The National Arterial Drainage Maintenance List of Activities 2016-2021

Volume I- Final Non-Technical Summary

February 2017

Office of Public Work

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Revision History

Revision Ref / Date Issued	Amendments	Issued to
Version 1.0/October 2016		Nathy Gilligan, OPW
Version 2.0/ December 2016	Inclusion of archaeology and cultural heritage sections. Updates following client review.	Nathy Gilligan, OPW
Version 3.0/ February 2017	Final Amendments	Nathy Gilligan, OPW

Contract

This report describes work commissioned by The Office of Public Works, by a letter dated (27/01/2016). The Office of Public Works' representative for the contract was Nathy Gilligan. Tom Sampson, Declan Egan and Catalina Herrera of JBA Consulting carried out this work.

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Purpose

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Abbreviations

AA	Appropriate Assessment
ACA	Architectural Conservation Area
AEP	Annual Exceedance Probability
AFA	Area for Further Assessment
BCR	Benefit - Cost Ratio
CEMP	Construction Environment Management Plan
CFRAM	Catchment-Based Flood Risk Assessment and Management
DAHRRGA	Department of Arts, Heritage, Regional, Rural, and Gaeltact Affairs
DECLG	Department of Environment, Community and Local Government
DHPLG	Department of Housing, Planning and Local Government (Formerly DECLG)
EEA	European Environment Agency
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
ESB	Electricity Supply Board
EU	European Union
FRMP	Flood Risk Management Plan
GSI	Geological Survey Ireland
IFA	Irish Farmers Association
IFI	Inland Fisheries Ireland
INFF	Irish National Flood Forum

IPCC	Intergovernmental Panel on Climate Change
IROPI	Imperative Reasons of Overriding Public Interest
LAP	Local Area Plan
LULC	Land Use and Land Cover
MCA	Multi-Criteria Analysis
NCCAF	National Climate Change Adaptation Framework
NFM	Natural Flood Management
NHA	Natural Heritage Area
NI	Northern Ireland
NIAH	National Inventory of Architectural Heritage
NMI	National Museum of Ireland
NMS	National Monuments Service
NIG	National Implementation Group
NPWS	National Parks and Wildlife Service
OPW	Office of Public Works
PCD	Public Consultation day
PFRA	Preliminary Flood Risk Assessment
RBD	River Basin District
RBMP	River Basin Management Plan
RPG	Regional Planning Group
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment
SI	Statutory Instrument
SMR	Sites and Monuments Records
SPA	Special Protection Area
SUDS	Sustainable Urban Drainage System
UoM	Unit of Management
WFD	Water Framework Directive
WMU	Water Management Unit
WTW	Water Treatment Works
WWTW	Waste Water Treatment Works
ZAP	Zones of Archaeological Potential

1 Introduction

The OPW is the body which exercises the statutory responsibility in respect with river drainage and flood relief works in Ireland. The Arterial Drainage Act, 1945 empowered the OPW to undertake and maintain arterial drainage around the country. To ensure the effectiveness of the drainage schemes the OPW prepares a 6-year maintenance plan for the schemes. The current programme is the National Arterial Drainage Maintenance Activities (2016-2021). The Flood Relief Schemes maintained by the County Councils are not covered by the OPW Arterial Drainage Maintenance Activities (2016-2021).

This is the Environmental Report for the Strategic Environmental Assessment (SEA) of the National Arterial Drainage Maintenance Activities (2016-2021). This report identifies the significant environmental effects of the proposed maintenance activities on the environment and where significant impacts have been identified, the report outlines appropriate mitigation measures to reduce those potential impacts.

The SEA process for the National Arterial Drainage Maintenance Activities (2016-2021) is being conducted in compliance with national legislation and guidelines to ensure an environmentally sound and transparent assessment.

The Environmental Report was conducted and prepared by JBA Consultants Ltd. Grove Island, Corbally, Co. Limerick. JBA Consultants Ltd will be referred to hereafter as JBA in this report.

1.1 SEA Environmental Report Outline

Volume I- Non-Technical Summary (NTS)

Volume II-Environmental Report

Volume III-Natural Impact Statement

Volume IV- Appendices

1.2 Non-Technical Summary Outline

This non-technical summary is divided into Sections which correspond to Volume II Environmental Report -Strategic Environmental Assessment (SEA), as follows:

Section A: Chapters 1-5 summarises in a non-technical language the following:

1. Introduction
2. Legislative Context
3. SEA Process
4. Relationship with other plans and policies
5. National Arterial Drainage Maintenance Activities (2016-2021) Programme

Section B: Chapter 6 summarises in a non-technical language the findings of baseline assessments (existing environment) and potential threats and opportunities on the following elements of the environment:

6. Baseline Environment
   - 6.1. Human Beings
   - 6.2 Water
   - 6.3 Morphology, geomorphology, and hydrogeomorphology
   - 6.4 Geology and Soils
   - 6.5 Land-use and Land-cover
   - 6.6 Flora and Fauna
   - 6.7 Cultural Heritage
   - 6.8 Climate Change

Section C: Summarises in a non-technical language the following:

7. Evaluation of the Impacts of the Impacts of the Proposed Arterial Drainage Maintenance Activities (2016-2021)
8. Recommended Mitigation Measure
9. Monitoring Measure
10. Alternative
11. Appropriate Assessment (AA)
12. Conclusion

2 Strategic Environmental Assessment

2.1 Introduction to the SEA Process

The SEA is an integral part of the development of any large scale plan, programme, or strategy. The legislative requirement for a SEA.

The overall aim of the SEA Directive is to:

'provide for a high level of protection of the environment and to contribute to the integration of environmental consideration into the preparation and adoption of plans and programmes with to promote sustainable development'.

SEA is a formal, systematic method which is used to consider the likely effects of implementing a plan or programme on the environment before a decision is made to adopt it. It also ensures environmental considerations are addressed as early as possible and in balance with technical and economic factors. The process also requires the delivery of multiple objectives. A monitoring programme will be initiated when the National Arterial Drainage Maintenance Activities (2016-2021) are adapted by the OPW.

2.2 SEA Process

The SEA will identify significant environmental effects created as a result of implementing the National Arterial Drainage Maintenance Activities (2016-2021) on issues such as biodiversity, water, human landscape, soils and geology, archaeology and cultural heritage and the interaction of the foregoing.

In the context of preparing a SEA for the National Arterial Drainage Maintenance Activities (2016-2021), the following stages were undertaken:

- Screening: to determine the requirement for a SEA for the National Arterial Drainage Maintenance Activities (2016-2021).
- Scoping: to liaise with Statutory Consultees to identify key issues of concern that should be addressed in the Strategic Environmental Report.
- Assessment and Evaluation: the identification, prediction, evaluation of the impact of the National Arterial Drainage Maintenance Activities (2016-2021).
- Consultations: Consultations with the Statutory Bodies, stakeholders and the public on the proposed National Arterial Drainage Maintenance Activities (2016-2021).
- Revisions and Amendments to the Strategic Environmental Report: Based on the comments received, they may influence the programme and consequently the Strategic Environmental Report.
- Post Adoption: Preparation of the SEA Statement and subsequent monitoring of the Programme during its implementation.

An initial set of Environmental Objective and Targets were established as part of the Scoping exercise. This list was reviewed to determine if the targets and indicators could be used as part of the options assessment process. Furthermore, the targets and indicators were assessed to determine if they would provide sufficient robust evidence in the future to determine the success or otherwise of the SEA for the National Arterial Drainage Maintenance Activities (2016-2021).

The environmental objectives were assessed against the environmental, social, technical, and economic objectives. This process is called the Multi-Criteria Analysis (MCA).

The SEA Team used various databases to define environmental receptors nationwide. There was a catchment-wide assessment undertaken for the ecology, water, and land-use receptors.

The potential environmental impacts of the measures of the National Arterial Drainage Maintenance Programme were characterised in terms of:

- Significance
- Duration of impact
- Extent of the impacts

2.3 Stakeholder and Public Involvement

In accordance with the Aarhus Convention, the public and other interested stakeholders were involved in the decision making for the National Arterial Drainage Maintenance Activities (2016-2021).

2.3.1 Project Website

The OPW publish details of Arterial Drainage Maintenance on their website. The SEA scoping report for the OPW Arterial Drainage Maintenance Activities (2016-2021) has been uploaded to this site (http://www.opw.ie/en/floodriskmanagement/operations/environmentalactivities/). To date there has been one document specific to this SEA uploaded and made available on the website:

- National Arterial Drainage Maintenance Activities 2016-2021. Strategic Environmental Assessment (SEA) Scoping Report.

All three volumes of this Environmental Report will be made available on the same website.

2.3.1.1 Formal Consultation

The SEA scoping phase first formal consultation on the draft National Arterial Drainage Maintenance Activities (2016-2021) SEA Scoping Report took place from 17th June 2016 until July 17th 2016.

The Scoping report was sent to statutory and non-statutory stakeholders, as well as, publicised on the OPW project website (mentioned above).

2.3.2 Statutory Consultees

The SEA Scoping Report was issued to primary and secondary stakeholders and environmental authorities on June 17, 2016.

The Environmental Protection Agency (EPA), National Parks and Wildlife Services (NPWS), and Inland Fisheries Ireland (IFI), all provided comments which were recorded and acknowledge were appropriate changes were made.

There was one SEA stakeholder meeting held during the SEA Scoping Stage:

- SEA-Stakeholder Meeting 1 (June 30, 2016)- OPW and EPA Attendees.

2.3.3 Non-Statutory Consultees and Stakeholders

Through the Arterial Drainage Maintenance Activities (2016-2021) SEA process and formal consultation feedback was received from local authorities, regional, and national organisations such as the ICMSA (Irish Creamery Milk Suppliers Association): The Family Farm Organisation and TII (Transport Infrastructure Ireland). All comments and suggestions provide were recorded and acknowledged, where appropriate changes were made. All reports have been issued to the OPW, statutory, and non-statutory.

3 Legislative Context

3.1 Arterial Drainage Legislative Background

Drainage Acts have been passed in this country for the past two centuries in the following years: 1842, 1867,1925,1928, 1945, and 1995.

The Arterial Drainage Act, 1945 was based on the Browne Commission Report (Report of the Drainage Commission 1938-1940), which assessed flooding in Ireland and improvements of land through the use of drainage. The legislation has been operated by the OPW over the last 50 years and it has empowered the OPW to undertake catchment-wide Arterial Drainage Schemes for *"any catchment area for the purpose of preventing or substantially reducing the periodical flooding of land in the area or improving by drainage lands in the said area"* (OPW, 2011). The main focus of the Arterial Drainage Act, 1945 was the improvement of agricultural land.

Following severe flooding in the 1980s and 1990s, the act was amended in 1995 in order to change the focus of flood management towards protection of urban areas with high risk of flooding. This amendment gave the OPW the power to carry out localised flood relief schemes to eliminate the risk of flooding in urban areas.

3.1.1 OPW's Role and Responsibility in Arterial Drainage Maintenance

Under Section 37 of the Arterial Drainage Act 1945, the OPW is statutorily obliged to maintain all channels, embankment and structures on which it has executed works since the 1945 Act in "proper repair and effective condition" (OPW, 2011).

Maintenance referred to under the Arterial Drainage Act 1945 includes:

1. The maintenance of river channels in a condition that ensures they are free-flowing thus reducing flood risk and providing adequate outfall for land drainage.
2. The maintenance of river and coastal embankments, in a condition that protects benefitting land, to the extent defined in the Scheme, from risk of flooding.
3. The maintenance, repair, and/or replacement of all structures forming part of a Scheme, including accommodation bridges, weirs, sluice barrages, sluices, pumping stations, grids, sand traps and tidal flap gates.

Failure to comply with these obligations would be contrary to the Arterial Drainage Act and could lead to a "writ of mandamus" or an award of compensation arising from claims for damage to the benefiting lands. All of the completed Arterial Drainage and Estuarine Embankment Schemes are now maintained under the statutory obligation (OPW, 2011).

3.2 Interaction with other programmes, policies and plans

There are a number of linkages between the National Arterial Drainage Maintenance Activities (2016-2021) and a number of other legislation, plans, and strategies. All of these document will support each other and provide a number of mutual benefits.

Spatial plans are a key plan type for consideration during the process as an understanding of the potential future land-use changes, over the short to medium term, will be based on published statutory and non-statutory spatial planning documents. An understanding of this is also important to enable future revisions of these plans to positively address issues identified in the National Arterial Drainage Maintenance Activities which provides opportunity to inform future development proposals.

As part of the SEA process, the relationship of the National Arterial Drainage Maintenance Activities operations with regard to other plans and programmes have been considered and reviewed for this study. Table 3-1 the legislation, policies, and plans/programmes adopted at the European Union (EU), National or Regional level, which could influence the National Arterial Drainage Maintenance Activities, further details are provided in Appendix A.

Spatial plans are a key plan type for consideration during the process as an understanding of the potential future land-use changes, over the short to medium term, will be based on published statutory and non-statutory spatial planning documents. An understanding of this is also important to enable future revisions of these plans to positively address issues identified in the National Arterial Drainage Maintenance Activities which provides opportunity to inform future development proposals.

Table 3-1. Legislation, policies, and plans/programmes adopted at the European Union, National or Regional level

Level	Plans, Policies and Programmes Reviewed
International	EU Drinking Water Directives
	EU Common Agricultural Policy
	EU Strategic Environmental Assessment (SEA)
	Bathing Water Directive (2006/7/EC)
	EU Bird Directive (2009/147/EC)
	EU Biodiversity Action Plan – Halting the loss of Biodiversity by 2010.
	The Habitats Directive (Council Directive 92/43/EEC)
	EU Water Framework Directive
	The Clean Air for Europe (CAFÉ) Directive
	EU Flood's Directive 2007 - Directive 2007/60/EC on the assessment and management of flood risks, 2007
	The Fourth Daughter Directive (2004/107/EC)
	EU Regulation 1143/2014 on Invasive Alien Species
	EU Directive on Environmental Impact Assessment (1989/227) EU Directive on Environmental Impact Assessment 2014/52/EU
Transboundary	CFRAM Draft Flood Risk Management Plans
	Draft 2cd-Cycle River Basin Management plants
National Legislation	Arterial Drainage Act 1945 and Amendment Act 1995 Acts empowering the OPW to implement and maintain Arterial Drainage Schemes (1945) and Flood Relief Schemes (1995)
	Coastal Protection Act, 1963
	S.I. No. 122 and S.I. No. 495 of 2010 and 2015 Transposing Instruments for the EU 'Floods Directive -European Communities (Assessment and Management of Flood Risk
	S.I. No. 465 and S.I. No. 201 of 2004 and 2014 Transposing instruments for the EU Strategic Environmental Assessment Directive -European Communities (Environmental Assessment of Certain Plans and Programmes) (Amendment) Regulations 2004 & 2011
	S.I. No. 477 of 2011 Transposing Instruments for the EU Habitats Directive -European Communities (Birds and Natural Habitats) Regulations 2011
	Planning and Development Act, 2000 (S.I. No.30 of 2000) and associated regulations Principal Planning Act (and Amendments) -Planning and Development regulations 2001 to 2015
	Climate Action and Low Carbon Development Act 2015
	S.4 6 [No. 2.] [2012.] Water Services (Amendment) Act 2012
	Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007)
	Architectural Heritage (National Heritage) and Historic Monuments (Miscellaneous Provisions) Act 1999
	National Monuments Acts 1930-2004 amendments
National Policy /Plans	National Peatlands Strategy 2015 (DAHG)
	National Planning Framework (under preparation)
	National Spatial Strategy (NSS) 2002 – 2020
	National Development Plan 2007 – 2013: Transforming Ireland
	Strategy for Renewable Energy: 2012 – 2020
	A Framework for Sustainable Development for Ireland (Public Consultation Draft, 2011)
	Actions for Biodiversity 2011-2016. Ireland's 2nd National Biodiversity Plan

Level	Plans, Policies and Programmes Reviewed
	Ireland National Climate Change Strategy 2007 - 2012
	Ireland Rural Development Programme 2007-2013
	Rural Environmental Protection Scheme (REPS)
	GRID25: A Strategy for the Development of Ireland's Electricity Grid for a Sustainable and Competitive Future
	FoodWise 2025: A vision for Irish Agri-food and fisheries
	Tourism Product Development Strategy, 2007 – 2013
	National (Climate) Mitigation Plan (In preparation /SEA underway)
	Sectoral Climate Adaptation Plans (In preparation)
	National Species Action Plans (SAPs) (for relevant species)
	Draft Plan for Forestry and Freshwater Pearl Mussel in Ireland
	SAC Raised Bog Conservation Management Plan (SAC Blanket Bog Conservation Management Plan also to commence preparation).
	National Report for Ireland on Eel Stock Recovery Plan (2008)
	National Heritage Plan (2002)
	Conserving Ireland's Maritime Heritage, 2006
	OPW Minor Flood Mitigation Works Programme
	Second Nitrates Action Programme 2010-2013
	National Renewable Energy Action Plan to 2020
	Delivering a Sustainable Energy Future for Ireland
	The National Bioenergy Action Plan
	The National Energy Efficiency Action Plan
	Smarter Travel - A Sustainable Transport Future.
	The Forest, products, and people, Ireland Forest Policy Review
	Ireland Prioritised Action Framework (PAF) for Natura 2000
	Food Wise 2025 and the associated Implementation Plan (DAFM)
	National Rural Development Programme 2014-2020 (DAFM)
	National Climate Change Mitigation Plan
	2015 Climate Action and Low Carbon Development Act
	National Strategic Aquaculture Plan (DAFM)
	National Forestry Programme (DAFM)
	National Forest Policy Review (DAFM)
	Capital Investment Programme (Irish Water)
	Water Services Strategic Plan
	National Wastewater Sludge Management Plan
	Waste Water Sludge Management Plan (Irish Water)
	Offshore Renewable Energy Development Plan (DCENR) (Onshore infrastructure)
	Draft BioEnergy Plan (DCENR)
	The NRA Design Manual for Roads and Bridges (DMRB)
	The NRA Manual of Contract Documents for Road Works (MCDRW)
	Code of Practice: various semi-state bodies have enacted COP specifically for Archaeology, including: Coillte, NRA, Railway Procurement, Iarnrod Éireann; Bord na Mona; Irish Concrete Federation; ESB Networks; EirGrid; Bord Gais Éireann.
Regional/Sub-Regional	The National Forestry Programme 2014-2020
	Regional Waste Management Plan
	Regional Economic and Spatial Strategies (to commence)
	Draft Regional Planning Guidelines for the West Region 2010 – 2022
	The Border Regional Authority: Draft Regional Planning Guidelines (2010-2022)
	Mid-West Regional Planning Guidelines 2010 – 2022

Level	Plans, Policies and Programmes Reviewed
	WFD River Basin Management Planning (Second cycle underway)
	Groundwater Protection Schemes
	Loughs Agency
	Draft Transport Strategy for the Greater Dublin Area 2015-2035 (NTA)
	Dublin Water Supply Project (DCC)
	Strategic Infrastructure Development Proposals
	Draft Transport Strategy for the Greater Dublin Area 2015-2035 (NTA)
	Dublin Water Supply Project (DCC)
	National CFRAM Programme, Flood Risk Management Plans (FRMP)
	Dublin Port Master Plan 2012-2040 (Dublin Port Company)
	Dun Laoghaire Harbour Company Master Plan
	Fisheries Management Plan (IFI)
	Coillte District Strategic Plans
	Sub-regional study for Galway Transportation and Planning (2002)
Local	Environmental River Enhancement Programme
	County Development Plans
	Local Area Plans
	Master Plans and SDZ Plans
	County Biodiversity Action Plans
	Freshwater Pearl Mussel Sub-Basin Management Plans
	Shellfish Water Action Programmes
	County Heritage Plans and Local Heritage Plans
	County Wind and Renewable Energy Strategies

3.2.1 Water Framework Directive and River Basin Management Plans

The requirements of the River Basin Management Plan have been integrated into the draft Arterial Drainage Strategic Environmental Assessment (SEA) through the inclusion of a SEA objective dealing with the Water Framework Directive. The SEA for the Arterial Drainage Maintenance Activities (2016-2021) is cognisant of the requirements of the current River Management Plans and considers the potential implications of the second cycle River Basin Management Plans. Specific environmental objectives have been included in the Arterial Drainage Maintenance Activities (2016-2021) programme objectives and the SEA objectives to ensure that the Arterial Drainage Maintenance Activities (2016-2021) will support achieving the objectives of the various River Basin Management Plans. This can be achieved through the implementation of recommended mitigation measures documented in the Environmental Report. The River Basin Management Plans are currently being revised and they are considered that the National Arterial Drainage Maintenance Activities (2016-2021) should be linked to the requirements of the revised 2nd cycle RBMP and the Programme of Measures that will emerge from the revised RBMP.

3.2.2 Habitats Directive

The National Arterial Drainage Maintenance Activities (2016-2021) recognises the need to protect Special Protection Areas (SPA) and Special Areas of Conservation (SAC). Ireland is largely designated for its biodiversity and it is a requirement to protect and conserve these habitats and the National Arterial Drainage Maintenance Activities (2016-2021) are subject to an Appropriate Assessment. Natural Heritage Areas were also considered during the preparation of the National Arterial Drainage Maintenance Activities (2016-2021). The spread of invasive species can threaten native species and it is important that the control of the spread of invasive species is considered in the Construction Environmental Management Plan for individual projects. The requirements of the Habitats Directive should be aligned to the National Arterial Drainage Maintenance Activities (2016-2021).

4 National Arterial Drainage Maintenance Activities (2016-2021) Programme Description

4.1 Introduction

Where the commissioner of the OPW has completed a drainage scheme under the Arterial Drainage Act, 1945 and 1995, there is statutory requirement to maintain the drainage works forming part of the Scheme. The potential drainage works included in the Arterial Drainage Scheme include but are not limited to: embankment, watercourses, and other structures. Watercourses are subject to siltation and erosion, while embankments are subject to settlement and erosion. The annual maintenance programmes are compiled to maintain the drainage watercourses which are prioritised based on the rate of deterioration and potential risk. Every year approximately one-fifth of all the watercourses are maintained.

4.2 National Arterial Drainage Maintenance Schemes

The OPW is the body that executes the statutory responsibility in respect to river drainage and flood relief works. The scope of the Arterial Drainage Maintenance Activities (2016-2021) covers all of the OPW Schemes carried out under the Arterial Drainage Acts 1945 and 1995 as listed below and displayed in Figure 4-1:

- Major Schemes (river catchments over 100,000 acres in extent),
- Minor Schemes (river catchments 25,000-1000,000 acres),
- Other small Schemes (river catchment less than 25,000 acres,
- Estuarine Embankment Schemes
- Flood Relief Schemes.

The Flood Relief Schemes maintained by the County Councils are not covered by the OPW Arterial Drainage Maintenance Activities (2016-2021).

The OPW is responsible for the maintenance of 11,500 km of channel, 730 km of embankments, some 18,500 bridges and 750 ancillary structures such a sluice gates and pumping stations.

The majority of National Arterial Drainage Maintenance works is on channel maintenance with an average channel requiring maintenance every four to six years. Some channels may require annual maintenance and other only require maintenance once every twenty years.

4.2.1 List of Activities

The National Arterial Drainage Maintenance 2016-2021 activities include:

- Channel Maintenance Activities
- Embankment Maintenance Activities
- Structural Maintenance Activities
- Flood Relief Scheme

4.2.2 Channel Maintenance 2016-2021

Channel Maintenance is required on average every four to six years. Channels with prolific weed growth may require maintenance every year, while channels with self-cleaning characteristics may need only need maintenance every 20-years. The activities involve the following:

- Bank protection
- Bush cutting/branch trimming
- Removal of water-entrained silt and associated vegetation.
- Aquatic Vegetation Cutting

4.2.3 Embankment Activities 2016-2021

The programming of works consists of inspections of sections of embankments known to be at high risk. Repair works consist of topping up clay embankments to design height and structural strengthening by importing rock/soil material or utilising in-situ material.

4.2.4 Structural Maintenance Activities 2016-2021

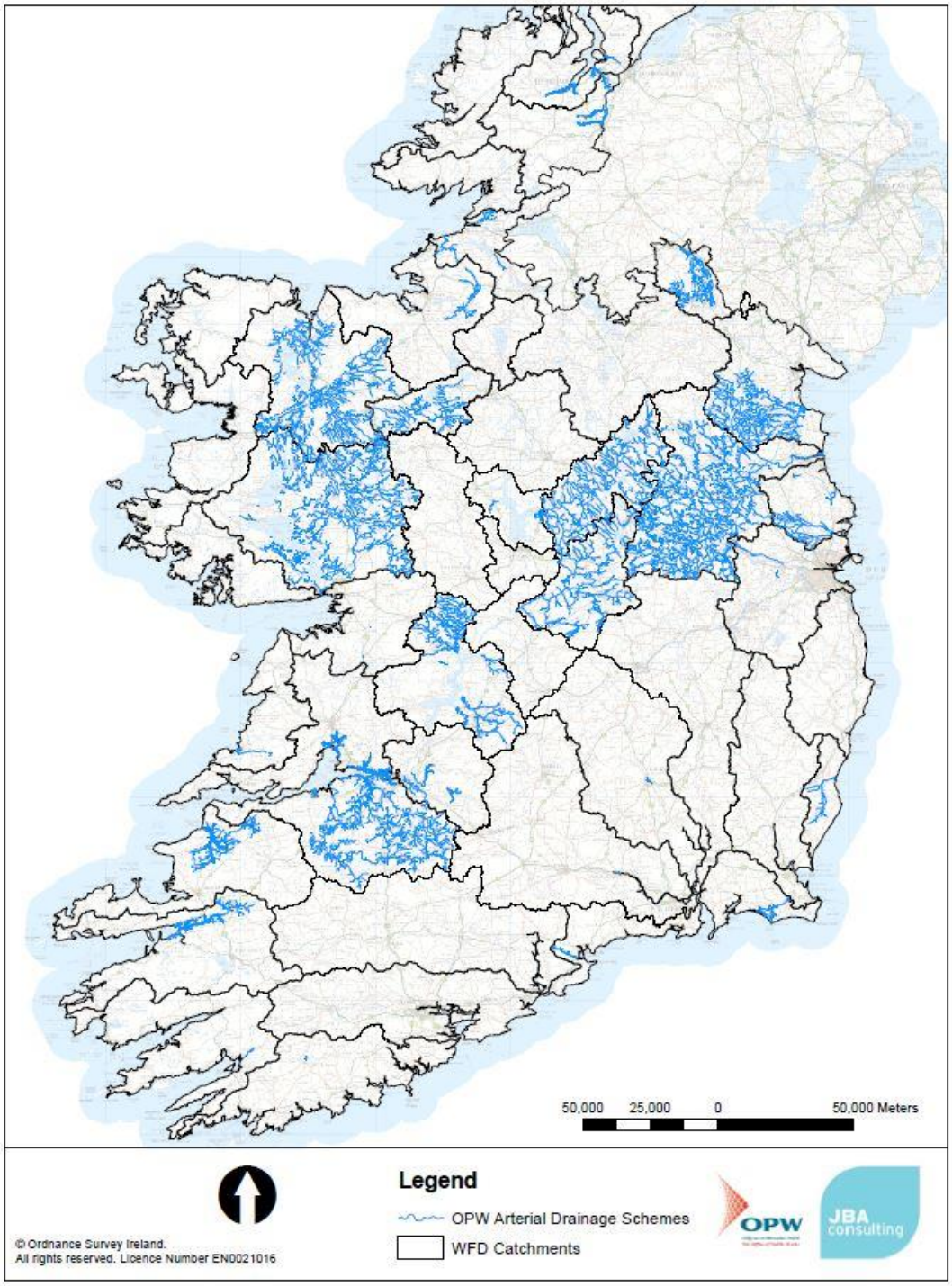
Inspections are carried out to assess necessity of repair or replacement of structures such as bridges, gates, barrages, and pumping stations are also maintained or repaired.

4.2.5 Flood Relied Scheme Maintenance Activities 2016-2021

Activities vary depending on the characterisation of the Scheme, durable structural works may require minimum maintenance, and however other schemes may require continued maintenance. The activities include:

- Periodical silt removal
- Riparian vegetation management
- Maintenance of designed channel capacity

Figure 4-1 Channels maintained by the OPW



4.2.6 Environmental Management and Maintenance Planning

All Maintenance operations are carried out in accordance with OPW's Environmental Management Protocols and Standard Operating Procedures (SOP), the OPW also engages in communication with stakeholders such as National Parks and Wildlife Service (NPWS) and Inland Fisheries Ireland (IFI). The OPW, in partnership with IFI, lead the Environmental River Enhancement Programme (EREP). Finally, all Arterial Drainage Schemes are subject to Appropriate Assessment (AA) of the five-year drainage maintenance programme.

4.2.7 Mitigation and Monitoring

The monitoring of the National Arterial Drainage Maintenance Activities (2016-2021 are made-up of two components:

- On-site implementation of OPWs Environmental Management Protocols and Standard Operating Procedure.

Scientific monitoring programme carried out under EREP, assessing impacts of routine maintenance and capital enhancement projects on the river corridor biodiversity. 2021).

4.2.8 Associated Activities

There are activities carried out by the OPW to enable the maintenance activities described above. These include the clearance of vegetation from maintenance access corridors and such activity has been considered in the SEA Environmental Report and NIR.

5 Baseline Environment

5.1 Human Beings

Human beings are associated with physical resources in the environment. Any potential impact on human beings by the National Arterial Drainage Maintenance Programme (2016-2021) have been thoroughly assessed. The main concerns to humans are in relation to the increase of potential risk of flooding upstream and downstream of the works, adaptation to climate change, potential diffuse pollution or release of suspended solids which may impact water quality (drinking water and/or bathing water) and/recreational activities. Relevant components of this chapter include demographics, housing and development, workforce, flooding, landscape, amenity/recreation, fisheries/angling, and tourism.

This chapter also described potential impacts to high quality environments such as sites along the Wild Atlantic Way and Ireland's Ancient East, therefore any risk of degradation of environment and aesthetics posed by the Arterial Drainage Maintenance Activities (2016-2021) could be a threat to tourism and recreation based economy.

Arterial Drainage Schemes, Land Commission Embankments and Flood Relief Schemes have positive benefits for properties, agricultural lands and other social infrastructure and amenities in benefitting lands. Flood Relief Schemes are usually designed to protect against the 1% Annual Exceedence Probability (AEP) of flooding, with no land drainage function. Arterial Drainage Schemes and Land Commission Embankments protect to a lower standard with their main purpose being land drainage. Maintenance of these schemes is intended to continue these benefits. In addition, where possible some maintenance activities could enhance the landscape character of the river corridors or channels in sections with valuable landscape characteristics, as well as, creates or clears access routes/or paths along the river corridor which can be used for tourism and recreational purposes (angling especially) as experienced in various areas in the Moy.

5.2 Water

Water quality in Ireland faces a major threat from pollution, caused by point sources such as discharges from waste water treatment plants and industry, and diffuse sources such as septic tanks, agriculture and forestry. For the WFD, water quality is measured in ecological status or ecological potential for artificial or heavily modified waterbodies[1]. The ecological status of surface water is based on the assessment of specified biological quality elements, as well as supporting hydromorphological quality elements, chemical (specific pollutants), and physico-chemical elements (EPA, 2015). The preliminary results of the water quality assessment for Ireland for 2013-2015 are presented in the EPA's State of the Environment Report (2016) and report that ecological status has not improved since the first river basin management cycle (EPA, 2016).

To be compliant with the Water Framework Directive maintenance activities must also not result in any deterioration to waterbody status, including hydromorphology. There are many protected species (Freshwater Pearl Mussel, Crayfish, Lamprey, fisheries etc.) that are very sensitive to pollution and could be directly or indirectly impacted by degradation of the ecological status of the watercourses. The OPW Arterial Drainage Schemes (channels, embankments, flood relief schemes) are distributed all throughout Ireland and have the potential to directly or indirectly, impact on surface water and groundwater across the country. Potential threats include:

- Impacts on morphology (e.g. changes in channel profile, straightening, riffle-glide-pool sequences, channel substrate and riparian zone) altering hydromorphological processes (e.g. flow characteristics and sediment transport),
- diffuse and point source pollution,
- potential impacts on drinking water abstraction points downstream of proposed maintenance activity sites,
- channels can act as pathways to pollutants into other watercourse or groundwater/aquifers,
- habitat degradation. and water quality deterioration.

Appropriate mitigation measures could present opportunities to minimise impacts of the National Arterial Drainage Maintenance Activities (2016-2021) and if implemented properly, activities such as silt/vegetation management, bush cutting/branch trimming, aquatic vegetation cutting will help improve the hydraulic connectivity of the channel, preventing some potential impacts. In addition,

[1] None of the Arterial Drainage Scheme or Flood Relief Scheme channels are classified as Heavily Modified Waterbodies.

integrated catchment management could reduce the silt deposition and vegetation growth in channels, which could reduce the frequency and scale of maintenance required.

5.3 Morphology, geomorphology, and hydromorphology

Hydromorphology is the study of a water body's physical characteristics and water content. Good hydromorphological processes such as water/sediment/wood flux, river channel adjustment, lateral connectivity which influence processes (i.e. pools, riffles, bars) and hydromorphological elements such as (water flow and substrate) support aquatic ecosystems.

There are a significant portion of water bodies 'at risk' from hydromorphological pressures in Ireland as identified by the Characterisation and Analysis of Ireland's River Basin Districts (2005) and the EPA's Water Quality Report 2010-2012. The potential threats posed by the National Arterial Drainage Maintenance Activities 2010-2012 could result in the following effects:

- Siltation,
- Disturbance of spawning habitat,
- Changes in water quality,
- Connectivity in flood plains and associated habitats,
- Changes to sediment regime (e.g: shoaling),
- Connectivity to wetland and coastal habitats,
- Alteration of conveyance.

Proposed maintenance activities must be compatible with any with any WFD requirements to restore the natural morphology of 'waterbodies at risk' due to structural alterations. To be compliant with the Water Framework Directive maintenance activities must also not result in any deterioration to waterbody status, including hydromorphology.

Opportunities along river channels for river restoration and ecological enhancement beyond EREP criteria. The REFORM tools and guidance may present opportunities and mechanisms to implement catchment characterisation and restoration whilst maintaining land drainage functions. The REFORM tools have the advantage of allowing catchment processes to be considered in hydromorphological assessments.

5.4 Geology and soils

The underlying bedrock geology varies throughout the country. However, there is a large extent of limestone bedrock covering the north western section of the island. The west and south of Ireland are composed of sandstone, siltstone, and mudstone bedrock. The south east of Ireland is mostly siltstone and mudstone, and a mixture conglomerates, schists, slates, muddy limestone and slates. The east of Ireland contains predominantly limestone, shale, and sandstone. The bedrock in the midlands are made-up of limestone among shale, and mudstone. Lands used predominately for tillage need free-draining soil of the south and east. The best soils for intensive livestock farming are limestone rich soils in lowland areas, which are found in the midlands and the south. The acid and peat soils of the western seaboard are most suitable for extensive hill farming and forestry (Creatmer et al, 2007).

The potential impacts of the National Arterial Drainage Maintenance Activities (2016-2021) on geology and soil are erosion which can influence land-use practices. Inappropriate land management practices, especially on more sensitive soil types could reduce water infiltration into the soil resulting in an increase of surface of surface water runoff. In addition, insensitive removal of vegetation during maintenance could increase the rate of erosion and sediment input to river channels, further increasing the rate of in-channel deposition and need for activity to maintain conveyance.

The introduction of natural flood storage, attenuation and conveyance areas on floodplains including wetlands, should be considered. Depending on the location maintenance activities could be a benefit or detriment to soil conditions.

5.5 Land-use and Land-cover

The Irish Landscape has been shaped by hundreds of years of human intervention and land-use change. The overall area of artificial surfaces remains low in comparison with the rest of Europe and agriculture continues to be the dominant land use in Ireland. The main land cover type in Ireland is agriculture which accounts for two-thirds of the national landmass (CORINE, 2012). The majority

of the agricultural land is permanent grassland pasture, followed by peatlands and wetlands, which cover one-fifth of the country, while forestry covers one-tenth of the country (CORINE, 2012). In spite of increased development in Ireland, the country's landscape is predominately rural and agricultural.

The main land-uses in Ireland include agriculture, peatland, wetland, forestry, and artificial surfaces.

The potential threats to land-use and land-cover depend on the extent and intensity of drainage in both the uplands and lowlands. Inappropriate land management practices can result in reduced water infiltration, increased erosion, modification of channel geomorphology, and discharge of receiving sediments.

The better management of grasslands, semi-natural vegetation, wetlands, and woodlands, can assist in the storage of rapid surface run-off and floodplain flows upstream of flood risk receptors. The potential for maintenance activity to ensure sustainability of land-use through the maintenance of an FRS for sustainability of flood risk and maintenance of channels for agricultural productivity.

5.6 Flora and Fauna

Ireland is committed on in a national and international level to protect biodiversity. It comprises of a variety of terrestrial, wetland, freshwater, estuarine, and coastal habitats that support a range of species. Ireland's wetlands and aquatics systems sustain internationally significant populations of birds, fish, and invertebrates, as well as, supporting seabird breeding colonies, cold-water coral communities, among many other valuable species. National Parks and Wildlife Services (NPWS) estimates that Ireland is home to 28 species of land mammal, over 400 species of birds, more than 4,000 plant species and over 12,000 species of insects (NPWS. 2016).

Ireland is required under the terms of the EU Birds Directive (2009/147/EC) to designate Special Protection Areas (SPAs) for the protection and conservation of endangered species of wild birds. 140 of Ireland's 154 SPA sites have been protected by Statutory Instruments (NPWS, 2016). Special Areas of Conservation (SAC) are main wildlife areas in Ireland, considered to be of significant importance in a National and European Level. The Habitats Directive (Council Directive 92/43/EEC) was adopted in 1992 with the aim of protecting wild fauna and flora, as well as, its habitat. In Ireland, the directive was transposed and amended in 1998 and 2005. The Irish habitats include raised bogs, blanket bogs, turloughs, sand dunes, machair, heaths, lakes, rivers, woodlands, estuaries, and sea inlets. There are 25 Irish species protected, these include Otter, Salmon, Freshwater Pearl Mussel, Bottlenose Dolphin, and Killarney Fern. There are 424 SACs areas around Ireland. SPAs and SACs make-up the Natura 2000 network.

The most basic designation for wildlife is Natural Heritage Area (NHA) given to areas considered important habitats or which hold species of plants and animals whose habitat require protection. Seventy-five75 raised bogs and 73 blanket bogs have received legal protection. In addition, there are approximately 630 Proposed NHAs (pNHAs), which were published on a non-statutory basis in 1995 but have not since statutorily proposed or designated (NPWS, 2016). Prior to designation pNHA receive limited protection. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation.

The Wildlife Act 1976 (as amended 2000) is the principle mechanism for the legislative protection of wildlife in Ireland. It outlines strict protection for species that have significant conservation value. The Act protects species from injury, disturbance and damage to breeding and resting areas. All the species protected under the Act must be subject to material consideration in the planning process. The Flora Protection Order 1999 makes it illegal to cut, uproot, or damage listed plant species in any way.

Unfortunately, Ireland's most important habitats are reported to be in poor or bad conservation status, especially raised and blanket bogs, dune systems, oligotrophic lakes, fens and mires, natural grassland, and woodlands. It is believed that a mere 9 percent of habitats listed under the Habitat's Directive have been found to be in a favourable position. Species are doing better in conservation terms, as approximately 52 percent of the listed species are in a favourable state. However, NPWS have identified some species in their Red List of species in need of conservation intervention, these include: Irish bee species, non-marine mollusc, Irish water beetle, damselflies, dragonflies, and butterfly species. From the 199 bird species assessed in the population status of Ireland's birds (2007-2011), 25 were placed on the red list, including the kestrel and skylark.

The Arterial Drainage Schemes have been constructed throughout Ireland and the majority of the channels are located in close proximity or within SAC and SPA sites. There are approximately

6,000km of Arterial Drainage channels that cross through an SAC or are located within an SAC and around 3,000km of Arterial Drainage Channels that overlap with an SPA.

There are 19 Marine Protected Areas (MPA) under the OSPAR Convention in Irish waters. Arterial drainage scheme channels and the embankments have the potential to influence flow rates and the concentration of pollutants discharging to MPAs. All designated nature conservation sites in Ireland are listed in the table below (Table 5-1).

Table 5-1. Summary of Designated Nature Conservation Sites in Ireland

Site	Legislation	Number in Ireland
Special Area of Conservation	European Communities (Natural Habitats) Regulations, 1997 (as amended) and consolidated by the European Communities (Birds and Natural Habitats) Regulations 2011	~424
Special Protection Area	European Communities (Natural Habitats) Regulations, 1997 (as amended) and consolidated by the European Communities (Birds and Natural Habitats) Regulations 2011	~154
Ramsar Site	The Convention on Wetlands of International Importance especially as Waterfowl Habitat (i.e. the Ramsar Convention)	~25
Natural Heritage Area	Wildlife (Amendment) Act, 2000	~148
Proposed Natural Heritage Area	Wildlife (Amendment) Act, 2000	~630
Nature Reserve	Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000	~75
Wildfowl Sanctuaries	Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000	~68
OPSAR Marine Protected Areas	No relevant legislation	~19

Summary of potential threats to ecology and Natura 2000 sites:

Impacts on Morphology:

- Channel profile
- Channel straightening
- Riffle-glide-pool sequence
- Substrate
- Riparian Zone

Impacts on Channel Processes:

- Flow characteristics
- Sediment transport
- Impacts on water quantity and quality

The potential impacts on ecology and Natura 2000 sites include:

- Reduction in habitat diversity & stability
- Removal of riffle-glide-pool sequence
- Habitat deterioration
- Habitat loss
- Species loss and reduction in species populations
- Habitat and species fragmentation
- Increased turbidity, suspended solids & sedimentation
- Accidental spills and pollution causing damage or loss to habitats and species
- Alterations in flow regime
- Impairment of riparian zone
- Lowering of water levels and alterations in water quantity

5.7 Cultural Heritage

Ireland's earliest archaeological sites date back to the end of the last Ice Age, 10,000 years ago. They consist of evidence of temporary settlements of fishermen, hunters and gatherers that survived as scatters of stone implements and shell mounds or middens (National Monument Service, 2016). However, structures and remains from any time period can be considered of archaeological interest.

Monuments of archaeological importance are protected under the National Monuments Acts 1930-2004. The National Monuments Service of the Department of Arts, Heritage, Regional, Rural, and Gaeltacht Affairs (DAHRRGA) maintains a record of all known monuments and this forms the Records and of Monuments and Places (RMP). There are approximately 120,000 RMPs and these are published county-by-county and include registered monuments and National Monuments. The NMS also maintains the Historic Shipwreck Inventory, which addresses specifically the incidents and locations of recorded and known shipwreck sites. There are more than 18,000 shipwreck event entries for the inland waterways alone. The Planning and Development Act 2000 (as amended) requires that development plans contain objectives for the protection of the archaeological heritage and architectural conservation areas and conditions relating to archaeology to be attached to individual planning permissions (National Monument Service, 2016). This includes works proposed above and below the waterline. It is also necessary to consider the potential to discover new sites and features on any given river system.

The National Inventory of Architectural Heritage (NIAH) is a state initiative under the administration of the DAHRRGA and established on a statutory basis under the provision of the Architectural Heritage (National Heritage) and Historic Monuments (Miscellaneous Provisions) Act 1999 (Buildings of Ireland, 2016). The NIAH aims to identify, record, and evaluate post-1700 architectural heritage in Ireland, as a measure to protect built heritage.

Early human inhabitants on the island settled near bodies of water (coast, lakes, and rivers) because watercourses provided sources of food, communication, and transportation, while also historically demarcating territories. Ports, bridges, ferries, and settlement on Irish Rivers evolved over time, tributaries of main watercourses were altered to provide power, drinking water, and for draining land. For that reason, there are sites and evidence of human life adjacent to river bodies or arterial drainage schemes. Peatlands and estuaries are known for their ability to preserve artefacts, therefore, works carried out in these environments must follow special precautions, as the likelihood of encountering objects of cultural or historical importance is higher than in other landscapes.

National Arterial Drainage Maintenance Activities (2016-2021) will be constrained by the need to protect the setting of areas of existing archaeological and architectural value (i.e. Monuments, RMP, and NIAH). For that reason, assessments should be implemented and carried out by archaeologists experienced in riverine and underwater archaeology, to record and map the nature and extent of the cultural heritage assets along river courses in advance of drainage maintenance activities and as part of the pre-works surveys. Fording points and other natural shallows retain archaeological potential and need to be considered as sites of archaeological interest during arterial drainage maintenance operations, Flood Relief works and related operations.

There are various opportunities for cultural heritage such as increase understanding of riverine impacts on cultural heritage assets by engaging with fluvial dynamic studies, improve methods and processes for managing cultural heritage assets through integrated study and engagement with stakeholders.

Engagement with the Public and other stakeholders at community, regional and national level, to demonstrate the value of historical knowledge of river usage in contributing to current and future planning for river systems management.

5.8 Climate Change

Climate change is described by the scientific community as a significant change in the average weather around the world, this involves variations in temperature, rainfall, wind, lasting for an extended period of time. Natural climate change has occurred during the planets history, with events ranging from ice ages to periods of higher temperature. The problem is that anthropogenic changes are influencing climate change through emissions of greenhouse gases.

5.8.1 Contribution to Climate Change

Ireland's greenhouse gas emissions arise from a mixture of activities. The EPA compiled greenhouse gas figures for Ireland in 2009 and determined that Ireland has a high level of emission per capita compared to other European countries (EPA, 2015).

Land use change is also a factor that contributes to greenhouse gas release, activities such as deforestation, afforestation, removal of peat for fuel and/or the drainage of peatlands, all have significant effects on the environment such as release of greenhouse gases and/or contamination of surrounding surface water or groundwater systems. For that reason, the conservation of these habitats and the control/limitation of some activities are crucial to help mitigate climate change.

The protection, conservation and enhancement of existing carbon stores (e.g. peatlands and forest) can offer some contribution to the net carbon budget of the state. This could be achieved through careful planning of maintenance activity to maximise ecosystem conditions.

5.8.2 Impacts of Climate Change

There are various threats that could be posed by climate changes such as increased rainfall leading to a higher risk of coastal, fluvial, and pluvial flooding, potential sea level rise, and habitat fragmentation.

With sustainable management strategy that allows for adaptive capacity to be maximised, flood protection and land drainage function could be continued into the future. There is also the potential for schemes to provide enhanced flood protection where there is potential significant projected future flood risk. In some cases, current schemes, channels and embankments may no longer be viable and continued maintenance of these should be considered as part of a long term climate change adaptation and asset management strategy.

6 Evaluation of the Impacts of the Proposed Arterial Drainage Maintenance Activities

Chapter 10 in the SEA assesses the likely significant environmental impacts of implementing the Arterial Drainage Maintenance Activities 2016-2021 on a catchment level and nationally.

The assessment of the activities has been carried out at a strategic level and the predicted impacts are based on the current information available. A catchment-wide qualitative assessment of the Maintenance Activities against the environmental objectives was undertaken. The proposed activities have been assessed against the environmental objectives given in Volume II Section 7. The assessment tables for each of the catchments are presented in Appendix E.

The assessment found that the impacts per catchment were very similar. The impacts on maintenance activity were more localised in catchment with smaller schemes or where benefitting lands only covered a part of the catchment. The distribution of EREP schemes, shellfish and salmonid waters is not evenly spread across the catchments and this drives some of the differences in environmental impact ratings. Consequently, the mitigation measures for some of the catchments may vary depending upon the sensitivity of the waterbody and the species contained therein.

The assessment may appear unduly negative, and in many cases the OPW is working towards higher standards and looking to improve processes, methods and the general approach to maintenance activities. As these are not fully established they are not included in the impact assessment of the activities as described. The impact of maintenance activity with these, and other improvements, when fully implemented and effective is represented in the residual impact assessment. Examples of such improvements already in progress include:

- additional mitigation measures within Appropriate Assessment Screening and Natura Impact Statement reports,
- development of pilot approaches to tree management in sensitive locations,
- targeted ecological surveys before EREP scheme works commence,
- development of GIS systems and data sharing with field operatives,
- development of environmental risk registers.

6.1 Summary of potential impacts

6.1.1 Objective A Environmental (Water): Support the objectives of the Water Framework Directive (WFD)

With the exception of a small number of schemes our assessment has predicted a minor negative impact on the objective relating to the supporting the WFD objectives. Our assessment has concluded that, in the absence of suitable mitigation measures, this impact will be negative on the catchment scale and could be of medium term duration (6-years). Any maintenance activity that involves dredging or in-channel works will cause increases in suspended solids and nutrients. It is estimated that in general this will be a short-term local impact. Longer term impact may arise due to changes in the hydromorphology of the channel and the receiving waters. Our assessment has identified a number of mitigation measures that will reduce/remedy these impacts.

The EREP projects offer benefits to salmon fisheries at the local scale. The current criteria do not allow for catchment scale or comprehensive river restoration or enhancement projects.

The hydromorphological risk assessment in the last WFD cycle had a high level of subjectivity as only one variable (channelisation) was used to assess whether a river body was at risk rather than all hydromorphological modifications needed to make a complete diagnosis of a river condition. The output from the proposed hydromorphological risk assessment was not confirmed in the field and therefore the extent of impact of arterial drainage through channelisation still remains uncertain (Quinlan, 2015). The EPA Catchment Science and Management Unit are investigating hydromorphological characterisation assessment tools adapted for Ireland (ie: Morpholoqical Quality Index (MQI)). Continued scientific development in this field must be closely followed as improved hydromorphological assessment tools are being developed.

Recent judgement by the European Court of Justice[2] has clarified that projects cannot cause any deterioration in WFD status of waterbodies without the application of an exemption under Article

[2] The Weser Case: Case C-461/13 BUND V GERMANY

4(7) of the WFD. Deterioration was also clarified to be a deterioration of any water quality indicator and not of the overall ecological status.

6.1.2 Objective B Environmental (Flora, Fauna & Biodiversity): Protect the flora and fauna within the river, river corridor and along vehicular access points and where possible enhance biodiversity.

The impacts of the maintenance activities on flora/fauna and biodiversity is dependent upon the environmental receptors contained within those catchments. The presence of protected species such as the freshwater pearl mussel, lamprey and salmonids requires a high level of protection and suitable mitigation measures to reduce/eliminate any impacts. Protection of the habitats that supports these species is also vitally important. The appropriate assessment (AA) process for the Arterial Drainage Maintenance Activities 2016-2021 will follow the current process. Recent appropriate assessments have been informative in identifying potential impacts in relation to the EU Habitats and Birds Directives. To avoid or mitigate potential impacts, additional environmental mitigation measures beyond the Standard Operating Procedures (SOPs) and Environmental Drainage Maintenance (EDM) Protocols have been required. This suggests that the method statements and mitigation measures as detailed in the Arterial Drainage Maintenance Activities 2016-2021 are insufficient in managing the impacts, upon Habitats Directive Annexed species and habitats. In practise these are managed through implementation of the avoidance and mitigation measures listed in the appropriate assessments (AA). Moderate negative, long term and catchment wide impacts are predicted based on the strict application of the activities described. The significance and duration relates to the number of, recovery, and potential for impact upon priority habitats such as turloughs, raised and blanket bogs present within many catchments subject to maintenance activities. Ireland contains significant proportions at the European scale of these habitats and so impacts could potentially be realised at the international scale.

6.1.3 Objective C Environmental (Fisheries): Protect and, where possible, enhance the integrity of fisheries within the Arterially Drained catchments.

Twelve of the thirty catchments subject to the Arterial Drainage Maintenance Activities 2016-2021 contain salmonid designated waters.

The impact of maintenance activities on these watercourses is uncertain at the catchment scale and will be dependent upon a number of factors such as the extent of in-channel works such as dredging, the distance of the drainage channel from the salmonid waters and the timing of the maintenance activity. The activity. The activities can be of detriment over the long term and on a regional scale, however EREP schemes can offer local improvements.

Fifteen of the thirty catchments subject to the Arterial Drainage Maintenance Activities 2016-2021 drain to shellfish waters. Shellfish waters can be impacted through changes in temperature, sediment and nutrient content of river discharges. Within these catchments where there is a potential connectivity between the maintenance location and the shellfish waters the impacts of maintenance activity have been assessed to be minor negative and long term due to the recovery period of shellfish waters.

6.1.4 Objective D Environmental (Climate Change): Minimise the climate change impacts of Arterial Drainage Maintenance Activities

The scale of maintenance activity across the country indicates the potential for a notable level of emissions. Machinery use and mileage is logged by the OPW but greenhouse gas emissions and embedded carbon equivalent in materials are not recorded or logged. The Arterial Drainage Maintenance Activities 2016-2021 are likely to be one of the OPWs largest source of greenhouse gas emissions which cumulatively have potentially permanent, international impacts.

For catchments where maintenance activity interacts with the hydrology and condition of peatlands and forests there is a moderate negative impact on a catchment scale, which could lead to permanent release of a nationally important carbon store. The impacts are very uncertain and would also be as a result of other land use practices. At present, there is no formal screening process or SOP for specifying or detailing maintenance activity, including access routes, to avoid or mitigate such impacts. The progression of pilot studies recommended in the National Peatlands Strategy have been considered in the residual impact assessment.

6.1.5 Objective D Environmental (Climate Change): Adaptation to climate change.

The assessment of the Arterial Drainage Maintenance Activities 2016-2021 is uncertain due to the lack of evidence to form a baseline of future performance of schemes. There is the potential that

the current maintenance activities and planning process could be reducing the adaptive capacity of drained channels and embankments. This could have long term, regional implications.

6.1.6 Objective E Social: Public access and recreation.

A number of waterbodies such as the River Moy and the Corrib offer angling of international interest. In these catchments Arterial Drainage Maintenance Activities 2016-2021 have the potential for detrimental impacts, however the continuing high profile status of these watercourses for angling suggest that maintenance activity is not diminishing the amenity value for angling. In our assessment we have rated this impact as neutral in most catchments.

6.1.7 Objective E Social: Contribute to viable and sustainable local communities.

The Arterial Drainage Maintenance Activities 2016-2021 are assumed to continue to provide the same level of land drainage and flood risk protection as the current maintenance activities (2010-2015). These provide a minor benefit to rural communities and a moderate benefit to maintaining access to local services and transport networks. Maintenance activities contribute to medium term and regional benefits by enabling sustainable rural communities to develop. Ceasing or reducing maintenance activities could result in negative impacts on local communities.

6.1.8 Objective F Economic: Avoid damage to, and where possible improve, the function and quality of the soil resource.

The assessment of maintenance activities in terms of their impact on soil resource for agriculture is a neutral impact over the medium term at the regional scale due to the combination of negative from loss of sediment deposition to floodplain and positive from increased drainage allowing productive. The agriculture. The assessment of this objective is not related to peatland, wetland or soil resource for non-agricultural use.

6.1.9 Objective F Economic: Support agricultural activity without conflicting with environmental objectives.

The original intention of Arterial Drainage Schemes and Land Commission Embankments was to improve the agricultural productivity of poorly drained or land liable to flooding. Continuation of current maintenance activity in the Arterial Drainage Maintenance Activities 2016-2021 will have moderate positive impacts on agricultural economic activity. Confidence in the continuation of maintenance activity will allow for medium term regional economic benefits.

6.1.10 Objective G Cultural Heritage: Protect known features of cultural heritage.

Systematic cultural heritage assessment and survey of the known and potential remains and their contexts ahead of maintenance works associated with the Arterial Drainage schemes will help to further identify the nature and extent of known archaeological and architectural heritage remains, and may result in moderate positive impacts on the cultural heritage resource. The actual benefit is not known as the assessment to date has been piecemeal based on a case-by-case basis and is not yet national in scope.

6.1.11 Objective G Cultural Heritage: Protect unknown features of cultural heritage.

Systematic cultural heritage assessment and survey of the river systems ahead of maintenance works associated with the Arterial Drainage schemes will help to further identify the nature and understand the locations within river systems that are most likely to retain undiscovered archaeological remains, and may result in moderate positive impacts on the cultural heritage resource.

The actual benefit is not known as the assessment to date has been piecemeal based on a case-by-case basis and is not yet national in scope.

6.2 Cumulative impacts/ In-combination effects

6.2.1 With Relevant Plans and Strategies

There is a potential for interactions between the draft Arterial Drainage Maintenance Activities 2016-2021 and other National, Regional and County Plans and policies outlined in Volume II Section 5 of the Environmental Report. These potential impacts could result in additional in-combination effects. These plans, programmes and policies include:

- Floods Directive and Flood Risk Management Plans

- The Water Framework Directive
- The Habitats Directive
- Coillte BAU2 Strategic Plan 2016-2020
- County Development Plan and Local Area Plans
- Food Harvest 2020 and Food Wise 2025
- INSPIRATION-EU Funded
- The 2015 Climate Act
- Ireland Rural Development Programme 2014-2020

6.2.2 With Related Ongoing Activities

- Agricultural Land Management Practices and GLAS Schemes
- Forestry

6.2.3 Cumulative Impacts of Maintenance Activity

- Drainage District Maintenance within the Same Catchment

7 Recommended Mitigation Measures

7.1 Introduction

Mitigation measures are recommended where our assessment has identified significant negative impacts on the environment. Based on the source/pathway/receptor concept where an environmental burden (e.g. water pollution, noise etc.) can impact on a receptor e.g. human, water, biodiversity or landscape via particular pathways, these significant impacts can be either mitigated at:

- Source e.g. avoid the impacts at source
- Pathway e.g. reduce the magnitude of the impact
- Receptor e.g. compensate for the impact by providing an alternative

To negate or minimise these impacts, mitigation measures are set out in the following sections. The assessment tables given in Volume III Appendix F indicates that in the majority of cases, and in the absence of suitable site specific mitigation measures, maintenance activities will impact negatively on the environment. A number of mitigation measures are recommended at this stage. These mitigation measures have been grouped into seven categories. Not all of the recommended mitigation measures are appropriate for all catchments and they are in addition to the current Standard Operating Procedures (SOPs) and Environment Management Protocols.

7.2 M1-Improved Maintenance Planning (6-year and annual plans)

These recommended mitigation measures are concerned with continuously improving the types of maintenance activity and the way in which these are specified for specific channels, embankments and structures as displayed in Table 7-1Table 7-6.They also include recommendations for enhancing the consultation on the 6-year and annual maintenance programmes, sharing of information with stakeholders and incorporating 3rd third party information into the planning and decision making process. There are many research projects, best practise examples, methods and guidance reports that can be applied to the planning of OPW maintenance activity in Ireland.

Table 7-1. M1- Improved Maintenance Planning (6-year and annual plans)

Code	Mitigation Measure	Timescale
M1a	Incorporate GIS data from other bodies in maintenance activity decision making GIS systems	Short-Term
M1b	To maintain, update and share GIS information on arterial drainage scheme channels, embankments and structures. Maintenance programmes to be made available, if possible in GIS format, but as a minimum with reference to GIS information.	Short-Term
M1c	Specific and targeted consultation of the 6-year and annual plans with stakeholders for high risk or sensitive impacts, activities or locations.	Short-Term to Long-Term (ongoing)
M1d	Cross-border consultation with relevant Northern Ireland bodies on 6-year and annual maintenance programmes.	Short-Term to Long-Term (ongoing)
M1e	Planning for Appropriate Assessment project level AA Screening, consultation and license application routes for Wildlife Act and Habitats Directive.	Short-Term
M1f	Refine the suite of maintenance activity types and methods.	Short-Term to Long-Term (ongoing)
M1g	Improved planning of maintenance activity, based on international best practice and tools to: a) incorporate hydromorphological assessment of channel type and conditions. b) screen for archaeological and cultural heritage impacts c) minimise the spread and colonisation of invasive species. d) minimise impacts on and enhance conditions for sensitive species and habitats. e) minimise impacts upon and enhance wetland and peatland ecosystems. f) consider aquifer type and status.	Short-Term to Long-Term (ongoing)

Code	Mitigation Measure	Timescale
M1h	Consider CSO and other significant surface water discharges to arterial drainage schemes. Consult Irish Water and National Federation of Group Water Schemes on 6-year and annual maintenance programmes	Long-Term
M1i	Ongoing training and continuous staff development of management and engineers involved in planning and specifying maintenance activities.	Short-term and Long-term (ongoing)

7.3 M2 - Improved Standard Operating Procedures and Environmental Protocols

These recommended mitigation measures are focused on addressing concerns from key stakeholders on the methods and approach to undertaking specified maintenance activities as displayed in Table 7-2.The intention of these recommendations is to further facilitate good environmental practices in the field. They focus on how maintenance activity is carried out once it has been specified for channels, embankments and flood relief schemes in the 6-year and annual programmes.

Table 7-2. M2- Improved Standard Operating Procedures and Environmental Protocols

Code	Mitigation Measure	Timescale
M2a	Where appropriate, update SOPs to include methods and techniques for any works which require transversing, crossing or are in proximity to highways. Updated SOP to ensure designers consult DMRB Road Safety Audit (HD19) to determine whether a Road Safety Audit is required. SoP to ensure responsibilities of designers and operatives are clear and able to be implemented.	Short-Term
M2b	Update SoPs, EcIAs and Environmental Protocols to continuously improve and facilitate the undertaking of environmentally sensitive maintenance activity as specified out in 6-year and annual maintenance programmes.	Short-Term and Long-Term (ongoing)
M2c	Develop clear guidance and processes for identifying and protecting cultural heritage and archaeology features.	Short-Term
M2d	Ongoing training and continuous staff development of field operatives, foremen and local engineers involved in undertaking maintenance activities.	Short-Term to Long-Term
M2e	Check and review SOPs	Short-Term to Long-Term

7.4 M3 - Monitoring of all maintenance activity, with continuous improvement through feedback into methods and approach

These recommended mitigation measures address deficits in the range of robust scientific evidence of the potential impacts of maintenance activity as addressed in Table 7-3. Further monitoring is required to develop evidence in relation to the direct impacts of a maintenance activity, the cumulative impacts of maintenance on multiple drainage schemes within or beyond a catchment, the in-combination effects of maintenance with other land uses and activities.

Table 7-3. M3- Monitoring of all maintenance activity with continuous improvement through feedback into methods and approach

Code	Mitigation Measure	Timescale
M3a	Monitoring of the effectiveness of invasive species control measures	Short-Term to Long-Term (Ongoing)
M3b	Specific monitoring to build scientific evidence base of impact of different maintenance activities on specific species and habitats of interest to include: - Freshwater Pearl Mussel, - Salmon, - Lamprey, - Crayfish, - Otter, - Badger & other Mammals,	Short-Term to Long-Term (Ongoing)

Code	Mitigation Measure	Timescale
	- Kingfisher, - and others as appropriate.	
M3c	Specific monitoring of pathways to build scientific evidence base. Research into groundwater pathways to groundwater dependent habitats and species as a priority.	Short-Term to Long-Term (Ongoing)
M3d	Specific monitoring to build scientific evidence base of impact of different maintenance activities on hydromorphology and WFD Status.	Short-Term to Long-Term (Ongoing)
M3e	Specific monitoring to build scientific evidence on the in-combination and cumulative effects of maintenance activity	Short-Term to Long-Term (Ongoing)
M3f	Specific monitoring to build scientific evidence base of impact of different maintenance activities on wetland and peatland ecosystems	Short-Term to Long-Term (Ongoing)
M3g	Specific monitoring to build scientific evidence on the effectiveness of mitigation measures	Short-Term to Long-Term (Ongoing)
M3h	Specific monitoring to build scientific evidence base of erosion/deposition/ stabilisation factors at known cultural heritage sites and area of potential.	Short-Term to Long-Term (Ongoing)

7.5 M4 - Expansion of river restoration and environmental enhancement

These recommended mitigation measures intend to maximise the benefit of proposed river restoration and environmental enhancement works currently carried out as part of the maintenance programmes under the Environmental River Enhancement Programme (EREP) projects as displayed below (Table 7-4).

Table 7-4. M4- Expansion of river restoration and environmental enhancement

Code	Mitigation Measure	Timescale
M4a	Expand the criteria for river restoration and enhancement of EREP works to include opportunities with other benefits, not just fisheries or salmonid potential.	Long-Term
M4b	Identify strategic corridors and locations for protection of riparian and floodplain hedgerows and woodlands.	Long-Term

7.6 M5 - Asset Management and Climate Adaptation

These recommended mitigation measures relate to the development of an asset management system approach to maintenance of arterial drainage schemes, land commission embankments and flood relief schemes.

The objective is to optimise the benefit (in terms of economic, social, cultural and environmental factors) delivered from, and to justify, Government expenditure as demonstrated in below (Table 7-5).

An inspection process can be used to refine the maintenance programme, with specific focus on the inspection of structures which would result in significant consequences if they were to fail (e.g. flood relief schemes, coastal embankments).

The future performance of schemes and individual structures should be addressed under a range of future climate change scenarios. This will inform longer term planning as to whether maintenance activities are:

- restricting adaptive capacity,
- maximising adaptive capacity, or
- redundant as the scheme in the current form will not perform under climate change scenarios.

Table 7-5. M5- Asset Management and Climate Adaptation

Code	Mitigation Measure	Timescale
M5a	Incorporate condition inspection into the planning of maintenance activity.	Short-Term
M5b	Implement an asset management approach to maintenance of channels, embankments and structures.	Long-Term
M5c	Continuous improvement in the environmental performance of machinery and fleet, and materials used.	Long-Term

7.7 M6 - Monitoring of environmental conditions

These recommended mitigation measures relate to environmental monitoring and continued review of international science and best practice. The purpose is so that environmental change and land use change can be detected and adjustments made to maintenance activities and plans in advance of problems as shown below (Table 7-6).

Table 7-6.M6- Monitoring of Environmental Conditions

Code	Mitigation Measure	Timescale
M6a	Modelling and monitoring of the benefits of maintenance activity	Long-Term
M6b	Regular review of recent scientific research in climate change, catchment management and continuous improvement of procedures.	Long-Term
M6c	Link to CFRAM monitoring	Long-Term
M6d	Design survey specification and monitor catchment change (hydrology, hydromorphology and ecology)	Long-Term

7.8 Residual Impacts with Recommended Mitigation Measures in Place

The assessment of implementing all of the recommended mitigation measures has been presented for each catchment in the tables in Appendix F in Volume III.

8 Monitoring Measures

8.1 Introduction

Article 10 of the SEA Directive and the SEA Regulations requires that the responsible authority monitors the significant effects of the implementation of a plan or programme. The purpose of the monitoring programme is to identify unforeseen adverse effects at an early stage and undertake appropriate remedial actions. This is analogous to the approach suggested by JBA in this SEA; pre-maintenance assessment and post-maintenance assessment. The monitoring will provide a cross-check of the impacts.

The focus of the monitoring framework is to set out the measures that can be used by the OPW to monitor the implementation of the maintenance activities and the effects that this has on the environment.

The proposed draft Arterial Drainage Maintenance Activities 2016-2021 sets out what maintenance activities could occur on applicable channels, embankments and structures. A full monitoring programme for the draft activities is difficult to present at this stage because the actual maintenance activity to be carried out, when and with what mitigation measures is not determined until the five year, annual maintenance programmes are developed. In some cases, such as where Otters presence is identified during a pre-works inspection the need for mitigation measures or refinement in approach may not be specified until this point.

The recommended mitigation measures include proposed monitoring to build a scientific evidence base on:

a. the impacts of the Arterial Drainage Maintenance Activities 2016-2021, and
b. environmental change to assess how maintenance activities and the scheme elements should evolve and adapt over time.

9 Alternatives

This section discusses the alternatives that have been considered for the maintenance activities. The JBA project team has followed the EPA guidelines for the assessment of alternatives in Strategic Environmental Assessment. The key consideration for the Arterial Drainage Maintenance Activities 2016-2021 is that the alternatives proposed and assessed must be technically viable and within existing Arterial Drainage Act legislation. The current approach is unlikely to be significantly changed as this would require an amended or new Arterial Drainage Act legislation. There are however potential alternatives within the scope of the Arterial Drainage Acts. All of the recommended mitigation measures proposed in this SEA comply with the current legislation, however some of the follow on findings or changes may require updates to legislation in the future.

9.1 The Do Nothing Alternative

This is not a viable alternative due to Arterial Drainage Act legislation and will not be assessed.

9.2 Do minimum

The do minimum alternative will more than likely result in more negative impacts than the proposed activities. This is because the reduced funding is most likely to be targeted at maximising the coverage of maintenance activities each year and not allocated to monitoring or changes to planning and onsite activities and approaches.

9.3 Do existing

This is the same as the proposed activities, which are no change from current practise.

JBA has carried out a desktop assessment for a number of alternatives that was considered for this SEA. The full assessment is presented in Appendix E and the main findings of the assessment are discussed below. The alternatives are assessed against the current maintenance activities.

9.4 Alternative 1-an evolved approach to the selected preferred method activities

This alternative would be the implementation of changes in the planning, supervision and details of activities and mitigation. These changes are to improve both the planning and application of arterial drainage maintenance activities in the following areas:

- M1- Improved maintenance planning (5-year and annual plans),
- M2- Improved Standard Operating Procedures and Environmental Protocol,
- M3-Monitoring of all maintenance activities with continuous improvement through feedback into methods and approach,
- M4-Expansion of river restoration and environmental enhancement
- M5-Assests Management and Climate Adaptation Planning
- M6-Monitoring of environmental conditions
- M7: Natural Flood Management, Working with Natural Processes and Land Management Practices.

9.5 Alternative 2-different methods to achieve the objective of Arterial Drainage Maintenance

This alternative is based upon the application of different methods to achieve the same objectives. This would include:

- M2- Improved Standard Operating Procedures and Environmental Protocol.

9.6 Alternative 3- modification of Arterial Drainage Schemes

Alternative 3 is to change the form and function of arterial drainage schemes. This could range from walking away from some schemes, broader catchment scale environmental enhancements and natural flood management (e.g. forestry, restoring natural floodplains, runoff storage).

10 Appropriate Assessment (AA)

10.1 Mitigation and Recommendations in relation to Natura 2000 sites

The following is taken from the Natura Impact Report in Volume III: Volume III-Arterial Drainage Maintenance Activities 2016-2021 SEA Natura Impact Statement. The conclusions of the NIR have informed the recommended mitigation measures for the SEA Environmental Report. This assessment offers the OPW potential to review and improve upon their current work programme and activities, but also to further investigate areas that may also improve and enhance species and habitat diversity within and adjacent to Natura 2000 sites.

Given the geographical scope of this assessment and the generic description of work activities at this scale, it is not possible to identify specific potential impacts on Natura 2000 sites and their qualifying interests.

The following measures should be incorporated into the overall approach to the Programme of activities. These can be applied to every cycle thereafter and updated or improved when necessary. These are based upon JBA's experience working on projects over recent years and consider previous comments from NPWS. As the OPW have relied on SOPs and the Environment Management Research projects to date, these have been very helpful in mitigating potential impacts, however these require updating. The OPW should consider the following measures regarding their proposed arterial drainage maintenance programme:

1. The OPW SOPs require updating in relation to details of working methods and mitigation measures detailed therein. This may be done through the revision of the SOPs, or the provision of method statements to supplement the SOPs. Mitigation measures should be site specific and should not only rely on the contribution of bodies such as Inland Fisheries Ireland and National Parks and Wildlife Service. This will provide the OPW with the opportunity to improve the demonstration of their responsibility and compliance under the Birds and Habitats Directive through establishing more detailed working procedures. For example, the current SOP for otter details the avoidance of areas of dense scrub and undergrowth. However, the feasibility of this in practice may not be achievable as it is often areas of overgrowth that need to be removed through the maintenance of areas such as the machine access corridor or those causing obstruction to water flow.
2. The updating of the OPW SOPs should consider the inclusion of the assessment of the potential impacts (not identified in SOPs) that working methods within the riverine corridor may have on adjacent watercourses in relation to the release of suspended solids through activities such as tree cutting, tree removal, bush cutting and the maintenance of MACs.
3. The OPW should include a detailed and quality controlled method statement within an updated SOPs for the management of invasive species. If avoidance of areas containing invasive species is not possible, specific biosecurity and mitigation measures are required to be in place for the removal, treatment and management of invasive species, when they are encountered on embankments, along river banks or within drainage channels. A protocol for the disinfection, appropriate cleaning of equipment and the disposal of disinfectants should be implemented. JBA have noted that some of the OPW protocols for invasives species are either absent or outdated in SOPs.
4. As the mitigation measures of Appropriate Assessment reports currently rely heavily on the OPW's SOPs, which are supplemented with additional mitigation measures where required, these assessments will need to be revised when an updated version of the SOPs are made available.
5. Overall the update of SOPs requires experienced technical scientists and suitably qualified ecologists to provide input for the updates and consultation with IFI and NPWS.
6. The SOPs should undergo monitoring to examine the success of their implementation. This could be done over a number of years at particularly sensitive sites such as Natura 2000 sites.
7. The Source-Pathway (Ryan-Hanley, 2014a) and Screening Methodology (Ryan-Hanley, 2014b) methods should be updated also. Some examples include: impacts from the embankment activities and tree and bush cutting activities as indirect sources of suspended solids via surface water pathways. Bush cutting, which involves the maintenance of the MAC, should also be included as an indirect source of sediments and nutrients to an adjacent waterbody and a threat to the spread of invasives. The update will look at all potential impacts posed to Natura 2000 sites to ensure they are addressed, thereby

ensuring a comprehensive identification and evaluation of potential impacts during the Appropriate Assessment process.

8. OPW currently carry out an Environmental River Enhancement Programme in conjunction with Inland Fisheries Ireland (IFI). IFI monitor the physical habitat and biological elements pre and post works in order to assess the effectiveness of such works on the river corridor biodiversity and hydromorphology. The findings of this monitoring regarding elements such as the recovery time of biotic elements such as instream vegetation, crayfish and lamprey, and river corridor biodiversity. Actions to be taken as a result of the outcomes of monitoring should be identified and the actions undertaken.
9. OPW monitoring programmes are useful in assessing the success of enhancement programmes and restoration projects. Monitoring should be seen as an iterative process with updates or changes where necessary. The monitoring should include for any relevant condition assessments to ensure the special features of a Natura 2000 site and/or protected species are conserved in the best possible condition. Monitoring and evaluation are important in any enhancement and restoration project, as the information gained may lead to greater overall success and reduced costs in future restorations (Sears et al., 2006).
10. The OPW should introduce enhancement programmes for other habitats and species, additional to those for salmonids in river channels. These should also be applied on a catchment wide basis, rather than at specific points along a maintenance channel, which would take the conservation objective for a Natura 2000 site's qualifying interest and WFD objectives into consideration as a whole. Examples include Kingfisher embankments, grey wagtail nests, sandmartin embankments, artificial otter holts etc. It is important that these are designed and suitable areas chosen by suitable qualified ecologists.
11. As discussed in above the commissioning of scientific based pilot studies by the OPW is a great opportunity to improve work practices. A case study (pilot study) approach can be taken where results can be sensibly extrapolated to similar sites. However, in order to assist with pilot studies that can provide greater information and can be applied to a wide number of projects, it is recommended that the pilot studies are chosen based upon a screening process for suitability, applicability to other cases as well as financial for reasons.
12. The OPW can improve the evidence for the effectiveness of river restoration by investing in long-term monitoring (i.e. >5 years) at selected sites. These should encompass a large geographical range and use robust scientific approaches to evaluate projects that focus on process-based approaches. Monitoring should be undertaken before restoration and afterwards for a sufficient timescale to detect both rapid and longer term changes (Addy et al., 2016).
13. A review of arterial drainage schemes and their interaction with flood relief schemes should be undertaken. It should be discerned what responsibilities and activities are required to be carried out by the OPW as part of channel maintenance within a flood relief scheme so a specific final project design can be assessed through the Appropriate Assessment process.
14. A review of the adaptive capacity of the OPW's flood risk management strategies and measures in relation to climate change should be undertaken as maintaining arterial drainage schemes including those that form part of the Flood Relief Schemes, have the potential to impact on Natura 2000 sites due to their part in flood relief schemes. The impact of maintaining arterial drainage schemes, channels and embankments on the adaptive capacity of ecosystems (including Natura 2000 sites, habitats and species) should also be considered, and fed into the long-term planning for arterial drainage schemes and their maintenance. This may include reconsidering activities in certain areas and examining how restoring ecosystems can play a big role in reducing the risk of the kind of floods.
15. There are opportunities for the OPW to i*ncorporate objectives* of the National Biodiversity Plan *to minimise biodiversity loss and degradation of ecosystem services, and to optimise biodiversity gains, in flood risk management plans* that will be implemented through CFRAMS. This objective should be implemented at project level at both the local and catchment level. For example, green revetement and other novel methods for stabilising bare banks (Koo & Hyojin, 2013). This however, requires training and should not be attempted by OPW staff without appropriate training and certifications.
16. There is a need to further investigate potential and inherent conflicts between flood risk management policy and legislation, and the OPW's statutory arterial drainage programme regarding wetland habitats. European best practise states that enhancing and protecting water retention capacity within catchments (including soil and wetlands) is important at all landscape scales (Williams et al., 2012) and the controlled flooding of certain stretches of

riparian floodplains, or creation of storage areas that are periodically flooded by overflowing streams, should be incorporated into catchment and flood risk management.

17. New concepts of channel management should be explored by the OPW regarding channel performance and channel management at multiple scales, i.e. local, reach and catchment scales. Channels form part of a dynamic system and channel management issues can reflect different scale processes. Therefore, it is important to understand and try to work with natural processes and challenge the need for intervention. These elements of channel management could also link in with existing Flood Risk Management Plans and River Basin Management Plans in a sustainable approach to catchment and channel management, which would further reduce potential impacts on Natura 2000 sites.
18. OPW have carried out training programmes in the past for their staff in relation to environment and ecology. OPW should provide further training and updates to all staff on a regular basis and in particular in relation to any updates to SOPs and Environmental studies.
19. To ensure compliance with the Birds and Habitats Directive, proposed arterial drainage maintenance activities should undergo an Appropriate Assessment at project level, based on final project design or the specifics of the programme elements. The other technical areas such as hydraulic, hydrological and hydrogeological impacts resulting from the proposed works at project level should also be considered in the Appropriate Assessment.
20. For some of the proposed arterial drainage activities the development of a Construction Environmental Management Plan (CEMP) will be important to include mitigation measures as part of the AA. The inclusion of a CEMP will safeguard the integrity of the Natura 2000 network of sites by minimising the potential for habitat loss, disturbance of species and potential adverse impacts on water quality/quantity dependant sites. The CEMP will need to be site specific and relevant to the detailed design of the activity, including associated activities such as access to a channel and surface water runoff controls.

11 Conclusion

11.1 Summary

In conclusion there are potential negative environmental, social and economic impacts of the draft Arterial Drainage Maintenance Activities (2016-2021). There are no viable alternatives that can be immediately implemented. This Environmental Report recommends a suite of mitigation measures which would result in a more sustainable approach to Arterial Drainage Maintenance. These mitigation measures relate to:

- M1: Improved Maintenance Planning (6-year annual plans).
- M2: Improved Standard Operating Procedures and Environmental Protocol
- M3: Monitoring of all Maintenance Activity with Continuous Improvement through Feedback into Methods and Approach.
- M4: Expansion of River Restoration and Environmental Enhancement
- M5: Asset Management and Climate Adaptation Planning
- M6: Monitoring of Environmental Conditions
- M7: Natural Flood Management, Working with Natural Processes and Land Management Practices

An Appropriate Assessment of the Arterial Drainage Maintenance Activities (2016-2021) was carried out as part of this Strategic Environmental Assessment and is detailed in Volume III-Arterial Drainage Maintenance Activities 2016-2021 SEA Natura Impact Statement.

11.2 What's Next?

The draft Arterial Drainage Maintenance Activities 2016-2021 and the accompanying SEA Environmental Report and Appropriate Assessment will be available for review and comment during a consultation period.

The draft Environmental Report will be available online at:

http://www.opw.ie/en/floodriskmanagement/operations/environmentalactivities/

All comments received on the draft Arterial Drainage Maintenance Activities 2016-2021 and the SEA Environmental Report will be reviewed. Any changes required will be made to the draft Arterial Drainage Maintenance Activities 2016-2021 and an assessment of these changes will be made by the SEA team. When the Arterial Drainage Maintenance Activities 2016-2021 are adopted an SEA Statement will be prepared. The SEA Statement will document the process, and identify how comments were addressed in the Arterial Drainage Maintenance Activities 2016-2021.

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