearby European sites. Provided the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

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 at Blessington AFA

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
Poulaphouca Reservoir SPA (004063)	Greylag Goose (<i>Anser anser</i>) [A043] Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	<p>The birds for which this SPA is designated are dependent upon wetland habitats within the site. Construction of hard defences upstream 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 lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is potential for indirect, negative impacts from sedimentation during construction work upstream; however any 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 of species in the SPA.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments could alter hydrological regimes, thereby impacting wetland habitats, the food supply and the conservation objectives of the bird species that they support (population trends, distribution).</p> <p>However, significant changes to the hydrological</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 Impacts	Avoidance/mitigation measures	Residual impact
				regime are unlikely, as hard defences in the upstream river are confined to short stretches. There are therefore not predicted to be any negative impacts on attributes used to define conservation status of wetland habitat or waterbirds at this site.		
		Noise and visual disturbance	Land and air	These waterbird species will be sensitive to disturbance from machinery and workforces during construction of new flood walls and embankments upstream and during maintenance activities. Noise and visual disturbance could cause displacement of populations which can require significant energy expenditure for the birds, which could have an adverse impact on population trends and distribution.	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</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>Avoid carrying out construction work in the over-wintering period (September - March). See also general mitigation in Chapter 6.</p>	No
		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	<p>Carry out invasive species surveys and follow SOPs (see Table 6.1.1)</p> <p>See general mitigation in Chapter 6</p>	No

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 Blessington AFA on the following European site:

- Poulaphouca Reservoir (004063)

The Appropriate Assessment investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above European site, alone and in-combination with other plans and projects, taking into account the site's 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 Blessington 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 DUBLIN CITY AFA - CARYSFORT MARETIMO HPW

All European sites in the zone of influence of Dublin City AFA - Carysfort Maretimo HPW (hereafter Carysfort Maretimo HPW) were screened for possible impacts from FRM methods (Chapter 3.5). Screening assessed the potential for impact at twenty-seven European sites; Baldoyle Bay SAC (000199), Baldoyle Bay SPA (004016), Ballyman Glen SAC (000713), Bray Head SAC (000714), Broadmeadow/Swords Estuary SPA (004025), Dalkey Islands SPA (004172), Glenasmole Valley SAC (001209), Howth Head Coast SPA (004113), Howth Head SAC (000202), Ireland's Eye SAC (002113), Ireland's Eye SPA (004117), Knocksink Wood SAC (000725), Lambay Island SAC (000204), Lambay Island SPA (004069), Malahide Estuary SAC (000205), North Bull Island SPA (004006), North Dublin Bay SAC (000206), Poulaphouca Reservoir SPA (004063), Red Bog, Kildare SAC (000397), Rockabill to Dalkey Island SAC (003000), Rogerstown Estuary SAC (000208), Rogerstown Estuary SPA (004015), Rye Water Valley/Carlton SAC (001398), South Dublin Bay and River Tolka Estuary SPA (004024), South Dublin Bay SAC (000210), Wicklow Mountains SAC (002122), and Wicklow Mountains SPA (004040) (see Figure 5.2.1).

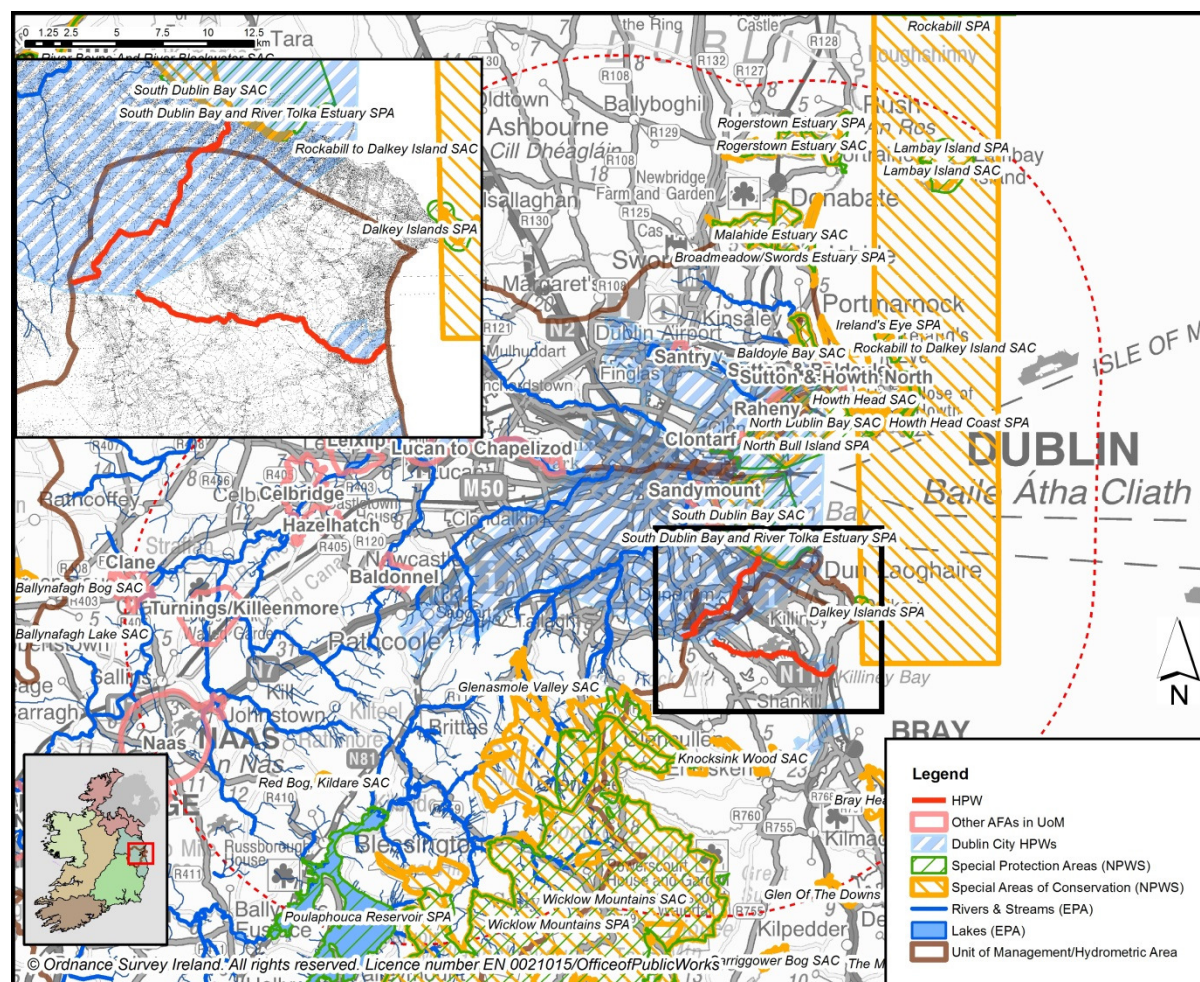


Figure 5.2.1: Carysfort Maretimo HPW in context of catchment and surrounding European sites

Eighteen sites were found to have no identifiable impact pathway arising from the implementation of FRM methods within the Dublin City catchment and were therefore screened out as not requiring any further assessment. Nine European sites were identified as potentially being impacted upon through FRM activities at Dublin City HPWs; Baldoyle Bay SAC (000199), Baldoyle Bay SPA (004016),

Dalkey Islands SPA (004172), Howth Head Coast SPA (004113), Howth Head SAC (000202), North Bull Island SPA (004006), North Dublin Bay SAC (000206), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). These Natura sites were screened for impact from FRM measures within all Dublin City HPWs, those that are likely to be impacted by FRM measures at Carysfort Maretimo HPW are discussed further below on the basis of potential impact pathways. The following section assesses the proposed FRM measures described in Chapter 4.3.2.2 in relation to the screened-in 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 Carysfort Maretimo HPW on the screened in European sites.

The qualifying interest(s) of the site(s) 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.

5.2.1.1 Potential Sources of Impact via Surface Water Pathways

Two European sites were identified as potentially being impacted upon via surface water pathways; South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). Owing to the separation distance, across coastal waters, no impacts from the implementation of FRM measures in the Carysfort Maretimo HPW are predicted to occur via surface water pathways on the qualifying interests of Baldoyle Bay SAC (000199), Baldoyle Bay SPA (004016), Dalkey Islands SPA (004172), Howth Head Coast SPA (004113), Howth Head SAC (000202), North Bull Island SPA (004006), and North Dublin Bay SAC (000206), either from sedimentation during the construction phase of FRM works, or from alteration of flows within the watercourse. Qualifying interests of those sites 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 Carysfort Maretimo HPW.

European Site (Site code)	Qualifying interests
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]

The following sources of impact arising from FRM measures at Carysfort Maretimo HPW 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 of flood walls and embankments and upstream storage can result in the release of suspended sediments into surface waters. This can lead to increased turbidity of surface waters, and an associated reduction in photosynthesis, which can impact on surface water dependent habitats downstream.
- **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. 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.
- **Changes in water levels/channel morphology** – Construction of flood walls and embankments, and improvement of channel conveyance can lead to increased capacity and flow rates. This can lead to hydrological impacts on surface water dependent habitats upstream or downstream.

5.2.1.2 Potential Sources of Impact via Land and Air Pathways

Two European sites were identified as potentially being impacted upon via land and air pathways; South Dublin Bay and River Tolka Estuary SPA (004024) and Dalkey Islands SPA (004172). Qualifying 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 Carysfort Maretime HPW.

European Site (Site code)	Qualifying interests
South Dublin Bay and River Tolka Estuary SPA (004024)	Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Dunlin (<i>Calidris alpina</i>) [A149] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Redshank (<i>Tringa totanus</i>) [A162] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Roseate Tern (<i>Sterna dougallii</i>) [A192] Common Tern (<i>Sterna hirundo</i>) [A192] Arctic Tern (<i>Sterna paradisaea</i>) [A194] Wetland and Waterbirds [A999]
Dalkey Islands SPA (004172)	Roseate Tern (<i>Sterna dougallii</i>) [A192] Common Tern (<i>Sterna hirundo</i>) [A192] Arctic Tern (<i>Sterna paradisaea</i>) [A194]

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

- **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 waterbird species.

5.2.2 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.

5.2.2.1 In-combination Effects

Appropriate Assessment requires consideration of the impacts on European sites of FRM measures at Carysfort Maretimo HPW, 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. Cumulative effects will be further 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:

- 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. Provided the FRM works are planned and managed correctly, the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- The Regional Planning Guidelines for the Greater Dublin Area, 2014-2016 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The Dublin City Development Plan, 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- A Vision for Dublin Bay has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The draft Eastern River Basin District Management Plan, 2015-2021 and associated Programmes of Measures lists European sites in the Water Framework Directive Register of Protected Areas for protection. The OPW will work with the EPA, local authorities and other agencies to identify,

where possible, measures that will have benefits for both WFD and flood risk management objectives and thus negative in-combination effects are unlikely.

- The Dublin Bay Water Quality Management Plan (Environmental Research Unit, 1991) is an environmental protection plan. Provided that FRM physical works timings are well planned and managed, negative in-combination effects with this plan are unlikely.
- The South Dublin County Development Plan, 2010-2016 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The flood risk area for Carysfort Maretimo HPW has connectivity with Loughlinstown AFA in UoM10 via the Deansgrange River. The FRMP for UoM10 has concluded that FRM methods at Loughlinstown AFA may be screened out of requiring appropriate assessment, as that AFA has no potential impact pathway to any European sites. 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 when project-specific design information is available.
- The projects preceding or running in parallel with the Eastern CFRAM Study (see Chapter 3.1.2.2) have the potential for cumulative or in-combination effects on the European sites in Dublin Bay with FRM measures in UoM 09. This includes FRM works occurring in the adjacent UoM 08 and UoM 10. 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 timing of FRM works is planned and managed correctly, no significant in-combination impacts are anticipated.

The Flood Risk Management Plan UoM09, 2015-2021 contains the types of measures that have potential to impact on European sites. It has been concluded that the proposed works in the Carysfort Maretimo HPWs will have no significant residual impacts on European sites. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

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 Carysfort Maretimo HPW (Hard defences and storage).

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
South Dublin Bay and River Tolka Estuary SPA (004024)	Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Dunlin (<i>Calidris alpina</i>) [A149] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Redshank (<i>Tringa totanus</i>) [A162] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Roseate Tern (<i>Sterna dougallii</i>) [A192] Common Tern (<i>Sterna hirundo</i>) [A192] Arctic Tern (<i>Sterna paradisaea</i>) [A194] Wetland and Waterbirds [A999]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	<p>The birds for which this SPA is designated are dependent upon wetland habitats within the site. Construction of hard defences and storage upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale, and are not predicted to significantly impact upon the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments and storage could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species that they support (population trends, distribution).</p> <p>However, any changes to the hydrological and morphological regime of the river arising from</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 Impacts	Avoidance/mitigation measures	Residual impact
				the construction phase will be short-term in nature and are not expected to significantly impact upon habitat in the SPA.		
		Noise and Visual Disturbance	Land and Air	<p>These waterbird species will be sensitive to disturbance from machinery and workforces during construction of hard defences and storage. This disturbance could cause displacement of populations, which could have an adverse impact on population trends and distribution.</p> <p>Many of the designated species are wintering, utilising the SPA for foraging during these months. Tern species breed further north in Dublin Bay in early summer, and roost in exposed sand banks in south Dublin Bay primarily between the Martello Towers at Sandymount and Williamstown, a short distance north along the coastline from Carysfort Maretime HPW. It is a conservation objective for these species to have no significant decline in roosting areas and no disturbance at roosting sites that would adversely affect numbers of that tern species among the post-breeding aggregation of terns.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Avoid carrying out construction work in the over-wintering period (September - March) to ensure wintering waterbirds are not disturbed.</p> <p>Avoid carrying out construction work in the Tern roosting season (July-September).</p> <p>See also general mitigation in Chapter 6.</p>	No
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction of hard defences and storage upstream of the SAC could impact on the designated habitat through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitat. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the mudflat and sandflat habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel,</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				There is potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale, and are not predicted to significantly impact upon the conservation status of designated habitat	<p>wherever possible.</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>	
		Water level changes		<p>The designated wetland habitat is dependent on a specific hydrological regime. Construction of upstream flood walls/embankments and storage could alter the hydrological regime, thereby impacting upon the conservation objectives of the mudflat and sandflat habitat.</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and are not expected to significantly impact upon habitat in the SAC.</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
Dalkey Islands SPA (004172)	<p>Roseate Tern (<i>Sterna dougallii</i>) [A192]</p> <p>Common Tern (<i>Sterna hirundo</i>) [A192]</p> <p>Arctic Tern (<i>Sterna paradisaea</i>) [A194]</p>	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. This disturbance could cause displacement of populations which can require significant energy expenditure for the birds, which could have an adverse impact on population trends and distribution.</p> <p>Terns breed and roost at this site during summer months. It is a conservation objective for these species to have no significant decline in roosting areas or disturbance at roosting sites that would adversely affect numbers of that tern species among the post-breeding aggregation of terns.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Avoid carrying out construction work in the Tern roosting season (July-September).</p> <p>See also general mitigation in Chapter 6.</p>	No

5.2.3 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 Carysfort Maretimo HPW on the following European sites:

- Baldoyle Bay SAC (000199)
- Baldoyle Bay SPA (004016)
- Dalkey Islands SPA (004172)
- Howth Head Coast SPA (004113)
- Howth Head SAC (000202)
- North Bull Island SPA (004006)
- North Dublin Bay SAC (000206)
- South Dublin Bay and River Tolka Estuary SPA (004024)
- South Dublin Bay SAC (000210).

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 Carysfort Maretimo HPW 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 CELBRIDGE AFA AND HAZELHATCH AFA

All European sites in the zone of influence of Celbridge and Hazelhatch AFAs were screened for possible impacts from FRM methods. Screening assessed the potential for impact at ten European sites; Ballynafagh Bog SAC (000391), Glenasmole Valley SAC (001209), North Bull Island SPA (004006), North Dublin Bay SAC (000206), Poulaphouca Reservoir SPA (004063), Red Bog, Kildare SAC (000397), Rye Water Valley/Carlton SAC (001398), South Dublin Bay and River Tolka Estuary SPA (004024), South Dublin Bay SAC (000210), and Wicklow Mountains SAC (002122) (Figure 5.3.1). Six sites were found to have no identifiable impact pathway arising from the implementation of FRM methods within the Celbridge and Hazelhatch catchments and were therefore screened out as not requiring any further assessment. Four European sites were identified as potentially being impacted upon through FRM activities at Celbridge and Hazelhatch AFAs; North Bull Island SPA (004006), North Dublin Bay SAC (000206), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). The following section assesses the proposed FRM measures described in Chapter 4.3.2.3 in relation to the screened-in European sites.

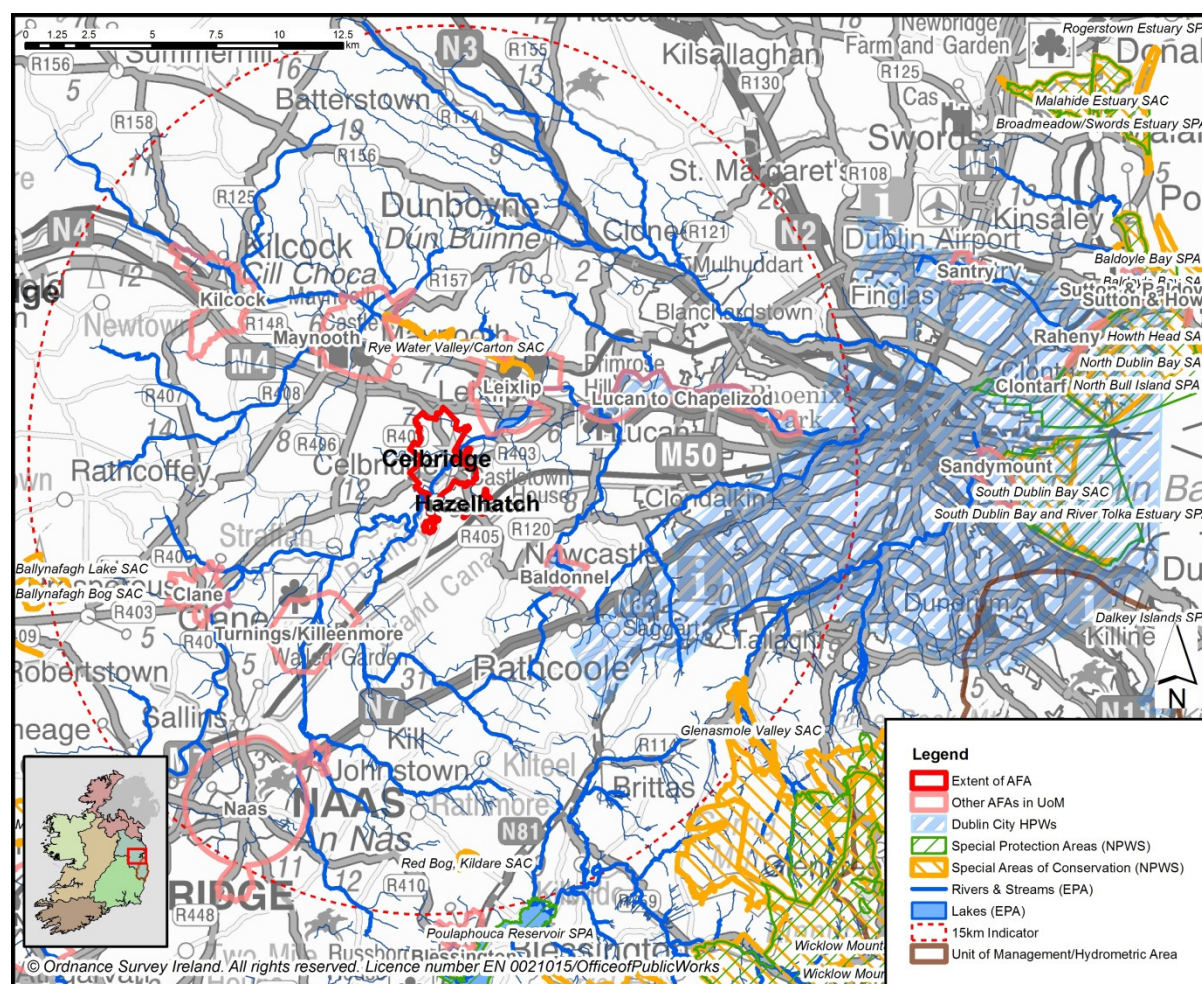


Figure 5.3.1: Celbridge and Hazelhatch AFAs in the context of catchment and surrounding European sites

5.3.1 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 Celbridge and Hazelhatch AFAs on the screened in European sites.

The qualifying interest(s) of the site(s) at risk from surface water pathways are identified in Table 5.3.1. 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; North Bull Island SPA (004006), North Dublin Bay SAC (000206), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). Qualifying interests of these sites at risk from surface water pathways are identified in 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 Celbridge and Hazelhatch AFAs. 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 Celbridge and Hazelhatch AFAs.

European Site (Site code)	Qualifying interests
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]

The following sources of impact arising from FRM measures at Celbridge and Hazelhatch AFAs 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 of flood walls and embankments, improvement of channel conveyance through dredging and diversion of flow can result in the release of suspended sediments into surface waters. This can lead to increased turbidity of surface waters, and an associated reduction in photosynthesis, which can impact on surface water dependent habitats downstream.
- **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. 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.
- **Changes in water levels/channel morphology** – Construction of flood walls and embankments can lead to increased capacity and flow rates. This can lead to hydrological impacts on surface water dependent habitats upstream or downstream.

5.3.2 Impact Assessment

Table 5.3.2 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 Celbridge and Hazelhatch AFAs, 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. Cumulative effects will be further 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:

- 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. Provided the FRM works are planned and managed correctly, the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- Kildare County Council carries out inspections and maintenance of watercourses as and when resources are available, however these maintenance activities are likely to be local in nature, and provided the FRM works are planned and managed correctly, are not expected to have significant in-combination impacts with FRM measures.
- The Kildare County Development Plan 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.

- The Regional Planning Guidelines for the Greater Dublin Area, 2014-2016 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The Dublin City Development Plan, 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- A Vision for Dublin Bay has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The draft Eastern River Basin District Management Plan, 2015-2021 and associated Programmes of Measures lists European sites in the Water Framework Directive Register of Protected Areas for protection. The OPW will work with the EPA, local authorities and other agencies to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives and thus negative in-combination effects are unlikely.
- The Dublin Bay Water Quality Management Plan (Environmental Research Unit, 1991) is an environmental protection plan. Provided that FRM physical works timings are well planned and managed, negative in-combination effects with this plan are unlikely.
- The OPW carries out regular maintenance on those channels altered through schemes implemented following the 1945 Arterial Drainage Act. The Shinkeen (Hazelhatch) Arterial Drainage scheme includes 4.5km of watercourse. Arterial Drainage maintenance activities could potentially result in adverse cumulative impacts on habitats or species. It is recommended that no arterial maintenance is carried out on the Shinkeen Stream while FRM work is being undertaken during the construction phase.
- The projects preceding or running in parallel with the Eastern CFRAM Study (see Chapter 3.1.2.2) have the potential for cumulative or in-combination effects on the European sites in Dublin Bay with FRM measures at Celbridge and Hazelhatch AFAs. Where relevant, these plans or projects have been or will be subject to appropriate assessment. The principal mitigation will be the avoidance of undertaking FRM work on adjoining reaches of rivers for different AFAs or other parallel projects simultaneously. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

The Flood Risk Management Plan UoM09, 2015-2021 contains the types of measures that have potential to impact on European sites. It has been concluded that the proposed works in the Celbridge and Hazelhatch AFAs will have no significant residual impacts on European sites. Provided

that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

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 5.3.2: Impact assessment for FRM measures at Celbridge and Hazelhatch AFAs (Hard defences, improvement of channel conveyance, and diversion of flow).

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences, improvement of channel conveyance through dredging, and flow diversion upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SPA from the Celbridge and Hazelhatch AFAs (23km and 22.6km, respectively), there are not predicted to be any impacts on the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments, improvement of channel</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				<p>conveyance and flow diversion could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species that they support (population trends, distribution).</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in North Bull Island SPA 23km and 22.6km downstream of the Celbridge and Hazelhatch AFAs, respectively.</p>	<p>maintenance.</p> <p>See also general mitigation in Chapter 6.</p>	
North Dublin Bay SAC (000206)	<p>Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]</p>	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction of hard defences, improvement of channel conveyance, and diversion of flow upstream of the SAC could impact on designated habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the wetland habitats.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SAC from the Celbridge (23km) and Hazelhatch (22.6km) AFAs, there are not predicted to be any impacts on the conservation status of designated habitats.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
		Water level changes		<p>The designated wetland habitats are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments, improvement of channel conveyance and diversion of flow could alter hydrological regimes, thereby impacting upon the conservation objectives of wetland and coastal habitats.</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SAC 23km and 22.6km downstream of the Celbridge and Hazelhatch AFAs, respectively.</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
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences, improvement of channel conveyance, and flow diversion upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is slight potential for indirect, negative</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</p> <p>Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation.</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SPA from the Celbridge (19.8km) and Hazelhatch (19.5) AFAs, there are not predicted to be any impacts on the conservation status of designated habitat.	See also general mitigation in Chapter 6.	
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments, improvement of channel conveyance and flow diversion could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species that they support (population trends, distribution).</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in South Dublin Bay and River Tolka Estuary SPA 19.8km and 19.5km downstream of the Celbridge and Hazelhatch AFAs, respectively.</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
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	Construction of hard defences, improvement of channel conveyance, and diversion of flow upstream of the SAC could impact on the designated habitat through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitat. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants.	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</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 Impacts	Avoidance/mitigation measures	Residual impact
				<p>This could negatively impact on the conservation objectives of the mudflat and sandflat habitat.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SAC from the Celbridge (19.8km) and Hazelhatch (19.5km) AFAs, there are not predicted to be any impacts on the conservation status of designated habitats.</p>	<p>Avoid working in-channel, wherever possible.</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>	
		Water level changes		<p>The designated wetland habitat is dependent on a specific hydrological regime. Construction of upstream flood walls/embankments, improvement of channel conveyance and diversion of flow could alter the hydrological regime, thereby impacting upon the conservation objectives of the mudflat and sandflat habitat.</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SAC 19.8km and 19.5km downstream of the Celbridge and Hazelhatch AFAs, respectively.</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

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 Celbridge and Hazelhatch AFAs on the following European sites:

- North Bull Island SPA (004006)
- North Dublin Bay SAC (000206)
- South Dublin Bay and River Tolka Estuary SPA (004024)
- South Dublin Bay SAC (000210)

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 Celbridge and Hazelhatch AFAs 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 CLANE AFA

All European sites in the zone of influence of Clane AFA were screened for possible impacts from FRM methods (see Chapter 3.5). Screening assessed the potential for impact at nine European sites; Ballynafagh Bog SAC (000391), Mouds Bog SAC (002331), North Bull Island SPA (004006), North Dublin Bay SAC (000206), Pollardstown Fen SAC (000396), Red Bog, Kildare SAC (000397), Rye Water Valley/Carton SAC (001398), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210) (see Figure 5.4.1). Five sites were found to have no identifiable impact pathway arising from the implementation of FRM methods within the Clane catchment and were therefore screened out as not requiring any further assessment. Four European sites were identified as potentially being impacted upon through FRM activities at Clane AFA; North Bull Island SPA (004006), North Dublin Bay SAC (000206), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). The following section assesses the proposed FRM measures described in Chapter 4.3.2.4 in relation to the screened-in European sites.

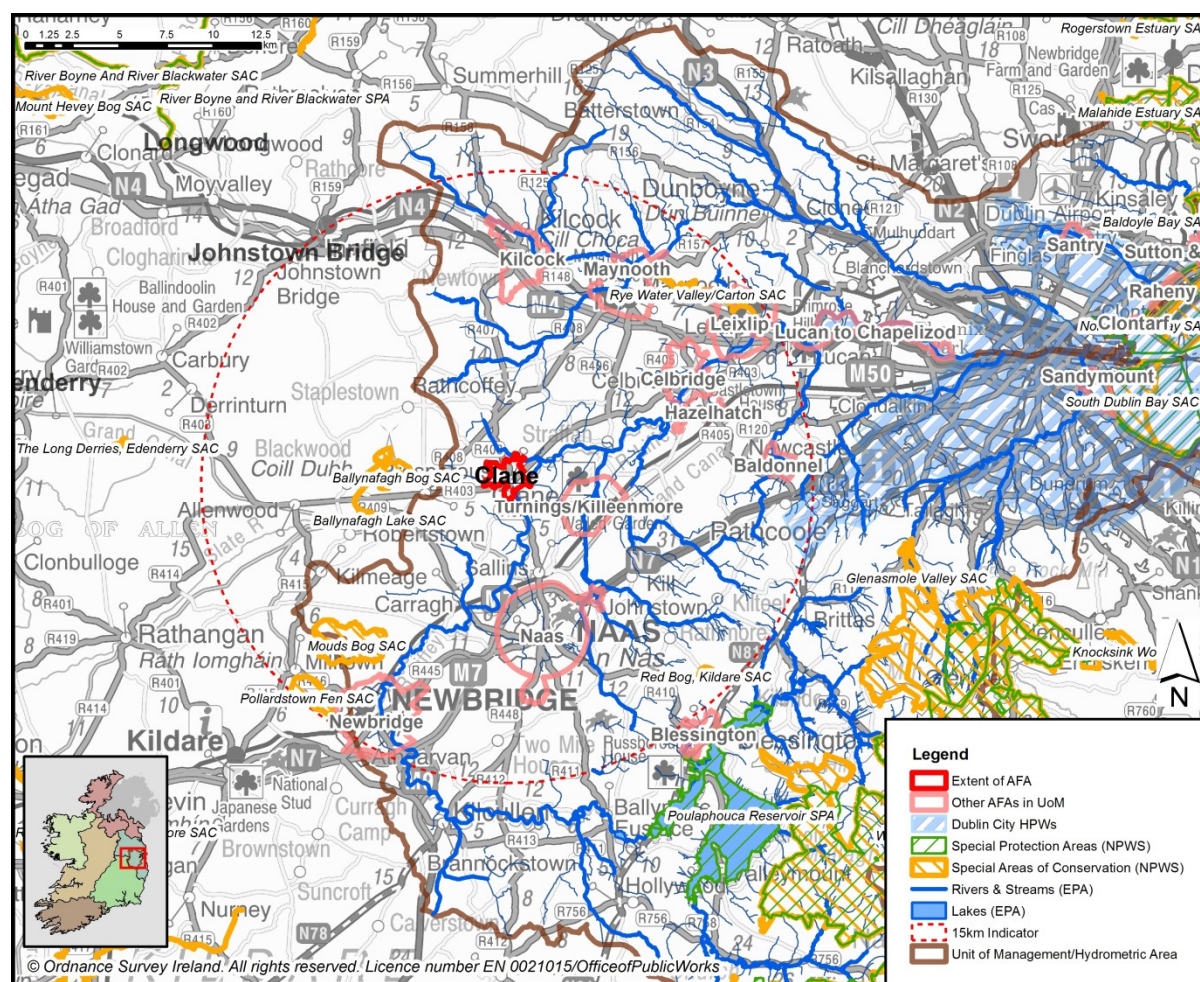


Figure 5.4.1: Clane AFA in context of catchment and surrounding European sites

5.4.1 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 Clane AFA on the screened in European sites.

The qualifying interest(s) of the site(s) at risk from surface water pathways are identified in Table 5.4.1. 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

Four European sites were identified as potentially being impacted upon via surface water pathways; North Bull Island SPA (004006), North Dublin Bay SAC (000206), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). Qualifying interests of these sites 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 Clane AFA.

European Site (Site code)	Qualifying interests
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]

The following sources of impact arising from FRM measures at Clane 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 of flood walls and embankments, and improvement of channel conveyance through culvert removal and upgrading of bridges can result in the release of suspended sediments into surface waters. This can lead to increased turbidity of surface waters,

and an associated reduction in photosynthesis, which can impact on surface water dependent habitats downstream.

- **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. 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.
- **Changes in water levels/channel morphology** – Construction of flood walls and embankments, and improvement of channel conveyance can lead to increased capacity and flow rates. This can lead to hydrological impacts on surface water dependent habitats upstream or downstream.

5.4.2 Impact Assessment

Table 5.4.2 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 Clane 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. Cumulative effects will be further 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:

- 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. Provided the FRM works are planned and managed correctly, the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- Kildare County Council carries out inspections and maintenance of watercourses as and when resources are available, however these maintenance activities are likely to be local in nature, and provided the FRM works are planned and managed correctly, are not expected to have significant in-combination impacts with FRM measures.
- The Kildare County Development Plan 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.

- The Regional Planning Guidelines for the Greater Dublin Area, 2014-2016 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The Dublin City Development Plan, 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- A Vision for Dublin Bay has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The draft Eastern River Basin District Management Plan, 2015-2021 and associated Programmes of Measures lists European sites in the Water Framework Directive Register of Protected Areas for protection. The OPW will work with the EPA, local authorities and other agencies to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives and thus negative in-combination effects are unlikely.
- The Dublin Bay Water Quality Management Plan (Environmental Research Unit, 1991) is an environmental protection plan. Provided that FRM physical works timings are well planned and managed, negative in-combination effects with this plan are unlikely.
- The projects preceding or running in parallel with the Eastern CFRAM Study (see Chapter 3.1.2.2) have the potential for cumulative or in-combination effects on the European sites in Dublin Bay with FRM measures at Clane AFA. Where relevant, these plans or projects have been or will be subject to appropriate assessment. The principal mitigation will be the avoidance of undertaking FRM work on adjoining reaches of rivers for different AFAs or other parallel projects simultaneously. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.
- The Flood Risk Management Plan UoM09, 2015-2021 contains the types of measures that have potential to impact on European sites. It has been concluded that the proposed works in the Clane AFA will have no significant residual impacts on European sites. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

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 5.4.2: Impact assessment for FRM measures at Clane AFA (Hard defences and improvement of channel conveyance).

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences and improvement of channel conveyance upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SPA from the Clane AFA (32.8km), there are not predicted to be any impacts on the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments and improvement of channel conveyance could alter hydrological regimes, thereby impacting upon wetland habitats and the conservation objectives of the bird species that they support (population</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				trends, distribution). However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SPA 32.8km downstream of Clane AFA.	mitigation in Chapter 6.	
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	Construction of hard defences and improvement of channel conveyance upstream of the SAC could impact on designated habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the wetland habitats. There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SAC from the Clane AFA (32.8km), there are not predicted to be any impacts on the conservation status of designated habitats.	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. Avoid working in-channel, wherever possible. Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation. See also general mitigation in Chapter 6.	No
		Water level changes		The designated wetland habitats are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments and improvement of channel conveyance could alter hydrological regimes, thereby impacting upon	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 Impacts	Avoidance/mitigation measures	Residual impact
				<p>the conservation objectives of wetland and coastal habitats.</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in SAC 32.8km downstream of the AFA.</p>	See also general mitigation in Chapter 6.	
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences and improvement of channel conveyance upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SPA from the Clane AFA (32.8km), there are not predicted to be any impacts on the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		The habitats that support these species are	Strictly adhere to best	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				<p>dependent on specific hydrological regimes. Construction of upstream flood walls/embankments and improvement of channel conveyance could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species that they support (population trends, distribution).</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SPA 32.8km downstream of Clane AFA.</p>	<p>practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general mitigation in Chapter 6.</p>	
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction of hard defences and improvement of channel conveyance upstream of the SAC could impact on designated habitat through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitat. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the mudflat and sandflat habitat.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SAC from the Clane AFA (32.8km), there are not predicted to be any impacts on the conservation status of designated</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</p> <p>Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation.</p> <p>See also general</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				habitat.	mitigation in Chapter 6.	
		Water level changes		<p>The designated wetland habitat is dependent upon a specific hydrological regime. Construction of upstream flood walls/embankments could alter the hydrological regime, thereby impacting upon the conservation objectives of mudflat and sandflat habitat.</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SPA 32.8km downstream of Clane AFA.</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

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 Clane AFA on the following European sites:

- North Bull Island SPA (004006)
- North Dublin Bay SAC (000206)
- South Dublin Bay and River Tolka Estuary SPA (004024)
- South Dublin Bay SAC (000210)

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 Clane 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.

5.5 LEIXLIP AFA

All European sites in the zone of influence of Leixlip AFA were screened for possible impacts from FRM methods (see Chapter 3.5). Screening assessed the potential for impact at seven European sites; Glenasmole Valley SAC (001209), North Bull Island SPA (004006), North Dublin Bay SAC (000206), Rye Water Valley/Carton SAC (001398), South Dublin Bay and River Tolka Estuary SPA (004024), South Dublin Bay SAC (000210), and Wicklow Mountains SAC (002122) (see Figure 5.5.1). Two sites were found to have no identifiable impact pathway arising from the implementation of FRM methods within the Leixlip 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 Leixlip AFA; North Bull Island SPA (004006), North Dublin Bay SAC (000206), Rye Water Valley/Carton SAC (001398), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). The following section assesses the proposed FRM measures described in Chapter 4.3.2.5 in relation to the screened-in European sites.

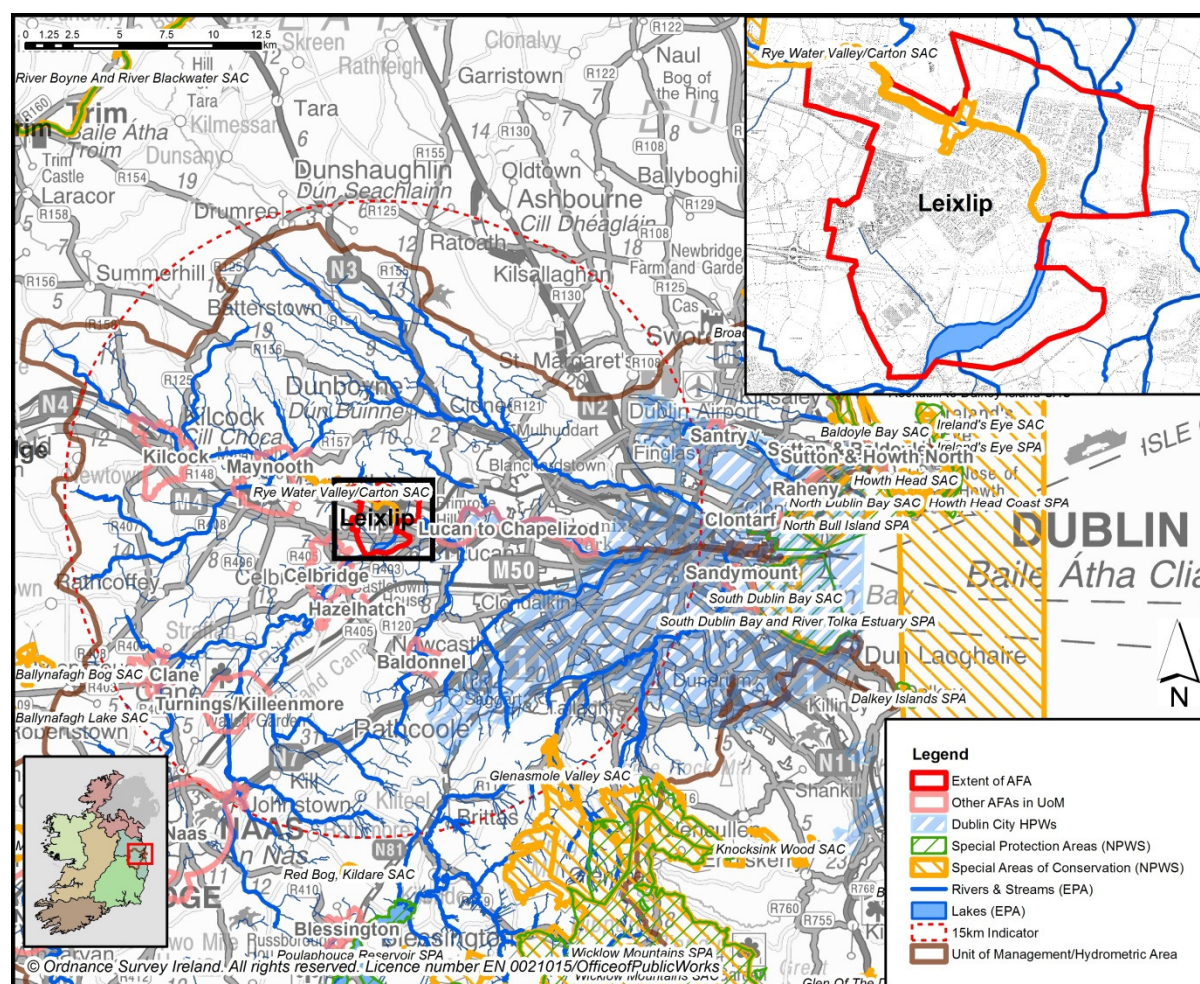


Figure 5.5.1: Leixlip AFA in context of catchment and surrounding European sites

5.5.1 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 Leixlip AFA on the screened in European sites.

The qualifying interest(s) of the site(s) at risk from surface water pathways are identified in Table 5.5.1, from land and air pathways in Table 5.5.2 and from groundwater pathways in Table 5.5.3. 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.

5.5.1.1 Potential Sources of Impact via Surface Water Pathways

Five European sites were identified as potentially being impacted upon via surface water pathways; North Bull Island SPA (004006), North Dublin Bay SAC (000206), Rye Water Valley/Carton SAC (001398), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). Qualifying interests of these sites at risk from surface water pathways are identified in Table 5.5.1. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.5.1: Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Leixlip AFA.

European Site (Site code)	Qualifying interests
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]
Rye Water Valley/Carton SAC (001398)	Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220] <i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014] <i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]

The following sources of impact arising from FRM measures at Leixlip 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 of flood walls and embankments can result in the release of

suspended sediments into surface waters. This can lead to increased turbidity of surface waters, and an associated reduction in photosynthesis, which can impact on surface water dependent habitats downstream.

- **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. 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.
- **Changes in water levels/channel morphology** – Construction of flood walls and embankments, and improvement of channel conveyance can lead to increased capacity and flow rates. This can lead to hydrological impacts on surface water dependent habitats upstream or downstream.

5.5.1.2 Potential Sources of Impact via Land and Air Pathways

One European site was identified as potentially being impacted upon via land and air pathways; Rye Water Valley/Carton SAC (001398). Qualifying interests of this site at risk from land and air pathways are identified in Table 5.5.2. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.5.2: Qualifying Interests of the screened in European site likely to be impacted upon via land and air pathways from FRM measures undertaken at Leixlip AFA.

European Site (Site code)	Qualifying interests
Rye Water Valley/Carton SAC (001398)	Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220] <i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014] <i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]

The following sources of impact arising from FRM measures at Leixlip 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 and along access routes. 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 trends or range).

5.5.1.3 Potential Sources of Impact via Groundwater Pathways

One European site was identified as potentially being impacted upon via groundwater pathways; Rye Water Valley/Carton SAC (001398). Qualifying interests of this site at risk from groundwater pathways are identified in Table 5.5.3. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.5.3: Qualifying Interests of the screened in European site likely to be impacted upon via groundwater pathways from FRM measures undertaken at Leixlip AFA.

European Site (Site code)	Qualifying interests
Rye Water Valley/Carton SAC (001398)	Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220] <i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014] <i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]

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

- **Changes in nutrient levels/pollutants** – Construction activities can result in the release of nutrients or pollutants into groundwater. 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 ground water dependent habitats.
- **Changes in water levels/channel morphology** – Petrifying springs are vulnerable to changes in the flow and quality of ground water as well as changes in land use practices. Construction of flood walls and embankments, and improvement of channel conveyance can lead to increased capacity and flow rates. This can lead to hydrological impacts on groundwater dependent habitats upstream or downstream.

5.5.2 Impact Assessment

Table 5.5.4 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.

5.5.2.1 In-combination Effects

Appropriate Assessment requires consideration of the impacts on European sites of FRM measures at Leixlip 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. Cumulative effects will be further 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:

- 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. Provided the FRM works are planned and managed correctly, the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- Kildare County Council carries out inspections and maintenance of watercourses as and when resources are available, however these maintenance activities are likely to be local in nature, and provided the FRM works are planned and managed correctly, are not expected to have significant in-combination impacts with FRM measures.
- The Kildare County Development Plan 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The Regional Planning Guidelines for the Greater Dublin Area, 2014-2016 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The Dublin City Development Plan, 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- A Vision for Dublin Bay has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.

- The draft Eastern River Basin District Management Plan, 2015-2021 and associated Programmes of Measures lists European sites in the Water Framework Directive Register of Protected Areas for protection. The OPW will work with the EPA, local authorities and other agencies to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives and thus negative in-combination effects are unlikely.
- The Dublin Bay Water Quality Management Plan (Environmental Research Unit, 1991) is an environmental protection plan. Provided that FRM physical works timings are well planned and managed, negative in-combination effects with this plan are unlikely.
- The projects preceding or running in parallel with the Eastern CFRAM Study (see Chapter 3.1.2.2) have the potential for cumulative or in-combination effects on the European sites in Dublin Bay and at Rye Water Valley/Carton SAC with FRM measures at Leixlip AFA. Where relevant, these plans or projects have been or will be subject to appropriate assessment. The principal mitigation will be the avoidance of undertaking FRM work on adjoining reaches of rivers for different AFAs or other parallel projects simultaneously. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.
- The OPW carries out regular maintenance on those channels altered through schemes implemented following the 1945 Arterial Drainage Act. The Ryewater Arterial Drainage scheme includes 32km of watercourse. Arterial Drainage maintenance activities could potentially result in adverse cumulative impacts on habitats or species. It is recommended that no arterial maintenance is carried out on the Rye Water while FRM work is being undertaken during the construction phase.

The Flood Risk Management Plan UoM09, 2015-2021 contains the types of measures that have potential to impact on European sites. It has been concluded that the proposed works in the Leixlip AFA will have no significant residual impacts on European sites. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

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 5.5.4: Impact assessment for FRM measures at Leixlip AFA (Hard defences).

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SPA from Leixlip AFA (19.3km), there are not predicted to be any impacts on the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments could alter hydrological regimes, thereby impacting upon wetland habitats and the conservation objectives of the bird species that they support (population trends, distribution).</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 Impacts	Avoidance/mitigation measures	Residual impact
				However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SPA 19.3km downstream of Leixlip AFA.		
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia 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] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	Construction of hard defences upstream of the SAC could impact on designated habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland and coastal habitats. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the designated wetland and coastal habitats. There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SAC from Leixlip AFA (19.3km), there are not predicted to be any impacts on the conservation status of designated habitats.	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. Avoid working in-channel, wherever possible. Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation. See also general mitigation in Chapter 6.	No
		Water level changes		The designated wetland habitats are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments could alter hydrological regimes, thereby impacting upon the conservation objectives of wetland and coastal habitats. However, any changes to the hydrological and	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 Impacts	Avoidance/mitigation measures	Residual impact
				morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in SAC 19.3km downstream of Leixlip AFA.	mitigation in Chapter 6.	
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SPA from the Leixlip AFA (16.2km), there are not predicted to be any impacts on the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				<p>that they support (population trends, distribution).</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SPA 16.2km downstream of Leixlip AFA.</p>	See also general mitigation in Chapter 6.	
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction of hard defences upstream of the SAC could impact on designated habitat through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitat. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the mudflat and sandflat habitat.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SAC from the Leixlip AFA (17.5km), there are not predicted to be any impacts on the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		The designated wetland habitat is dependent upon a specific hydrological regime. Construction of upstream flood walls/embankments could alter the hydrological regime, thereby impacting upon the conservation objectives of mudflat and	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 Impacts	Avoidance/mitigation measures	Residual impact
				<p>sandflat habitat.</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SPA 17.5km downstream of Leixlip AFA.</p>	See also general mitigation in Chapter 6.	
Rye Water Valley/Cartron SAC (001398)	<p>Petrifying springs with tufa formation (Cratoneurion) [7220]</p> <p><i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014]</p> <p><i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]</p>	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	<p>Surface water</p> <p>Ground water</p>	<p>Petrifying spring habitats and habitats supporting <i>Vertigo</i> species for which the Rye Water Valley/Cartron SAC was designated are dependent on specific water quality and nutrient ground water / surface water conditions. 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 habitat. 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.</p> <p>Impacts to the <i>Vertigo</i> species of the SAC may also occur from loss of habitat or changes to food supply through reductions in water quality.</p> <p>There are likely to be indirect adverse impacts from sedimentation during construction. These impacts are expected to be short-term and local in scale but in the absence of mitigation may become significant.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Employ best practice sediment and pollution control measures, in consultation with NPWS.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
		Water level changes		<p>The designated habitat and <i>Vertigo</i> species depend on specific hydrological regimes, with groundwater supply and a stable wetland water table.</p> <p>Maintenance of appropriate hydrological regimes is a key attribute of petrifying spring habitats. Petrifying springs have been identified by the NPWS (NPWS, 2013) as relying on permanent irrigation usually from upwelling groundwater sources or seepage sources and the height of the water and water flow are key attributes for this habitat type which define condition.</p> <p>The snail species for which the SAC is designated are also indirectly dependent on specific hydrological regimes, and how this impacts on soil moisture conditions and the vegetation communities that support <i>Vertigo</i>.</p> <p>Construction of flood walls and embankments 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 trends, range or habitat use).</p> <p>Significant changes to the hydrological regime at Leixlip are unlikely, as the works will be local in nature and confined to short stretches, and are therefore unlikely to impact significantly on attributes used to define conservation status.</p>	<p>Detailed information on the location and hydrology of petrifying springs should be obtained to inform design of works in Leixlip AFA.</p> <p>An appropriate <i>Vertigo</i> expert should be consulted, to identify potential impacts on this species and provide appropriate mitigation advice. The detailed FRM option design must prevent hydrological impacts on the habitats and /or potential habitats on which this species depends.</p> <p>Design will be subjected to hydraulic testing to establish nature and scale of effects and confirm that no significant effects will occur on <i>Vertigo</i> and petrifying springs objectives.</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 Impacts	Avoidance/mitigation measures	Residual impact
		Physical habitat disturbance	Land and Air	<p>Petrifying springs habitat and <i>Vertigo</i> species are likely to be vulnerable to physical disturbance arising from construction activities within the SAC boundaries. Physical disturbance (including compaction) by machinery and workers could lead to a direct loss of wetland habitat or destruction of <i>Vertigo</i> molluscs in the footprint and vicinity of the defences and along access routes.</p> <p>The designated habitat 'Petrifying springs with tufa formation' and species <i>Vertigo angustior</i> and <i>Vertigo moulinsiana</i> are found in the Louisa Bridge area of Leixlip AFA. The proposed hard defences in Flood Cell 1 are downstream of this location; therefore direct impacts from FRM work in this area are not predicted to result in adverse impacts. However, the proposed hard defences in Flood Cell 2 are directly adjacent to this area, therefore direct impacts may occur, affecting conservation objectives of the habitat (range, structure and functions and typical species) and species (population trends, range or habitat).</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Liaise with NPWS to identify the precise location of designated habitat and species in the Louisa Bridge area.</p> <p>Ecological survey to identify designated habitat or species at the location of proposed hard defence measures. The location of hard defences should be carefully placed to ensure they do not encroach on the designated habitat or species.</p> <p>See also general mitigation in Chapter 6.</p>	No
		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	<p>Carry out invasive species surveys and follow SOPs (see Table 6.1.1)</p> <p>See general mitigation in Chapter 6</p>	No

5.5.3 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 Leixlip AFA on the following European sites:

- North Bull Island SPA (004006)
- North Dublin Bay SAC (000206)
- South Dublin Bay and River Tolka Estuary SPA (004024)
- South Dublin Bay SAC (000210)
- Rye Water Valley/ Carton SAC (001398)

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 Leixlip 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.

5.6 LUCAN TO CHAPELIZOD AFA

All European sites in the zone of influence of Lucan to Chapelizod AFA were screened for possible impacts from FRM methods (see Chapter 3.5). Screening assessed the potential for impact at thirteen European sites; Baldoyle Bay SAC (000199), Baldoyle Bay SPA (004016), Broadmeadow/Swords Estuary SPA (004025), Glenasmole Valley SAC (001209), Howth Head SAC (000202), Malahide Estuary SAC (000205), North Bull Island SPA (004006), North Dublin Bay SAC (000206), Rye Water Valley/Cartron SAC (001398), South Dublin Bay and River Tolka Estuary SPA (004024), South Dublin Bay SAC (000210), Wicklow Mountains SAC (002122), and Wicklow Mountains SPA (004040) (see Figure 5.6.1). Eight sites were found to have no identifiable impact pathway arising from the implementation of FRM methods within the Lucan to Chapelizod 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 Lucan to Chapelizod AFA; North Bull Island SPA (004006), North Dublin Bay SAC (000206), Rye Water Valley/Cartron SAC (001398), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). The following section assesses the proposed FRM measures described in Chapter 4.3.2.6 in relation to the screened-in European sites.

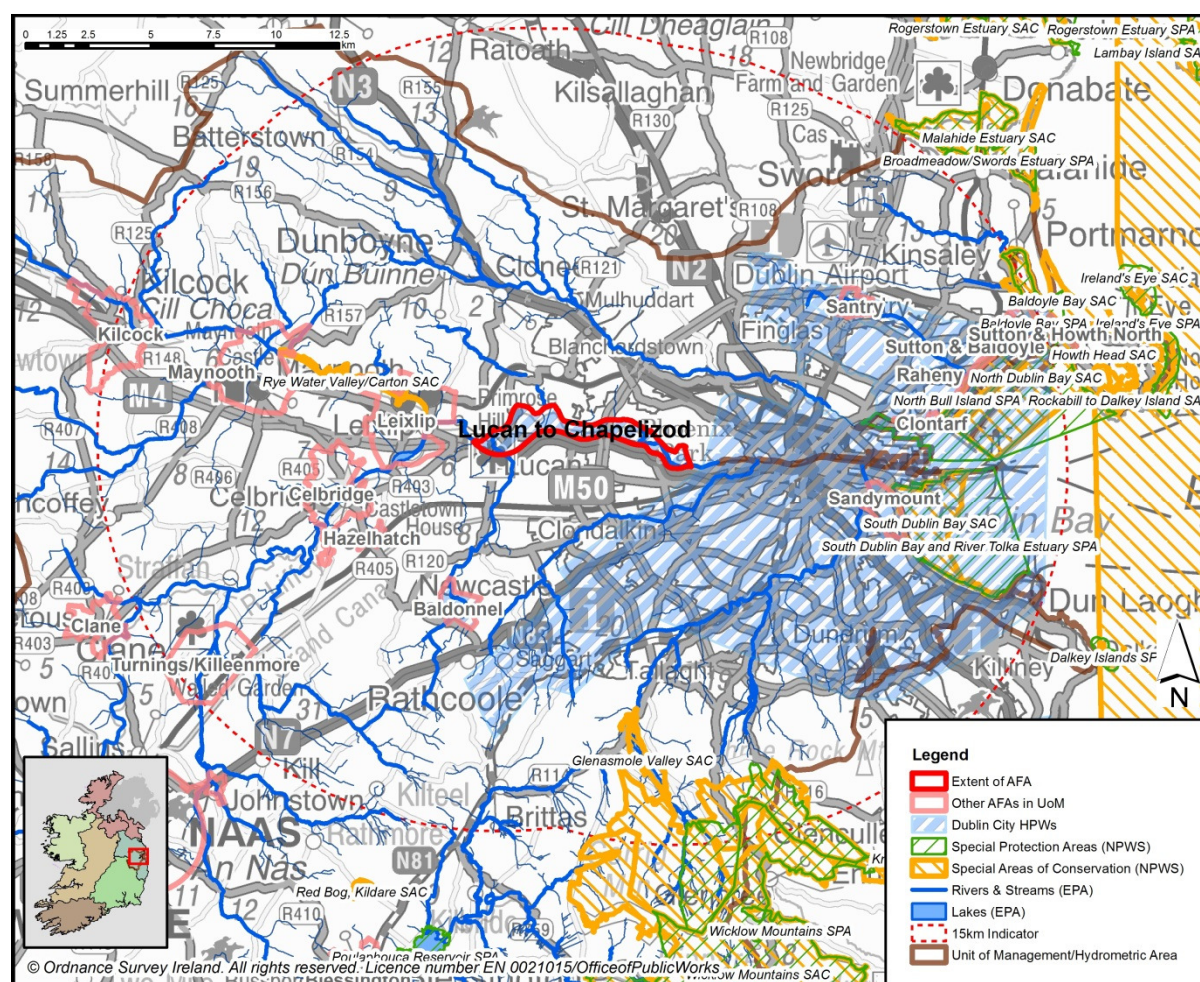


Figure 5.6.1: Lucan to Chapelizod AFA in context of catchment and surrounding European sites

5.6.1 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 Lucan to Chapelizod AFA on the screened in European sites.

The qualifying interest(s) of the site(s) at risk from surface water pathways are identified in Table 5.6.1. 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.

5.6.1.1 Potential Sources of Impact via Surface Water Pathways

Four European sites were identified as potentially being impacted upon via surface water pathways; North Bull Island SPA (004006), North Dublin Bay SAC (000206), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). Rye Water Valley/Carton SAC (001398) is situated 2km upstream of Lucan to Chapelizod AFA; therefore no surface water pathways are expected to impact upon attributes used to define conservation status of designated habitats and species at this site. Qualifying interests of these sites at risk from surface water pathways are identified in Table 5.6.1. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.6.1: Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Lucan to Chapelizod AFA.

European Site (Site code)	Qualifying interests
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]

The following sources of impact arising from FRM measures at Lucan to Chapelizod 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 of flood walls and embankments can result in the release of suspended sediments into surface waters. This can lead to increased turbidity of surface waters, and an associated reduction in photosynthesis, which can impact on surface water dependent habitats downstream.
- **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. 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.
- **Changes in water levels/channel morphology** – Construction of flood walls and embankments, and improvement of channel conveyance can lead to increased capacity and flow rates. This can lead to hydrological impacts on surface water dependent habitats upstream or downstream.

5.6.2 Impact Assessment

Table 5.6.2 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.

5.6.2.1 In-combination Effects

Appropriate Assessment requires consideration of the impacts on European sites of FRM measures at Lucan to Chapelizod 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. Cumulative effects will be further 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:

- 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. Provided the FRM works are planned and managed correctly, the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- Local Authorities (Dublin City Council, South Dublin County Council and Fingal County Council) carry out inspections and maintenance on watercourses as and when resources are available.
- The Regional Planning Guidelines for the Greater Dublin Area, 2014-2016 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.

- The Dublin City Development Plan, 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- A Vision for Dublin Bay has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The draft Eastern River Basin District Management Plan, 2015-2021 and associated Programmes of Measures lists European sites in the Water Framework Directive Register of Protected Areas for protection. The OPW will work with the EPA, local authorities and other agencies to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives and thus negative in-combination effects are unlikely.
- The Dublin Bay Water Quality Management Plan (Environmental Research Unit, 1991) is an environmental protection plan. Provided that FRM physical works timings are well planned and managed, negative in-combination effects with this plan are unlikely.
- The projects preceding or running in parallel with the Eastern CFRAM Study (see Chapter 3.1.2.2) have the potential for cumulative or in-combination effects on the European sites in Dublin Bay with FRM measures at Lucan to Chapelizod AFA. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

The Flood Risk Management Plan UoM09, 2015-2021 contains the types of measures that have potential to impact on European sites. It has been concluded that the proposed works in the Lucan to Chapelizod AFA will have no significant residual impacts on European sites. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

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 5.6.2: Impact assessment for FRM measures at Lucan to Chapelizod AFA (Hard defences).

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale.</p> <p>Owing to the distance of the SPA from Lucan to Chapelizod AFA (10.1km), there are not predicted to be any impacts on the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</p> <p>Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation.</p>	No
		Water level changes		The habitats that support these species are dependent on specific hydrological regimes.	Strictly adhere to best practice protocols and	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				<p>Construction of upstream flood walls/embankments could alter hydrological regimes, thereby impacting upon wetland habitats and the conservation objectives of the bird species that they support (population trends, distribution).</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and are not predicted to impact on habitat in North Bull Island SPA 10.1km downstream of Lucan to Chapelizod AFA.</p>	SOPs during design, construction and maintenance.	
North Dublin Bay SAC (000206)	<p>Mudflats and sandflats not covered by seawater at low tide [1140]</p> <p>Annual vegetation of drift lines [1210]</p> <p>Salicornia and other annuals colonising mud and sand [1310]</p> <p>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]</p> <p>Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]</p> <p>Embryonic shifting dunes [2110]</p> <p>Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]</p> <p>Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]</p> <p>Humid dune slacks [2190]</p>	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction of hard defences upstream of the SAC could impact on designated habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the wetland habitats.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</p> <p>Careful timing of works to avoid periods of high flow that could</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
	<i>Petalophyllum ralfsii</i> (Petalwort) [1395]			<p>short-term and local in scale.</p> <p>Owing to the distance of the SAC from Lucan to Chapelizod AFA (10.1km), there are not predicted to be any impacts on the conservation status of designated habitats.</p>	result in increased sediment mobilisation.	
		Water level changes		<p>The designated wetland habitats are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments could alter hydrological regimes, thereby impacting upon the conservation objectives of wetland and coastal habitats.</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and are not predicted to impact upon habitat in the SAC 10.1km downstream of Lucan to Chapelizod AFA.</p>	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.	No
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				<p>a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale.</p> <p>Owing to the distance of the SPA from Lucan to Chapelizod AFA (7km), there are not predicted to be any significant impacts on the conservation status of designated habitat.</p>	<p>possible.</p> <p>Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation.</p>	
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species that they support (population trends, distribution).</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and are not expected to significantly impact upon habitat in South Dublin Bay and River Tolka Estuary SPA 7km downstream of Lucan to Chapelizod AFA.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction of hard defences upstream of the SAC could impact on the designated habitat through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitat. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the mudflat and sandflat habitat.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale.</p> <p>Owing to the distance of the SAC from Lucan to Chapelizod AFA (8km), there are not predicted to be any significant impacts on the conservation status of designated habitats.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</p> <p>Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation.</p>	No
		Water level changes		<p>The designated wetland habitat is dependent on a specific hydrological regime. Construction of upstream flood walls/embankments could alter the hydrological regime, thereby impacting upon the conservation objectives of the mudflat and sandflat habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/ mitigation measures	Residual impact
				However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and is not expected to significantly impact on habitat in the SAC 8km downstream of Lucan to Chapelizod AFA.		

5.6.3 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 Lucan to Chapelizod AFA on the following European sites:

- North Bull Island SPA (004006)
- North Dublin Bay SAC (000206)
- South Dublin Bay and River Tolka Estuary SPA (004024)
- South Dublin Bay SAC (000210)
- Rye Water Valley/ Carton SAC (001398)

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 Lucan to Chapelizod 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.

5.7 MAYNOOTH AFA

All European sites in the zone of influence of Maynooth AFA were screened for possible impacts from FRM methods (see Chapter 3.5). Screening assessed the potential for impact at six European sites; Ballynafagh Bog SAC (000391), North Bull Island SPA (004006), North Dublin Bay SAC (000206), Rye Water Valley/Carton SAC (001398), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210) (see Figure 5.7.1). One site was found to have no identifiable impact pathway arising from the implementation of FRM methods within the Maynooth catchment and was therefore screened out as not requiring any further assessment. Five European sites were identified as potentially being impacted upon through FRM activities at Maynooth AFA; North Bull Island SPA (004006), North Dublin Bay SAC (000206), Rye Water Valley/Carton SAC (001398), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). The following section assesses the proposed FRM measures described in Chapter 4.3.2.7 in relation to the screened-in European sites.

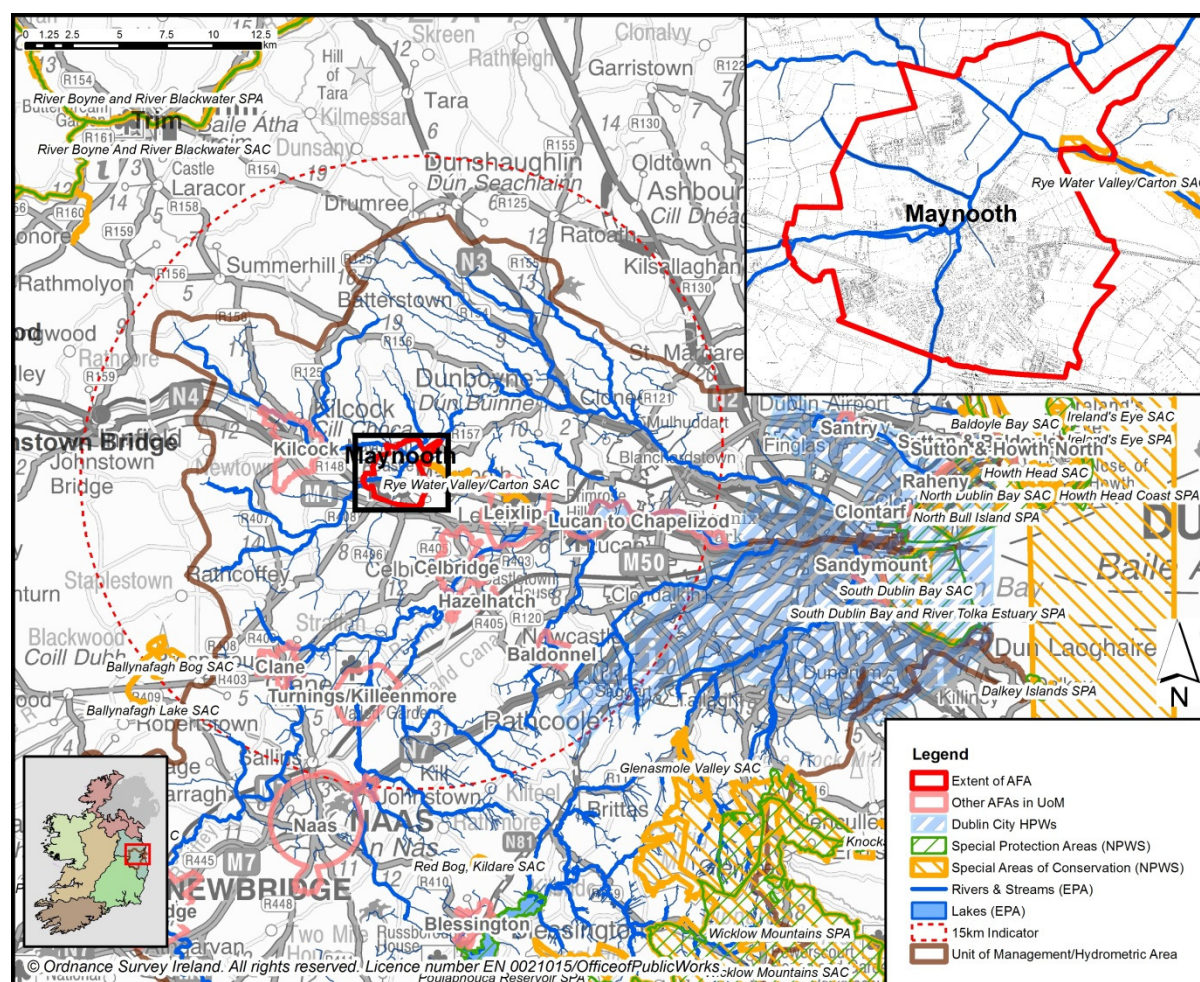


Figure 5.7.1: Maynooth AFA in context of catchment and surrounding European sites

5.7.1 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 Maynooth AFA on the screened in European sites.

The qualifying interest(s) of the site(s) at risk from surface water pathways are identified in Table 5.7.1. 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.

5.7.1.1 Potential Sources of Impact via Surface Water Pathways

Five European sites were identified as potentially being impacted upon via surface water pathways; North Bull Island SPA (004006), North Dublin Bay SAC (000206), South Dublin Bay and River Tolka Estuary SPA (004024), South Dublin Bay SAC (000210), and Rye Water Valley/Carton SAC (001398). Qualifying interests of these sites at risk from surface water pathways are identified in Table 5.7.1. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.7.1: Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Maynooth AFA.

European Site (Site code)	Qualifying interests
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]
Rye Water Valley/Carton SAC (001398)	Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220] <i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014] <i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]

The following sources of impact arising from FRM measures at Maynooth 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 of flood walls and embankments can result in the release of

suspended sediments into surface waters. This can lead to increased turbidity of surface waters, and an associated reduction in photosynthesis, which can impact on surface water dependent habitats downstream.

- **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. 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.
- **Changes in water levels/channel morphology** – Construction of flood walls and embankments, and improvement of channel conveyance can lead to increased capacity and flow rates. This can lead to hydrological impacts on surface water dependent habitats upstream or downstream.

5.7.2 Impact Assessment

Table 5.7.2 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.

5.7.2.1 In-combination Effects

Appropriate Assessment requires consideration of the impacts on European sites of FRM measures at Maynooth 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. Cumulative effects will be further 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:

- 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. Provided the FRM works are planned and managed correctly, the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- Kildare County Council carries out inspections and maintenance of watercourses as and when resources are available, however these maintenance activities are likely to be local in nature, and provided the FRM works are planned and managed correctly, are not expected to have significant in-combination impacts with FRM measures.
- The Kildare County Development Plan 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.

- The Regional Planning Guidelines for the Greater Dublin Area, 2014-2016 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The Dublin City Development Plan, 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- A Vision for Dublin Bay has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The draft Eastern River Basin District Management Plan, 2015-2021 and associated Programmes of Measures lists European sites in the Water Framework Directive Register of Protected Areas for protection. The OPW will work with the EPA, local authorities and other agencies to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives and thus negative in-combination effects are unlikely.
- The Dublin Bay Water Quality Management Plan (Environmental Research Unit, 1991) is an environmental protection plan. Provided that FRM physical works timings are well planned and managed, negative in-combination effects with this plan are unlikely.
- The OPW carries out regular maintenance on those channels altered through schemes implemented following the 1945 Arterial Drainage Act. The Ryewater Arterial Drainage scheme includes 32km of watercourse. Arterial Drainage maintenance activities could potentially result in adverse cumulative impacts on habitats or species. It is recommended that no arterial maintenance is carried out on the Rye Water while FRM work is being undertaken during the construction phase.
- The projects preceding or running in parallel with the Eastern CFRAM Study (see Chapter 3.1.2.2) have the potential for cumulative or in-combination effects on the European sites in Dublin Bay and at Rye Water Valley/Carton SAC with FRM measures at Maynooth AFA. Where relevant, these plans or projects have been or will be subject to appropriate assessment. The principal mitigation will be the avoidance of undertaking FRM work on adjoining reaches of rivers for different AFAs or other parallel projects simultaneously. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

The Flood Risk Management Plan UoM09, 2015-2021 contains the types of measures that have potential to impact on European sites. It has been concluded that the proposed works in the Maynooth AFA will have no significant residual impacts on European sites. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

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 5.7.2: Impact assessment for FRM measures at Maynooth AFA (Hard defences and diversion of flow).

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale.</p> <p>Owing to the distance of the SPA from Maynooth AFA (25km), there are not predicted to be any impacts on the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments could alter hydrological regimes, thereby impacting upon wetland habitats and the conservation objectives of the bird species that they support (population trends, distribution).</p> <p>However, any changes to the hydrological and</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 Impacts	Avoidance/mitigation measures	Residual impact
				morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SPA 25km downstream of Maynooth AFA.		
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia 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] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	Construction of hard defences upstream of the SAC could impact on designated habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland and coastal habitats. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the designated wetland and coastal habitats. There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SAC from Maynooth AFA (25km), there are not predicted to be any impacts on the conservation status of designated habitats.	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. Avoid working in-channel, wherever possible. Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation. See also general mitigation in Chapter 6.	No
		Water level changes		The designated wetland habitats are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments could alter hydrological regimes, thereby impacting upon the conservation objectives of wetland and coastal habitats. However, any changes to the hydrological and morphological regime of the river arising from	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance. See also general mitigation in Chapter 6.	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in SAC 25km downstream of Maynooth AFA.		
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SPA from Maynooth AFA (22.3km), there are not predicted to be any impacts on the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species that they support (population trends,</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				distribution). However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SPA 22.3km downstream of Maynooth AFA.	mitigation in Chapter 6.	
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	Construction of hard defences upstream of the SAC could impact on designated habitat through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitat. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the mudflat and sandflat habitat. There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SAC from Maynooth AFA (24km), there are not predicted to be any impacts on the conservation status of designated habitat.	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. Avoid working in-channel, wherever possible. Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation. See also general mitigation in Chapter 6.	No
		Water level changes		The designated wetland habitat is dependent upon a specific hydrological regime. Construction of upstream flood walls/embankments could alter the hydrological regime, thereby impacting upon the conservation objectives of mudflat and sandflat habitat.	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 Impacts	Avoidance/mitigation measures	Residual impact
				However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SPA 24km downstream of Maynooth AFA.	See also general mitigation in Chapter 6.	
Rye Water Valley/Carton SAC (001398)	Petrifying springs with tufa formation (Cratoneurion) [7220] <i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014] <i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water Groundwater	<p>Petrifying spring habitats and habitats supporting <i>Vertigo</i> species for which the Rye Water Valley/Carton SAC was designated are dependent on specific water quality and nutrient ground water / surface water conditions. 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 habitat.</p> <p>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.</p> <p>Impacts to the <i>Vertigo</i> species of the SAC may also occur from loss of habitat or changes to food supply through reductions in water quality.</p> <p>There are likely to be indirect adverse impacts from sedimentation during construction. These impacts are expected to be short-term and local in scale but in the absence of mitigation may become significant.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Employ best practice sediment and pollution control measures, in consultation with NPWS.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Habitat and hydrological studies will be carried out at project level to inform the FRM design. Design will be subjected to model testing to establish nature and scale of effects and confirm that no significant effects will occur.</p> <p>Avoid working in-channel, wherever possible.</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
					Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation. See also general mitigation in Chapter 6.	
		Water level changes		<p>The designated habitat and <i>Vertigo</i> species depend on specific hydrological regimes, with groundwater supply and a stable wetland water table.</p> <p>Maintenance of appropriate hydrological regimes is a key attribute of petrifying spring habitats. Petrifying springs have been identified by the NPWS (NPWS, 2013) as relying on permanent irrigation usually from upwelling groundwater sources or seepage sources and the height of the water and water flow are key attributes for this habitat type which define condition.</p> <p>The snail species for which the SAC is designated are also indirectly dependent on specific hydrological regimes, and how this impacts on soil moisture conditions and the vegetation communities that support <i>Vertigo</i>.</p> <p>Construction of flood walls and embankments 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 trends, range or habitat use).</p>	<p>An appropriate <i>Vertigo</i> expert should be consulted, to identify potential impacts on this species and provide appropriate mitigation advice. The detailed FRM option design must prevent hydrological impacts on the habitats and /or potential habitats on which this species depends.</p> <p>Design will be subjected to hydraulic testing to establish nature and scale of effects and confirm that no significant effects will occur on <i>Vertigo</i> objectives. Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				Significant changes to the hydrological regime at Maynooth are unlikely, as the works will be local in nature and confined to short stretches, and are therefore unlikely to impact significantly on attributes used to define conservation status.	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

5.7.3 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 Maynooth AFA on the following European sites:

- North Bull Island SPA (004006)
- North Dublin Bay SAC (000206)
- South Dublin Bay and River Tolka Estuary SPA (004024)
- South Dublin Bay SAC (000210)
- Rye Water Valley/ Carton SAC (001398)

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 Maynooth 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.

5.8 NAAS AFA

All European sites in the zone of influence of Naas AFA were screened for possible impacts from FRM methods (see Chapter 3.5). Screening assessed the potential for impact at nine European sites; Ballynafagh Bog SAC (000391), Mouds Bog SAC (002331), North Bull Island SPA (004006), North Dublin Bay SAC (000206), Pollardstown Fen SAC (000396), Poulaphouca Reservoir SPA (004063), Red Bog, Kildare SAC (000397), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). Five sites were found to have no identifiable impact pathway arising from the implementation of FRM methods within the Naas catchment and were therefore screened out as not requiring any further assessment. Four European sites were identified as potentially being impacted upon through FRM activities at Naas AFA; North Bull Island SPA (004006), North Dublin Bay SAC (000206), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). The following section assesses the proposed FRM measures described in Chapter 4.3.2.8 in relation to the screened-in European sites.

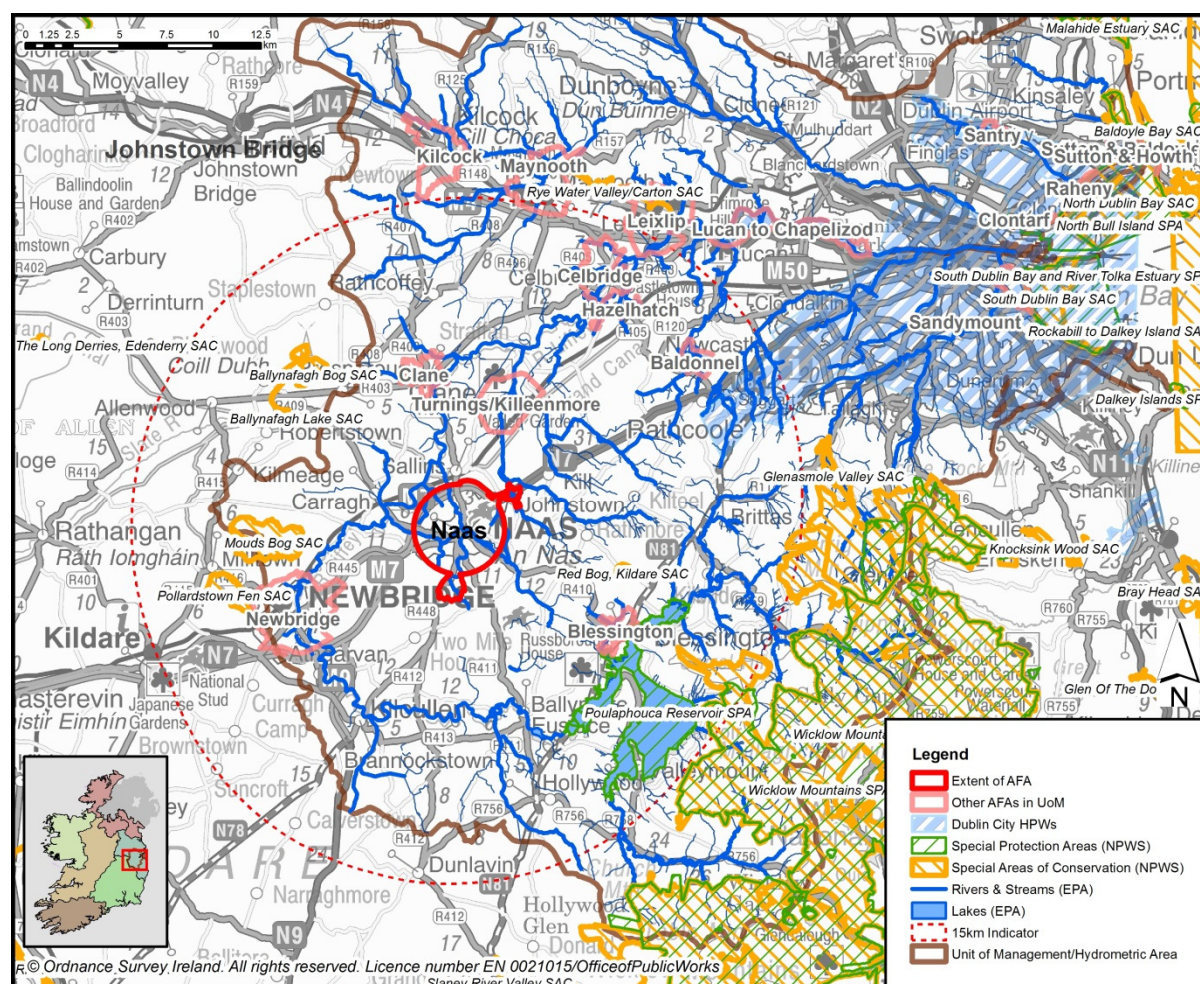


Figure 5.8.1: Naas AFA in context of catchment and surrounding European sites

5.8.1 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 Naas AFA on the screened in European sites.

The qualifying interest(s) of the site(s) at risk from surface water pathways are identified in Table 5.8.1. 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.

5.8.1.1 Potential Sources of Impact via Surface Water Pathways

Four European sites were identified as potentially being impacted upon via surface water pathways; North Bull Island SPA (004006), North Dublin Bay SAC (000206), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). Qualifying interests of these sites at risk from surface water pathways are identified in Table 5.8.1. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.8.1: Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Naas AFA.

European Site (Site code)	Qualifying interests
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia 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] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]

The following sources of impact arising from FRM measures at Naas 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 of flood walls and embankments, improvement of channel conveyance and flow diversion can result in the release of suspended sediments into surface

waters. This can lead to increased turbidity of surface waters, and an associated reduction in photosynthesis, which can impact on surface water dependent habitats downstream.

- **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. 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.
- **Changes in water levels/channel morphology** – Construction of flood walls and embankments, and improvement of channel conveyance can lead to increased capacity and flow rates. This can lead to hydrological impacts on surface water dependent habitats upstream or downstream.

5.8.2 Impact Assessment

Table 5.8.2 assesses the screened in European sites in more detail and examine 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.

5.8.2.1 In-combination Effects

Appropriate Assessment requires consideration of the impacts on European sites of FRM measures at Naas 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. Cumulative effects will be further 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:

- 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. Provided the FRM works are planned and managed correctly, the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- Kildare County Council carries out inspections and maintenance of watercourses as and when resources are available, however these maintenance activities are likely to be local in nature, and provided the FRM works are planned and managed correctly, are not expected to have significant in-combination impacts with FRM measures.
- The Kildare County Development Plan 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.

- The Regional Planning Guidelines for the Greater Dublin Area, 2014-2016 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The Dublin City Development Plan, 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- A Vision for Dublin Bay has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The draft Eastern River Basin District Management Plan, 2015-2021 and associated Programmes of Measures lists European sites in the Water Framework Directive Register of Protected Areas for protection. The OPW will work with the EPA, local authorities and other agencies to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives and thus negative in-combination effects are unlikely.
- The Dublin Bay Water Quality Management Plan (Environmental Research Unit, 1991) is an environmental protection plan. Provided that FRM physical works timings are well planned and managed, negative in-combination effects with this plan are unlikely.
- The projects preceding or running in parallel with the Eastern CFRAM Study (see Chapter 3.1.2.2) have the potential for cumulative or in-combination effects on the European sites in Dublin Bay with FRM measures at Naas AFA. Where relevant, these plans or projects have been or will be subject to appropriate assessment. The principal mitigation will be the avoidance of undertaking FRM work on adjoining reaches of rivers for different AFAs or other parallel projects simultaneously. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

The Flood Risk Management Plan UoM09, 2015-2021 contains the types of measures that have potential to impact on European sites. It has been concluded that the proposed works in the Naas AFA will have no significant residual impacts on European sites. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

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 5.8.2: Impact assessment for FRM measures at Naas AFA (Option 1: Hard defences, Storage, Flow Diversion and Improvement of Channel Conveyance).

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences, storage, improvement of channel conveyance and flow diversion upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SPA from Naas AFA (30.8km), there are not predicted to be any impacts on the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments, storage, improvement of channel conveyance and flow diversion could alter hydrological regimes, thereby impacting upon wetland habitats and the conservation</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				<p>objectives of the bird species that they support (population trends, distribution).</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SPA 30.8km downstream of Naas AFA.</p>	mitigation in Chapter 6.	
North Dublin Bay SAC (000206)	<p>Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia 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] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]</p>	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction of hard defences, storage, improvement of channel conveyance and flow diversion upstream of the SAC could impact on designated habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland and coastal habitats. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the designated wetland and coastal habitats.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SAC from Naas AFA (30.8km), there are not predicted to be any impacts on the conservation status of designated habitats.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel. Avoid working in-channel, wherever possible.</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>	No
		Water level changes		The designated wetland habitats are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments, storage, improvement of channel conveyance and flow	Strictly adhere to best practice protocols and SOPs during design, construction and	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				<p>diversion could alter hydrological regimes, thereby impacting upon the conservation objectives of wetland and coastal habitats.</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SAC 30.8km downstream of Naas AFA.</p>	<p>maintenance.</p> <p>See also general mitigation in Chapter 6.</p>	
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences, storage, improvement of channel conveyance and flow diversion upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SPA from Naas AFA (30.8km), there are not predicted to be any impacts on the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments, storage, improvement of channel conveyance and flow diversion could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species that they support (population trends, distribution).</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SPA 30.8km downstream of Naas AFA.</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
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction of hard defences, storage, improvement of channel conveyance and flow diversion upstream of the SAC could impact on designated habitat through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitat. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the mudflat and sandflat habitat.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SAC from Naas AFA (30.8km), there are not predicted to be any</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</p> <p>Careful timing of works to avoid periods of high flow that could result in increased sediment mobilisation.</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				impacts on the conservation status of designated habitat.	See also general mitigation in Chapter 6.	
		Water level changes		<p>The designated wetland habitat is dependent upon a specific hydrological regime. Construction of upstream flood walls/embankments, storage, improvement of channel conveyance and flow diversion could alter the hydrological regime, thereby impacting upon the conservation objectives of mudflat and sandflat habitat.</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SPA 30.8km downstream of Naas AFA.</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

5.8.3 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 Naas AFA on the following European sites:

- North Bull Island SPA (004006)
- North Dublin Bay SAC (000206)
- South Dublin Bay and River Tolka Estuary SPA (004024)
- South Dublin Bay SAC (000210)

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 Naas 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.

5.9 NEWBRIDGE AFA

All European sites in the zone of influence of Newbridge AFA were screened for possible impacts from FRM methods (see Section 3.5). Screening assessed the potential for impact at ten European sites; Ballynafagh Bog SAC (000391), Mouds Bog SAC (002331), North Bull Island SPA (004006), North Dublin Bay SAC (000206), Pollardstown Fen SAC (000396), Poulaphouca Reservoir SPA (004063), Red Bog, Kildare SAC (000397), River Barrow And River Nore SAC (002162), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). Five sites were found to have no identifiable impact pathway arising from the implementation of FRM methods within the Newbridge 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 Newbridge AFA; Pollardstown Fen SAC (000396), North Bull Island SPA (004006), North Dublin Bay SAC (000206), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). The following section assesses the proposed FRM measures described in Chapter 4.3.2.9 in relation to the screened-in European sites.

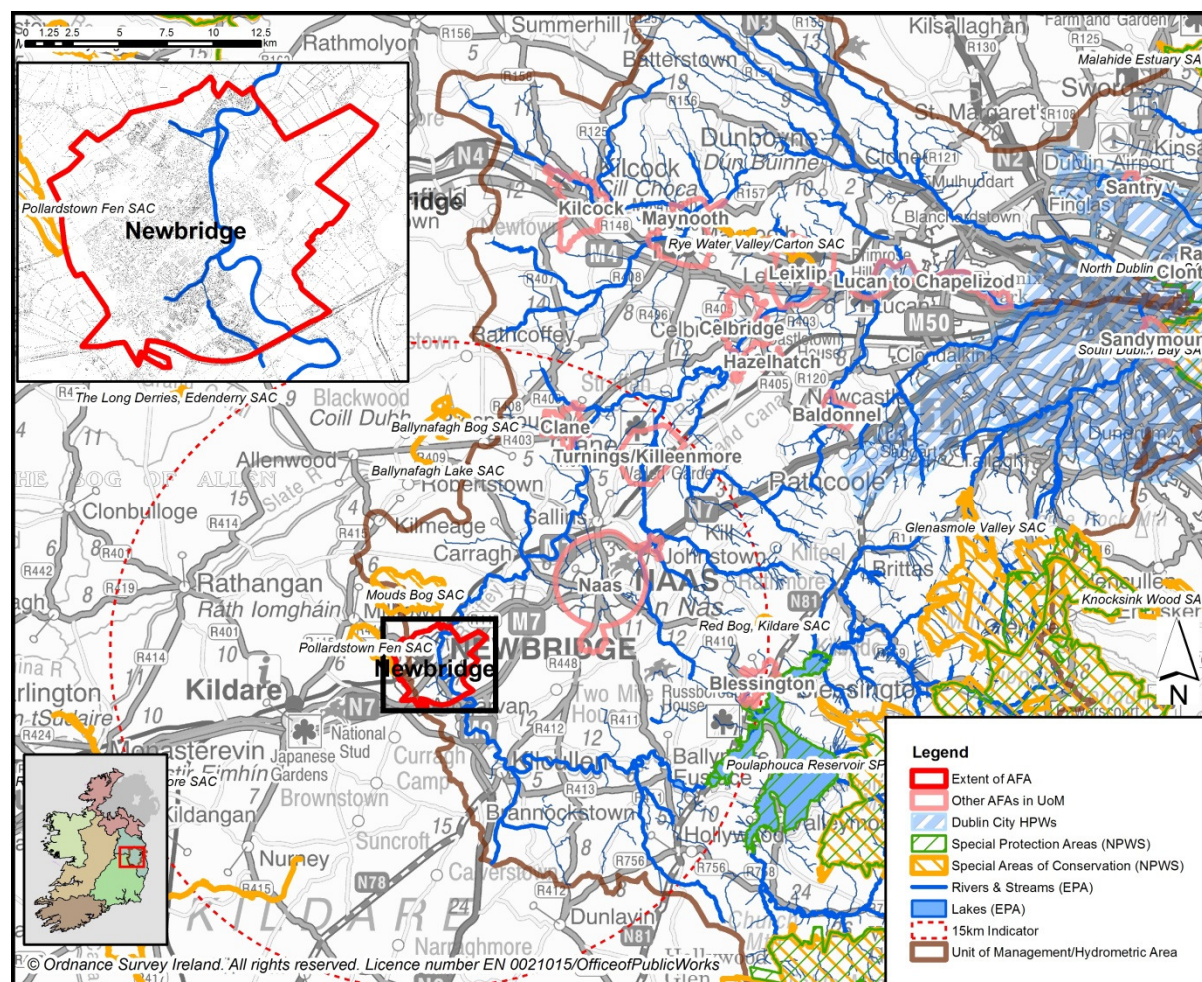


Figure 5.9.1: Newbridge AFA in context of catchment and surrounding European sites

5.9.1 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 Newbridge AFA on the screened in European sites.

The qualifying interest(s) of the site(s) at risk from surface water pathways are identified in Table 5.9.1. 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.

5.9.1.1 Potential Sources of Impact via Surface Water Pathways

Four European sites were identified as potentially being impacted upon via surface water pathways; North Bull Island SPA (004006), North Dublin Bay SAC (000206), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). Pollardstown Fen SAC has no hydraulic connectivity with the Liffey and was therefore excluded from further assessment (water supply to the fen comes from the Curragh aquifer and excess water flows from the fen into the Grand Canal via the Milltown feeder). Qualifying interests of those sites at risk from surface water pathways are identified in Table 5.9.1. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.9.1: Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Newbridge AFA.

European Site (Site code)	Qualifying interests
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]

The following sources of impact arising from FRM measures at Newbridge 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 of flood walls and embankments, improvement of channel conveyance through dredging and upgrading of culverts can result in the release of suspended sediments into surface waters. This can lead to increased turbidity of surface waters, and an associated reduction in photosynthesis, which can impact on surface water dependent habitats downstream.
- **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. 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.
- **Changes in water levels/channel morphology** – Construction of flood walls and embankments, improvement of channel conveyance through dredging and upgrading of culverts can lead to increased capacity and flow rates. This can lead to hydrological impacts on surface water dependent habitats upstream or downstream.

5.9.2 Impact Assessment

Table 5.9.2 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.

5.9.2.1 In-combination Effects

Appropriate Assessment requires consideration of the impacts on European sites of FRM measures at Newbridge 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. Cumulative effects will be further 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:

- 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. Provided the FRM works are planned and managed correctly, the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- Kildare County Council carries out inspections and maintenance of watercourses as and when resources are available, however these maintenance activities are likely to be local in nature, and provided the FRM works are planned and managed correctly, are not expected to have significant in-combination impacts with FRM measures.
- The Kildare County Development Plan 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.

- The Regional Planning Guidelines for the Greater Dublin Area, 2014-2016 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The Dublin City Development Plan, 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- A Vision for Dublin Bay has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The draft Eastern River Basin District Management Plan, 2015-2021 and associated Programmes of Measures lists European sites in the Water Framework Directive Register of Protected Areas for protection. The OPW will work with the EPA, local authorities and other agencies to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives and thus negative in-combination effects are unlikely.
- The Dublin Bay Water Quality Management Plan (Environmental Research Unit, 1991) is an environmental protection plan. Provided that FRM physical works timings are well planned and managed, negative in-combination effects with this plan are unlikely.
- The projects preceding or running in parallel with the Eastern CFRAM Study (see Chapter 3.1.2.2) have the potential for cumulative or in-combination effects on the European sites in Dublin Bay with FRM measures at Newbridge AFA. Where relevant, these plans or projects have been or will be subject to appropriate assessment. The principal mitigation will be the avoidance of undertaking FRM work on adjoining reaches of rivers for different AFAs or other parallel projects simultaneously. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

The Flood Risk Management Plan UoM09, 2015-2021 contains the types of measures that have potential to impact on European sites. It has been concluded that the proposed works in the Newbridge AFA will have no significant residual impacts on European sites. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

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 5.9.2: Impact assessment for FRM measures at Newbridge AFA (Hard defences, improvement of channel conveyance, and other works).

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences, improvement of channel conveyance through dredging and other FRM work upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SPA from Newbridge AFA (41.4km), there are not predicted to be any impacts on the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments, improvement of channel conveyance and other FRM work could alter hydrological regimes, thereby impacting upon wetland habitats and the conservation objectives</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				<p>of the bird species that they support (population trends, distribution).</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in North Bull Island SPA 41.4km downstream of Newbridge AFA.</p>	See also general mitigation in Chapter 6.	
North Dublin Bay SAC (000206)	<p>Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia 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] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]</p>	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction of hard defences, improvement of channel conveyance, and other FRM work upstream of the SAC could impact on designated habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the wetland habitats.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SAC from Newbridge AFA (41.4km), there are not predicted to be any impacts on the conservation status of designated habitats.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		The designated wetland habitats are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments,	Strictly adhere to best practice protocols and SOPs during design,	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				<p>improvement of channel conveyance and other FRM works could alter hydrological regimes, thereby impacting upon the conservation objectives of wetland and coastal habitats.</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SAC 41.4km downstream of Newbridge AFA.</p>	<p>construction and maintenance.</p> <p>See also general mitigation in Chapter 6.</p>	
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences, improvement of channel conveyance, and other FRM works upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SPA from Newbridge AFA (41.4km), there are not</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				predicted to be any impacts on the conservation status of designated habitat.		
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments, improvement of channel conveyance and other FRM works could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species that they support (population trends, distribution).</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in South Dublin Bay and River Tolka Estuary SPA 41.4km downstream of Newbridge AFA.</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>	
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction of hard defences, improvement of channel conveyance, and other FRM works upstream of the SAC could impact on the designated habitat through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitat. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the mudflat and sandflat habitat.</p> <p>There is slight potential for indirect, negative</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel</p> <p>Avoid working in-channel, wherever possible.</p> <p>Careful timing of works to</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SAC from Newbridge AFA (41.4km), there are not predicted to be any impacts on the conservation status of designated habitats.	avoid periods of high flow that could result in increased sediment mobilisation. See also general mitigation in Chapter 6.	
		Water level changes		The designated wetland habitat is dependent on a specific hydrological regime. Construction of upstream flood walls/embankments, improvement of channel conveyance and other FRM works could alter the hydrological regime, thereby impacting upon the conservation objectives of the mudflat and sandflat habitat. However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and will be limited to the catchment and will not impact on habitat in the SAC 41.4km downstream of Newbridge AFA.	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance. See also general mitigation in Chapter 6.	No

5.9.3 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 Newbridge AFA on the following European site:

- Pollardstown Fen SAC (000396)
- North Bull Island SPA (004006)
- North Dublin Bay SAC (000206)
- South Dublin Bay and River Tolka Estuary SPA (004024)
- South Dublin Bay SAC (000210)

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 6). As a result of this Appropriate Assessment it has been concluded that, following the avoidance and mitigation measures suggested, the FRM measures at Newbridge 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.

5.10 SANTRY HPW/AFA

All European sites in the zone of influence of Santry HPW/AFA were screened for possible impacts from FRM methods (see Chapter 3.5). Screening assessed the potential for impact at eighteen European sites; Baldoyle Bay SAC (000199), Baldoyle Bay SPA (004016), Broadmeadow/Swords Estuary SPA (004025), Dalkey Islands SPA (004172), Howth Head Coast SPA (004113), Howth Head SAC (000202), Ireland's Eye SAC (002193), Ireland's Eye SPA (004117), Lambay Island SAC (000204), Lambay Island SPA (004069), Malahide Estuary SAC (000205), North Bull Island SPA (004006), North Dublin Bay SAC (000206), Rockabill to Dalkey Island SAC (003000), Rogerstown Estuary SAC (000208), Rogerstown Estuary SPA (004015), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210) (see). Fourteen sites were found to have no identifiable impact pathway arising from the implementation of FRM methods within the Santry catchment and were therefore screened out as not requiring any further assessment. Four European sites were identified as potentially being impacted upon through FRM activities at Santry HPW/AFA; North Bull Island SPA (004006), North Dublin Bay SAC (000206), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). The following section assesses the proposed FRM measures described in Chapter 4.3.2.10 in relation to the screened-in European sites.

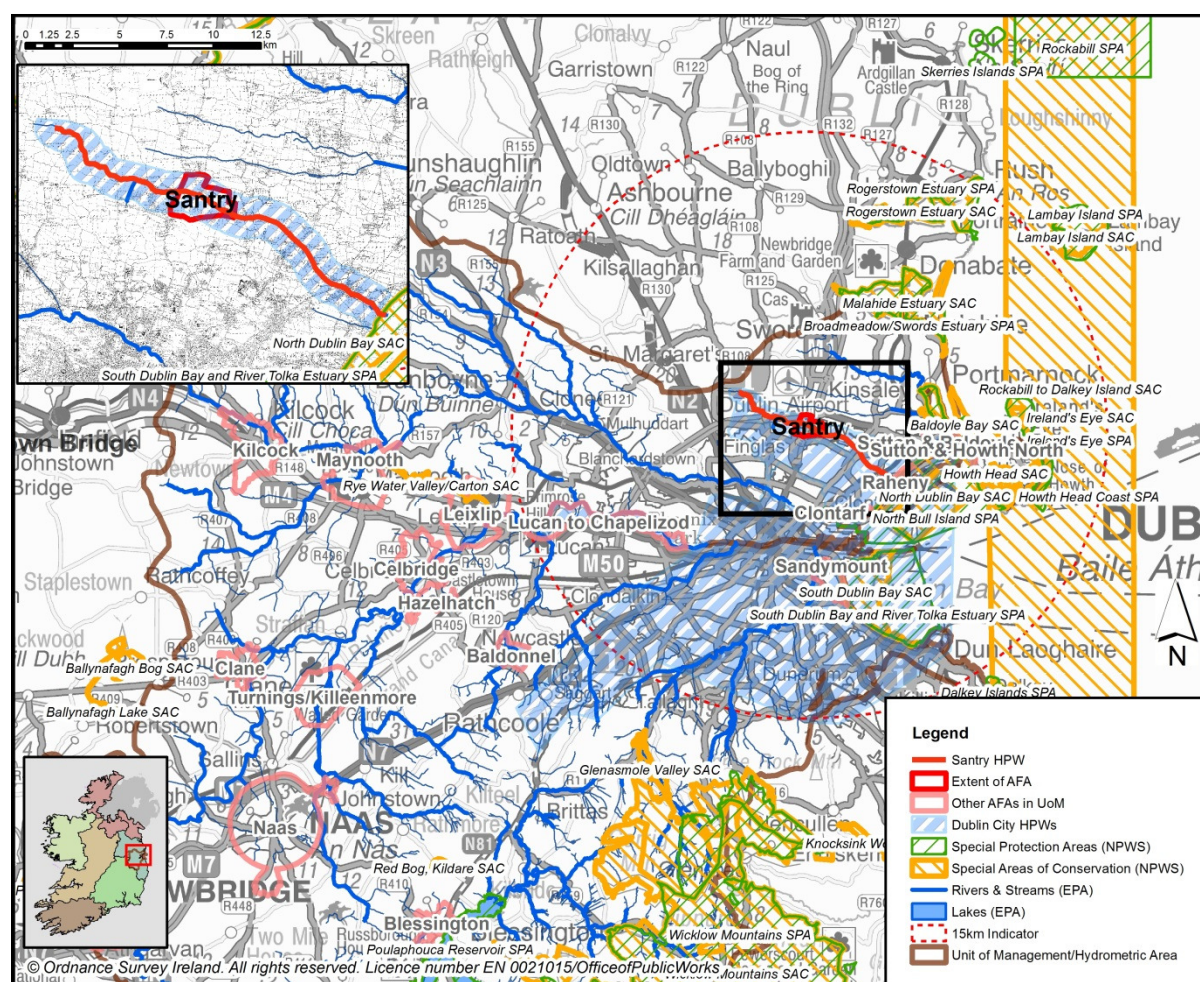


Figure 5.10.1: Santry HPW/AFA in context of catchment and surrounding European sites

5.10.1 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 Santry HPW/AFA on the screened in European sites.

The qualifying interest(s) of the site(s) at risk from surface water pathways are identified in Table 5.10.1. 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.

5.10.1.1 Potential Sources of Impact via Surface Water Pathways

Four European sites were identified as potentially being impacted upon via surface water pathways; North Bull Island SPA (004006), North Dublin Bay SAC (000206), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). Qualifying interests of these sites at risk from surface water pathways are identified in Table 5.10.1. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.10.1: Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Santry HPW/AFA.

European Site (Site code)	Qualifying interests
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]

The following sources of impact arising from FRM measures at Santry HPW/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 of flood walls and embankments and culvert replacement can result in the release of suspended sediments into surface waters. This can lead to increased

turbidity of surface waters, and an associated reduction in photosynthesis, which can impact on surface water dependent habitats downstream.

- **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. 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.
- **Changes in water levels/channel morphology** – Construction of flood walls and embankments, and improvement of channel conveyance can lead to increased capacity and flow rates. This can lead to hydrological impacts on surface water dependent habitats upstream or downstream.

5.10.2 Impact Assessment

Table 5.10.2 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.

5.10.2.1 In-combination Effects

Appropriate Assessment requires consideration of the impacts on European sites of FRM measures at Santry HPW/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. Cumulative effects will be further 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:

- 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. Provided the FRM works are planned and managed correctly, the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- Local Authorities (DCC and FCC) carry out inspections and maintenance as and when resources are available, however these maintenance activities are likely to be local in nature, and provided the FRM works are planned and managed correctly, are not expected to have significant in-combination impacts with FRM measures.
- The Regional Planning Guidelines for the Greater Dublin Area, 2014-2016 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.

- The Dublin City Development Plan, 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- A Vision for Dublin Bay has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The draft Eastern River Basin District Management Plan, 2015-2021 and associated Programmes of Measures lists European sites in the Water Framework Directive Register of Protected Areas for protection. The OPW will work with the EPA, local authorities and other agencies to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives and thus negative in-combination effects are unlikely.
- The Dublin Bay Water Quality Management Plan (Environmental Research Unit, 1991) is an environmental protection plan. Provided that FRM physical works timings are well planned and managed, negative in-combination effects with this plan are unlikely.
- The projects preceding or running in parallel with the Eastern CFRAM Study (see Chapter 3.1.2.2) have the potential for cumulative or in-combination effects on the European sites in Dublin Bay with FRM measures at Santry HPW/AFA. Where relevant, these plans or projects have been or will be subject to appropriate assessment. The principal mitigation will be the avoidance of undertaking FRM work on adjoining reaches of rivers for different AFAs or other parallel projects simultaneously. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

The Flood Risk Management Plan UoM09, 2015-2021 contains the types of measures that have potential to impact on European sites. It has been concluded that the proposed works in the Santry AFA and HPW will have no significant residual impacts on European sites. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

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 5.10.2: Impact assessment for FRM measures at Santry HPW/AFA (Hard defences and improvement of channel conveyance).

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences and improvement of channel conveyance through culvert upgrading upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is potential for indirect, intermittent, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SPA from Santry AFA (4.5km), there are not predicted to be any impacts on the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments and improvement of channel conveyance through culvert upgrading could alter hydrological regimes, thereby impacting upon wetland habitats and the conservation objectives of the bird species that</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general</p>	No

				<p>they support (population trends, distribution).</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and are not predicted to significantly impact upon habitat in North Bull Island SPA 4.5km downstream of Santry AFA.</p>	mitigation in Chapter 6.	
North Dublin Bay SAC (000206)	<p>Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia 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] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]</p>	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction of hard defences and improvement of channel conveyance through culvert upgrading upstream of the SAC could impact on designated habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the wetland habitats.</p> <p>There is slight potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SAC from Lucan to Chapelizod AFA (4.5km), there are not predicted to be any significant impacts on the conservation status of designated habitats.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		<p>The designated wetland habitats are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments and improvement of channel conveyance through culvert upgrading could alter hydrological regimes, thereby impacting upon the conservation objectives of wetland and coastal habitats.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>See also general</p>	No

				However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and are not predicted to significantly impact upon habitat in the SAC 4.5km downstream of Lucan to Chapelizod AFA.	mitigation in Chapter 6.	
South Dublin Bay and River Tolka Estuary SPA (004024)	Wetland and Waterbirds [A999]	<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 upon wetland habitats within the site. Construction of hard defences and improvement of channel conveyance through culvert upgrading upstream of the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale.</p> <p>Owing to the distance of the SPA from Santry AFA (3.9km), there are not predicted to be any significant impacts on the conservation status of designated habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of upstream flood walls/embankments and improvement of channel conveyance through culvert upgrading</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p>	No

				<p>could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species that they support (population trends, distribution).</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and are not expected to significantly impact upon habitat in South Dublin Bay and River Tolka Estuary SPA 3.9km downstream of Santry AFA.</p>	See also general mitigation in Chapter 6.	
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]	<p>Suspended sediments</p> <p>Changes to nutrient levels/pollutant release</p>	Surface water	<p>Construction of hard defences and improvement of channel conveyance through culvert upgrading upstream of the SAC could impact on the designated habitat through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitat. Disconnecting areas of floodplain from the river channel can also lead to a reduction in water quality owing to a reduction in habitat area to attenuate nutrients or other pollutants. This could negatively impact on the conservation objectives of the mudflat and sandflat habitat.</p> <p>There is potential for indirect, negative impacts from sedimentation during construction work upstream; however any impacts are expected to be short-term and local in scale. Owing to the distance of the SAC from Santry AFA (6.8km), there are not predicted to be any significant impacts on the conservation status of designated habitats.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the river channel, wherever possible to minimise sediment loss into the river channel.</p> <p>Avoid working in-channel, wherever possible.</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>	No
		Water level changes		The designated wetland habitat is dependent on a specific hydrological regime. Construction of upstream flood walls/embankments and	Strictly adhere to best practice protocols and SOPs during design,	No

				<p>improvement of channel conveyance through culvert upgrading could alter the hydrological regime, thereby impacting upon the conservation objectives of the mudflat and sandflat habitat.</p> <p>However, any changes to the hydrological and morphological regime of the river arising from the construction phase will be short-term in nature and is not expected to significantly impact on habitat in the SAC 6.8km downstream of Santry AFA.</p>	<p>construction and maintenance.</p> <p>See also general mitigation in Chapter 6.</p>	
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5.10.3 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 Santry HPW/AFA on the following European sites:

- North Bull Island SPA (004006)
- North Dublin Bay SAC (000206)
- South Dublin Bay and River Tolka Estuary SPA (004024)
- South Dublin Bay SAC (000210)

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 Santry HPW/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.

5.11 SUTTON AND HOWTH NORTH AFA

All European sites in the zone of influence of Sutton and Howth North AFA were screened for possible impacts from FRM methods (see Chapter 3.5). Screening assessed the potential for impact at eighteen European sites; Baldoyle Bay SAC (000199), Baldoyle Bay SPA (004016), Broadmeadow/Swords Estuary SPA (004025), Dalkey Islands SPA (004172), Howth Head Coast SPA (004113), Howth Head SAC (000202), Ireland's Eye SAC (002193), Ireland's Eye SPA (004117), Lambay Island SAC (000204), Lambay Island SPA (004069), Malahide Estuary SAC (000205), North Bull Island SPA (004006), North Dublin Bay SAC (000206), Rockabill to Dalkey Island SAC (003000), Rogerstown Estuary SAC (000208), Rogerstown Estuary SPA (004015), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). Twelve sites were found to have no identifiable impact pathway arising from the implementation of FRM methods within the Sutton and Howth North catchment and were therefore screened out as not requiring any further assessment. Six European sites were identified as potentially being impacted upon through FRM activities at Sutton and Howth North AFA; Baldoyle Bay SAC (000199), Baldoyle Bay SPA (004016), North Bull Island SPA (004006), North Dublin Bay SAC (000206), South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210). The following section assesses the proposed FRM measures described in Chapter 4.3.2.11 in relation to the screened-in European sites.

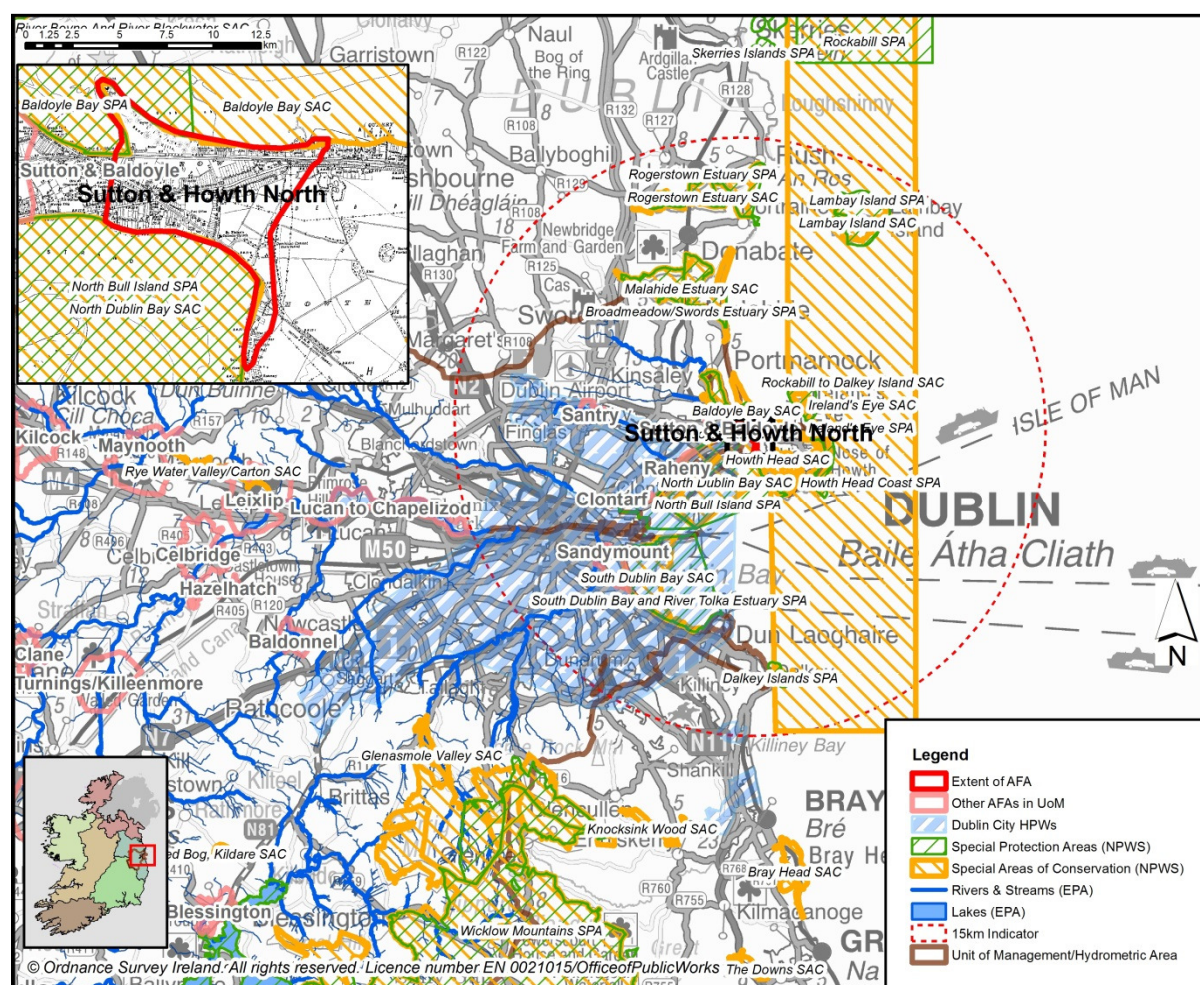


Figure 5.11.1: Sutton and Howth North AFA in context of catchment and surrounding European sites

5.11.1 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 Sutton and Howth North AFA on the screened in European sites.

The qualifying interest(s) of the site(s) at risk from surface water pathways are identified in Table 5.11.1 and from land and air pathways in Table 5.11.2. 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.

5.11.1.1 Potential Sources of Impact via Surface Water Pathways

Four European sites were identified as potentially being impacted upon via surface water pathways; Baldoyle Bay SAC (000199), Baldoyle Bay SPA (004016), North Bull Island SPA (004006), and North Dublin Bay SAC (000206). South Dublin Bay and River Tolka Estuary SPA (004024), and South Dublin Bay SAC (000210) are situated 5km and 6.1km to the south of the AFA, respectively, and the qualifying interests of these sites 'Wetland and Waterbirds' and 'Mudflats and sandflats not covered by seawater at low tide' are not expected to be impacted upon by FRM works via surface water pathways. Qualifying interests of those sites at risk from surface water pathways are identified in Table 5.11.1. Additional detail on the qualifying interests has been included in Appendix C.

Table 5.11.1: Qualifying Interests of the screened in European sites likely to be impacted upon via surface water pathways from FRM measures undertaken at Sutton and Howth North AFA.

European Site (Site code)	Qualifying interests
North Bull Island SPA (004006)	Wetland and Waterbirds [A999]
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]
Baldoyle Bay SAC (000199)	Mudflats and sandflats not covered by seawater at low tide [1140] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]
Baldoyle Bay SPA (004016)	Wetland and Waterbirds [A999]

The following sources of impact arising from FRM measures at Sutton and Howth North 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 of flood defence walls and wave return walls can result in the release of suspended sediments into surface waters. This can lead to increased turbidity of surface waters, and an associated reduction in photosynthesis, which can impact on surface water dependent habitats downstream.
- **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. 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.
- **Changes in water levels/channel morphology** – Construction of flood walls and embankments, and improvement of channel conveyance can lead to increased capacity and flow rates. This can lead to hydrological impacts on surface water dependent habitats upstream or downstream.

5.11.1.2 Potential Sources of Impact via Land and Air Pathways

Five European sites were identified as potentially being impacted upon via land and air pathways; Baldoyle Bay SAC (000199), Baldoyle Bay SPA (004016), North Bull Island SPA (004006), North Dublin Bay SAC (000206) and South Dublin Bay and River Tolka Estuary SPA (004024). South Dublin Bay SAC (000210) is situated 6.1km to the south of the AFA, and does not include any species among its qualifying interests that could be disturbed by noise or visual means by the FRM works. Qualifying interests of those sites at risk from land and air pathways are identified in Table 5.11.2. . Additional detail on the qualifying interests has been included in Appendix C.

Table 5.11.2: Qualifying Interests of the screened in European sites likely to be impacted upon via land and air pathways from FRM measures undertaken at Sutton and Howth North AFA.

European Site (Site code)	Qualifying interests
North Bull Island SPA (004006)	Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Shelduck (<i>Tadorna tadorna</i>) [A048] Teal (<i>Anas crecca</i>) [A052] Pintail (<i>Anas acuta</i>) [A054] Shoveler (<i>Anas clypeata</i>) [A056] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Dunlin (<i>Calidris alpina</i>) [A149] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Curlew (<i>Numenius arquata</i>) [A160] Redshank (<i>Tringa totanus</i>) [A162] Turnstone (<i>Arenaria interpres</i>) [A169] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Wetland and Waterbirds [A999]
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210]

	<p>Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]</p>
Baldoyle Bay SAC (000199)	<p>Mudflats and sandflats not covered by seawater at low tide [1140] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]</p>
Baldoyle Bay SPA (004016)	<p>Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Shelduck (<i>Tadorna tadorna</i>) [A048] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Wetland and Waterbirds [A999]</p>
South Dublin Bay and River Tolka Estuary SPA (004024)	<p>Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Dunlin (<i>Calidris alpina</i>) [A149] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Redshank (<i>Tringa totanus</i>) [A162] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Roseate Tern (<i>Sterna dougallii</i>) [A192] Common Tern (<i>Sterna hirundo</i>) [A192] Arctic Tern (<i>Sterna paradisaea</i>) [A194] Wetland and Waterbirds [A999]</p>

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

- **Physical habitat disturbance** – There is potential for direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the coastal defences and along access routes. Construction of flood walls 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 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 waterbird species.

5.11.2 Impact Assessment

Table 5.11.3 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.

5.11.2.1 In-combination Effects

Appropriate Assessment requires consideration of the impacts on European sites of FRM measures at Sutton and Howth North 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. Cumulative effects will be further 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:

- 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. Provided the FRM works are planned and managed correctly, the in-combination effects of FRM measures and agricultural operations is not likely to be significant.
- The shorelines in Sutton and Howth AFA are maintained by Fingal County Council. Inspections and maintenance are carried out as and when resources are available. These maintenance activities are likely to be local in nature, and provided the FRM works are planned and managed correctly, are not expected to have significant in-combination impacts with FRM measures.
- The Regional Planning Guidelines for the Greater Dublin Area, 2014-2016 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The Dublin City Development Plan, 2011-2017 has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- A Vision for Dublin Bay has the potential for impacts in relation to planned new infrastructure. 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 when project-specific design information is available.
- The draft Eastern River Basin District Management Plan, 2015-2021 and associated Programmes of Measures lists European sites in the Water Framework Directive Register of

Protected Areas for protection. The OPW will work with the EPA, local authorities and other agencies to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives and thus negative in-combination effects are unlikely.

- The Dublin Bay Water Quality Management Plan (Environmental Research Unit, 1991) is an environmental protection plan; negative in-combination effects are unlikely, provided timing of physical works are correctly planned and managed.
- The projects preceding or running in parallel with the Eastern CFRAM Study (see Chapter 3.1.2.2) have the potential for cumulative or in-combination effects on the European sites in Dublin Bay and Baldoyle Bay with FRM measures at Sutton and Howth North AFA. Provided the timing of FRM works is planned and managed correctly, no significant in-combination impacts are anticipated.
- The FEM FRAM Study and FRMP covers Dublin Airport, Kinsaley, Malahide, Portmarnock and Swords. There is the potential for cumulative or in-combination effects of FRM measures at these AFAs with FRM measures at Sutton and Howth North AFA. Following the precautionary principle it is also recommended that in accordance with the mitigation outlined above, FRM works at Sutton and Howth North AFA are not carried out simultaneously with FRM works at these AFAs, to ensure avoidance of significant in-combination effects.

The Flood Risk Management Plan UoM09, 2015-2021 contains the types of measures that have potential to impact on European sites. It has been concluded that the proposed works in the Sutton and Howth North AFA will have no significant residual impacts on European sites. Provided that the FRM works are planned and managed correctly, cumulative or in-combination effects are considered to be unlikely.

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 5.11.3: Impact assessment for FRM measures at Sutton and Howth North AFA (Hard defences).

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
North Bull Island SPA (004006)	Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Shelduck (<i>Tadorna tadorna</i>) [A048] Teal (<i>Anas crecca</i>) [A052] Pintail (<i>Anas acuta</i>) [A054] Shoveler (<i>Anas clypeata</i>) [A056] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Dunlin (<i>Calidris alpina</i>) [A149] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	<p>The birds for which this SPA is designated are dependent upon wetland habitats within the site. Construction of hard defences adjacent to the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution.</p> <p>There is potential for indirect, negative impacts from sedimentation during construction work along the coastline; however any 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>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the coastline to minimise sediment mobilisation.</p> <p>See also general mitigation in Chapter 6.</p>	No
	Curlew (<i>Numenius arquata</i>) [A160] Redshank (<i>Tringa totanus</i>) [A162] Turnstone (<i>Arenaria interpres</i>) [A169] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Wetland and Waterbirds [A999]	Water level changes		<p>The habitats that support these species are dependent on specific hydrological regimes. Construction of flood walls could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species that they support (population trends, distribution).</p> <p>Long sections of coastal hard defences may cause changes to the natural circulation of sediment and organic matter and lead to increased rates of erosion of adjacent coastline.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Hydrodynamics study/survey to assess the likely implications of coastal hard defences to erosion rates in adjacent areas. Results of this survey should feedback into the planning process.</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
		Morphological changes	Surface water/ land	<p>If coastal processes are altered due to the proposed measures at Sutton & Howth North, there could be impacts on the intertidal sediment habitats.</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>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>	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 (population trends or range).</p> <p>There is potential for a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences. However, coastal defences will be set back from the SPA boundary, and will therefore not have any direct physical disturbance impacts on wetland habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the SPA boundary.</p> <p>See also general mitigation in Chapter 6.</p>	No
		Noise and visual disturbance		<p>These waterbird species will be sensitive to disturbance from machinery and workforces during construction of new flood walls. This disturbance could cause displacement of populations which can require significant energy expenditure for the birds, which could have an adverse impact on population trends and</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				distribution.	Avoid carrying out construction work in the over-wintering period (September - March). See also general mitigation in Chapter 6.	
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] <i>Petalophyllum ralfsii</i> (Petalwort) [1395]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	Construction will take place adjacent to the SAC boundary. 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 defence/wave return walls, and along access routes. This could lead to a reduction in water quality, adversely affecting the wetland habitats. There is potential for indirect, negative impacts from sedimentation during construction work along the coastline; however any 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.	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance. Set hard defences back from the coastline to minimise sediment mobilisation. See also general mitigation in Chapter 6.	No
		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). It is a conservation objective for several of the designated habitats at this site to "maintain/restore natural circulation of sediments and organic matter, without any physical obstructions". Long sections of coastal hard defences may cause changes to the natural circulation of	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance. Hydrodynamics study/survey to assess the likely implications of coastal hard defences to erosion rates in adjacent areas. Results of this survey should feedback	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
				sediment and organic matter and lead to increased rates of erosion of adjacent coastline.	into the planning process. See also general mitigation in Chapter 6.	
		Physical habitat disturbance	Land and Air	Construction of flood defence and wave return walls 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. Ongoing maintenance of the flood walls could also result in physical disturbance of adjacent habitats or along access routes. There is potential for a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences. However, coastal defences will be set back from the SAC boundary, and will therefore not have any direct physical disturbance impacts on wetland habitat.	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance. Set hard defences back from the SPA boundary. See also general mitigation in Chapter 6.	No
		Morphological changes	Surface water/ land	If coastal processes are altered due to the proposed measures at Sutton & Howth North, there could be impacts on the intertidal sediment habitats. Coastal flood walls and embankments must be designed and constructed in a manner ensuring that adverse impacts to habitat do not occur.	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.	No
		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
South Dublin Bay and River Tolka Estuary SPA (004024)	Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Ringed Plover (<i>Charadrius hiaticula</i>)	Noise and visual disturbance	Land and Air	These waterbird species will be sensitive to disturbance from machinery and workforces during construction of new flood walls. This disturbance could cause displacement of populations which can require significant energy	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 Impacts	Avoidance/mitigation measures	Residual impact
	[A137] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Knot (<i>Calidris canutus</i>) [A143] Sanderling (<i>Calidris alba</i>) [A144] Dunlin (<i>Calidris alpina</i>) [A149] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Redshank (<i>Tringa totanus</i>) [A162] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Roseate Tern (<i>Sterna dougallii</i>) [A192] Common Tern (<i>Sterna hirundo</i>) [A192] Arctic Tern (<i>Sterna paradisaea</i>) [A194] Wetland and Waterbirds [A999]			expenditure for the birds, which could have an adverse impact on population trends and distribution.	Avoid carrying out construction work in the over-wintering period (September - March) to ensure wintering waterbirds are not disturbed. Avoid carrying out construction work in the Tern roosting season (July-September). See also general mitigation in Chapter 6.	
Baldoye Bay SAC (000199)	Mudflats and sandflats not covered by seawater at low tide [1140] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>) [1330] Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]	Suspended sediments Changes to nutrient levels/pollutant release	Surface water	Construction will take place adjacent to the SAC boundary. 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 defence/wave return walls, and along access routes. This could lead to a reduction in water quality, adversely affecting the wetland habitats. There is potential for indirect, negative impacts from sedimentation during construction work along the coastline; however any 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.	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance. Set hard defences back from the coastline to minimise sediment mobilisation. See also general mitigation in Chapter 6.	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 Impacts	Avoidance/mitigation measures	Residual impact
				<p>alter hydrological regimes, thereby impacting upon wetland habitats and their conservation objectives (composition and area).</p> <p>It is a conservation objective for several of the designated habitats at this site to “maintain/restore natural circulation of sediments and organic matter, without any physical obstructions”. Long sections of coastal hard defences may cause changes to the natural circulation of sediment and organic matter and lead to increased rates of erosion of adjacent coastline.</p>	<p>construction and maintenance.</p> <p>Hydrodynamics study/survey to assess the likely implications of coastal hard defences to erosion rates in adjacent areas. Results of this survey should feedback into the planning process.</p> <p>See also general mitigation in Chapter 6.</p>	
		Morphological changes	Surface water/ land	<p>If coastal processes are altered due to the proposed measures at Sutton & Howth North, there could be impacts on the intertidal sediment habitats.</p> <p>Coastal flood walls and embankments must be designed and constructed in a manner ensuring that adverse impacts to habitat do not occur.</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>	No
		Physical habitat disturbance	Land and Air	<p>Construction of flood defence and wave return walls 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. Ongoing maintenance of the flood walls could also result in physical disturbance of adjacent habitats or along access routes.</p> <p>There is potential for a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences. However, coastal defences will be set back from the SAC boundary, and will therefore not have any direct physical disturbance impacts on wetland habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the SPA boundary.</p> <p>See also general mitigation in Chapter 6.</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
		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
Baldoyle Bay SPA (004016)	Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] Shelduck (<i>Tadorna tadorna</i>) [A048] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Wetland and Waterbirds [A999]	Suspended sediments Changes to nutrient levels/pollutant release	Surface Water	The birds for which this SPA is designated are dependent upon wetland habitats within the site. Construction of hard defences adjacent to the SPA could impact on these habitats through the release of suspended sediments and associated nutrients or through pollution incidents from machinery. This could lead to a reduction in water quality, affecting the extent or composition of wetland habitats and the food supply and roosting sites of waterbirds. This could negatively impact on the conservation objectives of the species, through changes in population trends and/or distribution. There is potential for indirect, negative impacts from sedimentation during construction work along the coastline; however any 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.	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance. Set hard defences back from the coastline to minimise sediment mobilisation. See also general mitigation in Chapter 6.	No
		Water level changes		The habitats that support these species are dependent on specific hydrological regimes. Construction of flood walls could alter hydrological regimes, thereby impacting wetland habitats and the conservation objectives of the bird species that they support (population trends, distribution). Long sections of coastal hard defences may cause changes to the natural circulation of sediment and organic matter and lead to increased rates of erosion of adjacent coastline.	Strictly adhere to best practice protocols and SOPs during design, construction and maintenance. Hydrodynamics study/survey to assess the likely implications of coastal hard defences to erosion rates in adjacent	

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/ mitigation measures	Residual impact
					<p>areas. Results of this survey should feedback into the planning process.</p> <p>See also general mitigation in Chapter 6.</p>	
		Morphological changes	Surface water/ land	<p>If coastal processes are altered due to the proposed measures at Sutton & Howth North, there could be impacts on the intertidal sediment habitats.</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>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>	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 (population trends or range).</p> <p>There is potential for a direct loss of natural and semi-natural habitat in the direct footprint and vicinity of the defences. However, coastal defences will be set back from the SPA boundary, and will therefore not have any direct physical disturbance impacts on wetland habitat.</p>	<p>Strictly adhere to best practice protocols and SOPs during design, construction and maintenance.</p> <p>Set hard defences back from the SPA boundary.</p> <p>See also general mitigation in Chapter 6.</p>	No

Site name (site code)	Qualifying interests	Potential source of impact	Pathway	Potential Impacts	Avoidance/mitigation measures	Residual impact
		Noise and visual disturbance		<p>These waterbird species will be sensitive to disturbance from machinery and workforces during construction of new flood walls. This disturbance could cause displacement of populations which can require significant energy expenditure for the birds, which 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>Avoid carrying out construction work in the over-wintering period (September - March).</p> <p>See also general mitigation in Chapter 6.</p>	No

5.11.3 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 Sutton and Howth North AFA on the following European sites:

- Baldoyle Bay SAC (000199)
- Baldoyle Bay SPA (004016)
- North Bull Island SPA (004006)
- North Dublin Bay SAC (000206)
- South Dublin Bay and River Tolka Estuary SPA (004024)
- South Dublin Bay SAC (000210)

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 Sutton and Howth North 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 manager 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.
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

Potential Impact	Proposed Mitigation
	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 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

Potential Impact	Proposed Mitigation
	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 UoM09 incorporating the AFAs/HPWS of Blessington AFA, Dublin City AFA – Carysfort Maretimo HPW, Celbridge AFA & Hazelhatch AFA, Clane AFA, Leixlip AFA, Lucan to Chapelizod AFA, Maynooth AFA, Naas AFA, Newbridge AFA, and Santry AFA/HPW on the following European sites:

- North Bull Island SPA (004006)
- North Dublin Bay SAC (000206)
- South Dublin Bay and River Tolka Estuary SPA (004024)
- South Dublin Bay SAC (000210)
- Poulaphouca Reservoir SPA (004063)
- Baldoyle Bay SAC (000199)
- Baldoyle Bay SPA (004016)
- Dalkey Islands SPA (004172)
- Howth Head Coast SPA (004113)
- Howth Head SAC(000202)
- Rye Water Valley/Carton SAC (001398)
- Pollardstown Fen SAC (000396)

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 UoM09 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.

Table 0.1: 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 six SACs and six 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 six SACs and six 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 proposed works will should not result in any fragmentation of designated sites.
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 (2013) *Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC (site code 627) Conservation objectives. 18 September 2013.*

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

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

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 implementing pollution prevention measures. Having regard to this is therefore considered that maintenance is unlikely to have significant negative environmental impacts upon designated sites. 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</i>	<ul style="list-style-type: none"> Unlikely to be significant positive impacts at a strategic level, however will 	<ul style="list-style-type: none"> Unlikely to be significant negative impacts at a strategic level, however will

<i>Development</i>	prevent future additional flood risk from being created.	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 management. 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 	<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>biodiversity.</p> <ul style="list-style-type: none"> ▪ 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. ▪ 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. 	<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 spawning gravels. ▪ 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.		

Storage	<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 riparian zone and can then provide environmental benefits through the creation of high biodiversity wetlands. 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. 	<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 method could be further investigated within designated areas that require or are not sensitive to periodic inundation. 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.
Improvement of Channel Conveyance Deepening channel, widening channel, realigning long section, removing constraints and / or lining smoothing channel.		
Increase Conveyance	<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 	<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

	<p>property and infrastructure.</p> <ul style="list-style-type: none"> 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. 	<p>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.</p> <ul style="list-style-type: none"> 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 increased sediments. 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. 	<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

	<ul style="list-style-type: none"> Depending on their design, some defences can improve access for some types of recreation. 	<p>lead to a reduction in water quality.</p> <ul style="list-style-type: none"> 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

		<p>structures offshore or on the beach.</p> <ul style="list-style-type: none"> ▪ 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 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. ▪ 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

		<ul style="list-style-type: none"> 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. ▪ 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>	<ul style="list-style-type: none"> ▪ Unknown 	<ul style="list-style-type: none"> ▪ Unknown
<i>Site Specific Protection Works</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.
Flood Forecasting Monitoring rain and flows and alerting relevant recipients of flood risk likely to occur.		
<i>Flood Forecasting</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.
Public Awareness Make public aware of risk and advice on measures to protect themselves and properties.		
<i>Public Awareness</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.
Individual Property Protection Flood proofing, flood gates, capping vents and / or resilience measures.		
<i>Individual Property Protection</i>	<ul style="list-style-type: none"> ▪ 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. 	<ul style="list-style-type: none"> ▪ 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

UoM09 SCREENING TABLES

1. Name: Baldoye Bay SAC		Site Code: (IE000199)
Qualifying Interest(s)	Annex I Habitat: Mudflats and sandflats not covered by seawater at low tide [1140], Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330], Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] and Salicornia and other annuals colonizing mud and sand [1310]	
Proximity to AFA(s) and Linkage	<p>Baldoye Bay is a tidal estuarine bay protected from the open sea by a large sand - dune system. Large areas of intertidal flats are exposed at low tide at this site. These are mostly sands but grade to muds in the inner sheltered parts of the estuary. Baldoye Bay is an important bird site for wintering waterfowl and the inner part of the estuary is a Special Protection Area under the E.U. Birds Directive as well as being a Statutory Nature Reserve.</p> <p>There are eight AFAs/HPWs within 15km of Baldoye Bay SAC. These are: Clontarf (5.5km), Dublin City HPWs (0.0km), Lucan to Chapelizod (14.2km), Raheny (2.3km), Sandymount (9.0km), Santry (5.1km), Sutton & Baldoye (0.0km), Sutton & Howth North (0.0km)</p> <p>The AFAs of Clontarf, Raheny and Sandymount are all subject to coastal flood risk. These AFAs are on the shoreline of Dublin Bay, but are separated from Baldoye Bay SAC by Howth Head. Due to the separation distance between the sites, across coastal waters, no impacts from the implementation of coastal FRM methods in Clontarf, Raheny and Sandymount AFAs are predicted to occur on the qualifying interests of the Baldoye Bay SAC.</p> <p>The AFAs of Lucan to Chapelizod and Santry are located on the Rivers Liffey and Santry respectively. These rivers also discharge into Dublin Bay. Due to the separation distance between the sites, across coastal waters, no impacts from the implementation of FRM methods in Lucan to Chapelizod and Santry AFAs are predicted to occur on the qualifying interests of the Baldoye 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 protection measures.</p> <p>Sutton & Baldoye and Sutton & Howth North AFAs are subject to coastal flooding. The coastlines of these AFAs, in addition to the boundary of the Dublin City HPWs, immediately border the Baldoye Bay SAC and consequently there is a risk of direct impacts occurring from FRM methods at these AFAs.</p>	
Potential Impacts	There exists the potential for direct impacts on the qualifying interests of Baldoye Bay SAC from the implementation of FRM methods at the Dublin City HPWs, Sutton & Baldoye and Sutton & Howth North AFAs. Appropriate Assessment is required to assess the significance of these impacts.	

2.Name: Baldoye Bay SPA		Site Code: (IE004016)
Qualifying Interest(s)	Wetland and Waterbirds habitat [A999]supporting Species of Special Conservation Interest: Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046], Shelduck (<i>Tadorna tadorna</i>) [A048], Ringed Plover (<i>Charadrius hiaticula</i>) [A137], Golden Plover (<i>Pluvialis apricaria</i>) [A140], Grey Plover (<i>Pluvialis squatarola</i>) [A141] and Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157]	
Proximity to AFA(s) and Linkage	<p>Baldoye Bay is a tidal estuarine bay protected from the open sea by a large sand - dune system. Large areas of intertidal flats are exposed at low tide at this site. These are mostly sands but grade to muds in the inner sheltered parts of the estuary. Baldoye Bay is an important bird site for wintering waterfowl and the inner part of the estuary is a Special Protection Area under the E.U.Birds Directive as well as being a Statutory Nature Reserve.</p> <p>There are eight AFAs/HPWs within 15km of Baldoye Bay SPA. These are: Clontarf (5.5km),Dublin City HPWs (0.0km), Lucan to Chapelizod (14.6km), Raheny (2.3km),</p>	

	<p>Sandymount (9.0km), Santry (5.4km), Sutton & Baldoyle (0.0km) and Sutton & Howth North (0.0km)</p> <p>The AFAs of Clontarf, Raheny and Sandymount are all subject to coastal flood risk. These AFAs are on the shoreline of Dublin Bay, but are separated from Baldoyle Bay SPA by Howth Head. Due to the separation distance between the sites, across coastal waters, no impacts from the implementation of coastal FRM methods in Clontarf, Raheny and Sandymount AFAs are predicted to occur on the qualifying interests of the Baldoyle Bay SPA.</p> <p>The AFAs of Lucan to Chapelizod and Santry are located on the Rivers Liffey and Santry respectively. These rivers also discharge into Dublin Bay. Due to the separation distance between the sites, across coastal waters, no impacts from the implementation of FRM methods in Lucan to Chapelizod and Santry AFAs are predicted to occur on the qualifying interests of the Baldoyle 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 protection measures.</p> <p>Sutton & Baldoyle and Sutton & Howth North AFAs are subject to coastal flooding. The coastlines of these AFAs, in addition to the boundary of the Dublin City HPWs, immediately border the Baldoyle Bay SPA and consequently there is a risk of direct impacts occurring from FRM methods at these AFAs.</p>
Potential Impacts	<p>There exists the potential for direct impacts on the qualifying interests of Baldoyle Bay SPA from the implementation of FRM methods at the Dublin City HPWs, Sutton & Baldoyle and Sutton & Howth North AFAs. Appropriate Assessment is required to assess the significance of these impacts.</p>

3.Name: Ballyman Glen SAC Site Code: (IE000713)	
Qualifying Interest(s)	<p>Annex I Habitat: Alkaline fens [7230] and Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]</p>
Proximity to AFA(s) and Linkage	<p>Ballyman Glen is situated approximately 3 km north of Enniskerry and straddles the County boundary between Dublin and Wicklow. It is orientated in an east-west direction with a stream running through the centre. The glen is bounded mostly by steeply sloping pasture with Gorse and areas of wood and scrub. Ballyman Glen contains a small strip of alkaline fen which is associated with petrifying spring/seepage areas that have given rise to thick deposits of marl.</p> <p>Ballyman Glen SAC is located in UoM10, but it is also located within 15km of UoM09 and as such may be influenced by the UoM09 FRMP. Therefore has been included in the screening.</p> <p>There is one AFA from UoM09 within 15km of the SAC boundary, Sandymount (12.3km), as well as the Dublin City HPWs. On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and Sandymount AFA or the Dublin City HPWs and therefore it is considered that there is no potential impact pathway between the AFA/HPWs and Ballyman Glen SAC.</p>
Potential Impacts	<p>As there is no potential impact pathway between the qualifying interests of the Ballyman Glen SAC and the AFAs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening.</p>

4.Name: Ballynafagh Bog SAC Site Code: (IE000391)	
Qualifying Interest(s)	<p>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]</p>
Proximity to AFA(s) and	<p>Ballynafagh Bog is a raised bog situated about 1 km west of Prosperous in Co. Kildare. The site</p>

Linkage	<p>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 UoM09 (and UoM07) and therefore has the potential to be influenced by the UoM09 FRMP. As such, it has been included in the screening.</p> <p>There are 7 AFAs in UoM09 within approximately 15km of Ballynafagh Bog SAC. These are: 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).</p> <p>In reviewing the EPA watercourse datasets it appears that Ballynafagh Bog SAC is surrounded by a network of streams and aqueducts that straddle the boundary between catchments and hydrometric areas with no clear watershed defined. These drainage channels appear to provide connectivity between the site and the AFAs of Clane (via Butter Stream) and Turnings/Killeenmore (via the Grand Canal) and consequently downstream on the River Liffey/Grand Canal to Celbridge and Hazelhatch. 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 these AFAs 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> <p>There is no hydraulic connectivity between Ballynafagh Bog SAC and the AFAs of Kilcock, Maynooth, Naas and Newbridge, nor any connectivity evident by virtue of a biodiversity stepping stone or corridor. It is concluded that no potential impact pathway exists between these AFAs and the European site.</p>
Potential Impacts	<p>As there is no potential impact pathway between the qualifying interests of the Ballynafagh Bog SAC and the AFAs of Celbridge, Clane, Hazelhatch, Kilcock, Maynooth, Naas, Newbridge and Turnings/Killeenmore in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently, the SAC has been removed from any further screening.</p>

5.Name: Ballynafagh Lake SAC Site Code: (IE001387)	
Qualifying Interest(s)	<p>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]</p>
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 UoM09 (and UoM07) and therefore has the potential to be influenced by the UoM09 FRMP. As such, it has been included in the screening.</p> <p>7 AFAs in UoM09 are within approximately 15km of Ballynafagh Bog SAC. These are: Celbridge (14.9km), Clane (5.0km), Hazelhatch (15.8km), Kilcock (9.8km), Maynooth (13.4km), Naas (7.5km), Newbridge (8.1km) and Turnings/Killeenmore (8.9km).</p>

	<p>In reviewing the EPA watercourse datasets Ballynafagh Lake SAC principally drains into the River Slate which has no hydraulic connectivity with any of the AFAs. The SAC also follows the route of the (now abandoned) Blackwood Branch (feeder) of the Grand Canal which links with the Grand Canal at Bonyng Bridge. Sections of the feeder canal appear to have been infilled, blocking any hydraulic linkage between the Grand Canal and the SAC.</p> <p>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 any of the AFAs in UoM09 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, nor any connectivity evident by virtue of a biodiversity stepping stone or corridor.</p>
Potential Impacts	<p>As there is no potential impact pathway between the qualifying interests of the Ballynafagh Lake SAC and the AFAs of Celbridge, Clane, Hazelhatch, Kilcock, Maynooth, Naas, Newbridge and Turnings / Killeenmore in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09. Consequently, the SAC has been removed from any further screening.</p>

6.Name: Boyne Coast And Estuary SAC Site Code: (IE00001957)	
Qualifying Interest(s)	<p>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 maritima</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').</p>
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	<p>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.</p>

7.Name: Boyne Estuary SPA Site Code: (IE00004080)	
Qualifying Interest(s)	<p>"Wetlands" habitat supporting Species of Special Conservation Interest: 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>,</p>

	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 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	There exists the potential for indirect impacts on the qualifying interests of Boyne 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.

8.Name: Bray Head SAC Site Code: (IE000714)	
Qualifying Interest(s)	Annex I Habitat: Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] and European dry heaths [4030]
Proximity to AFA(s) and Linkage	<p>Bray Head is a coastal site situated in the north-east of Co. Wicklow between the towns of Bray and Greystones. The bedrock geology is Cambrian quartzites and shales (with mudstones and greywackes). Bray Head consists of a plateau of high ground, with five prominent quartzite knolls and has a maximum height of 241 m. Bray Head is of high conservation importance as it has good examples of two habitats (sea cliffs and dry heath) listed on Annex I of the E.U. Habitats Directive. It also supports a number of rare plant species and has ornithological importance</p> <p>Bray Head SAC is located in UoM10, but it is also located within 15km of UoM09 and thus has the potential to be influenced by the UoM09 FRMP. It has therefore been included in the screening.</p> <p>There are two AFAs/HPWs from UoM09 within 15km of the SAC boundary, Dublin City HPWs (10.2km) and Sandymount (15.2km). On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and the Dublin City HPWs or Sandymount AFA and therefore it is considered that there is no potential impact pathway between the AFA/HPW and Bray Head SAC. .</p>
Potential Impacts	As there is no potential impact pathway between the qualifying interests of Bray Head SAC and the AFAs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening.

9.Name: Broadmeadow/Swords Estuary SPA Site Code: (IE004025)	
Qualifying Interest(s)	Wetland and Waterbirds [A999] supporting Species of Special Conservation Interest: Great Crested Grebe (<i>Podiceps cristatus</i>) [A005], Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046], Shelduck (<i>Tadorna tadorna</i>) [A048], Pintail (<i>Anas acuta</i>) [A054], Goldeneye (<i>Bucephala</i>

	<i>clangula</i>) [A067], Red-breasted Merganser (<i>Mergus serrator</i>) [A069], Oystercatcher (<i>Haematopus ostralegus</i>) [A130], Golden Plover (<i>Pluvialis apricaria</i>) [A140], Grey Plover (<i>Pluvialis squatarola</i>) [A141], Knot (<i>Calidris canutus</i>) [A143], Dunlin (<i>Calidris alpina</i>) [A149], Black-tailed Godwit (<i>Limosa limosa</i>) [A156], Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] and Redshank (<i>Tringa totanus</i>) [A162]
Proximity to AFA(s) and Linkage	<p>Malahide Estuary is situated in north Co. Dublin, between the towns of Malahide and Swords. The site encompasses the estuary, saltmarsh habitats and shallow subtidal areas at the mouth of the estuary. A railway viaduct, built in the 1800s, crosses the site and has led to the inner estuary becoming lagoonal in character and only partly tidal. Much of the outer part of the estuary is well-sheltered from the sea by a large sand spit, known as "The Island". Malahide Estuary SPA is a fine example of an estuarine system, providing both feeding and roosting areas for a range of wintering waterfowl. The lagoonal nature of the inner estuary is of particular value as it increases the diversity of birds which occur. The site is of high conservation importance, with internationally important populations of Light-bellied Brent Goose and Black-tailed Godwit, and nationally important populations of a further 12 species.</p> <p>There are eight AFAs/HPWs within 15km of the Broadmeadow/Swords Estuary SPA. These are: Clontarf (9.6km), Dublin City HPWs (4.4km), Lucan to Chapelizod (15.2km), Raheny (6.7km), Sandymount (13.1km), Santry (6.3km), Sutton & Baldoyle (4.4km) and Sutton & Howth North (5.0km).</p> <p>The AFAs of Clontarf, Raheny and Sandymount are all subject to coastal flooding only and are within Dublin Bay, separated from Broadmeadow/Swords Estuary SPA by Howth Head. Lucan to Chapelizod and Santry AFAs are located upstream from the coast on rivers which also discharge into Dublin Bay. Although large areas of Dublin Bay are also designated for bird habitats, it is considered that due to the distances involved, around Howth Head, no adverse impacts to the qualifying interests of Broadmeadow/Swords Estuary SPA are expected to arise, either from the alteration of flows within the affected watercourses, from alterations to the sediment regime where those watercourses discharge into Dublin Bay or from the implementation of coastal flood protection measures in Dublin Bay.</p> <p>Sutton & Baldoyle and Sutton & Howth North are subject to coastal flooding only. The two AFAs are 4.4 and 5km respectively from Broadmeadow/Swords Estuary SPA and the Dublin City HPWs are also 4.4km from the site. Baldoyle Bay pNHA and Malahide Estuary pNHA afford some connectivity between the AFAs/HPW and the European site, however there is 2km of undesignated coastline with open coastal waters and less favourable habitats for bird feeding between the sites. It is considered that due to the distances involved, there is no potential impact pathway for adverse impacts to the qualifying interests of Broadmeadow/Swords Estuary SPA from the implementation of coastal flood protection measures at Sutton & Baldoyle and Sutton & Howth North, or at the Dublin City HPWs.</p>
Potential Impacts	As there is no potential impact pathway between the qualifying interests of Broadmeadow/Swords Estuary SPA and the AFAs in UoM09, it has been concluded that the SPA will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SPA has been removed from any further screening.

10.Name: Carriggower Bog SAC Site Code: (IE000716)	
Qualifying Interest(s)	Annex I Habitat: Transition mires and quaking bogs [7140]
Proximity to AFA(s) and Linkage	<p>Carriggower Bog is situated on Calary plateau at the eastern edge of the Wicklow Mountains. The site is an area of wet bog and poor fen, flanked by the Vartry River on the south-western side. This site is of conservation importance because it shows a good transition between fen and bog vegetation (with the fen being colonised by characteristic bog species).</p> <p>Carriggower Bog SAC is located in UoM10, but it is also located within 15km of UoM09 and thus has the potential to be influenced by the UoM09 FRMP. It has therefore been included in the screening.</p>

	There are no AFAs from UoM09 within 15km of the SAC boundary. The nearest AFA to the site is Sandymount, 23.1km away. There are no potential impact pathways between the qualifying interest of this site and the use of FRM methods in the catchment of any of the AFAs in UoM09.
Potential Impacts	As there is no potential impact pathway between the qualifying interests of Carriggower Bog SAC and the AFAs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening.

11.Name: Dalkey Islands SPA		Site Code: (IE004172)
Qualifying Interest(s)	Species of Special Conservation Interest: Roseate Tern (<i>Sterna dougallii</i>) [A192], Common Tern (<i>Sterna hirundo</i>) [A193] and Arctic Tern (<i>Sterna paradisaea</i>) [A194]	
Proximity to AFA(s) and Linkage	<p>The site comprises Dalkey Island, Lamb Island and Maiden Rock, the intervening rocks and reefs, and the surrounding sea to a distance of 200 m. Dalkey Island, which is the largest in the group, lies c. 400 m off Sorrento Point on the Co. Dublin mainland from which it is separated by a deep channel. The island is low-lying, the highest point of which (c. 15 m) is marked by a Martello Tower. Dalkey Islands SPA is a short distance offshore from UoM09. There are 12 AFAs/HPWs within 15km of Dalkey Islands SPA; seven in UoM09 and five in UoM10. Dalkey Islands SPA is of particular importance as a post-breeding/pre-migration autumn roost area for Roseate Tern, Common Tern and Arctic Tern. The recent nesting by Roseate Tern is highly significant. All three tern species using the site are listed on Annex I of the E.U. Birds Directive.</p> <p>The AFAs in UoM09 with potential to influence the SPA are: Clontarf (10.7km), Dublin City HPWs, Raheny (11.0km), Sandymount (8.4km), Santry (15.5km), Sutton & Baldoyle (12.2km) and Sutton & Howth North (11.1km). The tern species which are the qualifying interests of the SPA and which use the Dalkey Islands as a roosting/staging area, interact with and may originate from breeding sites at Rockabill and South Dublin Bay. The implementation of coastal FRM methods at Sandymount AFA, which borders South Dublin Bay and River Tolka Estuary SPA has the potential for indirect impacts on the qualifying interests of the Dalkey Islands SPA. FRM methods at the Dublin City HPWs may also have the potential for indirect impacts on the qualifying interests of the Dalkey Islands SPA.</p> <p>For the AFAs of Clontarf, Raheny, Santry, Sutton & Baldoyle and Sutton & Howth North, it is considered that the distances involved are such that no impact pathway exists between the European site and these AFAs.</p>	
Potential Impacts	As there is no potential impact pathway between the qualifying interests of Dalkey Islands SPA and the AFAs in UoM09, it has been concluded that the SPA will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SPA has been removed from any further screening.	

12.Name: Glen of The Downs SAC		Site Code: (IE000719)
Qualifying Interest(s)	Annex I Habitat: Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in British Isles [91A0]	
Proximity to AFA(s) and Linkage	<p>Glen of the Downs is a semi-natural oak wood situated within a steep valley created by a former glacial overflow channel. This woodland is well developed, rich in species and is of high conservation significance. The site supports oak woodland of a type that is listed on Annex II of the E.U. Habitats Directive. The glacial overflow channel is the largest example of such a feature in the country.</p> <p>Glen of The Downs SAC is located in UoM10, but it is also located within 15km of UoM09 and thus has the potential to be influenced by the UoM09 FRMP. It has therefore been included in the screening.</p>	

	The boundary of the Dublin City HPWs is 14.3km from the SAC boundary however a review of the available hydraulic and environmental data confirms that there is no potential connectivity or impact pathway between Glen of The Downs SAC and the Dublin City HPWs.
Potential Impacts	As there is no potential impact pathway between the qualifying interest of Glen of the Downs SAC and the AFAs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening.

13.Name: Glenasmole Valley SAC		Site Code: (IE001209)
Qualifying Interest(s)	Annex I Habitat: Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco Brometalia</i>)(*important orchid sites) [6210], Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] and Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]	
Proximity to AFA(s) and Linkage	<p>Glenasmole Valley in south Co. Dublin lies on the edge of the Wicklow uplands, approximately 5 km from Tallaght. The River Dodder flows through the valley and has been impounded here to form two reservoirs which supply water to south Dublin. Glenasmole Valley contains a high diversity of habitats and plant communities, including three habitats listed on Annex I of the E.U. Habitats Directive. The presence of four Red Data Book plant species further adds to the value of the site, as does the presence of populations of several mammal and bird species of conservation interest.</p> <p>The AFAs in UoM09 with potential to influence the SAC are: Baldonnel (7.0km), Blessington (12.6km), Celbridge (13.0km), Dublin City HPWs (2.1km), Hazelhatch (12.0km), Leixlip (12.9km), Lucan to Chapelizod (9.7km), Sandymount (12.0km) and Turnings/Killeenmore (14.8km). The Glenasmole Valley SAC is located in the environs of the Glenasmole Reservoirs, which are impounding reservoirs on the River Dodder. With the exception of Sandymount, none of the AFAs in UoM09 have any hydraulic connectivity with the Dodder catchment, nor any connectivity by virtue of a biodiversity corridor or stepping stone. Sandymount AFA is at the downstream limit of the River Dodder, however it is at risk of coastal flooding only, therefore there is no potential for FRM methods at this AFA to have any impact on the qualifying interests of the SAC. The boundary of the Dublin City HPWs, which incorporates the River Dodder, is 2.1km downstream of the SAC boundary. The River Dodder has been subject to a separate AA and NIS which presented a conclusion of no significant impacts from FRM methods in its catchment.</p>	
Potential Impacts	As there is no potential impact pathway between the qualifying interests of Glenasmole Valley SAC and the AFAs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening.	

14.Name: Howth Head Coast SPA		Site Code: (IE004113)
Qualifying Interest(s)	Species of Special Conservation Interest: Kittiwake (<i>Rissa tridactyla</i>) [A188]	
Proximity to AFA(s) and Linkage	<p>Howth Head is a rocky headland situated on the northern side of Dublin Bay. The peninsula is composed of Cambrian rock of the Bray Group, the most conspicuous component being quartzite. The site comprises the sea cliffs extending from just east of the Nose of Howth to the tip of the Bailey Lighthouse peninsula. The marine area to a distance of 500 m from the cliff base, where seabirds socialise and feed, is included within the site. This site is of high ornithological importance, with four seabird species having populations of national importance. It is also a traditional nesting site for Peregrine Falcon.</p> <p>The AFAs in UoM09 with potential to influence the SPA are: Clontarf (8.5km), Dublin City HPWs (2.6km), Raheny (6.2km), Sandymount (10.9km), Santry (10.9km), Sutton & Baldoyle</p>	

	<p>(4.4km) and Sutton & Howth North (2.6km). With the exception of Santry and the Dublin City HPWs (which are subject to fluvial flooding) all of the AFAs border Dublin Bay and are subject to coastal flooding only (although Sutton & Howth and Sutton & Baldoyle also have coastline on Baldoyle Bay to the north of Howth Head). The SPA is designated for its cliff habitats which are home to a nationally important population of the qualifying interest. The designation extends 500m offshore, where seabirds socialise and feed. Due to the separation distance between the AFAs, which are in relatively sheltered bay waters, and the SPA, which is in open coastal waters, no impacts from the implementation of coastal FRM methods in Clontarf, Raheny, Sandymount, Santry, Sutton & Baldoyle and Sutton & Howth North AFAs are predicted to occur on the qualifying interests of Howth Head Coast SPA.</p> <p>The boundary of the Dublin City HPWs polygon is 2.6km from the SPA boundary. However, the discharge point of the nearest river, the Santry River, is 4.3km at its closest point and the Lower Liffey is around 6.5km. The potential impacts on the qualifying interest of the SPA of FRM methods at these HPWs, such as the alteration of flows within the affected watercourses, or alterations to the sediment regime where those watercourses discharge into Dublin Bay is uncertain.</p>
Potential Impacts	<p>It is considered that there is no potential impact pathway between the qualifying interests of Howth Head Coast SPA and any of the AFAs in UoM09, with the exception of the Dublin City HPWs where the potential impact pathway is uncertain. Appropriate Assessment is recommended to assess the significance of these impacts.</p>

15.Name: Howth Head SAC		Site Code: (IE000202)
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>Howth Head is a rocky headland situated on the northern side of Dublin Bay. The peninsula is composed of Cambrian slates and quartzites, joined to the mainland by a post-glacial raised beach. Limestone occurs on the north-west side while glacial drift is deposited against the cliffs in places. The site is of national importance for breeding seabirds. It also displays a fine range of natural habitats, including two Annex I habitats, within surprisingly close proximity to Dublin city. The site is also of scientific importance for its seabird colonies, invertebrates and lichens. It also supports populations of at least two legally protected plant species and several other scarce plants.</p> <p>The AFAs in UoM09 with potential to influence the SAC are: Clontarf (5.8km), Dublin City HPWs (0.8km), Raheny (3.6km), Sandymount (8.6km), Santry (8.5km), Sutton & Baldoyle (2.4km) and Sutton & Howth North (0.8km).</p> <p>The qualifying interests for the SAC are not intertidal, though vegetated sea cliffs are classed as water-dependent. The main pressures on the qualifying interests are described in the context of increased/enriched water seepage down the cliff face from development near cliff tops. In this respect no potential impacts from the implementation of coastal FRM methods in Clontarf, Raheny, Sandymount, Sutton & Baldoyle or Sutton & Howth North AFAs and fluvial FRM methods in Santry AFA or the Dublin City HPWs are predicted to occur on the qualifying interests of the Howth Head SAC.</p>	
Potential Impacts	<p>It is considered that there is no potential impact pathway between the qualifying interests of Howth Head SAC and any of the AFAs/HPWs in UoM09. It has therefore been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP and as a consequence the SAC has been removed from any further screening.</p>	

16.Name: Ireland's Eye SAC		Site Code: (IE002193)
Qualifying Interest(s)	<p>Annex I Habitat: Perennial vegetation of stony banks [1220] and Vegetated sea cliffs of the</p>	

	Atlantic and Baltic coasts [1230]
Proximity to AFA(s) and Linkage	<p>Ireland's Eye SAC is a small island approx. 1.5km offshore from Howth Head in UoM09. This uninhabited marine island has a well developed maritime flora, with two habitats (sea cliffs and shingle) listed on Annex II of the E.U. Habitats Directive, and nationally important seabird colonies. Owing to its easy access and proximity to Dublin it has great educational and amenity value.</p> <p>There are seven AFAs/HPWs in UoM09 within 15km of Ireland's Eye SAC: Clontarf (9.0km), Dublin City HPWs (2.1km), Raheny (6.0km), Sandymount (12.3km), Santry (9.9km), Sutton & Baldoyle (3.7 km and Sutton & Howth North (2.1km). All of the SACs are either within, or discharge into Dublin Bay, although Sutton and Baldoyle and Sutton and Howth North also have coastline in Baldoyle bay. With the exception of Santry and the Dublin City HPWs (which are subject to fluvial flooding) all these AFAs are subject to coastal flooding only. Baldoyle Bay SAC extends approx. 1km along the mudflats and sandflats of Baldoyle spit from Sutton & Howth North towards Ireland's Eye, however there is still c.900m of open water (Howth Sound) between the AFA and the Ireland's Eye SAC. It is considered that due to the separation distance, across open coastal waters, there is no potential impact pathway and the implementation of FRM methods in any of these AFAs/HPWs is not predicted have any impact on the qualifying interests of the Ireland's Eye SAC.</p>
Potential Impacts	It is considered that there is no potential impact pathway between the qualifying interests of Ireland's Eye SAC and any of the AFAs/HPWs in UoM09. It has therefore been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP and as a consequence the SAC has been removed from any further screening.

17.Name: Ireland's Eye SPA Site Code: (IE004117)	
Qualifying Interest(s)	Species of Special Conservation Interest: Cormorant (<i>Phalacrocorax carbo</i>) [A017], Herring Gull (<i>Larus argentatus</i>) [A184], Kittiwake (<i>Rissa tridactyla</i>) [A188], Guillemot (<i>Uria aalge</i>) [A199] and Razorbill (<i>Alca torda</i>) [A200]
Proximity to AFA(s) and Linkage	<p>Ireland's Eye SPA is a small island approx. 1.5km offshore from Howth Head in UoM09. This relatively small island is of high ornithological importance, with seven seabird species having populations of national importance. The regular presence of a breeding pair of Peregrine Falcon is also of note.</p> <p>There are seven AFAs/HPWs in UoM09 within 15km of Ireland's Eye SAC: Clontarf (8.8km), Dublin City HPWs (1.9km), Raheny (5.8km), Sandymount (12.1km), Santry (9.7km), Sutton & Baldoyle (3.5km) and Sutton & Howth North (1.9km). All of the SACs are either within, or discharge into Dublin Bay, although Sutton and Baldoyle and Sutton and Howth North also have coastline in Baldoyle Bay. With the exception of Santry and the Dublin City HPWs (which are subject to fluvial flooding) all these AFAs are subject to coastal flooding only. Baldoyle Bay SAC extends approx. 1km along the mudflats and sandflats of Baldoyle spit from Sutton & Howth North towards Ireland's Eye, however there is still c.750m of open water (Howth Sound) between the AFA and the Ireland's Eye SPA. It is considered that due to the separation distance, across open coastal waters, there is no potential impact pathway and the implementation of FRM methods in any of these AFAs/HPWs is not predicted have any impact on the qualifying interests of the Ireland's Eye SPA.</p>
Potential Impacts	It is considered that there is no potential impact pathway between the qualifying interests of Ireland's Eye SPA and any of the AFAs/HPWs in UoM09. It has therefore been concluded that the SPA will not be impacted by any of the FRM methods proposed in the UoM09 FRMP and as a consequence the SPA has been removed from any further screening.

18.Name: Knocksink Wood SAC		Site Code: (IE000725)
Qualifying Interest(s)	Annex I Habitat: Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220] 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]	
Proximity to AFA(s) and Linkage	<p>Knocksink Wood is situated in the valley of the Glencullen River, just north-west of Enniskerry in Co. Wicklow. The fast flowing Glencullen River winds its way over granite boulders along the valley floor. The steep sides of the valley are mostly covered with calcareous drift, and support extensive areas of woodland. The importance of this site lies in the diversity of woodland habitats which occur. Two habitats listed in Annex I of the E.U. Habitats Directive, both with priority status, occur at this site (petrifying springs and alluvial woodland). The presence of rare or threatened plants and invertebrates adds to the interest</p> <p>Knocksink Wood SAC is located in UoM10, but it is also located within 15km of UoM09 and thus has the potential to be influenced by the UoM09 FRMP. It has therefore been included in the screening.</p> <p>There is one AFA, Sandymount (12.6km) and the Dublin City HPWs (5.3km) 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 Sandymount AFA or the Dublin City HPWs and therefore it is considered that there is no potential impact pathway between the AFA/HPWs and Knocksink Wood SAC, nor any other AFA in UoM09.</p>	
Potential Impacts	It is considered that there is no potential impact pathway between the qualifying interests of Knocksink Wood and any of the AFAs/HPWs in UoM09. It has therefore been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP and as a consequence the SAC has been removed from any further screening.	

19.Name: Lambay Island SAC		Site Code: (IE000204)
Qualifying Interest(s)	Annex I Habitat: Reefs [1170], Vegetated sea cliffs of the Atlantic and Baltic coasts [1230], Annex II Species, <i>Halichoerus grypus</i> (Grey Seal) [1364] and <i>Phoca vitulina</i> (Common Seal) [1365]	
Proximity to AFA(s) and Linkage	<p>Lambay Island is a large (250 ha) inhabited island lying 4 km off Portrane on the north Co. Dublin coast. It is privately owned and is accessible by boat from Rogerstown Quay. The island rises to 127 m and is surrounded by steep cliffs on the north, east and south slopes. Lambay Island has good examples of vegetated sea cliffs, a habitat listed on Annex I of the E.U. Habitats Directive, and these cliffs hold internationally important populations of seabirds. The site is also of conservation importance for the populations of Grey Seal and Common Seal, species listed on Annex II of this Directive, that it supports.</p> <p>Lambay Island SAC is in UoM08, but it is also located within 15km of UoM09 and thus has the potential to be influenced by the UoM09 FRMP. It has therefore been included in the screening.</p> <p>There are five AFAs/HPWs in UoM09 within 15km of Lambay Island SAC: Dublin City HPWs (10.9km), Raheny (13.8km), Santry (15.5km), Sutton & Baldoyle (11.4km), Sutton & Howth North (10.9km).</p> <p>Due to the separation distance, across coastal waters, no impacts from the implementation of coastal FRM methods in Raheny, Sutton & Baldoyle and Sutton & Howth North, or from fluvial FRM methods in Santry and the Dublin City HPWs, are predicted to occur on the qualifying interests of the Lambay Island 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	As there is no potential impact pathway between the qualifying interests of the Lambay Island SAC and any of the AFAs/HPWs in UoM09, it has been concluded that the SAC will not	

	be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening.
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20.Name: Lambay Island SPA		Site Code: (IE004069)
Qualifying Interest(s)	Species of Special Conservation Interest: Fulmar (<i>Fulmarus glacialis</i>) [A009], Cormorant (<i>Phalacrocorax carbo</i>) [A017], Shag (<i>Phalacrocorax aristotelis</i>) [A018], Greylag Goose (<i>Anser anser</i>) [A043], Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183], Herring Gull (<i>Larus argentatus</i>) [A184], Kittiwake (<i>Rissa tridactyla</i>) [A188], Guillemot (<i>Uria aalge</i>) [A199], Razorbill (<i>Alca torda</i>) [A200] and Puffin (<i>Fratercula arctica</i>) [A204]	
Proximity to AFA(s) and Linkage	<p>Lambay Island is a small island approx. 4km offshore from Portrane in UoM08. As it is located within 15km of UoM09, it has been included in the screening.</p> <p>There are five AFAs/HPWs in UoM09 within 15km of Lambay Island SPA: Dublin City HPWs (10.7km), Raheny (13.6km), Santry (15.5km), Sutton & Baldoyle (11.2km), Sutton & Howth North (10.7km).</p> <p>Due to the separation distance, across coastal waters, no impacts from the implementation of coastal FRM methods in Raheny, Sutton & Baldoyle and Sutton & Howth North, or from fluvial FRM methods in Santry and the Dublin City HPWs, are predicted to occur on the qualifying interests of the Lambay Island 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	As there is no potential impact pathway between the qualifying interests of the Lambay Island SPA and any of the AFAs/HPWs in UoM09, it has been concluded that the SPA will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SPA has been removed from any further screening.	

21Name: Malahide Estuary SAC		Site Code: (IE000205)
Qualifying Interest(s)	Annex I Habitat: Mudflats and sandflats not covered by seawater at low tide [1140], <i>Salicornia</i> and other annuals colonising mud and sand [1310], <i>Spartina</i> swards (<i>Spartinion maritimae</i>) [1320], Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) [1330], Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410], Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120] and Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	
Proximity to AFA(s) and Linkage	<p>Malahide Estuary is situated immediately north of Malahide and east of Swords in Co. Dublin. It is the estuary of the River Broadmeadow. The site is divided by a railway viaduct which was built in the 1800s. This site is a fine example of an estuarine system with all the main habitats represented. The site is important ornithologically, with a population of Brent Goose of international significance.</p> <p>Malahide Estuary SAC is on the border between UoM09 and the neighbouring UoM08. There are eight AFAs/HPWs from UoM09 within 15km of the SAC. These are: Clontarf (8.9km), Dublin City HPWs (3.6km), Lucan to Chapelizod (15.2km), Raheny (6.0km), Sandymount (12.4km), Santry (6.3km), Sutton & Baldoyle (3.6km) and Sutton & Howth North (4.2km).</p> <p>The AFAs of Clontarf, Raheny and Sandymount are all subject to coastal flooding only and are within Dublin Bay, separated from Malahide Estuary SAC by Howth Head. Lucan to Chapelizod and Santry AFAs are located upstream from the coast on rivers which also discharge into Dublin Bay. The Dublin City HPWs also discharge into Dublin Bay. No adverse impacts to the qualifying interests of Malahide Estuary SAC are expected to arise, either from the alteration of flows within the affected watercourses, from alterations to the sediment regime where those watercourses discharge into Dublin Bay or from the implementation of coastal flood protection measures in Dublin Bay.</p>	

	Sutton & Baldoyle and Sutton & Howth North are subject to coastal flooding only and in addition to having coastline in Dublin Bay, south of Howth Head, they also have coastline in Baldoyle Bay, north of Howth Head. The two AFAs are 3.6km and 4.2km respectively from Malahide Estuary SAC and are separated from the site by open coastal waters. It is considered that due to the distances involved, across open water, there is no potential impact pathway for adverse impacts to the qualifying interests of Malahide Estuary SAC from the implementation of coastal flood protection measures at Sutton & Baldoyle and Sutton & Howth North.
Potential Impacts	As there is no potential impact pathway between the qualifying interests of the Malahide Estuary SAC and any of the AFAs/HPWs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening.

22.Name: Mouds Bog SAC		Site Code: (IE002331)
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>Mouds Bog comprises a raised bog that includes both areas of high bog and cutoverbog. 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 a raised bog on the eastern boundary of UoM09. There are four AFAs in UoM09 within 15km of the site, these are: Clane (9.4km), Naas (5.9km), Newbridge (0.7km) and Turnings/Killeenmore (11.3km).</p> <p>On reviewing the available datasets in the area, there are no watercourses either draining in to, or out of, the SAC. There is no hydraulic linkage present with any of the AFAs in UoM09, nor is there any connectivity by virtue of a biodiversity stepping stone or corridor. It is concluded that no potential impact pathway exists between any of the AFAs in UoM09 and the qualifying interests of Mouds Bog SAC.</p>	
Potential Impacts	As there is no potential impact pathway between the qualifying interests of the Mouds Bog SAC and any of the AFAs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening.	

23.Name: North Bull Island SPA		Site Code: (IE004006)
Qualifying Interest(s)	Wetland and Waterbirds [A999] habitat supporting Species of Special Conservation Interest: Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046], Shelduck (<i>Tadorna tadorna</i>) [A048], Teal (<i>Anas crecca</i>) [A052], Pintail (<i>Anas acuta</i>) [A054], Shoveler (<i>Anas clypeata</i>) [A056], Oystercatcher (<i>Haematopus ostralegus</i>) [A130], Golden Plover (<i>Pluvialis apricaria</i>) [A140], Grey Plover (<i>Pluvialis squatarola</i>) [A141], Knot (<i>Calidris canutus</i>) [A143], Sanderling (<i>Calidris alba</i>) [A144], Dunlin (<i>Calidris alpina</i>) [A149], Black-tailed Godwit (<i>Limosa limosa</i>) [A156], Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157], Curlew (<i>Numenius arquata</i>) [A160], Redshank (<i>Tringa totanus</i>) [A162], Turnstone (<i>Arenaria interpres</i>) [A169] and Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179]	
Proximity to AFA(s) and Linkage	The North Bull Island sand spit is a relatively recent depositional feature, formed as a result of improvements to Dublin Port during the 18 th and 19 th centuries. It is almost 5km long and 1	

	<p>km wide and runs parallel to the coast between Clontarf and Sutton. Part of the interior of the island has been converted to golf courses. A well-developed and dynamic dune system stretches along the seaward side of the island. The North Bull Island SPA is an excellent example of an estuarine complex and is one of the top sites in Ireland for wintering waterfowl. It is of international importance on account of both the total number of waterfowl and the individual populations of Light-bellied Brent Goose, Black-tailed Godwit and Bar-tailed Godwit that use it.</p> <p>There are eight AFAs/HPWs from UoM09 within 15km of North Bull Island SPA: Clontarf (0.0km), Dublin City HPWs (0.0km), Lucan to Chapelizod (10.1km), Raheny (0.0km), Sandymount (3.5km), Santry (4.5km), Sutton & Baldoyle (0.0km) and Sutton & Howth North (0.0km).</p> <p>Ten additional AFAs, Baldonnel (19.7km), Celbridge (23.0km), Clane (c.32.7km), Hazelhatch (22.6km), Kilcock (c.31.2km), Leixlip (19.3km), Maynooth (c.25.8km), Naas (c.30.8km), Newbridge (c.41.4km) and Turnings/Killeenmore (c.27.9km) were also screened. These AFAs, although in excess of 15 linear km from the European site, are directly upstream of it and may therefore influence it.</p> <p>The AFAs of Clontarf, Raheny, Sutton & Baldoyle and Sutton & Howth North, which are all subject to coastal flood risk only, immediately border the SPA. There is potential for direct impacts on the qualifying interests of the SPA from the implementation of coastal FRM methods at these AFAs.</p> <p>Sandymount AFA is also subject to coastal flood risk and borders the South Dublin Bay and River Tolka Estuary SPA, which adjoins the North Bull Island SPA. The implementation of coastal FRM methods at Sandymount AFA has the potential to generate indirect impacts on the qualifying interests of the North Bull Island SPA.</p> <p>A number of the Dublin City HPWs discharge directly into the SPA and there is therefore a risk of direct impacts to the qualifying interests from FRM methods in these catchments. The AFAs of Lucan to Chapelizod and Santry are located on rivers upstream from Dublin Bay <10km and <5km upstream respectively from the European site (Lucan to Chapelizod is subject to coastal as well as fluvial flood risk). There is a risk of direct and indirect impacts on the qualifying interests of North Bull Island SPA from the implementation of coastal and/or fluvial FRM methods at these AFAs/HPWs.</p> <p>The upstream distance from North Bull Island SPA to the catchment of Leixlip AFA is approximately 23.5km. Indirect impacts on the qualifying interests of the European site from FRM methods at Leixlip AFA are unlikely, but not impossible, therefore further assessment is recommended.</p> <p>The AFAs of Baldonnel, Celbridge, Clane, Hazelhatch, Kilcock, Leixlip, Maynooth, Naas, Newbridge and Turnings/Killeenmore are all in the River Liffey catchment, with upstream distances from Dublin Bay of between 23.5km (Leixlip) and 61km (Newbridge). Potential impacts 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 direct impacts on the North Bull Island SPA from FRM methods at Clontarf, Dublin City HPWs, Raheny, Sutton & Baldoyle and Sutton & Howth North. There exists the potential for indirect impacts on the North Bull Island SPA from FRM methods at Sandymount, Lucan to Chapelizod and Santry AFAs. Appropriate Assessment is required to determine the significance of these impacts.</p>

24. Name: North Dublin Bay SAC		Site Code: (IE000206)
Qualifying Interest(s)	<p>Annex I Habitat: Mudflats and sandflats not covered by seawater at low tide [1140], Annual vegetation of drift lines [1210], Salicornia 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], Embryonic shifting dunes [2110], Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120], Fixed coastal dunes with</p>	

	herbaceous vegetation (grey dunes) [2130] and Humid dune slacks [2190] Annex II Species, <i>Petalophyllum ralfsii</i> (Petalwort) [1395]
Proximity to AFA(s) and Linkage	<p>This site covers the inner part of north Dublin Bay, the seaward boundary extending from the Bull Wall lighthouse across to the Martello Tower at Howth Head. The North Bull Island is the focal point of this site. This site is an excellent example of a coastal site with all the main habitats represented. The site holds good examples of nine habitats that are listed on Annex I of the E.U. Habitats Directive; one of these is listed with priority status. Several of the wintering bird species have populations of international importance, while some of the invertebrates are of national importance. The site contains a numbers of rare and scarce plants including some which are legally protected.</p> <p>There eight AFAs from UoM09 within 15km of North Dublin Bay SAC. They are: Clontarf (0.0km), Dublin City HPWs (0.0km), Lucan to Chapelizod (10.1km), Raheny (0.0km), Sandymount (3.5km), Santry (4.5km), Sutton & Baldoyle (0.0km) and Sutton & Howth North (0.0km).</p> <p>Ten additional AFAs, Baldonnel (19.7km), Celbridge (23.0km), Clane (c.32.7km), Hazelhatch (22.6km), Kilcock (c.31.2km), Leixlip (19.3km), Maynooth (c.25.8km), Naas (c.30.8km), Newbridge (c.41.4km) and Turnings/Killeenmore (c.27.9km) were also screened. These AFAs, although in excess of 15 linear km from the European site, are directly upstream of it and may therefore influence it.</p> <p>The AFAs of Clontarf, Raheny, Sutton & Baldoyle and Sutton & Howth North, which are all subject to coastal flood risk only, immediately border the SAC. There is potential for direct impacts on the qualifying interests of the SAC from the implementation of coastal FRM methods at these AFAs.</p> <p>Sandymount AFA is also subject to coastal flood risk and borders the South Dublin Bay SAC. The implementation of coastal FRM methods at Sandymount AFA has the potential to generate indirect impacts on the qualifying interests of the North Dublin Bay SAC if the coastal processes in Dublin Bay are significantly changed.</p> <p>A number of the Dublin City HPWs discharge directly into the SAC and there is therefore a risk of direct impacts to the qualifying interests from FRM methods in these catchments. The AFAs of Lucan to Chapelizod and Santry are located on rivers upstream from Dublin Bay <10km and <5km upstream respectively from the European site (Lucan to Chapelizod is subject to coastal as well as fluvial flood risk). There is a risk of indirect impacts on the qualifying interests of North Dublin Bay SAC from the implementation of coastal and/or fluvial FRM methods at these AFAs.</p> <p>The AFAs of Baldonnel, Celbridge, Clane, Hazelhatch, Kilcock, Leixlip, Maynooth, Naas, Newbridge and Turnings/Killeenmore are all in the River Liffey catchment, with upstream distances from Dublin Bay of between c.23.5km (Leixlip) and c.61km (Newbridge). Potential impacts 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 direct impacts on the North Dublin Bay SAC from FRM methods at Clontarf, Dublin City HPWs, Raheny, Sutton & Baldoyle and Sutton & Howth North. There exists the potential from indirect impacts on the North Dublin Bay SAC from FRM methods at Baldonnel, Celbridge, Clane, Hazelhatch, Kilcock, Leixlip, Lucan to Chapelizod, Maynooth, Naas, Newbridge, Sandymount and Turnings/Killeenmore AFAs. Appropriate Assessment is required to determine the significance of these impacts.</p>

25.Name: Pollardstown Fen SAC		Site Code: (IE000396)
Qualifying Interest(s)	<p>Annex I Habitat: Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> [7210], Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220], Alkaline fens [7230]</p> <p>Annex II Species, <i>Vertigo geyeri</i> (Geyer's Whorl Snail) [1013], <i>Vertigo angustior</i> (Narrow-</p>	

	mouthed Whorl Snail [1014] and <i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]
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 UoM09 and therefore has the potential to be influenced by the UoM09 FRMP. As such, it has been included in the screening. There are four AFAs within 15km of Pollardstown Fen SAC: Clane (13.7km), Naas (9.4km), Newbridge (0.0km) and Turnings/Killeenmore (15.6km).</p> <p>On reviewing the available environmental and hydraulic data, it can be seen that the AFAs of Clane, Naas and Turnings/Killeenmore have no hydraulic connectivity, nor any connectivity by virtue of a biodiversity stepping stone or corridor. It is concluded that no potential impact pathway exists between these AFAs and the European site.</p> <p>The boundary of Pollardstown Fen SAC touches the boundary of Newbridge AFA. Although a review of watercourse and other environmental information suggests that there is no hydraulic connectivity with the River Liffey, more detailed information is required on FRM methods to confirm this. Further assessment is therefore recommended at the next stage of the FRMP.</p>
Potential Impacts	There exists the potential for indirect impacts on the Pollardstown Fen SAC from FRM methods at Newbridge AFA. Appropriate Assessment is required to determine the significance of these impacts.

26.Name: Poulaphouca Reservoir SPA Site Code: (IE004063)	
Qualifying Interest(s)	Species of Special Conservation Interest: Greylag Goose (<i>Anser anser</i>) [A043], Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183]
Proximity to AFA(s) and Linkage	<p>Poulaphouca Reservoir is a man-made lake, created by impounding the River Liffey for the purpose of hydro power generation. It also receives water from the King's River.</p> <p>There are seven AFAs within approximately 15km of the Poulaphouca Reservoir SPA: Baldonnel (11.9km), Blessington (0.0km), Celbridge (14.9km), Dublin City HPWs (7.9km), Hazelhatch (15.2km), Naas (7.5km), Newbridge (13.3km) and Turnings/Killeenmore (12.1km).</p> <p>The AFAs of Newbridge and Celbridge, and the Dublin City HPWs are located on the River Liffey, downstream of the SPA. Downstream distances are well in excess of 18km there is no possibility of any upstream / upcatchment FRM methods being adopted for Newbridge or Celbridge AFAs, or the Dublin City HPWs, that would have any impact on the qualifying interests of the SPA.</p> <p>The catchment areas of the AFAs of Baldonnel, Hazelhatch, Naas and Turnings/Killeenmore have no hydraulic connectivity with the reservoir, nor any connectivity by virtue of a biodiversity stepping stone or corridor. It is concluded that no potential impact pathway exists between these AFAs and the European site.</p> <p>Blessington AFA immediately borders the SPA and the watercourses passing through the AFA drain into Poulaphouca Reservoir. There exists the potential for direct impacts on the qualifying interests of the SPA from FRM methods at Blessington AFA.</p>
Potential Impacts	There exists the potential for direct impacts on the Poulaphouca Reservoir SPA from FRM methods at Blessington AFA. Appropriate Assessment is required to determine the significance of these impacts.

27.Name: Red Bog Kildare SAC		Site Code: (IE000397)
Qualifying Interest(s)	Annex I Habitat: Transition mires and quaking bogs [7140]	
Proximity to AFA(s) and Linkage	<p>Red Bog comprises a wetland complex of lake, fen and bog situated in a hollow between ridges of glacially-deposited material and underlain by rocks of Ordovician age. It is a site of particular conservation significance, supporting a good example of transition mire, a habitat that is listed on Annex I of the E.U. Habitats Directive.</p> <p>There are nine AFAs/HPWs within 15km of Red Bog Kildare SAC. They are: Baldonnel (10.8km), Blessington (1.7km), Celbridge (12.6km), Clane (13.3km), Dublin City HPWs (7.6km), Hazelhatch (13.1km), Naas (6.1km), Newbridge (14.3km) and Turnings/Killeenmore (9.1km).</p> <p>A review of the watercourse and environmental data for the site shows no watercourses issuing from or draining into the site. There is therefore no apparent hydraulic connectivity with any of the AFAs in UoM09. In addition, no connectivity by virtue of a biodiversity stepping stone or corridor is evident.</p> <p>The site is within the Liffey_040 sub-basin catchment which also incorporates Blessington AFA, 1.7km from the site. Red Bog is located 60m uphill from Blessington and is separated from the AFA by a large sand quarry. It is concluded that no potential impact pathway exists between any of the AFAs/HPWs in UoM09 and the European site.</p>	
Potential Impacts	<p>As there is no potential impact pathway between the qualifying interests of the Red Bog Kildare SAC and any of the AFAs/HPWs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening.</p>	

28.Name: River Barrow And River Nore SAC		Site Code: (IE002162)
Qualifying Interest(s)	<p>Annex I Habitat: Estuaries [1130], Mudflats and sandflats not covered by seawater at low tide [1140], Salicornia and other annuals colonising mud and sand [1310], Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>) [1330], Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410], Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [3260], European dry heaths [4030], Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430], Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220], Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] 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>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016], <i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029], <i>Austropotamobius pallipes</i> (White-clawed Crayfish) [1092], <i>Petromyzon marinus</i> (Sea Lamprey) [1095], <i>Lampetra planeri</i> (Brook Lamprey) [1096], <i>Lampetra fluviatilis</i> (River Lamprey) [1099], <i>Alosa fallax fallax</i> (Twaite Shad) [1103], <i>Salmo salar</i> (Salmon) [1106], <i>Lutra lutra</i> (Otter) [1355], <i>Trichomanes speciosum</i> (Killarney Fern) [1421] and <i>Margaritifera durrovensis</i> (Nore Pearl Mussel) [1990]</p>	
Proximity to AFA(s) and Linkage	<p>The River Barrow And River Nore SAC covers an extensive area as it consists of the freshwater stretches of the Barrow and Nore River catchments as far upstream as the Slieve Bloom Mountains, and it also includes the tidal elements and estuary as far downstream as Creadun Head in Waterford.</p> <p>The River Barrow And River Nore SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM09 and therefore has the potential to be influenced by the UoM09 FRMP. As such, it has been included in the screening.</p> <p>There is one AFA, Newbridge (10.0km) within 15km of River Barrow And River Nore SAC. Examination of the available watercourse and environmental data shows that Newbridge AFA is hydraulically separated from the catchment of the Newbridge AFA and there is no potential hydraulic connectivity between the sites and no connectivity by virtue of a biodiversity</p>	

	stepping stone or corridor is evident. It is concluded that no potential impact pathway exists between any of the AFAs in UoM09 and the River Barrow And River Nore SAC.
Potential Impacts	As there is no potential impact pathway between the qualifying interests of the River Barrow And River Nore SAC and any of the AFAs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening.

29.Name: River Boyne And River Blackwater SAC		Site Code: (IE002299)
Qualifying Interest(s)	<p>Annex I Habitat: 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]</p> <p>Annex II Species: <i>Lampetra fluviatilis</i> (River Lamprey) [1099], <i>Salmo salar</i> (Salmon) [1106], <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>The River Boyne And River Blackwater SAC is located in UoM07, but is located within 15km of UoM09 and therefore has the potential to be influenced by the UoM09 FRMP. As such, it has been included in the screening.</p> <p>There is one AFA from UoM09 within 15km of the SAC boundary, Kilcock (13.3km). On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and Kilcock AFA, and therefore it is considered that there is no potential impact pathway between this AFA, or any other AFA catchment in UoM09, and the River Boyne And River Blackwater SAC.</p>	
Potential Impacts	As there is no potential impact pathway between the qualifying interests of the River Boyne And River Blackwater SAC and any of the AFAs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening.	

30.Name: River Boyne and River Blackwater SPA		Site Code: (IE004232)
Qualifying Interest(s)	Species of Special Conservation Interest: Kingfisher (<i>Alcedo atthis</i>) [A229]	
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>Ardee AFA is 14.6 linear km from the SPA and has no hydraulic connectivity with the site, nor any connectivity by means of a biodiversity corridor or ecological stepping stone.</p> <p>The River Boyne and River Blackwater SPA is located in UoM07, but it is also located within 15km of UoM09 and therefore has been included in the screening.</p> <p>There are no AFAs from UoM09 within 15km of the SAC boundary, the nearest is Kilcock (15.1km). On reviewing the datasets in the area, no possible hydraulic or biodiversity linkage is present between the European site and Kilcock AFA and therefore it is considered that there is no potential impact pathway between this AFA, or any other AFA catchment in UoM09, and the River Boyne and River Blackwater SPA.</p>	
Potential Impacts	As there is no potential impact pathway between the qualifying interests of the River Boyne	

	And River Blackwater SPA and any of the AFAs in UoM09, it has been concluded that the SPA will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SPA has been removed from any further screening.
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31.Name: Rockabill SPA Site Code: (IE004014)	
Qualifying Interest(s)	Species of Special Conservation Interest: Purple Sandpiper (<i>Calidris maritima</i>) [A148], Roseate Tern (<i>Sterna dougallii</i>) [A192], Common Tern (<i>Sterna hirundo</i>) [A193], Arctic Tern (<i>Sterna paradisaea</i>) [A194]
Proximity to AFA(s) and Linkage	<p>Rockabill consists of two small, low-lying, granitic islets situated c. 7 km off the Co. Dublin coast. Rockabill also supports a nationally important population of Black Guillemot and a small colony of Kittiwake. Rockabill is of international importance for nesting terns and is one of the most important tern colonies in Europe.</p> <p>The boundary of Rockabill SPA is 14.8km from Mornington AFA (subject to both fluvial and coastal flood risk).</p> <p>There are no AFAs from UoM09 within 15km of Rockabill SPA, the nearest are Sutton & Baldoyle (18.9 km) and Sutton & Howth North (19.2 km). There is not considered to be any potential impact pathway from the use of FRM methods in any of the AFA catchments in UoM09 and the qualifying interests of Rockabill SPA.</p>
Potential Impacts	As there is no potential impact pathway between the qualifying interests of the Rockabill SPA and any of the AFAs in UoM09, it has been concluded that the SPA will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SPA has been removed from any further screening.

32.Name: Rockabill to Dalkey Island SAC Site Code: (IE003000)	
Qualifying Interest(s)	Annex I Habitat: Reef [1170] Annex II Species: <i>Phocoena phocoena</i> (Harbour Porpoise) [1351]
Proximity to AFA(s) and Linkage	<p>Rockabill to Dalkey Island SAC encompasses a large and broadly rectangular-shaped offshore area, measuring approximately 7 km wide and 40 km in length, extending south from Rockabill Island, running adjacent to Howth Head, and crossing the outer part of Dublin Bay to Frazer Bank in south Co. Dublin. The site encompasses Dalkey, Muglins and Rockabill islands. This site is of conservation importance for reefs, listed on Annex I, and Harbour Porpoise, listed on Annex II, of the E.U. Habitats Directive.</p> <p>There are 12 AFAs/HPWs within 15km of Rockabill to Dalkey Island SAC. Seven AFAs/HPWs are in UoM09: Clontarf (6.2km), Dublin City HPWs (1.8km), Raheny (4.4km), Sandymount (7.6km), Santry (9.3km), Sutton & Baldoyle (3.3km) and Sutton & Howth North (1.8km). With the exception of Santry (which is subject to fluvial flood risk), all these AFAs are subject to coastal flood risk. Having regard to the separation distance, across coastal waters and the nature of the qualifying interests, no impacts from the implementation of FRM methods in the AFAs in UoM09 are predicted to occur on the qualifying interests of the Rockabill to Dalkey Island 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	As there is no potential impact pathway between the qualifying interests of the Rockabill to Dalkey Island SAC and any of the AFAs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening.

33.Name: Rogerstown Estuary SAC		Site Code: (IE000208)
Qualifying Interest(s)	Annex I Habitat: Estuaries [1130], Mudflats and sandflats not covered by seawater at low tide [1140], <i>Salicornia</i> and other annuals colonizing mud and sand [1310], Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410], Atlantic salt meadows (<i>Glaucio-Puccinellietalia maritimae</i>) [1330], Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] and Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]	
Proximity to AFA(s) and Linkage	<p>Rogerstown Estuary is situated about 2 km north of Donabate in Co. Dublin. It is a relatively small, narrow estuary separated from the sea by a sand and shingle bar. The estuary is divided by a causeway and narrow bridge, built in the 1840s to carry the Dublin-Belfast railway line. This site is a good example of an estuarine system, with all typical habitats represented, including several listed on Annex I of the E.U. Habitats Directive. Rogerstown is an internationally important waterfowl site and has been a breeding site for Little Terns. The presence within the site of three rare plant species adds to its importance.</p> <p>Rogerstown Estuary SAC is located in UoM08, but it is also located within 15km of UoM09 and therefore has been included in the screening.</p> <p>There are six AFAs/HPWs in UoM09 within 15km of Rogerstown Estuary SAC. They are: Clontarf (14.9km), Dublin City HPWs (10.3km), Raheny (12.7km), Santry (10.4km), Sutton & Baldoyle (10.3km) and Sutton & Howth North (10.8km). With the exception of Santry and the Dublin City HPWs (which are subject to fluvial flood risk), all these AFAs are subject to coastal flood risk only.</p> <p>Due to the separation distance between these AFAs/HPWs and the SAC, across open coastal waters, no impacts from the implementation of FRM methods in Clontarf, Raheny, Santry, Sutton & Baldoyle and Sutton & Howth North AFAs or the Dublin City HPWs, are predicted to occur on the qualifying interests of the Rogerstown Estuary 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 protection measures.</p>	
Potential Impacts	As there is no potential impact pathway between the qualifying interests of the Rogerstown Estuary SAC and any of the AFAs/HPWs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening	

34.Name: Rogerstown Estuary SPA		Site Code: (IE004015)
Qualifying Interest(s)	Wetland and Waterbirds [A999] habitat supporting populations of Species of Special Conservation Interest: Greylag Goose (<i>Anser anser</i>) [A043], Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046], Shelduck (<i>Tadorna tadorna</i>) [A048], Shoveler (<i>Anas clypeata</i>) [A056], Oystercatcher (<i>Haematopus ostralegus</i>) [A130], Ringed Plover (<i>Charadrius hiaticula</i>) [A137], Grey Plover (<i>Pluvialis squatarola</i>) [A141], Knot (<i>Calidris canutus</i>) [A143], Dunlin (<i>Calidris alpina</i>) [A149], Black-tailed Godwit (<i>Limosa limosa</i>) [A156], Redshank (<i>Tringa totanus</i>) [A162],	
Proximity to AFA(s) and Linkage	<p>Rogerstown estuary is situated about 2 km north of Donabate in north County Dublin. It is a relatively small, funnel shaped estuary separated from the sea by a sand and shingle peninsula and extending eastwards beyond the low water mark to include an area of shallow marine water. The estuary receives the waters of the Ballyboghil and Ballough rivers, both of which flow through intensive agricultural catchments. Rogerstown Estuary SPA is located in UoM08, but it is also located within 15km of UoM09 and therefore has been included in the screening. Rogerstown Estuary is an important link in the chain of estuaries on the east coast. It supports an internationally important population of Brent Goose and a further 14 species in numbers of national importance.</p> <p>There are five AFAs in UoM09 within approximately 15km of Rogerstown Estuary SPA. They are: Clontarf (15.1km), Dublin City HPWs (10.4km), Raheny (12.4km), Santry (10.7km), Sutton & Baldoyle (10.0km) and Sutton & Howth North (10.4km). With the exception of Santry and</p>	

	<p>the Dublin City HPWs (which are subject to fluvial flood risk), all these AFAs are subject to coastal flood risk only.</p> <p>Due to the separation distance between these AFAs/HPWs and the SPA, across open coastal waters, no impacts from the implementation of FRM methods in Clontarf, Raheny, Santry, Sutton & Baldoyle and Sutton & Howth North AFAs, or the Dublin City HPWs, are predicted to occur on the qualifying interests of the Rogerstown Estuary 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 protection measures.</p>
Potential Impacts	<p>As there is no potential impact pathway between the qualifying interests of the Rogerstown Estuary SPA and any of the AFAs/HPWs in UoM09, it has been concluded that the SPA will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SPA has been removed from any further screening</p>

35.Name: Rye Water Valley/Carton SAC		Site Code: (IE001398)
Qualifying Interest(s)	<p>Annex I Habitat: Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]</p> <p>Annex II Species: <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>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 between Leixlip and Maynooth, in Counties Meath and Kildare, and extends along the Rye Water, a tributary of the River Liffey.</p> <p>There are nine AFAs within 15km of Rye Water Valley/Carton SAC. They are: Baldonnell (6.3km), Celbridge (2.2km), Clane (11.7km), Dublin City HPWs (10.9km), Hazelhatch (4.3km), Kilcock (4.9km), Leixlip (0.0km), Lucan to Chapelizod (2.0km), Maynooth (0.0km) and Turnings/Killeenmore (10.4km).</p> <p>The AFAs of Clane, Celbridge, Hazelhatch and Turnings/Killeenmore are upstream of the impoundment of the Leixlip Reservoir on the River Liffey and therefore have no hydraulic connectivity with the SAC.</p> <p>Baldonnell AFA is on a separate tributary of the River Liffey, the Griffin River) which joins the Liffey 3.6km downstream of the Rye Water Valley/Carton SAC and therefore also has no hydraulic connectivity.</p> <p>The boundary of the Dublin City HPW area is 11 linear km (c. 13km downstream) from the Rye Water Valley/Carton SAC. There is no possibility of any upstream / upcatchment FRM methods being adopted for the Dublin City HPWs that would have any impact on the qualifying interests or conservation objectives of Rye Water Valley/Carton SAC.</p> <p>Kilcock AFA is approximately 5km upstream of the SAC and Maynooth is immediately upstream of the SAC. Indirect impacts may occur on the SAC qualifying interests from the implementation of FRM methods at these AFAs.</p> <p>The AFA passes through Leixlip AFA and therefore there is potential for direct impacts on the qualifying interests from FRM methods at this AFA.</p> <p>Lucan to Chapelizod AFA is 2km downstream from the SAC. Indirect impacts on the qualifying interest of Rye Water Valley/Carton SAC are considered unlikely, but not impossible, if upcatchment methods are considered and therefore further assessment is recommended once FRM methods under consideration have been finalised, in order to assess whether the impacts are significant.</p>	

Potential Impacts	There exists the potential for indirect impacts on the qualifying interest of Rye Water Valley/Carton SAC from the implementation of FRM methods at Kilcock, Leixlip, Lucan to Chapelizod and Maynooth AFAs; Appropriate Assessment is required to assess the significance of these impacts.
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36.Name: Skerries Islands SPA		Site Code: (IE004122)
Qualifying Interest(s)	Species of Special Conservation Interest: Cormorant (<i>Phalacrocorax carbo</i>) [A017], Shag (<i>Phalacrocorax aristotelis</i>) [A018], Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046], Purple Sandpiper (<i>Calidris maritima</i>) [A148], Turnstone (<i>Arenaria interpres</i>) [A169] and Herring Gull (<i>Larus argentatus</i>) [A184]	
Proximity to AFA(s) and Linkage	<p>The Skerries Islands are a group of three small uninhabited islands situated between 0.5 km and 1.5 km off the north Dublin coast (UoM08). The seas surrounding the islands, to a distance of 200m, are included in the site. Although the site is located at UoM08, it is also located within 15km of UoM09 and therefore has been included in the screening.</p> <p>There are no AFAs from UoM09 within 15km of the SPA boundary; the nearest sites are Sutton & Baldoyle and Sutton & Howth North which are more than 18km away. It is considered that there is no potential impact pathway between these AFAs, or any other AFA in UoM09 and Skerries Islands SPA.</p>	
Potential Impacts	As there is no potential impact pathway between the qualifying interests of the Skerries Islands SPA and any of the AFAs in UoM09, it has been concluded that the SPA will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SPA has been removed from any further screening	

37.Name: Slaney River Valley SAC		Site Code: (IE000781)
Qualifying Interest(s)	<p>Annex I Habitat: Estuaries [1130], Mudflats and sandflats not covered by seawater at low tide [1140], Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation [3260], Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] 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>Margaritifera margaritifera</i> (Freshwater Pearl Mussel) [1029], <i>Petromyzon marinus</i> (Sea Lamprey) [1095], <i>Lampetra planeri</i> (Brook Lamprey) [1096], <i>Lampetra fluviatilis</i> (River Lamprey) [1099], <i>Alosa fallax fallax</i> (Twaite Shad) [1103], <i>Salmo salar</i> (Salmon) [1106], <i>Lutra lutra</i> (Otter) [1355] and <i>Phoca vitulina</i> (Common Seal) [1365]</p>	
Proximity to AFA(s) and Linkage	<p>This SAC comprises the freshwater stretches of the River Slaney as far as the Wicklow Mountains; a number of tributaries, the larger of which include the Bann, Boro, Glasha, Clody, Derry, Derreen, Douglas and Carrigower Rivers; the estuary at Ferrycarrig; and Wexford Harbour. The site supports populations of several species listed on Annex II of the E.U. Habitats Directive, and habitats listed on Annex I of this Directive, as well as important numbers of wintering wildfowl including some species listed on Annex I of the E.U. Birds Directive. The presence of wet and broadleaved woodlands increases the overall habitat diversity and the occurrence of a number of Red Data Book plant and animal species adds further importance to the site. Overall it is of considerable conservation significance.</p> <p>Slaney River Valley SAC is outside the Eastern CFRAM Study area, but is located within 15km of UoM09 and therefore has the potential to be influenced by the UoM09 FRMP. As such, it has been included in the screening.</p> <p>Slaney River Valley SAC is in a separate hydrometric area from the AFAs in UoM09 and therefore has no hydraulic connectivity with the river catchments of the AFAs in UoM09, the nearest of which are Blessington (16.7 km), Naas and Newbridge (both 19.0 km). There is no potential connectivity between the qualifying interests of this European site and the AFAs in</p>	

	UoM09 by virtue of a biodiversity corridor or stepping stone, or by groundwater, land or air pathways. There is not considered to be any potential impact from the use of FRM methods used in the catchments of the AFAs in UoM09 and the qualifying interests of this European site.
Potential Impacts	As there is no potential impact pathway between the qualifying interests of the Slaney River Valley SAC and any of the AFAs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening

38.Name: South Dublin Bay and River Tolka Estuary SPA		Site Code: (IE004024)
Qualifying Interest(s)	Wetland and Waterbirds [A999] , habitat supporting Species of Special Conservation Interest: Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046], Oystercatcher (<i>Haematopus ostralegus</i>) [A130], Ringed Plover (<i>Charadrius hiaticula</i>) [A137], Grey Plover (<i>Pluvialis squatarola</i>) [A141], Knot (<i>Calidris canutus</i>) [A143], Sanderling (<i>Calidris alba</i>) [A144], Dunlin (<i>Calidris alpina</i>) [A149], Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157], Redshank (<i>Tringa totanus</i>) [A162], Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179], Roseate Tern (<i>Sterna dougallii</i>) [A192], Common Tern (<i>Sterna hirundo</i>) [A193] and Arctic Tern (<i>Sterna paradisaea</i>) [A194]	
Proximity to AFA(s) and Linkage	<p>The South Dublin Bay and River Tolka Estuary SPA comprises a substantial part of Dublin Bay. It includes the intertidal area between the River Liffey and Dun Laoghaire, and the estuary of the River Tolka to the north of the River Liffey, as well as Booterstown Marsh. A portion of the shallow marine waters of the bay is also included. The South Dublin Bay and River Tolka Estuary SPA is of international importance for Light-bellied Brent Goose and of national importance for nine other waterfowl species. As an autumn tern roost, it is also of international importance. Furthermore, the site supports a nationally important colony of Common Tern. All of the tern species using the site are listed on Annex I of the E.U. Birds Directive, as are Bar-tailed Godwit and Mediterranean Gull.</p> <p>There are eight AFAs/HPWs from UoM09 within approximately 15km of the South Dublin Bay and River Tolka Estuary SPA, They are: Clontarf (0.0km), Dublin City HPWs (0.0km), Lucan to Chapelizod (7.0km), Raheny (0.9km), Sandymount (0.0km), Santry (3.9km), Sutton & Baldoyle (4.3km) and Sutton & Howth North (5.0km).</p> <p>Ten additional AFAs, Baldonnel (19.7km), Celbridge (23.0km), Clane (c.32.7km), Hazelhatch (22.6km), Kilcock (c.31.2km), Leixlip (19.3km), Maynooth (c.25.8km), Naas (c.30.8km), Newbridge (c.41.4km) and Turnings/Killeenmore (c.27.9km) were also screened. These AFAs, although in excess of 15 linear km from the European site, are directly upstream of it and may therefore influence it.</p> <p>The AFAs of Sandymount and Clontarf are subject to coastal flood risk and immediately border the South Dublin Bay and River Tolka Estuary SPA. The implementation of coastal FRM methods at these AFAs has the potential to generate direct impacts on the qualifying interests of the South Dublin Bay and River Tolka Estuary SPA.</p> <p>The AFAs of Raheny, Sutton & Baldoyle and Sutton & Howth North, which are all subject to coastal flood risk only, also border Dublin Bay but adjoin the North Bull Island SPA, which is immediately adjacent to the South Dublin Bay and River Tolka Estuary SPA and which shares many of the same qualifying interests. There is potential for indirect impacts on the qualifying interests of the South Dublin Bay and River Tolka Estuary SPA from the implementation of coastal FRM methods at these AFAs.</p> <p>The Dublin City HPWs discharge directly into Dublin Bay. There exists the potential for direct impacts on the SPA from FRM methods in these HPWs.</p> <p>The AFAs of Lucan to Chapelizod and Santry are located on rivers upstream from Dublin Bay <10km and <5km upstream respectively from the European site (Lucan to Chapelizod is subject to coastal as well as fluvial flood risk). There is a risk of indirect impacts on the qualifying interests of South Dublin Bay and River Tolka Estuary SPA from the implementation</p>	

	<p>of coastal and/or fluvial FRM methods at these AFAs.</p> <p>The AFAs of Baldonnel, Celbridge, Clane, Hazelhatch, Kilcock, Leixlip, Maynooth, Naas, Newbridge and Turnings/Killeenmore are all in the River Liffey catchment, with upstream distances from Dublin Bay of between c.23.5km (Leixlip) and c.61km (Newbridge). Potential indirect impacts 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 direct impacts on the South Dublin Bay and River Tolka Estuary SPA from FRM methods at the Dublin City HPWs and from Sandymount and Clontarf AFAs.</p> <p>There exists the potential for indirect impacts on the South Dublin Bay and River Tolka Estuary SPA from FRM methods at Celbridge, Clane, Hazelhatch, Kilcock, Leixlip, Lucan to Chapelizod Maynooth, Naas, Newbridge, Raheny, Santry, Sutton & Baldoyle, Sutton & Howth North and Turnings/Killeenmore AFAs. Appropriate Assessment is required to determine the significance of these impacts.</p>

39.Name: South Dublin Bay SAC Site Code: (IE000210)	
Qualifying Interest(s)	Annex I Habitat: Mudflats and sandflats not covered by seawater at low tide [1140]
Proximity to AFA(s) and Linkage	<p>This site lies south of the River Liffey in Co. Dublin, and extends from the South Wall to the west pier at Dun Laoghaire. It is an intertidal site with extensive areas of sand and mudflats. The sediments are predominantly sands but grade to sandy muds near the shore at Merrion Gates. The main channel which drains the area is Cockle Lake. This site is a fine example of a coastal system with extensive sand and mudflats, a habitat listed on Annex I of the E.U. Habitats Directive. South Dublin Bay is also an internationally important bird site.</p> <p>There are eight AFAs/HPWs from UoM09 within approximately 15km of the South Dublin Bay SAC. They are: Clontarf (2.0km), Dublin Bay HPWs (0.0km), Lucan to Chapelizod (8.0km), Raheny (2.9km), Sandymount (0.0km), Santry (6.8km), Sutton & Baldoyle (5.5km) and Sutton & Howth North (6.1km).</p> <p>Ten additional AFAs, Baldonnel (19.7km), Celbridge (23.0km), Clane (c.32.7km), Hazelhatch (22.6km), Kilcock (c.31.2km), Leixlip (19.3km), Maynooth (c.25.8km), Naas (c.30.8km), Newbridge (c.41.4km) and Turnings/Killeenmore (c.27.9km) were also screened. These AFAs, although in excess of 15 linear km from the European site, are directly upstream of it and may therefore influence it.</p> <p>Sandymount AFA is subject to coastal flood risk and immediately borders the South Dublin Bay SAC. The implementation of coastal FRM methods at this AFA has the potential to generate direct impacts on the qualifying interests of the South Dublin Bay SAC.</p> <p>The AFAs of Clontarf, Raheny, Sutton & Baldoyle and Sutton & Howth North, which are all subject to coastal flood risk only, also surround Dublin Bay but adjoin the North Dublin Bay SAC, which is immediately adjacent to the South Dublin Bay SAC and which shares its qualifying interest. There is potential for indirect impacts on the qualifying interests of the South Dublin Bay SAC from the implementation of coastal FRM methods at these AFAs, if the coastal processes in Dublin Bay are significantly changed.</p> <p>The Dublin City HPWs discharge directly into Dublin Bay. There exists the potential for direct impacts on the SAC from FRM methods in these HPWs.</p> <p>The AFAs of Lucan to Chapelizod and Santry are located on rivers upstream from Dublin Bay <10km and <5km upstream respectively from the European site (Lucan to Chapelizod is subject to coastal as well as fluvial flood risk). There is a risk of indirect impacts on the qualifying interests of South Dublin Bay SAC from the implementation of coastal and/or fluvial FRM methods at these AFAs.</p> <p>The AFAs of Baldonnel, Celbridge, Clane, Hazelhatch, Kilcock, Leixlip, Maynooth, Naas, Newbridge and Turnings/Killeenmore are all in the River Liffey catchment, with upstream distances from Dublin Bay of between c.23.5km (Leixlip) and c.61km (Newbridge). Potential indirect impacts of FRM methods at these AFAs are unlikely, but not impossible and as</p>

	uncertainty remains, further assessment is recommended.
Potential Impacts	<p>There exists the potential for direct impacts on the South Dublin Bay SAC from FRM methods at Sandymount AFA and the Dublin City HPWs.</p> <p>There exists the potential for indirect impacts on the South Dublin Bay SAC from FRM methods at Baldonnell, Celbridge, Clane, Clontarf, Hazelhatch, Kilcock, Leixlip, Lucan to Chapelizod, Maynooth, Naas, Newbridge, Raheny, Santry, Sutton & Baldoyle, Sutton & Howth North and Turnings/Killeenmore AFAs. Appropriate Assessment is required to determine the significance of these impacts.</p>

40.Name: The Long Derries Edenderry SAC		Site Code: (IE000925)
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 UoM09 and therefore has the potential to be influenced by UoM09 FRMP. As such, it has been included in the screening.</p> <p>The Long Derries, Edenderry SAC is in a separate hydrometric area from the AFAs in UoM09 and therefore has no hydraulic connectivity with the river catchments of the AFAs in UoM09, the nearest of which are Clane (18.9km) and Newbridge (17.4km). There is no potential connectivity between the qualifying interests of this European site and the AFAs in UoM09 by virtue of a biodiversity corridor or stepping stone, or by groundwater, land or air pathways. There is not considered to be any potential impact from the use of FRM methods used in the catchments of the AFAs in UoM09 and the qualifying interests of this European site.</p>	
Potential Impacts	<p>As there is no potential impact pathway between the qualifying interests of The Long Derries, Edenderry SAC and any of the AFAs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening</p>	

41.Name: Vale of Clara (Rathdrum Wood) SAC		Site Code: (IE000733)
Qualifying Interest(s)	Annex I Habitat: Old sessile oak woods with Ilex and Blechnum in British Isles [91A0],	
Proximity to AFA(s) and Linkage	<p>The Vale of Clara woodland is situated mostly on the east side of the Avonmore River, immediately north of Rathdrum in Co. Wicklow. It lies between 107 and 244 m above sea level, and forms an integral part of one of the most scenic valleys in Wicklow. The woodland is a remnant of the once extensive forests of east Wicklow, which may have occupied this site since the end of the last Ice Age.</p> <p>The Vale of Clara (Rathdrum Wood) SAC is located in UoM10, but it is also located within 15km of UoM09 and therefore has been included in the screening.</p> <p>Vale of Clara (Rathdrum Wood) SAC is in a separate hydrometric area from the AFAs in UoM09 and therefore has no hydraulic connectivity with the river catchments of the AFAs in UoM09, the nearest of which are Blessington (28km). There is no potential connectivity between the qualifying interests of this European site and the AFAs in UoM09 by virtue of a biodiversity corridor or stepping stone, or by groundwater, land or air pathways. There is not considered</p>	

	to be any potential impact from the use of FRM methods used in the catchments of the AFAs in UoM09 and the qualifying interests of this European site.
Potential Impacts	As there is no potential impact pathway between the qualifying interests of the Vale of Clara (Rathdram Wood) SAC and any of the AFAs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening

42.Name: Wicklow Mountains SAC		Site Code: (IE002122)
Qualifying Interest(s)	<p>Annex I Habitat: Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i> [3130], Natural dystrophic lakes and ponds [3160], Northern Atlantic wet heaths with <i>Erica tetralix</i> [4010], European dry heaths [4030], Alpine and Boreal heaths [4060], Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230], Blanket bogs (* if active bog) [7130], Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>) [8110], Calcareous rocky slopes with chasmophytic vegetation [8210], Siliceous rocky slopes with chasmophytic vegetation [8220] and Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0]</p> <p>Annex II Species: <i>Lutra lutra</i> (Otter) [1355]</p>	
Proximity to AFA(s) and Linkage	<p>Wicklow Mountains SAC is a complex of upland areas in Counties Wicklow and Dublin, flanked by the Blessington reservoir to the west and Vartry reservoir in the east, Cruagh Mountain in the north and Lybagh Mountain in the south. Most of the site is over 300 m, with much ground over 600 m. The highest peak is 925 m at Lugnaquilla. Wicklow Mountains is important as a complex, extensive upland site. It shows great diversity from a geomorphological and a topographical point of view. The vegetation provides examples of the typical upland habitats with heath, blanket bog and upland grassland covering large, relatively undisturbed areas. In all, eleven habitats listed on Annex I of the E.U. Habitats Directive are found within the site. Several rare or protected plant and animal species occur, adding further to its value.</p> <p>Wicklow Mountains SAC is a large SAC, spread over a number of hydrometric areas including UoM09 and UoM10. There are 11 AFAs/HPWs in UoM09 with the potential to influence the Wicklow Mountains SAC. They are: Baldonnel (8.1km), Blessington (2.5km), Celbridge (14.2km), Clontarf (14.4km), Dublin City HPWs (3.5km), Hazelhatch (13.1km), Leixlip (14.6km), Lucan to Chapelizod (12.1km), Naas (10.8km), Sandymount (10.1km) and Turnings/Killeenmore (14.5km).</p> <p>The Wicklow Mountains SAC is the upland source catchment for the River Liffey and the Kings River tributary of the River Liffey. The AFAs of Blessington, Celbridge, Leixlip, and Lucan to Chapelizod are all located downstream from the Wicklow Mountains SAC on the River Liffey. The closest AFA, Blessington, is located on the Poulaphouca Reservoir impoundment and the other AFAs located on the River Liffey are all downstream of this impoundment. It is considered that impoundment presents a physical barrier to any connectivity between the upstream catchment in the SAC and the downstream AFAs/HPWs.</p> <p>The AFAs of Baldonnel, Hazelhatch, Naas, Sandymount and Turnings/Killeenmore are located on other tributaries of the River Liffey and have no hydraulic connectivity with the site, nor any connectivity by virtue of a biodiversity stepping stone or corridor. There is not considered to be a potential impact pathway between any of the AFAs in UoM09 and the Wicklow Mountains SAC.</p>	
Potential Impacts	As there is no potential impact pathway between the qualifying interests of Wicklow Mountains SAC and any of the AFAs in UoM09, it has been concluded that the SAC will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SAC has been removed from any further screening	

43.Name: Wicklow Mountains SPA		Site Code: (IE004040)
Qualifying Interest(s)	Species of Special Conservation Interest: Merlin (<i>Falco columbarius</i>) [A098], Peregrine (<i>Falco peregrinus</i>) [A103],	
Proximity to AFA(s) and Linkage	<p>Wicklow Mountains SPA is an extensive upland site, comprising a substantial part of the Wicklow Mountains. The Wicklow Mountains SPA is of high ornithological importance as it supports nationally important populations of Merlin and Peregrine, both species that are listed on Annex I of the E.U. Birds Directive.</p> <p>Wicklow Mountains SPA is a large SPA, spread over a number of hydrometric areas including UoM09 and UoM10. There are 10 AFAs/HPWs in UoM09 with the potential to influence the Wicklow Mountains SPA. They are: Baldonnel (11.6km), Blessington (5.5km), Clontarf (14.7km), Dublin City HPWs (3.7km), Lucan to Chapelizod (12.1km), Naas (13.6km) and Sandymount (10.3km).</p> <p>The Wicklow Mountains SPA is the upland source catchment for the River Liffey and the Kings River tributary of the River Liffey. The AFAs of Blessington and Lucan to Chapelizod are located downstream from the Wicklow Mountains SAC on the River Liffey. The closest AFA, Blessington, is located on the Poulaphouca Reservoir impoundment and the other AFAs are downstream of this impoundment. It is considered that impoundment presents a physical barrier to any connectivity between the upstream catchment in the SPA and the downstream AFAs/HPWs.</p> <p>The AFAs of Baldonnel, Naas and Sandymount are located on other tributaries of the River Liffey and have no hydraulic connectivity with the site, nor any connectivity by virtue of a biodiversity stepping stone or corridor. Clontarf is a coastal AFA and subject to coastal flood risk only. There is not considered to be a potential impact pathway between any of the AFAs in UoM09 and the Wicklow Mountains SPA.</p>	
Potential Impacts	<p>As there is no potential impact pathway between the qualifying interests of Wicklow Mountains SPA and any of the AFAs in UoM09, it has been concluded that the SPA will not be impacted by any of the FRM methods proposed in the UoM09 FRMP. Consequently the SPA has been removed from any further screening.</p>	

APPENDIX C

Table C1 – Qualifying Interests, key environmental conditions supporting site integrity and conservation objectives for European sites in UoM09.

Site Name and Code	Qualifying interests	Key environmental conditions supporting site integrity	Conservation Objectives	Water-dependent
Poulaphouca Reservoir SPA (004063)	Greylag Goose (<i>Anser anser</i>) [A043]	Food availability (intertidal aquatic vegetation/ pasture/ crops). Undisturbed coastal roosting sites close to feeding sites. Grazing.	<p>Maintain/restore favourable conservation condition, defined by the following attributes and targets:</p> <p>Population trend – 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.</p> <p>Range – The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future.</p> <p>Habitat – There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.</p>	-
	Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183]	Food availability (intertidal fauna/pasture/sewage). Coastal water quality.		
North Bull Island SPA (004006)	Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046]	Food availability (intertidal aquatic vegetation/ pasture/ crops). Undisturbed coastal roosting sites close to feeding sites. Grazing.	<p>Maintain 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 light-bellied brent goose, other than that occurring from natural patterns of variation.</p>	-
	Shelduck (<i>Tadorna tadorna</i>) [A048]	Food availability (intertidal flora and fauna/pasture/cereal). Undisturbed coastal roosting sites close to feeding sites.	<p>Maintain 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 Shelduck, other than that occurring from natural patterns of variation.</p>	
	Teal (<i>Anas crecca</i>) [A052]	Food availability (intertidal flora and fauna/pasture/cereal). Undisturbed	<p>Maintain favourable conservation condition, defined by the following attributes and targets:</p> <p>Population trend – Long-term population trend stable or increasing.</p>	

CONSERVATION OBJECTIVES

		freshwater/coastal roosting sites close to feeding sites.	<u>Distribution</u> - No significant decrease in the range, timing or intensity of use of areas by Teal, other than that occurring from natural patterns of variation.	
	Pintail (<i>Anas acuta</i>) [A054]	Food availability (intertidal flora and fauna/pasture/cereal). Undisturbed freshwater/coastal roosting sites close to feeding sites.	<u>Maintain</u> 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 Pintail, other than that occurring from natural patterns of variation.	
	Shoveler (<i>Anas clypeata</i>) [A056]	Food availability (intertidal fauna/pasture). Flooding regime of coastal grasslands. Undisturbed coastal roosting sites close to feeding areas.	<u>Maintain</u> 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 Shoveler, other than that occurring from natural patterns of variation.	
	Oystercatcher (<i>Haematopus ostralegus</i>) [A130]	Food availability (intertidal fauna/pasture). Flooding regime of coastal grasslands. Undisturbed coastal roosting sites close to feeding areas.	<u>Maintain</u> 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 Oystercatcher, other than that occurring from natural patterns of variation.	
	Golden Plover (<i>Pluvialis apricaria</i>) [A140]		<u>Maintain</u> 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.	
	Grey Plover (<i>Pluvialis squatarola</i>) [A141]		<u>Maintain</u> 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 Grey Plover, other than that occurring from natural patterns of variation.	

CONSERVATION OBJECTIVES

	Knot (<i>Calidris canutus</i>) [A143]		<p>Maintain 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>	
	Sanderling (<i>Calidris alba</i>) [A144]		<p>Maintain 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>	
	Dunlin (<i>Calidris alpina</i>) [A149]		<p>Maintain 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 Dunlin, other than that occurring from natural patterns of variation.</p>	
	Black-tailed Godwit (<i>Limosa limosa</i>) [A156]		<p>Maintain 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>	
	Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157]		<p>Maintain 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 Bar-tailed Godwit, other than that occurring from natural patterns of variation.</p>	
	Curlew (<i>Numenius arquata</i>) [A160]		<p>Maintain 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</p>	

CONSERVATION OBJECTIVES

			Curlew, other than that occurring from natural patterns of variation.	
	Redshank (<i>Tringa totanus</i>) [A162]		<p>Maintain 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>	
	Turnstone (<i>Arenaria interpres</i>) [A169]		<p>Maintain 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>	
	Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179]		<p>Maintain 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-headed Gull, other than that occurring from natural patterns of variation.</p>	
	Wetland and Waterbirds [A999]	-	<p>Maintain favourable conservation condition, defined by the following attributes and targets:</p> <p>Habitat Area - The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 1,713 hectares, other than that occurring from natural patterns of variation.</p>	
North Dublin Bay SAC (000206)	Mudflats and sandflats not covered by seawater at low tide [1140]	Silt deposits in sheltered estuaries.	<p>Maintain favourable conservation condition, defined by the following attributes and targets:</p> <p>Habitat Area - The permanent habitat area is stable or increasing, subject to natural processes.</p> <p>Community Extent - Maintain the extent of the <i>Mytilus edulis</i>-dominated community, subject to natural processes.</p> <p>Community Structure: <i>Mytilus edulis</i> density - Conserve the high quality of the <i>Mytilus edulis</i>-dominated community, subject to natural processes.</p>	Yes

CONSERVATION OBJECTIVES

			<p><u>Community Distribution</u> - Conserve the following community types in a natural condition: Fine sand to sandy mud with <i>Pygospio elegans</i> and <i>Crangon crangon</i> community complex; Fine sand with <i>Spio martinensis</i> community complex.</p>	
Annual vegetation of drift lines [1210]	Sandy substrate. Physical impact and nutrient supply from tidal flow.		<p>Restore favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Habitat Area</u> - The permanent habitat area is 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: typical species and sub-communities</u> - Maintain the presence of species-poor communities with typical species: sea rocket (<i>Cakile maritima</i>), sea sandwort (<i>Honckenya peploides</i>), prickly saltwort (<i>Salsola kali</i>) and oraches (<i>Atriplex spp.</i>).</p> <p><u>Vegetation composition: negative indicator species</u> - Negative indicator species (including non-natives) to represent less than 5% cover.</p>	
Salicornia and other annuals colonising mud and sand [1310]	Frequency of tidal submergence. Absence of erosion.		<p>Restore favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Habitat Area</u> - The permanent habitat area is 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, or where necessary restore, the natural circulation of sediment 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>	

CONSERVATION OBJECTIVES

			<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 of creeks vegetated.</p> <p><u>Vegetation composition: typical species and sub-communities</u> - Maintain the presence of species-poor communities listed in SMP (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>	
	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]	Frequency of tidal submergence.	<p><u>Maintain</u> favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Habitat Area</u> - The permanent habitat area is stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: North Bull Island - 81.84ha.</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 the natural circulation of sediment 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 of creeks vegetated.</p> <p><u>Vegetation composition: typical species and sub-communities</u> - Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009).</p> <p><u>Vegetation structure: negative indicator species - <i>Spartina anglica</i></u> - No significant expansion of common</p>	

CONSERVATION OBJECTIVES

			cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1%.	
	Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]	Frequency of tidal submergence.	<p>Maintain favourable conservation condition, defined by the following attributes and targets:</p> <p>Habitat Area - The permanent habitat area is stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: North Bull Island - 81.84ha.</p> <p>Habitat Distribution – No decline or change in habitat distribution, subject to natural processes.</p> <p>Physical structure: sediment supply – Maintain the natural circulation of sediment and organic matter, without any physical obstructions.</p> <p>Physical structure: creeks and pans - Maintain creek and pan structure, subject to natural processes, including erosion and succession.</p> <p>Physical structure: flooding regime – Maintain natural tidal regime.</p> <p>Vegetation structure: zonation - Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.</p> <p>Vegetation structure: vegetation height – Maintain structural variation within sward.</p> <p>Vegetation structure: vegetation cover – Maintain more than 90% of area outside of creeks vegetated.</p> <p>Vegetation composition: typical species and sub-communities - Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009).</p> <p>Vegetation structure: negative indicator species - <i>Spartina anglica</i> - No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1%.</p>	
	Embryonic shifting dunes [2110]	Dune-building grasses <i>Elytrigia juncea</i> and <i>Leymus arenarius</i> . Supply of windblown sand.	<p>Restore favourable conservation condition, defined by the following attributes and targets:</p> <p>Habitat Area - The permanent habitat area is 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, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions.</p>	

CONSERVATION OBJECTIVES

			<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 juncea</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><u>Vegetation composition: typical species and sub-communities</u> – 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><u>Vegetation structure: negative indicator species</u> - Negative indicator species (including non-native species) to represent less than 5% cover.</p>	
Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes) [2120]	Supply of wind-blown sand.	<p>Restore favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Habitat Area</u> - The permanent habitat area is stable or increasing, subject to natural processes, including erosion and succession. North Bull - 2.20ha; South Bull - 0.97ha.</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, or where necessary restore, 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 dune grasses</u> - 95% of marram grass (<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><u>Vegetation composition: typical species and sub-communities</u> – Maintain the presence of species-poor communities dominated by marram grass (<i>Ammophila arenaria</i>) and/or lyme-grass (<i>Leymus arenarius</i>).</p> <p><u>Vegetation structure: negative indicator species</u> - Negative indicator species (including non-native species) to represent less than 5% cover.</p>		
Fixed coastal dunes with herbaceous vegetation (grey	Low wind, weakly saline conditions in shelter of <i>Ammophila arenaria</i> dunes.	<p>Restore favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Habitat Area</u> - The permanent habitat area is stable or increasing, subject to natural processes, including</p>		

CONSERVATION OBJECTIVES

	dunes) [2130]	Grazing.	<p>erosion and succession. For sub-sites mapped: North Bull - 40.29ha; South Bull - 64.56ha.</p> <p>Habitat Distribution – No decline or change in habitat distribution, subject to natural processes.</p> <p>Physical structure: functionality and sediment supply – Maintain, or where necessary restore, 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 structure: sward height – Maintain structural variation within sward.</p> <p>Vegetation composition: typical species and sub-communities – Maintain range of sub-communities with typical species listed in Delaney et al. (2013).</p> <p>Vegetation structure: negative indicator species (including <i>Hippophae rhamnoides</i>) - Negative indicator species (including non-native species) to represent less than 5% cover.</p> <p>Vegetation composition: scrub/trees – No more than 5% cover or under control.</p>	
	Humid dune slacks [2190]	High water maintained by groundwater and impermeable soils. Grazing. Salinity.	<p>Restore favourable conservation condition, defined by the following attributes and targets:</p> <p>Habitat Area - The permanent habitat area is stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: North Bull – 2.96ha; South Bull – 9.15ha.</p> <p>Habitat Distribution – No decline or change in habitat distribution, subject to natural processes.</p> <p>Physical structure: functionality and sediment supply – Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions.</p> <p>Physical structure: flooding regime – Maintain natural hydrological regime.</p> <p>Vegetation structure: zonation - Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.</p> <p>Vegetation structure: bare ground - Bare ground should not exceed 5% of dune slack habitat, with the exception of pioneer slacks which can have up to 20% bare ground.</p>	

CONSERVATION OBJECTIVES

			<p><u>Vegetation structure: vegetation height</u> – Maintain structural variation within sward.</p> <p><u>Vegetation composition: typical species and sub-communities</u> – Maintain range of sub-communities with typical species listed in Delaney et al. (2013).</p> <p><u>Vegetation composition: cover of <i>Salix repens</i></u> – Maintain less than 40% cover of creeping willow (<i>Salix repens</i>).</p> <p><u>Vegetation structure: negative indicator species</u> – Negative indicator species (including non-native species) to represent less than 5% cover.</p> <p><u>Vegetation composition: scrub/trees</u> – No more than 5% cover or under control.</p>	
	<p><i>Petalophyllum ralfsii</i> (Petalwort) [1395]</p>	<p>Lime-rich sandy habitat. Overgrazing. Fluctuating water table for damp conditions.</p>	<p>Restore favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Distribution of populations</u> – No decline.</p> <p><u>Population size</u> – No decline. Population at Bull Island estimated at a maximum of 5,824 thalli. Actual population is more likely to be 5% of this, or c. 300 thalli.</p> <p><u>Area of suitable habitat</u> – No decline. Area of suitable habitat at Bull Island is estimated at c. 0.04ha.</p> <p><u>Hydrological conditions: soil moisture</u> – Maintain hydrological conditions so that substrate is kept moist and damp throughout the year, but not subject to prolonged inundation by flooding in winter.</p> <p><u>Vegetation structure: height and cover</u> – Maintain open, low vegetation with a high percentage of bryophytes (small acrocarps and liverwort turf) and bare ground.</p>	
<p>South Dublin Bay and River Tolka Estuary SPA (004024)</p>	<p>Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046]</p>	<p>Food availability (intertidal aquatic vegetation/ pasture/ crops). Undisturbed coastal roosting sites close to feeding sites. Grazing.</p>	<p>Maintain 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 light-bellied brent goose, other than that occurring from natural patterns of variation.</p>	<p>-</p>
	<p>Oystercatcher (<i>Haematopus ostralegus</i>) [A130]</p>	<p>Food availability (intertidal fauna/pasture). Flooding regime of coastal grasslands. Undisturbed coastal roosting</p>	<p>Maintain favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Population trend</u> – Long-term population trend stable or increasing.</p>	

CONSERVATION OBJECTIVES

		sites close to feeding areas	<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.	
	Ringed Plover (<i>Charadrius hiaticula</i>) [A137]			
	Grey Plover (<i>Pluvialis squatarola</i>) [A141]		<u>Maintain</u> 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 Grey Plover, other than that occurring from natural patterns of variation.	
	Knot (<i>Calidris canutus</i>) [A143]		<u>Maintain</u> 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.	
	Sanderling (<i>Calidris alba</i>) [A144]		<u>Maintain</u> 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.	
	Dunlin (<i>Calidris alpina</i>) [A149]		<u>Maintain</u> 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 Dunlin, other than that occurring from natural patterns of variation.	
	Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157]		<u>Maintain</u> 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	

CONSERVATION OBJECTIVES

			Bar-tailed Godwit, other than that occurring from natural patterns of variation.	
	Redshank (<i>Tringa totanus</i>) [A162]		<p>Maintain 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>	
	Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179]		<p>Maintain 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-headed Gull, other than that occurring from natural patterns of variation.</p>	
	Roseate Tern (<i>Sterna dougallii</i>) [A192]	Sea level. Natural/artificial nest site availability. Undisturbed breeding sites. Regularity of extreme weather events. Marine prey availability (sand eel). Predation	<p>Maintain favourable conservation condition, defined by the following attributes and targets:</p> <p>Passage population: individuals – No significant decline.</p> <p>Distribution: roosting areas – No significant decline.</p> <p>Prey biomass available – No significant decline.</p> <p>Barriers to connectivity – No significant increase.</p> <p>Disturbance at roosting site - Human activities should occur at levels that do not adversely affect the numbers of roseate tern among the post-breeding aggregation of terns.</p>	
	Common Tern (<i>Sterna hirundo</i>) [A192]	Sea level. Natural/artificial nest site availability. Undisturbed breeding sites. Regularity of extreme weather events. Marine prey availability (sand eel).	<p>Maintain favourable conservation condition, defined by the following attributes and targets:</p> <p>Breeding population abundance: apparently occupied nests (AONs) – No significant decline.</p> <p>Productivity rate: fledged young per breeding pair – No significant decline.</p> <p>Passage population: individuals – No significant decline.</p> <p>Distribution: breeding colonies – No significant decline.</p>	

CONSERVATION OBJECTIVES

			<p><u>Distribution: roosting areas</u> – No significant decline.</p> <p><u>Prey biomass available</u> – No significant decline.</p> <p><u>Barriers to connectivity</u> – No significant increase.</p> <p><u>Disturbance at breeding site</u> - Human activities should occur at levels that do not adversely affect the breeding common tern population.</p> <p><u>Disturbance at roosting site</u> - Human activities should occur at levels that do not adversely affect the numbers of common tern among the post-breeding aggregation of terns.</p>	
	Arctic Tern (<i>Sterna paradisaea</i>) [A194]	Sea level. Natural/artificial nest site availability. Undisturbed breeding sites. Regularity of extreme weather events. Marine prey availability (sand eel). Predation.	<p>Maintain favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Passage population: individuals</u> – No significant decline.</p> <p><u>Distribution: roosting areas</u> – No significant decline.</p> <p><u>Prey biomass available</u> – No significant decline.</p> <p><u>Barriers to connectivity</u> – No significant increase.</p> <p><u>Disturbance at roosting site</u> - Human activities should occur at levels that do not adversely affect the numbers of arctic tern among the post-breeding aggregation of terns.</p>	
	Wetland and Waterbirds [A999]	-	<p>Maintain favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Habitat Area</u> - The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 2,192 hectares, other than that occurring from natural patterns of variation.</p>	
South Dublin Bay SAC (000210)	Mudflats and sandflats not covered by seawater at low tide [1140]	Silt deposits in sheltered estuaries.	<p>Maintain favourable conservation condition, defined by the following attributes and targets:</p> <p><u>Habitat Area</u> - The permanent habitat area is stable or increasing, subject to natural processes.</p> <p><u>Community Extent</u> - Maintain the extent of the <i>Zostera</i>-dominated community, subject to natural processes.</p> <p><u>Community Structure: Zostera density</u> - Conserve the high quality of the <i>Zostera</i>-dominated community, subject to natural processes.</p>	

CONSERVATION OBJECTIVES

			Community Distribution - Conserve the following community type in a natural condition: Fine sands with <i>Angulus tenuis</i> community complex.	
Rye Water Valley/Cartoon SAC (001398)	Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]	Calcium-rich, nutrient-poor groundwater/surface water supply.	Maintain/Restore favourable conservation condition, defined by the following attributes and targets: Range – The natural range of the habitat, and the area it covers within that range, are stable or increasing. Structure and functions – The specific structure and functions which are necessary for the long-term maintenance of the habitat exist and are likely to continue to exist for the foreseeable future. Typical species – The conservation status of typical species is favourable.	
	<i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014]	Stable wetland water table. Emergent vegetation. Groundwater supply. Lime-rich conditions.	Maintain/restore favourable conservation condition, defined by the following attributes and targets: Population trend – 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.	
	<i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]	Stable wetland water table. Emergent vegetation. Groundwater supply. Lime-rich conditions.	Range – The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future. Habitat – There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.	
Pollardstown Fen SAC (000396)	Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> [7210]		Maintain/Restore favourable conservation condition, defined by the following attributes and targets: Range – The natural range of the habitat, and the area it covers within that range, are stable or increasing. Structure and functions – The specific structure and functions which are necessary for the long-term maintenance of the habitat exist and are likely to continue to exist for the foreseeable future.	
	Petrifying springs with tufa formation (<i>Cratoneurion</i>) [7220]	Calcium-rich, nutrient-poor groundwater/surface water supply.	Typical species –	

CONSERVATION OBJECTIVES

	Alkaline fens [7230]	High water table. Ground/surface water supply. Calcium-rich, nutrient-rich conditions	The conservation status of typical species is favourable.	
	<i>Vertigo geyeri</i> (Geyer's Whorl Snail) [1013]	Stable wetland water table. Emergent vegetation. Groundwater supply. Lime-rich conditions.	Maintain/restore favourable conservation condition, defined by the following attributes and targets: Population trend – 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. Range – The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future. Habitat – There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.	
	<i>Vertigo angustior</i> (Narrow-mouthed Whorl Snail) [1014]	Stable wetland water table. Emergent vegetation. Groundwater supply. Lime-rich conditions.		
	<i>Vertigo moulinsiana</i> (Desmoulin's Whorl Snail) [1016]	Stable wetland water table. Emergent vegetation. Groundwater supply. Lime-rich conditions.		
Baldoyle Bay SAC (000199)	Mudflats and sandflats not covered by seawater at low tide [1140]	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: Fine sand dominated by <i>Angulus tenuis</i> community complex; and Estuarine sandy mud with <i>Pygospio elegans</i> and <i>Tubificoides benedii</i> community complex.	
	Salicornia and other annuals colonising mud and sand [1310]	Salicornia and other annuals colonizing mud and sand	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, including erosion and succession. For sub-site mapped: Baldoyle-0.383ha. Habitat Distribution – No decline or change in habitat distribution, subject to natural processes. Physical structure: sediment supply – Maintain the natural circulation of sediment 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,	

CONSERVATION OBJECTIVES

			<p>subject to natural processes including erosion and succession.</p> <p>Vegetation structure: vegetation height – Maintain structural variation within sward.</p> <p>Vegetation structure: vegetation cover – Maintain more than 90% of area outside of creeks vegetated.</p> <p>Vegetation composition: typical species and sub-communities - Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009).</p> <p>Vegetation structure: negative indicators species - <i>Spartina anglica</i> - No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1%.</p>	
	<p>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) [1330]</p>	<p>Frequency of tidal submergence.</p>	<p>Maintain favourable conservation condition, defined by the following attributes and targets:</p> <p>Habitat Area - The permanent habitat area is stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: Baldoyle-11.98ha.</p> <p>Habitat Distribution – No decline or change in habitat distribution, subject to natural processes.</p> <p>Physical structure: sediment supply – Maintain the natural circulation of sediment and organic matter, without any physical obstructions.</p> <p>Physical structure: creeks and pans - Maintain creek and pan structure, subject to natural processes, including erosion and succession.</p> <p>Physical structure: flooding regime – Maintain natural tidal regime.</p> <p>Vegetation structure: zonation - Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.</p> <p>Vegetation structure: vegetation height – Maintain structural variation within sward.</p> <p>Vegetation structure: vegetation cover – Maintain more than 90% of area outside of creeks vegetated.</p> <p>Vegetation composition: typical species and sub-communities - Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009).</p> <p>Vegetation structure: negative indicator species - <i>Spartina anglica</i> - No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1%.</p>	

CONSERVATION OBJECTIVES

	Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]	Frequency of tidal submergence.	<p>Maintain favourable conservation condition, defined by the following attributes and targets:</p> <p>Habitat Area - The permanent habitat area is stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: Baldoyle-2.64ha.</p> <p>Habitat Distribution – No decline or change in habitat distribution, subject to natural processes.</p> <p>Physical structure: sediment supply – Maintain the natural circulation of sediment and organic matter, without any physical obstructions.</p> <p>Physical structure: creeks and pans - Maintain creek and pan structure, subject to natural processes, including erosion and succession.</p> <p>Physical structure: flooding regime – Maintain natural tidal regime.</p> <p>Vegetation structure: zonation - Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.</p> <p>Vegetation structure: vegetation height – Maintain structural variation within sward.</p> <p>Vegetation structure: vegetation cover – Maintain more than 90% of area outside of creeks vegetated.</p> <p>Vegetation composition: typical species and sub-communities - Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009).</p>	
Baldoyle Bay SPA (004016)	Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046]	Food availability (intertidal aquatic vegetation/ pasture/ crops). Undisturbed coastal roosting sites close to feeding sites. Grazing.	<p>Maintain 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 light-bellied brent goose, other than that occurring from natural patterns of variation.</p>	
	Shelduck (Tadorna tadorna) [A048]	Food availability (intertidal flora and fauna/pasture/cereal). Undisturbed coastal roosting sites close to feeding sites.	<p>Maintain 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 Shelduck, other than that occurring from natural patterns of variation.</p>	

CONSERVATION OBJECTIVES

	Ringed Plover (<i>Charadrius hiaticula</i>) [A137]	Food availability (intertidal fauna/pasture). Flooding regime of coastal grasslands. Undisturbed coastal roosting sites close to feeding areas.	<p>Maintain 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 Ringed Plover, other than that occurring from natural patterns of variation.</p>	
	Golden Plover (<i>Pluvialis apricaria</i>) [A140]	Food availability (intertidal fauna/pasture). Flooding regime of coastal grasslands. Undisturbed coastal roosting sites close to feeding areas.	<p>Maintain 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 Golden Plover, other than that occurring from natural patterns of variation.</p>	
	Grey Plover (<i>Pluvialis squatarola</i>) [A141]		<p>Maintain 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 Grey Plover, other than that occurring from natural patterns of variation.</p>	
	Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157]		<p>Maintain 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 Bar-tailed Godwit, other than that occurring from natural patterns of variation.</p>	
	Wetland and Waterbirds [A999]	-	<p>Maintain favourable conservation condition, defined by the following attributes and targets:</p> <p>Habitat Area – The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 263 hectares, other than that occurring from natural patterns of variation.</p>	
Dalkey Islands SPA (004172)	<p>Roseate Tern (<i>Sterna dougallii</i>) [A192]</p> <p>Common Tern (<i>Sterna hirundo</i>) [A192]</p> <p>Arctic Tern (<i>Sterna paradisaea</i>) [A194]</p>	<p>Sea level. Natural/artificial nest site availability.</p> <p>Undisturbed breeding sites.</p> <p>Regularity of extreme weather events. Marine prey availability (sand eel).</p> <p>Predation.</p>	<p>Maintain 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 Bar-tailed Godwit, other than that occurring from natural patterns of variation.</p>	

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.cfram.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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