

Scoping Report for the Arterial Drainage Maintenance Activities 2022- 2027

Technical Report
October 21



OPW

Oifig na
nOibreacha Poiblí
Office of Public Works

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Revision History

Revision Ref / Date Issued	Amendments	Issued to
2021s0348V1.0 20.10.21	Final Report	Nathy Gilligan, OPW Tony Brew, OPW

Contract

This report describes work commissioned by the OPW, by a letter dated 9th April 2021. Nathy Gilligan and Tony Brew are the representatives for the contract. Conor O Neill, Declan Egan, and Tom Sampson of JBA Consulting carried out this work.

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Purpose

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Abbreviations

AA.....	Appropriate Assessment
ACA.....	Architectural Conservation Areas
AFA.....	Area for Further Assessment
ASPC.....	Area of Special Planning Designation
CFRAM.....	Catchment-based Flood Risk Assessment and Management
CFRMP.....	Catchment-based Flood Risk Management Plan
CORINE.....	Coordination of Information on the Environment
CSO.....	Central Statistics Office
DoHLGH.....	Department of Housing, Local Government and Housing
EIA.....	Environmental Impact Assessment
EIS.....	Environmental Impact Statement
EPA.....	Environmental Protection Agency
EPO.....	Environmental Protection Objectives
EREP.....	Environmental River Enchantment Programme
EU.....	European Union
GIS.....	Geographic Information System (mapping software)
GWB.....	Groundwater Body
HSE.....	Health Service Executive
FRMP.....	Flood Risk Management Plan
FRS.....	Flood Relief Scheme
ICPSS.....	Irish Coastal Strategy Study
IPPC.....	Integrated Pollution and Prevention Control
IE.....	Industrial Emission licence
OSI.....	Ordnance Survey Ireland
OPW.....	Office of Public Works
NIAH.....	National Inventory of Architectural Heritage
NHA.....	Natural Heritage Areas
NIS.....	Natura Impact Statement
NPWS.....	National Parks and Wildlife Service
NRA.....	National Road Authority
NSS.....	National Spatial Strategy
PCD.....	Public Consultation Day
PFRA.....	Preliminary Flood Risk Assessment
pNHA.....	Proposed Natural Heritage Areas
RBD.....	River Basin District
RMBP.....	River Basin Management Plan
RMP.....	Record of Monuments and Places
RPS.....	Record and Protected Structures
SAC.....	Special Area of Conservation

SEA Strategic Environmental Assessment
SEAI Sustainable Energy Authority of Ireland
SMR..... Sites and Monuments Record
SPA Special Protection Area
WFD Water Framework Directive
WMU..... Water Management Unit
WWTP.....Wastewater Treatment Plant

1 Introduction

1.1 Background to the Scoping Report

This is the Scoping Report for the Strategic Environmental Assessment (SEA) of the Arterial Drainage Maintenance Activities (2022-2027). A SEA is a systematic process for predicting, evaluating, and mitigating, at the earliest appropriate stage, the environmental effects of a national, regional plan or programme before it is adopted. Its purpose, and in accordance with the requirements of the Aarhus Convention, is to give the public and other interested stakeholders an opportunity to comment, and to be kept informed of decisions about a strategic programme and how they evolved. The SEA process facilitates the integration of environmental considerations into environmental decision making at an early stage and allow for a sustainable solution. The purpose of this SEA is to set out the likely significant environmental effects of the Arterial Drainage Maintenance Activities for the period 2022-2027. This report identifies the likely significant environmental impacts of drainage maintenance activities and outlines appropriate mitigation measures to reduce these effects.

The SEA process for the Arterial Drainage Maintenance Activities (2022-2027) is being conducted in compliance with national legislation and guidelines to ensure an environmentally sound and transparent assessment. The Office of Public Works (OPW) carried out a screening activity in 2006 which concluded drainage maintenance activities was exempt from SEA requirements. However subsequent consultations with the Environmental Protection Agency (EPA) determined ongoing Arterial Drainage Maintenance Activities within the state could be interpreted as requiring SEA, hence it is prudent to complete same.

The Scoping Report was conducted and prepared by JBA Consulting Engineers and Scientists Ltd (JBA in this report). JBA liaised closely with the OPW for all aspects of this Scoping Report.

This Scoping Report will go on public display during the consultation process and be issued to statutory consultees and interested stakeholders. Submissions received during this time will be reviewed and any submissions or comments received will be incorporated into the Environmental Report (next stage of the SEA process).

In subjecting the Arterial Drainage Maintenance Activities (2022-2027) to a SEA, appropriate measures for activities and works can be directed to where they are sustainable and compatible with the environment but still ensuring protection of welfare of humans.

An Appropriate Assessment of the Maintenance Activities will be carried out in tandem with the preparation of the Environmental Report. The purpose of the Appropriate Assessment is to determine the impacts, if any, on Natura 2000 sites.

1.2 Legislation and Guidelines

The EU enacted the Strategic Environmental Assessment (SEA) Directive under Council Directive 2001/42/EC on the 'Assessment of the Effects of Certain Plans and Programmes on the Environment'. The purpose of the Directive is to undertake an environmental assessment to assess the likely significant impacts of the plan or programme on the environment before it is adopted. The Directive was transposed into Irish legislation under S.I. No. 435 of 2004 - the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations, 2004 and S.I. No. 436 of 2004 the Planning and Development (Strategic Environmental Assessment) Regulation. These statutory instruments were amended under S.I. No. 200 of 2011 and S.I. No. 201 of 2011, respectively. S.I. No. 435 of 2004 and S.I. No. 200 are relevant to this SEA.

Several Irish and European governmental departments have prepared guidance documents to assist SEA practitioners in interpreting the requirements of the SEA Directive and their associated Regulations. The key guidance documents are:

- SEA Spatial Information Sources Inventory, Environmental Protection Agency, 2019
- Department of Environment, Heritage and Local Government 2004: Implementation of SEA Directive: Assessment of the Effects of Certain Plans and Programmes on the Environment. Guidelines for Regional Authorities and Planning Authorities (2004)
- Environmental Protection Agency: SEA Pack (2020)
- Environmental Protection Agency: SEA Spatial Information Sources Inventory (2020)
- Environmental Protection Agency: SEA Process Checklist (2008)

- Environmental Protection Agency: SEA Scoping Guidance Document (2017)
- Environmental Protection Agency: Integrating Climatic Factors into Strategic Environmental Assessment in Ireland - A Guidance Note (2019)
- Environmental Protection Agency: GISEA Manual - Improving Evidence Base in SEA (2017)
- SEA Effectiveness Review in Ireland - Action Plan, 2018-2020
- European Commission: Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment (2013).
- Environmental Protection Agency: Developing and Assessing Alternatives in Strategic Environmental Assessment (2015)
- Environmental Protection Agency: Integrating Biodiversity Impact Assessment - Streamlining AA, SEA and EIA Processes - Practitioner's Manual (2013)
- Environmental Protection Agency: Guidance on SEA Statements and Monitoring (2020).

1.3 An Overview of the SEA Process

The preparation of the Arterial Drainage Maintenance Activities 2022-2027, the SEA and the Appropriate Assessment are taking place concurrently and the findings of the AA will inform both the SEA and the Arterial Drainage Maintenance Activities. A draft AA will accompany the draft Environmental Report and draft Arterial Drainage Maintenance Activities 2022-2027 that will be put on public display.

The process of conducting a SEA for the Arterial Drainage Maintenance Activities 2022-2027 involves several steps. The steps are described below.

1.3.1 Screening

Screening is the first stage in preparing a SEA and involves asking the question - does the plan or programme require a SEA? If the plan or programme falls into one of the classes in S.I. No. 200 of 2011 or S.I. No. 201 of 2011, then a SEA is required. Some plans or programmes do not fall into the required classes and for these scenarios, a screening assessment is carried out.

The OPW liaised with the Environmental Protection Agency regarding the requirements for a SEA for the 2011-2015 Arterial Drainage Maintenance Activities. The EPA screened the maintenance activities in, and a SEA was prepared. These maintenance activities for 2022-2027 are similar, consequently a SEA will be prepared for same.

1.3.2 Scoping

The Scoping Report (this report) provides the statutory consultees, stakeholders, and the public with an opportunity to comment on the content and level of detail of a SEA, including the key environmental issues, the likely significant impacts and the alternatives considered. The Scoping Report meets the requirements of the Aarhus Convention.

1.3.3 Environmental Report

The Environmental Report is the key output of the SEA process. The Environmental Report consists of an assessment of the impacts of a plan or programme on several environmental objectives. The assessment is 'objective led' and the objectives are based on European and National strategic environmental objectives, for example, the European Biodiversity Plan, or the Water Framework Directive. The Environmental Report considers the alternatives that were identified and the feedback from the statutory consultees and stakeholders. Where significant impacts are identified, mitigation measures to reduce/remedy the impacts will be considered and a monitoring programme to demonstrate the effectiveness of the mitigation measures will be put in place.

The draft Environmental Report will contain details of the environmental monitoring that will be carried out during the arterial drainage maintenance activities.

A draft Environmental Report and the draft Arterial Drainage Maintenance Activities 2022-2027 is issued for comment and put on public display for six weeks. The Appropriate Assessment will also be put on public display. Based on the comments received, the plan or programme may require amendments and updates to the draft Environmental Report.

1.3.4 SEA Statement and Monitoring Programme

Upon adoption of a plan or programme, a SEA Statement is prepared. The SEA Statement summarises how environmental considerations shaped the plan or programme. A list of the proposed mitigation measures is contained in the SEA Statement, and how consultations with the Statutory Bodies and Stakeholders influenced the final plan or programme.

The monitoring programme is put in place to demonstrate and verify the effectiveness of the mitigation measures and whether the SEA is fulfilling its core objective of providing for a high-level protection of the environment.

1.4 Objectives of the SEA

The objectives of the SEA for the Arterial Drainage Maintenance Activities (2022-2027) are to:

- Determine baseline environmental data
- Identify, predict, and evaluate the impact of the drainage maintenance activities on the baseline environment
- Define mitigation measures to alleviate effects
- Put in place a monitoring programme
- Allows stakeholders and the public to participate in the development of the Arterial Drainage Maintenance Activities (2022-2027).

1.5 Appropriate Assessment

An Appropriate Assessment (AA) screening is currently being carried out on the Arterial Drainage Maintenance Activities. The AA process assess the impact of the activities on Natura 2000 sites - sites which have been designated by virtue of their ecological status and importance. Natura 2000 sites are comprised of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

The Habitats Directive (92/43/EEC) requires that plans and programmes undergo an AA screening assessment to determine the likely impacts of a plan or programme on a Natura 2000 site(s). Article 6(3) of the Habitats Directive requires that “Any plan or project not directly connected with or necessary to the conservation of a site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site’s conservation objectives.” If the assessment determines significant, potentially significant, or uncertain effects, then a Stage 2 Appropriate Assessment is required.

As will be described in Section 2.2, the preparation of the Maintenance Programme, the SEA and the AA will run concurrently with each process informing the others.

1.6 Expected Outcomes of the SEA/AA Process

The expected outcome of the SEA and the AA are:

- A robust, transparent report that demonstrates how the SEA and the AA influenced the arterial drainage maintenance activities
- Mitigation measures that, in association with the OPW Environmental Guidance: Drainage Maintenance & Construction Manual, will protect the environment
- The establishment of a monitoring programme to demonstrate the effectiveness of the mitigation measures and the Standard Operating Procedures in the OPW’s Environmental Guidance document.

2 SEA Methodology

2.1 The SEA Directive

The SEA Directive was adopted in 2004 with the aim to:

'Provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development.'

The environmental assessment which is carried out on a plan or programme before it is implemented, enables the plan or the programme to be amended to meet the high-level environmental objectives. The process allows the plan/programme making team to interact with the SEA team and the Appropriate Assessment team.

The SEA for the proposed Arterial Drainage Maintenance 2022-2027 will be assessed against several environmental objectives with a view to determining if the Maintenance Programme supports or conflicts with these environmental objectives. A monitoring programme will be initiated when the Arterial Drainage Programme is adapted by the OPW. This monitoring programme will facilitate early intervention if it is determined that the Programme is impacting on the environment.

2.2 The SEA Process

The stages involved for the preparation of the SEA for the Arterial Drainage Maintenance Programme is shown in Figure 2-1. The stages have been described in Section 1.3 of this report.

This process is consistent with the recommendations of the Environmental Protection Agency (EPA) publications listed in Section 1.2 and Government guidelines on SEA's.

Newly constructed Flood Relief Schemes are outside the scope of the Arterial Drainage Maintenance Activities (2022-2027) and will be recommended through other programmes such as the Catchment Flood Risk Assessment and Management Studies (CFRAMS) programme. New Flood Relief Schemes will require a project specific Environmental Impact Assessment (EIA) in accordance with the EIA Directive (EU Directive 85/337/EEC).

2.3 Consultation with Statutory Bodies

This Scoping Report forms the first step in the consultation process. The consultation meets the requirements of the SEA Regulations and the Aarhus Convention. The list of Statutory Bodies to be consulted as per the requirements of the Regulations are:

- Minister for Arts, Heritage and Gaeltacht Affairs
- Environmental Protection Agency
- Minister for the Environment, Community and Local Government
- Minister for Agriculture, Marine and Food
- Minister for Communications, Marine and Natural Resources.

Consultation will continue throughout the SEA process to allow the statutory bodies and interested stakeholders an input in the process. The draft Environmental Report (Stage 3b in Figure 2.1 above) will be put on public display along with the draft Arterial Drainage Maintenance List of Activities (2022-2027) to allow for public consultation and comment. Submissions received from the statutory consultees or other stakeholders will be reviewed and amendments made to the draft Environmental Report to reflect same. The final adapted Environmental Report and SEA Statement will demonstrate where and how stakeholders, concerns were addressed.

The Scoping Report will be sent to the Statutory Consultees, and they will have 4 weeks to make a submission/observation on the Scoping Report.

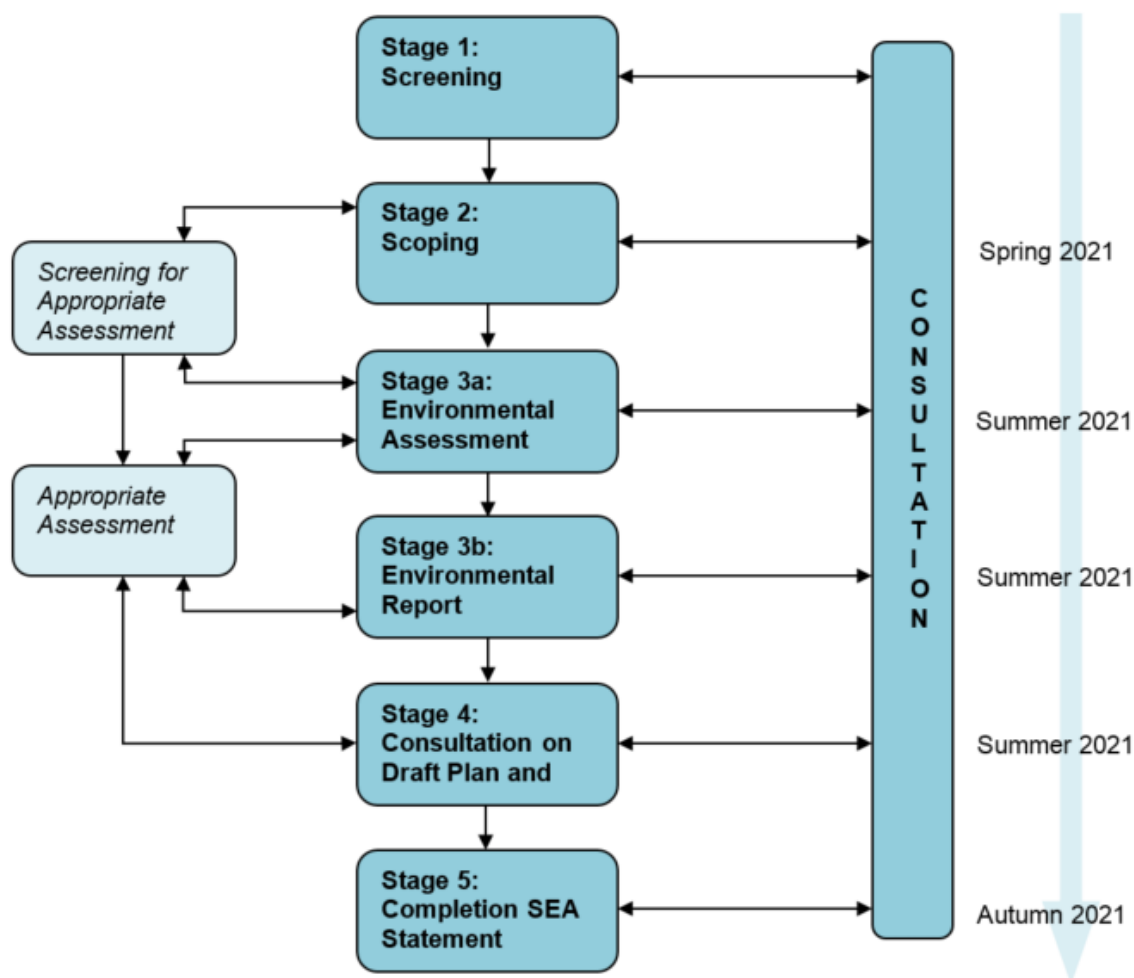


Figure 2-1: Stages in the Preparation of the SEA

2.4 Appropriate Assessment

As shown in Figure 2.1 above, a further aspect of the SEA and programme development process is to ensure compliance with the provisions of the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) and Birds Directive (Council Directive 79/409/EEC on the conservation of wild birds) through the undertaking of an Appropriate Assessment.

The requirements of these directives are transposed into Irish law through the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011).

The Habitats Directive requires that, in relation to European designated sites (i.e. Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) that form the Natura 2000 network), "any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives".

The initial, screening stage of the Appropriate Assessment is to determine whether; (a) the proposed Arterial Drainage Maintenance Activities (2022-2027) are directly connected with or necessary for the management of the European designated site for nature conservation; and (b) it is likely to have a significant adverse effect on the European designated site, either individually or in combination with other plans or projects. As the proposed works or maintenance activities are not connected with or necessary for the nature conservation management of European designated sites, the screening exercise will focus on assessing the likely significant adverse effects of the proposals on European designated sites. This screening process has already begun, through the collation of baseline information, and will be finalised in a Screening Statement.

For those sites where potential adverse impacts are identified, either alone or in combination with other plans or projects, further assessment is necessary to determine if the proposals will have an adverse impact on the integrity of a European designated site, in view of the site's conservation objectives. This process requires a more in-depth evaluation of the proposals and potential direct and indirect impacts of them on the interest features of the European designated site and where required, mitigation or avoidance measures are suggested. The information from this assessment will be detailed in a Natura Impact Statement (NIS), which will allow the competent authority to conduct an Appropriate Assessment. The competent authority can only agree to the proposals only after having ascertained that it will not adversely affect the integrity of the site concerned. If this cannot be determined then alternative solutions will need to be considered, if none can be found, the plan will only be allowed to progress if imperative reasons of overriding public interest for allowing the plan to have an adverse impact on a European designated site can be demonstrated; it is likely that compensatory measures would be necessary in this situation.

The Appropriate Assessment will be carried out in parallel to the SEA process, the findings used to guide the development of alternative options for the Arterial Drainage Maintenance Activities. The assessment will consider possible impacts on European designated sites that could be affected by recommendations of the plan, including consideration of potential downstream impacts on internationally designated conservation sites. The process consultation will be undertaken with the National Parks and Wildlife Service (NPWS).

2.5 Climate Change

The SEA Directive provides SEA practitioners and Statutory Bodies with a statutory framework to integrate climate-related policies/objectives into plans and programmes. JBA will consider the guidance provided by the EPA in their document titled Integrating Climate Change into Strategic Environmental Assessment in Ireland (2015). The guidance documents recommends that:

- Environmental (climatic) baselines are provided and considered
- The development of climate change Environmental Objectives
- Identify environmental vulnerabilities that may be significantly affected by climate change
- Consideration of climate change and ways to reduce it by means of mitigation measures.

2.6 SEA Guidance, Methodology, and integration of other assessments

The following guidance documents will be used and referenced in the preparation of the SEA:

- SEA Spatial Information Sources Inventory, June 2019, Environmental Protection Agency.
- Strategic Environmental Assessment (SEA) Pack, 2018, Environmental Protection Agency.
- SEA Effectiveness Review in Ireland - Action Plan 2018-2020.
- GISEA Manual, 2017, Environmental Protection Agency.
- SEA Scoping Guidance Document, 2017, Environmental Protection Agency.
- Integrating Climate Change into Strategic Environmental Assessment in Ireland - A Guidance Note, June 2019, Environmental Protection Agency.
- Implementation of SEA Directive (2001/42/EC). Assessment of Certain Plans and Programmes on the Environment. Guidelines for Regional Planning Authorities. November 2004. Department of Environment, Heritage and Local Government.
- Developing and Assessing Alternatives in Strategic Environmental Assessment – Good Practice Guidance, 2015, Environmental Protection Agency.
- Strategic Environmental Assessment (SEA) Checklist - 2008. Environmental Protection Agency.
- Integrated Biodiversity Impact Assessment – Streamlining AA, SEA and EIA Processes: Practitioner’s Manual. EPA Strive Programme 2007-2013. Strive Report Series No. 106.
- Development and Assessing Alternatives in SEA - EPA, 2015.
- GISEA Manual - Improving the Evidence Base in SEA - EPA, 2017.
- Guidance on SEA Statements and Monitoring - EPA, 2020.
- SEA Spatial Information Sources Inventory - EPA, 2021.

JBA will use the Environmental Sensitivity Mapping (ESM) to examine the baseline information available for biodiversity, water quality indicators layers to identify area of the country that are sensitive to change. This tool was developed by the EPA/AIRO/OSI/UCD as a decision support tool for environmental assessment and SEA.

2.7 What happens next?

This Scoping Report will be uploaded onto the OPW website. The Statutory Consultees will be informed by letter inviting them to make a submission on the Scoping Report. Members of the public or interested stakeholders can also make submissions.

3 Description of the Proposed Programme

3.1 Introduction

There is no statutory requirement under the Arterial Drainage Acts 1945 & 1995, to produce a 'Plan or Programme', for Arterial Drainage Maintenance. Following a SEA screening and consulting with the Environmental Protection Agency (EPA) some years ago, it was decided that a SEA for the ongoing Arterial Drainage Maintenance Activities in Ireland was required.

Under the Arterial Drainage Acts, 1945 and 1995, the Commissioner of Public Works has a statutory requirement to maintain all drainage works under the Scheme. The drainage works includes watercourses, embankments, and other structures. Watercourses are subject to siltation and erosion, while embankments are subject to settlement and erosion.

An annual programme of maintenance is compiled to maintain the drainage watercourses which are prioritised based on the rate of deterioration and the risk arising. Every year approximately one-fifth of the watercourses are maintained.

3.1.1 Timescale

The 2022-2027 timescale has been adopted to facilitate the coordination with the 3rd River Basin Management Plans (RBMP). In the water management sector, the Water Framework Directive (WFD) and the Floods Directive set six-year cycles. The current (3rd) WFD programme covers 2021-2026.

3.2 Arterial Drainage Maintenance

3.2.1 The Arterial Drainage Scheme

The Office of Public Works (OPW) is the body which exercises the statutory responsibility in respect to river drainage and flood relief works. The scope of the Arterial Drainage Maintenance Activities (2022-2027) covers all the schemes listed in Table 3.1, which forms the spatial extent of the activities for the SEA.

Table 3-1: OPW Schemes carried out under the Arterial Drainage Acts 1945 & 1995.

Scheme	Duration of Works	Areas Benefiting (hectares)
Major Schemes (River Catchments over 100,000 acres in extent)		
Brosna	1948-1955	3,4883
Glyde & Dee	1950-1957	1,0643
Feale	1951-1959	1,0724
Corrib-Clare	1951-1959	1,0724
Maine	1954-1964	3,0310
Inny	1959-1963	4,694
Deel	1962-1968	2,0234
Moy	1960-1971	4,816
Corrib-Headford	1967-1973	24,685
Boyne	1969-1986	48157
Maigue	1973-1986	12,343
Corrib-Mask	1979-1986	9,712
Boyle	1982-1992	1,0845
Blackwater (Monaghan)	1984-1992	2,367
Minor Schemes (River Catchment 25,000-1000,000 acres)		
Nenagh	1955-1960	2,630
Ballyteige/Kilmore	1959-1961	931
Broadmeadow & Ward	1961-1964	2,995
Killimor/Cappagh	1962-1968	5,099
Bonet	1982-1992	1,295

Scheme	Duration of Works	Areas Benefiting (hectares)
Other Small Schemes (River Catchment less than 25,000 acres)		
Clareen	1959-1961	445
Ouvane	1962-1963	162
Matt	1964-1965	202
Duff	1963-1965	1,457
Brickey	1965-1967	405
Abbey	1964-1967	364
Knockcroghery	1967-1968	202
Creagh	1968-1969	405
Burnfoot/Skeoge	1968-1970	162
Kilcoo	1969-1971	162
Owenavorrigh	1968-1970	1,052
Carrigahorig	1968-1971	1,538
Groody	1970-1973	1,214
Deel and Swillyburn	1957-1961	1,416
Cloonburn	1967-1968	162
Estuarine Embankment Schemes		
Shannon (Limerick)	1962-1971	4,897
Shannon (Clare)	1958-1960	728
Fergus	1959-1960	728
Owenogarney	1955-1959	850
Swilly etc	1961-1968	1,295
Flood Relief Scheme		Year Completed
Belclare, Clare River		1995
Gort Town, Co. Galway		997
Sixmilebridge, Co. Clare		1997
Lacken (Ardraham), Co. Galway		1997
Nanny River, Duleek, Co. Meath		1998
Mulkear River, Newport, Co. Tipperary		1998
Ballymakeogh, Co. Tipperary		1998
Mulkear River, Cappaghmore, Co. Limerick		2000
Bridge End, Co. Donegal		2000
Dromcollogher, Co. Limerick		2000
Bandon River, Dunmanway, Co. Cork		2001
Shinkeen Stream, Hazelhatch, Co. Kildare		2001
Maam Valley, Co. Galway		2001
Morrell River, Maynooth, Co. kildare		2003
Suir River, Carrick-on-Suir, Co. Tipperary		2003
Nore River, Kilkenny		2006
Leixlip, Co. Kildare		2009
Ennis, Co. Clare		2013
Carlow, Co. Carlow		2013
Johnstown, Co. Meath		2012
Mornington, Co. Meath		2012
Tullamore, Co. Offaly		2013
Clonmel, Co. Tipperary		2014
Fermoy, Co. Cork		2015
Mallow, Co. Cork		2016

3.2.2 OPW Roles and Responsibilities

Under Section 37 of the Arterial Drainage Act 1945, the OPW is statutorily obliged to maintain rivers, embankments, and urban flood defences on which it has executed works since the 1945 Act. Maintenance referred to under the Arterial Drainage Act 1945 Act 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 lands 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 and tidal flap gates.

The Arterial Drainage Act uses the terms "proper repair and effective condition". The performance criteria relate to the design standard of the original Scheme works, its condition and performance of the various watercourses, embankments, etc.

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

It is important to note, that maintenance activities are necessary because the original drainage works has resulted in unstable catchment sediment regimes, where upstream sediment load has increased as drained land is used for agriculture and increased in-channel sediment deposition through widening and deepening river channels. Over time, the channels will experience increased deposition and nutrient input resulting in deficiency of the overall scheme due to changes in the conditions of the channels and the risk that drained channels will revert to their pre-drainage condition.

3.2.3 List of Activities

The National Arterial Drainage Maintenance 2022-2027 activities include:

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

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, pumping stations, and tidal barrages.

Most of the 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 others only require maintenance once every twenty years.

Channel Maintenance

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 only need maintenance every 20-years. The activities involve the following:

- Removal of water-entrained silt and associated vegetation from the bed of the channel by hydraulic excavators
- Bank Protection: Re-profiling the bank in-situ or importing protection material such as rock armour or log poles in case of channel breaches due to erosion.
- Bush cutting/branch trimming/tree cutting: Trimming or removal of trees or branches that may be impinging on channel.
- Aquatic Vegetation Cutting: For wide channels weed-cutting boats are used.

When developing a programme, consideration is given to impacts on fisheries and Natura 2000 Sites. Consultations are carried out with Inland Fisheries Ireland and National Parks and Wildlife Services.

Embankment Activities 2022-2027

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. The works are carried out by direct labour or contract.

Structural Maintenance Activities 2022-2027

Bridges provide farmers with farm vehicular or foot access across Arterial Drainage Scheme Channels. Inspections are carried out to assess necessity of repair or replacement of structures. Approximately 170 bridges are repaired/replaced annually. Other structures such as gates, barrages, and pumping stations are also maintained or repaired.

Flood Relief Scheme Maintenance Activities 2022-2027

All Flood Relief Schemes have a statutory maintenance requirement. The need for maintenance is identified at a regional level on an annual basis. Activities vary depending on the characterisation of the Scheme, durable structural works may require minimum maintenance, and however other schemes may require continued maintenance. Activities may vary, and include:

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

Programme Exclusion

The National Arterial Drainage Maintenance Activities 2022-2027 activities does not include maintenance of the following:

- Newly constructed Arterial Drainage Scheme
- Catchment Flood Risk Assessment & Management Studies (CFRAM)
- New Flood Relief Schemes, which entail public exhibition and Ministerial Approval.
- Drainage Districts that are the responsibility of Local Authorities.

3.3 Environmental Management and Maintenance Planning

The maintenance function of the OPW is divided into three regions for the purpose of programming and executing the work. The East Region main office is in Newtown, Trim, Co. Meath with four sub-offices in Ardee, Monaghan, Mullingar, and Wexford. The Southwest region main office is in Templemungret, Co. Limerick with two sub-offices in Listowel and Portumna. The West region main office is in Headford, Co. Galway with two sub-offices in Ballina and Lifford.

Every year, each Arterial Drainage Maintenance Region produces a draft Annual Drainage Maintenance Programme for the upcoming year. The proposed works are indicated for each channel under the headings A-F, as per Table 1.3 of the Environmental Guidance: Drainage Maintenance & Construction, 2019:

- A - Silt and vegetation management
- B - Aquatic Vegetation Cutting
- C - Bank Protection
- D - Bush Cutting/Branch Trimming
- E - Tree Cutting
- F - Other. This category includes mulching embankment, mowing embankment, gate installation, sluice maintenance, bridge maintenance and spraying with herbicide.

The drainage maintenance subcategories are shown in Table 3-2 below (as per Table 1.4 of the OPW's Environmental Guidance Manual, 2019).

Table 3-2: Drainage Maintenance Subcategories.

Drainage Maintenance Subcategories		
Channel Maintenance	Silt and Vegetation management	A
	Aquatic vegetation cutting	B
	Bank Protection	C
	Brush cutting/branch trimming	D
	Tree cutting	E
	Other	F
Embankment Maintenance	Brush cutting/branch trimming	D
	Tree cutting	E
	Spraying with herbicide	F
	Mulching	F
	Mowing	F
	Gate Installation	F
Structural Maintenance	Sluice Maintenance	F
	Bridge Maintenance	F
	Spraying with Herbicide	F
	Bank Protection	C
	Brush cutting/branch trimming	D
	Tree cutting	E

Environmental management of the OPW's arterial drainage work is captured in the OPW's publication 'Environmental Guidance: Drainage Maintenance & Construction, 2019'. In summary, the OPW recognises its statutory function and the importance of protecting sensitive habitats and the environment whilst undertaking these tasks. It recognises the benefits of the Drainage Maintenance Schemes by providing benefiting land to agriculture, avoiding increased flooding, protecting humans and properties. The Guidance Document aims to deliver good drainage and flood relief functions while reducing the associated environmental impacts. The Guidance Document is aimed at providing all levels in the OPW with tools and Environmental Procedures (EP) to carry out their activities in an environmentally sustainable fashion. The guidance and procedures are designed as best practice and are subject to updating depending on the experiences gained or advances in technologies to control environmental impacts. The OPW progresses its works with a framework of five-year Appropriate Assessments, site specific Appropriate Assessments, Ecological Impact Assessments and Construction Environmental Management Plans for large construction projects. The Guidance Document is divided into several sections that are relevant for drainage maintenance management, operational staff, and construction staff. A summary of the contents of the Guidance Document is provided below. The document is available [here](#) to view.

A summary of the Guidance Document is given in the following section.

3.3.1 Section 1A: Drainage Maintenance Planning Procedures

This requires the Regional Management Staff and Environmental Section to carry out an Environmental Risk Assessment (as per Procedure EP2 of the OPW's Environmental Guidance Manual) on the proposed work site. The purpose of the environmental risk assessment is to identify sensitive sites that may require further assessment in addition to the 5-year AA framework.

The OPW Environmental Section reviews the draft programme for the upcoming years including timing, season, month, and duration of the works.

The frequency of maintenance is usually driven by a 5-year cycle or specific landowner requests. Prior to maintenance activity, the operators and foremen are provided with maps and details of the information in the OPWs drainage maintenance species and habitats GIS layers. It is the decision of the driver how to undertake the maintenance using established maintenance access corridors or whether further access to the watercourse or embankments are required.

3.3.2 Section 1B : Drainage Maintenance Implementation Procedures

This section of the Guidance manual relates to the practical delivery of the works and is referred to by management and operational staff. Like the 'Red Book' it has several new procedures and older programmes such as the Environmental River Enhancement Programme (EREP) are retained. New procedures on mapping information and tree management, silt and bank protection are included. The document encourages delivery of environmentally sensitive systems of work that will protect the environment and Natura 2000 sites.

3.3.3 Section 2: Construction Procedures

This section relates to the planning and implementation of construction works. Procedures relevant to silt control, culvert construction (EP 16) and water pollution controls (EF 17) during construction are provided.

3.3.4 Section 3: Invasive Species Procedures

Methods for dealing with invasive species including Standard Biosecurity and High Biosecurity methods to water borne larvae and pathogens are included in this part of the Guidance Manual. Procedures for boat cleaning (EF 18C) and invasive plants treatment (EF 18 D) are also given.

3.3.5 Section 4: Animal and Plant Procedures

Much of this section of the Guidance manual reflects the earlier 'Red Book' processes for protecting legally recognised wildlife. Additional procedures and updates are provided for the protection of badgers, bats, and rare plants. These include:

- EP 19 Salmonid
- EP 20 Otter
- EP 21 Lamprey
- EP22 Crayfish
- EF 23 Badger
- EF 24 Bank Nesting Birds
- EF 26 Bats
- EF 27 Rare Plants
- EF 28 Fresh Water Pearl Mussel
- EF 29 Swan and Duck Mussel.

3.3.6 Section 5 Habitat Procedures

The protection of important habitats is addressed in this section, and several procedures are given to reduce/avoid these impacts. There are procedures for Alluvial woodland (EP 30), Wetland (EP 31), Mudflat (EP 32) and Floating River Vegetation (EP 33).

Appropriate Assessments

All Arterial Drainage Schemes are subject Appropriate Assessment of the five-year drainage maintenance programme. The OPW issues relevant completed assessments directly to the NPWS District Conservation Officer and issues all assessments to the Development Applications Unit (DAU), Department of Arts, Heritage, and the Gaeltacht.

Management staff are responsible for implementing all prescribed mitigating measures and ensuring that operational staff are made aware of all relevant site-specific mitigating measures.

Environmental River Enhancement Programme (EREP)

Sites identified for river enhancement projects will be subject to hydromorphological surveys to ensure the enhancements are technically feasible, along with other screening processes (i.e., Water Framework Directive Programme of Measures under the requirements for morphology). Some sites will be prioritised based on best return for investment. In all cases, Inland Fisheries Ireland (IFI) is the statutory authority to give design guidance to the OPW. Angling Clubs or other sectoral funding source can liaise with IFI authorities in respect to the design and environmental monitoring requirements.

As part of EREP projects, team members are required to carry out walkover surveys as an opportunity to discuss in detail on site, the potential options for river enhancement. In attendance are members of IFI and OPW. The walkovers serve to reinforce learnings from training on same, as well as to provoke discussions on opportunities for river enhancement of fisheries habitat, following the Environmental River Enhancement SOP. This collaborative approach promotes opportunities for OPW foremen/drivers to implement enhancement strategies on similar channels on their upcoming work programme. In 2020 several walkover surveys were carried out:

- Kilroe River (CH1) Corrib Scheme
- Ballaghtrillick River (C1/8) - Duff Scheme
- Mountain Water (C1/3) - Blackwater Scheme.

In 2021, it is proposed to focus on catchment wide RHAT results and the scope for arterial drainage maintenance practices to positively influence RHAT outcomes. Efforts will be made to streamline data collection into a mobile web-mapping application, enabling quicker data compilation and analysis. Walkovers will continue in 2021, with input not just from the two public authorities involved in the EREP, but also LawPro, where waterbodies of interest are overlapping with their priority areas for action. Specific walkovers with the OPW Environment Section will highlight areas of hydromorphology which have the potential for improvement with optimal application of the Environmental Drainage Maintenance procedures.

In 2020, IFI and OPW undertook a study at Stonyford River with the aims to quantify the effects of a commonly adapted stream rehabilitation methodology (fencing) on a hydromorphologically altered stream. Stonyford River forms part of the Boyne Arterial Drainage Scheme. The study found that the findings raise important points of relevance to management of OPW channels namely:

- Vegetation is a key component of river function and associated instream habitats
- Relatively short maintenance cycles may encourage the proliferation of excessive vegetation, ultimately reducing conveyance capacity
- Arising from the mitigation of channel pressures, the river will re-naturalise over a short timeframe.

The study also identified some key issues which can be considered in the management of arterially drained channels:

- Appropriate timing for maintenance cycles in rivers where instream vegetation proliferates
- Effective implementation of the Environmental Drainage Maintenance protocol's ten steps including berm management and selective vegetation removal
- The importance of working with the river's natural processes to retain diversity in channel bedforms, substrate type and flows
- Assess conveyance capacity of these stretches considering these developments
- Whether or not conveyance changes in the upper catchment have any implications for natural flood management strategies including 'slow the flow' campaign.

National Recording Process

Environmental Procedure 6 - Environmental Data and Usage, in the Guidance Document, ensures the gathering and use of environmental information. Record Cards are used by the operators and management staff to record information on the presence of Lamprey, Crayfish, Kingfishes, Mussels, Otter, invasive species, and other site-specific environmental information. When

recorded these cards are sent to the Environmental Section of the OPW. All the information is recorded into national database. Each drainage office is responsible to fill out the Weekly Record Cards. Once input is reviewed and approved, the database is accessible to all offices. Any additional information in relation to a particular species such as mitigating agreements for a particular channel, or individual observations (i.e., protected species present) will be included in the database.

Environmental Drainage Maintenance (EDM) Guidelines

Operational crews are audited annually for implementation of the EDM guidelines and environmental operating procedures (SOPs). The auditing will be carried out separately by both IFI and OPW Environment Section on a rotational basis to ensure all operational crews are audited at least once every three years.

The OPW and IFI, summarised the Environmental Strategies for Channel Maintenance into the following 10 steps:

1. Protecting bank slope
2. Restrict maintenance to channel
3. Spoil Management
4. Vegetation Management
5. Leaving sections untouched
6. Tree Management
7. Berm Management to form two stage channels
8. Replacing stone and boulders back in the channel
9. Gravel bed channels
10. Re-profiling the channel bed.

There are also additional mitigation measures recommended for different stages of maintenance works. These include skipping sections of the channel to retain intact habitat, avoidance of secondary disturbance downstream, proposal of longer periods between maintenance, timing maintenance to accommodate spawning or breeding seasons, among others.

Salmonids

Maintenance of the channel must be in accordance with Salmon and Trout Spawning Season. The location of the works must accommodate spawning areas. Activities on spawning beds are carried out from July to September. Prior to works, the local IFI must be consulted. River enhancement works to improve fisheries and broader ecology are covered under the EREP programme.

Lamprey (EP 21)

The presence of Lamprey must be checked using the OPWs Environmental Mapping for previous records of Lamprey before any in-channel work takes place. If new Lamprey are encountered, the machine driver informs the Foreman, and the location and abundance of Lamprey should be noted in a Weekly Record Card. To reduce potential impacts three approaches are suggested such as skip a defined stretch of channel, confine maintenance to 2/3 of the channel to retain marginal vegetation and silt intact and maximise the use of weed cutting buckets.

Crayfish (EP 22)

The presence of Crayfish must be checked before any in-channel work takes place. If Crayfish are encountered, several members of staff should be notified (Foreman, Engineer) and the location and abundance of Crayfish should be noted in a Weekly Record Card. To reduce potential impacts, three approaches are suggested: skip a defined stretch of channel, confine maintenance to 2/3 of the channel to retain marginal vegetation and silt intact and maximise the use of weed cutting buckets.

Otter (EP 20)

Otters are widespread across all sizes of drainage channels nationally. Operational staff should walkover the site one week before the maintenance commences. Dense areas with access directly

to water should be noted and avoided where feasible. If there are any recognisable signs of otter presence observed such as spraints, footprints, or suspected Holts. If any features have been found, no maintenance activities should take place within 30m or 150m if a breeding holt is found.

Freshwater Pearl Mussel (FWPM) (EP 28)

According to NPWS, there are 91 known FWPM populations in Ireland, nine of which are OPW channels. There are no in-stream works allowed in an area recognised as a FWPM habitat, typically only non-in-stream works adjacent to the channel are acceptable. Simple activities require special precaution to minimise channel bed disturbance. There is a need for silt management procedures for works upstream of the FWPM habitat.

Kingfisher

In areas known to hold populations of Kingfishers, the mitigation measures include avoiding nesting areas, and visual sighting of kingfisher must be recorded on Weekly Report Cards. All sightings must be recorded on the Record Database in accordance with the National Recording Process.

Birds (EP 24 and EP 25)

The removal of any abnormally dense layer of vegetation is to be executed between September and February to minimise impacts on nesting birds. If the channel is located within a Natura 2000 site containing valuable over-wintering bird populations, consultation with the NPWS must be undertaken to determine the timing and phasing of the works to limit disturbance.

Bats (EP 26)

In the case that the removal of a large tree is necessary for the maintenance works in an area known to have bats, it is essential to contract a bat specialist to carry out a survey before the works, to avoid disturbance.

Invasive Species (EP 18A, EP18B, EP 18C and EP 18D)

Multiple invasive species are spread nationally, and it can be assumed that one or more of these are present on any work sites. The most common species of invasive plants include Japanese Knotweed, Giant Hogweed, and Himalayan Balsam. The OPW does not have any direct responsibility for the management of invasive species. However, to ensure OPW operations are not a vector for these invasive, measures are required to reduce the risk of spreading.

Zebra Mussels are present in the River Shannon, Grand Canal, L Derg, L.Ree, L Garra, L. Derravaragh, L.Sheelin, and L. Corrib. Due to the quick spread of the species, any proposed work close to a river or lake that has potential to contain Zebra Mussels must be flagged and staff should pay special attention to cleaning procedures for all equipment, prior to removal from site.

Wetlands - Bogs, Fenlands and Turloghs (EP 30, EP 31)

All channels located within an SAC must be checked against the list of channels that impinge on Raised Bog, Fen habitat, Turlough and have regard to any NPWS agreements. In the case where impact is likely, conduct necessary site visit in consultation with NPWS to determine mitigation measures, such as: skipping channel in questions, while recognising the flood risk management requirements, maximising use of weed bucket, and inspection by OPW line management to determine the likelihood of over-digging the channel below the original design datum.

Tree Management

Site with dense tree cover may require maintenance for conveyance or fisheries purposes. Removal of dense layers or vegetation can only be executed between September and February, to minimise disturbance on nesting birds. IFI might request tree management to reduce "tunnelling" on drainage channels. To facilitate the request, OPW management staff and IFI officer carry out a site visit, where they propose a selective approach to tree removal, which maintains a dappling of shade along the channel.

Maintenance Access Corridors (MAC)

The OPW is statutory required to maintain all Arterial Drainage Schemes in `proper repair and effective condition` to reduce to flood risk. The Maintenance Access Corridor (MAC) is to allow for drainage maintenance operations along each channel on one or both riverbanks.

3.4 Mitigation and Monitoring

All the maintenance works carried out as part of this programme are done with OPWs Environmental Management Protocols. There are various approaches taken by the OPW to promote environmental management such as the introduction of EREP and the provision of ongoing environmental training to staff.

Geographic Information Systems (GIS) tools are used to manage both existing and future environmental data, which allows for a rapid and accurate transfer of geographical environmental information.

The Arterial Drainage Programme is screened for potential impacts on Natura 2000 sites. If drainage maintenance on OPW scheme channel is identified as having the potential to impact on a Natura 2000 site, then the site is subject to Appropriate Assessment under Article 6(3) of the Habitats Directive. A national framework has been set up where Arterial Drainage Maintenance activities undergo an Appropriate Assessment for a 5-year period. Each scheme undergoes an AA and all prescribed mitigation measures are disclosed in programme plan.

The ecological consultant carries out walkover surveys on all channels that are within the boundary of Natura 2000 sites plus 100 m outside this boundary to gather sufficient data to inform the AA process. The completed assessment will be issued to NPWS and the Department of Arts, Heritage, and the Gaeltacht.

3.4.1 Monitoring Programme

The monitoring of Arterial Drainage Maintenance Activities is made-up of two components:

- On-site implementation of OPWs Environmental Management Protocols and Standard Operating Procedures.
- Scientific monitoring programme carried out under EREP, assessing impacts of routine maintenance and capital enhancement projects on the river corridor biodiversity.

The OPW in coordination with Inland Fisheries Ireland (IFI) have an ongoing research programme to assess the impacts of Arterial Drainage Maintenance Activities and the Environmental River Enhancement Programme (EREP) on the river corridor biodiversity and hydromorphology. In addition, a Series of Ecological Assessments (EcIA) on Arterial Drainage Maintenance has been published of the effects of drainage maintenance activities on various ecological receptors including otter, Atlantic salmon, raised bogs, etc.

3.4.2 Auditing

The OPW employs the services of several consultants to undertake audits of their drainage works. During 2020, JBA carried out over 50 audits of the drainage maintenance work over all regions. The purpose of the audits is to ensure that the Standard Operating Procedures given in the Environmental Manual are adhered to. The audit form comprises details on:

- The site
- The channel names
- Operators
- Suitable habitats in the reach
- The presence of invasive species
- Works been carried out in the channel
- Spoil management techniques
- Vegetation management
- Tree Management
- Replacement of boulders/stone back into the channel
- Works on gravel bed channels
- New excavation works
- Scoring.

Auditors discuss the findings of the audit on-site with the operators and offer them guidance on specific issues that may arise. The audit findings are reported to the OPW with notes on recommended improvements if applicable.

All audit results are forwarded to the relevant engineer for that drainage scheme within two working weeks. In the event of an audit showing non-compliance with EDM guidelines and SOPs, the relevant engineer is notified within one working day.

The pie charts below provide a breakdown of the audit findings for 2020 and 2021. Findings per region are also provided.



Figure 3.1. Audit Findings 2020.

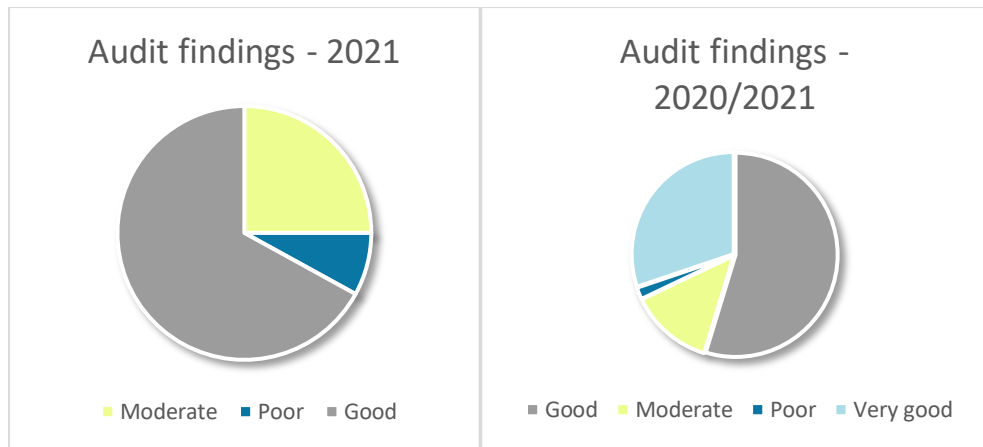


Figure 3-2. Audit Findings 2021.

Figure 3-3. Audit findings 2020/2021.

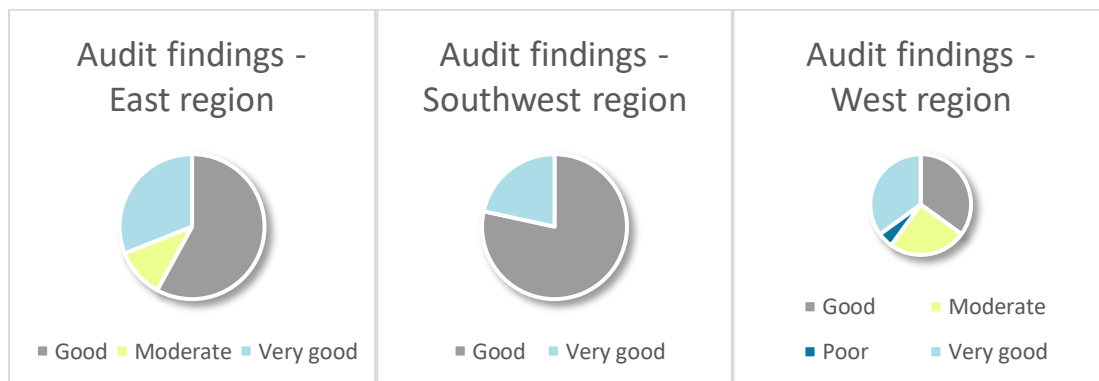


Figure 3-4. Audit Findings per Region, 2020 - 2021.

JBA assessed the findings of the Moderate audit reports and found that excessive vegetation removal, poor spoil management, and poor channel maintenance were the reason for the moderate scoring.

3.4.3 Scientific monitoring

The EREP biological monitoring programme is administered by the IFI and the programme assesses the impacts of routine maintenance and capital enhancement projects on the ecology of the river corridor. Flora and fauna (fish, birds, macro-invertebrates, lamprey, and crayfish) are monitored across various sites. The physical changes of the channels are also monitored. The monitoring programme is reviewed periodically and altered as required. The EREP Annual Reports are published on the IFI website (www.fisheriesireland.ie/publications).

3.4.4 Physical monitoring

Physical monitoring includes pre and post works monitoring of several variables such as bank-full width, wetted perimeter width, channel length, depth, velocity, and canopy cover.

EREP has included monitoring of hydromorphological conditions in its programme. The River Hydromorphology Assessment Technique (RHAT) monitoring system has been approved as the appropriate method to determine hydromorphological status. Other monitoring activities include:

- Floral monitoring: Aquatic (in-channel), marginal vegetation, and riparian vegetation. A walkover survey comprised of a species inventory, as well as tree survey.
- Macro-invertebrate monitoring: Sampling is carried out at both experimental and control sites, where species inventories are compiled.
- Fish sampling: The primary focus of EREP fish stock survey is salmon and sea trout, however, data from all species encountered during survey are recorded.
- Bird population studies: Key objective of bird surveys are to record abundance, species richness, and distribution of bird species in OPW channels and assess the impact of drainage on bird species.
- Lamprey and fish studies: OPW funded studies carried out by Central Fisheries Board to examine effects of Arterial Drainage Maintenance Activities on lamprey and white-clawed cray fish. The surveys include monitoring population size and age structure, prior to and in a series of years post maintenance.

4 Plan and Policy Context

4.1 Introduction

The SEA Regulations requires a demonstration of where the proposed plan or programme fits in with other plans, programmes, and policies. The Arterial Drainage Maintenance Activities (2022-2027) will influence, and will in turn be influenced by, several external statutory and non-statutory plans, strategies and policies and ongoing studies. Compliance with and support of environmental objectives and strategies of these plans and policies need to be considered in the preparation of this SEA. It is necessary to consider these interactions at all levels of the plan and policy-making hierarchy; European, National, Regional and Local.

4.2 Plan and Policy Context

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 4.1 shows 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.

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 4.1: Legislation, policies and plans/programmes adopted at the European, National and 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)
	CBD Convention on Biodiversity
	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 Flood Risk Management Plans
	2nd-Cycle River Basin Management plans, the 3rd RBMP when released in December 2021
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
	Wastewater 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 Raised Bog Special Areas of Conservation Management Plan 2017-2022
	National Planning Framework
	National Development Plan 2018 - 2027
	National Spatial Strategy (NSS) 2002 – 2020
	Capital Investment Plan 2016-2021
	National Biodiversity Plan
	Biodiversity Strategy to 2030
	All Ireland Pollinator Plan
	Strategy for Renewable Energy: 2012 – 2020
	A Framework for Sustainable Development for Ireland (Public Consultation Draft, 2011)
	National Climate Action Plan 2019
	European Green Deal
	Rural Environmental Protection Scheme (REPS)
	GRID25: A Strategy for the Development of Ireland's Electricity Grid for a Sustainable and Competitive Future
	Food Wise 2025: A vision for Irish Agri-food and fisheries
	Agri-Food Strategy, 2030
	Faite Irelands 10 Year Strategy
	National (Climate) Mitigation Plan
	Sectoral Climate Adaptation Plans 2018
	National Species Action Plans (SAPs) (for relevant species)
	Draft Plan for Forestry and Freshwater Pearl Mussel in Ireland
	Bord Na Mona Biodiversity Action Plan
	The Biodiversity Climate Change Sectoral Adaptation Plan 2019
	National Heritage Plan
	The Status of EU Protected Habitats and Species in Ireland (2019)
	OPW Minor Flood Mitigation Works Programme
	OPW Sectoral Climate Change and Mitigation Plan
	Second Nitrates Action Programme 2010-2013
	National Renewable Energy Action Plan to 2020
	<i>Delivering a Sustainable Energy Future for Ireland</i>
	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
	Food Wise 2025 and the associated Implementation Plan (DAFM)
	National Rural Development Programme 2014-2020 (DAFM)
	National Landscape Strategy for Ireland
	National Strategic Aquaculture Plan (DAFM)
	National Forestry Programme (DAFM) 2014 - 2020
	Land use, land-use change and forestry (LULUCF) regulation for 2021-2030
	Capital Investment Programme (Irish Water)
	Water Services Strategy
	Water Quality and Water Services Infrastructure Climate Change Sectoral Adaptation Plan (2019)
	National Wastewater Sludge Management Plan
	Wastewater 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, Iarnród Éireann; Bord na Mona; Irish Concrete Federation; ESB Networks; EirGrid; Bord Gáis 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
	WFD River Basin Management Planning (Third cycle underway)
	Groundwater Protection Schemes
	Loughs Agency
	Transport Strategy for the Greater Dublin Area 2015-2035 (NTA)
	Dublin Water Supply Project (DCC)
	Strategic Infrastructure Development Proposals
	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
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

5 Baseline Environment

5.1 Introduction

The following section outlines the environmental baseline, in line with the SEA Directive. The purpose of this part of the Scoping Report is to identify the existing environmental quality baseline for several environmental aspects. Based on baseline data and predicted trends, either positive or negative, JBA in agreement with the OPW has established several measurable Environmental Objectives against which the maintenance activities can be assessed. We have developed suitable indicators to measure the trends in the Environmental Objectives in the future. The purpose of the indicators is that they are measurable, and trends can be identified easily. The current trends of each receptor and interactions with the Arterial Drainage Maintenance Activities (2022-2027) is discussed.

In accordance with the legislation and guidance, the existing (baseline) environment is described with respect to populations and human health, biodiversity, water (surface, transitional, marine, and groundwater), air and climate, soils and geology, archaeology and cultural heritage, landscape, material assets (roads, transportation, energy etc) and the interaction of the above.

The Environmental Report (the next stage of the SEA process) will have a more detailed baseline assessment. The following section of this Scoping Report provides a brief description of the current state of the environment. The data sources that were interrogated to create the baseline assessment are given in Table 5-1.

Table 5-1: Baseline Data Sources

SEA Topic	Data Sources
Population and Human Health	Central Statistics Office, Census 2020 data EPA Geoportal Site
Biodiversity	National Parks and Wildlife Services (NPWS) database Ireland's National Biodiversity Plan EPA Geoportal Site Water Framework Directive website Invasive Species website National Biodiversity Data Centre
Water	Geological Survey of Ireland website EPA Geoportal website EPA Envision website National Catchment Flood Risk Management Programme (CFRAM) Water Framework Directive website. Catchments.ie website
Soils and Geology	Corine Land Cover and Land Use database Collite Forestry database Geological Survey of Ireland database Teagas Soil information
Archaeology & Cultural Heritage	National Monuments of Ireland database National Inventory of Architectural Heritage Record of Protected Structures
Air Quality & Climate Change	EPA Air Quality Database EPA's Prediction for Climate Change Sustainable Energy Ireland
Landscape	Landscape Character Area (County Development Plans) Corine Land Use Database

5.2 Environmental Sensitivity Mapping (ESM)

The data sources shown in Table 5.1 will be used by JBA, on behalf of the OPW, to formulate the baseline assessment for the environmental aspects. The Environmental Sensitivity Mapping (ESM) tool developed by the EPA, UCD, AIRO of Maynooth University and OSI will be used to support the SEA. ESM uses spatial data sets with specific layers attributed to a pre-defined

scientific score. A sensitivity map is generated when the layers are overlaid. A colour scale from green to orange to red is used to describe the sensitivity of the area.

5.3 Human Beings

The Republic of Ireland population estimate, based on the CSO statistical release of April 2020, is 4,977,400. The general trends witnessed between the 2011 and 2016 Irish census were (Table 5.):

- Increase in immigration and decrease in emigration,
- Decrease in the rate of natural increase (the subtraction of crude birth rate and crude death rate),
- Overall population growth from 4.6 million (2011) to 4.7 million (2016).

The 2019 and 2020 (CSO year ending estimates) show (Table 5.) a less significant variation in population changes with a:

- Slight decrease in immigration,
- Slight increase in emigration.

The 2020 release was compiled during the COVID-19 pandemic; however, it does not fully reflect the social and demographic impacts of COVID-19 as much of the reference period predates the beginning of the pandemic.

Table 5.2. CSO Statistical Release: August 2020 (Source: CSO, 2020)

	Census		Year Ending	
	2011	2016	April 2019	April 2020
Immigration	53,300	82,346	88,600	85,400
Emigration	80,600	66,200	54,900	56,500
Net Migration	-27,300	16,200	33,700	28,900
Natural Increase	47,500	35,600	30,800	27,100
Population Change	20,100	51,800	64,500	55,900
Population	4,588,252	4,739,600	4,921,500	4,977,400

Housing

In comparison with the rest of Europe, the population of Ireland continues to be relatively sparse, with approximately 60 persons per square kilometre as opposed to the EU's average of 108.8 persons per square kilometre (Eurostat, 2020). In more recent years, the Irish population has become more urbanised, especially around major cities.

The number of private households in permanent housing units in 2016 are displayed in Table 5.3. Rural areas would likely have more detached houses, as opposed to towns or cities which would have a mixture of housing units (semi-detached houses, terraced houses, flats, etc).

Table 5.3. Private households in permanent housing units (number) by Type of Private Accommodation, Census Year 2016 (Source: CSO, 2016)

House Type	Private households
Detached house	715,133
Semi-detached house	471,948
Terraced house	284,569
Flat in purpose-built block	172,096
Flat in house or building	28,783
Bed Sit	3,266
Not stated	21,870
Total	1,697,665

The Arterial Drainage Maintenance Activities (2022-2027) aims to contribute to viable and sustainable communities through its contribution to flood risk management and land drainage. The activities related to embankments and flood relief schemes are intended to preserve or maintain

the level of flood risk to existing property, land, and material assets. For arterial drainage channels the maintenance activities preserve the Arterial Drainage Scheme drainage function to enable productive land use. It is estimated that the areas of benefitting land are approximately 647,500 acres nationwide. Arterial Drainage Schemes Maintenance of structures ensures continued access to land and road networks.

New developments and housing units should not be developed in floodplains or areas of high flood risk, especially if located in low-lying zones. The Irish Government recognises the threat of climate change and Local Authorities are required to implement measures, particularly in Development Plans and Strategic Development Polices, to adapt to climate change. Current Development plans contain several policies and objectives dealing with climate change. Current housing shortages will create pressure for rapid development and precautions (i.e., flood risk assessments) should be taken.

Workforce

Employment and industry patterns in Ireland are constantly changing due to economic variations. The broad industry groups in the labour force in the 2011 and 2016 census are listed below (Table 5.4). The major industry groups based on census year are health and social work; education; wholesale and retail trade; and manufacturing. The Arterial Drainage Maintenance Activities (2016-2021) could contribute to local and rural employment by helping maintain access to local services and transport networks as well as maintain the productivity of agriculture and forestry land and in placed also protect these from flooding. Programmes that work in conjunction with the Arterial Drainage Maintenance Activities (2022-2027) such as EREP (Environmental River Enhancement Program) aim to help improve channel conditions to enhance salmonid fisheries, benefiting the tourist and recreation sectors. The EREP also helps to improve the quality of the river corridor and habitat for many other species.

These figures do not reflect the changes that have taken place in the workforce because of the COVID-19 pandemic. Numbers working in retail trade, hotels and restaurants will have gone down because of restrictions. Construction has also been negatively impacted.

Table 5.4. Population aged 15 years and over in the labour force (number) by broad industrial group, and Census year (2011, 2016 and 2020). (Source: CSO, 2020).

Employment	2011	2016	2020
Agriculture, forestry, and fishing	94,247	89,116	100,000
Mining, quarrying and turf production	5,674	5,055	No Data
Manufacturing industries	193,080	201,315	No Data
Electricity, gas, and water supply	13,116	12,919	No Data
Construction	90,357	101,849	136,400
Wholesale and retail trade	265,751	266,673	316,100
Hotels and restaurants	103,560	116,918	133,100
Transport, storage, and communications	97,569	81,124	107,800
Banking and financial services	93,151	90,878	124,500
Real estate activities	8,378	9,044	No Data
Professional, scientific, and technical activities	92,868	113,522	145,700
Public administration and defence	113,521	105,929	122,400
Education	163,728	176,855	196,400
Health and Social Work	203,379	223,725	293,000
Other community, social and personal service activities	84,665	34,165	
Industry not stated	101,311	76,654	
Total at work	1,807,360	2,006,641	
Unemployed - looking for first regular job	34,166	31,434	
Unemployed - having lost or given up previous job	390,677	265,962	138,900
Total in labour force	2,232,203	2,304,037	2,306,200

Flooding

Water can act as a threat to human beings in the form of flooding which results in extensive environmental, economic, and social problems. Ireland has experienced periods of extreme

weather conditions in the past years that have resulted in coastal, fluvial, and pluvial flooding around the country, affecting buildings, residences, and causing extensive economic damages. The EU introduced the Flood Directive [2007/60/EC] that addressed management of flood risk and required member states to carry out Preliminary Flood Risk Assessments (PFRA), flood maps, and flood risk management plans. It was transposed into Irish law as S.I. No. 122 of 2010. The OPW and other bodies were given the responsibility of implementing the Directive through various programmes. As a result, the national Catchment Flood Risk Assessment and Management (CFRAM) programme started in 2011 in Ireland, made up of three phases: Preliminary Flood Risk Assessments (PFRAs), Catchment Flood Risk Assessment and Management (CFRAM) studies, and implementation and review. Since flooding has a moderate to severe effect on human beings, prevention measures and appropriate flood risk management plans are necessary and are continuing to be implemented in local, regional and towns throughout the country.

Arterial Drainage Maintenance Activities (2022-2027) aim to maintain the channels that were introduced in catchment areas for the purpose of preventing or substantially reducing the periodical flooding of lands or improving by drainage lands (OPW, 2009). There have been substantial social and economic benefits from the drainage of marginal land. Property, roads, and annual floods have been mitigated in areas where the Arterial Drainage Programme has been implemented. These channels need continuous monitoring over time due to changes in flow rates, sediment loading or accumulation, which could potentially increase flood risk. Arterial Drainage Maintenance Activities (2022-2027) involves the removal of build-up of foreign or natural material that impedes the free flow of water such as the removal of water-entrained silt and associated vegetation, or repairing channel breaches from erosion (OPW, 2009). These activities prevent the channel from deteriorating in the long-term and potentially increasing the risk of flooding. It should be noted that the design standard of flood alleviation schemes is usually the 1% AEP (Annual Exceedance Probability) in comparison to the 2% or 5% AEP level of protection provided by Arterial Drainage Schemes.

Landscape

Ireland is a popular tourist destination due to its beautiful landscape and views. Several policies, plans, and strategies have been introduced to ensure that these views are recognised and protected. The Planning and Development Act 2000 contains provisions that relate to the preservation and conservation of the landscape. Sections 10, 202, and 204 of the Act give local authorities the discretion to include objectives on the conservation of landscapes in Development Plans or the power to designate areas for protection. Other plans in place that recognise the importance of Irish landscapes are the National Landscape Strategy for Ireland 2015-2025, National Spatial Strategy (NSS) and National Guidelines. Many scenic views and routes in rural and urban landscapes around Ireland have been acknowledged in County Development Plans and several local authorities have prepared Landscape Characteristic Assessment Plans.

Amenity/Tourism/Recreation

The CSO suspended its tourism surveys at all airports and seaports in March 2020, in response to the COVID-19 pandemic. Tourism Ireland estimated that tourism dropped by 77% in 2020 due to the pandemic. The number of tourists lost in one year from 2019 to 2020 was 14 million in the Republic of Ireland. In 2019 Ireland had 18 million tourists, 2020 saw that number drop to 4.2 million tourists. Most tourists in Ireland in 2020 came from the UK (7 million in 2019) and 1.7 million in 2020. The number of Spanish tourists in 2020 was 400,000.

Rivers, lakes, and coastal areas are key components to tourism and recreation supporting activities such as bathing, sailing, recreational boating, bird watching, nature walks, and kayaking/canoeing. There are 135 designated bathing areas in Ireland with majority of the achieving a high quality of water and meeting the required EU standards. The revised Bathing Water Directive (2006/7/EC) prioritises human health, proactive management of water quality, and increased public participation. Inland recreational activities consist of golf, horse racing, hurling and Gaelic football, which are spread out throughout the country and have their own facilities throughout.

As a result of the COVID-19 pandemic, domestic, particularly local, tourism and recreation are more important than ever, with particular importance on outdoor activities such as nature walks. The maintenance of these amenities will be vital as the pandemic comes to an end.

Arterial Drainage Maintenance Activities (2022-2027) aim to protect existing waterside access for recreational and community facilities.

5.3.1 Future Trends

The general trend in terms of population growth and distributions in Ireland continues to be a slight annual increase in population and a movement towards larger towns and cities. The growth of population will create a pressure in urban fringes and rural areas. A rise in housing and infrastructure development will be needed to accommodate the population numbers and movement. This includes water infrastructure and the associated demand for abstraction and discharges of wastewater. The growing population will also require amenity and recreation areas. Waterbodies are likely to be areas of potential opportunity for informal and formal development. It is crucial to consider risk of flooding in future housing of recreational developments.

Tourism will likely begin to recover from the effects of the COVID-19 pandemic over the course of the proposed Maintenance Activities, with a greater focus on domestic tourism. Tourism points in rural areas can be beneficial socially and economically, as well requiring access road improvement and potentially more development.

Agriculture plays a significant part in Ireland's economy and the adaptation of the Food Wise 2025 has strengthened Ireland's vision of producing more 'green' food and dairy products. Food Wise 2025 has placed ambitious targets on food exports over the coming years and all agricultural land is now premium for food production. The OPW's Arterial Programme will help to ensure that flooding on agricultural land is minimised.

Now, Arterial Drainage Schemes benefit rural populations as it allows landowners to install field drainage, which reduces waterlogging of land and enables it to carry more livestock or produce higher crop yields. If the shift from rural to urban continues, it may be worth considering a shift of maintenance regime to more urban areas, however, this could conflict with agricultural productivity goals. Maintaining a close look at population dynamics will be essential for planning future Arterial Maintenance Activities.

5.3.2 Key Environmental Issues

In accordance with the SEA Regulations (S.I. 435 of 2004), consideration has been given to whether the environmental effects, both positive and negative, of the Arterial Drainage Maintenance Activities (2022-2027) are likely to be significant on each receptor. The following are key environmental issues to consider:

1. Some flood risk alleviation for residences near channels because of drainage and maintenance.
2. Arterial Drainage cannot eliminate the risk of flooding. Most of the schemes carried out by the OPW are aimed to reduce flooding of agricultural fields from the main channel on average at a 'three-year return' flood period. Therefore, flood risk from climate change and changes in land management practices (new developments in flood sensitive area) may not be mitigated through Arterial Drainage Maintenance Activities on channels.
3. It is important to consider the areas where the works are being carried out and their susceptibility to flooding. Consider residences/housing locations both upstream and downstream of the works. It is necessary to ensure that the works will not increase the risk of flooding (i.e., complete removal of treeline, increases erosion and in turn rate at which runoff and sediment can discharge to watercourses) by impacting the flows or removing areas of water accumulation/storage. The consideration of areas both upstream and downstream of the potential works is crucial. It is also important to recognise the benefit of drainage and its impact in flood risk management.
4. Recreational use of water-related tourism (fishing, bathing, navigation).
5. Reliance on tourism and recreation on natural, cultural, and heritage resources including landscape, rivers, loughs, and coasts.

5.4 Land-use

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.

Land use and land cover (LULC) describe the form and function of the natural land surface. Land cover is the physical description of the land and land use describes the terrestrial use from a human perspective based on socio-economic usage (EPA, 2012). In Ireland, the main source of LULC is the EPA and EEA CORINE (Co-Ordinated Information on the Environment) land cover data series, which have delivered maps in 1990, 2000, 2006, 2012, and 2018. Table 5-5 summarises the percentage of land use cover.

The main land cover type in Ireland is agriculture, which accounts for two-thirds of the national landmass (CORINE, 2018). Most 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, 2018). Despite increased development in Ireland, the country's landscape is predominantly rural and agricultural.

Table 5.5. Summary of 2006, 2012, and 2018 land cover statistics

CORINE Level 1	CLC 2006 %National Area	CLC 2012 % National Area	CLC 2018 % National Area
Artificial Surface	2.45	2.49	2.46
Agricultural Areas	68.25	68.13	66.68
Forest and semi-natural areas	11.37	11.49	12
Wetlands	15.79	11.49	14.68
Water	2.14	2.14	2.1

Agriculture

Arterial Drainage Schemes were implemented in Ireland by the Office of Public Works (OPW) to bring long-term improvement to agricultural incomes in river catchments. The works were designed to allow landowners to install field drainage, which reduced waterlogging of land, allowing for more areas for livestock grazing or production of higher crop yields. The scheme has the effect of reducing the duration and in some cases, incidences of flooding. Depending on the type of soil and the nature of the flooding problems, some land may improve directly because of the drainage, however, in most cases, waterlogged land will only improve if field drainage is installed. Projections of improvement due to Arterial Drainage estimated that approximately 88% of the target damaged land would be improved to the extent that it could carry extra livestock.

Agriculture continues to be the largest use of land in Ireland, with about two thirds of the land devoted to it (CORINE, 2018). The land is primarily used for silage, rough grazing, or grass for pasture, and it sustains various types of farming (dairy, meat, tillage). The Single Payment System (SPS), as part of the EU Common Agricultural Policy (CAP), places obligations on land managers to sustain good environmental conditions. For that reason, the Department of Agriculture, Food, and the Marine (DAFM) proposed the Rural Environmental Protection Schemes (REPS) for farmers to integrate environmental consideration with agricultural objectives to prevent negative impacts to the environment. A new REPS scheme was introduced by the Department in February 2021. The new scheme is aimed at environmental sustainability and the greenest farmers will net the biggest payments in the scheme. A pilot version is currently underway, and applications will be limited to a group of farmers until June 2021. The new REPS will be a marked departure from its predecessors, GLAS and AEOS. Payments will now be based on the environmental quality of fields and ditches. The REPS is a scheme aimed to rewards land managers for carrying out their farm management strategies in an environmental sound manner and to attempt to improve the environment in the existing farms (DAFM, 2008). A public consultation was carried out in early 2021 for a replacement of the GLAS scheme, with pilot projects set to take place in 2021. DAFM also promotes enhancement of farm management procedures and strategies. With production in mind, they proposed the Food Wise 2025 Plan. The guidelines suggest increasing productivity and primary output in the agriculture, fisheries, and forestry sector, enhancing market position, while also increasing export targets (DAFM, 2020). Arterial Drainage Maintenance is not a direct element of Food Wise 2025, as the focus of the plan is to increase productivity and bring about more efficient agricultural practices; however, the upkeep of the channels from degradation (vegetation and silt accumulation, obstruction, bank slippage), is necessary to ensure the drainage scheme channels maintain their original design condition to facilitate the drainage purpose.

Siltation and nutrient loading are impacts of agricultural practices caused because of bank erosion, cattle access to streams, and losses from tillage land. Runoff of pesticides, fertilisers, and animal nutrients are threats to water quality from agriculture, especially with the presence of field drainages. To determine the interaction of agricultural land use with watercourses various receptors should be monitored: responses to rainfall, water quality (pesticides, fertilisers, animal nutrients), and sediment regime change.

Peatland

Deposition of peat occurred in post-glacial periods associated with the start of warmer and wetter climatic conditions. Peat is an unconsolidated brown and black organic material made-up of decomposed and undecomposed plant matter accumulated in a waterlogged environment. Peat has a high-water content, averaging over 90% by volume.

There are three main types of peat deposits:

- Blanket Bog - composed of a carpet of flat, sloped, or undulating peat over a large area of land that is recharged by rainfall (in areas with >1,200 mm annually). The bog can be further divided into lowland blanket bogs (below 200mAOD) and mountain blanket bog (above 200mAOD). The soil tends to be acidic (approximate pH of 4.2) and can be 2 to 6m deep.
- Raised Bog - comprising dome shaped bogs that have developed in former lake basins (on top of fens) and recharged by rainfall (in areas with an annual rainfall between 800 to 900mm). The soil is acidic (pH 3.5).
- Fens - Made up of flat bogs that are found around lake margins and in waterlogged areas where there is supply of mineral rich groundwater. They develop into raised bogs when the supply of mineral rich water is cut off. Soil is alkaline (approximate pH of 7 to 8) and can be around 2m deep.

Currently, approximately one-fifth of land in Ireland is peatland, including raised bogs, blanket bogs, and fens. The Blanket Bog found in the West of Ireland is rare on a European scale. Peatlands are valuable ecosystems with rich flora and fauna, and they provide valuable ecosystem services such as value for biodiversity, regulation of climate change, water infiltration and supply, and important supply for human welfare. In addition, peatlands also provide a unique landscape which can be used for amenity activities for locals, visitors, or tourists. The degradation, damage, and inappropriate management of peatland has resulted in additional costs from increased flooding of properties and land, damage to rivers and lakes, losses in fisheries due to decreased fish spawning or nursery grounds, increased cost of water treatment and increased emission (NPWS, 2015). Natural peatlands act as long-term carbon storage, however, when peatland is cut, carbon dioxide (CO₂) and other greenhouse gases are released into the atmosphere. In addition, damage to peatland impacts water quality due to silt release from mechanical peatland harvesting, increasing nutrient loading from drained bogs and acidification from afforestation on bogs. NPWS Article 17 Report states that several peatland habitats remain in bad status with predicted ongoing declines. The assessment suggests that while internal drainage within a bog does cause drying out of the bog, the NPWS as part of the EU LIFE Raised Bog project and the National Raised Bog SAC Restoration Plan 2017-2022, has shown that arterial drainage channels can be maintained through and around the periphery of bogs provided they are not deepened. Bord na Móna has recently announced the cessation of peat production on all their bogs. Peat had been extracted from these Bord na Móna bogs under Integrated Pollution Control (IPC) licences issued and administered by the Environmental Protection Agency. As part of Condition-10 of this licence, decommissioning and rehabilitation must be carried out when industrial peat production ceases. Bord na Móna's accelerated decarbonisation strategy, and depending on the availability of government funding, the company has also committed to ambitious enhanced peatland decommissioning, rehabilitation, and restoration measures, targeting circa 33,000 hectares in over 80 Bord Na Móna bogs. Bord Na Mona's Peatland Action Scheme is aimed at optimising the climate action benefits of rewetting the former industrial peat production areas. The wetting of the peatlands will also benefit the creation and redevelopment of peatland habitats. Their Brown to Green Strategy is focused on assisting Ireland become carbon neutral by 2050.

In April 2021, the Minister for Heritage and Electoral Reform launched a two-month public consultation on the mid-term review of the National Peatland Strategy 2015 - 2025. The mid-term review provides a broad assessment of where the Strategy currently is, what it can achieve over the next five years, and, where necessary, to propose changes to the actions set out in the Strategy to refocus it in line with its overall goals and the current context. The Strategy has been developed in partnership between relevant Government Departments/State bodies and key stakeholders through the Peatlands Council. It is underlined by 25 key principles and commits to the undertaking of 32 actions across various sectors and themes, including, among others, Research, Tourism, Agriculture, Forestry, Conservation, Restoration, Peat Extraction, Energy, Water Quality and Climate Change.

Arterial Drainage Maintenance Activities (2022-2027) aim to return the arterial drainage rivers and channel to its intended original design conditions. The maintenance activities include the removal of obstructions, excess silt, and vegetation, and repairing bank damage or slippage. Although the direct impacts are not assumed to be significant, some of the Arterial Drainage Maintenance Activities (2022-2027) may impact on the hydrology of peatland. The lowering of the local water table can benefit and encourage peat cutting which can result in the drying out of the uppermost peat, increasing temperature, oxygen levels, and hence decomposition rate within surface peat. Subsidence of raised bog can occur because of both drainage and peat cutting.

Wetlands

Wetlands cover around 15% of the surface area of Ireland. Much of this land cover is comprised of over 12,000 lakes. Wetlands such as lakes, rivers and estuaries provide significant habitat for migratory birds and form significant landscape features.

The west of Ireland is one of the few locations globally where turloughs are also present. Turloughs are topographic depressions in geologically karst regions that are intermittently inundated on an annual basis, mainly from groundwater, that drain without overland stream outflow, and that have a substrate and/or ecological communities that are characteristic of wetlands (NPWS, 2015). Turloughs have been subject to drainage and agricultural intensification, and many are degraded. The continued maintenance of drainage channels has the potential to continue to degrade the status and condition of turloughs.

Forestry

Forestry in Ireland accounts for 9.53% of land cover (CORINE, 2018). The forests in Ireland are young, with approximately 40% planted since 1990. However, about 75% of these forested areas are coniferous, mainly of commercial timber species. The Rural Development Programme 2007-2013 set a target of 30% annual broadleaf afforestation, which was accomplished primarily through the reduced plantation of coniferous trees. The appropriate management of forest land is crucial to mitigate environmental impacts, while maintaining their commercial requirements. The period between 2006 and 2012 experienced the largest land cover change with afforestation on agricultural land and peatland having the biggest influence. The DAFM prepared a Draft National Forestry Programme and a National Policy Review to promote better forest management practices around Ireland. The Native Woodland Scheme is also aiming to increase the proportion of broadleaf forest in Ireland.

COFORD, a forestry appointed by the Minister for Agriculture, Food and the Marine advises the Minister and his/her department on issues relating to the development of the forestry sector in Ireland. A series of papers, Forestry 2030, addresses the key issues with the forestry sector and charts a way forward. COFORD had demonstrated that forestry is an important economic source in Ireland. They report that Irish wood as a fuel is contributing significantly to mitigating climate change.

Arterial Drainage Maintenance Activities can maintain the productivity and soil conditions of forestry land close to drainage channels. Maintenance of embankments preserves the level of flood protection offered to some commercial forestry land. Apart from climate change mitigation, forestry investment also provides a range of other public goods and services, such as biodiversity, recreation, and forests play a role in water protection and flood prevention.

Forestry 2030 sets two challenges for the state and private sector to be achieved by 2030:

- a national forest area of 970,000 ha
- a doubling of the annual all island annual roundwood harvest to 7 million cubic metres.

Artificial surface and Benefiting Lands

Artificial surfaces account for 2% of the land surface, which is half the Europe wide average of 4% (EPA, 2012).

Lands identified as being liable to flooding are categorised as "benefiting lands". Benefiting lands are defined by the Office of Public Works (OPW) as land that might benefit from the implementation of Arterial (Major) Drainage Schemes (under the Arterial Drainage Act 1945) and indicating areas of land subject to flooding or poor drainage. The Arterial drainage scheme and drainage districts facilitated the improvement of extensive areas of agricultural land, by the provision of an outfall for drainage of marginal lands liable to flooding. The Arterial Drainage Maintenance Activities ensure

that the channels remain in a good condition, which ensure that the productivity of these agricultural lands and social benefits continue to be exhibited. If arterial drainage schemes, embankments and flood relief schemes fall into disrepair there is the potential for claims for financial losses from landowners within benefitting lands.

5.4.1 Future Trend

It is unlikely that the land use in Ireland will substantially change in the short to medium term. Agriculture will continue to be the dominant land-use, with the more intensive arable production continuing to be restricted to better quality soils.

The Food Wise 2025 agricultural strategy put forward by the Department of Agriculture sets out a range of objectives for the entire agricultural sector for the next decade. The aim of the plan is to increase the value of agri-food exports by 85% to €19 billion by 2025, while increasing the value added in the agri-food, fisheries, and wood products sector by 70%, and to create an additional 23,000 jobs in the sector. Although the strategy acknowledges that environmental protection and economic competitiveness are equal and complementary, it also promotes increased productivity and growth which can counter the environmental objectives of schemes such as GLAS. Agriculture is responsible for 35.3% (over one-third) of Ireland's total climate emissions and it is important that sustainable agricultural practices continued to be promoted and practiced.

Forest management practices, particularly afforestation with a focus on broadleaf and native woodland, have potential to provide environmental and economic benefits if managed sensibly. Potential impacts of afforestation on water quality should be included in forestry schemes such as the Afforestation Scheme, the Forest Environmental Protection Scheme (FEPS), and the Native Woodland Scheme (Forest Service, 2011a, b. c).

Peatland and wetland areas are of environmental and ecological importance. The protection and appropriate management of these are crucial for their short-term and long-term conservation. Climate change impacts such as changes in rainfall and temperature and sea level rise have the potential for significant impacts on wetlands in Ireland, such as squeezing coastal and estuarine wetlands.

5.4.2 Key Environmental Issues

In accordance with the SEA Regulations (S.I. 435 of 2004), consideration has been given to whether the environmental effects, both positive and negative, of the Arterial Drainage Maintenance Activities (2022-2027) are likely to be significant on each receptor.

1. There are several issues that should be considered while planning and carrying out the Arterial Drainage Scheme and maintenance works:
2. The extent and intensity of land drainage in both the uplands and lowlands could have an impact on the regime of the waterways and increase flood risk.
3. Inappropriate land management practices, especially on more sensitive soil types could lead to reduced water infiltration into the soil, resulting in an increase in surface water runoff.
4. The management of grassland, semi-natural vegetation, wetlands, and woodlands can assist in the storage of rapid surface runoff and floodplain flows upstream of flood risk receptors.
5. Natural flood storage areas on floodplains including wetlands should be protected from development pressures.
6. Inappropriate or intensive land-use practices can result in erosion, modification of channel geomorphology, or discharge of receiving sediments.

5.5 Soil and Geology

Soil is a valuable resource that performs many ecological services such as food production, storage of nutrients and carbon, control of runoff and flooding, production of biomass, contributes to landscape and the wellbeing of humans. The south and east of the country are used predominantly for tillage, and thus require free-draining soils. 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). Calcareous limestone underlies large areas of the midlands, while acidic sandstones and shales are found in the south-west. Acidic igneous rocks such as granite

are found in the Wicklow mountains, while the north and west are composed of metamorphic rocks such as gneiss, schist, and quartzite, which result in beautiful landscapes such as Connemara, West Mayo, and Donegal.

Underlying bedrock geology varies across the country; the following paragraph gives a basic overview of Ireland's geology. Limestone bedrock is dominant in the northwest, with the west and south mainly composed of sandstone, siltstone, and mudstone. Siltstone and mudstone underlie most of the southeast, along with a mixture of schists, slates, muddy limestones, and slates. The east is composed predominantly of limestone, shale, and sandstone. Finally, the midlands are made up primarily of limestone with areas of shale and mudstone. Karstic areas can contain caves, underground water channels, and turloughs. The latter are seasonal lakes, which fill up and drain via groundwater through a series of sinkholes and fissures, with no overland drainage pathways. Groundwater aquifers are vulnerable in karst areas due to potential for contamination. Counties with large karst areas are Clare (the Burren), Galway, Kerry, Limerick, Wicklow, and Carlow.

According to Gardiner and Radford (1980), Irish soil types can be associated with geology and landscapes:

- Mountain landscapes like those in the west of Ireland are made-up of shallow soils located on steep slopes (>500m); on less steep slopes, wet soils (groundwater and surface water gleys) and acidic soils are present. Peatlands tend to occur on gently undulating landscapes.
- Hilly landscapes (150-360m) developed from shale, sandstone, or occasionally granite. These soils are mainly acidic in nature, and they include brown podzolics, brown earths and surface-water-gleys.
- Drumlin landscapes developed after the most recent glacial advance. Drumlins are small oval-shaped hills that together create an undulating landscape. The soil depends on the thickness of the glacial deposits but generally consists of luvisols, brown earths, and brown podzolics.
- Flat undulating lowland landscapes are usually limestone dominated, with shallow soils and bedrock close to the surface. However, deeper soils tend to develop on glacial till those covers most of the limestone bedrock.
- Acidic lowland landscapes are underlain glacial deposits composed of sandstones and shales, or granite, or igneous rocks and metamorphic materials. These soils are more acidic than those above limestone. Acidic brown earths and brown podzolics underlie these landscapes.
- Alluvial valley landscapes are found in areas at the base of hills or mountains and on the floodplains and terraces of major rivers. Alluvial soils and peats are associated with these areas.

Arterial Drainage Maintenance Activities (2022-2027) will have no interaction with geology but can influence soils through sediment transport regime and land drainage.

5.5.1 Future Trends

Land use changes have a direct impact on soil, geology, and geomorphology. Climate conditions and rainfall shape landscape through weathering and erosion. Increased flooding has resulted in sediment loading into river channels. Management of land-use practices directly impacts the soils.

5.5.2 Key Environmental Issues

In accordance with the SEA Regulations (S.I. 435 of 2004), considerations have been given to whether the environmental effects, both positive and negative, of the Arterial Drainage Maintenance Activities (2022-2027) are likely to be significant on each receptor.

1. Natural flood storage and attenuation areas on floodplains, including wetlands, should be further protected from maintenance activities.
2. Erosion and influence on land-use practices.
3. Effect on hydromorphology (i.e., river channel and catchment flow and sediment regimes).

5.6 Flora, Fauna, Biodiversity

Ireland is committed at a national and international level to protecting biodiversity. Ireland contains 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, and many other valuable species. The 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.

The Natura 2000 network is a group of sites protected under the EU Birds and Habitats Directives. Under the terms of the EU Birds Directive (2009/147/EC), Ireland has designated 132 Special Protection Areas (SPAs) for the protection and conservation of endangered species of wild birds. Special Areas of Conservation (SAC) are major wildlife areas in Ireland, considered to be significant 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, and their habitats. 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, including Otter, Salmon, Freshwater Pearl Mussel, Bottlenose Dolphin, and Killarney Fern. There are 439 SACs around Ireland.

The most basic designation for wildlife is the Natural Heritage Area (NHA), given to areas considered important habitats or which hold species of plants and animals whose habitats require protection. 75 raised bogs and 73 blanket bogs have received legal protection under this framework. In addition, there are approximately 630 Proposed NHAs (pNHAs), which were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated (NPWS, 2016). Prior to designation, pNHAs 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 principal 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 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 Habitats 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, including 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.

5.6.1 OPW Biodiversity Action Strategy

The OPW recognises the importance of biodiversity and their responsibility to protect it. They have employed permanent ecologist. They have prepared a draft Biodiversity Action Strategy (June 2021) to cover all the areas across its operations. It recognises that as an organisation it interacts with biodiversity in ways that may create risk or opportunities for biodiversity protection and conservation. The OPW is the lead authority for flood risk management including the maintenance of effective drainage and the protection of properties and people. While drainage and the requirements to adequately maintain arterial drainage is a requirement under statutory legislation (Arterial Drainage Act 1945) the OPW recognises that these operations may conflict with optimal delivery for biodiversity. The OPW, through the Biodiversity Action Strategy, will create an approach to working with biodiversity which will maintain and contribute to its recovery. The Biodiversity Action Strategy aims to:

- Provide and understanding of and raising awareness of biodiversity across the organisation
- Developing specific skills and knowledge within the organisation

- Ensuring biodiversity gain through conservation and enhancement across the portfolio of sites, initiatives and projects
- Fostering strategic partnerships where collaborative working is required for biodiversity
- Strengthening governance and management approaches to include biodiversity considerations
- Ensuring alignment with Government and EU policy and commitments on biodiversity.

The OPWs vision is that *'Biodiversity will be a core consideration in all our plans and operations to deliver our primary functions, ensuring that we are contributors to biodiversity conservation through our policies, practices and people.'* The Biodiversity Action Strategy covers the period 2021 to 2026 and within this timeframe, the OPW will:

- have increased awareness and recognition of the value of biodiversity and its importance in their work, amongst staff, partners and contractors.
- have completed a baseline of key biodiversity metrics on their properties, flood risk and heritage areas.
- have established site biodiversity plans across their most important sites for nature – identifying where they have special biodiversity responsibility and planning management to ensure protection and enhancement wherever we can.
- have built upon the existing environmental management tools within drainage maintenance, with increasingly advanced processes and training to further limit potential biodiversity impacts and maximise biodiversity gain for a range of species and habitats. Drainage maintenance activities will be working to manage water, balancing social, economic and environmental needs while integrating opportunities to further improve the biodiversity through restoration programmes and ever improving skills of staff.
- have built upon our existing efforts within flood relief to take a holistic approach identifying and implementing solutions which deliver our core project aims of flood protection while conserving and enhancing a range of habitats for wildlife, including instream and riparian habitats.
- actively utilising biodiversity conservation as a key consideration in effective hydrological management regimes and will have developed more knowledge and application of Nature Based Catchment Management Solutions such as the use of wetlands for slowing the flow, making a large contribution to restoring ecosystem services.
- have identified areas where more nature-based approaches to coastal erosion and flooding are feasible, like coastal lagoons and saltmarshes, utilising the same as part of the solution, making a meaningful contribution to climate adaptation while providing valuable habitats for coastal and wetland species.
- management of cultural heritage sites, properties and waterways will place biodiversity integral to our plans, wherever possible to become part of the interpreted features, perhaps envisaging and restoring the ancient natural environments where the monuments reside. Where this is deemed suitable and planned, there will be real experiential benefits for visitors.
- further develop the role of the national botanic gardens in raising awareness of native flora and habitats and will seek to identify and develop areas for interpretation within our gardens, in the herbarium dried collections and online, including outreach to education and to lead in furthering national awareness of Ireland's flora.
- have audited our contribution to biodiversity and ecosystem services for property, flood risk and heritage activities including recognising where natural heritage is as important as cultural heritage.

An outcome of the Biodiversity Strategy is several strategic actions across five strategic themes. The strategic actions are aligned to national and international plans and strategies. The strategic actions are assigned to create the best strategic opportunities and commitments to deliver a positive outcome for biodiversity. The strategic actions are described, their expected outcomes and a set of Key Performance

Indicators (KPIs) designed to enable tracking of the progress and delivery success of the action(s). The estimated life of the strategies is 5 years. The strategy is assigned a priority level:

- **A - Essential (High Priority).** This action is linked to statutory responsibilities and obligations. They are aligned with National and International programmes and policies.
- **B - Desirable (Medium Priority).** These actions are not linked to a statutory requirement or are not urgent or imperative. The action(s) would be linked to a high benefit for national or regional initiatives or programmes.
- **C- Optional.** Optional actions which are important at site or project level but not linked to a statutory requirement or are not urgent or imperative but would be of benefit for national, regional, or local initiatives or programmes.

And the strategic themes are divided into:

- **Strategic Theme 1. Planning for Nature.** These actions are based on the National Biodiversity Action Plan (NBAP) objectives around increasing the level of awareness, governance and decision making for biodiversity within an operational context.

Relevant National Biodiversity Action Plan.	1. Mainstreaming of biodiversity into decision-making across all sectors
	6. Increased awareness & appreciation of biodiversity and ecosystem services
	7 Strengthen international governance for biodiversity and ecosystem services

- **Strategic Theme 2. Natural Leaders.** These actions relate to NBAP objectives around increasing the level of awareness and knowledge of biodiversity and provide an opportunity to lead on increasing awareness and appreciation.

Relevant National Biodiversity Action Plan.	1. Mainstreaming of biodiversity into decision-making across all sectors
	2. Strengthen the knowledge base for conservation, management and sustainable use of biodiversity
	6. Increase awareness & appreciation of biodiversity and ecosystem services
	7 Strengthen international governance for biodiversity and ecosystem services

- **Strategic Theme 3. Working with Water and Wildlife.** These actions relate to a wide range of NBAP objectives but are of relevance to biodiversity and ecosystem services both on protected sites and in the wider countryside and are of relevance to the marine environment in some cases.

Relevant National Biodiversity Action Plan.	1. Mainstreaming of biodiversity into decision-making across all sectors
	2. Strengthen the knowledge base for conservation, management, and sustainable use of biodiversity
	3. Increase awareness and appreciation of biodiversity and ecosystem services
	4. Conserve and Restore biodiversity and ecosystem services in the wider countryside
	5. Conserve and restore biodiversity and ecosystem services in the marine environment
	6. Expand and improve management of protected areas and species

- Strategic Theme 4. Diversity by Design.** The focus of actions in this area during this first strategy period will be on assessing where opportunities lie and developing appropriate approaches and trials. Some of these already exist and can be built upon (such as the Swift Initiative and aspects of grassland management and pollinator planting) but wider role out and development of new approaches will be needed.

Relevant National Biodiversity Action Plan.	1. Mainstreaming of biodiversity into decision-making across all sectors
	4. Conserve and Restore biodiversity and ecosystem services in the wider countryside
	6. Expand and improve management of protected areas and species

- Strategic Theme 5. Natural Knowledge.** This theme focusses on both the provision of information and interpretation of biodiversity and on develop knowledge and expertise amongst out staff and partners. The focus of actions in this area during this first strategy period include the development of specific staff skills and roles, interpretation of biodiversity at visitor sites, highlighting OPW sites and efforts for biodiversity through events and awards, the development of education programmes and the collection of biodiversity information. Initiatives to increase and improve interactions with communities will also be important in engendering support for biodiversity work and working effectively around our sites and projects.

Relevant National Biodiversity Action Plan.	2 Strengthen the knowledge base for conservation, management, and sustainable use of biodiversity
	3 Increase awareness and appreciation of biodiversity and ecosystems services

This strategy will begin in June 2021 and will run for five years. There will be annual reviews driven by the Biodiversity Working Group reporting publicly on progress against actions using the identified KPIs. The Biodiversity Working Group will report to the OPW Board, and it is envisaged that the staff will see a focus of their work will be the protection of biodiversity. The public will particularly when visiting OPW properties and parks see the physical changes in the environment with increased habitat management at these sites.

Reviews of progress will be tailored to suit the frequency and timing of the specific actions. Reporting will be at least annual. The development of additional targets or performance indicators are likely to arise through the development of actions identified in this strategy and may relate to the extent or status of habitats or species relevant to the OPW's work, and where they need to monitor these as part of their auditing of natural capital, an identified action.

Strategic Theme 1. Planning for nature					
#	Action	Lead OPW Division	Priority	expected outcome	KPI
1.1	Working with our Biodiversity Action Strategy to ensure its delivery	All	A	Actions within the Biodiversity Action Strategy will be delivered. Progress will be monitored and reported on annually	Annual progress reports years 1-5
1.2	Recruit a Biodiversity Officer to lead all aspects of biodiversity programming	Corporate Services (to recruit and assign)	A	A Biodiversity Officer appointed at a level which enables significant influence across the organisation and who works with BWG and Biodiversity Champions to develop and deliver the actions identified in this strategy and plans flowing from it, including facilitating reporting	Appointed in year 1
1.3	Fill biodiversity related gaps in OPW staff to allow for internal expertise to feed into the BWG	All & HR	A	Vacant positions should be filled to ensure a full complement of competent trained staff in ecological, botanical or biodiversity related roles	Identify vacant positions and prioritise year 1 Biodiversity related staff compliment increases by year 3
1.4	Embed biodiversity responsibility within organisational management through further development of the Biodiversity Working Group	A. Sec. Her. & IP	A	Further development of the Biodiversity Working Group to support delivery and monitoring of the Action Strategy - including development of specific staff roles and resources for biodiversity planning and delivery, awareness raising and other strategic actions	BWG continues, led by Biodiversity Officer-reports to Management Board
1.5	Develop a financial plan with work programme and budget to implement the Biodiversity Action Strategy	SMT & BWG	A	Building business cases for biodiversity action in each OPW sections	Number of business cases and allocated funding for biodiversity actions
1.6	Carry out an OPW-wide audit of priority biodiversity on property or locations that are owned by or impacted by OPW activities such as SAC/SPAs, NHAs and Nature Reserves	Biodiversity Officer & FRM data management	A	A review of designated site co-incidence with OPW properties and the conservation condition of the qualifying interests and supporting features. Creating actions plans (through Site Biodiversity Planning) to address site condition	Audit plan in place and designated sites prioritised by year 2
1.7	Develop indicators and metrics to monitor performance on biodiversity protection across OPW portfolio & schemes	Biodiversity Officer, HS, ES, FRM data management, Prop. maintenance	B	Align indicators and metrics to those developed by National Biodiversity Action Plan, the National Biodiversity Data Centre, and other relevant organisations	Targets identified and monitored via site Biodiversity plans

1.8	Development and roll out of Biodiversity Plans for owned or managed properties and infrastructure	Biodiversity Officer, HS, ES, SAO, FRM, AD, PM, Prop. Maintenance,	B	Approach and structure/format of Biodiversity Plans will be developed and rolled out in a phased way across key sites for biodiversity. Where applicable, will include cases where OPW own the lands, are developing the property on behalf of another agency or developing flood relief infrastructure. Sites prioritised based on biodiversity value, potential gain that can be readily achieved, legally designated or high value, nature conservation sites.	Agreed approach by end year 1 Roll out commences year 2
1.9	Transcribe and implement requirements of the Biodiversity Action Strategy into operational programming for each Business Unit	All	A	Biodiversity Officer to work with business units to translate actions applicable to each service, prioritise and programme the same in Operational Plans. Biodiversity Working Group will provide oversight to ensure a consistent approach is developed for the delivery of the BAS into the sectoral business plans to ensure that priorities are identified and delivered	Biodiversity programming implemented by year 2
1.10	Carry out a qualitative review of operational policies and procedures relating to biodiversity	BWG, Biodiversity Officer, ES, NBG	B	Identify and review the potential impacts/opportunities of policies and operational procedures or guidance where they are relevant to biodiversity and identify priority areas for change	Carry out review by mid-year 3 and report

Strategic Theme 2. Natural leaders					
#	Action	Lead OPW section	Priority	expected outcome	KPI
2.1	Maintain and develop the role of OPW in delivery of the National Biodiversity Action Plan and other relevant national plans and programmes as they arise	NBG	B	Involvement in the steering of the production of the next National Biodiversity Action Plan	Production of the NBP with OPW representation
2.2	Identify and develop strategic "partnerships for nature" at site, project, national and international level	NBG	B	Build on existing partnerships and forge new partnerships with other organisations, institutions, and communities where the biodiversity of projects and sites would benefit from wider experience or the involvement of other stakeholders	Identify and record existing partnerships by end year 1
2.3	Increase communications with the environmental NGO and sectoral representatives to strengthen biodiversity awareness and expectations	ES	C	Forge relationship and communications with eNGO and a broader scope of environmental stakeholders such as Environmental Pillar, An Foram Uisce (Water Forum) to strengthen biodiversity evolution in the OPW.	Identify and agree at least 3 new partnerships by year 5
2.4	Revise Ireland's National Strategy for Plant Conservation in line with the Global Strategy for Plant Conservation	NBG	B	Creation of a new national strategy for plant conservation in conjunction with NPWS and taking account of recent changes and with NBG as a key partner to its delivery	Revised national strategy by year 2 Favourable progress towards strategy targets by year 5
2.5	Development of resources for the National Seedbank at the National Botanic Gardens herbarium	NBG	B	Complete establishment of a National Seedbank at the NBG with dedicated Seed Bank Manager to manage the collection, curation, and germination trials to ensure there is a viable source of seeds for all Irish plant species into the future. Establish MoU with the Millennium Seed Bank to ensure international best standards.	Delivery on Seeds for Nature 2019 commitment by end year 1
2.6	National Botanic Gardens – Support biodiversity-related international agreements (including CBD, CITES, GSPC, Ramsar, SDGs)	NBG	B	International agreements which aim to conserve biodiversity and build a sustainable future relevant to OPW work will be monitored and in house experts consulted to ensure OPW is in line with national and global goals in relation to global and national trends. Expert staff advice and input into relevant conventions to ensure that Ireland and OPW plays a role in the future of international biodiversity policy, particularly around mainstreaming biodiversity, and ecosystem services across all sectors e.g., the NBG act as CITES Scientific Authority for Ireland and Convention on Biological Diversity Nagoya Protocol on Access and Benefit sharing focal point.	Review of CBD outcomes by end of year 1

Strategic Theme 2. Natural leaders					
#	Action	Lead OPW section	Priority	expected outcome	KPI
2.7	Create demonstration projects on OPW sites and projects which showcase biodiversity enhancement		B	Development of a series of projects encompassing drained waterways, flood protection works, building services, designed landscapes and heritage properties which can be used by OPW and partners to demonstrate techniques in-house or to external parties. These would be linked to guidance manuals, utilising best practice techniques advocated.	Three projects by end year 2 Eight projects by end year 5
2.8	Adopt and where necessary modify biodiversity guidance and manuals for built and historic properties and designed landscapes	NHP	B	Access to a series of guidance documents which are used to benchmark approaches in house. Manuals would be available predominantly online and include complementary training courses where appropriate	Manual topics identified by end year 1 Production of manuals series started by end year 2
2.9	Development of biodiversity guidance and manuals for waterway maintenance and flood relief schemes	FRM	B	Building on the existing Environmental Guidance for waterway maintenance, continue to evolve the same and develop guidance documents for flood relief schemes, which are used to standardise approaches in house, and which can be utilised by others in delivering for biodiversity elsewhere. These guidance documents would be available predominantly online and include complementary training courses where appropriate	Gap analysis of guidance by end year 1 At least 25% completion of identified new guidance by end year 4

Strategic Theme 3. Working with water and wildlife				
Action	Lead OPW section	Priority	Expected outcome	KPIs
Develop bespoke biodiversity training for direct labour staff working in the aquatic environment	FRM	B	Training provision programmes aimed at promoting and instructing on the techniques and approaches used in protecting and promoting biodiversity within watercourses	Training programme planning initiated in year 2 Training programme delivery from year 3
Development of a requirement for contractors to have completed the environmental awareness training as a requirement for OPW funded work on flood relief schemes or river maintenance	FRM	B	Development of requirements and implementation mechanisms for contractors working within the aquatic environment, on OPW funded projects, to have completed training on OPW's environmental river maintenance and construction guidance.	Scheme planned by year 3
Develop a conference and workshop programme for technical practitioners in working with biodiversity in aquatic environments	FRM	C	Technical conference, organised with other partners (such as IFI or EPA), to promote and showcase best practice and develop discussion within professional bodies, partner organisations, companies and in-house teams	Conference or workshop programme held by year 4
Carry out a review of biodiversity measures within flood relief schemes	FRM	B	Review of existing flood relief schemes, identifying opportunities for retrofit of biodiversity enhancement measures, and evolving biodiversity good practice from the lessons learned into guidance for new schemes.	Review initiated by year 2 Review complete by mid-year 4
Work with other bodies to develop an integrated catchment management approach to assist, research and develop flagship 'Nature Based Catchment Management Solutions' projects as demonstration of multiple benefit projects including flood attenuation with a priority on wetland creation projects.	FRM	C	The identification and subsequent implementation of at least two projects which utilise wetland within the solutions mix for flood attenuation and which contribute significantly to biodiversity. These becoming demonstration projects with associated research and monitoring of biodiversity and flood attenuation benefits	Identification of project sites by end year 2 Project initiated by end year 4
Carry out a national review of managed realignment opportunities for coastal areas with identified flood risk and areas with existing embanked flood defences	FRM & external	B	Review coastal areas with flood risk that require solutions and existing embanked flood defences, for potential management in relation to risk or opportunity for biodiversity. This would include identifying where approaches such as managed re-alignment may play a role in coastal defences alongside providing restored wetland habitats	National review complete by end year 3

Strategic Theme 3. Working with water and wildlife				
Action	Lead OPW section	Priority	Expected outcome	KPIs
Work with other authorities as part of integrated catchment approach to assist development of a managed re-alignment demonstration project in Ireland	FRM & external	C	The planning, development and initiation of a coastal managed re-alignment project as an appropriate response to coastal flood risk and biodiversity gain	Key project identified and planning commenced by year 4
Develop biodiversity opportunity planning within in all flood relief schemes projects and drainage maintenance operations	FRM	B	Projects to include biodiversity enhancement plans. These will take account of on-site and wider biodiversity opportunities and impacts and will compliment in addition to statutory environmental assessments, provide for a focus on biodiversity and the opportunity for any readily achievable biodiversity gain	Plan format agreed by end year 1
Development of a suitable approach to biodiversity net gain as a policy principal within flood scheme decisions	FRM	C	Evaluate international best practice and give consideration to bring into national policy, the incorporation of broader principles in the evaluation of flood scheme decisions such as Natural Capital or Ecosystem Services or Biodiversity Net Gain principles	Review approach agreed by year 3 Policy proposals developed by mid-year 4
Develop a Biodiversity audit process for OPW funded works in waterways including flood relief projects, drainage maintenance, fostering the principle of Biodiversity Net Gain	FRM	B	Develop a biodiversity audit process to evaluate the project in terms of biodiversity, promoting the uptake of readily achievable biodiversity gain opportunities and fostering a principle of Biodiversity Net Gain where feasible.	Process initiated by year 3
Integrate the All-Ireland Pollinator Plan with biodiversity gain procedures for flooding related projects	FRM	B	Work with the All-Ireland Pollinator Plan to develop pollinator plan guidance specifically for flood risk management functions e.g. wildflower meadow seeding on flood embankments	Process initiated by year 2

Strategic Theme 4. Diversity by design					
#	Action	Lead OPW section	Priority	Expected outcomes	KPIs
4.1	Development of a "homes for wildlife" programme	HBS/FRM	C	<p>Development of a programme of retrofitting of buildings and associated spaces, building on the "Swift Initiative" to broaden and expand more properties and a greater diversity of species and approaches.</p> <p>Development of a decision-making toolkit for selection and siting of homes for wildlife (dipper cavities, otter holts etc.) within the aquatic environment.</p>	Continuation of Swift Initiative while developing roll out of bigger programme (by year 1)
4.2	Develop "grassland management for biodiversity" policy and plan for public and heritage spaces	NHP/PEM	C	The establishment of a menu of agreed approaches to grassland management for the promotion of biodiversity in amenity, heritage, and other public spaces. A toolbox for site managers. This would include options for conversion of amenity grassland to biodiversity rich habitats, the suitability of seed mixes for re-seeding and identification of appropriate cutting or grazing regimes required. Guidance development for flood risk management activities to promote grassland management for biodiversity.	<p>Production of management toolkit by end of year 2</p> <p>Plan production by end year 3</p>
4.3	Identification of opportunities & programme design for pollinator planting in amenity spaces	NBG/ NHP/PEM	C	Identification of sites and management options for pollinator planting in amenity spaces to create a programme	<p>Programme plan by year 3</p> <p>Plan targets on schedule by year 5</p>
4.4	Building on the good practice to-date, support the principle of multi-annual treatment of invasive species to assist long-term eradication post OPW projects.	NHP/EM/FRM	A	Established approaches to treatment of invasive species in all projects such as flood schemes, river maintenance, property management. Continued reduction of invasive species issues on OPW managed lands or projects.	<p>Establish baseline of invasive species issues by end year 2</p> <p>Trend of reduction in invasive species extent measurable by year 5</p>
4.5	Development of a suitable approach to a principle of carbon capture through habitat creation in OPW projects		B	Evaluate international best practice and give consideration to bring into national policy, incorporation of carbon offsetting and biodiversity gain through e.g., woodland planting, wetland creation, principles in the evaluation of in flood scheme decision in lieu of carbon footprint of flood protection infrastructure and other core activities	<p>Assessment approach devised by end year 3</p> <p>Assessment completed by end year 4</p>
4.6	Further development of ancient tree management policies to incorporate biodiversity	NHP	C	Support and utilise the Tree Register of Ireland. Risk assessments of trees should have biodiversity as part of the assessment.	Continue efforts to map trees at OPW sites, as is currently progressing at NHP sites.

Strategic Theme 5. Natural knowledge					
#	Action	Lead OPW section		Expected outcome	KPIs
5.1	Develop "Biodiversity Champions" to lead on promoting awareness among OPW staff of priority species and habitats	CS	C	Biodiversity champions recruited from existing staff, with time allocation within existing roles, will provide a leadership and communication role to promote their priority species or habitat within OPW internal communications and may engage with wider forums where they exist	Biodiversity champions identified and approach to the role agreed by end year 1
5.2	Interpretation of biodiversity at all appropriate visitor sites	NHP/CS	C	A programme of implementation of biodiversity interpretation at all appropriate visitor sites, preceded by site selection. To raise awareness amongst visitors to sites. Either as standalone interpretation where necessary or as part of interpretive planning	Site selection & plan approach by end year 2 Implementation commenced by end year 3
5.3	Develop and deliver a programme of biodiversity awareness training for OPW staff	CS	B	Development of a tiered programme of biodiversity awareness training for staff, based around sectoral and role needs. This may include short webinars and seminars, online tools, and challenges and on-site, outdoor, sessions	Carry out staff biodiversity awareness survey Programme development in year 1 Training delivery years 2-5 Repeat awareness testing showing increases in key metrics in year 3 and 5
5.4	Develop an OPW biodiversity awards initiative	CS	C	Development of an awards scheme for our staff and partners to recognise where people and projects have made the biggest difference to biodiversity. This will include judging by an expert panel and the promotion of the winners as exemplars of best practice	Awards scheme devised and implemented by year 4
5.5	Develop biodiversity focussed education programmes at the National Botanic Gardens and other suitable sites	NBG/NHP/FRM	C	Education teams at botanic gardens and selected heritage properties will develop and run biodiversity courses for schoolchildren and as lifelong learning opportunities for adults. These will begin as pilot programmes to identify levels of interest and teaching approaches and will develop fully by the end of the strategy period. This will include a focus on the aquatic environment at appropriate sites.	Pilot programmes in place by year 2 Implementation of full programme and targets set, by year 5

Strategic Theme 5. Natural knowledge					
#	Action	Lead OPW section		Expected outcome	KPIs
5.6	Develop and promote collection of biodiversity records on OPW sites	ES	C	Development of systems of biodiversity record collection for OPW managed sites by staff and the public, promotion of collection of ad hoc records at all sites, partnerships developed with lead organisations such as NBDC, NPWS, IFI and relevant NGOs where appropriate. Promotion of citizen science.	Agreed systems of biodiversity ad hoc records collection by end year 2 Promote recording at sites through at least 10 projects or events by year 5
5.7	Develop Biodiversity data & management recording	ES	B	Development of coherent systems of data capture and management information for spatial and non-spatial biodiversity data across sites and projects. Building on the Environmental mapping system developed for flood risk management, pilot expansion of the same to other business units, to have unified and centralised habitat and species information for OPW overall. This should include the availability of key species data to the NBDC. Including the development of mapping viewers to ensure data management is at the core of biodiversity delivery in key work areas	System progress review and plan by end year 1 Pilot system for selected units by end year 2 Progress review and gap analysis by year 4
5.8	Natural Capital Auditing		C	Develop a Natural Capital Asset Register for OPW and national Natural Capital accounts, and integrate these accounts into economic policy and decision-making (NBAP) Link OPW data to national accounting. Initiate natural capital accounting through sectoral and small-scale pilot studies, including the integration of environmental and economic statistics using the framework of the UN System of Experimental-Ecosystem Accounting (SEEA)	Pilot in place by year 3
5.9	Development of funding mechanism for community and NGO biodiversity projects for OPW projects in the flood risk management, heritage, and property sectors	FRM	C	Evaluation of the opportunities and development of initiatives for funding the development of projects of high biodiversity value particularly in the aquatic sector that can support flood risk management gain. Preference to co-funding of other community orientated authorities that can provide the financial governance required for OPW co-funding.	Evaluation of options by end year 3 Pilot project by end year 5

Strategic Theme 5. Natural knowledge					
#	Action	Lead OPW section		Expected outcome	KPIs
5.10	Development of OPW biodiversity events programmes	CS	C	Development of an events programme which encompasses the delivery of key messages deriving from PW sites and projects which are targeted at enhancing public awareness and understanding of the relevance of OPW's work to biodiversity conservation.	Outline events framework by end year 1 Annual programme delivery.

The Arterial Drainage Scheme has been implemented throughout Ireland and most of the channels are located in proximity to 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. All nature conservation site designations are listed below (Table 5-6).

Table 5.6. 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	439
Special Protection Area	European Communities (Natural Habitats) Regulations, 1997 (as amended) and consolidated by the European Communities (Birds and Natural Habitats) Regulations 2011	132
Ramsar Site	The Convention on Wetlands of International Importance especially as Waterfowl Habitat (i.e., the Ramsar Convention)	45
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 - several SACs are designated as MPAs as well	19

Freshwater Pearl Mussels

Freshwater Pearl Mussel (FPM) are widespread in Ireland, particularly in the Southwest, Southeast, West and North West of the country. The population range significantly, from a small community with few elderly mussels that have not recruited successfully, to some of the largest pearl mussel populations in the world. There are 96 populations of pearl mussels in the Republic of Ireland, some which include two or more rivers in proximity to them one single population (Moorkens et al., 2007). However, only 27 populations (26 for *M. margaritifera* and 1 for *M. durrovensis*) have been designated within 19 SACs areas for *Margaritifera margaritifera*. From the 96 populations, only those in Bundorragha catchment are in favourable condition; the rest have been found in an unfavourable status as reproduction and juvenile survival is not meeting adult mortality and population numbers are significantly declining (Moorken, 2011). The main reasons for the population decrease are decline in water quality due to nutrient enrichment, pollution incidents, riverbank erosion, forest plantation, road building, bog drainage, arterial drainage schemes, river modification, and over-grazing. The FPM need an environment with well-oxygenated water, low in minerals and nutrients, and a clean riverbed, including well oxygenated gravel and sand substrate (Moorken, 1999).

The Freshwater Pearl Mussel (FPM) sub-basin management plan for water designated for protection under the European Union Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 to 2018 includes the rivers listed in the table below (Table 5.). Areas surrounding the river catchment are *Margaritifera*-sensitive areas and should be recognised and protected from degradation of water quality. OPW's EP 28 (Freshwater Pearl Mussel) covers the protection of Freshwater Pearl Mussel) and their habitats.

Table 5.7. Waters protected for conservation of Irish Fresh Water Pearl Mussel (*Margaritifera margaritifera*)

Water designated for protection of Fresh Water Pearl Mussel			
Bandon	Owenriff (Corrib)	Leannan	Owenea
Aughavaud (Barrow)	Currane	Allow (Munster Blackwater)	Owenmore
Ballymurphy (Barrow)	Dawros	Licky	Owagappul
Mountain (Barrow)	Eske	Newport	Cloon (Shannon Estuary)
Bundorragha	Kerry Blackwater	Nore	Derreen (Slaney)
Caragh	Gearhameen (Laune)	Owencarrow	Clodiagh (Suir)
Clady	Glaskeelan (Leannan)		

The OPW channels listed in Table 5.8 have been identified as containing FWPM. Any works carried out in the vicinity will have to follow procedures recommended by NPWS.

Table 5.8. OPW Channels identified as containing FWPM

Channel	Scheme	Location	Most Recent Record
CH9	Corrib Headford	Oughterard	2009
C1/21/3	Moy	Approx 500yards from outfall to into L. Cullin	2004
C1 Sect M &N	Moy	Ballygallagart	2004
C1/21/14	Moy	Crossmolina	2008
C1	Dunmanway FRS	d/s of the Long Bridge	2003
C1	Owvanme	Approx 1400 yards from outfall	2002
C1	Feale	d/s Listowel near Scartleigh cementary	2006
**Owenaher	Moy	u/s of C1/54	1996
**Brown Flesk River	Maine	Trib of C1 Maine near Farranfore	1987
** Galey River	Feale	Approx 1400 yards u/s of C1/18 near Ahavoher Br.	1950
** River Liffey	Ryewater	(Lucan) Approximately 3.5 d/s C1 Ryewater outfall	1894
** Although not on OPW channels- these channels may or may not contain populations of FWPM. Works in vicinity which could impact on a possible population need to be considered in close consultation with local FWPM knowledge.			

White-clawed Crayfish

White-clawed crayfish (*Austropotamobius pallipes*) are protected under Annex II of the EU Habitats Directive. These species are believed to be dispersed around central Ireland. The various OPW channels are believed to contain crayfish, as the species are known to inhabit a range of drainage channels in many catchment areas, nationwide. The following SACs have white-clawed crayfish as a qualifying interest and are intersected by channels maintained by the OPW (Table 5.9). OPW's EP 22 (Crawfish) covers the protection of crayfish and their habitats.

Table 5.9. Designated sites with qualifying interest (White-clawed Crayfish) and presence of OPW drainage work

Site Code	Site Name	Intersected by OPW Channels
000297	Lough Corrib	Yes
000688	Lough Owel	Yes
001976	Lough Gill	Yes
002120	Lough Bane and Lough Glass	Yes
002298	River Moy	Yes
001810	White Lough, Ben Lough, & Lough Doo	Yes
001919	Glenade Lough	No - channel within 100m of SAC
002121	Lough Lene	Yes
002137	Lower River Suir	Yes
002162	River Barrow and River Nore	Yes

Lamprey

Three species of Lamprey exist in Irish waters: sea lamprey (*Petromyzon marinus*), the river lamprey (*Lampetra fluviatilis*), and the brook lamprey (*Lampetra planeri*). The brook lamprey is an entirely freshwater animal, while the other two species spend most of their adult life in the sea but migrate upstream to spawn.

Legislation for the protection of lamprey was introduced by the European Union through the Habitats Directive (92/43/EEC) and the designation of SACs. The objective of SACs with regard

to Lamprey is to ensure 'the maintenance or restoration, at a favourable conservation status of lamprey populations'. Freshwater sites under protection for lamprey populations must be characterised by good water quality, clean sediments at spawning grounds, and the presence of stable sandy silt beds (Kurz and Costello, 1999). To conserve lamprey, the known spawning grounds need protection and maintenance, with lamprey migrating upstream requiring unhindered access to spawning grounds (Kurz and Costello, 1999). 14 SAC sites recognise lamprey as a species of qualifying interest, and from these, ten are located near or within a maintained OPW channel (Table 5.10). Any changes in the drainage patterns of relevant river catchments for the Arterial Drainage Programme, thus require careful control and should preserve good water quality. OPW's EP 21 (Lamprey) covers the protection of lamprey and their habitats.

Table 5.10. Designated sites with qualifying interest (Lamprey) and presence of OPW drainage work

Site Code	Site Name	Species	Intersected by OPW Channels
000297	Lough Corrib	<i>Petromyzon marinus</i> <i>Lampetra planeri</i>	Yes
000343	Castlemaine Harbour	<i>Petromyzon marinus</i> <i>Lampetra fluviatilis</i>	Yes
000458	Killala Bay / Moy Estuary	<i>Petromyzon marinus</i>	Yes
001976	Lough Gill	<i>Petromyzon marinus</i> <i>Lampetra planeri</i> <i>Lampetra fluviatilis</i>	Yes
002137	Lower River Suir	<i>Petromyzon marinus</i> <i>Lampetra planeri</i> <i>Lampetra fluviatilis</i>	Yes
002162	River Barrow and River Nore	<i>Petromyzon marinus</i> <i>Lampetra planeri</i> <i>Lampetra fluviatilis</i>	Yes
002165	Lower River Shannon	<i>Lampetra fluviatilis</i> <i>Lampetra planeri</i> <i>Petromyzon marinus</i>	Yes
002171	Bandon River	<i>Lampetra Planeri</i>	Yes
002298	River Moy	<i>Petromyzon marinus</i> <i>Lampetra planeri</i>	Yes
002299	River Boyne and River Blackwater	<i>Lampetra fluviatilis</i>	Yes

Salmon (*Salmon Salar*)

Wild salmon in Ireland are part of our national identity and Ireland has been one of the largest producers of wild salmon in the North Atlantic. Ireland traditionally operated a commercial offshore fishery, an estuarine draft net fishery and in-river angling. Due to the declining number of salmon returning to the Irish Coast, conservation initiatives were introduced to address the decline in stock.

Salmon is now managed on a river-by-river basis, as opposed to a national or district level. Rivers that have an excess of 65% of the conservation limit are granted catch and release status subject to approval. Rivers that have insufficient scientific information or have a rod catch of less than 10 salmon remain closed.

Conservation limits have been set for the 148 Irish Salmon Rivers and recreational and commercial inshore fisheries are now regulated relative to these conservation limits being met on a river-by-river basis. The standing Scientific Committee (SSC) of Inland Fisheries Ireland (IFI) reviews all data for salmon rivers to provide scientific advice on the compliance levels (i.e., CL attainment levels).

Wild Salmon and Sea Trout Tagging Schemes regulate salmon and sea trout fishing in Ireland and are administered by Inland Fisheries Ireland (IFI). Anglers are prohibited from selling salmon (any size) or sea trout (any size) caught by rod and line. The protected areas of salmonid species are listed in the Salmonid Regulations (S.I. 293 of 1988), which designate 'waters capable of supporting salmon (*Salmo salar*), trout (*Salmo trutta*), char (*Salvelinus*) and whitefish (*Coregonus*) as protected. The Habitat Regulations (S.I. 94 of 1997) separately protect the habitats of Atlantic Salmon. There are 12 designated salmonid waters overlapping with OPW Scheme Channels, 11 rivers and one lake, as displayed in Table 5.11. Salmon inhabit extents outside these areas and may use habitat near other OPW channels.

Table 5.11. Salmonid Designated Waterbodies with OPW Schemes (Source. OPW, 2011)

Salmonid Waterbody	OPW Scheme
River Boyne	Boyne
River Maine	Maine
River Corrib	Corrib Clare
Lough Corrib	Corrib Clare, Corrib Headford
River Swilly	Swilly Embankments
River Moy	Moy
Corry	Moy
Owengarve	Moy
Glore	Moy
Mullaghanoe	Moy
Spaddagh	Moy
Gweestion	Moy
Manulla	Moy
Castlebar	Moy
Deel River	Moy
Trimoge River	Moy
Yellow River	Moy
Nore River	Kilkenny FRS
Feale River	Feale

Otter (*Lutra lutra*)

Otters are strictly protected in Ireland, with any person who deliberately captures, kills, or disturbs an otter in the wild, or who damages or destroys a breeding site or resting place, guilty of an offence. Otter faces significant threats in Ireland, in particular habitat destruction and water pollution. The Arterial Drainage Scheme has been identified by the NPWS (2009) as a contributor to historic otter habitat destruction. The NPWS note that if works to be undertaken may impact on otter or their habitat, and are deemed essential, then the OPW must seek a derogation licence to cover those works. The National Biodiversity Data Centre in a recent report state that the future prospect for the species is favourable.

Table 5-12 shows the SACs which are designated for Otter, and which are intersected by or near arterial drainage channels. OPW's SOP EP 20 covers the protection of otter and their habitat.

Table 5.12: Designated sites with qualifying interest (Otter) and presence of OPW drainage work

Site Code	Site Name	Intersected by OPW Channels
000216	River Shannon Callows SAC	Yes
000268	Galway Bay Complex SAC	Yes
000297	Lough Corrib SAC	Yes
000343	Castlemaine Harbour SAC	Yes
000428	Lough Melvin SAC	Yes
000440	Lough Ree SAC	Yes
001774	Lough Carra/Mask Complex SAC	Yes

001976	Lough Gill SAC	Yes
002034	Connemara Bog Complex SAC	Yes
002165	Lower River Shannon SAC	Yes
002287	Lough Swilly SAC	Yes
002298	River Moy SAC	Yes
002299	River Boyne and River Blackwater SAC	Yes
002301	River Finn SAC	Yes

Invasive Species

Alien species are plants or animals that have been introduced, often by people, outside their natural range. These species can sometimes become 'invasive' when they spread rapidly and outcompete the native flora and fauna, pushing out native species or leading to environmental degradation.

There are many non-native invasive species recorded along OPW Arterial Drainage Channels. Species of concern are Giant Rhubarb (*Gunnera tinctoria*), Japanese Knotweed (*Persicaria wallichii*), Giant Hogweed (*Heracleum spondylium*), Himalayan Balsam (*Impatiens glandulifera*), Rhododendron (*Rhododendron ponticum*), Waterweeds (*Elodea* spp) and Curly Waterweed (*Lagarosiphon major*). Highly invasive zebra mussels are also a significant threat, especially in lakes, although rivers can be affected as well. Extreme flooding events result in further dispersal of invasive species, upstream and downstream, as well as onto land through the waterway. Many of these invasive species thrive in highly disturbed environments, where soils are routinely disturbed and transported. Machinery or equipment can also be a pathway for invasive species to spread. During the Arterial Drainage Maintenance Activities, work within stands of non-native invasive species should be avoided and the maintenance crew must strictly adhere to the OPW Invasive Species SOP (EP 18A, EP 18B, EP 18C and EP 18D).

5.6.2 Future Trend

The EU Habitats and Birds directives have enforced legislation in European countries that provide recognition and protection to European flora and fauna. The continuous development of proposals and action plans to protect biodiversity should help improve future frameworks and recommendations. Climate change has the potential to change the range of habitats and species in Ireland.

Changes in land-use (i.e., urbanisation, afforestation, intensive agriculture) will continue to threaten biodiversity both in designated and non-designated sites.

5.6.3 Key Environmental Issues

In accordance with the Irish SEA Regulations (S.I. No. 435 of 2004), consideration has been given to whether the environmental effects, both positive and negative, of the Arterial Drainage Maintenance Activities (2022-2027) are likely to be significant on each receptor.

The Arterial Drainage Scheme and its associated maintenance works could potentially impact flora, fauna, and biodiversity by:

1. Negatively impacting Natura 2000 sites and their protected flora and fauna. As a result, assessments under the Habitats and Birds Directives should be implemented to assess if adverse impacts are being caused to SACs or SPAs, respectively.
2. Impacts on sensitive habitats, such as NHAs or pNHAs (e.g., peatlands, limestone habitats).
3. Riparian areas such as alluvial forests and wetlands should not be altered, as they provide habitats, support species, and increase biodiversity.
4. Effects of maintenance operations on salmonids, other protected fish, and shellfish species.
5. Freshwater Pearl Mussel, Atlantic Salmon, lamprey species, and White-clawed Crayfish will be particularly sensitive to pollution and in-channel maintenance works, which may also contradict the objectives of the WFD.
6. Protect and where possible enhance the integrity of fisheries within Arterial Drainage Scheme catchments, Flood Relief Scheme channels and designated channels.

7. Maintain or expand habitat supporting salmonid fisheries and carry out enhancement works where possible.
8. Potential introduction or spread of invasive species.
9. Protecting and enhancing biodiversity on a national, regional, and local level.

5.7 Water

Water is a highly important resource, and appropriate management is crucial for securing our current needs and the needs of future generations. Water quality in Ireland faces threats from pollution, caused by anthropogenic activities. The EU Water Framework Directive (WFD) is a major driver for achieving sustainable management of water in Ireland and the rest of Europe. The WFD was implemented in 2000 as a Europe-wide law that encourages a communal goal to protect all water and water-dependent ecosystems; groundwater systems, rivers, lakes, transitional waters, coastal waters, and wetlands (EC, 2000). The main goals of the WFD are to maintain high and good status waters where they already exist and restore waters that are unable to support aquatic ecosystems sufficiently (EPA, 2012).

To satisfy the requirements of the WFD, Ireland has devised a series of River Basin Management Plans (RBMP), the most recent of which is for 2018-2021. This represented the 2nd cycle of the RBMPs. This plan brought a change in approach, with Ireland being defined as a single national River Basin District (RBD), where previously there were seven such districts. This change signifies a shift to a whole-catchment approach, and an acknowledgement that water management must take place at this high-level scale. The RBMP aims to classify waterbodies by their quality status and sets objectives with the aim to protect and improve water quality in accordance with the WFD goals. The RBMP uses data collated by the EPA and partner organisations (i.e., Inland Fisheries Ireland).

The third cycle RBMP will run from 2022-2027, the same timeframe as the proposed Arterial Drainage Maintenance Activities. The third-cycle Plan is currently being drafted and will be released in December 2021. There are however elements of the Plan available through public consultation documents which reflect some of the key principles to be adopted for the developing the 3rd RBM Plan.

- Continue to target priority Areas for Action identified in the second cycle RBMP
- Increase public access, community action, and local engagement
- Continue to develop the changes made in the second cycle RBMP, to examine the effectiveness of changes in governance structure and the work of the Agricultural Sustainability Support and Advisory Programme (ASSAP) and the Local Authority Waters Programme (LAWCO and LAWCAT).

The EPA's Water Quality in Ireland report (2013-2018) concluded that (see Table 5.1313 for a further breakdown):

- 52.8% of surface waterbodies are at high or good status (down from 55.4% for the period 2010-2015)
- 47.2% of surface waterbodies are at moderate, poor, or bad status
- 92% of groundwater bodies are at good status.

Water quality in Ireland is reasonably good compared to other EU countries, however, there are still challenges such as point source pollution and nutrient and sediment loading that must be addressed through legislative measures and administrative systems. Of particular concern is the decline in high status waterbodies in Ireland. In 2007-2009, the first WFD baseline assessment, high status surface waterbodies were at 12.9%; this has since declined to 8.5%. Over the same period, poor status waterbodies have been increasing.

Table 5.13: Summary of WFD surface water (ecological status) and groundwater (chemical status) 2013-2018 [13-18] and 2010-2015 [10-15] (EPA, 2019)

Percentage of water bodies	High	Good	Moderate	Poor	Bad
	13-18 / 10-15	13-18 / 10-15	13-18 / 10-15	13-18 / 10-15	13-18 / 10-15
Groundwater	n/a	92 / 92	n/a	8 / 8	n/a
Rivers	8.3 / 10.4	44 / 46.3	27.9 / 25.5	18.8 / 17.5	0.4 / 0.3
Lakes	7.6 / 11	42.9 / 35	32 / 33	12.5 / 13	4.9 / 8

Transitional	8.9 / 12.5	29.1 / 18.75	36.7 / 48.75	17.7 / 15	7.6 / 5
Coastal	22.2 / 23.3	57.8 / 55.8	17.8 / 16.3	0.0 / 4.6	2.2 / 0.0

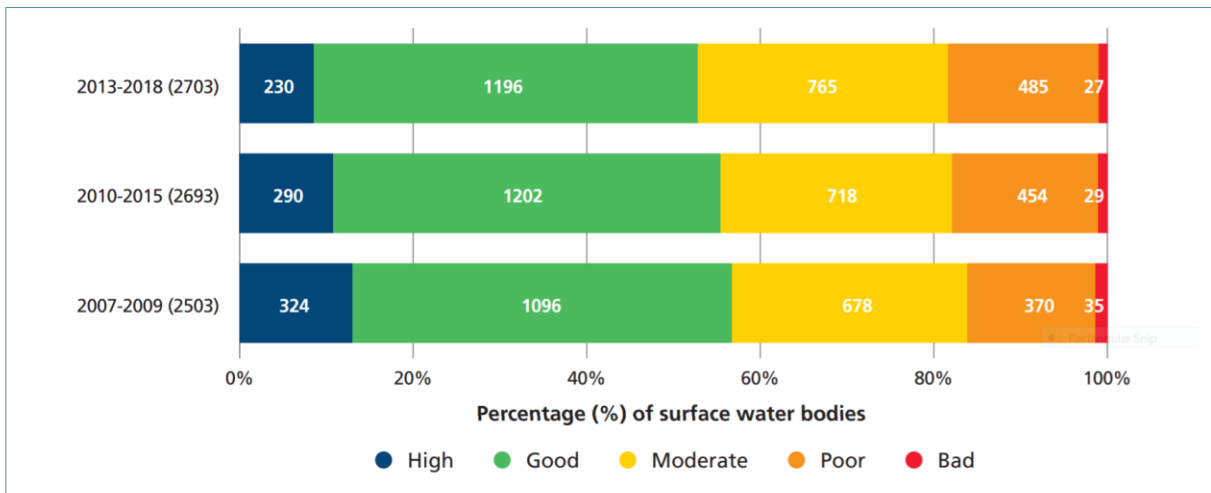


Figure 5-1: Changes in water quality for % WFD status categories

5.7.1.1 Surface Water

The EPA reports in their State of the Environment Report (2020) that nearly half of the surface waters in Ireland are failing to meet the legally binding water quality objectives set by the Water Framework Directive. Pollution and other anthropogenic sources are the main causes of the poor water quality. Figure 5-1 shows the overall ecological status of surface water for the period 2013 - 2018.

The EPA report found that a net decline of 115 surface water bodies (4.4%) had occurred over the last period. River water bodies showed the biggest decline (5.5 %) in water quality while coastal waters showed a net improvement.

The ecological status of surface water is based on the assessment of specified biological quality elements, as well as supporting hydromorphological, chemical (specific pollutants), and physico-chemical elements (EPA, 2015).

Hydromorphological pressures are relevant in relation to potential impacts on benthic invertebrates and fish populations, but the link between these pressures and ecological status in Irish waters needs further investigation. Many surface waters (rivers, lakes, and coastal waters) are controlled or have been modified to support flood protection, navigation, freshwater supply, drainage, or hydropower production, yet the ecological impacts of these alterations are difficult to quantify (EPA, 2015). Arterial Drainage Maintenance Activities proposed on the river channels have the potential to change the hydromorphological condition of the waterbodies resulting in alterations in water quality through increased sediment loading from dredging or similar works. The EPA Catchments Unit published in September 2019, the findings of hydromorphological assessments as part of the 2nd cycle river basin management plans. They estimated that modifications of the hydromorphological characteristics of surface water is estimated to be a significant pressure in 24 % (345) of the 1,460 water bodies that are At Risk of not meeting their water quality objectives. This includes 329 river waterbodies, 10 lakes and 6 estuaries. It is the second most prevalent pressure within surface water bodies (see Figure 5-2).

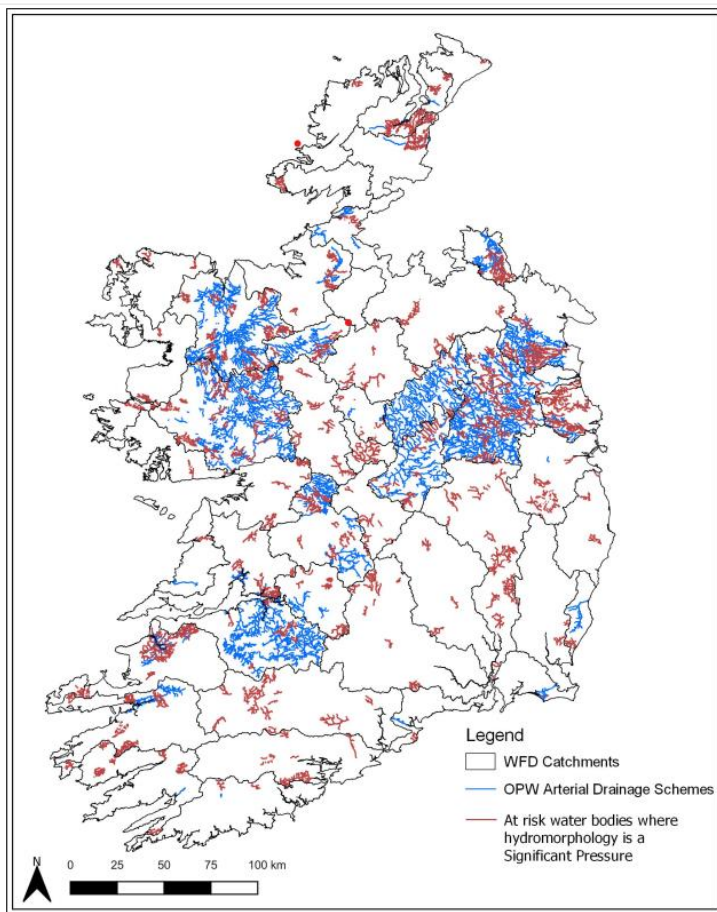


Figure 5-2: Hydromorphological Modification pressures on waterbodies (source: EPA Catchment 2019) and the OPW Arterial Drainage Schemes.

The OPW Arterial Drainage channels are mostly located in the west, the midlands, the east north of Dublin, and around the Shannon catchment, although there are flood relief schemes and embankments all around the country. The assessments of surface water and groundwater in Ireland conducted by the Environmental Protection Agency in Ireland have been summarised below. The findings are taken from the EPA's State of the Environment Report, 2020.

Rivers

Rivers in Ireland are regularly monitored to assess water quality trends, and ecological and physio-chemical status. Parameters for water quality measures include nitrate, phosphate, BOD, ammonia, ecological status such as macroinvertebrates, and hydromorphology. The water status assessment for 2013-2018 showed that 52.3% of the rivers monitored were at satisfactory ecological status as displayed in Figure 5-3.

Water quality is monitored using a macroinvertebrate monitoring and assessment method (Q-values). This is effective, as it is a highly sensitive ecological assessment method available for detecting organic pollution and nutrient enrichment impacts on Irish Rivers (European Commission, 2013). For 2013-2018, 13,376 km of river channel were examined using the biological Q-value scheme. Of that length, approximately 8,853 km is in satisfactory condition.

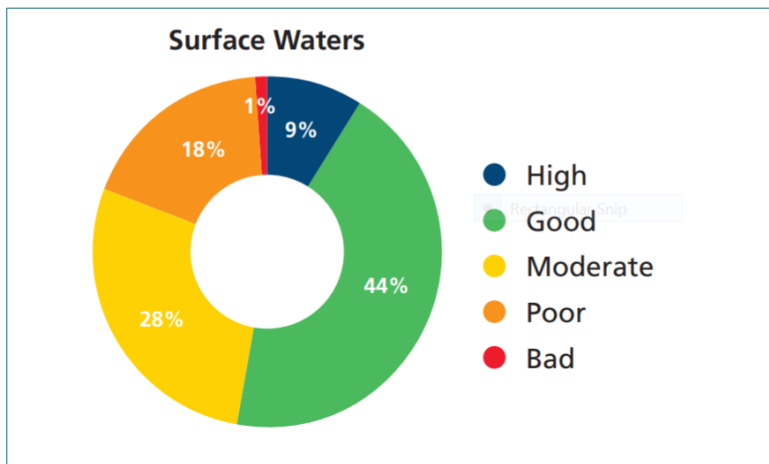


Figure 5-3: Surface Water overall ecological status 2013 - 2018 (Source: EPA)

Macroinvertebrates were responsible for determining 91% of river statuses. General physico-chemical parameters and specific pollutants including copper, iron, and chromium were responsible for downgrading a small number of sites, while hydromorphology was responsible for 111 river waterbodies being classified as good rather than high status.

The Arterial Drainage Schemes in Ireland have involved the deepening and widening of river channels to increase their capacity to contain floodwaters and to provide an outfall for drainage from agricultural land, i.e., changes to their hydromorphological regime. Channelisation of the rivers results in significant modifications to channel morphology through engineering works to produce a structurally simplified and hydraulic efficient channel. However, the ecology of the river environment can be disrupted and impaired due to changes in flow regimes, increased sediment loads, and reduction in habitat diversity. As hydromorphology is a supporting element for rivers at high biological status, the work of the Arterial Drainage Scheme has the potential to prevent a river which is otherwise high biological status from achieving an overall high status.

Lakes

There are over 12,000 lakes in Ireland, primarily located at the west and the centre of the island. 224 were monitored for the WFD assessment from 2013 to 2018. Biological and chemical parameters were evaluated with 50.5% (113 lakes) of the monitored lakes achieving 'high' or 'good' status (EPA, 2019). There has been a 4.3% improvement in the number of lakes in satisfactory condition since 2010-2015.

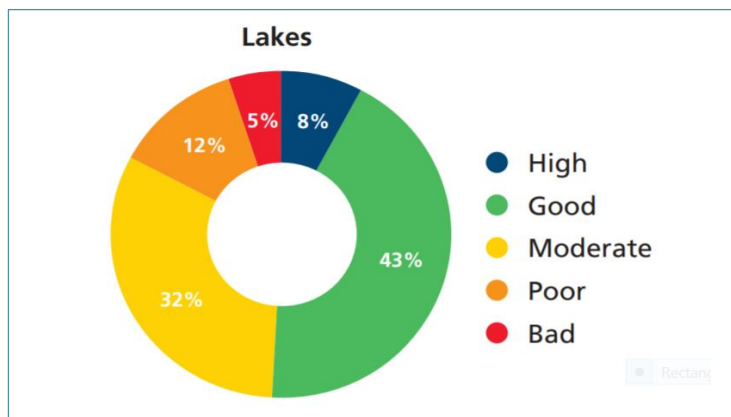


Figure 5-4: Overall ecological status for Lakes 2013 - 2018 (Source: EPA).

Greenan, Guitane, Inchiquin, Kilsellagh, Kylemore, Loughaunore, Mourne, Pollacappul and Lough Rea. These lakes were downgraded because of extensive hard and soft bank engineering and adjustments to water level relative to natural conditions, partly due to arterial drainage works. The potential for further changes due to the Arterial Drainage Maintenance Activities must be considered.

Transitional and Coastal Waters

Coastal and Transitional Waters are under a range of human threats such as discharge from industrial and municipal wastewater treatment plants, inputs from diffuse agricultural sources, harbour and port activities, and discharge of marine vessels. The EPA's 2020 reported that coastal waters had the highest percentage of waters in good or better ecological status (80%). The EPA assessed 79 transitional water bodies between 2013 and 2018 and discovered that over one-third (38%) was found to be at good or high ecological status (EPA, 2019). Coastal waterbodies were also assessed, of which the majority (80%) received a high or good ecological status. Transitional waters, on the other hand, have a much lower percentage of high or good waterbodies demonstrating greater human influence and activity, directly affecting water quality. Of the transitional and coastal bodies assessed in Ireland, 30 were assessed using the Hydromorphological Quality Index. 19 (63%) of these were in high or good hydromorphological condition.

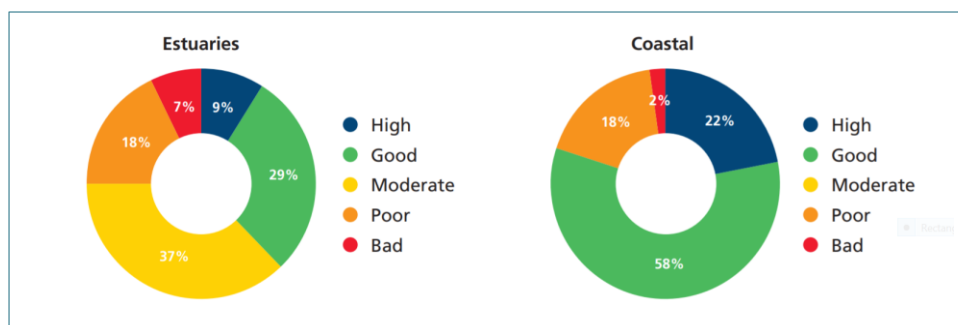


Figure 5-5: Overall ecological status for estuaries and coasts 2013 - 2018 (Source: EPA).

Groundwater

Groundwater is an important source of drinking water in Ireland, providing approximately 25 percent of drinking water nationally (EPA, 2015). In 2019, the EPA's assessment of the groundwater bodies in Ireland determined that only 1.5 % (11) groundwater bodies were classified as poor chemical status based on the best available data.

Pollution

Agriculture, primarily diffuse agricultural pollution resulting in eutrophication, is one of the main suspected causes of pollution and pressures on Irish waters (EPA, 2019). Municipal sources such as municipal wastewater, urban run-off, landfills, and water treatment work are the major causes for nutrient losses. Industrial and forestry pollution are another source of slight pollution resulting in eutrophication, which is enhanced by phosphorus and nitrogen input. Siltation is an effect caused by municipal sources as well as engineering works such as dredging, civil works, and peat harvesting. Sensitive species such as Freshwater Pearl Mussel or fish can be impacted by the smothering effect of inert organic silt from the activities mentioned previously. Siltation is also caused because of bank erosion, cattle access to streams, and losses from tillage land.

Drainage works may cause deterioration of water quality due to the introduction of more direct routes for polluted water to enter the stream, bypassing natural purification processes which occur on the soil. In some cases, drainage works contribute directly to pollution through the introduction of eroded bank material or creating outflow from highly mineralised groundwater zones.

5.7.2 Future Trends

Surface water and groundwater are important resources in Ireland. There are drivers and pressures that threaten this resource such as municipal point source pollution, nutrient and sediment loading from agriculture, and hydromorphological pressures; however, better management and sustainable practices could help mitigate potential impacts. The EPA's State of the Environment Report 2020 mentions that the continuing decline in high status water bodies and

the increase in the number of water bodies in poor ecological health is of major concern. The loss of high-water quality status has knock on implications for the survival of certain protected species such as the freshwater pearl mussel. The ecology of poor status waters is altered that their ability to function as an ecosystem and continue to play a role in nutrient recycling is diminished.

The RBMP for 2022-2027 will outline further objectives which will be in place over the period of the Arterial Drainage Maintenance Activities.

5.7.3 Key Environmental Issues

In accordance with the Irish SEA Regulations (S.I. 435 of 2004), consideration has been given to whether the environmental effects, both positive and negative, of the Arterial Drainage Maintenance Activities (2022-2027) are likely to be significant on each receptor.

1. Arterial Drainage Maintenance Activities (2022-2027) must ensure that the objectives align with those of the WFD and that the Arterial Drainage Activities proposed will not interfere in accomplishing the goals set out by the WFD, RBMP objectives, and achievement of good ecological status/potential.
2. Water quality and biological potential of surface water is partly dependent on hydromorphology, especially in relation to the WFD. For that reason, Arterial Drainage Maintenance Activities may have both direct and indirect impacts on water quality, due to the changes they produce in the hydromorphological condition of the waterway. It is difficult to determine the extent to which Arterial Drainage Maintenance Activities may affect water quality in relation to the rest of the activities that could potentially pollute the waters. The EPA's 2020 State of the Environment Report identified hydromorphology as a significant pressure on Ireland's aquatic environment.
3. The flooding of important water treatment plants could pose a significant pollution risk with associated impacts on human health, water quality, and ecology.
4. Changes in water quality could create pressure and impacts on the ecological and chemical status of waterbodies: river, lakes, ponds, standing waters, and other wetlands including peatlands.
5. Potential impacts on water supply (including potable) and water conservation.
6. Water quality could be improved through flood risk management. Potential to improve waterbody status, including heavily modified and artificial water bodies
7. Climate change impacts on water quality due to increase storm events, rainfall, and flooding with the potential to change hydromorphology of riverbeds, cause bank erosion, and re-suspended nutrients.

5.8 Cultural Heritage

Ireland's earliest archaeological sites date back to the end of the last Ice Age, approximately 10,000 years ago. They consist of evidence of temporary settlements of fishermen, hunters, and gatherers, and are generally comprised of scattered stone implements and shell mounds or middens (National Monument Service, 2016). However, structures and remains from any time can be considered of archaeological interest, and indeed much of Ireland's recorded archaeological features date from much more recent times.

Monuments of archaeological importance are protected under the National Monuments Acts 1930-2004. The National Monuments Service maintains a record of all known monuments, the Record of Monuments and Places (RMP). There are approximately 120,000 RMP sites, published county-by-county. These include burial grounds, standing stones, medieval churches, tower houses, ring forts, and many other sites. Any work proposed near an RMP site requires written notice to the Minister. 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).

The National Inventory of Architectural Heritage (NIAH) is a state initiative under the administration of the Department of Housing, Local Government and Heritage, 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) as 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. During the construction and excavation of the original arterial drainage scheme, features of archaeological importance were recovered.

The OPW commissioned an archaeologist to produce a pilot study on screening for archaeological and architectural heritage impacts on the OPW's programme of arterial drainage works on the Neagh Scheme. The purpose of the report was to formulate a method and standard for future archaeological and architectural heritage screening reports. The pilot study was carried out on the Neagh Scheme. The study found that the Sites and Monuments Records (SMR), National Inventory of Architectural Heritage (NIAH) and Record of Protected Structures (RPS) datasets provide a baseline assessment for assessing likely heritage features. The report made several recommendations:

- The OPW should appoint a Project Archaeologist to prepare Arterial Drainage Heritage Screening Reports for each scheme. An archaeology consultant has been retained by the OPW on a 3-year contract. The company will have a dedicated archaeologist for the three arterial drainage regions, and they will develop new SOPs and will carry out cultural heritage screening assessments of the schemes.
- The findings of the reports should be used to inform the maintenance crews
- The OPW's Maintenance Manual should incorporate measures to protect archaeological features
- Access and egress from maintenance works should avoid recorded archaeological heritage assets
- Toolbox talks should be given to the maintenance crews by the appointed OPW Archaeologist
- The Project Archaeologist should advise the OPW about specific mitigation measures
- The Project Archaeologist should liaise with the National Monuments Service regarding the screening reports, SOP's, and toolbox talks.

For that reason, during the Arterial Drainage Maintenance Activities (2022-2027), it is important to be sensible when carrying out the works and to be aware of any RMP or NIAH sites in proximity, as appropriate methodologies should be followed.

Future Trends

Cultural heritage and archaeological features face a growing threat posed by development pressures and urbanisation. As mentioned above, heritage screening will be carried out by the OPW consultant archaeologist, to avoid potential impacts on known and recorded heritage. Its purpose is not to identify unknown heritage interests. However, the Guidance Documents, the training etc. to be developed by the Project Archaeologists will provide OPW staff with a basic level of understanding and skills to assist in the identification of unknown or buried sites and artefacts. The protection of existing designated sites, structures, buildings and unknown or buried archaeological interests will be required for any proposed maintenance works.

5.8.1 Key Environmental Issues

In accordance with the SEA Regulations (S.I. 435 of 2004), consideration has been given to whether the environmental effects, both positive and negative, of the Arterial Drainage Maintenance Activities (2022-2027) are likely to be significant on each receptor.

1. Arterial Drainage Maintenance Activities will be constrained by the need to protect the setting of areas of existing archaeological and architectural value (i.e., Monuments, RMP, and NIAH).
2. Ensure that areas adjacent to the works are not of cultural, architectural, or archaeological significance. If so, appropriate measures and guidelines to be used to protect these.

5.9 Infrastructure and Material Assets

Ireland has thousands of kilometres of road and active rail routes across the country. The primary and secondary road network is approximately 5,306 km long, and consists of motorways, dual carriageways, and single carriageways. The motorways primarily connect Dublin to major cities such as Cork, Limerick, Galway, and Waterford. Dual and single carriageways typically link other built-up areas and rural parts of the country. Some of these roads are in low-lying areas and could be at risk of flooding during intense and prolonged rainfall.

Many urban areas and industries have been centred on rivers or coastlines. There are 10 commercial ports in the Republic of Ireland: Port of Cork, Shannon Foynes Port, Dublin Port, Rosslare-Europort, Port of Waterford, Port of Galway, Drogheda Port, Dundalk Port, New Ross, Wicklow Harbour, and Port of Arklow. These create pressures for the water quality of coastal and transitional water bodies while providing a vital component of Ireland's infrastructure.

There are four international airports in the Republic of Ireland: Dublin Airport, Cork Airport, Shannon Airport, Knock Airport, and several smaller domestic airports, including Kerry Airport, Waterford Airport, Galway Airport, Donegal Airport, and Sligo Airport.

Water Supply

Most drinking water in Ireland is extracted from surface water sources (rivers and lakes), with the remainder drawn from groundwater sources and springs.

For the population living in urban areas the water is supplied by the local authority following extensive treatment. In smaller communities, private water schemes are implemented, and in rural areas, individual houses tend to rely on groundwater wells with little to no treatment (EPA, 2012).

The EU Drinking Water Directive sets quality standards for water supplies using indicators such as microbiological content, in particular *Escherichia coli*. The presence of *E. coli* provides an indication that the water has been contaminated by faecal pollution or inadequate operation of treatment plant. Large water supply systems in Ireland are well monitored and have generally found a negligible amount of *E. coli*.

Approximately 3 million people are dependent on public water supplies, with 200,000 people served by private group water schemes. The EPA's 2019 report on Drinking Water Quality in Ireland found:

- The quality of drinking water in public supplies remained high
- Of 67 Boil Water Notices issued in 2019, 59 were long-term, requiring consumers to boil their water for more than 30 days
- Two boil water notices for over 600,000 consumers highlights the vulnerability of our water supplies
- There was a high level of disinfection by-products and persistent pesticide failures in water supplies.

Wastewater Treatment Plant

Sewage and other waste waters pose a threat to human health and the environment. Pollution from wastewater treatment plants can occur if there is inadequate treatment and/or combined storm water overflows. Since 2007, local authorities and private companies are required to obtain a Wastewater Discharge License or Certificate of Authorisation from the EPA to control and monitor the discharge levels and mitigate the potential effects to the waterways (EPA, 2012).

Septic Tanks are ordinarily used in rural areas. If these are poorly sited and/or not properly maintained, they could pose a threat to surface water, groundwater, and local drinking water. The Department of the Environment, Community, and Local Government (DECLG) published the Water Services (Amendment Act) (S.I. No. 2 of 2012) to control wastewater discharges from houses not connected to the sewer network (EPA, 2015). The EPA and local authorities are responsible for the enforcement of this legislation.

The EPA's Urban Wastewater Treatment Report (2019) found that:

- The number of large urban wastewater treatment plants failing to meet the EU treatment standards has fallen from 28 to 19 in the past two years

- This report identifies the 113 priority areas where improvements are needed to prevent water pollution, eliminate discharges of raw sewage, meet EU treatment standards, and protect bathing waters and freshwater pearl mussels.
- Treatment at 19 of our 172 large urban areas failed the mandatory EU treatment standards set to protect the environment. These 19 areas generate more than half of Ireland's sewage.
- Raw sewage is released into our waters every day from 35 towns and villages.

Arterial Drainage Maintenance Activities (2022-2027) will ensure that the drainage channels continue to protect against low-level flooding, as well as ensuring that embankments and flood relief schemes are maintained and able to protect highly sensitive infrastructure such as water treatment plants.

5.9.1 Future Trends

With the slight yearly population increase there may be some growing pressures on infrastructure and resources. These are more likely to be experienced in urban fringes and suburbs near urban centres. As the population increases and a shift in population dynamics is experienced, there will be a need for further development of infrastructure.

The demand for water abstractions and discharges of wastewater are likely to change with regional population changes. Climate change may add further pressure to these demands.

5.9.2 Key Issues

In accordance with the SEA Regulations (S.I. 435 of 2004), consideration has been given to whether the environmental effects, both positive and negative, of the Arterial Drainage Maintenance Activities (2016-2021) are likely to be significant on each receptor.

1. Drinking water supply, both groundwater and surface water, should always be considered.
2. Surface water and groundwater continue to be a crucial resource and their connectivity and quality should be maintained to ensure water supply.
3. Wastewater treatment plants and septic tanks in low-lying areas can be at risk of flooding.

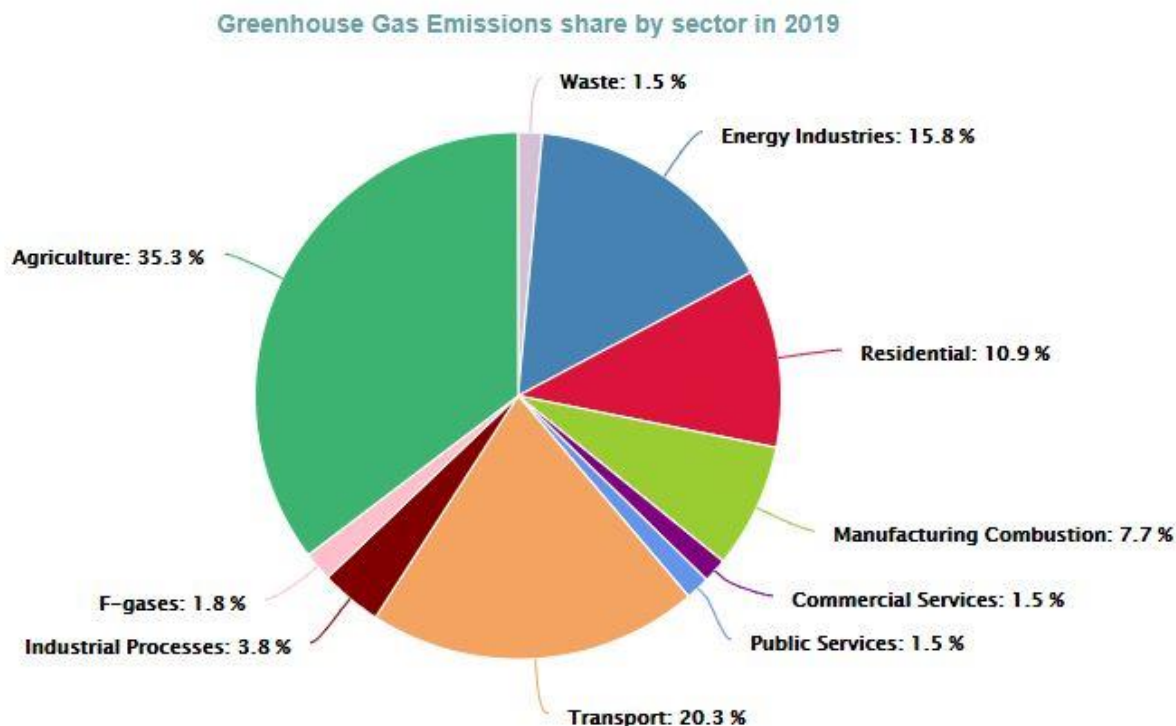
5.10 Air and Climate Change

The impact human activity is having on the climate is well established. The primary mechanism by which humans are altering the planet is through the release of greenhouse gases by the burning of fossil fuels. This release is leading to an increase atmospheric CO₂. Human interference is increasing air and ocean temperatures, which will result in droughts, melting ice and snow, rising sea levels, increased rainfall, and flooding. It is also likely that an increase of extreme weather events (annual hurricanes, tornadoes, and earthquakes) is related to varying climate around the planet.

Human activities that impact the composition of the atmosphere include carbon dioxide (CO₂) emissions from the burning of fossil fuels (coal, oil, peat); methane and nitrous oxide from agriculture; and emissions through land use changes (deforestation, afforestation, urbanisation, and desertification).

Ireland's greenhouse gas emissions arise from a mixture of activities. The Irish Government's Climate Action Plan 2021 is currently out for public consultation. The Climate Action Plan is Ireland's roadmap to becoming a climate neutral economy and resilient society by 2050. Published on the 17 June 2019, the Climate Action Plan contains 183 actions, broken down into 619 individual measures, required to meet our EU 2030 targets and put Ireland on the right trajectory towards net zero emissions by 2050. Ireland's Long-Term Strategy will identify pathways beyond 2030, towards decarbonisation to 2050. The EPA figures for Ireland's Greenhouse Gas Emissions by sector in 2019 are shown in Figure 5-66.

Figure 5-6. Ireland's greenhouse gas emissions by sector for 2019 (Source EPA, 2019).

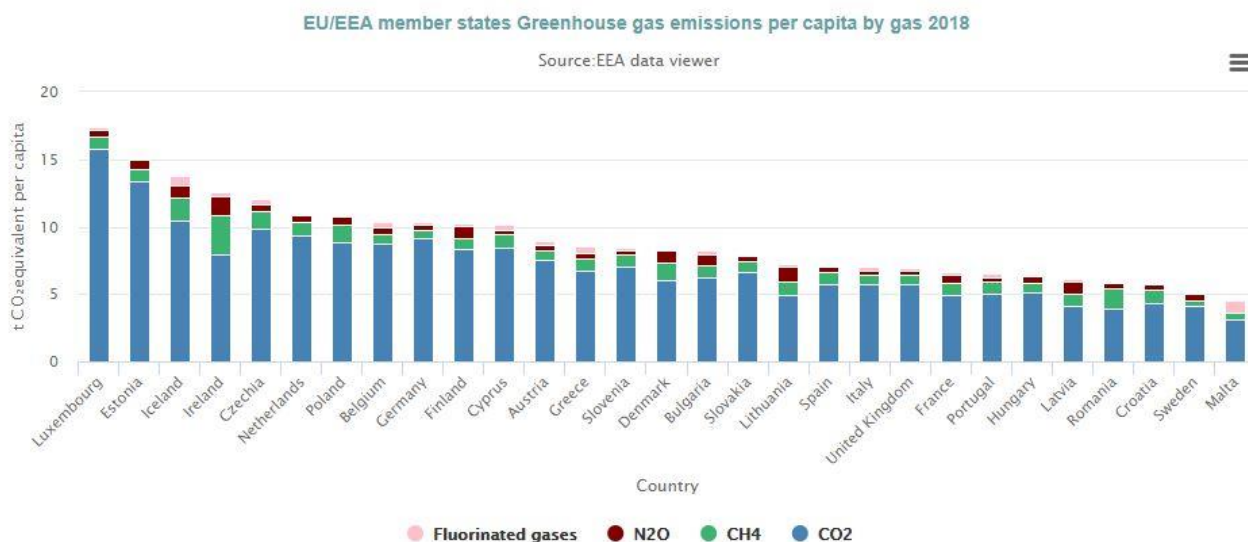


The main sources of greenhouse gas emissions are agriculture (35.3%, unchanged from 1990), transport (20.3%, up from 9.5% in 1990), and energy industry (15.8%, down from 20.8% in 1990). Although some changes have taken place and are likely to continue with the implementation of policy and legislation, it is likely that these will still dominate as the main sources of emissions. Energy and transport may decrease in the coming years as these sectors decarbonise. Land use change is also a factor that contributes to greenhouse gas release, with deforestation, afforestation, and the removal of peat for fuel or the draining of peatland all having significant effects on the environment. For that reason, the conservation of these habitats is crucial to helping mitigate climate change.

Ireland's greenhouse gas emissions per capita are among the highest in Europe, primarily because of our high reliance on agriculture (see Figure 5-77), with methane (CH₄) emissions in green. Ireland's methane emissions per capita are the highest in Europe, while our carbon dioxide is comparatively low).

Ireland has made various improvements in its ambient air quality since the introduction of several legislative measures around acid rain and photochemical smog, beginning in the early 1990s. There are two EU directives which require the comprehensive monitoring of air quality and set out air quality standards and objectives. The Clean Air for Europe (CAFE) Directive (2008/50/EC) merged previous legislation into a single Directive, with new objectives for PM_{2.5}. The 'Fourth Daughter Directive' (2004/107/EC) set limits and target values for ambient concentrations of air pollutants harmful to human health and the environment, such as cadmium, arsenic, mercury, nickel, and polycyclic aromatic hydrocarbons.

Figure 5-7. Total greenhouse gas emissions and CO2 emissions as Tonnes CO2 per person by Country in 2009 (Source: EPA, 2015)



Ireland has introduced various monitoring strategies and policies to control and maintain 'good' air quality and fulfil EU and international commitments. The EPA implemented a measure to assess air quality called the Air Quality Index for Health (AQIH). The AQIH is a number from 1 to 10 that rates the air quality of an area at a particular time; AQIH is calculated every hour. A ban on the sale and distribution of bituminous fuel (or 'smoky coal') has been introduced in 27 cities and towns, which have experienced a reduction in particulate matter (PM₁₀), as opposed to those towns where the ban does not apply.

Emission reductions from road traffic have been applied through new standards and cleaner technologies, however, pollutants from car emissions continues to be one of the main threats to air quality in Ireland.

Climate change is likely to influence Ireland through the fluctuation of river flows and tide levels and its impact on flood frequency, extent, distribution, and patterns (EPA, 2012). This assessment will examine the potential impact of climate change on flood events in Ireland and consider the need for outfalls for the drainage of agricultural lands.

There are various carbon sinks in Ireland such as peatlands, forestry, and other soils, grasslands, and habitats. Natural peatlands act as long-term carbon storage, however, when peatland is cut, carbon dioxide (CO₂) and other greenhouse gases, specifically methane, are released into the atmosphere. Irish peatlands make up approximately 17% of the country's land area and store 1.2 billion tonnes of carbon, which is equivalent to 4.4 billion tonnes of carbon dioxide. Unfortunately, approximately 80% of Irish peatlands have been damaged to some extent (Reour-Wilson et al, 2011). Bord na Móna has recently announced the cessation of peat production on all their bogs. Peat had been extracted from these Bord na Móna bogs under Integrated Pollution Control (IPC) licences issued and administered by the Environmental Protection Agency. As part of Condition-10 of this licence, decommissioning and rehabilitation must be carried out when industrial peat production ceases. Bord Na Móna's accelerated decarbonisation strategy, and the availability of government funding, the company has also committed to ambitious enhanced peatland decommissioning, rehabilitation, and restoration measures, targeting circa 33,000 hectares in over 80 Bord Na Móna bogs. Bord Na Mona's Peatland Action Scheme is aimed at optimising the climate action benefits of rewetting the former industrial peat production areas. The wetting of the peatlands will also benefit the creation and redevelopment of peatland habitats. Their Brown to Green Strategy is focused on assisting Ireland become carbon neutral by 2050.

5.10.1 Ireland's Commitments to Climate Change

An overview of selected international, EU and national policy objectives and targets are shown in Table 5-14.

Policy Objectives and Targets	Sources	Target Year
Limit global temperature rise to well below 2°C and pursue efforts to limit the temperature increase to 1.5°C above preindustrial levels	Paris Agreement 2015 (United Nations)	Long-term global goal
Balance GHG emissions and removals as informed by best available science	Paris Agreement 2015 (United Nations)	Second half of this century
Take urgent action to combat climate change and its impacts	United Nations Sustainable Development Goal 13	2030
Non-ETS (Effort Sharing Regulation) sectors to reduce emissions by 20% (compared with 2005) – main sectors are agriculture, transport, commercial, residential, and waste	EU 2020 Climate and Energy Package	2020
Non-ETS (Effort Sharing Regulation) sectors to reduce emissions by 30% (compared with 2005) – main sectors are agriculture, transport, commercial, public, residential, and waste.	EU 2030 Climate and Energy Framework	2030
EU ETS sectors to reduce emissions by 21% (compared with 2005)	EU 2020 Climate and Energy Package	2020
Fundamental national objective to achieve transition to a competitive, low-carbon, climate-resilient and environmentally sustainable economy by 2050	National Policy Position (2014)	2050
Statutory basis for the national transition objective; to achieve the transition to a low-carbon, climate-resilient and environmentally sustainable economy by the end of 2050	Climate Action and Low Carbon Development Act (2015)	2050
Reduce emissions of CO ₂ in electricity generation, the built environment and transport by at least 80% compared with 1990	Climate Action and Low Carbon Development Act (2015)	2050
Identify an approach to 'carbon neutrality' for the agriculture and land use sector	National Mitigation Plan (2017)	2050
Build sectoral and local-level resilience to climate change impacts	National Adaptation Framework (2018)	Ongoing
Pathway to meeting EU 2030 targets that is consistent with net zero carbon target by 2050 (in line with EU vision)	Climate Action Plan (2019)	2030 and 2050

Table 5-14: Overview of Selected international, EU and national policy/plan objectives and targets (Source: EPA, 2020)

5.10.2 Future Trends

Since climate change is the most significant challenge facing current and future generations, significant declines in greenhouse gas emissions are necessary to avoid irreversible impacts. The UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol are international conventions addressing causes, consequences, and potential mitigation measures for climate change. In the European Union, the Climate and Energy Package and the Adaptation Strategy provide guidelines for Irish action.

Ireland commitment to the Paris Agreement, The Climate Action Plan, the National Climate Change Adaptation Framework (2013), and the OPW Climate Change Sectoral Adaptation Plan for Flood Defence, all address the potential impacts of climate change and potential strategies to mitigate and adapt to climate change impacts. Reducing the carbon emissions of public sector activities is included in the Climate Action and Low Carbon Development (Amendment) Act 2021. Ireland is now legally bound to a net-zero emissions no later than 2050, and to a 51% reduction in its emissions by the end of this decade.

Climate predictions

The Met Eireann publication 'Ireland's Climate: The Road Ahead' (2013), based on downscaled global climate simulation models, predicts potential changes in climate and their impact for Ireland. It is anticipated that mean temperatures will increase by 1.5 degrees by 2050. These warm temperatures will become more evident in winter and summer, which will experience a 3 degree and 2-degree rise, respectively. Winters are expected to be wetter with increases of up to 14% in precipitation (under the high emissions scenario) and the frequency of heavy rainfall events will rise to up to 20%. Summers are also expected to be drier (approximately 20% in reduction of precipitation under the high emissions scenario). These climate change impacts vary by region

with the Southeast likely to experience the greatest increase in summer temperatures and the West experiencing the greatest increase in winter rainfall. The changes in precipitation are, among other things, likely to alter river catchment hydrology. Expected mean height of waves is estimated to reduce while winter and spring storms wave heights are likely to rise. Mean sea level is also predicted to increase.

Arterial Drainage Maintenance Activities need to adapt to the potential changes in climate conditions that may be experienced in Ireland. These variations will impact the Arterial Drainage Programmes differently (Arterial drainage scheme (major and minor), Embankments, Flood relief schemes). Each programme must be considered individually when determining potential adaptation strategies to climate change. Future performance will depend on the adaptive capacity of the Arterial Drainage Schemes, embankments, and flood relief schemes.

A significant amount of Arterial Drainage Schemes is in the west of the country or comprise of small coastal outlets. Therefore, an increase in rainfall and winter flow, higher sea levels, and frequency of storms, will impact the effectiveness and suitability of the Arterial Drainage assets. For smaller arterial drainage schemes, sea level rise alone could result in the existing scheme being unable to provide its intended function. It is important to consider how the climate change predictions could prompt a change in land-use to adjust accordingly. The potential challenges that could be faced are the following:

- Increased flood risk from embankments and schemes through asset failure.
- Decreased drainage of benefitting lands due to increased rainfall.
- Importance of adaptive capacity of arterial drainage channels, embankments, and flood relief schemes to continue to provide their intended function and other as yet unknown functions, such as water storage for irrigation or human water supply.

Potential adaptation alternatives can range from (1) do nothing; (2) contain; (3) increase standard; (4) refurbish assets.

Monitoring of current receptors (flow regime, agricultural practices, discharges, irrigation, and flood risk) in terms of the adaptive capacity can help determine the best course of action to adapt to climate change projections in the most sustainable manner.

5.10.3 OPW Climate Change Co-Ordination Group

The OPW has a Climate Change Co-Ordination Group, whose function is to track GHG emissions from OPW activities. The Co-Ordination Group has identified two objectives for the arterial drainage activities namely to enhance their knowledge and understanding of climate change on flooding and flood risk management. The OPW has set a target of Q4, 2021 to engage with findings and recommendations arising from the Climate Observation System National Committee reports and to align hydrometric monitoring objectives with the climate change objectives. The OPW has, in line with various objectives in the 2019 Climate Action Plan such as use of electric vehicles and development of a strategy to reduce CO₂ eq emissions by 30% by 2030, stated that it will focus on reducing CO₂ emissions from plant through fuel efficiency. The OPW is currently replacing 25 tonne long reach excavators with machines capable of delivering a 25% fuel saving. In the long term, end of economic life diesel powered fleet will be replaced with full electric vehicles such as forklifts and light electric vehicles.

5.10.4 Key Environmental Issues

In accordance with the Irish SEA Regulations (S.I. 435 of 2004), consideration has been given to whether the environmental effects, both positive and negative, of the Arterial Drainage Maintenance Activities (2022-2027) are likely to be significant on each receptor.

1. Greenhouse gas emissions from plant and machinery and offices and buildings occupied by the OPW drainage sections.
2. Climate change mitigation and adaptation of Arterial Drainage Assets and Maintenance Activities are needed, including effects from severe weather events.
3. Increased likelihood of river and coastal flooding.
4. Potential for increased fluvial and coastal flooding resulting from climate change.
5. Increased rainfall and sea level influencing the ability of arterial drainage schemes and embankments to function as designed.

5.11 Interrelationships

In accordance with the SEA Directive, the interrelationships between the SEA environmental topics must be considered.

Human Being	✓								
Land-Use	✓	✓							
Flora, Fauna, Biodiversity	✓	✓	✓						
Water	✓	✓	✓	✓					
Cultural Heritage	✓	✓	X	✓	✓				
Infrastructure and Material Assets	✓	✓	✓	✓	✓	✓			
Air and Climate Change	✓	✓	✓	✓	X	✓	✓		
Soil and Geology	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Human Being	Land-Use	Flora, Fauna, Biodiversity	Water	Cultural Heritage	Material Assets	Air and Climate Change	Soil and Geology	

✓=Interrelationship anticipated

X=No Interrelationship anticipated

Key interrelationships arise between water, biodiversity, flora and fauna, geology and soils, land use, and human beings. It is important to recognise that the impact on one receptor will directly or indirectly influence the others. A sustainable approach to management is necessary for a comprehensive methodology for the Arterial Drainage Maintenance Activities (2022-2027).

The relationship between biodiversity, flora and fauna, and water resources in Ireland is very important because the aquatic environment (e.g., Freshwater Pearl Mussel, Atlantic Salmon) directly depends on the quality and quantity of water resources. Terrestrial/wetland habitats rely indirectly on water to sustain environments such as turlough, peatlands, wetlands, and fens, which support high levels of biodiversity. Good water quality also supports fisheries populations, which in turn delivers a valuable amenity resource, along with direct recreational use of the water environment. In addition, water quality is crucial for human health as it provides drinking water to nearby populations.

JBA proposes to use the Environmental Sensitivity Mapping (ESM) tool developed by the EPA, UCD, AIRO of Maynooth University and OSI to support our SEA. ESM uses spatial data sets with specific layers attributed to a pre-defined scientific score. A sensitivity map is generated when the layers are overlaid. A colour scale from green to orange to red is used to describe the sensitivity of the area.

Humans, land-use, and infrastructure are interconnected since they are influenced by population dynamics, growth, and movement (urbanisation etc). These receptors are also dependent on the Irish and European economy, as well as the political agenda of the country at the time. These receptors cause anthropogenic changes to the natural environment, therefore, directly impacting water, biodiversity, soil, and geology, and in the long-term impacting air and climate change.

Archaeological and architectural sites and artefacts are crucial to understanding the cultural evolution and human history of the country. The maintenance and protection of these sites are

therefore very important. Land-use changes, infrastructure change/construction, urbanisation, and flooding are all developments that could cause potential threat to these areas or items.

6 Proposed Framework for Assessing the Environmental Effects

6.1 Introduction

Scoping of the SEA enables the setting out of sufficient details of the proposed framework for the assessment of the environmental effects of the 2022-2027 Arterial Drainage Maintenance Activities. The SEA process uses an 'objective-led' assessment which involves setting several high-level Environmental Objectives and assessing the findings of the assessment against these Environmental Objectives. This process, coupled with the interaction between the SEA team, the Appropriate Assessment team and the OPW's Arterial Drainage Maintenance Team, allows the Maintenance Activities meet the Environmental Objectives and put in place a monitoring programme to demonstrate successful compliance with the Environmental Objectives.

6.2 Draft Environmental Objectives

The nature of a plan or programme influences the Environmental Objectives that will be proposed. The key environmental issues arising from the Arterial Drainage Maintenance Programme will be potential impacts on water quality, biodiversity, and archaeology. However, based on the requirements of Annex 1(f) of the SEA Directive Environmental Objectives will be assigned for all environmental aspects. These draft Environmental Objectives are provided for the purposes of scoping and JBA invites the consultees, in their replies, to provide us with feedback on these Environmental Objectives. The Environmental Objectives that are being considered to test the potential environmental impact of the Maintenance Programme is shown in Table 6-1. The effects on these topics will address the positive, negative, long term, short-term, temporary, and permanent impacts of the Programme. JBA will assess the proposed alternatives against the Environmental Objectives. Given the nature of the Maintenance Programme, the impacts of same on the environment will be a qualitative assessment of the differences in environmental conditions with the Programme and without the Programme (baseline conditions). SEA indicators will be developed at the Environmental Reporting stage to assist in formulating a Monitoring Programme for the SEA.

Draft Environmental Objective	Draft Targets
<p>Population and Human Health Public access and recreation. Contribute to viable and sustainable local communities.</p> <p>Protection of lands from flooding, thereby maintaining soil quality and function for productivity on agricultural lands.</p> <p>Maintain benefiting lands available for economic activity and no change as to render existing economic activity unviable.</p>	<p>Maintain level of existing water-based leisure activities during this 6-year maintenance period.</p> <p>No flooding of infrastructure in benefitting lands to the current standard of protection of Arterial Drainage Schemes (between the 50% and 20% AEP) during this 6-year maintenance.</p> <p>Maintain average agricultural yield in benefitting lands over this 6-year maintenance period.</p>
<p>Biodiversity Protect the flora and fauna within the river, river corridor and along vehicular access points and where possible enhance biodiversity.</p> <p>Support the objectives of the EU Habitats and Birds Directives by avoiding detrimental effects to, and where possible enhance, Natura 2000 network, protected species, and habitats.</p> <p>Avoid damage to, and where possible enhance, legally protected sites/habitats and species of national, regional, and local conservation importance.</p> <p>Protect existing riverine, wetland and peatland habitats to maintain naturally functioning ecosystems and hydromorphological conditions.</p> <p>Protect, and where possible enhance, hedgerows and</p>	<p>No adverse impacts in the conservation status of designated sites screened in for Appropriate Assessment (level 2 Natura Impact Statement) because of maintenance activities on channels, embankments and completed flood relief schemes during and beyond this 6-year maintenance period.</p> <p>No adverse impacts in the conservation status of designated sites as a result of maintenance activities on arterial drainage schemes, embankments, or flood relief schemes during and beyond this 6-year maintenance period.</p> <p>Minimal loss of hedgerow and woodland within the riparian corridor, excluding the machine access corridor, during and beyond the 6-year maintenance period.</p> <p>Minimal net decrease in area or detriment to</p>

<p>woodlands within the riparian corridor.</p> <p>Protect and, where possible, enhance the integrity of fisheries within the Arterially Drained catchments.</p> <p>Minimise the risk of spread of any invasive aquatic or terrestrial species.</p>	<p>existing protected habitat or species because of maintenance activity during and beyond the 6-year maintenance period.</p>
<p>Water</p> <p>Support the objectives of the Water Framework Directive (WFD).</p> <p>Enhance natural fluvial processes in support of WFD objectives, through delivery of new, and maintenance of existing, EREP and other river restoration works that are part of the arterial drainage maintenance programme.</p> <p>Provide no impediment to the achievement of water body objectives and contribute to the achievement of water body objectives.</p> <p>Ensure water quality remains adequate to support a healthy aquatic biological community and that it meets environmental standards established for general physiochemical conditions and specific pollutants of concern.</p>	<p>Improved biological status and hydromorphological conditions of all arterial drainage channels influenced by EREP and other river restoration works.</p> <p>Minimise constraints to the achievement of water body objectives during and beyond this 6-year maintenance period.</p> <p>Minimal deterioration of physiochemical conditions or an increase of specific pollutants of concern, maintain adequate biological environment in the rivers and channels.</p> <p>Maintain dissolved oxygen levels at acceptable levels.</p>
<p>Air & Climate</p> <p>Minimise the climate change impacts of Arterial Drainage maintenance activities.</p> <p>Reduce greenhouse gas emissions from machinery and equipment used in Arterial Drainage maintenance activity.</p> <p>Minimise release of sequestered greenhouse gases from sinks such as peatlands and forests.</p>	<p>Reduce greenhouse gas emissions from machinery and other arterial drainage maintenance activities.</p> <p>No changes in hydrological regime resulting in the release of sequestered greenhouse gases during this 6-year maintenance period.</p>
<p>Archaeology & Cultural Heritage</p> <p>Protect known features of cultural heritage.</p> <p>Protect archaeological features listed on the Record of Monuments and Places (RMP) and other listed National Monument and Archaeological Sites, Protected wrecks, archaeological objects, and world heritage sites.</p>	<p>Minimal impact upon architectural features because of arterial drainage maintenance activities during and beyond this 6-year maintenance period.</p> <p>Minimal damage to or loss of features listed on the RMP because of Arterial drainage maintenance works during and beyond the 6-year maintenance period.</p>

7 Alternatives

7.1 Introduction

Article 5(1) of the SEA Directive and 13 E(1) of the Planning and Development (Strategic Environmental Assessment) Regulations 2004 (as amended 2011) requires that the OPW considers alternatives within the Environmental Report. The alternative assessment will follow the EPA guidelines for the assessment of alternatives in SEA (EPA, 2015). The key consideration for the Arterial Drainage Maintenance Activities 2022-2027 is that alternatives considered must be technically available and meets the requirements of the OPW's responsibilities under the Arterial Drainage Act. The current approach to the arterial drainage maintenance activities is unlikely to change significantly as this would require an amendment/variation to the Arterial Drainage Act. There are however potential alternatives within the scope of the Arterial Drainage Act, and these will be explored.

In developing alternatives, the 'do nothing' approach is not considered a realistic option due to the statutory requirements and responsibilities of the OPW. The 'do nothing' scenario will therefore act as the baseline for the SEA.

The alternatives will be assessed for possible significant effects on the environmental aspects. The SEA is an evaluation tool to assess the impacts of a plan or programme before it is adapted. The SEA will be used to gather information and be used to make an informed decision on the preferred alternative(s). Where negative impacts are identified, other constraints such as the OPW's statutory obligations, costs and the public's needs must be considered.

8 Statutory Consultation Process

8.1 Introduction

As described in Section 2.3, this Scoping Report forms the first step in the consultation process. The consultation meets the requirements of the SEA Regulations and the Aarhus Convention. The list of Statutory Bodies to be consulted as per the requirements of the Regulations are:

- Minister for Arts, Heritage and Gaeltacht Affairs
- Environmental Protection Agency
- Minister for the Environment, Community and Local Government
- Minister for Agriculture, Marine and Food
- Minister for Communications, Marine and Natural Resources.

All submissions or observations on the Scoping Report should be made to JBA Consulting at the address below by 15th November 2021.

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8.2 Outcome of this Scoping Exercise

The comments received as part of the scoping exercise will be included in and addressed in the Environmental Report and the SEA Statement.

The logo for JBA consulting, featuring the text "JBA consulting" in white on a teal background with rounded corners.

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