INTERREG VA IMPACT EVALUATION

PRIORITY 2 – ENVIRONMENT – FINAL

Cogent Management Consulting LLP

19th August 2019

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PRIORITY 2 - ENVIRONMENT

CONTENTS

List of Abbreviations

Abbreviation	Definition
ACT	Argyll and the Isles Coast and Countryside Trust
ADI	Asset Discharge Improvements
AFBI	Agri-Food and Biosciences Institute
ABCBC	Armagh City, Banbridge & Craigavon Borough Council
AMU	Asset Management Unit
ANSWER	Agricultural Need for Sustainable Willow Effluent Recycling
AUV	Autonomous Underwater Vehicles
AWQMS	Automatic Water Quality Monitoring Station
BC	Butterfly Conservation
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BWD	Bathing Water Directive
BWI	BirdWatch Ireland
CABB	Conservation Across-borders for Biodiversity
CaBA	Catchment Based Approach
CAFRE	College of Agriculture, Food and Rural Enterprise
CANN	Collaborative Action for the Natura Network
CAP	Conservation Action Plan
CCGHT	Causeway Coast and Glens Heritage Trust
CENIT	CEntral NITrogen
CEO	Chief Executive Officer
CIWEM	Chartered Institution of Water and Environmental Management
COMPASS	Collaborative Oceanography and Monitoring for Protected Areas and Species
CPMR	Capital Programme Monitoring and Reporting System
DAERA	Department of Agriculture, Environment and Rural Affairs
DAFM	Department of Agriculture, Food and Marine
DAP	Drainage Area Plan
DCC	Donegal County Council
DEFRA	Department of Environment, Food and Rural Affairs
DfI	Department for Infrastructure
DWPAs	Drinking Water Protected Areas
EBR	East Border Region Ltd.
EC	European Commission
ECNI	Equality Commission for Northern Ireland
EIAs	Environmental Impact Assessments
EMODnet	European Marine Observation and Data Network
ENGOs	European Non-Governmental Organisation
EPA	Environmental Protection Agency
EU	European Union
EUNIS	European Nature Information System
EVA	Earned Value Analysis
FAEB	Fisheries and Aquatic Ecosystems Branch
GAW	Global Atmosphere Watch
GDPR	General Data Protection Regulation
GES	Good Environmental Status
GET	Golden Eagle Trust
GIS	Geographic Information System
GLAS	Green Low-Carbon Agri-Environment Scheme
GMIT	Galway-Mayo Institute of Technology
GSI	Geological Survey of Ireland
HSO	Higher Scientific Officer
HNV	High Nature Value
IE	Intestinal Enterococci
IFI	Inland Fisheries Ireland
IUCN	International Union for Conservation of Nature
IW	Irish Water
KNIB	Keep Northern Ireland Beautiful
LA	Loughs Agency
LAWCO	Local Authority Water and Communities Office
LoO	Letter of Offer
MarPAMM	Marine Protected Areas Management and Monitoring

Abbreviation	Definition
MCC	Monaghan County Council
MFTF	Moors for the Future
MI	Marine Institute
MMP	Marine Management Plans
MoU	Memorandum of Understanding
MPAs	Marine Protected Areas
MSFD	Marine Strategy Framework Directive
MSS	Marine Scotland Science
MST	Microbial Source Tracking
NGO	Non-Governmental Organisation
NI	Northern Ireland
NIEA	Northern Ireland Environment Agency
NIW	Northern Ireland Water
NMDDC	Newry, Mourne & Down District Council
NPWS	National Parks and Wildlife Service
OPEX	Operational Expenditure
PAG	Project Advisory Group
PAM	Passive Acoustic Monitoring
PE	Population Equivalent
PM	Project Manager
PMO	Programme Management Office
PPE	Personal Protective Equipment
PxP	Project Execution Plan
QUB	Queen's University Belfast
RBAPS	Results Based Agri-environment Pilots
RBMPs	River Basin Management Plans
R&D	Research and Development
RDPs	Rural Development Programmes
RHAT	River Hydromorphology Assessment Technique
ROI	Republic of Ireland
RSPB	Royal Society for the Protection of Birds
SACs	Special Areas of Conservation
SAMS	Scottish Association for Marine Science
SCAMP	Sustainable Catchment Area Plan
SDS	Sustainable Development Strategy
SEPA	Scottish Environmental Protection Agency
SEUPB	Special EU Programmes Body
Sligo IT	Institute of Technology Sligo
SMART	Specific, Measurable, Achievable, Realistic, Time-Bound
SMILE	Sustainable Mariculture in Northern Irish Sea Ecosystems
SNH	Scottish Natural Heritage
SPAs	Special Protected Areas
SSSI	Site of Special Scientific Interest
STMB	Scientific and Technical Management Board
StT	Source to Tap
SWAT	Soil and Water Assessment Tool
SWELL	Shared Waters Enhancement and Loughs Agency
TRT	The Rivers Trust
UAV	Unmanned Aerial Vehicle
UCC	University College Cork
UCD	University College Dublin
UoG	University of Glasgow
UU	Ulster University
UW	Ulster Wildlife
UKWIR	UK Water Industry Research
UWWTD	Urban Wastewater Treatment Directive
WFD	Water Framework Directive
WTWs	Water Treatment Works
WWTWs	Wastewater Treatment Works

EXECUTIVE SUMMARY

Introduction & Background

The Special EU Programmes Body (SEUPB) has commissioned Cogent Management Consulting LLP (Cogent) to carry out an impact evaluation of INTERREG VA Programme[1] Investment Priority 2: Environment.

The Cooperation Programme states that the key aim of Priority Axis 2: Environment is to *"encourage investment to achieve a resource-efficient, sustainable economy through the implementation of green infrastructure and environmental risk management strategies"*.[2]

It also states that two key challenges in the programme region will be tackled through this priority axis, namely the integrity of its:

1. Biodiversity; and
2. Water quality.

The **selected investment priorities** under Priority Axis 2: Environment and their **associated objectives** are as follows:

Investment Priority	Associated Objectives
2a - Protecting and restoring biodiversity and soil and promoting ecosystem services, including through Natura 2000, and green infrastructure.	**1.1** Recovery of Protected Habitats and Priority Species **1.2** Manage Marine Protected Areas and Species
2b - Investing in the water sector to meet the requirements of the Union's environmental acquis and to address needs, identified by the Member States, for investment that goes beyond those requirements.	**1.3** Improve Water Quality in Transitional Waters **1.4** Improve Freshwater Quality in Cross-Border River Basins

The tables below provide a summary of the Specific Objectives, Results Indicators and Targets for Priority Axis 2: Environment:

Specific Objectives, Result Indicators and Targets			
Specific Objective	**Result Indicator**	**Baseline**	**Target**
1.1 To promote cross-border co-operation to facilitate the recovery of selected protected habitats and priority species	The percentage of selected protected habitats in or approaching favourable condition	1%	10%
1.2 To develop cross-border capacity for the monitoring and management of marine protected species in the region	Cross-border capacity for monitoring and management of marine protected areas and species	A little collaboration	A lot of collaboration
1.3 To improve the water quality in shared transitional waters	The percentage of shared transitional waters in the region with good or high quality	0%	100%
1.4 To improve freshwater quality in cross-border river basins	The percentage of cross-border freshwater bodies in cross-border river basins with good or high quality	32%	65%

[1] For Northern Ireland, Ireland and Western Scotland

[2] The Cooperation Programme identifies that the proposed financial allocation for Priority Axis 2: Environment is anticipated to be €84.71m (€72m from ERDF and €12.71m via national match funding).

The anticipated Output Indicators are summarised below:

Anticipated Output Indicators		
Output Indicator	**Measures by Number of:**	**Number**
Surface Area of Habitats supported in order to obtain a better conservation status	Hectares	4,500
Conservation action plans	Conservation action plans	25
The network of buoys for regional seas	Networks	1
Models developed to support conservation of marine habitats and species	Models	5
Marine Management Plans for designated protected areas	Complete plans	6
System for the prediction of bathing water quality and the installation of real-time signage	Systems	1
People benefiting from improved wastewater treatment	People	10,000
Sewage network and wastewater treatment projects completed to improve water quality in shared transitional waters	Projects	2
Cross-border drinking water Sustainable Catchment Area Management Plans	Plans	1
Cross-border groundwater monitoring wells installed	Wells	50
River water quality improvement projects	Projects	3

Priority Level Activity & Project Financing

As detailed below, 9 projects representing a cumulative ERDF commitment of €73.8 million against a budget of €72m (102%) have been supported. Across the 9 projects, should all proceed to plan, each of the Programme outputs within this priority will be met.

At the Objective level:

- Two projects are being implemented under Objective 2.1 (Recovery of protected habitats and species), with a total ERDF allocation of €12.2m. Both projects (CANN and CABB) will carry out a range of conservation activities through the development of 35 Conservation Action Plans in total.
- Four projects are being implemented under Objective 2.2 (Manage marine protected areas and species), with a total ERDF allocation of €15.9m. These projects (COMPASS, SWIM, MarPAMM and Sea Monitor 2) will focus on diverse areas of marine conservation through the development of a bathing water quality prediction model and the delivery of a fully coherent network of monitoring buoys across the regional seas of Northern Ireland, Ireland and Western Scotland.
- One project is being implemented under Objective 2.3 (Improvement of water quality in transitional waters), with a total ERDF allocation of €29.8m. This project (SWELL) which is led by Northern Ireland Water has been approved to deliver a two-phased approach. Phase 1 has been successfully completed and focused on catchment investigation, which has, in turn, informed Phase 2;
- Two projects are being implemented under Objective 2.4 (Improvement of freshwater quality in river basins), with a total ERDF allocation of €15.9m. These projects (Source to Tap and Catchment Care) will focus on improving freshwater quality in a number of cross-border river basins.

Projects Approved for Funding (source: Letters of Offer issued by SEUPB)							
Project Ref	**Lead Partner**	**Project Name**	**Operational start date**	**Operational end date**	**Project Cost (€)**	**ERDF Allocation**	
						(€)	**%**
Objective 2.1							
032	Newry, Mourne & Down District Council	CANN	01/01/2017	31/12/2021	€9,406,313	€7,995,366	85%
037	RSPB NI	CABB	01/01/2017	31/12/2021	€4,926,403	€4,195,586	85%
Subtotal					***€14,332,716***	***€12,190,952***	
Objective 2.2							
034	Agri-food and Biosciences Institute (AFBI)	COMPASS	01/01/2017	31/03/2022	€7,726,441	€5,632,299	73%
038	University College Dublin (UCD)	SWIM	01/01/2017	30/06/2020	€1,108,358	€891,530	80%
5059	AFBI	MarPAMM	01/01/2018	31/03/2022	€6,361,317	€5,385,015	85%
5060	Lough Agency	Sea Monitor 2	25/07/2017	31/03/2022	€4,722,671	€4,014,271	85%
Subtotal					***€19,918,787***	***€15,923,115***	
Objective 2.3							
005	Northern Ireland Water (NIW)	SWELL[3]	18/11/2014	31/12/2022	€35,047,604	€29,790,464	85%
Subtotal					***€35,047,604***	***€29,790,464***	
Objective 2.4							
029	NIW	Source to Tap	01/10/2016	31/03/2022	€4,909,921	€4,173,433	85%
027	Donegal County Council	Catchment Care	01/10/2017	31/10/2022	€13,792,436	€11,723,571	85%
Subtotal					***€18,702,357***	***€15,897,004***	
Total					**€88,001,464**	**€73,801,535**	

[3] NB The SWELL project received an original Letter of Offer (dated 31st January 2017) offering a grant of up to a maximum of €3,282,786.52 (ERDF + Government Match Funding) to be expended and claimed by 30th April 2018 (The period of assistance was for 42 months starting on 1st November 2014 and completing on 30th April 2018), towards total anticipated project costs of €3,282,786.52. This Letter of Offer was later superseded by a second letter of offer that incorporated both Phase I and Phase II of the project.

The Evaluation Brief & Interim Conclusions

The Impact Evaluation Team has been tasked with addressing the following:

- To what extent have the Specific Objectives been achieved?
- To what extent have the targets for the Result Indicators listed in Section 1.3.6 been achieved?
- Comment on the effectiveness and added value of cross-border collaboration in relation to the specific objectives?
- What external factors have impacted, positively or negatively, on the achievement of the Specific Objective?
- What new ways of working/partnerships/relationships have been created as a result of activities carried out within the priority axis?
- Identify key areas of best practice and learning;
- What level of mainstreaming has occurred for cross-border delivery of environmental work?
- Are there barriers to cross-border cooperation that the priority axis is not addressing?
- What is the contribution of the priority axis to[4]:

  - EU 2020 objectives;
  - The Atlantic Strategy; and
  - The horizontal principles of equality and sustainable development?

The extent to which the Specific Objectives & Result Indicators have been achieved

As per Sections 3 - 11, discussion with each of the project partnerships indicates that various activities are underway on each of the projects and they are making positive progress towards achieving their respective outputs. Some notable key achievements reported by project partnerships include:

Notable Key Achievements	
CANN	Further to the project partners' original work plan, an additional work plan within the CANN project was approved by Steering Committee on 24 July 2018. As a result, it is now anticipated that the CANN project will deliver additional (from those originally proposed) outputs on an important cross-border site, comprising: • 500 additional hectares of habitats supported in order to attain a better conservation status bringing the projected total to 3,650 ha; • 2 additional Conservation Action Plans (Cuilcagh Mountain SAC in Northern Ireland and Cuilcagh Anierin Uplands SAC in Ireland) bringing the project total to 27 conservation action plans (exceeding the output target of 25). A highlight for the CANN project has been the discovery of a rare snail Vertigo moulinsiana which has been found in large numbers on one of the project sites. Field visits to other sites have been undertaken in order to update habitat maps, and data collection work is underway in order to inform the draft conservation action plans which will directly contribute to the programme outputs once completed. In addition, there has been a significant level of liaison with local stakeholders to inform the public of the activities and actions that will be undertaken and the benefits that the project will bring. This has included consultation and dissemination of information to landowners and other local interested parties. On an overall basis, this has been received positively. However, in one specific area, there has been a number of tensions between the project and a small group of local landowners. This has unfortunately culminated in the project withdrawing from one of the original selected sites (Boleybrack Mountain in Co. Leitrim). Fortunately, the project team had gathered sufficient data to produce a draft Conservation Action Plan for this particular site (albeit no conservation actions will take place), which will provide a legacy for future action beyond the lifetime of the project. The SEUPB is currently working with the Lead Partner on a strategy to transfer some of the works to different sites. Any significant changes will be reported to the Steering Committee and relevant approvals sought. Importantly, 12 draft Conservation Action Plans have been developed and the Accountable Departments in each jurisdiction are working with the SEUPB to provide feedback on the plans.

[4] NB An overview of the aims and objectives of these strategies is provided in Appendix I.

	SEUPB is developing mechanisms for final sign off and verification of the outputs as per programme requirements. Of further note, during September 2018, the CABB and CANN projects delivered a joint event showcasing activities undertaken to that date and demonstrated their commitment to joined-up working.
CABB	Since its commencement, the CABB project has undertaken several surveys and mapping exercises in order to gain a more thorough understanding of the habitats and species located within the project and programme area. This work is assisting the project in its development of the Conservation Action Plans (CAPs) which will ultimately result in the achievement of the outputs. However, it is noted that the mapping exercises have taken longer than first envisaged (after the project partners encountered some issues with sub-contractors), with it now estimated that the mapping will be completed by August 2019. This will likely impact on the project delivery timeframes for some of the CAPs. Nonetheless, at May 2019, the CAP for Garron Plateau is being produced in a first draft format and RSPB Scotland has produced some draft sections of the CAPs for Shiel Farm and Airds Moss. Positively, work is ongoing at all of the sites, with it anticipated that this work will provide improvements of the habitats within this project area. Activities including drain blocking and predator fencing are underway. General fencing and scrub removal at the Montiaghs Moss site has been completed and this has enabled successful grazing of cattle at the site. The capital works at Dungonnell catchment have been completed. The project has reported that 493ha of blanket bog will be positively impacted by drain blocking and should move the land into 'favourable' condition.
COMPASS	The project partnership has been undertaking surveys, fish tagging, data collection (via acoustic moorings) and examining scientific models e.g. collecting data on the movement of Humpback Whales across the region. Sensors have also been deployed at various locations (further details are included in Section 5). It is understood that the project successfully conducted its first Glider mission (underwater autonomous vehicle) on the Malin Shelf.
SWIM	The partnership has identified and agreed on the beaches that will be monitored (discussed further in Section 6) and weather stations and river level sensors have been deployed. It is understood that weather monitoring, water sampling, flow meter data collection, and other relevant data is now being collected (and being transmitted back to the project team), including that being captured by a weather station that was installed at a local primary school (St. Patrick's School in Glenariff in Waterfoot). Further discussion with the project partnership suggests that the location of this particular weather station will provide an excellent opportunity for learning. The project partnership advised that a substantial amount of historical data has also been provided by Met Eireann to inform the development of the scientific model. In addition, the general public can access the project's interactive website, where data is collected and analysed in preparation for the development of the models. Furthermore, software developers have commenced work on the App that will be made available to the public, whilst the real-time signage is, as of May 2019, being procured.
MarPAMM	The project partnership has been undertaking various data collection and research activities, including surveys and the collection of video footage. For example, as part of the Benthic habitat mapping and modelling work package, video footage collected on the project survey was analysed and SAMS commenced testing on UAV (Unmanned Aerial Vehicle) and new anodes and cable were purchased to facilitate testing.
Sea Monitor 2	The project's Letter of Offer was issued during November 2018 and the project was launched in April 2019. All members of the administrative team took up their posts in early 2019. Positively, the project partnership has already made initial contact with other relevant INTERREG VA funded projects (COMPASS, MarPAMM, and CatchmentCARE), SEUPB and the sponsoring departments[5].
SWELL	At INTERREG VA application stage, the SWELL Partnership had identified key agglomerations that had the greatest potential to improve water quality within the Carlingford Lough and Lough Foyle catchments. Identification was on the basis of expert knowledge on network and treatment capability, age of the plant, compliance history, and operational

[5] Department of Agriculture, Environment and Rural Affairs (DAERA) and Department of Communications, Climate Action and Environment (DCCAE).

<table>
<tr><td></td><td>
performance. However, subsequently, during Phase 1 of the SWELL Project, baseline catchment investigations and flow & load surveys were undertaken to justify site selection and to enable the development of Business Cases for the identified sites to demonstrate the cost-effectiveness and value for money of the proposed capital upgrade solutions.

In total, 10 Business Cases were developed to maximise funding potential, with the following 8 preferred sites (considered as most likely to deliver the required water quality improvements, results, and outputs), submitted for Government Departmental and SEUPB approval:

<table>
<tr><th>Catchment</th><th>Work Package</th></tr>
<tr><td rowspan="3">Carlingford</td><td>Newpoint SPS</td></tr>
<tr><td>Warrenpoint WwTW</td></tr>
<tr><td>Omeath DAP</td></tr>
<tr><td rowspan="5">Foyle</td><td>Strabane WwTW</td></tr>
<tr><td>Donemana WwTW</td></tr>
<tr><td>Lifford WwTW</td></tr>
<tr><td>Killea WwTW</td></tr>
<tr><td>Carrigans WwTW</td></tr>
</table>

The 8 sites are considered to represent key agglomerations with the greatest potential to improve water quality within the Carlingford Lough and Lough Foyle catchments. Identification was on the basis of expert knowledge on network and treatment capability, age of the plant, compliance history, and operational performance. The project partners have a high level of confidence regarding the negative impact of the named problem sites and a belief that their rectification will make a significant positive contribution towards the results indicator.

Discussion with the project partnership indicates that the sites located in Northern Ireland are at construction stage (contractor procured), whilst those located in Ireland are at the design stage, as illustrated below:

<table>
<tr><th>Work Package</th><th>Status (as of May 2019)</th></tr>
<tr><td>Donemana WwTW</td><td rowspan="4">At the construction stage</td></tr>
<tr><td>Newpoint SPS</td></tr>
<tr><td>Strabane WwTW</td></tr>
<tr><td>Warrenpoint WwTW</td></tr>
<tr><td>Carrigans WwTW</td><td rowspan="4">At the design stage</td></tr>
<tr><td>Killea WwTW</td></tr>
<tr><td>Lifford WwTW</td></tr>
<tr><td>Omeath DAP</td></tr>
</table>
</td></tr>
<tr><td>Source to Tap</td><td>The project partnership has been undertaking weekly water sampling and analysis in the Finn and Derg catchments. It is also understood that the pilot Land Incentive Scheme was launched on the 25th July 2018 in Castlederg and the event was attended by 82 landowners (further details are included in Section 10). Community engagement has also been supported via social media e.g. Twitter, Facebook, and Instagram.</td></tr>
<tr><td>CatchmentCARE</td><td>The project partnership has, in line with its work packages, been undertaking research activities to identify areas that require further monitoring e.g. establishing the toxicity of metal salts, which will contribute to the fixing of phosphorous levels within the lakes.

It is understood that site surveys and assessments have been undertaken in order to evaluate future project impacts, whilst site plans are being prepared for land improvements (e.g. planting of native plant species and the installation of stock fencing) that will assist the project partners to prepare their River Water Quality Improvement Projects (NB: the project partners are seeking relevant landowner agreements).

It is also understood that some boreholes have been identified and work will commence on drilling once the relevant approvals are in place.</td></tr>
</table>

Notwithstanding the above, further discussion with each of the project partnerships indicates their anticipated (approved) project outputs have, as of May 2019, not been achieved (albeit, it was not expected of the projects at this stage in their implementation, as they have a 2023 delivery date). This is illustrated in the table overleaf:

The extent to which Approved Outputs have been achieved (by Project)			
Name of Output (by Project)	**Programme Output Indicator Target[6]**	**Project Target**	**Status (as of May 2019)**
CANN			
Nature and biodiversity Surface area of habitats supported in order to attain a better conservation status (hectares)	4,500ha	3,650ha	0
Conservation Action Plans	25	27	0
CABB			
Nature and biodiversity Surface area of habitats supported in order to attain a better conservation status (hectares)	4,500ha	2,228ha	0
Conservation Action Plans	25	8	0
COMPASS			
A network of buoys for regional seas, including telemetry and oceanographic monitoring (e.g. for seals, cetaceans, and salmonids)	1	1	0
Models developed to support the conversation of habitats and species	5	3	0
SWIM			
System for the prediction of bathing water quality and install real-time signage	1	1	0
MarPAMM			
Models developed to support the conversation of habitats and species	5	4	0
Marine management plans for designated protected areas complete	6	6	0
Sea Monitor 2			
Models developed to support the conversation of habitats and species	5	5	0
Marine management plans for designated protected areas complete	6	3	0
SWELL			
People benefit from improved wastewater treatment	10,000	10,000	0
2 Sewage network and wastewater treatment projects completed to improve water quality in shared transitional waters	2	2	0
StT			
Cross-border drinking water 'Sustainable Catchment Area Management Plan' research and pilot project	1	1	0
CatchmentCARE			
Develop and implement cross-border groundwater monitoring wells	50	50	0
Establish 3 river water quality improvement projects	3	3	0

Given the early stage of each project's implementation and the fact that the projects have yet to achieve their anticipated (approved) project outputs, the nine projects are, therefore, at May 2019, making only marginal progress towards the Priority's Result Indicator Targets and Specific Objectives as illustrated below. However, this should be expected at this stage of the projects' implementation (as the output targets have a suggested 2023 delivery date), and should not be considered a concern.

[6] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

Progress towards the Priority's Result Indicator Targets and Specific Objectives				
Specific Objective	**Result Indicator**	**Baseline**	**Target**	**Change between baseline and target (as of May 2019)**
1.1 To promote cross-border co-operation to facilitate the recovery of selected protected habitats and priority species	The percentage of selected protected habitats in or approaching favourable condition	1%	10%	0%
1.2 To develop cross-border capacity for the monitoring and management of marine protected species in the region	Cross-border capacity for monitoring and management of marine protected areas and species	A little collaboration	A lot of collaboration	0
1.3 To improve the water quality in shared transitional waters	The percentage of shared transitional waters in the region with good or high quality	0%	100%	0%
1.4 To improve freshwater quality in cross-border river basins	The percentage of cross-border freshwater bodies in cross-border river basins with good or high quality	32%	65%	0%

During consultation with the project partnerships, the uncertainty associated with the UK's potential withdrawal from the EU ('Brexit') was highlighted as an external factor that may impact on the achievement of the Specific Objectives. Whilst the nature and extent of any future arrangements between the EU and the UK are yet to be agreed, some of the project partners reported that future environmental legislation across Ireland, Northern Ireland and Scotland may diverge post 'Brexit', with different regulatory regimes and standards applying across the UK (Scotland and Northern Ireland) and the EU (Ireland). This may potentially impact on the relationship between the project partners (and in turn, project delivery), as each will be required to adhere to the relevant legislation in their respective jurisdiction.

Effectiveness and added value of cross-border collaboration

The preceding analysis illustrates that each of the project partnerships has demonstrated that their respective projects are jointly:

- Developed;
- Implemented;
- Staffed; and
- Financed.

The effectiveness and added value of the cross-border collaboration are further demonstrated by the fact that three of the projects supported under Objective 2.2 (the COMPASS, MarPAMM and Sea Monitor 2 projects) have adopted a collaborative and partnership working approach by holding 'synergy meetings' with each other. As part of this, the various partnerships have agreed to, amongst other things, prepare joint communication publications such as ezines and to potentially host a joint conference/seminar in November 2019. The Evaluation Team notes that this approach aligns with the objectives of the MSFD (as per Section 1), which states that the need for a coherent approach across the region is particularly relevant in this area because of the shared waters.

Similarly, discussion with the CABB project partnership suggests that the project partners engage in 'information share days' with, for example, NPWS, NIEA, DAERA and the various project partners involved in the CANN project. The purpose of this engagement is to discuss common issues and share pertinent information. It is understood that the project partnership hosted one of these days in October 2018 at Montiagh's Moss SAC.

New ways of working/partnerships/relationships created

Some specific new ways of working/ partnerships/ relationships have been created. For example, as part of the StT and CatchmentCARE projects, there is liaison with NIEA Catchment Officers (in Northern Ireland) and the Local Authority Water and Communities Office (LAWCO) in Ireland in relation to cross-border WFD issues. In doing so, project partnerships are of the view that this creates the potential to generate future initiatives and results in permanent sustainability benefits at cross-border level.

In addition, the SWELL project partners suggest that, prior to this project, there was minimal engagement/partnership working between the regions, and in particular between NIW and IW, in relation to the development of WWTWs. The SWELL project is, therefore, considered to be significant in terms of adding value on a cross-border basis.

Key areas of best practice and learning identified

Some specific areas of best practice and learning have been set out below:

- As per Section 5, the COMPASS project benefits from having members of NGOs on its Advisory Group. As of May 2019, one of the main achievements of, or lessons learnt from, this project has been the successful interaction with stakeholders and civil society (or 'citizen science'). For example, as part of the project's Salmonid research, fishermen have played an important supporting role in catching trout and salmon for tagging and deploying equipment. The COMPASS project partnership notes that this results in a number of direct benefits:

    - Catching fish by fly appears to cause the least distress to the fish;
    - Using fishermen at sea to deploy equipment brings additional knowledge and expertise to the project; and
    - This method provides an important opportunity to involve and engage with a broader stakeholder group.

- As part of the Source to Tap project, the Project Manager is liaising with the Water Catchment Partnership, a working partnership with representatives from Ulster Farmers Union, the Voluntary Initiative, NIW, NIEA and CAFRE, in order to maximise opportunities for knowledge sharing on pesticide best practice.

Level of mainstreaming that has occurred

The preceding analysis indicates that it is, unsurprisingly (given the stage of implementation), too early for each project to have achieved any mainstreaming of cross-border delivery of environmental work (albeit many of the projects have set out their plans for such activity beyond their respective project period).

Barriers to cross-border cooperation

From the outset, each of the project partnerships has been mindful that there are many potential constraints[7] and risks that could have a significant impact on the delivery of their respective projects and given this have developed strategic risk registers with potential mitigation measures.

Nonetheless, some specific barriers to cross-border cooperation identified at this stage include:

- The uncertainty associated with the UK's potential withdrawal from the EU ('Brexit'), which may potentially impact on the relationship between the project partners (and in turn, project delivery), as each will be required to adhere to the relevant legislation in their respective jurisdiction.
- For the MarPAMM project partnership, one of the key risks to cross-border cooperation not evident at the time of its application for funding has been the delay between making a finance claim to the SEUPB and

[7] At the outset potential constraints were identified as falling under headings such as technical, financial, organisational, economic, social, management, legal, timing or environmental.

that finance being made available to individual project partners. One of the MarPAMM project partners is a registered charity (BWI), which relies heavily on having sufficient cash flow to deliver its project activities. The MarPAMM project partners note that cash flow issues for this particular partner pose a risk to project delivery, which may delay the implementation of those work packages that BWI is involved in. This, in turn, has the potential to impact on cross-border cooperation between the project partners. It is, however, understood that the Lead Partner is working with the BWI to ensure that it has sufficient cash flow on a quarterly basis to deliver its allocated work packages.

- The SWIM project partners identified that a key risk to cross-border cooperation was the delay associated with the partners agreeing a Collaborative Agreement (or Partnership Agreement) and a Data Sharing Agreement. It was noted that the delays associated with each partner agreeing to such arrangements have impacted on project delivery, with delays in the implementation of certain work packages. This, in turn, has impacted on the extent of cross-border cooperation between the project partners. Discussion with the SWIM project partners indicates that the two agreements have now been agreed and that the project partnership has undertaken activities to progress the project in a timely manner.

Contribution of the Priority Axis to Policy Objectives

Each of the project partnerships has demonstrated that their respective projects are closely aligned (where applicable) with EU 2020 objectives; the Atlantic Strategy and the EU's horizontal principles of equality and sustainable development. In addition, each of the project partnerships has demonstrated that their respective projects are closely aligned with a number of key EU directives and regional strategies (where applicable). For example:

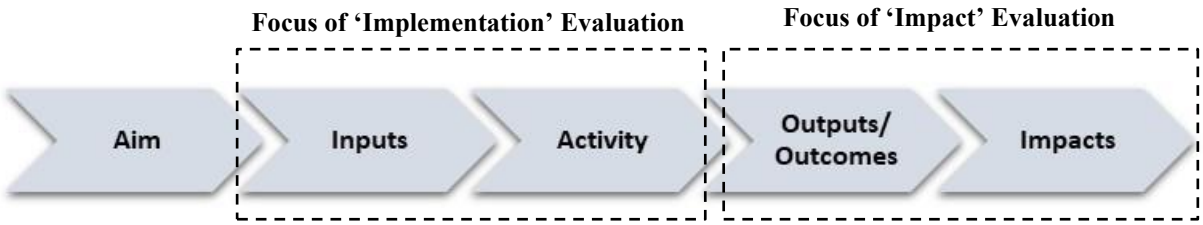
Objective 2.1	• EU 2020 Strategy • EU Birds and Habitats Directive • EU Biodiversity Strategy • The Prioritised Action Frameworks (PAFs) of the three countries and in particular selected protected sites and species of cross-border relevance
Objective 2.2	• EU Atlantic Strategy and Action Plan • Marine Strategy Framework Directive • EU Marine strategies
Objective 2.3	• EU Water Framework Directive
Objective 2.4	• EU Water Framework Directive (including integrated river basin management plans)

Recommendations

1. By way of aiding post-project evaluation, SEUPB should ensure that all objectives, outputs and result indicators established for all future programmes adhere to the 'SMART' criteria.

2. The 'logic chain' to Evaluation illustrates the intrinsic linkages between an intervention's aims, inputs, activities, outputs and outcomes (as depicted in Figure 12.1). However, the Evaluation Team understands that SEUPB has commissioned two separate evaluations – an 'Implementation' Evaluation and 'Impact' Evaluation - which focus on assessing the progress made by the Priority (and projects supported therein) at different stages of the logic chain.

The logic chain to Evaluation



However, given the interlinkages that exist between each stage of the logic chain, the Evaluation Team is of the view that a more rounded, holistic approach should be taken to Evaluation which would require the assessment of the implementation and impact made by the Priority axis as part of one evaluation. For example, in a scenario in which an intervention does not achieve its anticipated outputs/outcomes or impacts, this would naturally lead to the question as to why such a scenario arose. Based on the logic chain to Evaluation, such a scenario could have arisen as a result of the implementation of the activities of the intervention which, in turn, may have been influenced by the scale and quality of inputs utilised to deliver the activities. Therefore, any rationalisation as to why an intervention's outturns are achieved (or otherwise) requires a 'joined-up' approach to Evaluation focused on each stage of the logic chain.

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

The Special EU Programmes Body (SEUPB) has commissioned Cogent Management Consulting LLP (Cogent) to carry out an impact evaluation of INTERREG VA Programme[8] Investment Priority 2: Environment.

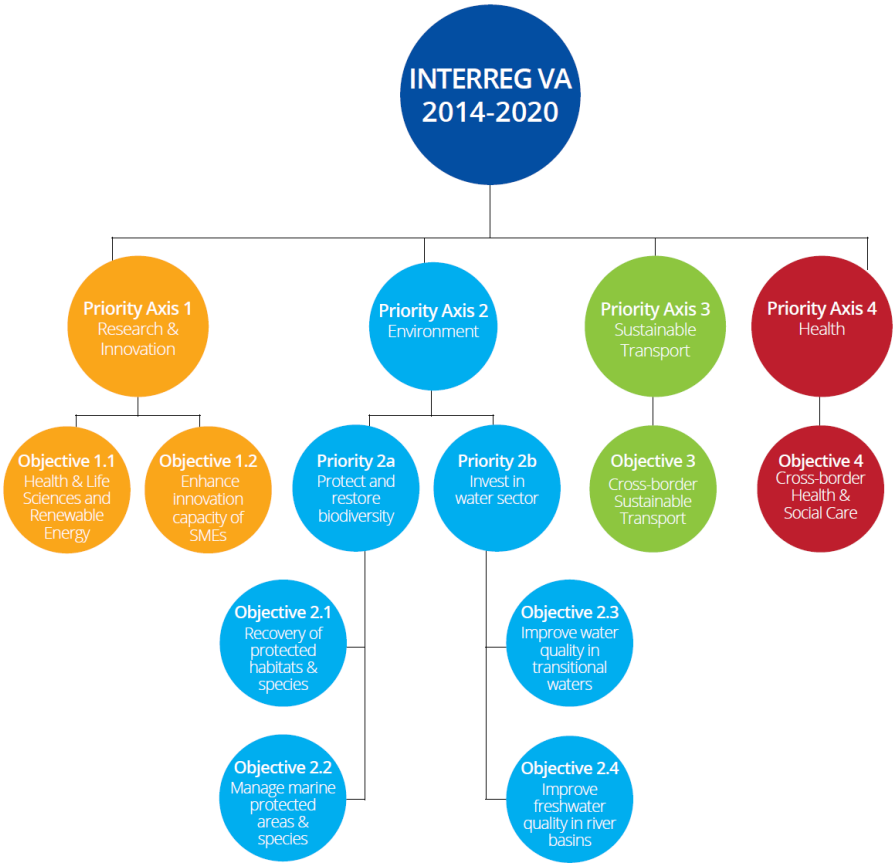
1.2 Background to the INTERREG VA Programme

Launched in January 2016, the INTERREG VA Programme is one of over 60 funding programmes across the EU that have been specifically designed to address problems that arise from the existence of borders. Borders can reduce economic development, hamper the efficient management of the environment, obstruct travel and hinder the delivery of essential health and social care services. The INTERREG VA Programme, therefore, aims to promote greater levels of economic, social and territorial cohesion to create a more prosperous and sustainable cross-border region.

The INTERREG VA Programme has a total value of €283m, which is funded as follows:

- 85% (€240m) via the European Regional Development Fund (ERDF), which is within the European Structural and Investment Funds (ESIF).
- 15% (€43m) via match funding from non-EU sources e.g. national, regional, local government, a project's own resources or private contributions. Contributions in-kind may be used as match-funding. NB: arrangements for match-funding may vary between priority axes of the Programme.

Figure 1.1: INTERREG VA Programme Priority Axes[9]



[8] For Northern Ireland, Ireland and Western Scotland
[9] Source: Citizens' Summary: INTERREG VA Programme (2014-2020).

As depicted above, the INTERREG VA Programme has four key priority axes, which were selected to address identified weaknesses in the programme region's economy, as set out in the Cooperation Programme for the INTERREG VA Programme 2014-2020[10]. The Cooperation Programme states that the priority axes are congruent with 'Europe 2020 - A Strategy for Smart, Sustainable and Inclusive Growth' and the priority areas identified for European Territorial Cooperation within the EU Commission Position Papers for the UK and Ireland.

The following subsections provide further details of Priority Axis 2: Environment.

1.3 Priority Axis 2: Environment & its Objectives

1.3.1 Introduction

The Cooperation Programme states that the key aim of Priority Axis 2: Environment is to *"encourage investment to achieve a resource-efficient, sustainable economy through the implementation of green infrastructure and environmental risk management strategies".*[11]

It also states that two key challenges in the programme region will be tackled through this priority axis, namely the integrity of its:

1. Biodiversity; and
2. Water quality.

The **selected investment priorities** under Priority Axis 2: Environment and their **associated objectives** are as follows:

Investment Priority	Associated Objectives
2a - Protecting and restoring biodiversity and soil and promoting ecosystem services, including through Natura 2000, and green infrastructure.	**2.1** Recovery of Protected Habitats and Priority Species **2.2** Manage Marine Protected Areas and Species
2b - Investing in the water sector to meet the requirements of the Union's environmental acquis and to address needs, identified by the Member States, for investment that goes beyond those requirements.	**2.3** Improve Water Quality in Transitional Waters **2.4** Improve Freshwater Quality in Cross-Border River Basins

The following subsections provide further details of the four objectives (objectives 2.1 – 2.4) that sit under Priority Axis 2: Environment.

1.3.2 Objective 2.1 – Recovery of Protected Habitats and Priority Species

A key challenge for the region is to address common environmental issues and to meet the EU Biodiversity Strategy's overall aim to *"halt biodiversity loss by 2020"*. Scientific evidence indicates that in addition to unsustainable development and use of natural resources, climate change is also likely to have a substantial effect on biodiversity in the region.

The investment by the programme in this area will try to promote an integrated approach by the relevant statutory agencies to environmental management across the entire programme region. It is anticipated that this will result in the development of collaborative cross-border approaches that will increase the potential to achieve the targets of the EU Birds and Habitats Directives and the Biodiversity Strategy[12].

The need to protect the environment is one of the key themes in the EU 2020 Strategy. It is also one of the needs and priorities identified in the Socio-Economic Profile of the Region and in the Position Papers

[10] Formally adopted in February 2015.
[11] The Cooperation Programme identifies that the proposed financial allocation for Priority Axis 2: Environment is anticipated to be €84.71m (€72m from ERDF and €12.71m via national match funding).
[12] Source: The Call Documentation issued for Objective 2.1

from the European Commission for the United Kingdom and Ireland. The investment by the programme in this important area will be aimed at ensuring that designated habitat sites of cross-border importance and identified areas for priority species will achieve or be approaching favourable conditions. These include nationally designated areas (areas of specific scientific interest (ASSI), sites of special scientific interest (SSSIs), natural heritage areas (NHAs)) and European designated areas (special protection areas (SPAs) and special areas of conservation (SAC)). Other areas for breeding wader species and marsh fritillary that are not designated may also be considered where they are important to the ecological functioning of habitats within the designated site network. In many cases, sites will be close to or straddle the border. However other sites further from the terrestrial border, including those in Western Scotland, may be included, where the site is of cross-border significance.

It is anticipated that increased levels of integration in the planning and management of the environment across the region will result in the development of best practice methodologies and increased levels of public sector efficiency. It is also anticipated to lead to increased awareness of, and responsiveness to, the potential threats of climate change to habitats and species.

The aim of Objective 2.1 is, therefore, to *"promote cross-border cooperation to facilitate the recovery of selected protected habitats and priority species".*

In order to achieve this objective, it was anticipated that it would be necessary to invest in increased cross-border integrated planning and management of habitats and species, using best-practice methodologies. It is anticipated that this investment will lead to results beyond the lifetime of the Programme in the form of increased compliance with EU directives in the area of environmental protection.

The three jurisdictions have prioritised 7 protected habitats and 7 priority species. These have been selected from habitats and species common to all three jurisdictions and include habitats that have an important role in connectivity between protected areas and protected species that migrate across the eligible region[13]. All habitats and species selected for investment will be taken from this priority list:

Protected Habitats	1. Alkaline fens 2. Blanket bog 3. Active raised bog 4. Marl Lakes	5. Calcareous fens 6. Petrifying springs with tufa formation 7. Transition mires and quaking bogs
Priority Species	1. Hen Harrier 2. Marsh Fritillary 3. White-clawed crayfish 4. Breeding waders (curlew, lapwing, redshank and snipe)	5. Golden plover 6. Corncrake 7. Red grouse

Only sites important to these protected habitats or priority species can be chosen for investment by the Programme.

The INTERREG Programme's impact is monitored through the use of output and result indicators. The **output indicators**[14] for Objective 2.1 are set out below[15]:

- 4,500 hectares of habitats supported in order to attain a better conservation status; and
- 25 conservation action plans.

[13] NB: The Call Documentation issued for Objective 2.1 provided details of specific protected sites and species that were identified as being of particular cross-border relevance.
[14] Source: Citizens' Summary: INTERREG VA Programme (2014-2020)
[15] See Appendix II for the definitions of each of the output indicators for Objective 2.1

It was stated that the above outputs could be achieved through the following **indicative actions**:

Table 1.1: Indicative Actions[16]
• Development of mapping of protected habitats and sites of cross-border relevance; • Development and implementation of conservation action plans for protected sites of cross-border relevance; • Tangible conservation actions for protected habitats and species; • Conservation management and protection activities to encourage sustainable natural regeneration of species populations; • Development and sharing of best practice and enhancement of skills in ecosystem management; • Development and use of databases to assist conservation actions; • Removal of invasive species; • Research into species and habitats, including the impact of climate change, which supports the actions within the Programme; and • Education and outreach activities.

The **result indicator[17]** for this specific objective is the percentage of selected protected habitats in or approaching, favourable condition. The stated baseline value for 2014 (i.e. the start of the Programme period) is 1%, whilst the target value for 2023 is 10%[18].

Applicants to this call were required to demonstrate that the project proposed would facilitate the recovery of selected protected habitats and/or species and provide a conservation action plan to guide activities and provide a framework for future action. Proposed activities also had to align with the EU Birds and Habitats Directive, the EU Biodiversity Strategy and the Prioritised Action Frameworks (PAFs) of the three countries and in particular selected protected sites and species of cross-border relevance.

1.3.3 Objective 2.2 – Manage Marine Protected Areas and Species

The EU Atlantic Strategy advocates the sustainable development of the Atlantic region's natural resources and has an overriding objective of creating sustainable jobs and growth. One of the key challenges for Northern Ireland, the Border Region of Ireland and Western Scotland is addressing environmental issues associated with development in the marine environment while achieving the EU Biodiversity Strategy's overall aim to halt biodiversity loss by 2020.

The Marine Strategy Framework Directive (MSFD) requires EU Member States to co-operate in the management of regional seas with the objective of meeting Good Environmental Status by 2020. Increased co-operation in this area can mitigate climate change impact. The need for a coherent approach across the region is particularly relevant in this area because of the shared waters. Maintaining biodiversity is a requirement to achieve Good Environmental Status and an inherent part of the delivery of MSFD is to develop an ecologically coherent network of Marine Protected Areas across Europe. With the marine environment coming under increasing pressure from human activity, such a network will ensure that biodiversity is safeguarded.

Studies illustrate that the marine environment shared by Northern Ireland, Ireland and Scotland is regarded as having one of the greatest renewable energy resources in Europe, with the capacity to support economically viable wind, wave and tidal energy projects. Within the confines of a network of marine protected areas, developments need to be managed and mitigated in a manner which will promote, sustain and conserve the marine environment. Investment by the programme in this area is aimed at increasing the capacity for integrated planning and management of marine resources and increasing the effectiveness of cross-border marine management strategies. It is anticipated that new

[16] Source: Citizens' Summary: INTERREG VA Programme (2014-2020).
[17] The Programme's impact is monitored through the use of output and result indicators. Projects receiving funding through INTERREG VA are expected to report progress against output indicators only (Output Indicator Guidance document for Objective 2.1, December 2016).
[18] Source: Cooperation Programme for the INTERREG VA Programme 2014-2020.

cross-border cooperation strategies will be developed on the basis of existing and newly acquired data. This will lead to an increase in compliance with the EU MSFD.

It is further envisaged that investment by the programme will lead to an increased understanding of and ability to capitalise on the marine resources in the region. This will include an increase in the availability of comprehensive mapping programmes; the development and growth of a regional "blue economy" based on the maritime resource and the alignment of regional activities with the EU Atlantic Strategy and Action Plan.

The aim of Objective 2.2 is to *"develop cross-border capacity for the monitoring and management of marine protected areas and species".* [19]

In order to achieve this objective, it was considered that it would be necessary to invest in cross-border data capture and mapping for the development of joint marine management and development activities. It is anticipated that the sustainability of this activity beyond the lifetime of the Programme will be evidenced by the creation of a regional marine innovation centre that will provide a focal point for these activities. This will result in an increased contribution to the achievement of the targets associated with EU Marine strategies.

The **output indicators**[20] for Objective 2.2 are set out below[21]:

- 1 network of buoys for regional seas, including telemetry and oceanographic monitoring (e.g. for seals, cetaceans and salmonids);
- 5 models developed to support the conservation of marine habitats and species;
- 6 complete marine management plans for designated protected areas; and
- 1 system for the prediction of bathing water quality and the installation of real-time signage.

It was stated that the above outputs could be achieved through the following **indicative actions**:

Table 1.2: Indicative Actions[22]
• Development and implementation of cross-border management plans for marine protected areas and species; • Mapping of marine/seabed environment; • Creation of a network of marine protected areas; • Research and development in the marine environment (including the impact of climate change); • Marine skills initiatives; • The coordinated research programme of direct relevance to the management challenges of the eligible area; • Knowledge and data sharing; • Prediction model development and signage for short-term pollution and real-time management of bathing water quality in coastal waters.

The **result indicator** for this specific objective is an increase in the cross-border capacity for monitoring and management of marine protected areas and species. The stated baseline value for 2014 (start of the Programme period) is 'a little collaboration', whilst the target value for 2023 is a 'lot of collaboration'[23].

[19] The Output Indicator Guidance document for Objective 2.2 (January 2016) states that Marine Protected areas (MPAs) or conservation areas are locations which receive protection because of their recognised natural, ecological and/or cultural values. Special Protected Areas (SPAs) with marine components are defined as those sites with qualifying Birds Directive species or regularly occurring migratory species that are dependent on the marine environment for all or part of their lifecycle, where these species are found in association with intertidal or sub tidal habitats.
[20] Source: Citizens' Summary: INTERREG VA Programme (2014-2020).
[21] Each output indicator is defined in the 'Output Indicator Guidance' document for Objective 2.2 – See Appendix II for details.
[22] Source: Citizens' Summary: INTERREG VA Programme (2014-2020).
[23] Source: Cooperation Programme for the INTERREG VA Programme 2014-2020.

Applicants to this call were required to demonstrate that the proposed project would contribute to improved monitoring and management of marine protected areas and species; and knowledge sharing of research data and outputs.

1.3.4 Objective 2.3 – Improve Water Quality in Transitional Waters

Within the Programme area, Ireland and Northern Ireland share the following transitional water bodies:

1. Carlingford Lough - between County Louth in Ireland and County Down in Northern Ireland; and
2. Lough Foyle - between County Derry in Northern Ireland and County Donegal in Ireland.

According to the Programme's Citizens' Summary, cross-border collaboration is essential to improve the water quality of these shared transitional waters and thus efficiently address the requirements of the Water Framework Directive[24]. In particular, this specific objective will seek to achieve a good or high water quality status for these two shared transitional waters. Modelling of cross-border waters can identify the potential sources of pollution and the optimum way to achieve and maintain good water quality status. Such modelling will identify the most effective interventions and improvements required for the sewage network and wastewater treatment works that impact upon the shared transitional waters.

It is also anticipated that the Programme will facilitate the implementation of common approaches to the management of the water resources and the sharing of best practice and technical expertise across the eligible region, drawing on the relative strengths of the three jurisdictions.

The aim of Objective 2.3 is, therefore, to *"improve the water quality in shared transitional waters".*

In order to achieve this objective, it is stated that it will be necessary to invest in cross-border solutions and the joint management of water bodies that straddle the border. It is anticipated that this will result in long term impacts on the quality of water in the region beyond the lifetime of the Programme.

The **output indicators**[25] for Objective 2.3 are set out below[26]:

- 10,000 people benefiting from improved wastewater treatment; and
- 2 sewage network and wastewater treatment projects completed to improve water quality in shared transitional waters.

It is stated that the above outputs could be achieved through the following **indicative actions**:

Table 1.3: Indicative Actions[27]
• Research and development in wastewater treatment technologies, including the use of sustainable technologies with direct relevance to the shared transitional waters; • Creation of demonstration sites in the catchment areas to illustrate best practice wastewater treatment methodologies; and • Sewerage network and wastewater treatment projects to protect and enhance the Water Framework Directive classification of the cross-border catchment areas.

The **result indicator** for this specific objective is the percentage of shared transitional waters in the region with 'good' or 'high' quality. The stated baseline value for 2014 (start of the Programme period) is 0%, whilst the target value for 2023 is 100%[28].

[24] Which is an EU directive that commits EU member states to achieve good qualitative and quantitative status of all water bodies (including marine waters up to one nautical mile from shore) by 2015.
[25] Source: Citizens' Summary: INTERREG VA Programme (2014-2020).
[26] Each output indicator is defined in the 'Output Indicator Guidance' document for Objective 2.3 – See Appendix II for details.
[27] Source: Citizens' Summary: INTERREG VA Programme (2014-2020).
[28] Source: Cooperation Programme for the INTERREG VA Programme 2014-2020.

Factors that were considered in the quality of project design for applications under this Objective include:

- All projects activities had to align with the EU Water Framework Directive requirements;
- Activities involving urban wastewater treatment plants had to have a strategy for the disposal of sewage sludge;
- Climate change impacts on wastewater treatment had to be given attention, in particular in terms of stormwater management;
- Alternative innovative solutions should be taken into account where appropriate (e.g. in particular in remote areas/small villages);
- The financial sustainability of projects had to be considered and pertinent information such as proposed tariffs had to be given due consideration.
- Operational costs (including maintenance) had to be considered;
- Since wastewater collection and treatment is not compulsory below 2,000 population equivalent, any public investment there had to be duly justified technically and economically, compared to the alternative of individual septic tanks; and
- Proposed investments had to be able to meet current and future needs, without becoming oversized.

1.3.5 Objective 2.4 – Improve Freshwater Quality in Cross-Border River Basins

In order to improve water quality across the region, it is necessary to promote the shared management of shared water resources and to invest in cross-border solutions to achieve the targets within the EU Water Framework Directives. It is anticipated that investment by the programme will lead to an improvement in the baseline condition of water quality, physical structure and habitat in a number of cross-border catchment areas. This will contribute towards the achievement of targets relating to good water quality and ecological status of all water bodies (rivers, lakes, groundwater, transitional).

Importantly, such improvements in water quality may mitigate the need for capital investment and contribute to reducing operating costs whilst also protecting and enhancing biodiversity.

It is further anticipated that the investment will provide for an increase in the level of cross-border integrated management of river catchment areas and the development of shared solutions to meet EU targets with regard to water quality. There are also opportunities to share best practice approaches across the region. This will, in turn, lead to an increased number of water bodies with the higher classification of moderate, good or high quality and a decreased number of water bodies classified as poor or bad quality, in line with the designations contained within EU Water Directives.

It was anticipated that interventions supported under this Objective would focus on the following:

- The river catchment activities would be limited to river catchments where the area is on both sides of the Northern Ireland / Ireland border.
- The location of the groundwater wells would be on both sides of the Northern Ireland / Ireland border to support monitoring and pollution of the river catchment activities.
- The sustainable catchment area management modelling and plan would be a cross-border plan focusing on a freshwater capture area, encompassing activities in areas exclusive to some of the border counties of Ireland and the adjacent border counties of Northern Ireland.
- Knowledge transfer and exchange of best practice within the three jurisdictions.

The aim of Objective 2.4 is, therefore, to *"improve freshwater quality in cross-border river basins"*. Within the Programme area, Ireland and Northern Ireland share the following 11 cross-border river basins[29]:

Table 1.4: Cross-Border River Basins	
1. Blackwater River	7. Finn Foyle River
2. Burnfoot River	8. Flurry River
3. Castletown River	9. Foyle Deele River
4. Derg River	10. Lower Erne River
5. Fane River	11. Upper Erne River
6. Finn Fermanagh River	

In order to achieve this objective, it is stated that it will be necessary to invest in cross-border solutions and the joint management of water bodies that straddle the border. It is anticipated that this investment will lead to an improvement in the baseline condition of water quality, physical structure and habitat in a number of cross-border catchment areas.

The **output indicators**[30] for Objective 2.4 are set out below[31]:

- 3 river water quality improvement projects completed;
- 50 cross-border groundwater monitoring wells installed; and
- 1 cross-border drinking water Sustainable Catchment Area Management Plan.

It is stated that the above outputs could be achieved through the following **indicative actions**:

Table 1.5: Indicative Actions[32]
• Development and implementation of integrated river basin management plans and actions;
• Development and implementation of a management plan and projects for designated drinking water protected areas so that Water Framework Directive water classifications can be maintained and improved;
• Activities related to the improvement of river water quality;
• Activities related to freshwater quality management research; and
• Activities related to establishing groundwater monitoring wells.

The Cooperation Programme also states that:

- The river catchment activities will be limited to river catchments where the area is on both sides of the Northern Ireland/Ireland border.
- The location of the groundwater wells will be on both sides of the Northern Ireland/Ireland border to support monitoring and pollution of the river catchment activities.
- The suggested sustainable catchment area management modelling and plan will be a cross-border plan focusing on a freshwater capture area, encompassing activities in areas exclusive to some of the border counties of Ireland and the adjacent border counties of Northern Ireland.

The **result indicator** for this specific objective is the percentage of cross-border freshwater bodies in 'good' or 'high' quality. The stated baseline value for 2014 (start of the Programme period) is 32%, whilst the target value for 2023 is 65%[33].

Applications to this call were required to align with the EU Water Framework Directive (including integrated river basin management plans).

[29] As outlined in the Call Documentation issued for Objective 2.4.
[30] Source: Citizens' Summary: INTERREG VA Programme (2014-2020).
[31] Each output indicator is defined in the 'Output Indicator Guidance' document for Objective 2.4.
[32] Source: Citizens' Summary: INTERREG VA Programme (2014-2020).
[33] Source: Cooperation Programme for the INTERREG VA Programme 2014-2020.

1.3.6 Summary of Specific Objectives, Result Indicators and Targets

Tables 1.6 and 1.7 provide a summary of the Specific Objectives, Result Indicators and Targets for Priority Axis 2: Environment:

Table 1.6: Specific Objectives, Result Indicators and Targets

Specific Objective	Result Indicator	Baseline	Target
2.1 To promote cross-border co-operation to facilitate the recovery of selected protected habitats and priority species	The percentage of selected protected habitats in or approaching favourable condition	1%	10%
2.2 To develop cross-border capacity for the monitoring and management of marine protected species in the region	Cross-border capacity for monitoring and management of marine protected areas and species	A little collaboration	A lot of collaboration
2.3 To improve the water quality in shared transitional waters	The percentage of shared transitional waters in the region with good or high quality	0%	100%
2.4 To improve freshwater quality in cross-border river basins	The percentage of cross-border freshwater bodies in cross-border river basins with good or high quality	32%	65%

The anticipated Output Indicators are summarised below:

Table 1.7: Anticipated Output Indicators

Output Indicator	Measures by Number of:	Number
Surface Area of Habitats supported in order to obtain a better conservation status	Hectares	4,500
Conservation action plans	Conservation action plans	25
The network of buoys for regional seas	Networks	1
Models developed to support conservation of marine habitats and species	Models	5
Marine Management Plans for designated protected areas	Complete plans	6
System for the prediction of bathing water quality and the installation of real-time signage	Systems	1
People benefiting from improved wastewater treatment	People	10,000
Sewage network and wastewater treatment projects completed to improve water quality in shared transitional waters	Projects	2
Cross-border drinking water Sustainable Catchment Area Management Plans	Plans	1
Cross-border groundwater monitoring wells installed	Wells	50
River water quality improvement projects	Projects	3

1.4 The Evaluation – SEUPB's Requirements

To fulfil the requirement of Article 114(1) of the Common Provisions Regulation (EU No: 1303/2013), SEUPB's Managing Authority has submitted to the Commission an Evaluation Plan for the INTERREG VA Programme[34]. The Evaluation Plan has been put in place to facilitate learning and maximise the proposed investments of the Programme[35].

The Plan outlines two types of evaluations:

1. **Implementation Evaluations** which will assess the efficiency and effectiveness of the implementation mechanism established for the programme (these will not form any part of this assignment); and

2. **Impact Evaluations** will be carried out on each priority axis to test the intervention logic of that priority axis and form a view of the effectiveness and impact of the investment.

In relation to the Impact Evaluations, the Plan states that the evaluations will assess achievements as regards effectiveness (the attainment of the specific objectives set and of the intended results), efficiency (the relationship between the funding disbursed and the results achieved) and impact (the contribution of the programme to the end-objectives of the EU Cohesion Policy).

SEUPB has commissioned Cogent to undertake a longitudinal Impact Evaluation of Priority Axis 2 – Environment to include 3 reports due by end of 2018, end of 2020 and early 2022[36].

The overall focus of the evaluation is to assess (at three stages of implementation), the impact of the interventions within the 'Environment' Priority Axis. As a full implementation evaluation is being undertaken across INTERREG VA concurrently with the Impact Evaluation, **the Impact Evaluation does not seek to assess the implementation of projects nor how the Programme is operating. Rather than addressing financial and operational issues,** the purpose of the impact evaluation is learning, through an exploration of the contribution of the Programme to the movement of the Result Indicator, to inform the remainder of the INTERREG VA Programme and potential future programming periods.

[34] The Evaluation Steering Group (ESG), a sub-group of the Programme Monitoring Committees for the PEACE IV and INTERREG VA Programmes, was established to ensure the effective implementation of the Evaluation Plan for each Programme.

[35] Article 56(3) of Regulation (EC) No: 1303/2013 requires that an evaluation should assess how the support provided has contributed to the achievement of the objectives of the programme. Article 54 requires the impact evaluation to comment on the contribution of the priority axis to the EU 2020 objectives. In addition, Article 7 of the above regulation requires that Member States ensure equality between men and women and the integration of a gender perspective are taken into account and promoted throughout the preparation and implementation of the programmes, including in the monitoring and evaluation of the programmes. Article 7 also specifies that the programme authorities must take appropriate steps to prevent any discrimination on any of the specified grounds. Article 8 requires that the objectives of the funds shall be pursued in line with the principle of sustainable development and with the European Union's promotion of the aim of preserving, protecting and improving the quality of the environment taking into account the polluter pays principle.

[36] The report received in 2022 will include a summary of all previous findings and will contribute directly to the programme summary of evaluation findings, to be submitted to the EU Commission.

As such, the Impact Evaluation Team is required to address the following:

- To what extent have the Specific Objectives been achieved?
- To what extent have the targets for the Result Indicators listed in Section 1.3.6 been achieved?
- Comment on the effectiveness and added value of cross-border collaboration in relation to the specific objectives?
- What external factors have impacted, positively or negatively, on the achievement of the Specific Objective?
- What new ways of working/partnerships/relationships have been created as a result of activities carried out within the priority axis?
- Identify key areas of best practice and learning;
- What level of mainstreaming has occurred for cross-border delivery of environmental work?
- Are there barriers to cross-border cooperation that the priority axis is not addressing?
- What is the contribution of the priority axis to[37]:

  - EU 2020 objectives;
  - The Atlantic Strategy; and
  - The horizontal principles of equality and sustainable development?

[37] NB An overview of the aims and objectives of these strategies is provided in Appendix I.

2. OVERVIEW OF PROGRAMME ACTIVITY & SUPPORTED PROJECTS

2.1 Introduction

This section of the report provides a brief overview of the projects that have been approved and supported under Priority Axis 2: Environment.

2.2 Overview of Approved Projects

There were five calls for applications under Priority Axis 2: Environment. A two-stage process[38] was then initiated by the SEUPB's Joint Secretariat to assess applications submitted under each of these calls. Full details of the assessment process, including admissibility criteria, were outlined for applicants in the 'Call Documentation' and the 'Guide for Applicants'.

Details of the calls and the number of applications received at each stage are presented below:

Table: 2.1: Applications Received and Approved

	Call opened	Call closed	Applications received		Applications approved
			Stage 1	Stage 2	
Objective 2.1	7th October 2015	8th January 2016	4	2	**2**
Objective 2.2	7th October 2015	8th January 2016	6	4	**3**
	18th May 2017	9th June 2017	3	3	**2**
Objective 2.3	5th August 2015	30th October 2015	1	1	**1**
Objective 2.4	7th October 2015	8th January 2016	2	2	**2**
Total			-	-	**10**

As reflected above, 10 applications were approved under Priority Axis 2: Environment. However, the Lead Partner for one of the projects approved under Objective 2.2 subsequently withdrew its application, leaving 9 projects to go forward.

As detailed in Table 2.3, the 9 projects represent cumulative ERDF commitment of €73.8 million against a budget of €72m (102%). Across the 9 projects, should all proceed to plan, each of the Programme outputs within this priority will be met.

At the Objective level:

- Two projects are being implemented under Objective 2.1 (Recovery of protected habitats and species), with a total ERDF allocation of €12.2m. Both projects (CANN and CABB) will carry out a range of conservation activities through the development of 35 Conservation Action Plans in total.
- Four projects are being implemented under Objective 2.2 (Manage marine protected areas and species), with a total ERDF allocation of €15.9m. These projects (COMPASS, SWIM, MarPAMM and Sea Monitor 2) will focus on diverse areas of marine conservation through the development of a bathing water quality prediction model and the delivery of a fully coherent network of monitoring buoys across the regional seas of Northern Ireland, Ireland and Western Scotland.
- One project is being implemented under Objective 2.3 (Improvement of water quality in transitional waters), with a total ERDF allocation of €29.8m. This project (SWELL) which is led by Northern Ireland Water has been approved to deliver a two-phased approach. Phase 1 has been successfully completed and focused on catchment investigation, which has, in turn, informed Phase 2;
- Two projects are being implemented under Objective 2.4 (Improvement of freshwater quality in river basins), with a total ERDF allocation of €15.9m. These projects (Source to Tap and Catchment Care) will focus on improving freshwater quality in a number of cross-border river basins.

[38] Stage one - short application form and admissibility checks. Stage two – submission of full business plan and associated appendices (prepared in line with SEUPB's Business Plan Guidance).

Details of the **nine projects** approved by the INTERREG VA Programme Steering Committee[39] (which excludes the project that withdrew under Objective 2.2) are included in the table below. As illustrated, the Lead Partners for each of the nine projects are from the statutory and voluntary sectors across Northern Ireland and Ireland, and include a range of project partners, with an interest in the environment.

Table 2.2: Projects Approved for Funding – Named Project Partners (source: Letters of Offer issued by the SEUPB)

Project Ref	Lead Partner	Project Name	Named Project Partners	
Objective 2.1				
032	Newry, Mourne & Down District Council	Collaborative Action for the Natural Network (CANN)	• Monaghan County Council • Argyll & The Isles Coast and Countryside Trust • East Border Region • Agri-food and Biosciences Institute • Armagh Banbridge and Craigavon Borough Council	• Scottish Natural Heritage • Ulster Wildlife • Ulster University • Institute of Technology Sligo • Golden Eagle Trust
037	Royal Society for the Protection of Birds (RSPB) NI	Cooperation Across-borders for Biodiversity (CABB)	• Birdwatch Ireland • Butterfly Conservation • NI Water	• Royal Society for the Protection of Birds Scotland • Moors for the Future
Objective 2.2				
034	Agri-food and Biosciences Institute (AFBI)	Collaborative Oceanography and Monitoring for Protected Areas and Species (COMPASS)	• Scottish Association for marine species • Marine Scotland Science	• Inland Fisheries Ireland • Marine Institute
038	University College Dublin (UCD)	System for Bathing Water Quality Monitoring (SWIM)	• Keep Northern Ireland Beautiful	• Agri-Food and Biosciences Institute
5059	Agri-food and Biosciences Institute (AFBI)	Marine Protected Areas Management and Monitoring (MarPAMM)	• Scottish Natural Heritage • Birdwatch Ireland • University College Cork	• Marine Scotland • Scottish Association for Marine Science • Ulster University
5060	Loughs Agency	Sea Monitor 2	• Marine Institute (MI) • University of Glasgow (UoG) • Queen's University, Belfast (QUB) • Agri-Food and Biosciences Institute (AFBI) • Galway-Mayo Institute of Technology (GMIT)	• University College, Cork (UCC) • Ocean Tracking Network, Dalhousie University (Canada) • The University of California, Davis (USA)
Objective 2.3				
005	Northern Ireland Water (NIW)	Shared Waters Enhancement and Loughs Legacy (SWELL)	• East Border Region • Loughs Agency	• Irish Water • Agri-food and Biosciences Institute
Objective 2.4				
029	Northern Ireland Water (NIW)	Source to Tap	• Irish Water Ltd • Agri-food and Biosciences Institute • Land-Incentive Scheme – farmers (beneficiaries not partners)	• The Rivers Trust • Ulster University • East Border Region Ltd
027	Donegal County Council	CatchmentCARE	• Agri-food and Biosciences Institute • Loughs Agency • Armagh, Banbridge and Craigavon Borough Council	• Inland Fisheries Ireland • University of Ulster • British Geological Survey • Geological Survey Ireland

[39] The decision as to whether to fund a project rests entirely with the INTERREG VA Programme Steering Committee.

Per Table 2.3, the total anticipated project costs across the nine projects are circa €88m, which equates to an average cost per project of circa €9.78m. In total, the nine projects were offered up to €73.8m ERDF funding through the INTERREG VA Programme, which represents 84% of the total project costs.

Table 2.3: Projects Approved for Funding (source: Letters of Offer issued by the SEUPB)

Project Ref	Lead Partner	Project Name	Operational start date	Operational end date	Project Cost (€)	ERDF Allocation	
						(€)	%
Objective 2.1							
032	Newry, Mourne & Down District Council	CANN	01/01/2017	31/12/2021	€9,406,313	€7,995,366	85%
037	RSPB NI	CABB	01/01/2017	31/12/2021	€4,926,403	€4,195,586	85%
Subtotal					***€14,332,716***	***€12,190,952***	
Objective 2.2							
034	Agri-food and Biosciences Institute (AFBI)	COMPASS	01/01/2017	31/03/2022	€7,726,441	€5,632,299	73%
038	University College Dublin (UCD)	SWIM	01/01/2017	30/06/2020	€1,108,358	€891,530	80%
5059	AFBI	MarPAMM	01/01/2018	31/03/2022	€6,361,317	€5,385,015	85%
5060	Lough Agency	Sea Monitor 2	25/07/2017	31/03/2022	€4,722,671	€4,014,271	85%
Subtotal					***€19,918,787***	***€15,923,115***	
Objective 2.3							
005	Northern Ireland Water (NIW)	SWELL[40]	18/11/2014	31/12/2022	€35,047,604	€29,790,464	85%
Subtotal					***€35,047,604***	***€29,790,464***	
Objective 2.4							
029	NIW	Source to Tap	01/10/2016	31/03/2022	€4,909,921	€4,173,433	85%
027	Donegal County Council	Catchment Care	01/10/2017	31/10/2022	€13,792,436	€11,723,571	85%
Subtotal					***€18,702,357***	***€15,897,004***	
Total					**€88,001,464**	**€73,801,535**	

[40] NB The SWELL project received an original Letter of Offer (dated 31st January 2017) offering a grant of up to a maximum of €3,282,786.52 (ERDF + Government Match Funding) to be expended and claimed by 30th April 2018 (The period of assistance was for 42 months starting on 1st November 2014 and completing on 30th April 2018), towards total anticipated project costs of €3,282,786.52. This Letter of Offer was later superseded by a second letter of offer that incorporated both Phase I and Phase II of the project.

The following table outlines the stated contributions of each of the nine projects (as outlined in their respective Letters of Offer) to the Output Indicators for Priority Axis 2: Environment.

Table 2.4: Projects Approved for Funding – Stated Contributions to Output Indicators (source: Letters of Offer issued by the SEUPB)										
Output Indicator	**Objective and Project Ref**									**Total**
	2.1		**2.2**				**2.3**	**2.4**		
	032	**037**	**034**	**038**	**5059**	**5060**	**005**	**029**	**027**	
4,500 ha of habitats supported in order to attain a better conservation status	3,650	2,228								**5,878**
25 conservation action plans	27	8								**33**
1 network of buoys for regional seas, including telemetry and oceanographic monitoring (e.g. for seals, cetaceans and salmonids)			1	-	-	-				**1**
5 models developed to support conservation of marine habitats and species			3	-	4	5				**12**
6 complete marine management plans for designated protected areas			-	-	6	3				**9**
1 system for the prediction of bathing water quality and the installation of real-time signage			-	1	-	-				**1**
10,000 people benefiting from improved wastewater treatment							10,000			**10,000**
2 sewage network and wastewater treatment projects completed to improve water quality in shared transitional waters							2			**2**
3 river water quality improvement projects completed								-	3	**3**
50 cross-border groundwater monitoring wells installed								-	50	**50**
1 cross-border drinking water Sustainable Catchment Area Management Plan								1	-	**1**

2.3 Reasonableness of targets established

Based on its review of the output and result indicators/targets established for the Investment Priority, the Evaluation Team is of the view that greater focus should have been placed on ensuring that that all indicators/targets were Specific, Measurable, Achievable, Realistic and Timebound. For example:

- In relation to the Results Indicator associated with Objective 2.2, it is anticipated that the four projects (COMPASS, SWIM, MarPAMM and Sea Monitor 2) will enhance cross-border capacity for monitoring and management of marine protected areas and species by stimulating levels collaboration. However, it is unclear what constitutes either the baseline ('a little') or the target ('a lot of') levels of collaboration or how any change would ultimately be measured (as proposed, through the survey of Departments) as a result of the implementation of the project. As such, greater attention should have been given to ensuring this indicator was more specific and measurable;

- In relation to the Outputs Indicators associated with Objective 2.3, it is envisaged that the SWELL project would directly contribute to (inter alia) 10,000 people benefiting from improved wastewater treatment. However, as noted later in Section 9.4.2, the SWELL project promoters consider that

  - Given the nature of the result indicator, it will be influenced not only by projects funded by the Programme but will also be influenced by other policy and funding initiatives external to the Programme.
  - The results indicator is an unachievable project target given the level of funding and external pressures.

  Nonetheless, the SWELL project partners intend to deliver a programme of measures to improve water quality and thus contribute towards the achievement of *"good status"* of the receiving waters. However, according to the project partners, the project will not guarantee that any improvement will be made to WFD status by the year 2023 but will instead contribute towards it. As noted later, according to the project partners, there are several external reasons, beyond the control of the water companies, as to why this is the case, including diffuse pollution, industrial discharges, changes in catchment practices e.g. Rural Development Programmes, the Nitrates Directive etc. Based on these points, greater attention could have been given to ensuring this indicator was more achievable (as a direct result of project activity) and realistic;

- Related to this point, it is unclear whether other potential external influences (including other projects have been considered within the context of the Results targets established for Objectives 2.1, 2.3 and 2.4. Ultimately, this may preclude both the project promoters, an Evaluator or SEUPB from drawing definitive conclusions on the causal link (i.e. additionality) between the delivery of individual projects and the subsequent realisation of the targets (or otherwise).

In addition, per Section 1, it is noted that projects receiving funding through INTERREG VA are expected to report progress against the Priority Axis output indicators only (i.e. not monitor against the Results indicators). However, this requirement may inadvertently lead to a lack of 'ownership' of the ultimate Result indicator by project promoters under each specific objective.

3. CANN - COLLABORATIVE ACTION FOR THE NATURA NETWORK

3.1 Introduction

This section of the report considers the Collaborative Action for the Natura Network (CANN) project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 1 – Recovery of Protected Habitats & Priority Species.

3.2 Project Overview

Stores of carbon peatlands and wetlands are important in helping to tackle climate warming; as homes for nature they are special and unique; and as the raw ingredient of rural farming, tourism and crofting they are vital. They offer a range of vital ecosystems services, such as filtering of drinking water, regulation of water flows in wider catchment and carbon sequestration. On the other hand, degraded peatlands are responsible for an estimated 6% of anthropogenic CO2 emissions globally. Some of the other services they provide are distinct to the jurisdictions, for example, the contribution of peat to the Scottish whisky industry.

INTERREG VA has identified seven priority habitats, where the overall conservation status is poor, as summarised below.

Table 3.1: INTERREG VA priority habitats and their conservation status across the three jurisdictions

Habitat code	Habitat name	Northern Ireland	Ireland	Scotland
7230	Alkaline fens	Bad-declining	Bad-unknown	Bad - stable
7110	Active raised bog	Bad-declining	Unfavourable bad	Inadequate - declining
7130	Blanket bog	Bad-unknown	Bad-declining	Bad - stable
3140	Hard oligmesotrophic waters	Bad-declining	Bad-declining	Bad-unknown
7210	Calcareous fens	Bad-unknown	Bad-unknown	Not present
7220	Petrifying springs	Unknown	Unfavourable-Inadequate	Bad - improving
7140	Transition mires	Bad-declining	Bad-unknown	Inadequate - stable

However, designating sites alone has not been enough to achieve favourable conservation status. Protection mechanisms, such as statutory measures to prevent damaging operations occurring, have not necessarily prevented further degradation.

In addition, the jurisdictional border in Ireland has hampered efforts to manage the peatland resource across the region. Prior to the introduction of INTERREG VA, there were no cross-border networks that allowed managers to co-operate, share information and implement landscape-scale conservation. To this end, the CANN project – a consortium of public bodies, third-level institutions, charities and local government authorities from Ireland, Northern Ireland and Scotland - intends to carry out a number of activities across 24 separate sites, including:

- Delivery of 27 Conservation Action Plans (CAPs);
- With direct conservation actions to be delivered on 20 of these sites. This is anticipated to involve improving the conservation status of 3,650 ha[41] (hectare) of Special Areas of Conservation (of which over half is in private ownership, predominantly farmers) to contribute towards the programme output of 4,500 ha of habitats supported in order to improve conservation status[42].

[41] NB: While aspects of the project's progress reports and its Letter of Offer (dated 25th October 2018) state 3,605 ha, during consultation the Lead Partner confirmed that the correct figure is 3,650 ha.
[42] According to the project partners, they will aim to guarantee that they achieve this output, by selecting 4,605 ha of selected protected habitats on which direct conservation actions will take place.

It is anticipated that this activity will contribute towards the programme specific result *'to increase the total area of these habitats approaching favourable conservation status from the current baseline of 1% to over 10% of selected protected habitats by 2023.'*

The CANN project partnership is led by Newry Mourne & Down District Council (NMDDC), and is made up of the Agri-Food and Biosciences Institute (AFBI); Argyll & The Isles Coast and Countryside Trust (ACT); Armagh City, Banbridge & Craigavon Borough Council (ABCBC); East Border Region (EBR); Golden Eagle Trust (GET), the Institute of Technology Sligo (Sligo IT), Monaghan County Council (MCC), Scottish Natural Heritage (SNH), Ulster University (UU) and Ulster Wildlife (UW).

A key objective of this project is to strengthen cross-border co-operation to facilitate the recovery of selected habitats and priority species and meet the targets of the EU Birds and Habitats Directives and the EU Biodiversity Strategy. Recovery of these wetland and peatland habitats is considered to be vital for the provision of a range of ecosystem services across the region e.g. carbon sequestration and climate change mitigation; water quality and hydrological regulation; and aesthetic and cultural services such as tourism and recreation.

The CANN partnership intends to produce:

- Conservation action plans for 27 (across 24 sites[43]) Special Areas of Conservation[44] across six of the seven priority habitats: alkaline fens, blanket bog, active raised bog, hard oligo-mesotrophic waters (marl lakes), calcareous fens, and transition mires/quaking bogs. Across the three jurisdictions, the seven priority habitats are in 'unfavourable' condition. The continuing decline of these unique habitats and species is a global issue and ensuring protection and restoration is an obligation for all EU Member States. Each of the sites has been drawn from the SEUPB Priority Site List. It should be noted that for 20 of the sites, the project partnership also intends to deliver direct conservation actions; and
- Site-specific species action plans for five INTERREG VA priority species: white-clawed crayfish, hen harrier, breeding waders (curlew, redshank, snipe), golden plover, and red grouse. It is anticipated that species experts within the consortium will produce a list of recommended activities to improve the conservation status of targeted species and these will then be adapted and tailored per site and appropriate actions incorporated into each of the 27 conservation action plans where target species are recorded.

It is anticipated that the conservation action plans and mapping of these areas will follow an agreed common methodology to identify best practice actions across the three jurisdictions. The project partners consider that this approach will result in higher standards of conservation work and greater efficiency of delivery.

Specific actions will include:

- In relation to blanket bog concerns: herbivore and grazing management; removal of invasive species, scrub, bracken and conifers; hydrological management; controlled burning and wildfire management. In addition, nest protection and species-specific actions will benefit hen harrier, golden plover, merlin, red grouse and breeding waders across the upland site.
- In relation to the condition of active raised bog, alkaline fen, marl lake, calcareous fen, and transition mire: invasive species and scrub and conifer management; hydrological management and nutrient

[43] Although the number of sites is 24, the number of plans is 27 as three of the proposed sites are cross-border and it is anticipated that a plan will be produced for both the NI and ROI aspects of the site (albeit, it is anticipated that the two plans will 'speak' to each other).

[44] NB Stretching over 18% of the EU's land area and almost 6 % of its marine territory, the Natura 200 network is the largest coordinated network of protected areas in the world. It offers a haven to Europe's most valuable and threatened species and habitats is a network of nature protection areas in the territory of the European Union. It is made up of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) designated respectively under the Habitats Directive and Birds Directive. All of the action plans will cover Natura 2000 sites i.e. SAC or SPA designated sites.

limitation trials, fringing habitat maintenance, In addition, specific actions will be targeted at white-clawed crayfish population restoration and breeding waders.

A list of sites with their target priority habitats and species, site designations and conservation status is included below. As well as targeting sites that are physically cross-border, the project includes sites across the Republic of Ireland, Northern Ireland and Western Scotland where the transit of priority species has been recorded.

Table 3.2: List of sites (with target habitats/species), site designations and conservation status

Jurisdiction	Site name[45]	Target Habitats/Species	Designation	Conservation status[46]
Cross-border sites	**1. Kilroosky Lough Cluster SAC (ROI)/ Magheraveely Marl Lakes SAC (NI)**	Alkaline fen, calcareous fen, hard oligo-mesotrophic waters, white-clawed crayfish	SAC (NI/ROI)	Unfavourable
	2. Sliabh Beagh SAC (NI) / Sliabh Beagh SPA (ROI)/Sliabh Beagh- Mullaghfad-Lisnaskea SPA (NI)-Eshbrack NHA (ROI)	Blanket bog, hen harrier, red grouse, golden plover, breeding waders (curlew, snipe)	SAC/SPA (NI/ROI) NHA (ROI)	
	3. Cuilcagh Mountain			
Northern Ireland	**4. Garry Bog**	Active raised bog	SAC	Unfavourable
	5. Peatlands Park			
	6. Ballynahone Bog	Active raised bog (hen harrier, snipe, curlew)		
	7. Moneygal Bog	Active raised bog		
	8. Curran Bog			
	9. Fairy Water Bogs	Active raised bog (curlew)		
	10. Tully Bog	Active raised bog		
	11. Cranny Bogs			
	12. Lecale Fens	Alkaline fen		
	13. Turmennan	Transition mire		
Ireland	**14. Boleybrack Mountain[47]**	Blanket bog, red grouse, golden plover, curlew, snipe, hen harrier	SAC	Unfavourable
	15. Lough Arrow	Hard oligo-mesotrophic waters		
Scotland	**16. Eilean na Muice Duibhe**	Blanket bog	SAC	Unfavourable
	17. Rinns of Islay SSSI	Blanket bog, hen harrier, corncrake, redshank	SSSI	Unfavourable (blanket bog); others favourable
	18. Ben Nevis[48]	Blanket bog	SAC	Unfavourable
	19. Cockinhead Moss	Active raised bog		
	20. Trotternish Ridge	Alkaline fen, Blanket bog, Transition mire/quaking bog	SAC	Unfavourable (alkaline fen)
	21. Kirkcowan Flow	Blanket bog	SAC	Unfavourable
	22. Glen Coe	Blanket bog, Alkaline fen, Transition mire/quaking bog, Petrifying springs with tufa formation	SAC	Unfavourable (alkaline fen)
	23. Moffat Hills	Blanket bog	SAC	Unfavourable
	24. Mochrum Lochs			

[45] NB Site names **in bold** are those on which conservation actions are also proposed to take place.

[46] A technical paper (http://bd.eionet.europa.eu/activities/Reporting/Article_17/ Documents/ ART17%20public%20consultation%20guide.pdf) for reporting on Article 17 states that Conservation Status is given as one of three classes: Favourable; Unfavourable inadequate (change in management or policy is required to return the habitat type or species to favourable status but there is no danger of extinction in the foreseeable future); and Unfavourable bad (serious danger of becoming extinct, at least regionally). An 'improvement' of the conservation status of a habitat describes the change from 'unfavourable' to 'favourable' status. Article 1(e) of the Council Directive 92/43/EEC provides clear requirements that indicate a 'favourable' status.

[47] It is noted that (at May 2019) there has been a number of tensions between the project and a small group of local landowners at Boleybrack. This has unfortunately culminated in the project withdrawing from this site. However, positively, the project team had gathered sufficient data to produce a draft Conservation Action Plan for this particular site, which will provide a legacy for future action beyond the lifetime of the project. In relation to Boleybrack, it is understood that SEUPB is currently (at May 2019) working with the Lead Partner on a strategy to transfer some of the works to different sites. Any significant changes will be reported to Steering Committee and relevant approvals sought.

[48] Changed from Ben Alder, after it was identified that Ben Alder was partially outside the eligible area.

It is noted that on 24th July 2018, the INTERREG VA Steering Committee approved an application for the inclusion of Cuilcagh Mountain as an additional site within the CANN project[49].

Given that environmental management has not historically been a core element of agricultural education (and much of the targeted land is in the ownership of farmers), CANN has also proposed to offer training courses to help build capacity within the land-based sector and develop an understanding of the management of designated sites[50]. Landowner engagement will be secured through farm visits and information meetings in local halls and community centres and engagement with existing local organisations – gun clubs, fishing clubs etc. Farmer networks will be targeted through the Irish Farmers' Association, Ulster Farmers' Union and NI Agricultural Producers' Association.

The CANN project has also proposed to facilitate the establishment of the first formal environmental trust to be established to manage the overall conservation and protection of a cross-border habitat (at Sliabh Beagh). Two active Group Water Schemes and a Tidy Town Committee want to be more involved in the protection of this important habitat. The establishment of a demonstration site, interpretative signage and stakeholder engagement will respond to the needs of those who want to learn more about this important wildlife habitat.

The project partners have created a central management team that reports directly to the steering committee comprised of a representative from each project partner and a representative from the three Government organisations (National Parks & Wildlife Service, NI Environment Agency and Scottish Natural Heritage). Three cross-border specialist teams are delivering work plans at site level across the three jurisdictions. As part of their work, they have been working closely with all site stakeholders and liaise regularly with regional staff from the three Government agencies. These teams report to the Central Management Team via the project manager. East Border Region (EBR) is providing financial administration support. An Information & Biodiversity Co-Ordinator[51] (appointed during early 2019) and a communication/outreach officer are working across the project. A communications strategy aimed at increasing awareness and understanding of the international importance of the priority habitats and species and the European funding deployed to protect them has been drawn up.

It is anticipated that the project's objectives will be achieved in consultation and through liaison with key stakeholders, landowners and farmers. Conservation work will be undertaken in conjunction with local partnerships, such as those already established for Sliabh Beagh. This will be comprised of members of the local community as well as farmers and landowners, representatives of government departments and state agencies and NGOs. These local partnerships are linked directly to the project and will form the basis of local advisory groups set up as part of the implementation of the conservation actions at each site.

Seven work plans have been developed.

Table 3.3: Summary of CANN Project Work Plans (Per Progress Reports)
1. Project Mobilisation/Management
2. Mapping, Scientific Monitoring and Evaluation (implementation)
3. Conservation Action Plans (implementation)
4. Upland Peatland & Associated Species (implementation)
5. Freshwater and Lowland Wetlands/Peatlands (implementation)
6. Cuilcagh Mountain SACs (implementation)
7. Communications Activities

[49] It was a condition of the June 2017 LoO that a scoping study would be carried out on the Cuilcagh site to explore cross-border interventions. It was requested that this study's recommendations be presented to the Steering Committee as a supplementary Stage Two application no later than December 2017 (which was extended to March 2018, following approval of a 'project change request' made by NMDDC).

[50] It is noted that at the time of the CANN partnership application to INTERREG, the project partners had had preliminary contact with landholders across the three jurisdictions who had indicated support for restoration activities. Indeed, it was noted that farming representatives from Sliabh Beagh and Boleybrack had been actively engaged with site management planning for some time.

[51] Renamed (in consultation with SEUPB) from Best Practice Officer after initial recruitment exercises were unsuccessful.

Work plan leaders have responsibility for coordinating monitoring and evaluation to provide information to the project manager for final evaluation. Monitoring before, during and after the intervention of the site and species condition and status is planned to be undertaken to ensure cause and effect can be clearly established.

3.3 Project Budget

The CANN project received a Letter of Offer (dated 20th June 2017) offering a grant of up to a maximum of €8,173,689.24 (ERDF + Government Match Funding) to be expended and claimed by 31st December 2021, towards total anticipated project costs of €8,349,687.85.

However, this was later (LoO dated 25th October 2018) extended after the INTERREG VA Steering Committee approved (on 24th July 2018) an additional €1,056,624.70 following a secondary application for the inclusion of Cuilcagh Mountain as an additional site within the CANN project. The revised total anticipated cost is therefore €9,406,312.55, as summarised in tables 3.4 and 3.5:

Table 3.4: Anticipated Project Costs[52]

Summary Budget	Total Project Costs (€)
Staff Costs	4,295,817.00
Office and Administration Costs	644,372.55
External Expertise and Services	3,031,748.00
Travel and Accommodation Costs	750,862.00
Equipment Costs	641,513.00
Infrastructure and Works	42,000.00
Total	**9,406,312.55**

Table 3.5: Anticipated Project Funding

Funding Sources	Total Value (€) (Public)
Cash Contribution (Partner Supplied/other grant)	175,998.62
Government Match Funding	1,234,948.27
ERDF	7,995,365.66
Total Grant Funding	**9,230,313.93**
Total Project Costs	**9,406,312.55**
Intervention rate (% ERDF)	85%

3.4 Anticipated Project Objectives, Outputs & Results

3.4.1 Objectives

The CANN consortium aims to address the threats that have caused the six priority habitats to be in 'unfavourable' conservation condition, and have led to the serious decline in the five priority species.

The partnership intends to carry out tangible conservation actions across 4,605ha of selected protected habitats to improve condition status by 2023 (NB it is anticipated that there will be a level of attrition leading to the target of 3,650ha). The Project Partnership's objectives are to:

1. Improve the condition of blanket bog across the three jurisdictions by addressing key management concerns.
2. Improve the condition of active raised bog, alkaline fen, marl lake, calcareous fen, and transition mire by addressing key management concerns.

[52] NB Throughout this report the Evaluation Team has referred to 'Anticipated Project Costs' and 'Anticipated Project Funding' as it is often the case with large projects that are implemented over an extended period of time that final project costs may differ from those anticipated at the outset. Albeit, any such changes would likely be agreed between a Project Promoter and SEUPB.

3.4.2 Outputs & Results

Per the (second) Letter of Offer (dated 25th October 2018), the anticipated (approved) CANN Project Outputs are as follows:

Programme Output Code	Name of Output	Programme Output Indicator Target[53]	CANN Project Target
CO23:	Nature and biodiversity Surface area of habitats supported in order to attain a better conservation status (hectares)	4,500 ha	3,650ha
2.111	Conservation Action Plans	25	27

It is noted that it is a requirement that achievement in the change in habitat status should be recorded upon completion of activities in the supported areas and an improvement demonstrated.

The project partners have also proposed a 'target group reached' target of 300 members of the general public.

Further conditions of funding specified by the SEUPB Steering Committee included:

- A suitable mechanism for the delivery of the Incentive Based Scheme should be submitted to SEUPB for assessment and prior approval (including assessment of any State Aid implications):
- An Environment Impact Register highlighting how the project considers and assesses activities encompassing sustainable practices must be completed and monitored throughout the project lifespan;
- That the project had to ensure that structures were in place for knowledge and best practice sharing with the CABB project.

3.5 Contribution to the Priority's Specific Objectives & Result Indicators

This section considers the CANN project's key achievements (as of May 2019) and the extent to which the CANN project has:

- Contributed to the achievement of the Priority's Specific Objectives;
- Contributed to the achievement of the targets for the Result Indicators;
- Contributed to:
    - EU 2020 objectives;
    - The Atlantic Strategy; and
    - The horizontal principles of equality and sustainable development.

and where appropriate, the section:

- Identifies any external factors that have impacted, positively or negatively, on the project's ability to contribute to the achievement of the Specific Objective.

3.5.1 Key Achievements (to May 2019)

Further to the project partners' original work plan, an additional work plan within the CANN project was approved by Steering Committee on 24 July 2018. As a result, it is now anticipated that the CANN project will deliver additional (from those originally proposed) outputs on an important cross-border site, comprising:

[53] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

- 500 additional hectares of habitats supported in order to attain a better conservation status bringing the projected total to 3,650 ha;
- 2 additional Conservation Action Plans (Cuilcagh Mountain SAC in Northern Ireland and Cuilcagh Anierin Uplands SAC in Ireland) bringing the project total to 27 conservation action plans (exceeding the output target of 25).

In September 2018, the CABB and CANN projects delivered a joint event showcasing activities undertaken to date and demonstrating their commitment to joined-up working.

A highlight for the CANN project has been the discovery of a rare snail Vertigo moulinsiana which has been found in large numbers on one of the project sites. Field visits to other sites have been undertaken in order to update habitat maps and data collection work is underway in order to inform the draft conservation action plans which will directly contribute to the programme outputs once completed.

In addition, there has been a significant level of liaison with local stakeholders to inform the public of the activities and actions that will be undertaken and the benefits the project will bring. This has included consultation and dissemination of information to landowners and other local interested parties. On an overall basis, this has been received positively. However, in one specific area, there has been a number of tensions between the project and a small group of local landowners. This has unfortunately culminated in the project withdrawing from one of the original selected sites (Boleybrack Mountain in Co. Leitrim). Fortunately, the project team had gathered sufficient data to produce a draft Conservation Action Plan for this particular site (albeit no conservation actions will take place), which will provide a legacy for future action beyond the lifetime of the project. The SEUPB is currently working with the Lead Partner on a strategy to transfer some of the works to different sites. Any significant changes will be reported to the Steering Committee and relevant approvals sought.

Importantly, 12 draft Conservation Action Plans have been developed and the Accountable Departments in each jurisdiction are working with the SEUPB to provide feedback on the plans. SEUPB is developing mechanisms for final sign off and verification of the outputs as per programme requirements.

The CANN project partners also cite (within their progress reports) the project's key achievements (as of December 2018) as being:

Period	Dates	Key Achievements
1	1st January 2017 – 31st March 2017	• The first Letter of Offer was issued in February 2017, which included an amendment to include works on the priority blanket bog habitats of the cross-border site Cuilcagh SAC. This was a scoping study which established what work needed to be carried out on the site, with the information from this forming the basis of a supplementary Stage 2 application. • Partnership Agreements were drafted and finalised during this period. • Work began in drafting a Monitoring Plan for the Sliabh Beagh site. Planning began for holding a meeting to update stakeholders at Sliabh Beagh of the area-specific actions of the CANN Project. • Golden Eagle Trust and AFBI began preparing for field survey work: preparing maps, landowner liaison, survey methods, familiarisation, site access.
2	1st April 2017 – 30th June 2017	• Stakeholder meetings took place for Sliabh Beagh, an information session to gather views and opinions of local interest groups and state agencies; • Visits carried by UW and AFBI out to Peatlands Park SAC, Garry Bog SAC and Ballynahone Bog SAC to gather information on existing and new threats in order to move the sites towards a favourable condition. UW provided support to AFBI for the purposes of mapping, conservation action plans and baseline assessments for these sites. • UW held meetings with NIEA to develop a conservation action plan template, NIEA developed a template that they wished all INTERREG plans to conform to. • GET commenced bird surveys at Boleybrack and Slieve Beagh. • Stakeholder engagement took place at Boleybrack

Period	Dates	Key Achievements
3	1st July 2017 – 30th September 2017	• A joint CANN/CABB meeting was held with Government Departments.
4	1st October 2017 – 31st December 2017	• A joint CANN/CABB meeting was held in Ely Place Dublin with NPWS, NIEA and SNH. • Recruitment and employment of CANN Project Manager - commenced employment as PM on 2 November 2017 (NB there had been a delay in appointing a PM as a second round of recruitment was required); • There was further work in project communications during this period - the project logo was finalised and delivered, and the Communications Officer also spent dedicated time on progressing procurement activities associated with the project launch and website.
5	1st January 2018 – 31st March 2018	• Considerable stakeholder engagement took place in this period, with further engagement with local landholders. Partners also met with a range of external stakeholders including the Fire Service in Co. Monaghan, schools and a range of voluntary organisations (including gun clubs). • Considerable progress with procurement across partners, including in relation to the obtaining of LiDAR data for a number of sites.
6	1st April 2018 – 30th June 2018	• An official project launch took place in the Nuremore Hotel, Monaghan on 12 June 2018. The project partners considered the event to have been a great success, with over 100 attendees and good press coverage afterwards.
7	1st July 2018 – 30th September 2018	• An additional allocation of just over €1 million was approved by SEUPB in this Period for additional project works at the Cuilcagh Mountain SACs. • Joint CANN/CABB meetings took place on 12th August 2018 and on 5 September 2018. The first meeting also involved NIEA, where the format and content of CAPs was discussed; • The CANN Project Manager also worked closely with the CABB PM to finalise arrangements for the joint CANN/CABB information sharing event (proposed for Period 8). • A joint meeting was held with NMDDC, SEUPB & GET in this Period to discuss concerns presented by legal representatives to a number of apparently disgruntled landholders in the Boleybrack area. • A variety of scientific monitoring activities proceeded in each of the 3 jurisdictions. Data gathered was used to update and refine habitat maps for the various sites; • The Twitter page for the project had 300 followers (an increase of 100 on Period 6). • The project received some good press coverage due to the discovery of a rare snail in the Lecale Fens site.
8	1st October 2018 – 31st December 2018	• In this Period the Lead Partner engaged in significant dialogue with SEUPB and project partners Golden Eagle Trust and IT Sligo with a view to achieving a resolution to local landholder issues at the Boleybrack site in Co. Leitrim. A number of meetings were held in the local area and were also attended by other representative bodies including the IFA (Irish Farmer's Association) and INHFA (Irish Natura and Hill Farmers Association). At that time (December 2018), no agreed resolution had been achieved in this area. • A joint CANN/CABB meeting took place in this Period (8 & 9 October) with visits to CABB sites including the Garron Plateau and Montiaghs Moss; the CANN PM and other project partners also presented at the event and a range of other networking opportunities were also available. NB, It is anticipated that CANN will host the next joint information event in September 2019.

3.5.2 *Project Output Indicators*

Discussion with the CANN project partnership indicates that whilst the anticipated (approved) project outputs have, as of May 2019, not yet been achieved (albeit, it was not expected of the project at this stage in its implementation, as they have a 2023 delivery date), the project is being implemented as planned and making positive progress towards achieving its outputs.

Encouragingly, however, despite setbacks at Boleybrack, 12 draft Conservation Action Plans have been developed and the Accountable Departments in each jurisdiction are working with the SEUPB to provide feedback on the plans. SEUPB is developing mechanisms for final sign off and verification of the outputs as per programme requirements.

Programme Output Code	Name of Output	Programme Output Indicator Target[54]	CANN Project Target	Progress (as of May 2019)
CO23:	Nature and biodiversity Surface area of habitats supported in order to attain a better conservation status (hectares)	4,500 ha	3,650ha	-
2.111	Conservation Action Plans	25	27	12 in draft form

In addition, as of December 2018, the project partners had engaged with 165 local landowners, thereby achieving 55% of the CANN project's 'target group reached' target of 300 members of the general public.

Table 3.7: Performance against Target Groups Reached (as of December 2018)

Target Group	Target	Achieved	% Achieved	Description of Target Group	Source of Verification
General Public	300	165	55%	Local Landowners	ACT meeting log for Period 7

3.5.3 *The Priority's Result Indicator Targets & Specific Objectives*

Given the early stage of the project's implementation and the fact that the project has yet to achieve its anticipated (approved) project outputs, the CANN project is, therefore, at May 2019, making only marginal progress towards the Priority's Result Indicator Targets and Specific Objectives. However, this should be expected at this stage of the project's implementation (as they have a 2023 delivery date), and should not be considered of concern.

3.5.4 *EU2020 Objectives*

Whilst the CANN project is not overtly focused on economic growth, it does seek to encourage stakeholders to engage in 'smart' and 'sustainable' growth through, for example, sharing knowledge with landowners on habitat management.

The adoption of such techniques will serve to contribute to areas of the EU prospering in a low-carbon, resource-constrained world while **preventing environmental degradation, biodiversity loss and unsustainable use of resources**.

In turn, this should contribute to the EU2020 targets for climate change and energy (i.e. that the "20/20/20" climate/energy targets should be met, including an increase to 30% of emissions reduction if the conditions are right).

[54] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

3.5.5 The Atlantic Strategy

The CANN project does not contribute to the aims and objectives of the 'Atlantic Strategy'.

3.5.6 The Horizontal Principals

The CANN project aims to protect and improve the quality of the environment - a key component of sustainable development and as such it is anticipated that it will serve to contribute (at least in part) to the EU's three Horizontal Principals, per the following discussion:

Sustainable development	The fundamental principle of the CANN project is that it will make a positive contribution to the sustainable development of valued sites and habitats. Recovery of these wetland and peatland habitats is vital for the provision of a range of ecosystem services across the region e.g. carbon sequestration and climate change mitigation; water quality and hydrological regulation; and aesthetic and cultural services such as tourism and recreation. The concept and design of CANN have revolved around ensuring the development of ongoing community guardianship of the project sites and the creation of a cross-border partnership to support this ongoing work. The CANN project is aiming to address the threats that have caused priority habitats to be in 'unfavourable' conservation condition and have led to a serious decline priority species. The project aims to carry out conservation actions on 3,650 hectares of selected protected habitats to improve the condition and manage biodiversity at a landscape scale. As advised by the Convention on Biological Diversity, the project partners are adopting a *"strategy for the integrated management of land & living resources that promotes conservation & sustainable use in an equitable way"*. It is anticipated that this will be achieved through a process of adaptive management (i.e. a continuous cycle of sustainable development) collaboratively designed and based on partners' experience of delivering biodiversity projects at both a local and European level. This is being established from the outset through the Conservation Action Plans which will deliver an agreed common methodology established to identify best practice actions across the three jurisdictions. It is anticipated that this approach will result in higher standards of conservation work and greater efficiency of delivery. The CANN Outreach Programme intends to promote quality of life and reduce health inequalities by encouraging access to the natural environment and an appreciation of its features. It is anticipated that this will improve local communities' knowledge of habitat and species and help to foster a sense of responsibility and guardianship within communities which will ensure ongoing awareness, ownership and responsiveness of communities to potential threats and impacts, including climate change, to habitats and species. The CANN Steering Group has also adopted a 'green' policy throughout its project delivery, in order to reduce its carbon footprint and to lead behavioural change. This is being carried out, for example, by maximising its ability to use digital communication (e.g. video and teleconferencing) instead of travelling to meetings. In addition, scientific monitoring and evaluation form a key component of the CANN's project partnership's management tracking species and habitat responses to management activities over the lifetime of the project.

Equal opportunities and non-discrimination	Equality will be embedded at all operational levels of the project, all individuals involved will undertake an equality and diversity online module to recognise the value of diversity. The CANN project partners have sought to make a positive contribution to equal opportunities. This has included: • By abiding by all relevant legislation - Section 75 of the Northern Ireland Act 1998, the Employment Equality Act (1998) and the Equal Status Act (2000), as amended by the Equality Act (2004) in Ireland and the Equality Act (2006) in Scotland - in addition to each partner's own organisational commitments to equality and diversity, whilst recruiting for the project. • Requiring that all staff involved undertake an Equality and Diversity online module to recognise the value of diversity. Completing this module is mandatory for all CANN staff. • Throughout project delivery, the partners are seeking to ensure that no individual is discriminated against based on sex, marital status, pregnancy/maternity, race or ethnic origin, religion or belief, educational attainment, disability, age, sexual orientation and gender reassignment. These principles are being applied to all project participants, employees, beneficiaries and volunteers. • At each of its sites and partner work bases, the partners are seeking to ensure that a workplace environment is established which will encourage and value diversity. • The nature of CANN necessitates working with isolated rural locations and the participation of the communities directly involved is being encouraged throughout project delivery. An essential element of the CANN project partners' approach is to nurture ownership and ongoing guardianship of project sites. This can only be achieved through engagement and outreach activities with all associated parties at site locations, regardless of any other factors, and so will ensure CANN involvement with rural and isolated communities who can often be marginalised. • CANN has included a confidential monitoring survey with registration forms for landowners participating in farm plans, volunteers registered with CANN, members of the local advisory groups etc. These forms will be analysed for equality considerations.
Equality between men and women	• As noted above, throughout project delivery the partners are seeking to ensure that no individual is discriminated against based on all equality considerations, including gender. These principles are being applied to all project participants, employees, beneficiaries and volunteers.

3.5.7 Contribution to Other Strategies

The continuing decline of peatland and wetland habitats and associated species is a global issue and protection and restoration is an obligation for all EU Member States. As a signatory to the Convention on Biological Diversity and the Aichi Target, the Irish and UK Governments are committed to developing and using a set of indicators to report on progress towards meeting the international targets and goals of the EU Biodiversity Strategy[55]. Both Governments are also committed to the EU's Birds[56] and Habitats[57] Directives and the associated need to have priority habitats moving towards favourable condition. It is anticipated that the CANN project will assist Scotland and Ireland (north and south) to meet their EU obligations.

[55] In May 2011, the European Commission adopted a new strategy to halt the loss of biodiversity and ecosystem services in the EU by 2020, in line with the commitments made at the 10th meeting of the Convention on Biological Diversity (CBD)

[56] Europe is home to more than 500 wild bird species. But at least 32 % of the EU's bird species are currently not in a good conservation status. The Birds Directive aims to protect all of the 500 wild bird species naturally occurring in the European Union.

[57] The Habitats Directive ensures the conservation of a wide range of rare, threatened or endemic animal and plant species. Some 200 rare and characteristic habitat types are also targeted for conservation in their own right.

Each of the Natura 2000 sites included in the CANN project was selected from the list of sites with priority habitats in Northern Ireland, Ireland and the west of Scotland. The specific actions that the project partners are implementing aim to extend the general conservation objectives set by the competent authority for the priority habitats by delivering tangible conservation actions.

The CANN partnership's activities and objectives align with many regional and national action plans and strategies, including:

- The NI Blanket Bog Habitat Action Plan (2003);
- Ireland's Peatland Conservation Action Plan 2020;
- The Hen Harrier NI Species Action Plan;
- The Red Grouse NI & ROI Species Action Plans (2013);
- NI Curlew Species Action Plan;
- The NI Habitat Action Plan Lowland Raised Bog (2003);
- The NI Habitat Action Plan Fens (2005);
- The NI HAP for Marl Lakes (2005);
- The government policy statement Conserving Peatland in Northern Ireland;
- The NPWS Hen Harrier Threat Response Plan;
- The Scottish Government's performance target 'Improve the condition of protected nature sites';
- The 2020 Challenge for Scotland's Biodiversity - A Strategy for the conservation and enhancement of biodiversity in Scotland document;
- The Scottish Government's Peatland Action Programme and Scotland's National Peatland Plan (2015).

The CANN project also builds on existing community partnerships, such as at Sliabh Beagh, where local communities, state agencies and NGOs have already developed pilot environmental initiatives targeted at upland management.

In addition, the project partners consider that existing national implementation of the Common Agricultural Policy and existing agri-environmental schemes not to be sufficiently targeted or adapted to deal with the broad range of issues that are impeding the attainment of favourable conservation status. As such, the works included under the CANN project are distinct, additional and/or complementary to agri-environment schemes and so, are suggested, to avoid dual funding.

3.6 Effectiveness of the Cross-Border Collaboration & Partnership Working

This section considers aspects of the CANN project's collaborative and partnership working including:

- The effectiveness and added value of the CANN project's cross-border collaboration in relation to the specific objectives;
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The CANN Project Partners advise that designating sites alone in each of the three jurisdictions has not been enough to achieve favourable conservation status. Protection mechanisms in place, such as statutory measures to prevent damaging operations occurring, have not necessarily prevented further degradation. However, and of key importance, the jurisdictional border in Ireland has hampered efforts to manage the peatland resource across the Island. Prior to the introduction of INTERREG VA, there were no cross-border networks that allowed managers to co-operate, share information and implement landscape-scale conservation. To this end, the CANN project – a consortium of public bodies, third-level institutions, charities and local government authorities from Ireland, Northern Ireland and Scotland is implementing a number of activities to enhance the effectiveness of cross-border collaboration in relation to the specific objectives and new ways of working that would not otherwise have been possible in the absence of INTERREG VA. These include:

Joint Development	The development of the CANN project has involved 11 project partners – Newry, Mourne & Down District Council; East Border Region, Monaghan County Council; Armagh, Banbridge & Craigavon Borough Council; Agri-Food and Biosciences Institute; Institute of Technology Sligo; Ulster Wildlife; University of Ulster; Golden Eagle Trust; Scottish Natural Heritage; and Argyll and the Isles Coast and Countryside Trust. The partnership considers itself to be unique and suggests that it has been designed to maximise the cross-border added value for each region, through drawing on expertise from all three jurisdictions. Both prior to the project's commencement and since its launch, the project partners have met regularly, refining the scope to enable the delivery of the full suite of INTERREG VA output indicators. The project partners consider that the considerable environmental expertise within the consortium has proven invaluable during both the development and implementation phase and anticipate that strong collaboration will continue throughout the project lifecycle. The partners have identified 'best practice' from across the three jurisdictions that has been used as the foundation for the project. For example, Scottish Natural Heritage had developed new mapping techniques and protocols that are being trialled in all regions. Natura Management Plan templates have also been provided for a number of habitat types - this is guiding partners in their approach to developing site-specific Natura Management Plans within their region. The project partners are also ensuring to work in a complementary fashion with the Department of Arts, Heritage & the Gaeltacht, which is implementing its LIFE funded 'Restoring Active Raised Bog in Ireland's SAC Network 2016 – 2020' project in Ireland (only). The approach to peatland restoration is common across both the CANN project and theirs and joint visits to both projects' sites are planned/have been undertaken e.g. site visits to NPWS were undertaken in March 2019.
Joint Implementation	The CANN project has brought together a diverse range of partners across the three jurisdictions together for the first time to work on a cross-border basis. A steering committee comprising all partners is responsible for the implementation of the project at a strategic level. This committee meets bi-monthly, appraising progress towards Letter of Offer conditions and is also addressing any unexpected challenges (such as those at Boleybrack) that have been encountered during implementation. All partners have agreed their specific contribution to the delivery of project outputs with activities and targets clearly assigned. In addition, the formation of a collaborative best practice network is an integral feature of the CANN project's joint implementation. Joint implementation is further ensured throughout the project's implementation within the project management structure through the setup of five cross-border specialist teams[58] in four thematic areas: Upland Peatland & Associated Species Team[59]; Lowland Peatland-Wetland & Associated Species Team; Freshwater & Associated Species Team; the Applied Research & Monitoring Team and the Education, Outreach & Communications team. These teams are working closely together and are directly responsible for the implementation of work packages (2, 3, 4 and 7) across the three jurisdictions. Education and outreach support, best practice and volunteer support is a further shared function, as is the project infrastructure for recruiting and up-skilling volunteers. Financial administration and support is another a joint support service with this function carried out by East Border Region (EBR). A core project team has been established to deliver the CANN project. This comprises a Project Manager, Communications & Outreach Officer and a Finance an Administrative Officer.

[58] i.e. representing work packages 2-7 inclusive.
[59] NB: the Lead Partner advised that the Cuilcagh Mountain SACs work package (WP 6) falls within this thematic area.

Joint staffing	A number of the partners, such as the Agri-Food Biosciences Institute and the Golden Eagle Trust, are also delivering outputs on a cross-border basis with shared staffing structures. Ulster Wildlife's constitution allows for staff to work in the counties of Ulster outside of the six counties within Northern Ireland. The PhDs funded through the project are working on a cross-border basis with co-supervision by IT Sligo, AFBI and UU. In addition, the expertise of the applied research team within the collaboration will be available to the consortium as a whole to assist with implementation of the project e.g. upland ecologist employed by IT Sligo.

The CANN project partners consider that there is much to be learned from the approaches adopted within each region. They suggest that it is fair to say, that peatland restoration has been more advanced in the Republic of Ireland and Scotland than it has been in Northern Ireland and consider that INTERREG VA provides the Northern Irish partners with a valuable chance to learn from others' expertise. On a smaller scale, innovative restoration techniques have been trialled successfully in Northern Ireland and the other partners now have an opportunity to learn from those.

Similarly, habitat mapping techniques have been developed in Scotland and the CANN project is allowing the project partners to take this mapping approach and trial it within each region to assess the relevance and determine the costs and benefits.

Many of the SACs in Scotland, for which SNH is producing conservation action plans, are in favourable conservation status. This is affording the other partners an opportunity to visit and learn from high-quality sites.

In addition, it is understood that ACT commissioned a study to assess a rhododendron issue that it was experiencing on one of its blanket bog sites. The project partnership advised that the effectiveness and added value of the CANN project's cross-border collaboration were evident in this case by the fact that each of the project partners was able to review the study's findings and (where appropriate) learn lessons for their respective sites.

The CANN project partners further note that the NI/ROI border is meaningless in biodiversity terms yet in some cases runs through designated sites – indeed some high-value areas are designated Special Areas of Conservation on one side of the border but not on the other. The partnership intends to seek to address these anomalies throughout the course of the project.

The CANN partners are of the view that the cross-border project management structures and support networks that will be put in place for the duration of the project will help to develop the capacity of site owners and managers, increasing the level of specialist knowledge, skills and competencies to improve the long term condition status of the Natura sites targeted under the programme.

Furthermore, the partners note that cross-border collaboration is essential if they are to meet the requirements of the Biodiversity Strategy and Birds & Habitats Directives. The CANN partners note that it is simply not logical for peatland/wetland restoration to be localised. That is, it must occur at a landscape scale if we are to reverse the centuries of decline in these habitats and protect the species that rely on them.

The shared Communication and Outreach Officer and Information & Biodiversity Co-Ordinator[60] are helping to raise awareness of the importance and value of the Natura sites within local communities which in turn is anticipated to deliver a positive impact in terms of reducing damage caused by issues such as access or wildfires. In addition, the project partners have implemented a series of seminars rotating around the regions that again will serve to help to build capacity amongst key stakeholders and landowners.

[60] During consultation, the Lead Partner advised that this individual resigned from this post in June 2019.

A further collective outcome for the project is anticipated to be the building of an evidence base that will inform policymakers within the three regions when considering the development of future EU Programmes including INTERREG, Rural Development Programmes and wider Common Agricultural Policy post-2020. The CANN project partners note that agri-environment schemes operate across all jurisdictions but can differ considerably between countries. In addition, management issues related to land that is not 'actively farmed' can be particularly problematic to resolve and it is anticipated that the CANN project will identify alternative approaches that can be considered by each member state. This will explore the potential for joint LIFE bids and other potential Natura 2000 financing measures as identified in the EU Commission Handbook (May 2014) on Financing Natura 2000. The focus will be on similar sites that are cross-border in nature or part of the wider ecological coherent network.

3.7 Barriers to Cross-Border Cooperation

This section considers whether the CANN project has encountered any barriers to cross-border cooperation that the priority axis is not addressing.

The Lead Partner notes that the project partners have been selected due to their specialist expertise and this collective expertise is being used to resolve environmental issues and ensure delivery of the best possible result and best value services. As such, to date, the project partners have not encountered any significant barriers to cross-border cooperation; including engagement with local community and stakeholders. Albeit, the CANN project partners note that in one specific area there has been a number of tensions between the project and a small group of local landowners. This has unfortunately culminated in the project withdrawing from one of its original selected sites (Boleybrack Mountain in Co. Leitrim). However, positively, the project team had gathered sufficient data to produce a draft Conservation Action Plan for this particular site, which will provide a legacy for future action beyond the lifetime of the project. In relation to Boleybrack, it is understood that SEUPB is currently (at May 2019) working with the Lead Partner on a strategy to transfer some of the works to different sites. Any significant changes will be reported to the Steering Committee and relevant approvals sought.

The CANN partnership notes that the project has been designed to minimise risk whilst delivering the programme outcomes. The various sites have been carefully selected on the basis that targeted conservation actions should evidence environmental improvement within the lifecycle of the INTERREG Programme. The majority of sites have a combination of public and private ownership so that on-the-ground work has been able to commence early in the project which can then be used to demonstrate best practice to the surrounding landowners.

3.8 Best Practice & Learning

This section considers whether the CANN project has resulted in any areas of best practice and learning.

The CANN project partners have made links with other relevant EU projects (e.g. the LIFE funded 'Restoring Active Raised Bog in Ireland's SAC Network 2016 – 2020' project) and visits have occurred (e.g. during March 2019), and will continue to occur, during the project to assist with knowledge transfer[61]. In addition, discussion with the project partnership suggests that the same external ecologist has been appointed to both the LIFE funded project and the CANN project. It was suggested that this greatly benefits both projects, as it provides opportunities for shared learning and the identification of best practice.

In addition (but also as a condition of funding), the CANN project has introduced structured knowledge and best practice sharing with the CABB project (see Section 4 for details on this project).

As part of the seminars rotating around the regions that the project partners have implemented, it is understood that, based on the issues encountered at the Boleybrack Mountain site (as previously

[61] It is of note that the CANN project plan has been developed on the basis of the best available science and by applying best practice principles and approaches that have been successful elsewhere e.g. BurrenLIFE & AranLIFE which are both cited as examples of best practice by the European Commission.

highlighted), one of the future seminars will focus on how to undertake effective stakeholder engagement. The project partnership anticipates that some form of 'best practice' guide or information sheet will be prepared as part of this, which will serve to ensure that key learnings from this site are incorporated into further stakeholder engagement exercises.

The CANN project has appointed a dedicated 'Information & Biodiversity Co-Ordinator', who has responsibility for collating the scientific data generated by the project activities and interpreting this into a user-friendly format. The Information & Biodiversity Co-Ordinator is also responsible for checking that volunteers are trained. Alongside the Communications & Outreach Officer, the Information & Biodiversity Co-Ordinator will be responsible for:

- The delivery of at least three conferences, five seminars and 15 workshops during the project's lifetime at specified junctures.
- The dissemination of information about the project on the project website (as well as via individual partner websites).
- The programme will have a series of networking, information exchange and volunteer/citizen science components which will also be evaluated to understand the contribution and up-skilling provided during the programme.
- Eight best practice guides that will be produced by the project. These best practice guides will be informed directly by the actions and monitoring undertaken throughout all work plans in the programme. Where appropriate, these will make recommendations for policy change to ensure the sustainable and correct management of sites into the future. These will be shared with landowners and professionals involved in the management of N2K sites.

The CANN project also hopes to build knowledge and understanding of the value, sensitivity and management practices appropriate to the site as all key stakeholders will be actively involved in the development of CAPs and implementation of key actions.

Joint action for the sites which straddle the border will be embedded within the relationships and cultures of the relevant organisations.

The CANN project also aims to contribute to EU agricultural policy for High Nature Value (HNV) farming, specifically in relation to supports and practices that deliver measurable ecological benefits in Natura 2000 sites. Where the land is in private ownership, the conservation action plans identify the ongoing management requirements and costs and how they could be met, for example through 'Management of Sensitive Sites' funding, the provision of management payments for ecosystem services or HNV farming through the next cycle of RDP using the evidence base from the project. The CANN project partners intend to make this information available to the European Commission to inform the development process for the new RDP programme and the mid-term evaluation.

Whilst the project has not yet sufficiently progressed, the Project Partners hope to:

- **Contribute to research**: it is anticipated that academic papers will be presented at conferences and to peer-reviewed journals in relation to the applied research undertaken during the project that will highlight the benefits of the INTERREG VA project funding for the conservation of EU habitats and species, and the practices developed by the project to improve their conservation status.
- **Contribute to knowledge**: it is anticipated that habitat mapping and monitoring as part of the project will contribute to biodiversity datasets for each jurisdiction, and will be publicly available to official agencies, public, and researchers. Improved information on the sites will be available for Article 17 reports for the reporting agencies. Capacity-building activities will also increase awareness and understanding amongst local communities of the importance of Natura sites and appropriate management.
- **Contribute to advocacy**: it is anticipated that the project website will be maintained for 3 years after the project closure. Interpretation panels will also remain in their locations and be maintained by the local authorities in the area. The CANN project will also provide an evidence base that can be used to inform future policy decisions by the government.

3.9 Mainstreaming Activities

This section considers whether the implementation of the CANN project has led to any mainstreaming of cross-border delivery of environmental work.

The CANN project partners advise that an exit strategy has been incorporated into the CANN project from the outset. During the lifecycle of the project, the exit strategy is being supported through capacity building of the landowners and also the development and upskilling of a volunteer network that will be able to assist with ongoing site management. The project partners consider that this will be an important project legacy and a key element of the exit strategy.

Across the CANN project, the use of the European Nature Information System (EUNIS)/Annex 1 habitat classification will ensure common standards across the three jurisdictions and will ensure the accurate identification of Annex 1 habitats. The EUNIS system is now legally required under the INSPIRE Directive (Infrastructure for Spatial Information in the European Union) which sets out EU wide data sharing protocols. However, at the outset of the CANN project, this classification was not widely used in the UK or Ireland. Therefore, mapping under the project has developed the use of this approach. Use of EUNIS/Annex 1 is also anticipated to allow efficient reporting on habitat extent, range, and condition for the 6 yearly Habitat and Species Directive reporting and will ensure that all habitat data captured fully meets the requirements of the European INSPIRE Directive.

In addition, the CANN partners have extensive connections and linkages nationally and internationally and it is anticipated that learnings from the CANN project (and the new approaches that it will adopt and the evidence base that it will develop) will feed into this other activity:

- In the UK, the Wildlife Trusts are involved in the IUCN Peatland Programme and white-clawed crayfish steering group;
- Monaghan County Council is represented on the Irish Ramsar Wetland Committee;
- Sligo IT is a partner of a number of EU consortia: the EU RBAPS (Results Based Agri-environment Pilots), and the Horizon 2020 HNV Link-network promoting knowledge sharing on innovation and sustainable management of High Nature Value farmland;
- Golden Eagle Trust have co-ordinated national hen harrier surveys since 2010 and in the delivering of expertise for the implementation of the Hen Harrier Threat Response Plan currently in preparation in Ireland (to be released during 2019 for public consultation).

Indeed, the project partners anticipate that the CANN project will inform the common agricultural policy and wider land-use policy post-2020. For example, the partners intend to work together to provide an evidence base for policymakers on management approaches for Natura 2000 sites, particularly unfarmed habitats which are currently ineligible for agri-environment schemes.

As part of the sustainability of the project, the project partners consider that it is essential that a potential mechanism for securing the delivery of the site in favourable conservation is developed. To that end, monitoring results will be integrated into "scorecards" which can be tested by a number of landowners and advisors. The project partners consider that this could form the basis of future results-based agri-environment schemes under regional RDPs 2020-2025. In such an eventuality, the development of a standardised scoring system for monitoring the condition of designated sites could have long-lasting benefits beyond the lifetime of this project.

4. CABB - COOPERATION ACROSS-BORDERS FOR BIODIVERSITY

4.1 Introduction

This section of the report considers the Conservation Across-Borders for Biodiversity (CABB) project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 1 – Recovery of Protected Habitats & Priority Species.

4.2 Project Overview

A need to improve the conservation status of priority habitats and protected species comes largely from the statutory agencies (e.g. NIEA, NPWS, SNH)[62] - their obligations under the Birds and Habitats Directives, and the need to deliver actions outlined in country Biodiversity Strategies. Need also comes from the CABB project partners – RSPB, BWI and BC, who seek to deliver on their charitable objectives on the conservation of priority habitats and species and NI Water, which as a government-owned company, has both a biodiversity duty to fulfil but also gains ecosystem service benefits and cost savings from the restoration of peatland at Garron SPA.

The underlying causes of the habitat degradation and species population crashes are complicated and prolonged but, the project partners consider that the main difficulty in addressing the issue is lack of funding within statutory agencies, either to carry out work themselves or to fund others to do so and limited NGO and partner funding. Severe cuts to the relevant statutory bodies across the eligible areas, both in terms of funding and staffing, have resulted in a reduced capacity to deliver for protected habitats and priority species. ENGOs have also been impacted by cuts to the statutory agencies and have limited resources.

Conservation Across-Borders for Biodiversity (CABB) is a partnership of RSPB NI (lead partner), Birdwatch Ireland, RSPB Scotland, NI Water, Butterfly Conservation and (providing advice on peatland restoration) Moors for the Future (MFTF). The overall objective of the CABB project is to bring about the recovery of protected habitats (active raised and blanket bog) and priority species (breeding waders and marsh fritillary at key sites) on a cross-border and cross-country basis. Indicative actions to be delivered include:

- Mapping of protected sites;
- Development and implementation of 8 Conservation Action Plans (CAPs);
- Conservation action for habitats and species;
- Development and sharing of best practice; and
- Education and outreach.

It was anticipated that at the outset, baselines would be established in mapping, habitat quality and species numbers thus informing and facilitating monitoring and evaluation.

On an overall basis, the CABB partnership proposes to contribute to the programme outputs by producing 8 conservation action plans and ensuring 2,228 ha of habitats are supported to attain a better conservation status.

Ultimately, it is anticipated that CABB will result in a suite of protected sites across the eligible area that are mapped, have conservation action plans in place and are in favourable condition as a result of conservation action. UK and Ireland priority species (breeding waders and marsh fritillary) will also have actions put in place to improve their conservation status on a cross-border basis. This is new work that has not been possible to carry out through any other means (other than via INTERREG VA).

[62] Of note, these same statutory agencies also provided support to a sub-section of the current partnership (RSPB NI, BWI and RSPB Scotland) in the previous INTERREG IVA-funded HELP project, which focussed on work for priority species. The CABB project builds and expands on this earlier project.

It is anticipated that the 'on-the-ground' physical work delivered, best practice explored and shared, learnings embedded in future work, skilled up staff, key findings shared with colleagues at an EU level, influencing of future policy and the relationships and partnerships formed with stakeholders at and beyond CABB sites will endure well beyond the project's lifetime thus leaving a sustainable legacy.

Whilst it is anticipated that the project will present opportunities for both the statutory agencies and the project partners in helping them deliver on their statutory and charitable objectives, it also has the potential to reach a much wider range of beneficiaries, including:

- Repairing the Gruinart Sea Wall will provide benefits to **farmers/landowners, local communities, and tourists** by ensuring that the integrity of the site for farming, public access (a road runs through it), and conservation is protected and that it remains in favourable conservation status.
- Restoring peatland at Muirkirk Uplands SSSI will benefit the **Scottish government and the statutory agencies**, which want to see this particular site, previously damaged by open-cast coal mining to be brought into a favourable condition
- Replacing the cot at Lough Erne will provide benefits to the **RSPB** which owns or manages over 40 islands in the Lough but will also benefit local farmers enabling them to continue to move stock between their mainland and island holdings. Also, the purchase of specialist machinery at Lough Erne, designed to enable rush cutting on inundated grassland, will ensure sites previously in unfavourable condition for breeding waders can be restored, enabling farmers to graze them effectively.
- In Ireland, there are now options in place for breeding waders in the new agri-environment scheme (GLAS), as a result of the advocacy following the previous HELP project, however, this does not include capital works or advisory, both of which are essential to the conservation of breeding waders. Provision of these through the project is supported by the statutory agencies and will be of benefit to **farmers** to help them meet the scheme requirements.
- Fencing of NPWS land at Dunragh/Pettigo SAC will also enable grazing lets to be offered to local farmers.

The CABB Project Board will oversee the implementation of the project, they will seek to ensure that all objectives, timescales and budgets etc. are managed and progress is on schedule. The CABB Project Board will meet every 2 months initially and once the project is established this will move to quarterly thereafter. The NIEA, National Parks and Wildlife Service and the Scottish Natural Heritage will be represented in the CABB project board and will be involved in an advisory capacity.

The RSPB NI director will also report to the Director of Operations within the RSPB and will act as a link between the Project Board and RSPB Chief Executive.

A dedicated Programme Manager (RSPB NI) will manage the day to day delivery of the project. The Programme Manager and the Administration and Finance Officer will provide the secretariat function to the Board and will manage all aspects of the project including finances, reporting on progress/communications, claims processing and general liaison with SEUPB.

A CABB Working Group will oversee the delivery of the project in each of the three jurisdictions. This group will meet every two months initially and quarterly thereafter. It will be chaired by the Programme Manager and will include delivery leads from Project Delivery Groups and project partners. The CABB working group will ensure clear lines of communication and accountability between staff 'on the ground' and the CABB Project Board. Project Delivery Groups will meet every 6 weeks, will include key staff from Area Delivery Groups and relevant representatives from the statutory agencies and will be responsible for overseeing delivery in each jurisdiction. The Area Delivery Groups will meet every six weeks and will ensure on-the-ground management is being delivered effectively.

Nine work plans have been developed.

Table 4.1: Summary of CABB Project Work Plans (Per Progress Reports)
1. Project Management
2. Montiaghs Moss, Northern Ireland (implementation)
3. Fermanagh, NI & Ireland (implementation)
4. Garron Plateau CAP & Actions (ex. Drain Blocking) (implementation)
5. Scotland (implementation)
6. Ireland (implementation)
7. Marsh Fritillary work access key sites (implementation)
8. Garron Plateau Restoration: Drain Blocking (NI Water) (implementation)
9. Communication

During the consultation, the CABB project partnership confirmed that a mid-term evaluation will be completed by mid-December 2019, with a final evaluation undertaken towards the end of the project period.

4.3 Project Budget

The total proposed CABB project costs are €4,935,983.90, of which €4,195,586.29 (85%) is anticipated to be funded from the INTERREG VA Programme[63].

Table 4.2: Anticipated Project Costs		
Proposed Project	**Per Letter of Offer (dated 7 July 2017)[64]**	**Evaluation Team's interpretation of Letter of Offer**
Staff Costs[65]	1,635,186.00	1,635,186.00
Office and Administration Costs	245,277.90	245,277.90
External Expertise and Services	703,426.00	703,426.00
Travel and Accommodation	191,515.00	191,515.00
Equipment	387,064.00	387,064.00
Infrastructure and Works	1,773,515.00	1,773,515.00
Total	**4,926,402.90**	**4,935,983.90**

Table 4.3: Anticipated Project Funding		
Funding Sources	**Value (€)**	**Source**
Cash Contribution (Partner Supplied/other grant)	159,689.59	RSPB Scotland & Mines Restoration Ltd
In kind Contribution (Partner Supplied)	5,563.00	RSPB Scotland
Sub-Total	**165,252.59**	
Central Government Match Funding	575,145.02	
ERDF	4,195,586.29	
Total Grant Funding	**4,770,731.31**	
Total	**4,935,983.90**	
Intervention Rate (% ERDF)	**85%**	

There will be no revenue generated through the CABB project.

[63] Per Letter of Offer (dated 7th July 2017)
[64] NB The Evaluation Team's tally of the costs featured in the LoO provides a total of €4,935,983.90 and not €4,926,402.90 as presented in the LoO.
[65] It is anticipated that 15 new posts will be created in total by CABB, but several of these are relatively short-term contracts. CABB will create approximately 8.6 full time equivalent jobs.

4.4 Anticipated Project Objectives, Outputs & Results

4.4.1 Objectives

The overall objective of the CABB project is to work on a cross-border basis to bring about the recovery of protected habitats (lowland raised bog and blanket bog) and priority species (breeding waders and marsh fritillary at key sites) across the eligible area. It is anticipated that this will be achieved (and contribute to the programme outputs) by producing 8 conservation action plans and ensuring 2,228 ha of habitats are supported to attain a better conservation status[66].

The overall programme-specific result will be an increase in the percentage of active raised bog and blanket bog in or approaching favourable condition and an increase in the conservation status of breeding waders and marsh fritillary at key sites.

The main elements of the project are described below, alongside the objective and the SMART targets that the project partners anticipate will deliver this objective including each partner's role in delivering these. Also, where relevant the contribution of the targets to the programme-specific result indicator is highlighted.

[66] It is noted that the CABB's partnership's hectarage target delivered is greater than that required for the percentage of funding that it received. This relates to the fact that the project partners deliver habitat management to attain better conservation status on an ecological unit basis, so it would be near impossible to come in exactly on target.

Action	Objective	SMART targets[67]	Contribution to programme-specific result indicator	Contribution to output indicators
Development of mapping of protected habitats and sites of cross-border relevance	1. Mapping in place for 8 protected sites of cross-border relevance	**Mapping for 7 CAP preparation sites by 31st December 2018.** • RSPB NI – Montiaghs SAC, Garron SAC • RSPB NI/BWI - Pettigo SAC and Drumragh/Pettigo SAC; • BWI - Meentygranagh SAC, Croaghonagh Bog SAC and Lough Nillan Bog SPA; Note: Muirkirk Uplands SSSI in Scotland was already mapped so just needed to be converted for EUNIS reporting.		
Development and implementation of conservation action plans for protected sites of cross-border relevance	2. 8 CAPs prepared for protected sites of cross-border relevance by 31st December 2020	**8 CAPs developed for the following sites:** 1. RSPB NI Montiaghs SAC 31st December 2017 2. Garron SAC by 31st December 2017 3. RSPB Scotland Muirkirk Uplands SSSI by (1) 30th June 2018 4. BWI Meentygranagh SAC by 31st March 2020 5. Croaghonagh Bog SAC by 31st March 2020 6. Lough Nillan by 31st March 2020 7. RSPB NI/BWI Pettigo SPA by 31st December 2020 8. Dunragh/Pettigo SAC by 31st December 2020	8 CAPS in place, outlining the conservation action that needs to take place to ensure favourable conservation status can be achieved.	8 CAPs (against a target of 25) written by 31st December 2020
		2,228 ha of habitat supported in order to attain better conservation status by 31st December 2021 on the following sites a) RSPB NI – Montiagh's SAC b) NI Water – Garron SAC c) BWI - Dunragh/Pettigo SAC; d) Ox Mountains SAC; e) RSPB Scotland Muirkirk Uplands SSSI.	Actions in place on 2,228ha of active raised and blanket bog, increasing the percentage of these habitats in or approaching favourable condition.	2,228 ha (target of 4,500ha) of habitat supported in order to attain a better conservation status by 31st December 2021.

[67] NB: The Lead Partner confirmed that the project's objectives/targets, as presented in this subsection, are up to date (as of May 2019). However, during consultation, the Lead Partner advised that, in some instances, the estimated completion dates are no longer realistic or have elapsed. The project's objectives/targets have not been restated to account for new estimated completion dates.

Action	Objective	SMART targets[67]	Contribution to programme-specific result indicator	Contribution to output indicators
Conservation management and protection activities to encourage sustainable natural regeneration of species populations Tangible conservation actions for protected habitats and species	3. Relevant conservation actions in place for priority species (breeding waders, marsh fritillary) at key sites across the eligible area resulting in an improvement in their conservation status	**RSPB NI** • Specialist machinery purchased and used to control rush on 252 ha of key wader sites on Upper and Lower Lough Erne, to improve habitat for breeding waders, by 30th September 2017 (Note this is for sites where conventional machinery cannot be used due to ground conditions); • Cot purchased, enabling movement of stock and machinery to and from 20 key breeding wader islands on Lower Lough Erne, to improve habitat, by 31st December 2017.		
		BirdWatch Ireland • Survey and monitoring of key coastal and machair sites for breeding waders at the start and end of the project (2017 and 2021) • Predator fencing for breeding waders (to improve breeding success) installed at key sites (Inch, Dunfanaghy New Lake) by 31st December 2020. • Advice to farmers at key coastal and machair breeding wader sites resulting in management agreements and capital works.		
		Butterfly Conservation • Monitoring of marsh fritillary at Montiaghs SAC, Pettigo SPA and Drumragh/Pettigo SAC (cross-border) and conservation actions plans developed by 31st December 2019.		
		RSPB Scotland • Restoration of 3km of sea wall at Gruinart Flats SPA to protect 330ha for breeding waders (and blanket bog) by Dec 2018; • Trial habitat management for curlew at Muirkirk Uplands SSSI by 31st December 2018.		
Development and sharing of best practice and enhancement of skills in ecosystem management	4. Development and sharing of best practice resulting in effective conservation action for priority habitats and species across the eligible area	**Moors for the Future** • Provision of best practice advice on ditch blocking to contractors managed by NIW (Garron SAC) and RSPB NI (Montiaghs SAC) by 31st December 2017.		
		RSPB Scotland • Demonstration of trial habitat management for curlew to landowners at two sites in the Muirkirk Uplands SSSI by 31st December 2020. • Demonstration of peatland restoration techniques to landowners at Shiel Farm/Airds Moss in the Muirkirk SSSI by 31st December 2019.		
		RSPB NI • Demonstration of habitat management for breeding waders at two designated sites in Lower and Upper Lough Erne; • Demonstration of habitat restoration for active raised bog and Marsh fritillary at Montiaghs SAC.		

Action	Objective	SMART targets[67]	Contribution to programme-specific result indicator	Contribution to output indicators
Development and use of databases to assist conservation actions	5. All partners gathering conservation data have developed databases resulting in effective data gathering to inform conservation action.	**RSPB NI, RSPB Scotland, BWI, BC** • Databases in place to gather data and actions on priority species and habitats by 31st December 2020.		
Education and outreach activities	6. Education and outreach activities in place resulting in greater awareness of protected habitats and species, their needs, and actions required for their recovery by 31st December 2021.	**All Partners** • Project Officers to engage with landowners in the development of CAPs by 31st December 2020.		
		RSPB NI/Scotland • Assistant wardens to engage with landowners in delivery of CAPs by 30th June 2018.		
		RSPB NI/BWI • An interpretation sign, information leaflets and interpretation materials for sites across Ireland and NI; • Ten education events across 5 CAPS sites in Ireland and NI.		
		RSPB Scotland • Five volunteer days at Shiel Farm/Airds Moss to encourage local participation in conservation actions by 31st December 2019; • Five local events to raise awareness of wildlife at Shiel Farm/Airds Moss by 31st December 2019.		

The following table summarises the deliverables for each site targeted through the CABB project[68]:

Table 4.4: Key CABB Deliverables by Site					
Site	**Country**	**Indicator - 2.111 CAP**	**Indicator - CO23 Hectares**	**Delivery against Indicative Action[69]**	**Total CABB will deliver on (ha)**
Muirkirk	Scotland	1	435		435
Montiaghs	NI	1		151	151
Garron	NI	1	444		444
Pettigo (NI)	NI	1	0		0
Pettigo (I)	Ireland	1	900		900
Meentygranagh	Ireland	1	0		0
Croaghonagh Bog	Ireland	1	0		0
Lough Nilan Bog – Carrickatlieve Glebe	Ireland	1	0		0
Ox Mountains	Ireland		449		449
Breeding wader sites Donegal	Ireland			120	120
Gruinart Flat	Scotland			330	330
Lough Erne Islands	NI			307	307
Lough Erne priority habitat - not islands	NI			252	252
TOTAL		**8**	**2,228**	**1,160**	**3,388**

4.4.2 Outputs & Results

Per the Letter of Offer (dated 7th July 2017), the anticipated (approved) CABB Project Outputs are as follows:

Programme Output Code	**Name of Output**	**Programme Output Indicator Target[70]**	**CABB Project Target**
CO23:	Nature and biodiversity Surface area of habitats supported in order to attain a better conservation status (hectares)	4,500 ha	2,228ha
2.111	Conservation Action Plans	25	8

It is noted that it is a requirement that achievement in the change in habitat status should be recorded upon completion of activities in the supported areas and an improvement demonstrated.

Specific conditions of the Letter of Offer (dated 7th July 2017) that relate to impacts include:

- Whole site management plans, are to be developed using the DAERA templates to ensure a standardised approach (and supplied to SEUPB);
- The measurement of the baseline indicators for each site is required and the baselines and restoration of sites are to be independently verified and provided to SEUPB;
- The project must ensure that structures are in place for knowledge and best practice sharing with the CANN projects, as defined in the Partnership Agreement.

[68] Source: Stage 2 Assessment Report
[69] In addition to the proposed 2,228ha delivered against output CO23, the project intends to deliver works for breeding wagers on 1,160ha, as it is not a listed habitat this will not contribute to output CO23 but will add benefit to the project and target the relevant species
[70] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

4.5 Contribution to the Priority's Specific Objectives & Result Indicators

This section considers the extent to which the CABB project has:

- Contributed to the achievement of the Priority's Specific Objectives;
- Contributed to the achievement of the targets for the Result Indicators;
- Contributed to:

  - EU 2020 objectives;
  - The Atlantic Strategy; and
  - The horizontal principles of equality and sustainable development.

and where appropriate, the section:

- Identifies any external factors that have impacted, positively or negatively, on the project's ability to contribute to the achievement of the Specific Objective.

4.5.1 Key Achievements (to May 2019)

Since its commencement, the CABB project has implemented several surveys and mapping exercises in order to gain a more thorough understanding of the habitats and species located within the project and programme area. This work is assisting the project in its development of the Conservation Action Plans (CAPs) which will ultimately result in the achievement of the outputs. However, it is noted that the mapping exercises have taken longer than first envisaged (after the project partners encountered some issues with sub-contractors), with it now estimated that the mapping will be completed by August 2019. This will likely impact on the project delivery timeframes for some of the CAPs. Nonetheless, at May 2019, the CAP for Garron Plateau is being produced in a first draft format and RSPB Scotland has produced some draft sections of the CAPs for Shiel Farm and Airds Moss.

Positively, work is ongoing at all of the sites, with it anticipated that this work will provide improvements of the habitats within this project area. Activities including drain blocking and predator fencing are underway. General fencing and scrub removal at the Montiaghs Moss site has been completed and this has enabled successful grazing of cattle at the site.

The capital works at Dungonnell catchment have been completed. The project has reported that 493ha of blanket bog will be positively impacted by drain blocking and should move the land into 'favourable' condition.

There has been a delay in the purchase of the Cot boat due to an underestimation of the budget required. The partnership is working to identify underspends so that this issue can be resolved. It is planned that the partners will transfer existing budget funds to RSPB NI so that the purchase of the Cot boat can be expedited.

The CABB project partners also cite the following key project achievements (as of June 2018[71]) as being:

[71] The CABB project is considerably behind in terms of period verification. This is mainly due to the project partners being delayed following a project Modification Request. In addition, one project partner experienced high error rates in relation to spend. The Lead partner has since worked closely with the partner and SEUPB's Verification unit to agree appropriate methods of progressing and addressing concerns.

Period	Dates	Key Achievements
1	1st January 2017 – 31st March 2017	• Planning for the employment of CABB management and delivery staff; • Employment of staff for Birdwatch Ireland staff to do surveys and of consultants to do work on predator-proof fencing reviews and mending.
2	1st April 2017 – 30th June 2017	• CABB Board established, with an initial meeting planned for early in Period 3. • Recruitment of CABB management staff undertaken. Programme Manager in place from 29th May 2017 and recruitment of Admin & Finance Officer was underway. • Governance structures planned and Working, Delivery and Steering Group meetings planned/held in three countries. • Project Partners recruiting and starting to employ staff associated with management, CAP preparation and capital works delivery. • Mechanisms established for monitoring project delivery across Project Partners. • Liaison with Statutory agencies regarding CAP delivery, mapping and planning for capital works.
3	1st July 2017 – 30th September 2017	• Inaugural CABB Board meeting held on 5th July 2017 and the second meeting held on 20th September 2017. • Project governance honed and Board, Steering, Delivery and Working group meetings held. • Redrafting Partnership Agreement on request of SEUPB. • Meetings with partners from other INTERREG projects - CANN and Source to Tap to share best practice and learn about eMS; • Drafting of Specification for mapping and liaison with NIEA and NPWS; • Cross-border Working Group established for POs and key staff to share best practice, etc.
4	1st October 2017 – 31st December 2017	**RSPB as Lead Partner** • Held CABB Official Launch 11th Dec 2017 • All CABB staff on board apart from RSPB NI Erne Assistant Warden; • Discussions regarding the delivery of education aspects - agreed that delivery would be pushed back; • Attended CABB Cross-border Working Group meetings and partner meetings; • Initiated procurement for Mapping consultants. **RSPB NI** • Recruitment was underway for the Erne Assistant Warden • Project Officers familiarised themselves, gathering data and meeting landowners (suggested to be very time consuming). **RSPB Scotland** • Work progressing on CAP preparation - meetings established especially with SNH; • Shiel Farm initial discussions, early stages of fencing; • Shiel Farm and Airds Moss rush cutting procured, 5 vol days; • Met Muirkirk CC, BTO Scot, Ayrshire Rivers Trust; • Advisory visits held. **BWI** • Bog Restoration Officer and CAP Officers were recruited, started, met key personnel in NPWS. BWAO continued to visit landowners and advise on management, dealt with ongoing problems relating to predator fences. Contract to undertake scrub clearance at Curlew site in Lough Melvin progressed.

Period	Dates	Key Achievements
		• Specification for tenders for the fencing of Pettigo and hydrological and ecological monitoring of Fiddandarry progressed. **NIW** • Business case approved internally. Procurement progressed with a view to drain blocking in Period 5. **BC** • Follow up on surveying and monitoring and training on QGIS, volunteers collected seed of devil's-bit scabious (DBS), locating landowners was noted as being very time-consuming. **MFTF** • Staff visited NI, prepared a report for Garron and initiated report for Montiaghs.
5	1st January 2018 – 31st March 2018	• Majority of deliverables on time and budget. However, shed and cot delivery behind; • Mapping project initiated and consultants briefed. • A Cross-border working group meeting was held (6/3/18) • NI Water drain-blocking contractors had to leave the site due to poor weather conditions.
6	1st April 2018 – 30th June 2018	• The project was generally running well. However, some large capital works were running behind schedule. • Reporting and claiming through eMS was significantly behind schedule due to the time taken for the Modification Request (which the Evaluation Team understands related to the transfer of funding from one cost category to another in MFTF's project budget) to be processed and the high error rate of one partner resulting in a necessity for a larger sample size. • Initial meeting held with mapping contractors and follow up progress meetings; • Meeting with CANN reps and statutory agencies on 9/5/18; • Meeting with NPWS regarding baseline bird numbers at Inch on 6/618; • Liaison and info share with Source to Tap project.

4.5.2 Project Output Indicators

Discussion with the CABB project partnership indicates that whilst the anticipated (approved) project outputs have, as of May 2019, not yet been achieved (albeit, it was not expected of the project at this stage in its implementation, as they have a 2023 delivery date), the project is being implemented as planned and making positive progress towards achieving its anticipated outputs.

Programme Output Code	Name of Output	Programme Output Indicator Target[72]	CABB Project Target	Progress (as of May 2019)
CO23:	Nature and biodiversity Surface area of habitats supported in order to attain a better conservation status (hectares)	4,500 ha	2,228ha	-
2.111	Conservation Action Plans	25	8	-

The Project Partners' description (as of June 2018) of the level of achievement against its 'project-specific objectives' is described below:

Project Specific Objectives	Level of Achievement	Explanations
1. Mapping in place for 8 protected sites of cross-border relevance	to a minor degree	Contractors have been appointed, with mapping underway.
2. Development and implementation of conservation action plans for protected sites of cross-border relevance. 8 CAPs prepared for protected sites of cross-border relevance by 31st December 2020.	to a minor degree	All CAP Officers in place and working towards delivery deadlines. Working out who owns what land has been a major draw on POs time. In certain cases, this information is being purchased from land registry in NI and RoI.
3. Relevant conservation actions in place for priority species (breeding waders, marsh fritillary) at key sites across the eligible area resulting in an improvement in their conservation status.	to a minor degree	Work is well underway to achieve these objectives by the end of the project. Procurement is underway and planned physical works will start after the breeding season is over.

In addition, as of June 2018, the project partners had engaged with 45 'interest groups including NGOs', thereby exceeding its 'target group reached' target of 7 by 543%.

Table 4.5: Performance against Target Groups Reached (as of June 2018)

Target Group	Target	Achieved	% Achieved	Description of Target Group	Source of Verification
Interest groups including NGOs	7	45	643%	Meetings held with NIEA, SNH, landowners	-
General Public		6		Volunteers, community groups, schools	

4.5.3 The Priority's Result Indicator Targets & Specific Objectives

Given the early stage of the project's implementation and the fact that the project has yet to achieve its anticipated (approved) project outputs, the CABB project is, therefore, at May 2019, making only marginal progress towards the Priority's Result Indicator Targets and Specific Objectives. However, this should be expected at this stage of the project's implementation (as they have a 2023 delivery date), and should not be considered a concern.

[72] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

4.5.4 EU2020 Objectives

Whilst the CABB project is not overtly focused on economic growth, it does seek to encourage stakeholders to engage in 'smart' and 'sustainable' growth through, for example, sharing knowledge with landowners on habitat management and peatland restoration techniques.

The adoption of such techniques will serve to contribute to areas of the EU prospering in a low-carbon, resource-constrained world while **preventing environmental degradation, biodiversity loss and unsustainable use of resources**.

In turn, this should contribute to the EU2020 targets for climate change and energy (i.e. that the "20/20/20" climate/energy targets should be met, including an increase to 30% of emissions reduction if the conditions are right).

4.5.5 The Atlantic Strategy

The CABB project does not contribute to the aims and objectives of the 'Atlantic Strategy'.

4.5.6 The Horizontal Principals

The CABB project aims to protect and improve the quality of the environment - a key component of sustainable development and as such it is anticipated that it will serve to contribute (at least in part) to the EU's three Horizontal Principals, per the following discussion:

Sustainable development	All funded projects must align and comply with the Sustainable Development Strategy, adopted by the European Council in June 2006; as well as the respective national Sustainable Development Strategy within each jurisdiction. Sustainable Development can address three distinct impact areas: Social[73], Economic[74] and Environmental[75]. The CABB project is focused on improving habitat conditions, on both designated land that will deliver against the stated Priority 2a habitat output target and on other designated land important for key species, including some of those listed in the Priority 2a species output targets. It will, therefore, protect and improve the quality of the environment - a key component of sustainable development. Management of these activities is being delivered by contractors who are following clear briefs regarding best practice conservation management. These briefs have been shaped by research, shared knowledge and the project partners' years of experience delivering similar projects. The CABB project also involves close communication with local communities - in particular with landowners/farmers, in terms of offering advice and guidance on good practices such as habitat management and peatland restoration, and on the benefits of conservation management and the prospects to link into future funding from agri-environment schemes. More specifically, the principles of sustainable development have been implemented in the project in the following ways: • The Project Officers have been tasked with promoting management that will demonstrably improve habitat condition on key designated sites across the three countries. It is anticipated that this will largely be achieved by

[73] Crime, Community Safety and Victims, Equality, Health, human Rights, Rural and Social Inclusion are recommended subcategories in NI guidance documentation.
[74] Economic Appraisal, Economic Assessment, Regulatory and State Aid are recommended subcategories in NI guidance documentation.
[75] Environmental and Strategic Environmental are recommended subcategories in NI guidance documentation

	involving the local communities (landowners/farmers), communicating the environmental/biodiversity benefits of this management and providing advice on how these practices can lead to future financial sustainability for conservation measures through agri-environment payments • The purpose of the project is to improve the condition and fortunes of key habitats and species. Its design is underpinned by scientific research, collective knowledge and previous information exchange between partner organisations and respective environment agencies. The project has incorporated baseline surveys and ongoing ecological monitoring will provide condition/population data that will inform progress. • The majority of the habitat improvement work will focus on blanket bog. Previous/similar blanket bog restoration projects are known to have: - Significantly decreased carbon being released into the atmosphere by reducing oxidation of dried/degraded peat; - Slowed water flows and reduced diffuse pollution in watercourses due to fast water runoff; and - Had a positive effect on biodiversity as wildlife, including breeding waders, return to the restored habitat. These actions contribute positively to the engrained principle of sustainability – that today's population maintains or enhances the condition of the environment for the benefit of future generations. • Environmental Awareness has been considered during the procurement of contractors and completion of capital works is being undertaken to best practice, under the guidance of Land Agency and Safety Staff. CABB, therefore, engages in activity that promotes sustainable development and creates sustainable communities by safeguarding and requiring the sustainable use of, existing resources to enhance the long-term management of, and investment in, human, social and environmental resources for future generations.
Equal opportunities and non-discrimination	The CABB project will not be targeting beneficiaries as such but habitats and species. There is, therefore, limited opportunities for the project to apply the Equality Impact Assessment Screening. However, procurement and recruitment under the CABB project have been undertaken in a manner to comply with relevant policies to ensure equality of opportunity and non-discrimination. More specifically: • Staff recruitment has been undertaken in accordance with RSPB's and BirdWatch Ireland's equal opportunities policies to ensure that no applicant/employee receives less favourable treatment on grounds of gender, marital status, age, race, colour, nationality, ethnic/national origin, religion/belief, political opinion, disability, sexual orientation, past criminal convictions or type of contract, unless shown to be justified. • Applicants have been asked to complete an equal opportunities monitoring form, to be used solely to monitor the Equal Opportunities Policy's effectiveness. Applicants for posts based in Northern Ireland have also been asked, in confidence, to declare their religious background to comply with the Fair Employment (NI) Act 1989 and Fair Employment and Treatment (NI) Order 1998. • Recruitment advertisements have been placed through multiple channels to ensure they are visible to a wide and diverse external audience. Adverts stated that the RSPB/BWI are equal opportunities employers. • Contractor appointment has been in accordance with the RSPB/BWI's procurement policies. Invitations to tender have also been advertised widely and through public tender channels where appropriate. Tenders and quotes have been judged on anticipated service delivery and price. • Project officers have been building relationships with landowners/farmers across the project sites as part of the project's objective to promote land management, which will benefit targeted habitats/species. Advice on how to

	access future agri-environment funding has been provided to all, with no prejudice on any facet of equality. • Training events for land managers/farmers have been promoted widely to encourage participation from wide and diverse audiences across the three countries. They have been fully inclusive and have encouraged all participants to interact and build relationships based on land management experiences and learning.
Equality between men and women	Per the discussion above, the CABB project has pursued the objective of equality between men and women and taken appropriate steps to prevent any discrimination during the preparation and implementation of the project.

4.5.7 Contribution to Other Strategies

CABB aims to contribute to delivering the EC Birds and Habitats Directives and Biodiversity Strategies in each of the three countries and will also link with strategies for climate change mitigation and adaptation and sustainable development in the three countries, as well as Programme for Government targets. This is discussed further below:

Strategy	How CABB links or contributes to
The EC Birds and Habitats Directives	Under the EC Birds and Habitats Directives, each member state is required to designate protected sites for priority birds (SPAs) and habitats (SACs), collectively known as Natura 2000 (N2K) sites. Each country's (UK, NI, Scotland, and Ireland) EU Prioritised Action Framework (PAF) for Natura 2000[76] identifies key priorities for managing N2K sites, the management of which helps to deliver the objectives of the EU Biodiversity Strategy 2020 and thus each country's Biodiversity Strategy[77]. Each member state is required to not just designate sites but to adopt conservation measures, involving if needed, management plans to ensure favourable conservation status for priority birds, other priority species and priority habitats. CABB is contributing to delivering targets in the three eligible countries of the EC Birds and Habitats Directives, the Prioritised Action Framework and Biodiversity Strategies by: • Mapping and developing conservation actions plans for 8 protected sites (SPAs and SACs) of cross-border relevance for blanket and lowland raised bog[78]; • Carrying out works (fencing, scrub clearance, ditch blocking etc.) on a number of blanket and lowland raised bog protected sites[79], resulting in 2,228 ha more of habitat in favourable condition. • Mapping and management for marsh fritillary[80]; • Carrying out actions to improve the conservation status of breeding waders (UK and Ireland priority species) at key wet grassland and machair sites within and outside the network of the protected sites[81].
UK/Ireland Climate Change Acts	By delivering restoration of peatland habitat over 2,228 ha, CABB links to mitigation measures under the UK and country (Scotland, Ireland) climate change acts[82]. Also, by restoring areas for priority habitats (blanket bog, lowland raised bog, lowland wet grassland) and species (marsh fritillary, breeding waders) the project will enable

[76] EU Prioritised Action Framework for Natura 2000
[77] Valuing Nature – NI's Biodiversity Strategy to 2020, 2020 challenge for Scotland's Biodiversity, Actions for Biodiversity 2011 to 2016 (RoI).
[78] They are NI Montiagh's Moss SAC, Garron Plateau SAC, NI/Ire – Pettigo Plateau SPA, Dunragh Loughs/Pettigo SAC, Ireland – Croaghonagh Bog SAC, Meentygrannagh SAC, Lough Nillan Bog SAC, Scotland – Muirkirk and North Lowther Uplands SPA.
[79] NI Montiagh's Moss SAC, Garron Plateau SAC, Ireland – Dunragh/Pettigo SAC, Scotland – Muirkirk Uplands SSSI) plus the Ox Mountains SPA/SAC.
[80] Mapping & managing in NI/Ireland Pettigo Plateau SPA, Dunragh Loughs/Pettigo SAC and mapping at NI Montiagh's Moss SAC.
[81] At Upper and Lower Lough Erne, including sites in the Upper Lough Erne SPA/SAC in NI; Machair and coastal sites, including the Dunfanaghy New Lake SPA in Ireland; and Muirkirk Uplands SSSI and at Gruinart Flats SPA in Scotland
[82] UK Climate Change Act, Climate Change Scotland Act, Climate Action and Low Carbon Development Act

Strategy	How CABB links or contributes to
	these to adapt to climate change, thus linking to climate change adaptation strategies for NI, Ireland and Scotland[83].
IUCN UK Peatland Programme	This Programme was set up in 2009 to promote peatland restoration in the UK. It advocates the multiple benefits of peatlands through partnerships, strong science, sound policy and effective practice. CABB links to this programme, by restoring peatlands in partnership (RSPB /NI Water, National Parks and Wildlife Service, Scottish Natural Heritage) using best practice to deliver biodiversity benefits and ecosystem services (water and carbon storage etc.).
Programme for Government and Sustainable Development Strategies	By carrying out its intended actions, CABB links to the Programme for Government[84] and Sustainable Development Strategies[85] in NI, Ireland and Scotland around measures to halt biodiversity loss, promote sustainable land management, reduce greenhouse gas emissions and adapt to the impact of climate change.

4.6 Effectiveness of the Cross-Border Collaboration & Partnership Working

This section considers aspects of the CABB project's collaborative and partnership working including:

- The effectiveness and added value of the CABB project's cross-border collaboration in relation to the specific objectives;
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

As discussed, it is anticipated that CABB will result in a suite of protected sites across the eligible area that are mapped, have conservation action plans in place and are in favourable condition as a result of conservation action. UK and Ireland priority species (breeding waders and marsh fritillary) will also have actions put in place to improve their conservation status on a cross-border basis. The CABB project partners note that this is new work that has not been possible to carry out through any other means (other than via INTERREG VA).

The project partners anticipate that the 'on-the-ground' physical work delivered, best practice explored and shared, learnings embedded in future work, skilled up staff, key findings shared with colleagues at an EU level, influencing of future policy and the relationships and partnerships formed with stakeholders at and beyond CABB sites will endure well beyond the project's lifetime thus leaving a sustainable legacy.

The CABB project partners further note that partnership has been developed to address similar needs across countries and organisations and builds on the pre-existing INTERREG IVA HELP partnership of RSPB NI, BWI and RSPB Scotland. The partnership reports that the cross-border and cross-organisational collaborative working that it has developed has been particularly effective and brought added value to the work of the individual partners through the following activities:

Joint development	The CABB project has allowed effort to be focused on fewer species and habitats to enable a greater chance of success with buy-in from key partners.
Joint Implementation	The project partners suggest that the project's delivery on a cross-border basis has resulted in better value for money, as there has been less duplication of resources through joint staffing (4 cross-border posts), less duplication of processes (e.g. standardised mapping across all CAP sites) and sharing of best practice has helped to ensure the most effective conservation methods have been used.

[83] NI Climate Change Adaptation Programme 2014, Scotland's Climate Change Adaptation Framework, National Climate Change Adaptation Framework
[84] Northern Ireland Executive (2011) Programme for Government 2011-15, Programme for Government 2015-16 (Scotland), Government for National Recovery 2011-2016 (RoI)
[85] Northern Ireland Executive (2010) Sustainable Development Strategy, Our Sustainable Future – 2012 (Ireland)

	The project partners further consider that should CABB ultimately be successful that its joint implementation will increase the chances of developing future projects as a result of having built good working relations and a track record of sound delivery.
Joint Financing	RSPB NI has provided a one-stop-shop for strategic financial management, the submission of claims etc., which the project partners consider has resulted in greater consistency, coherence and cost-effectiveness.
Joint Staffing and contracts	Four cross-border posts (Pettigo Project officer, Invertebrate Field Officer, Programme Manager and Admin & Finance Officer) have been created and mapping has similarly been conducted on a cross-border basis, which the project partners consider has resulted in greater cost-effectiveness and relationship-building with the potential for legacy to continue outside the project and greater conservation benefit as each staff member has an understanding of the systems and ecology of the project as a whole.

In addition to the above, discussion with the CABB project partnership suggests that the project partners have engaged in 'information share days' with, for example, NPWS, NIEA, DAERA and the various project partners involved in the project. The purpose of this engagement is to discuss common issues and share pertinent information. It is understood that the project partnership hosted one of these days in October 2018 at Montiagh's Moss SAC.

4.7 Barriers to Cross-Border Cooperation

This section considers whether the CABB project has encountered any barriers to cross-border cooperation that the priority axis is not addressing.

To date (May 2019), the project partners have not encountered any significant barriers to cross-border cooperation; including engagement with local community and stakeholders.

The CABB project partners note that from the outset, they have been mindful that there are many potential constraints[86] and risks that could have a significant impact on the delivery of CABB, and given this have developed a strategic risk register with potential mitigation measures, which they monitor regularly to ensure that potential risks do not undermine the project's progress.

4.8 Best Practice & Learning

This section considers whether the CABB project has resulted in any areas of best practice and learning.

As of May 2019, one of the main opportunities to establish and share best practice from the CABB project has been the coordination and facilitation (by the project partnership) of site visits to various locations being considered as part of the project e.g. the Irish Peatlands Conservation Group visited the Garron SAC, which served to identified what works well and could possibly be replicated elsewhere.

4.9 Mainstreaming Activities

This section considers whether the implementation of the CABB project has led to any mainstreaming of cross-border delivery of environmental work.

Whilst it is too early in the project's implementation for it to have achieved any mainstreaming of cross-border delivery of environmental work, the CABB project partners anticipate that beyond the legacy effect generated by the physical actions taken that will persist well beyond the life of the project, that the project's legacy will be embedded in the ongoing best practice of conservation management across the project sites and similar sites across the participating areas. Such suggested legacies include:

[86] At the outset potential constraints were identified as falling under headings such as technical, financial, organisational, economic, social, management, legal, timing or environmental.

- On the ground physical work e.g. where ditch blocking is undertaken on areas of bog, the piling most likely to be used has a life expectancy of 150 years; simple earth dams on bogs should persist for a minimum of 10 years; the removal of forest from bog will, with ongoing maintenance, have a permanent effect; the proposed sea wall is anticipated to be effective for 25+ years, whilst predator and grazing control fencing is anticipated to last for 15-20 years;
- Once initial habitat improvements have been established, the project partners anticipate a period of steady recovery in the condition of the sites and the stabilisation and the possible growth of species populations. The proposed activities will be the essential foundation upon which to build the recovery of the designated sites. Indeed, it is anticipated that the process of recovery in site condition will continue over the years beyond the end of CABB
- Best Practice advocacy and advisory work will be linked to the activities carried out;
- Learning embedded into future work, such as using lessons learnt to inform recommendations to support land managers under future agri-environment schemes;
- Up-skilled staff – staff will have gained new skills through the project;
- Key findings shared with colleagues and other organisations;
- Influencing future policy; and
- Positive partnerships formed with stakeholders.

The CABB project partners have provided the following information regarding the anticipated implementation and action of the CAPs, once they have been written and completed as per each jurisdiction:

Northern Ireland	• Montiaghs CAP: will be adopted by the RSPB; • Garron Plateau CAP: the project will advocate for the adoption of it to the Causeway Coast and Glens Heritage Trust; • Pettigo Plateau (NI): while developing the CAP, RSPB is also leading on a Lough Erne Landscape Partnership funded by Heritage Lottery Fund. RSPB will advocate for a management structure for both projects to manage the landscape sustainably.
Ireland	Each CAP will have a clearly defined implementation plan following the planning process. Implementation of the CAPs will largely be the responsibility of Government, principally National Parks and Wildlife and Wildlife Service and DAFM. A range of stakeholders is likely to be involved in the delivery of actions identified in each plan, including Donegal County Council, Coillte, private landowners and turbary rights owners. The actions identified may require further funding sources, e.g. LIFE Nature applications may be identified as part of the plan, which could be taken forward in partnership between NPWS and the appropriate stakeholder group. Other actions may require coordinated payments to collectives of individual farmers by DAFM to achieve conservation aims at the landscape level. Such actions could be recommended for inclusion in Ireland's next Rural Development Plan.
Scotland	Muirkirk Uplands SSSI – the CAP will be used to identify priority areas for peatland restoration. The Project Officer will also use the CAP (which will identify other management that will benefit the designated features) to provide conservation advice to landowners and managers. By producing the plan with input from SNH, it is intended that the CAP will be a document SNH can use in relation to other agri-environment applications, so that this funding can assist with its implementation.

Furthermore:

- The advocacy and advisory work, linked to the activities carried out, will fulfil a demonstration of best practice role, leading to the more efficient delivery of conservation management in general. Results achieved and lessons learned will be used to inform recommendations to support land managers' options under any current or successor agri-environment schemes and to advise land managers and policymakers with regard to sustainable conservation-driven management of the target and similar sites.
- It is anticipated that partnerships will be formed with and between landowners, spreading the influence of the project well beyond the boundaries of the target sites;
- Wherever appropriate, the project partners intend to actively seek further funding to continue work started under CABB.

- It is envisaged that the managers of sites in the Natura 2000 network across Europe will be able to learn from the work of this project, integrating sustainable management of sites designated through the Birds and Habitats Directives.

5. COMPASS - COLLABORATIVE OCEANOGRAPHY AND MONITORING

5.1 Introduction

This section of the report considers the Collaborative Oceanography and Monitoring for Protected Areas and Species (COMPASS) project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 2 – Manage Marine Protected Areas and Species.

5.1 Project Overview

Marine ecosystems are experiencing an unprecedented loss of biodiversity and species due to the large-scale and far-reaching effects of human activities, including commercial fishing, shipping, aquaculture, oil and gas exploration and a rapidly developing marine renewable energy sector. Marine habitats, fauna and flora, including those designated for protection, are determined by the oceanographic climate (e.g. salinity, temperature, currents, waves, nutrients etc.). Changes in this oceanographic climate will lead to changes in distributions, behaviours and habitats of protected species.

While Marine Protected Areas (MPAs) may be geographically isolated, the marine environment is fluid. Organisms, nutrients and water bodies are transported on local, regional and oceanic scales. Understanding this, and the defining contribution of physical processes (e.g. current speed, turbulence, stratification, fronts etc.) to habitat type, is crucial to understanding the nature and interconnections between MPAs.

International conservation efforts are often hampered by a gap in exchange and communication across borders, resulting in inefficiencies or duplication of effort, wasted resources and negative conservation results. Furthermore, the high financial cost of delivering oceanographic and marine environmental data restricts observational science.

In areas where ecologically functional regions span national boundaries, integrated monitoring and the availability of data from different monitoring or assessment programmes are key to effective management. This is particularly important for the management and conservation of mobile species such as marine mammals (cetaceans and seals) and migratory fish (salmonids).

To this end, the COMPASS project – involving the key stakeholders in marine environmental research and conservation across Scotland, Ireland and Northern Ireland – has been developed to strengthen regional collaboration in the marine conservation sector, encompassing all stages of the marine conservation planning process, including long-term data collection and monitoring, cross-border data accessibility and improved communication.

The COMPASS project partnership is led by the Agri-Food and Biosciences Institute (AFBI) and is made up of the Marine Institute (MI), Inland Fisheries Ireland (IFI), Marine Scotland Science (MSS) and the Scottish Association for Marine Science (SAMS). To support this, the Loughs Agency is acting as a delivery agent for the cross-border elements of the project.

It is anticipated that the COMPASS project will utilise both observational data and proven models to help understand complex environmental processes to address management challenges in the eligible region.

The COMPASS project partnership intends to:

- Scientifically design monitoring programmes to deliver baseline oceanographic and species data for the management of MPAs and key protected species.
- Develop data management infrastructures to ensure data quality, accessibility and flow between the regional institutions and international initiatives.
- Interface operational models to support assessments of the connectivity of MPAs in the eligible region.

The COMPASS project partnership has also proposed to contribute to developing the cross-border capacity for the monitoring and management of MPAs and species by:

- Establishing a network of buoys for regional seas, delivering connected monitoring programmes for the statutory bodies of Northern Ireland, Ireland and Scotland - new moored observation stations will be created at key locations (where the requirement has been identified), which will then be integrated with established monitoring stations already within the region;
- Linking regional data management processes to national and international initiatives for a sustainable legacy;
- Establishing the skills and infrastructure for sustained coordinated monitoring that will not be dependent on further financial intervention, and that can provide the infrastructure for future collaborative works and funding applications;
- Developing capacity for monitoring new parameters essential for EU policy compliance (e.g. noise, ocean acidification);
- Providing data and knowledge that directly contributes to the management plans being developed by both statutory and non-statutory bodies; and
- Contributing to peer-reviewed publications.

It is anticipated that a fully coherent network of monitoring buoys across the regional seas of Ireland, Northern Ireland and West Scotland, will support long-term monitoring strategies to be developed for highly mobile protected species such as marine mammals and salmonids, and provide infrastructure for baseline oceanographic and ambient noise monitoring.

On an overall basis, the COMPASS project partnership intends to contribute to the programme outputs by developing one network of buoys for regional seas and 3 models to support the conservation of marine habitats and species.

To reflect the connected nature of the seas and to add value to the project, the COMPASS project partnership proposed (at a cost of circa €843k) to integrate two established monitoring locations outside the eligible area into the project, namely[87]:

Moored monitoring at Mace Head (Ireland)	It is anticipated that integrating marine observations with atmospheric time series at a World Meteorological Organisation Global Atmosphere Watch (GAW) station will contribute towards: • Knowledge exchange - implementing new parameters on platforms in Northern Ireland and Scottish waters. • Improvements to regional survey capacity.
Moored monitoring at Loch Ewe (Scotland)	Loch Ewe benefits from existing infrastructure and other (separately funded) monitoring activities. It is anticipated that by including this site, data will be representative of the west coast region where relevant MPAs and Special Areas of Conservation (SACs) are located. This will: • Contribute towards knowledge exchange and implementation of in-situ observations in Scottish waters. • Support and development of an existing time-series, benefitting from collaborative input.

[87] It is understood that these locations were identified by the project partnership on the basis of oceanographic relevance, added value and legacy, conservation status, logistics and cost effectiveness.

The following seven work plans have been developed:

Table 5.1: Summary of COMPASS Project Work Plans (Per Progress Reports)	
Work plan	**Work plan lead**
1. Management	AFBI
2. Oceanography	AFBI
3. Data Management Processes and Platforms	MI
4. Salmonids: tracking marine migration of salmon and sea trout	AFBI
5. Monitoring Cetaceans and Marine Protected Areas including Noise Assessment	SAMS
6. Modelling	SAMS
7. Communication	AFBI

As Lead Partner, AFBI will take responsibility for the administration and delivery of the COMPASS project. The COMPASS Project Management Team (within AFBI) is led by a Project Manager who will manage and coordinate the project, support the scientific teams and link AFBI's Corporate Support Office (which includes financial and administrative functions) with the project partners' teams.

Internal monitoring will be undertaken by the Project Manager, with supervision from the Project Lead.

A COMPASS Steering Group is the main decision-making body. It has overall responsibility for the project. It is responsible for the overall governance, quality and coherence of the project. It is anticipated to meet formally four times per annum (one face-to-face meeting and three teleconferences/Skype calls). Each of the partners is represented on the Steering Group, including the Project Lead, Project Manager and Work Plan Leaders. Activities and milestones will be monitored by the Steering Group to ensure the project is undertaken as planned.

An external COMPASS Advisory Group, comprising Statutory Bodies, non-governmental organisations (NGOs) and other organisations responsible for the use, management or curation of data associated with managing MPAs, will ensure the relevance of work to policymakers and end-users. It is anticipated that the Advisory Group will also provide a formal structure for links with other projects funded at European level. The Advisory Group will be invited to attend annual project meetings and to comment on progress reports quarterly.

Regularly scheduled interaction between the Advisory Group and the Steering Group will aim to ensure coherence between work plans and review will be undertaken at the quarterly meetings. The project will be evaluated on an on-going basis using the indicators, targets, milestones and deliverables detailed in the project proposal. Outputs will be assessed at Steering and Advisory Group meetings.

5.2 Project Budget

The total proposed COMPASS project costs are €7,726,441, of which €5,632,299 (73%) is anticipated to be funded from the INTERREG VA Programme[88].

Table 5.2: Anticipated Project Costs	
Proposed Project	**Total Project Costs**
Staff Costs[89]	€3,403,121.00
Office and Administration Costs	€510,468.15
Travel and Accommodation	€256,560.00
External Expertise and Services	€220,058.00
Equipment	€3,336,234.00
Infrastructure and Works	€0
Total	**€7,726,441.15**

[88] Per Letter of Offer (dated 12th June 2017).
[89] It is anticipated that 8 new posts (5 full-time and 3 part-time) will be created in total by the COMPASS project.

Table 5.3: Anticipated Project Funding		
Funding Sources	**Value (€)**	**Source**
Cash Contribution (Partner Supplied/other grant)	€829,197.07	AFBI, MI, IFI, MSS and SAMS
In kind Contribution (Partner Supplied)	€608,062.83	
Sub-Total	**€1,437,259.90**	
Central Government Match Funding	€656,882.57	
ERDF	€5,632,298.68	
Total Grant Funding	**€6,289,181.25**	
Total	**€7,726,441.15**	
Intervention Rate (% ERDF)	**73%**	

There will be no revenue generated during the COMPASS project.

5.3 Anticipated Project Objectives, Outputs & Results

5.3.1 Objectives

The COMPASS project partnership has established the following objectives[90]:

Table 5.4: COMPASS Project Objectives

1. To deliver, by December 2021, collaborative operational monitoring programmes through one regional network of buoys with three integrated elements:

   a. Enhanced oceanographic monitoring network with telemetry, underway observations and integrated glider (autonomous underwater vehicle) missions:

      - Oceanographic and carbonate chemistry monitoring to describe spatial and temporal variability;
      - An evaluation of ocean acidification sensor systems; and
      - An assessment of the vulnerability of MPA features to ocean acidification.

   b. Future-proof Passive Acoustic Monitoring (PAM) network for cetaceans and seals:

      - Year-round data on the seasonal distribution of a range of marine mammals;
      - The first Marine Strategy Framework Directive (MSFD) Descriptor 11 'Energy including Underwater Noise' regional assessment of ambient noise levels;
      - A predictive habitat model for mobile species; and
      - Develop the potential for PAM in seal monitoring, aligned with tracking programmes within other proposals.

   c. Acoustic receiver network to record the movement of salmonids:

      - Marine range determination for sea trout;
      - Marine migration habit determination for salmon; and
      - Near-shore partitioning of marine mortality in salmonids.

2. To develop, by September 2020, regional data management infrastructure to deliver project data, integrate with existing monitoring programmes and to leave an operational legacy:

   - Integrate and standardise monitoring outputs;
   - Develop high-quality data management interfaces, delivering data to and from models; and
   - Facilitate marine management plans through data dissemination.

3. To deliver, by December 2021, 3 cross-border interfaced physical oceanographic models to determine the environmental controls on habitats and species:

   - Region-wide simulations of currents, temperature and salinity structure;
   - A cross-border model of larval transport and connectivity for priority species; and
   - A region-wide model of hydrodynamic (physical energy) habitat type.

[90] Source: Stage 2 Assessment Report.

Table 5.4: COMPASS Project Objectives
4. To deliver, by March 2021, knowledge transfer and collaborative initiatives to beneficiaries such as environmental managers, the general public, scientific community and planners: • Knowledge transfer to share expertise and develop common practices; • Integration workshops between projects funded under the same INTERREG call to support management plans; • Public outreach and education workshops; and • Citizen Science activities.

5.3.2 Outputs & Results

Per the Letter of Offer (dated 12th June 2017), the anticipated (approved) COMPASS Project Outputs are as follows:

Programme Output Code	Name of Output	Programme Output Indicator Target[91]	COMPASS Project Target
2.211	A network of buoys for regional seas, including telemetry and oceanographic monitoring (e.g. for seals, cetaceans and salmonids)	1	1
2.212	Models developed to support the conversation of habitats and species	5	3

Additional conditions specified by the Steering Group (per the Letter of Offer, dated 12th June 2017) that may relate to impacts include:

- Advisory Group to meet bi-annually at a minimum and to receive quarterly progress reports.
- An agreed mechanism for information sharing between the two 2.2 Environment (Marine) projects that will be funded.

The results indicator is *"an increase in the cross-border capacity for the monitoring and management of marine protected areas and species".* The stated baseline value for 2014 (start of the Programme period) is 'a little collaboration', whilst the target value for 2023 is a 'lot of collaboration'. The COMPASS project partners envisage that the project will have a positive contribution towards the results indicator as the project will:

- Deliver Research and Development (R&D) elements including monitoring strategies for climate change.
- Involve mobility programmes and workshops to develop expertise and encourage knowledge exchange.
- Create an integrated network of buoys to support the management of MPAs and priority species.
- Co-develop interoperable data management infrastructures across regional institutions, with both direct and online communication strategies.

[91] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

5.4 Contribution to the Priority's Specific Objectives & Result Indicators

This section considers the COMPASS project's key achievements (as of May 2019) and the extent to which the COMPASS project has:

- Contributed to the achievement of the Priority's Specific Objectives;
- Contributed to the achievement of the targets for the Result Indicators;
- Contributed to:
  - EU 2020 objectives;
  - The Atlantic Strategy; and
  - The horizontal principles of equality and sustainable development.

and where appropriate, the section:

- Identifies any external factors that have impacted, positively or negatively, on the project's ability to contribute to the achievement of the Specific Objective.

5.4.1 Key Achievements (to May 2019)

Discussion with the project partnership indicates that, as of May 2019, activities are underway that will contribute to the delivery of the project's anticipated (approved) outputs. Notably, the project partnership has been undertaking surveys, fish tagging, data collection (via acoustic moorings) and examining scientific models e.g. collecting data on the movement of Humpback Whales across the region. Sensors have also been deployed at various locations. In addition, it is understood that the project has successfully conducted its first Glider mission (underwater autonomous vehicle) on the Malin Shelf.

The project partnership also hosted its annual seminar in Galway, Ireland, with representatives from a wide range of organisations and from the MarPAMM and Sea Monitor 2 projects attending (the COMPASS, MarPAMM and Sea Monitor 2 projects are all standalone projects but with intrinsic links[92] – it is understood that all three regularly share data, information and project ideas).

It is understood that further data collection and research are ongoing and once analysed, the research work undertaken to date, along with that still to be undertaken, will assist with the development of the models.

In addition, the COMPASS project partners cite the project's key achievements (as of December 2018) as being:

Period	Dates	Key Achievements[93]
1	1st January 2017 – 31st March 2017	• Collaboration and dialogue between the project partners pertaining to the start-up of the project commenced. This involved determining the scope and objectives of the project and how the project could be implemented (including the project work packages). • There was initial scoping and planning for scientific/other procurement, including equipment requirements for the various work packages.
2	1st April 2017 – 30th June 2017	• Technical discussions were undertaken to evaluate scientific hardware needs across individual work plans. • Scoping and design for joint procurement exercises (involving Centres of Procurement Expertise) were undertaken. • An interim project manager commenced employment in May 2017. • Pilot survey work at sea was carried out 'at-risk' (relating to operational integration of Passive Acoustics with Oceanography).

[92] All three are involved in water sampling, and oceanographic, weather station and marine mammal monitoring.
[93] NB: the COMPASS project did not receive permission to start from the SEUPB until July 2017.

Period	Dates	Key Achievements[93]
3	1st July 2017 – 30th September 2017	• With formal permission to start received in July 2017, the project partners commenced working in collaboration via a series of task workshops (held by SAMS and MSS in Scotland). • Procurement activities commenced by project partners for equipment associated with various work plans. • Project partners worked together to develop technologies required for monitoring, which included a workshop attended by AFBI, MSS and SAMS.
4	1st October 2017 – 31st December 2017	• The official launch of the project took place on the 14th November 2017 at the Corrymeela Centre, Ballycastle. It was attended by all project partners and there was representation from SEUPB and other stakeholders. The event was followed by media coverage. • A regional oceanography coordination workshop was held. • A large-scale procurement exercise for sensors/hardware for buoys/moorings was completed. • Technical preparation for a buoy at Mace Head was undertaken. • Data sharing platforms (ERDAPP) were established between project partners. • The first deployment cruise was jointly delivered by SAMS and MSS in Scottish waters - this took place in November and 6 acoustic moorings were successfully deployed.
5	1st January 2018 – 31st March 2018	**AFBI (as lead partner)** • AFBI contributed towards various COMPASS project workshops held in Ireland and Scotland, which were designed to facilitate a broad regional oversight of the related scientific activities and to assist the project to engage with other projects, institutions and individuals. **IFI** • Acoustic receivers (and supporting gear) and acoustic tags for fish being tagged within its project area (Dundalk Bay and Boyne estuary area) were ordered. • A scientific animal protection project license application was submitted to the Health Products Regulatory Authority in Ireland. **MI** • Mace head buoy nearly completed. **MSS** • Several monitoring moorings were recovered and deployed. • The development of hydrodynamic models was discussed. • A representative attended the Scottish Renewables Offshore Wind Conference in Glasgow (January 2018) – an MSS exhibition stand was located at the conference, which included COMPASS project materials/information. **SAMS** • Workshops relating to the connectivity and habitat models were organised and held.

Period	Dates	Key Achievements[93]
6	1st April 2018 – 30th June 2018	**AFBI (as lead partner)** • Successful trial deployments were undertaken to establish the tracking for salmonid fish. • Moorings were recovered and the first series of data from the regional network of buoys was retrieved. • The first formal project Steering Group was held on the 7th June 2018. **IFI** • Acoustic receivers were deployed in Castletown and Matrock. • Acoustic tagging of 40 sea trout smolts from the Castletown river was completed. **MI** • Mace head buoy was deployed in May 2018. • Extensive sensor testing was undertaken, and fortnightly sampling commenced. **MSS** • Several monitoring moorings were recovered and deployed. **SAMS** • Work-related to repairing/improving the mesh of the Scottish Shelf Model was undertaken.
7	1st July 2018 – 30th September 2018	• The second project Steering Group was held in September 2018. • The adult sea trout tagging programme commenced in July 2018. • Acoustic tagging of sea trout was completed. • The oceanographic mooring at Loch Ewe was serviced and the relevant data was downloaded.
8	1st October 2018 – 31st December 2018	• Receivers network along County Down were retrieved and a subsequent winter network was deployed. • Receivers were also deployed in Belfast and Strangford loughs. • Acoustic moorings were serviced and deployed. • The third project Steering Group was held in December 2018.

5.4.2 Project Output Indicators

Discussion with the COMPASS project partnership indicates that whilst the anticipated (approved) project outputs have, as of May 2019, not been achieved (albeit, it was not expected of the project at this stage in its implementation, as they have a 2023 delivery date), the project is being implemented as planned and making positive progress towards achieving its outputs.

Programme Output Code	Name of Output	Programme Output Indicator Target[94]	COMPASS Project Target	Status (as of May 2019)
2.211	A network of buoys for regional seas, including telemetry and oceanographic monitoring (e.g. for seals, cetaceans and salmonids)	1	1	0
2.212	Models developed to support the conversation of habitats and species	5	3	0

[94] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

5.4.3 *The Priority's Result Indicator Targets & Specific Objectives*

Given the early stage of the project's implementation and the fact that the project has yet to achieve its anticipated (approved) project outputs, the COMPASS project is, therefore, at May 2019, making only marginal progress towards the Priority's Result Indicator Targets and Specific Objectives. However, this should be expected at this stage of the project's implementation (as they have a 2023 delivery date), and should not be considered a concern.

5.4.4 *EU2020 Objectives*

Whilst the COMPASS project is not overtly focused on economic growth, it does seek to encourage 'sustainable' growth through the project activities being implemented, thereby contributing towards preventing environmental degradation and the unsustainable use of resources.

5.4.5 *The Atlantic Strategy*

The 'Atlantic Strategy' is the EU's Maritime Strategy for the Atlantic Ocean area. It provides for a coherent and balanced approach that is consistent with the EU 2020 agenda. The Strategy is based around five themes (as set out Appendix I), with actions within each contributing to the overriding objective of creating sustainable jobs and growth.

Following the development of the Atlantic Strategy document, an Action Plan was developed, with the intention that it should be implemented through to 2020. The COMPASS project has the potential to contribute towards the following priority area and associated objectives identified in the Action Plan:

Priority	Specific Objectives
2: Protect, secure and develop the potential of the Atlantic marine and coastal environment	• Improving maritime safety and security • Exploring and protecting marine waters and coastal zones • Sustainable management of marine resources • The exploitation of the renewable energy potential of the Atlantic area's marine and coastal environment

The COMPASS project aims to increase an understanding of, and an ability to capitalise on, the marine resources in the eligible region. The investment will support:

- An increase in the availability of comprehensive mapping programmes;
- The development and growth of a regional 'blue economy' based on the maritime resource; and
- The alignment of regional activities with the EU Atlantic Strategy.

5.4.6 *The Horizontal Principals*

The COMPASS project aims to protect and improve the quality of the environment - a key component of sustainable development and as such it is anticipated that it will serve to contribute (at least in part) to the EU's three Horizontal Principals, per the following discussion:

Sustainable Development	The COMPASS project partners consider that Sustainable Development is the achievement of a better quality of life through the efficient use of resources, which realise continued social progress and maintain stable economic growth and care for the environment. The COMPASS project will develop sustainable monitoring programmes by working with the regulatory authorities in each jurisdiction to establish programmes that increase their capacity to manage the marine and protect the marine environment, but that are in line with the economic climate, do not pose a legacy risk and will still facilitate economic growth. These programmes will be delivered in line with the principles of the EU Sustainable Development Strategy and related strategies for each jurisdiction.

The balance of observational measures and derived (modelled) products reflects the balance of effort identified within the scientific community as required for effective marine management. A considerable investment in observational science is required for effective models, but the cost of observations in the marine environment is typically quite high. The COMPASS project will develop established and tested models to improve and expand their application, enabling the dynamics of regional systems to be understood across appropriate domains and at appropriate scales.

The primary long-term goals of the COMPASS project have been aligned to the three pillars of sustainable development as follows:

Environmental Benefits

- Improved understanding of selected priority environmental attributes (oceanography, seals, salmonids and cetaceans);
- Reduced pollution from operational efficiencies and a reduction in duplication due to a collaborative approach across jurisdictions;
- Improved management plans resulting from a better understanding of MPA connectivity across the region;
- Better protection, management and conservation of key sentinel species; and
- Enhancement and protection.

Social Benefits

- Safer waterways resulting from access to operationalised data (wind and met-ocean conditions);
- Improved opportunity for leisure and amenity use;
- Greater stakeholder involvement in the management of the marine environment;
- Improved access to information; and
- Information about marine environment and protection.

Economic Benefits

- Fostering better environmental protection and delivering better environmental data supports sustainable economic development;
- Provides a cost and scientifically effective collaborative approach to the design of marine management strategies at regional scales;
- Potential opportunities for eco-tourism could be provided;
- Sustainable solutions resulting in reduced carbon emissions;
- Benefits to fisheries through improved environmental management; and
- Jobs created and/or safeguarded.

The COMPASS project partners intend to develop observational programmes alongside modelling initiatives in order to provide outputs of direct relevance to identified management plans, as this allows the impact of the deliverables of the COMPASS project to be iteratively reassessed. This will allow for both future and in-project optimisation of programmes to deliver the best output.

The COMPASS project will incorporate the use of sustainable practices as part of its project design, in accordance with the current best practice of each organisation. Sustainability of operations and activities will also be considered alongside and in addition to, the environmental policies of each partner organisation. The partner organisations also intend to assess each aspect of any proposed activity in an environmental impact register which will be managed by the Project Management Team and reviewed by the Advisory Group.

Equal opportunities and non-discrimination **Equality between men and women**	Each of the COMPASS project partners is committed to delivering the project in full accordance with the principles detailed in the relevant legislation in each jurisdiction, namely: **Northern Ireland** • Equality Act 2010. • Section 75 of the Northern Ireland Act 1998 (NI). • Section 49A of the Disability Discrimination Act 1995. **Ireland** • Employment Equality Act 1998. • National Disability Authority Act 1999. • Equal Status Act 2000. **Scotland** • Equality Act 2010 (with Specific provisions for Scotland) Each COMPASS project partners will promote equality of opportunity and good relations in all areas of the project, with all individuals being treated in a fair and equal manner and in accordance with the law regardless of gender, marital status, race, religious belief, political opinion, ethnic origin, age, disability or sexual orientation. Good practice will be promoted through Equality Screening and the provision of an Equality Impact Assessment (if deemed necessary). The COMPASS project partners have identified a number of specific measures to promote equality and encourage cross-border, cross-community and all-inclusive involvement in the design and execution of monitoring programmes in the eligible area. This will include: • Extensive stakeholder engagement and targeted consultation prior to activities. • Working with local schools and educational programmes in all three jurisdictions. In addition, AFBI (as Lead Partner) is committed to equality of opportunity and to creating and sustaining a working environment where everyone is treated with respect and dignity, free from any form of inappropriate behaviour, and one in which all employees can give of their best. This is embodied in the AFBI Value 'Respecting People' and its Associated Behaviours, and in its Dignity at Work Policy. AFBI's commitment to equality of opportunity is embedded in the equality awareness training for all staff.

5.4.7 Contribution to Other Strategies

The COMPASS project has been designed to enhance the existing marine monitoring capacity within the eligible region and to create a legacy of marine observation infrastructure, data interoperability and accessibility. In doing so, it is closely aligned with a number of key EU directives and regional strategies, such as:

- Marine Strategy Framework Directive (MSFD);
- Biodiversity and Habitats Directives;
- Marine Knowledge 2020;
- 'Harnessing Our Ocean Wealth', the Integrated Marine Plan for Ireland – specifically Goal 2 'achieve healthy ecosystems that provide monetary and non-monetary goods and services (e.g. food, climate, health and well-being)';
- UK Marine Science Strategy 2010-2025; and
- Galway Statement Atlantic Ocean Cooperation.

The MSFD requires EU Member States to cooperate in the management of regional seas with the objective of meeting Good Environmental Status (GES) by 2020. With the marine environment coming

under increasing pressure from human activity, the network of buoys created by the COMPASS project will help ensure that biodiversity is safeguarded, and policy targets can be achieved.

In addition, the COMPASS project partners consider that the project will support increased cooperation in the region, which will improve individuals' knowledge about climate change, which is a key policy objective set out in the MSFD, the Galway Statement and the Convention for the Protection of the Marine Environment of the North-East Atlantic (or OSPAR Convention)[95].

The Galway Statement, the Marine Knowledge 2020 Strategy and the Atlantic Strategy all call for an increase in communication – it is anticipated that the data management and communication strategies established as part of the COMPASS project will contribute towards these policy objectives.

5.5 Effectiveness of the Cross-Border Collaboration & Partnership Working

This section considers aspects of the COMPASS project's collaborative and partnership working including:

- The effectiveness and added value of the COMPASS project's cross-border collaboration in relation to the specific objectives;
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The COMPASS project partners recognise that there has been minimal coordination between the regions in relation to oceanographic monitoring. The COMPASS project partners consider that the project will co-develop programmes where trans-boundary monitoring has not previously been co-ordinated. It is anticipated that this cooperative approach will bring efficiencies and economies of scale with shared planning and resources.

The partnership suggests that this will be achieved through the following activities:

Joint development	The project partners suggest that the joint development of the COMPASS project utilises the strengths and expertise of leading scientists and organisations across the eligible region. The COMPASS partners have jointly developed a detailed strategy throughout the application phase, defining how the project will be implemented in order to successfully deliver the output indicators.
Joint implementation	A Steering Group will ensure that the joint implementation of the project is well balanced. The Project Manager will coordinate and will be supported by the work plan leads across the partner organisations to coordinate and manage activities ensuring cross-border integration.
Joint staffing	A consistent and coordinated approach to project delivery is supported by a joint staffing structure, which enables ongoing collaboration, knowledge exchange and networking. Additionally, mobility within the work plans has been designed for staff to work with each of the partner institutions, bringing significant added value to the work by supporting interaction and knowledge exchange. The project requires close coordination of the team across regional borders. The day-to-day collaboration and information exchange will be augmented by specifically targeted training workshops that will be attended by acknowledged international experts. The project partners suggest that this strategy will ensure that the COMPASS project operates at the cutting edge of marine monitoring expertise.
Joint financing	A commitment to joint financing is demonstrated by the contribution of match funding supplied by central governments and the significant commitment of contributions in kind from partner organisations.

[95] The current legislative instrument regulating international cooperation on environmental protection in the North-East Atlantic.

The project partners also suggest that cross-border coordination and co-operation may identify:

- Potential areas for future collaborative efforts, data sharing, and the application of new and innovative technologies. Sharing these benefits will improve the effectiveness of environmental management and will reduce operational costs and carbon footprints;
- Support mechanisms where regional resources are limited by cost or where unexpected circumstances (e.g. vessel failure, equipment failure, personnel availability or capacity) pose a threat to the delivery of environmental assessment and monitoring programmes.

In addition to the above, the COMPASS project partnership has adopted a collaborative and partnership working approach by being involved in 'synergy meetings' with other EU funded projects e.g. the MarPAMM and Sea Monitor 2 projects (as per Section 7 and 8 respectively). As part of this, the various partnerships have agreed to, amongst other things, prepare joint communication publications such as ezines and to potentially host a joint conference/seminar in November 2019.

5.6 Barriers to Cross-Border Cooperation

This section considers whether the COMPASS project has encountered any barriers to cross-border cooperation that the priority axis is not addressing.

From the outset, the COMPASS project partners were mindful that there were many potential constraints[96] and risks that could have a significant impact on the delivery of the COMPASS project and given this have developed a strategic risk register with potential mitigation measures.

The COMPASS project partners note, however, that one of the key risks to cross-border cooperation not evident at the time of its application for funding was the uncertainty associated with the UK's potential withdrawal from the EU ('Brexit'). Whilst the nature and extent of any future arrangements between the EU and the UK are yet to be agreed, the COMPASS project partners report that future environmental legislation across Ireland, Northern Ireland and Scotland may diverge post 'Brexit', with different regulatory regimes and standards applying across the UK (Scotland and Northern Ireland) and the EU (Ireland). This may potentially impact on the relationship between the COMPASS project partners (and in turn, project delivery), as each will be required to adhere to the relevant legislation in their respective jurisdiction.

5.7 Best Practice & Learning

This section considers whether the COMPASS project has resulted in any areas of best practice and learning.

The contribution of civil society to the monitoring of the marine environment, particularly in the area of cetaceans, is well established. There is a history of non-government organisations (NGOs) in Scotland and Ireland set up in support of this e.g. the Whale and Dolphin Conservation Group, Irish Whale and Dolphin Group, the Hebridean Whale and Dolphin Trust etc. The COMPASS project benefits from having members of such NGOs on its Advisory Group.

As of May 2019, one of the main achievements of, or lessons learnt from, the COMPASS project has been the successful interaction with stakeholders and civil society (or 'citizen science'). For example, as part of the project's Salmonid research, fishermen have played an important supporting role in catching trout and salmon for tagging and deploying equipment. The COMPASS project partnership notes that this results in a number of direct benefits, including:

[96] At the outset potential constraints were identified as falling under headings such as general, technical/environmental, financial, organisational, economic, social, management, legal or timing.

- Catching fish by fly appears to cause the least distress to the fish;
- Using fishermen at sea to deploy equipment brings additional knowledge and expertise to the project; and
- This method provides an important opportunity to involve and engage a broader stakeholder group.

5.8 Mainstreaming Activities

This section considers whether the implementation of the COMPASS project has led to any mainstreaming of cross-border delivery of environmental work.

Whilst it is (at May 2019) too early for the COMPASS project to have led to any mainstreaming of cross-border delivery of environmental work, the project partners anticipate that:

- The project will develop skills in the region in readiness to develop future larger-scale projects and mitigate risks to future development by promoting effective collaboration, knowledge sharing and progressive skills development.
- The COMPASS project will deliver enhanced monitoring programmes that can be adopted by the responsible bodies for future work, without the need for significant increases in ongoing funding. This focus recognises the importance of sustaining long term data sets, supporting coherent monitoring and management programmes.
- The COMPASS project will address questions of strategic importance to protecting MPAs and priority species, by undertaking activities which are designed to minimise risks to delivery. The project will develop the knowledge, methods and skills required to provide a lower risk platform for enabling larger-scale monitoring programmes when the opportunity arises.
- The project will stimulate the transfer of knowledge and expertise between partners and Member states across the region which will continue after project conclusion.
- Equipment purchased during the course of the project will likely have fully depreciated by the completion of the project. However, where such equipment/hardware is still viable and operational, it will be maintained and operated by partners after the project to support their obligations towards marine environmental management in support of regional policy demands.
- The models developed as part of the project (e.g. hydrodynamic and marine mammal models) will be maintained by their respective owners (MI and MSS). It is anticipated that access to these models and the use of the outputs will be used to improve the management of marine protected areas (indeed, a key deliverable will be a ‘federated network’ for data infrastructure, which will provide better access to all the project data across the three jurisdictions). The models will offer the opportunity to be updated and revalidated by the partners beyond the funding period as part of their normal statutory responsibilities.

In addition, the COMPASS project partners suggest that the long-term goal of the project is uniformity of policy, practice and delivery to allow interoperability across the responsible organisations in the region.

6. SWIM - SYSTEM FOR BATHING WATER QUALITY MONITORING

6.1 Introduction

This section of the report considers the System for bathing Water quality Modelling (SWIM) project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 2 – Manage Marine Protected Areas and Species.

6.2 Project Overview

Achieving and maintaining high-quality marine water standards is required under stringent EU environmental legislation such as the Bathing Water Directive (2006/7/EC), Shellfish Waters Directive (2006/113/EC) and Water Framework Directive (2000/60/EC). Relevant authorities in Ireland and Northern Ireland, namely local authorities and DAERA respectively, are charged with implementing the Bathing Water Directive (2006/7/EC).

To ensure effective and efficient implementation of these directives, water resource managers need to know the water quality in order to take appropriate mitigating actions for social and ecological benefits in the event of pollution. This is particularly so for the Bathing Water Directive, where water quality is defined in terms of Escherichia coli and intestinal enterococci (IE) concentrations as percentile limit values.

Furthermore, the health authorities in both jurisdictions have introduced regulations requiring a public warning against bathing to be issued for bathing water when microbial levels exceed certain values. These regulations are reactive and do not need prediction, but communication with the public is central to their implementation.

To this end, the SWIM project – which is led by University College Dublin (UCD) and involves the Agri-Food and Biosciences Institute (AFBI) and Keep Northern Ireland Beautiful (KNIB) as funded partners – aims to enable short-term pollution to be predicted through the development of a bathing water quality prediction model. The central concept of the SWIM project, 'predict and protect', has been established as part of bathing water regulations throughout the EU.

The SWIM project partnership intends to:

- Acquire all pre-existing available bathing water microbial water quality.
- Determine sources of, and acquire, all available retrospective relevant environmental data.
- Determine which bathing waters had less than 'Excellent' classifications (category 1).
- Determine which had one or more sample results that exceeded 'Sufficient' standard values (category 2).
- Operate the Discard Model[97] for categories 1 and 2.
- Validate successful model performance.
- Develop multivariate and other models where the Discard Model has not been successfully validated.
- Investigate short-term pollution sources using microbial source tracking.
- Obtain additional information relevant to model failure from beach profiles and from local sources.
- Implement the necessary software to reliably collect, conflate and route and store disparate data within the spatiotemporal domain from a variety of data streams.
- Design and produce electronic signage and associated software to deliver message alerts and set up a text alert, social media and web page information systems.
- Set up a sustained public awareness campaign and solicit citizen engagement.

The SWIM project partnership intends to test and monitor nine bathing waters, six in Northern Ireland and three in Ireland.

[97] Which is an Excel model that is already operational in Ireland.

It is proposed that the public will then be informed about water quality through a series of media channels, including:

- Automatic localised text alerts.
- Social media channels e.g. Facebook and Twitter.
- Real-time alert services using electronic signage installed strategically at beach entrance points. As part of the project, it is proposed that electronic signage will be installed at beaches where effective predictive modelling has been achieved. Each sign will be uniquely addressable via the internet (IPv6), enabling individual, real-time text messages to be sent to individual sign(s). Each sign will be solar-powered, avoiding the necessity for costly electricity supply and wired telecommunications networks.
- Web page updates - A SWIM project webpage will be added to UCD's website, which will update visitors on the progress of the project. The other project partners will also develop webpages, which will link to UCD's web site to provide the latest project updates. It is proposed that a dedicated beach information website will be developed and hosted by KNIB, which will provide detailed information on Northern Ireland bathing waters including daily alerts on, for example, whether bathing is advised. Information on any beach awards e.g. Blue Flags will also be included. For beaches in Ireland, daily alerts on whether bathing is advised will be added to the relevant Council website.

In addition, it is anticipated that text alerts and social media channels will use geofencing to alert citizens using GPS when they move to within a certain proximity of a given beach, advising them of bathing water quality (NB: they may also receive public advice on traffic/weather conditions, parking availability and surf conditions). It is proposed that such content will be personalised, thereby only delivering content when required and relevant to an individual's or family's needs.

The project objectives are to achieve:

- The development of bathing water quality prediction models. These will tie directly into software infrastructure to support the collection of data and delivery of information to the public.
- Water sampling and microbial source tracking. The methods and technology will be adapted and refined to uniquely suit the chosen sampling sites.
- Public engagement campaigns and local programmes for bathing waters aimed at promoting good management, environmental standards and sustainability for beaches.
- Installation and maintenance of beachfront real-time signage and infrastructure related to prediction modelling.

The SWIM project partnership anticipates that the predictive capability and public communication outcomes of the project will help to serve the needs of both the local authorities and public health agencies in both jurisdictions, as benefits will be delivered to local and visiting bathing water users. In doing so, it is anticipated that this will improve communication to members of the public and will help to:

- Protect public health by ensuring that bathers are warned and protected from adverse health effects;
- Contribute to promoting tourism;
- Mitigate against economic losses incurred by a reduction in amenity attractiveness (e.g. loss of Blue Flag status).

The following seven work packages have been developed:

Table 6.1: Summary of SWIM Project Work Packages (Per Progress Reports)
1. Management
2. Establishment of Data Inventory
3. Develop Bathing Water Quality Prediction Models
4. Equipment Infrastructure Deployment
5. Software Infrastructure
6. Validation of the Bathing Water Quality Prediction Model
7. Communication

As Lead Partner, UCD will be responsible for:

- Providing overall project coordination and acting as an intermediary between the project partners and the SEUPB;
- Developing several bathing water quality prediction models, along with joint responsibility for validation of such models;
- Developing the software infrastructure to support the collection of sensed data; and
- The delivery of citizen information through electronic signage and social media directly to citizens' phones. Where applicable, machine learning techniques will be utilised to help refine predictive models.

It is proposed that AFBI will undertake Microbial Source Tracking (MST)[98], which will provide preliminary data for the:

- Selection of 9 beaches for detailed examination; and
- Identification of electronic signage sites and installation.

It is proposed that KNIB will develop and implement an effective communication plan to ensure uptake of the new bathing water quality information service. This will involve two key areas, namely:

- Implementation of the most appropriate communications channels and forms to inform the public of bathing water quality; and
- Raising awareness of the bathing water quality information service to ensure good uptake in the use of the service among citizens.

In addition to the above, there are also several non-funded partners[99] in the SWIM project, namely: Louth County Council, Sligo County Council, Donegal County Council, Ards and North Down Borough Council, Causeway Coast and Glens Borough Council, Newry, Mourne and Down District Council and Northern Ireland Water. It is understood that the local authorities will be responsible for installing and maintaining beach infrastructure relating to prediction modelling.

A Scientific and Technical Management Board (STMB) will be responsible for the day-to-day decisions and delivery of the aims and objectives of the project. The STMB will meet every three months and will note any operational delays. Should these occur, the STMB will provide reasons for the delay, as well as an agreed plan to bring the delivery schedule back on track by the next meeting.

A Project Advisory Group (PAG) will meet every 6 months to be updated on the progress and delivery of the project. The PAG will provide advice in relation to scientific and technical aspects of the project, and when required, advice on priorities within work packages.

The Project Coordinator (within UCD) will have overall responsibility for the project and will be assisted by[100]:

UCD	• A part-time Project Manager • Two full-time post-doctoral researchers (who will be appointed for three years) • A full-time Research Assistant (will be appointed for two years)
AFBI	• A full-time Higher Scientific Officer (who will be appointed for three years) • A part-time Assistant Scientific Officer (who will be appointed for three years)
KNIB	• Project Officer (who will be appointed for two years)

[98] MST analysis has been applied to a significant number of water samples collected in 2015 from both a Northern Ireland Shellfish Water Protected Area (Shellfish Waters Directive (2006/113/EC)), as well as from all of the 23 Northern Ireland Bathing Water Beaches designated under the Bathing Water Directive (2006/7/EC) for the entire 2015 season. It is proposed that these technologies, along with the associated results, will provide preliminary data for the project's work packages.
[99] Per the project's Stage 2 Assessment Report.
[100] NB: The SWIM project partnership will also provide in-kind contributions in the form of individuals time spent on delivering the project e.g. (three posts within UCD, one post within AFBI and two within KNIB).

6.3 Project Budget

The total proposed SWIM project costs are €1,108,358, of which €891,530 (80%) is anticipated to be funded from the INTERREG VA Programme[101].

Table 6.2: Anticipated Project Costs	
Proposed Project	**Total Project Costs**
Staff Costs	€762,685.81
Office and Administration Costs	€114,402.87
Travel and Accommodation	€29,619.85
External Expertise and Services	€20,969.92
Equipment	€180,679.60
Infrastructure and Works	€0
Total	**€1,108,358.05**

Table 6.3: Anticipated Project Funding		
Funding Sources	**Value (€)**	**Source**
Cash Contribution (Partner Supplied/other grant)	€59,451.15	UCD, AFBI and KNIB[102]
In-kind Contribution (Partner Supplied)	€0	
Sub-Total	**€59,451.15**	
Central Government Match Funding	€157,377.32	
ERDF	€891,529.58	
Total Grant Funding	**€1,048,906.90**	
Total	**€1,108,358.05**	
Intervention Rate (% ERDF)	**80%**	

There will be no revenue generated during the SWIM project.

6.4 Anticipated Project Objectives, Outputs & Results

6.4.1 Objectives

The SWIM project partnership has established the following objectives or 'key project milestones'[103]:

Table 6.4: SWIM Project Objectives[104]		
Milestone Name	**Delivery month**	**Partners involved**
1. Project mobilisation	M1	UCD, AFBI & KNIB
2. Overview of all beach performance within the joint programme area	M8	UCD & AFBI
3. Selection of 9 beaches for detailed examination (3 in Ireland and 6 in Northern Ireland)	M9	UCD & AFBI
4. Instrumentation of chosen catchments	M14	UCD & AFBI
5. Delivery of interim and final robust SWIM software infrastructure	M18 & M34	UCD
6. Identification of electronic signage sites and installation	M28	UCD[105]
7. Public engagement - initial and final phases	M6 & M34	KNIB
8. Validation of bathing water quality prediction models	M32	UCD & AFBI
9. Project Closure	M36	UCD

[101] Per Letter of Offer (dated 14th June 2017).
[102] Per the project's Stage 2 Assessment Report.
[103] Source: Stage 2 Application Form/Business Plan.
[104] NB: The Lead Partner confirmed that the project's objectives/targets, as presented in this subsection, are up to date (as of May 2019). However, during consultation, the Lead Partner advised that, in some instances, the estimated completion dates are no longer realistic or have elapsed. The project's objectives/targets have not been restated to account for new estimated completion dates.
[105] In collaboration with Local Councils.

6.4.2 Outputs & Results

Per the Letter of Offer (dated 14th June 2017), the anticipated (approved) SWIM Project Outputs are as follows:

Programme Output Code	Name of Output	Programme Output Indicator Target[106]	SWIM Project Target
2.214	System for the prediction of bathing water quality and install real-time signage	1	1

No additional conditions specific to the project were specified in the project's Letter of Offer.

6.5 Contribution to the Priority's Specific Objectives & Result Indicators

This section considers the SWIM project's key achievements (as of May 2019) and the extent to which the SWIM project has:

- Contributed to the achievement of the Priority's Specific Objectives;
- Contributed to the achievement of the targets for the Result Indicators;
- Contributed to:
  - EU 2020 objectives;
  - The Atlantic Strategy; and
  - The horizontal principles of equality and sustainable development.

and where appropriate, the section:

- Identifies any external factors that have impacted, positively or negatively, on the project's ability to contribute to the achievement of the Specific Objective.

6.5.1 Key Achievements (to May 2019)

Discussion with the project partnership indicates that, as of May 2019, activities are underway that will contribute to the delivery of the project's anticipated (approved) outputs, with significant work already undertaken in relation to the development of the scientific model.

Notably, the partnership has identified and agreed upon the beaches that will be monitored and all of the weather stations and river level sensors have been deployed. It is understood that weather monitoring, water sampling, flow meter data collection and other relevant data is now being collected (and being transmitted back to the project team), including that being captured by a weather station that was installed at a local primary school (St. Patrick's School in Glenariff in Waterfoot). Further discussion with the project partnership suggests that the location of this particular weather station will provide an excellent opportunity for learning.

The project partnership advised that a substantial amount of historical data has also been provided by Met Eireann to inform the development of the scientific model.

In addition, the general public can access the project's interactive website, where data is collected and analysed in preparation for the development of the models. Furthermore, software developers have commenced work on the App that will be made available to the public, whilst the real-time signage is, as of May 2019, being procured (although the project partners advised that they are liaising with the SEUPB as the allocated budget may only enable basic signage to be purchased).

[106] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

In addition, the SWIM project partners cite, within their progress reports, the project's key achievements (as of December 2018) as being:

Period	Dates	Key Achievements[107]
1	1st January 2017 – 31st March 2017	• Project mobilisation commenced during this period.
2	1st April 2017 – 30th June 2017	• Several iterations of a draft collaborative agreement were circulated to partners for input/comment. • The collection of historical data was initiated, sources were identified, approached and data was secured (however, a data-sharing agreement between partners was required prior to this being shared). • Access was gained to the extensive suite of AFBI weather stations and data retrieval implemented. • Several site visits were undertaken at the end of this period to both collect additional microbiological data, as well as to identify potential sites for infrastructure deployment. • A number of sites were identified as potential sites for the development of prediction models and signage.
3	1st July 2017 – 30th September 2017	• A collaborative agreement was agreed and signed by the SWIM project partners in late August 2017. • The need for a Data Sharing Agreement between the SWIM Project partners was identified. • Microbial Source Tracking (MST) Ring trial samples were collected, and two 12-hour sampling events were undertaken. While invaluable experience was gained, it became evident that the lack of information on metrological and hydrological parameters was critical. Collection of historical data was continued, data gaps identified and efforts to fill those gaps were implemented. • Following the pre-market screening for the provision of telemetric weather stations for the project that commenced in Reporting Period 2, a formal Invitation to Tender (with detailed technical specification included) was prepared for the supply of 12 weather stations. • Analysis and due diligence were undertaken in examining pre-existing infrastructure that may possibly be able to augment the infrastructure that will explicitly be deployed through the SWIM research programme. • Presentations of the SWIM project were provided at the following: – SEUPB hosted dinner, Belfast – 11th September 2017. – The annual conference of the CIWEM (Chartered Institution of Water and Environmental Management) - 21st September 2017.
4	1st October 2017 – 31st December 2017	• A procurement exercise for 12 weather stations for the SWIM project was completed. • The SWIM project's formal launch took place on the 7th December 2017 at the Titanic Quarter, Belfast. • AFBI staff attended the UK Bathing Waters Conference in Wrexham on the 20th November 2017. This provided information on data sources such as Rain Radar. • A characterisation of the Bathing Waters selected for the project and the catchment areas draining to the selected sites commenced. This involved sourcing available GIS datasets which allowed for the characterisation and for identifying the locations and spatial distributions of available resources such as hydrometric and climatic/synoptic stations.

[107] NB: the SWIM project did not receive permission to start from the SEUPB until the 11th June 2017.

Period	Dates	Key Achievements[107]
5	1st January 2018 – 31st March 2018	• The establishment of the SWIM Data Inventory was largely completed, although this will be updated on an ongoing basis. • A contractor was awarded the contract for the weather stations. NB: only seven weather stations and five river level sensors (rather than the preferred 12 and six) were able to be purchased due to budget constraints. • The third STMB meeting was held on the 8th February 2018, along with the first meeting of the Project Advisory Group (PAG) (15th March 2018). • The SWIM project manager took up the position on the 29th January 2018. • AFBI completed the Northern Ireland data inventory. Preliminary modelling, using the Excel Discard and multivariate linear regression analysis, was applied to the data sets for 12 Northern Ireland beaches. • Preliminary microbiological analysis by AFBI was undertaken for five of the six Northern Irelands beaches. Operating procedures, equipment and risk assessments were also completed. • Preliminary beach catchments were either visited or studied from aerial analysis and potential locations of weather station deployment identified. For example, an agreement was reached with Northern Ireland Water to deploy a weather station at a pumping station close to Newcastle beach.
6	1st April 2018 – 30th June 2018	• It was agreed by all three project partners that the following nine beaches would be included in the SWIM project: **Northern Ireland** - Castlerock; - Portrush (Curran); - Waterfoot; - Ballyholme; - Ballywalter; and - Newcastle. **Ireland** - Enniscrone, Sligo; - Clogherhead County Louth; and - Lady's Bay, Donegal. • UCD purchased seven weather stations and five water level recorders. Six of the weather stations were delivered to AFBI for deployment at beaches in Northern Ireland - one of the weather stations was installed at Castlerock and the other one at Portrush, Curran. All of the water level recorders were transported to AFBI for deployment at five locations in Northern Ireland.
7	1st July 2018 – 30th September 2018	• Data inventory and historical metrological and hydrological data accumulated by the AFBI team was successfully transferred to the UCD team on their delivery of the signed Data Sharing Agreement. • AFBI deployed all of the metrological and hydrological Northern Ireland project infrastructure - weather stations at Castlerock, Portrush (Curran), Ballyholme, Ballywalter, Newcastle and St. Patrick's School in Glenariff in Waterfoot. • The five water level recorders were deployed at the following sites in Northern Ireland: one in Waterfoot, one in Ballyholme and three in Newcastle. • UCD worked closely with AFBI after the installation at sites in Northern Ireland to ensure that the sensor data coming from the weather stations and water level recorders were able to be sent successfully to the SWIM server based in UCD. • Preliminary work on possible protocols for reactive sampling to enable water quality prediction model validation was undertaken by AFBI.

Period	Dates	Key Achievements[107]
8	1st October 2018 – 31st December 2018	• A site visit (organised by UCD) to each of the nine sites took place in October 2018. This involved SWIM project partners and staff from SEUPB and the relevant local Councils. • AFBI negotiated a licence with the Meteorological Office to access both historical and live feed rain Radar data for all of Northern Ireland. It is anticipated that this will give AFBI access to 10 years of historical rain radar coverage for all Northern Ireland in addition to a 'live feed' which is updated every 5 minutes. • UCD made significant progress on the Software Infrastructure work package. • UCD established contact with the primary school Scoil Chríost Rí in Enniscrone, County Sligo. This school agreed to have a weather station installed on its premises.

6.5.2 Project Output Indicators

Discussion with the SWIM project partnership indicates that whilst the anticipated (approved) project outputs have, as of May 2019, not been achieved (albeit, it was not expected of the project at this stage in its implementation, as they have a 2023 delivery date), the project is being implemented as planned and making positive progress towards achieving its outputs.

Programme Output Code	Name of Output	Programme Output Indicator Target[108]	SWIM Project Target	Status (as of May 2019)
2.214	System for the prediction of bathing water quality and install real-time signage	1	1	0

6.5.3 The Priority's Result Indicator Targets & Specific Objectives

Given the early stage of the project's implementation and the fact that the project has yet to achieve its anticipated (approved) project outputs, the SWIM project is, therefore, at May 2019, making only marginal progress towards the Priority's Result Indicator Targets and Specific Objectives. However, this should be expected at this stage of the project's implementation (as they have a 2023 delivery date), and should not be considered a concern.

6.5.4 EU2020 Objectives

Whilst the SWIM project is not overtly focused on economic growth, it does seek to encourage 'sustainable' growth through the project activities being implemented, thereby contributing towards preventing environmental degradation and the unsustainable use of resources.

6.5.5 The Atlantic Strategy

The 'Atlantic Strategy' is the EU's Maritime Strategy for the Atlantic Ocean area. It provides for a coherent and balanced approach that is consistent with the EU 2020 agenda. It is largely focused on helping communities living and working on the Atlantic coast deal with new economic realities, but also recognises that the EU shares responsibility for stewardship of the world's oceans. The SWIM project has the potential to contribute to the following Atlantic Strategy priorities and objectives:

[108] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

Priority	Specific Objectives
1: Promote entrepreneurship and innovation	• Sharing knowledge between higher education organisations, companies and research centres; • Enhancement of competitiveness and innovation capacities in the maritime economy of the Atlantic area; • Fostering adaptation and diversification of economic activities by promoting the potential of the Atlantic area.
2: Protect, secure and develop the potential of the Atlantic marine and coastal environment	• Sustainable management of marine resources

6.5.6 The Horizontal Principals

The SWIM project aims to protect and improve the quality of the environment - a key component of sustainable development and as such it is anticipated that it will serve to contribute (at least in part) to the EU's three Horizontal Principals, per the following discussion:

Sustainable Development	The SWIM proposal aligns and complies with the Sustainable Development Strategy adopted by the European Council in June 2006, as well as the respective national sustainable development strategies within each jurisdiction. The SWIM project partnership considers that Sustainable Development seeks to deliver on the vision of continuous improvement of the quality of life on earth of both current and future generations and that the SWIM project addresses the guiding principles as follows: • **Protection** – By identifying pollution pressures in bathing waters in the coastal waters of Ireland and Northern Ireland, the SWIM project, therefore, promotes quality of life in urban and rural communities and enhances the local economy, by contributing to safe and clean coastal waters. • **Open and democratic society** – The SWIM project seeks to inform and empower the public of bathing water quality. This is central to a citizen's right to know and provides much-needed information that pertains to citizen lifestyle and public health. The knowledge generated via the SWIM project will serve to inform policymakers as to potential future remediation measures by which to address poor bathing water quality and would inform where to prioritise investment. • **Involvement of citizens** - Many stakeholder groups are involved in the SWIM project. The citizen is, therefore, made central and more aware of environmental issues pertaining to bathing water and coastal assets generally. • **Use best available knowledge** – The SWIM project involves a wide range of stakeholders, including local communities, local authorities and both government agencies and a leading research-intensive University. This spectrum of stakeholders contributes to the policy guiding principles of 'Policy Integration' and 'Using the best available knowledge'. During its implementation, the SWIM project partnership will adhere to the sustainable development requirements of the relevant governments. In doing so, the SWIM project will: • Where appropriate, develop and promote effective local supply chains that have a track record of environmental performance. • Adopt solar power for electronic signage. • Adopt a travel plan to promote car sharing and other ways of reducing the impact of travel in relation to conducting the research. Both UCD and AFBI have implemented sustainable development strategies and actively encourage and facilitate the use of public transport, electric cars and bicycles. UCD has changing and shower facilities for cyclists. • Provide the SEUPB with copies of all relevant Environmental Impact Assessments (EIAs) and marine licences/studies that are undertaken prior to commencement of the physical measurements.

	• Provide the SEUPB with evidence that all necessary statutory consents and licenses have been granted prior to approval or that clear deadlines have been stipulated in the mobilisation phase.
Equal opportunity and non-discrimination **Equality between men and women**	The SWIM project will comply with the legal requirements set out in legal instruments such as: • Section 75 of the Northern Ireland Act 1998 (NI); • The Employment Equality Act (1998) (NI); and • The Equal Status Act (2000), as amended by the Equality Act (2004) (Ireland). The SWIM project partnership will take appropriate measures to ensure no discrimination occurs/will occur based on sex, racial or ethnic origin, religion or belief, disability, age or sexual orientation during its preparation, set up and implementation. EIAs of the project will be carried out in accordance with the guidelines provided by the Irish Human Rights and Equality Commission and the Northern Ireland Human Rights Commissioner. In particular: • Recruitment to research positions will be exclusively on merit and suitability against the job descriptions provided. UCD is in the process of securing Athena SWAN[109] recognition. AFBI has an established Equality Scheme, which sets out its plans for fulfilling equality obligations and this was approved on 27 February 2013 by the Chief Commissioner of the Equality Commission for Northern Ireland (ECNI). • The SWIM project partnership will ensure there is appropriate gender balance when establishing research teams, boards and committees. Vacancies will be advertised using a range of methods, including national, local and specialist press and other websites where appropriate and affordable. • Engagement and consultation with communities will be indiscriminate, occurring on both sides of the border, across different socio-economic groups, in areas with different and contrasting religious, demographic, ethnic and race profiles. Venues for public consultation will ensure accessibility for persons of reduced mobility (enable Ireland will be consulted in this regard). • Most public engagement will be through social media, which, is agnostic to gender, sexual orientation, religion, race or ethnic origin. • Disability awareness will influence (i) the bathing water quality alerting system which will embrace universal access principles in the user interface: where the citizen has hearing difficulties text alert sounds could be highlighted with flashing screen and where visually impaired, enablement of the text to speech phone option would be activated as would screen zooming functionalities (ii) electronic signage will seek to use appropriate plain English, font size and screen contrast so as to maximise legibility and understandability. • SWIM will refer to National Council for the Blind of Ireland and RNIB Northern Ireland and BSI Web accessibility 'code of practice' to establish good practice for accessibility with respect of publications. • In Ireland, and if required, in Northern Ireland, the bathing water quality alert service will be available in English and Irish.

[109] Athena SWAN is a charter established and managed by the UK Equality Challenge Unit. It recognises and celebrates good practices in higher education and research institutions towards the advancement of gender equality: representation, progression and success for all.

6.5.7 Contribution to Other Strategies

The SWIM project is closely aligned with a number of key EU directives and regional strategies, such as:

- The Water Framework Directive (WFD), which was established to protect and prevent further deterioration of inland surface waters, estuaries and coastal waters and implement a framework to enhance and return these aquatic ecosystems to at least "Good Status" or better by 2020.
- Bathing Water Directive (2006/7/EC) and associated national bathing water-quality regulations (defining public-administration responsibilities).
- European Commission's Blueprint to Safeguard Europe's Water Resources (2012).
- Nitrates Directive (91/676/EEC).
- Urban Waste Water Treatment Directive (91/271/EEC).
- Nitrates Action Programme 2014-2017.

In addition, the 23 designated bathing waters in Northern Ireland are managed by four of the 11 Northern Ireland Councils, the National Trust and Northern Ireland Environment Agency (NIEA), whilst the 31 in the border counties of Ireland are managed by the Local Authorities with oversight by the EPA. Bathing waters are recognised as important environmental and tourism assets and each Agency/Council (in Northern Ireland and Ireland) has their development, promotion and management in a responsible and sustainable manner part of their strategic plans. The SWIM project partnership anticipates that the outputs delivered part of the project will, therefore, ultimately contribute towards these strategies, by protecting the health of bathers who visit the beaches.

6.6 Effectiveness of the Cross-Border Collaboration & Partnership Working

This section considers aspects of the SWIM project's collaborative and partnership working including:

- The effectiveness and added value of the SWIM project's cross-border collaboration in relation to the specific objectives;
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The partnership report that each partner and stakeholders will, in complementary ways, input to the project aims and objectives namely, to develop predictive modelling for short-term pollution and to devise information techniques to warn the public when this is predicted.

In relation to the modelling, AFBI will compile and supply the required Northern Ireland datasets to UCD, whilst UCD will source the Ireland datasets. Also, AFBI and UCD will interact in their own territories with the relevant local authority/Council staff to devise strategies for indicator organism and microbial source tracking sampling and sensor placement. The models and software infrastructure will be developed at UCD and at the end of the project period, they will be housed at AFBI and UCD.

The partnership anticipates that the effectiveness of the cross-border collaborations will ensure that the partners and stakeholders have full knowledge and understanding of each other's inputs in order to achieve the best possible model performance. In relation to the public advice, UCD will work with the local authority/Council stakeholders on signage selection and siting, and on the design of other information technologies. There will be close interaction with KNIB during the initial and final public engagement phases, in order to supply the information that it requires to fulfil the project's task of reaching the wider community.

The partnership considers that the SWIM project's cross-border collaborative approach offers the following benefits:

- **Social**: by protecting public health and providing public outreach and engagement for the cross-border area.

- **Economic**: by enhancing amenity appeal through improved bathing water classifications.
- **Environmental**: by instituting systematic regulatory capability and informing future remediation of short-term pollution.
- **Cooperation**: by supporting staff in public institutions and administrations in the cross-border area to working jointly and by forming new relationships, with each partner bringing different knowledge and experience. At times, this results in solutions and approaches the individuals alone would not have identified. By sharing new insights and enhancing expertise and achieving improved regulatory competence and consistency in applying bathing water regulations.

6.7 Barriers to Cross-Border Cooperation

This section considers whether the SWIM project has encountered any barriers to cross-border cooperation that the priority axis is not addressing.

From the outset, the SWIM project partners were mindful that there were many potential constraints[110] and risks that could have a significant impact on the delivery of the SWIM project and given this have developed a strategic risk register with potential mitigation measures.

The SWIM project partners note, however, that one of the key risks to cross-border cooperation not evident at the time of its application for funding was the delay associated with the partners agreeing a Collaborative Agreement (or Partnership Agreement) and a Data Sharing Agreement. The SWIM project partners note that the delays in each partner agreeing to such arrangements impacted on project delivery, as it delayed the implementation of certain work packages. This, in turn, has impacted on the extent of cross-border cooperation between the project partners. Discussion with the SWIM project partners indicates that the two agreements have now been agreed and that the project partnership has undertaken activities to progress the project in a timely manner.

6.8 Best Practice & Learning

This section considers whether the SWIM project has resulted in any areas of best practice and learning.

Discussion with the SWIM Partnership indicates that it is (at May 2019) too early for the SWIM project to have resulted in any areas of best practice and learning.

6.9 Mainstreaming Activities

This section considers whether the implementation of the SWIM project has led to any mainstreaming of cross-border delivery of environmental work.

Whilst it is (at May 2019) too early for the SWIM project to have led to any mainstreaming of cross-border delivery of environmental work, the project partners anticipate that:

- The mathematical and statistical modelling techniques adopted in the SWIM project will be transferable to several other modelling projects that are being implemented within Northern Ireland (e.g. the SWELL Project (as per Section 9), the Living with Water Programme, the Sustainable Mariculture in Northern Irish Lough Ecosystems (SMILE) project etc.) and Ireland (e.g. the proposed ACCLIMATIZE project).
- The establishment of an infrastructure and skills base within AFBI will enable post-project predictive model maintenance, future development and expansion. The capital investment and technology transfer provided by this project will put the beneficiaries in a strong position to secure future funding. Indeed, the project could be financially supported by, for example, local sponsorship, advertising revenue from signage or web applications etc.

[110] At the outset potential constraints were identified as falling under headings such as general, technical/environmental, financial, organisational, economic, social, management, legal or timing.

- The delivery of a verified autonomous predictive bathing water-quality model, capable of supporting discounting of compliance water samples, and that requires minimal maintenance, will enable continued compliance with Bathing Water Directive (BWD) and Water Framework Directive (WFD) policy requirements in the cross-border area beyond the project period.
- The adoption of a predictive model will contribute to continuous improvement in bathing water quality classifications. Such improvements will impact positively on regional environmental and tourism assets in a responsible and sustainable manner.
- Model software will be future-proofed to facilitate incorporation of additional sensors, data sources, data streams and/or additional electronic signage.

In addition to the above, the partnership states that stakeholders such as NIW, KNIB and Local Councils in both Northern Ireland and Ireland have signalled their intentions to support the project beyond the INTERREG VA Programme funding period. This may include, for example, maintenance of telemetric instrumentation and electronic signage, provision of additional signage and/or continued integration into existing communication systems (websites and mobile Apps).

7. MARPAMM - MARINE PROTECTED AREAS MANAGEMENT AND MONITORING

7.1 Introduction

This section of the report considers the Marine Protected Areas Management and Monitoring (MarPAMM) project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 2 – Manage Marine Protected Areas and Species.

7.2 Project Overview

Marine ecosystems are experiencing an unprecedented loss of biodiversity and species due to the large-scale and far-reaching effects of human activities, including commercial fishing, shipping, aquaculture, oil and gas exploration and a rapidly developing marine renewable energy sector. For example:[111]

- 38% of the UK's marine habitats protected by SACs are in unfavourable (or 'bad') condition;
- 75% of marine invertebrate species have declined over the long term; and
- Seabird populations in the eligible area have declined over the last 30 years e.g. 12 species of breeding seabirds in Scotland declined by 50% between 1986 and 2015. These declines have been attributed to invasive non-native species colonisation of breeding colonies, reduction in prey availability and climate change.

Due to jurisdictional boundaries, the waters adjacent to Northern Ireland, Scotland and Ireland (and the MPAs that they contain) are often viewed as separate stretches of water adjacent to the individual countries rather than as an interconnected sea area. This presents a challenge in managing sites effectively, where pressures from waters within adjacent jurisdictions (e.g. changing water temperature, ocean acidification, sea-level rise etc.) can have an impact on MPAs.

While MPAs may be geographically isolated, the marine environment is fluid. Organisms, nutrients and water bodies are transported on local, regional and oceanic scales. Furthermore, many protected species are either mobile (e.g. marine birds, marine mammals) or have pelagic life stages which leaves them vulnerable to pressures outside of protected areas.

The above challenges need to be understood and managed strategically to ensure adaptation and resilience of the MPA network. All jurisdictions in the eligible region are committed to developing a well-managed, ecologically coherent network of MPAs. Whilst much progress has been made in site designations and in the setting of conservation objectives, many sites have no management plans or have one which is out of date. This means that they may not reflect current pressures and risks.

There is little resource available within the cross-border region to update existing plans or produce new plans, which consequently means that the timescales associated with implementing management plans are uncertain. There is also no existing mechanism for the production of cross-border MPA plans, and there is no process for collaborating on management plans for the many MPAs that are ecologically related. Resource limitations mean MPA management is reactive, often focussing on localised issues and may not lead to the best MPA management outcomes. Locations can suffer damage before formal, and sudden, action is taken, which can also alienate users of MPAs.

Given that all the MPAs in the programme's eligible area are connected by the wide habitat use of mobile species (e.g. seabirds, cetaceans and seals) and pelagic life stages of benthic species (e.g. horse mussels), effective management requires knowledge of such connectivity and the cumulative pressures from a regional and cross-border context.

To this end, the MarPAMM project aims to address the need for cross-border MPA management plans across the eligible region, through a focus on both the information requirements for plan development (to be fulfilled by the development of models for species and habitats of conservation importance) and on plan preparation and implementation through collaboration with stakeholders.

[111] Source: Stage 2 Application Form/Business Plan.

The MarPAMM project partnership is led by the Agri-Food and Biosciences Institute (AFBI) and is made up of Marine Scotland Science (MSS), Scottish Natural Heritage (SNH), the Scottish Association for Marine Science (SAMS), BirdWatch Ireland (BWI), Ulster University (UU) and University College Cork (UCC).

The overarching objective of the MarPAMM project is to increase cross-border capacity for the monitoring and management of marine protected areas and species.

The MarPAMM project partnership intends to deliver four models designed to support the conservation of habitats and species that underpin MPA designations within the eligible region. Details of the four models are outlined below:

1. **Seabird monitoring and modelling:** this will provide information on how protected marine bird species or populations within the INTERREG VA eligible region may be impacted by key pressures, including the interaction with fisheries. The impact of future climate change scenarios on key seabird species will also be modelled.
2. **Benthic (seabed-dwelling) habitat mapping and modelling:** this will seek to understand the distribution and connectivity of key habitats and species of conservation value throughout the INTERREG VA eligible region, improving methods for habitat extent and condition monitoring, and identifying key habitats and areas for species of conservation importance. This model will provide vital baseline data required for the marine management plans' development through improving the information available on the eligible area's subtidal MPA network.
3. **Marine mammals modelling:** this will provide information on the foraging areas of harbour seals for improved regional management of MPAs with seals as designated features.
4. **Coastal processes modelling:** this will seek to understand the coastal processes operating along the County Down and County Louth coasts to enable long-term planning decisions to underpin the development of cross-border Marine Management Plans for the MPAs.

These models (alongside existing datasets and the models anticipated to be produced as part of the COMPASS project, as per Section 5) will provide the sound scientific evidence base required for marine management plan development for MPAs.

It is anticipated that six MPA marine management plans (MMP) (2 site-specific and 4 regional) will be delivered by the project, using a cross-border, collaborative focus and extensive stakeholder engagement:

Site-Specific MMP	1. Murlough Special Area of Conservation (SAC), County Down, Northern Ireland 2. Carlingford Lough Special Protection Areas (2 adjacent cross-border sites – Ireland and Northern Ireland)
Regional MMP	3. Outer Hebrides region, Scotland 4. Argyll region, Scotland 5. North Coast Ireland – North Channel (cross-border – Ireland and Northern Ireland) 6. County Down – County Louth (cross-border – Ireland and Northern Ireland)

The MarPAMM project partnership proposed that all MPA MMPs will follow the most up-to-date recommended best practice for the management of MPAs, including, for example, the Convention for the Protection of the Marine Environment of the NE Atlantic (OSPAR) Guidelines for Management of Marine Protected Areas.

It is anticipated that targeted stakeholder engagement will play a crucial role in the development of all the MMPs and the promotion of their adoption. It is proposed that the following will benefit from the production of MPA management plans:

- **Key stakeholders (e.g. coastal communities, fishing industry, recreational interests etc.)** will have the opportunity to feed into and shape the management of MPAs. They will also have the opportunity to feed their aspirations for MPAs into the process to produce a collective vision and identify benefits from the MPAs.

- **Government advisers and decision-makers** will be able to use the MPA management plans to support wider discussions on marine management e.g. through marine spatial planning. The plans will make it easier to integrate MPAs with other key marine policy areas.
- **Conservation/MPA practitioners** will learn lessons from the regional MPA management plans, which will help inform future conservation practice.

The MarPAMM project's outputs will be delivered through a series of co-designed work packages, with a separate work package for each model, and a further work package for development and implementation of the MPA management plans. Work package leads are distributed across the partnership, based on partner expertise, and each work package has a number of partners contributing to it from across the eligible region.

The following seven work packages have been developed:

Table 7.1: Summary of MarPAMM Project Work Package (Per Progress Reports)
1. Management
2. Seabird modelling
3. Benthic habitat mapping and modelling
4. Marine Mammal modelling
5. Coastal Processes
6. MPA management plans
7. Communication

The MarPAMM Project Steering Group, consisting of the lead partner's project officers (Project Coordinator, Project Manager and Administration Officer), representatives of each partner organisation and work package leads, will oversee the activities delivered as part of the project. It will be the main decision-making body in the consortium and will have overall responsibility for the project. It will ensure governance and the overall project quality and coherence.

The Steering Group will meet formally twice a year, with inter-sessional meetings facilitated by teleconferencing to coincide with the quarterly reporting and claim cycle.

An external MarPAMM Advisory Group, comprising Statutory Bodies, non-governmental organisations (NGOs) and other organisations responsible for the use, management or curation of data associated with managing MPAs (e.g. MS, SNH, DAERA, NPWS, the UK Joint Nature Conservation Committee, National Trust, Northern Ireland Marine Taskforce etc.) will ensure the relevance of work to policymakers and end-users. It is anticipated that the Advisory Group will also provide a formal structure for links with other projects funded at European level. The Advisory Group will be invited to attend annual project meetings and to comment on progress reports quarterly.

Regularly scheduled interaction between the Advisory Group and the Steering Group will aim to ensure coherence between work packages and review will be undertaken at the quarterly meetings.

The Project Coordinator (within AFBI) will be in charge of all scientific aspects of the project and will be the overall Project Lead. This individual will be assisted by a Project Manager (within AFBI) who will:

- Manage and coordinate the project;
- Support the scientific team;
- Link the AFBI administration and the partners' teams;
- Ensure that the project's administration runs smoothly and complies with all reporting obligations and regulations;
- Organise partnership meetings, compile reports and claims, liaise with the Programme Secretariat and between the scientific and policy aspects of the project;
- Prepare (and update quarterly) a simple Activity Plan and an updated Risk Register for the Project Steering Group; and

- Survey dependencies based on weather conditions, as this is the most likely source of risk to deliverable slippage, and where possible suitable contingencies will be put in place for this e.g. allowing extra time for surveys and have vessel time in reserve in case it is needed should a survey be adversely impacted by weather.

There will also be a full-time Administrative Assistant to assist with compiling project reports and compiling and verifying financial claims. This core group of staff at AFBI, together with the Communications work package lead (within SAMS) will comprise the Project Management Team. The Project Management Team will be supported by AFBI's Corporate Support Office which includes financial and administrative functions.

Project progress and evaluation will be an ongoing activity. The Project Manager will collate quarterly reports from each partner showing actual outputs against indicators presented in the application form, and progress in each of the activities.

Internal monitoring will be undertaken continually by the Project Manager, with supervision from the Project Coordinator.

7.3 Project Budget

The total proposed MarPAMM project costs are €6,361,317, of which €5,385,015 (85%) is anticipated to be funded from the INTERREG VA Programme[112].

Table 7.2: Anticipated Project Costs	
Proposed Project	**Total Project Costs**
Staff Costs[113]	€3,651,279.91
Office and Administration Costs	€547,691.92
Travel and Accommodation	€339,794.00
External Expertise and Services	€1,299,672.00
Equipment	€522,879.62
Infrastructure and Works	€0
Total	**€6,361,317.45**

Table 7.3: Anticipated Project Funding		
Funding Sources	**Value (€)**	**Source**
Cash Contribution (Partner Supplied/other grant)	€368,143.94	AFBI, SNH, MSS and SAMS
In-kind Contribution (Partner Supplied)	€0	
Sub-Total	**€368,143.94**	
Central Government Match Funding	€608,158.04	
ERDF	€5,385,015.47	
Total Grant Funding	**€5,993,173.51**	
Total	**€6,361,317.45**	
Intervention Rate (% ERDF)	**85%**	

There will be no revenue generated during the MarPAMM project.

[112] Per Letter of Offer (dated 5th July 2018).
[113] It is anticipated that 54 posts (21 full-time and 33 part-time) will be associated with the delivery of the MarPAMM project, of which 25 will be new posts created by the project.

7.4 Anticipated Project Objectives, Outputs & Results

7.4.1 Objectives

The MarPAMM project partnership has established the following objectives[114]:

Table 7.4: MarPAMM Project Objectives

The MarPAMM project will collaboratively deliver, by October 2021, four new, coherent and cross-disciplinary models to support the conservation of marine habitats and species, through the following integrated elements:

1. A **seabird model** designed to quantify and help manage protected seabird species within the INTERREG VA region's Special Protection Areas (SPAs) and understand how birds are being impacted by key pressures, to inform MPA management plans as well as wider stakeholders. The model will:

    - Collate all existing data and collect additional new survey data on seabird population sizes and distributions throughout the eligible region, by October 2020.
    - Analyse the population sizes, trends and distributions of a diverse selection of key bird species at colony SPAs, estimating the likely impact of changes in survival and/or productivity upon future population sizes to inform potential MPA management options (by April 2020).
    - Quantitatively examine the interactions between key seabird species and fisheries activities, to provide further evidence required for the design of MPA management actions (by October 2020).
    - Assess the impact of future climate change scenarios on key seabird species, to inform potential MPA management options (by October 2019).

2. A novel **benthic habitats and species model** will be produced to examine the distribution and connectivity of key habitats and species of conservation value throughout the INTERREG VA region to support a well-managed network of MPAs across the region. It is anticipated that the benthic habitats model will address maerl, fan mussels, horse mussels, burrowed mud/seapens and common skate habitat (*D. intermedia* (flapper skate) and *D. flossada* (blue skate)). The model will:

    - Establish coordinated and collaborative stakeholder liaison to determine modelling priorities (by September 2018).
    - Produce a benthic species distribution model, providing information from key species, habitats and substrates (seabed types) to help understand and communicate to stakeholders the species representation and any existing replication within the MPA network (by April 2021).
    - Undertake new high-resolution seabed surveys and mapping of benthic species and habitats to fill key gaps in data coverage across the eligible area (by April 2021).
    - Undertake connectivity modelling, using hydrodynamic models anticipated from the COMPASS project and other sources, to better understand dependencies between areas in supporting ecologically healthy benthic populations (by July 2021).
    - Examine how benthic communities can be used as management units (by April 2021).
    - Methodically explore the viability of novel technologies (e.g. marine robotics) for the low-cost routine monitoring of MPAs, which are compatible with monitoring management actions (by July 2021).

3. The **marine mammals model** aims to examine the movement of seals, levels of underwater noise, and the potential impacts of this noise on seal foraging behaviour, thereby providing key information for the improved regional management of MPAs with seals as designated features. The model will:

    - Complete data collation and data analysis using the latest techniques and knowledge to identify important areas for seals, such as foraging habitat, allowing MPA management measures to be based on sound scientific advice (by June 2020).
    - Map shipping pressure at relevant spatial scales, to identify potential pressures on seals (by June 2020).
    - Undertake underwater noise monitoring and assessment at a regional scale, to build on existing initiatives (including those anticipated to be undertaken as part of the COMPASS project) and together inform MPA management for noise-sensitive species (by June 2021).

4. A **coastal processes model** is proposed for the County Down and County Louth coasts to enable long-term planning decisions to underpin the development of MPA management plans. This includes:

[114] Source: Stage 2 Application Form/Business Plan.

Table 7.4: MarPAMM Project Objectives

- A geomorphological analysis of coastal processes in Murlough SAC and the wider County Down and County Louth region (by December 2020).
- Targeted coastal survey work and modelling to understand process-responses of the coast to change physical conditions (by June 2020).
- Evaluation of the processes controlling specific bedforms important in MPA designations, such as sand habitats (by December 2021).
- Examining scenarios and modelling of future shoreline behaviour in the context of projected climate and sea-level changes and indicating future extents of coastal flooding and erosion potential (by November 2020).

The MarPAMM project will collaboratively develop and implement, by December 2021, six marine management plans, applying a novel regional approach. These will be based on a sound scientific evidence base provided by the four new models developed by MarPAMM, along with existing data and models (including those anticipated to be prepared/developed as part of the COMPASS project). The following MPA management plans will be delivered:

Site-Specific MMP	1. Murlough Special Area of Conservation (SAC), County Down, Northern Ireland 2. Carlingford Lough Special Protection Areas (2 adjacent cross-border sites – Ireland and Northern Ireland)
Regional MMP	3. Outer Hebrides region, Scotland 4. Argyll region, Scotland 5. North Coast Ireland – North Channel (cross-border – Ireland and Northern Ireland) 6. County Down – County Louth (cross-border – Ireland and Northern Ireland)

7.4.2 Outputs & Results

Per the Letter of Offer (dated 5th July 2018), the anticipated (approved) MarPAMM Project Outputs are as follows:

Programme Output Code	Name of Output	Programme Output Indicator Target[115]	MarPAMM Project Target
2.212	Models developed to support the conversation of habitats and species	5	4
2.213	Marine management plans for designated protected areas complete	6	6

Additional conditions specified by the Steering Group (per the Letter of Offer, dated 5th July 2018) that may relate to impacts include:

- A recommendation that the marine mammals work package for seals is reconciled with other marine projects to avoid any duplication and to take account of the preferred location of the Departments for the monitoring of seals (i.e. off the coast of Counties Louth and Down).
- Externally recruited staff are to start at the bottom point of the salary scale unless approval is sought from and granted by the SEUPB to start at a higher point on the salary scale.

The results indicator is *"an increase in the cross-border capacity for the monitoring and management of marine protected areas and species".* The stated baseline value for 2014 (start of the Programme period) is 'a little collaboration', whilst the target value for 2023 is a 'lot of collaboration'. The MarPAMM project partners envisage that the project will have a positive contribution towards the results indicator as the project will collaboratively deliver, by October 2021, four new, coherent and cross-disciplinary models to support the conservation of marine habitats and species, and six marine management plans - these will be based on a sound scientific evidence base provided by the four new

[115] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

models developed by MarPAMM (alongside existing data and models anticipated to be prepared as part of the COMPASS project).

7.5 Contribution to the Priority's Specific Objectives & Result Indicators

This section considers the MarPAMM project's key achievements (as of May 2019) and the extent to which the MarPAMM project has:

- Contributed to the achievement of the Priority's Specific Objectives;
- Contributed to the achievement of the targets for the Result Indicators;
- Contributed to:
  - EU 2020 objectives;
  - The Atlantic Strategy; and
  - The horizontal principles of equality and sustainable development.

and where appropriate, the section:

- Identifies any external factors that have impacted, positively or negatively, on the project's ability to contribute to the achievement of the Specific Objective.

7.5.1 Key Achievements (to May 2019)

Discussion with the project partnership indicates that, as of May 2019, activities are underway that will contribute to the delivery of the project's anticipated (approved) outputs. Notably, the project partnership has been undertaking various data collection and research activities, including surveys and the collection of video footage.

In addition, the MarPAMM project partners cite, within their progress reports, the project's key achievements (as of September 2018) as being:

Period	Dates	Key Achievements[116]
1	1st January 2018 – 31st March 2018	• Stakeholder engagement was undertaken e.g. to get letters of endorsement for the project and to identify and refine stakeholder requirements, especially from policymakers across the three jurisdictions, to ensure the project application meets their needs. • UU completed some field visits and collected some existing reports and historical coastal information (as part of the Coastal Processes work package).
2	1st April 2018 – 30th June 2018	• MSS undertook ('at risk') a recruitment exercise for a Marine Ornithologist and a Project Officer. • BWI began survey work ('at risk') between April and late May in relation to cliff-nesting bird monitoring. Preliminary draft results indicated that 3,117 Apparently Occupied Nests were recorded and 214 Guillemot and 373 Razorbill individuals. • A Species Distribution Modeller was recruited ('at risk') by MSS to work full-time on the MarPAMM project. • Between 5th - 14th May 2018, a survey (0618A) was undertaken in the Scottish part of the INTERREG VA region to collect underwater videos which will be analysed to identify locations where benthic species of interest are present.

[116] NB: the MARPAMM project did not receive its Letter of Offer until July 2018 and it was not agreed until the beginning of August 2018. Due to delays in award of Letter of Offer, the majority of partners, including the lead partner, were not able to proceed 'at risk'.

Period	Dates	Key Achievements[116]
3	1st July 2018 – 30th September 2018	• The Letter of Offer was approved, and all partners (with the exception of SNH[117]) formally began work on the project in September 2018. • The official launch of the project took place on the 12th September 2018 at AFBI's offices in Belfast. It was attended by all project partners and Steering Group representatives were elected during this meeting. • As part of the Benthic habitat mapping and modelling work package: – Video footage collected on the project survey was analysed. – SAMS commenced testing on UAV (Unmanned Aerial Vehicle) and new anodes and cable were purchased to facilitate testing.

7.5.2 Project Output Indicators

Discussion with the MarPAMM project partnership indicates that whilst the anticipated (approved) project outputs have, as of May 2019, not been achieved (albeit, it was not expected of the project at this stage in its implementation, as they have a 2023 delivery date), the project is being implemented as planned and making positive progress towards achieving its outputs.

Programme Output Code	Name of Output	Programme Output Indicator Target[118]	MarPAMM Project Target	Status (as of May 2019)
2.212	Models developed to support the conversation of habitats and species	5	4	0
2.213	Marine management plans for designated protected areas complete	6	6	0

7.5.3 The Priority's Result Indicator Targets & Specific Objectives

Given the early stage of the project's implementation and the fact that the project has yet to achieve its anticipated (approved) project outputs, the MarPAMM project is, therefore, at May 2019, making only marginal progress towards the Priority's Result Indicator Targets and Specific Objectives. However, this should be expected at this stage of the project's implementation (as they have a 2023 delivery date), and should not be considered a concern.

7.5.4 EU2020 Objectives

Whilst the MarPAMM project is not overtly focused on economic growth, it does seek to encourage 'sustainable' growth through the project activities being implemented, thereby contributing towards preventing environmental degradation and the unsustainable use of resources.

7.5.5 The Atlantic Strategy

Whilst a well-managed network of MPAs would likely meet the objectives established in the Biodiversity Strategies developed in Ireland, Northern Ireland and Scotland, the MarPAMM project partnership notes that the project can also support the development of a sustainable 'Blue Economy' by fostering the ecosystem services provided by MPAs, such as the provision of nursery grounds for commercial fish/shellfish species, enhancing water quality or playing a role in climate change adaptation and resilience. It is anticipated that many of these activities will contribute towards the five themes of the EU's Maritime Strategy for the Atlantic Ocean area i.e. the 'Atlantic Strategy', as per Appendix I.

[117] SNH did, however, provide an 'in kind' contribution of staff time, which involved attending the project kick-off meeting and undertaking work package leadership and coordination roles.
[118] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

7.5.6 The Horizontal Principals

The MarPAMM project aims to protect and improve the quality of the environment - a key component of sustainable development and as such it is anticipated that it will serve to contribute (at least in part) to the EU's three Horizontal Principals, per the following discussion:

Sustainable Development	The MarPAMM project partnership notes that the proposed project outputs (4 models to support the conservation of marine habitats and species and 6 marine management plans) will derive both public and environmental benefits and align to a number of key EU directives and regional strategies, such as: • EU Sustainable Development Strategy (SDS); • Scottish 'Choosing Our Future' SDS (2005); • Northern Ireland's 'Everyone's Involved' SDS (2010); and • 'Our Sustainable Future: A Framework for Sustainable Development for Ireland' (2012). The models developed by MarPAMM (alongside those anticipated to be developed as part of the COMPASS project) will form a solid evidence base for sustainable management plan development, in line with the SDS principle of ensuring policy is developed and implemented on the basis of strong scientific evidence (whilst taking into account scientific uncertainty through the precautionary principle) as well as public attitudes and values (highlighting the key role of effective stakeholder engagement). The primary long-term goals of the MarPAMM project have been aligned to the three pillars of sustainable development as follows: **<u>Environmental Benefits</u>** • Improved understanding of marine habitats and species, tailored to underpin development and implementation of MPA management plans and fostered by practical examples of good practice; • An increase in the area of MPAs under effective management resulting in the better protection and conservation of MPA features; • Improved and safeguarded ecosystem services from MPA features e.g. to sustain good water quality or commercial species nursery grounds; • Improved resilience of MPAs to climate change through understanding how management can promote climate change adaptation or mitigation; and • Providing the Irish Marine Habitat Map with new data (as per the 'Our Sustainable Future' target). **<u>Social Benefits</u>** • Potential identification of emerging sustainable industries that are compatible with MPA management, such as marine recreation and tourism, suitably scaled aquaculture, low-impact fishing techniques etc.; • Greater stakeholder involvement in environmental management and local community cohesion over shared MPA stewardship; • Opportunities for volunteering (e.g. seabird surveys); • Improved access to information about the marine environment; • Enhanced education and employability through marine skills initiatives e.g. incorporating MarPAMM research in undergraduate and postgraduate degree courses, and potential for numerous student projects using MarPAMM data and outputs. **<u>Economic Benefits</u>** • Fostering a better understanding of the relative importance of pressures on protected species and habitats, enabling better assessment of the likely consequences of marine development (more targeted and realistic impact

	assessments) and better design of conservation measures. Safeguarding of ecosystem services provided by better managed MPAs will ensure natural resources (water quality, fish/shellfish nursery grounds) are available to support the growth of sustainable industries; • Providing a cost and scientifically effective collaborative approach to the design of marine management strategies at regional scales; • Providing ecotourism opportunities; • Benefits to fisheries through improved environmental management, including opportunities to improve integration of fisheries interests (e.g. through initiatives similar to the Irish National Inshore Fisheries Forum); • Jobs created and/or safeguarded through the improved ecosystem services resulting from well managed MPAs. The MarPAMM project will incorporate sustainable practices throughout its project design and execution. The partners will assess each aspect of any proposed activity in an environmental impact register, which will be managed by the Project Manager.
Equal opportunity and non-discrimination	Each of the MarPAMM project partners is committed to delivering the project in full accordance with the principles detailed in the relevant legislation in each jurisdiction, namely: **Northern Ireland** • Equality Act 2010. • Section 75 of the Northern Ireland Act 1998 (NI). • Section 49A of the Disability Discrimination Act 1995. **Ireland** • Employment Equality Act 1998. • National Disability Authority Act 1999. • Equal Status Act 2000. **Scotland** • Equality Act 2010 (with Specific provisions for Scotland) Each MarPAMM project partner will promote equality of opportunity and good relations in all areas of the project, with all individuals being treated in a fair and equal manner and in accordance with the law regardless of gender, marital status, race, religious belief, political opinion, ethnic origin, age, disability or sexual orientation. Good practice will be promoted through Equality Screening and the provision of an Equality Impact Assessment (if deemed necessary). The MarPAMM project partners have identified a number of specific measures to promote equality and encourage cross-border, cross-community and all-inclusive involvement in the design and execution of monitoring programmes in the eligible area. This will include: • Extensive stakeholder engagement and targeted consultation prior to activities. • Working with local schools and educational programmes in all three jurisdictions. In addition, AFBI (as Lead Partner) is committed to equality of opportunity and to creating and sustaining a working environment where everyone is treated with respect and dignity, free from any form of inappropriate behaviour, and one in which all employees can give of their best. This is embodied in the AFBI Value 'Respecting People' and its Associated Behaviours, and in the Dignity at Work Policy. AFBI's commitment to equality of opportunity is embedded in the equality awareness training for all staff.

Equality between men and women	Each of the project partners has clear policies on equality between men and women. Indeed, it is noted that several of the project partners have developed their equality policies through engagement with Athena SWAN[119] (e.g. UU and UCC have obtained bronze Athena Swan awards in recognition of the innovative equality policies that they have in place). The project partnership commits to ensuring that there are equal recruitment opportunities for both women and men. Whilst females are generally underrepresented within leadership roles in science, the MarPAMM project partnership notes that the Project Coordinator is female. Furthermore, the project partners will strive for gender equality across the partnership structure, including within the Advisory Committee. The project partnership is committed to increasing the gender balance in European Research and Technological Development (RTD) and will promote substantial involvement of senior female staff members across the whole project. Gender is an integral part of the hiring and organisational policies of the MarPAMM project partners, and in project management and operation - all partner institutions are committed to equal opportunity policies and encourage applications from women.

7.5.7 Contribution to Other Strategies

The MarPAMM project has been designed to increase capacity for monitoring and management of MPAs and to enhance the eligible region's ability to address such challenges. In doing so, it is closely aligned with a number of key EU directives and regional strategies, such as:

- Marine Strategy Framework Directive (MSFD);
- Biodiversity and Habitats Directives (including the Natura 2000 network of SPAs and SACs[120]);
- UN Convention on Biological Diversity;
- OSPAR Convention;
- EU Sustainable Development Strategy;
- EU Adaptation Strategy;
- 'Harnessing Our Ocean Wealth', the Integrated Marine Plan for Ireland;
- Irish National Biodiversity Plan 2017-2021; and
- Northern Ireland Biodiversity Strategy – which cites that, by 2020, at least 10% of coastal and marine areas should be conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other area-based conservation measures.

In addition, the Galway Statement, the Marine Knowledge 2020 Strategy and the Atlantic Strategy all call for an increase in communication – it is anticipated that the data management and communication strategies established as part of the MarPAMM project will contribute towards these policy objectives and associated initiatives e.g. European Marine Observation and Data Network (EMODnet).

[119] Athena SWAN is a charter established and managed by the UK Equality Challenge Unit. It recognises and celebrates good practices in higher education and research institutions towards the advancement of gender equality: representation, progression and success for all.
[120] Natura 2000 is a network of nature protection areas in the EU. It is made up of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) designated respectively under the Habitats Directive and Birds Directive.

7.6 Effectiveness of the Cross-Border Collaboration & Partnership Working

This section considers aspects of the MarPAMM project's collaborative and partnership working including:

- The effectiveness and added value of the MarPAMM project's cross-border collaboration in relation to the specific objectives;
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The MarPAMM project partners note that cross-border collaboration, at a number of levels, will deliver enhanced cross-border capacity for monitoring and management of marine protected areas and species. These include:

- **Operational**: daily operational contact between staff from the 3 jurisdictions.
- **Institutional**: cooperation between the project partners across the three jurisdictions.
- **Research**: development of shared modelling approaches and research of common management challenges. Deliverables will include co-developed research translation for policy toolkits, joint peer-reviewed publications and postgraduate doctoral degree (PhD) supervision.
- **Data and information**: cross-border data sharing and joint data collection will be facilitated.
- **Policy**: the project will inform future policy through the participation of policy departments via the project's Advisory Committee (i.e. MS, SNH, DAERA, NPWS and the UK Joint Nature Conservation Committee) and embedded within stakeholder engagement.

It is anticipated that this cooperative approach will bring efficiencies and economies of scale by supporting shared planning, resources and assessments.

As discussed, the MarPAMM project will deliver a number of cross-border MMPs for MPAs, which will be facilitated by the development of four regional models across the eligible area. The partnership report that this will be achieved through the following activities:

Joint development and implementation	The MarPAMM project partnership has taken an integrated approach to developing the project, which comprises defined contribution and task management from each partner, which is coordinated by the lead partner. This is considered by the partnership to be crucial to the success of the project, as it is where the 'groundwork is laid' for partnership pathways and it is also essential for a positive project legacy of enhanced cooperation. The MarPAMM project partnership notes that the benefits and advantages of the cross-border approach for the project are based on the fact that the partnership retains a vast repository of knowledge and skills in different areas. The added value and primary benefit of the partnership are that knowledge and skills between partners, and between jurisdictions, can be leveraged. The partners have also collaborated successfully on previous (and ongoing) INTERREG projects. The project Steering Group will ensure that the implementation of the MarPAMM project is well balanced and jointly executed - this will be monitored by parties both internal and external to the project partnership. The lead partner Project Manager, supported by the work package leads and administrative teams in the partner organisations, will coordinate and manage all activities to ensure full cross-border integration. The MarPAMM project partnership notes that each of the work packages involves multiple partners. In those instances when new surveys are required within modelling work packages, personnel from different partner organisations will be placed for periods onboard partner vessels to maximise knowledge exchange and ensure a common standard and quality of final deliverables. Partner survey vessels will not be constrained by maritime boundaries so that cross-border data collection can be undertaken. In addition, work shadowing and the use of technical workshops

	are embedded within all work packages to ensure cross-border collaboration and knowledge exchange. The project aims to upskill partners in: • The use and implementation of new and evolving technologies e.g. the use of Autonomous Underwater Vehicles (AUV) for habitat mapping; • Best practice in species distribution modelling; and • The preparation and collaborative development of marine management plans etc.
Joint staffing	The day-to-day management and leadership of the project will be undertaken by the Project Management Team at AFBI and all project communications will be overseen and managed by a project communications officer within SAMS. Each work package has a lead from the partnership, who will be responsible for delivery of that work package (with support from relevant project partners). Furthermore, for the technical work packages (models and management plan preparation), it is anticipated that staff will spend time with partner institutions training, being trained, coordinating and supporting the implementation of deliverables.
Joint financing	The MarPAMM project partnership notes that all seven work packages are jointly financed across the partnership, which demonstrates a commitment from each partner to deliver outputs that will deliver benefit throughout the region and ensure responsibility for delivery is shared. Each partner will be allocated a budget and will have control over their internal administration and accounting. AFBI, as Lead Partner, will, however, have overall responsibility for the administration and reimbursement of spend to each partner.

Given that many of the project partners (e.g. AFBI, MSS and SAMS) are involved in other INTERREG VA funded projects (such as COMPASS), it is anticipated that there will be, wherever possible, shared learning between projects and no duplication of resources.

In addition to the above, the MarPAMM project partnership has adopted a collaborative and partnership working approach by being involved in 'synergy meetings' with other EU funded projects e.g. the COMPASS and Sea Monitor 2 projects (as per Section 5 and 8 respectively). As part of this, the various partnerships have agreed to, amongst other things, prepare joint communication publications such as ezines and to potentially host a joint conference/seminar in November 2019.

7.7 Barriers to Cross-Border Cooperation

This section considers whether the MarPAMM project has encountered any barriers to cross-border cooperation that the priority axis is not addressing.

From the outset, the MarPAMM project partners were mindful that there were many potential constraints[121] and risks that could have a significant impact on the delivery of the MarPAMM project and given this have developed a strategic risk register with potential mitigation measures.

The MarPAMM project partners note, however, that one of the key risks to cross-border cooperation not evident at the time of its application for funding was the delay between making a finance claim to the SEUPB and that finance being available to individual project partners. One of the MarPAMM project partners is a registered charity (BWI), which relies heavily on having sufficient cash flow to deliver its project activities. The MarPAMM project partners note that cash flow issues for this particular partner have posed a risk to project delivery, which has delayed the implementation of those work packages that BWI is involved in. This, in turn, has the potential to impact on cross-border cooperation between the project partners. It is, however, understood that the Lead Partner is working with the BWI to ensure that it has sufficient cash flow on a quarterly basis to deliver its allocated work packages.

[121] At the outset potential constraints were identified as falling under headings such as general, technical/environmental, financial, organisational, economic, social, management, legal or timing.

7.8 Best Practice & Learning

This section considers whether the MarPAMM project has resulted in any areas of best practice and learning.

Within Northern Ireland, there is (as of May 2019) work being undertaken by the Causeway Coast and Glens Heritage Trust (CCGHT) and other stakeholders to develop site-specific management plans for:

- Skerries & Causeway SAC;
- Red Bay SAC; and
- The Maidens SAC.

Whilst it is (at May 2019) too early for the MarPAMM project to have resulted in any areas of best practice and learning, the project partners anticipate that work undertaken to develop the North Coast Ireland – North Channel (cross-border – Ireland and Northern Ireland) regional MMP will ensure that any best practice and/or lessons learned from the above site-specific management plans (and vice versa) will be factored into the relevant work package (as applicable).

7.9 Mainstreaming Activities

This section considers whether the implementation of the MarPAMM project has led to any mainstreaming of cross-border delivery of environmental work.

Whilst it is (at May 2019) too early for the MarPAMM project to have led to any mainstreaming of cross-border delivery of environmental work, the project partners anticipate that:

- Data and information held across the project partnership will be utilised (as appropriate) to promote cross-border coordination of future research programmes in shared marine waters in an effort to underpin MPA management.
- Education and employability will be enhanced through marine skills initiatives e.g. by incorporating the research emanating from the MarPAMM project into undergraduate and postgraduate degree courses and potentially making the project's data and outputs available to students.
- Vital linkages to marine managers (via the project partners links to policy groups in the relevant jurisdictions) will ensure the adoption of the MarPAMM project outputs into operational use. It is anticipated that the project partners will engage with relevant policy leads during the course of the project to ensure adoption.
- The models developed will be retained in public ownership, which will provide an opportunity to maintain and develop the models beyond the project lifetime.
- Knowledge transfer workshops and mobility programmes will be provided to mitigate against the risk of loss of skills or facilities within any one jurisdiction.

More specifically, in relation to the four models, the following is anticipated:

- **Seabirds model:** the component parts of the model will be made publicly available on the MSS website, accompanied by user manuals and demonstrations. It is proposed that these actions will ensure that they can be maintained and further developed after the MarPAMM project has finished.
- **Benthic habitats model:** a modelling toolkit will help ensure that updating and maintenance of models will be facilitated within existing work programmes both within the MarPAMM project partnership and beyond. Key information can, therefore, continue to be provided for MPA management.
- **Marine mammals model:** the component parts of the model will be made publicly available on the MSS website, accompanied by user manuals and demonstrations. It is proposed that these actions will ensure that they can be maintained and further developed after the MarPAMM project has finished.
- **Coastal processes model:** The monitoring protocols for coastal processes developed by the MarPAMM project will benchmark future nearshore/coastal monitoring approaches. It is anticipated that this will leave a legacy of knowledge and skills that will be shared among many parties within Northern Ireland, Ireland and Scotland.

8. SEA MONITOR 2

8.1 Introduction

This section of the report considers the Sea Monitor 2 project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 2 – Manage Marine Protected Areas and Species.

8.2 Project Overview

New and existing commercial activities are rapidly developing around the coasts of the programme's eligible area e.g. sub-sea marine renewables, fish farming, offshore wind farms, dredging, harbour development, oil and gas exploration and extraction, and commercial fishing. A key strategic objective across the programme's eligible area is, therefore, *"to manage human impact on the marine environment"*[122].

There is, however, a recognition that the current level of knowledge and information on such activities limits how the guiding principle of sustainable development can be translated into definitive planning policy[123]. This paucity of information directly affects the rate of development and success of strategically important marine businesses and conservation activities.

To mitigate against potentially adverse environmental impacts of such activities, and to ensure they are developed in a sustainable manner, there is a requirement for high-quality evidence to allow the development of balanced national and cross-jurisdictional management plans. In this context, highly mobile marine species are particularly difficult to manage, as a multi-jurisdictional approach is often required.

Furthermore, several key EU directives (e.g. the Habitats Directive and the MFSD) require specific monitoring and information to evaluate implementation outcomes. There are, however, notable gaps in the information retained, particularly in relation to MPAs (the information is particularly weak for large mobile marine species).

To this end, the Sea Monitor 2 project – involving the key stakeholders in marine environmental research and conservation across Scotland, Ireland and Northern Ireland – has been developed to address this knowledge gap. It is anticipated that the project will bring together and interpret existing information in the context of the conservation and management needs of important species and habitats in marine management plans.

Considerable evidence gaps exist for several species and habitats. It is anticipated that the Sea Monitor 2 project will address some of these gaps by utilising modelling techniques (built upon existing data) to identify management options and alternative management outcomes. Where empirical data does not exist but is important to deliver successful management outcomes, the Sea Monitor 2 project partnership proposed to undertake studies to collect additional data.

A key objective of the project is, therefore, to further develop cross-border capacity for the monitoring and management of marine protected areas and species.

The Sea Monitor 2 project partnership intends to:

- Develop 5 models to support the conservation of marine habitats and species. These include:
  - Spatial distribution of harbour seals;
  - Common skate spatial movement along with North Antrim coast (including population structuring and Loch Sunart to Jura MPA);

[122] As cited in the Scottish Government's National Marine Plan and the Irish Government's 'Harnessing Our Ocean Wealth' - the Integrated Marine Plan for Ireland.
[123] As referenced in the Scottish Government's National Marine Plan, Section 3.3.

- Cetacean spatial usage of the area;
- Salmonid marine migration pathway model for the Foyle, Bush and Clyde rivers; and
- Basking shark spatial usage of Malin/Islay area.

- Develop 3 Marine Management Plans (for designated protected areas). These include:

  - Loch Sunart to Jura MPA for Common skate;
  - Foyle area Marine Management Plan for Atlantic salmon; and
  - Clyde area Marine Management Plan for Atlantic salmon.

- Extend the network of buoys proposed as part of the COMPASS project (as per Section 5), from the east coast of the island of Ireland to the north, thereby establishing a physical connection of acoustic receivers between the island of Ireland and Scotland. This will include a line from Malin to Islay and the use of Autonomous Underwater Vehicles (AUVs) to monitor movements of acoustically tagged mobile marine species of high economic and conservation value through the region. It is anticipated that these will provide data to develop models and management plans e.g. common skate, salmonids, basking sharks etc.

The following three work plans have been developed:

Table 8.1: Summary of Sea Monitor 2 Project Work Plans (Per Progress Reports)
1. Management (M)
2. Implementation (T1), including: • Spatial model for Common skate on North Antrim coast and North Channel (T1.1) • Spatial distribution of harbour seals (T1.2) • Cetacean spatial usage model Malin/Islay (T1.3) • Salmonid migration pathway model for Foyle, River Bush and Clyde (T1.4) • Spatial usage model for basking shark Malin/Islay (T1.5) • Loch Sunart to Sound of Jura Management Plan (T1.11) • Foyle Area Atlantic Salmon Management Plan (T1.12) • Clyde Estuary Marine Management Plan for Atlantic salmon (T1.14) • Data and Technical Support from MI - Ocean Science Services (OSIS), Fisheries Ecosystems Advisory Services (FEAS) and INFOMAR[124] (T1.13) • Sea Monitor 2 Project Scientific Staff (T1.14)
3. Communication (C)

The Sea Monitor 2 project partnership is led by the Loughs Agency (LA) and is made up of the Marine Institute (MI), the University of Glasgow (UoG), Queen's University, Belfast (QUB), the Agri-Food and Biosciences Institute (AFBI), University College, Cork (UCC) and Galway-Mayo Institute of Technology (GMIT) as funded partners. There are also two non-funded partners, namely: Ocean Tracking Network, Dalhousie University (Canada) and University of California, Davis (USA)[125].

As Lead Partner, LA will take responsibility for the overall management and delivery of the project. A Project Board has been established, which is chaired by the Chief Executive Officer (CEO) of the LA and includes representation from each partner organisation. A project team has been appointed by the LA, which is led by a Principal Project Officer who has overall responsibility for the delivery of the science and administration functions. This individual is supported by a Finance Officer and a Clerical Officer (who have collective responsibility for the day-to-day administration and financial control/probity of the project).

[124] The Integrated Mapping for the Sustainable Development of Ireland's Marine Resource Programme, which creates integrated mapping products of the physical, chemical and biological features of the seabed in the near-shore area.
[125] NB: Per the Letter of Offer (19th November 2018), the Canadian and USA partners are not allocated any funding but bring additional expertise to the project. For example, the University of California Davis (as partners to QUB) is contributing 40+ additional acoustic receivers (equivalent to €80,000) to aid the animal tracking components (skate, basking shark, seals and salmonids).

In terms of project implementation:

- A Project Steering/Management Group has been established to monitor the progress of actual versus planned activities, identify potential issues with project delivery and associated solutions, ensure allocated resources are used to deliver the best technical solutions and to report on risk (delivery, financial and safety) to the Project Board.
- The Principal Investigator is supported by two Senior Scientific Officers and a Higher Scientific Officer, who are available to support the project partners across all work activities (but have specific responsibility for delivering the 3 management plans). Each of the activities proposed are led by a partner with a particular area of expertise (e.g. GMIT is leading on the cetacean spatial modelling, UCC on the seal spatial usage modelling and MI on data and technical support providing a lot of the baseline information for the development of the models and management plans with habitat mapping, and data handling etc.).

8.3 Project Budget

The total proposed Sea Monitor 2 project costs are €4,722,671, of which €4,014,271 (85%) is anticipated to be funded from the INTERREG VA Programme[126].

Table 8.2: Anticipated Project Costs	
Proposed Project	**Total Project Costs**
Staff Costs[127]	€2,431,646.01
Office and Administration Costs	€364,746.68
Travel and Accommodation	€606,889.56
External Expertise and Services	€94,192.00
Equipment	€1,225,197.06
Infrastructure and Works	€0
Total	**€4,722,671.31**

Table 8.3: Anticipated Project Funding		
Funding Sources	**Value (€)**	**Source**
Cash Contribution (Partner Supplied/other grant)	€81,234.81	UoG
In-kind Contribution (Partner Supplied)	€0	
Sub-Total	**€81,234.81**	
Central Government Match Funding	€627,165.91	
ERDF	€4,014,270.59	
Total Grant Funding	**€4,641,436.50**	
Total	**€4,722,671.31**	
Intervention Rate (% ERDF)	**85%**	

There will be no revenue generated during the Sea Monitor 2 project.

The Sea Monitor 2 project partnership notes that the MI will acoustically tag 180 Atlantic salmon smolts on three rivers located outside the eligible area (the Boyne, Liffey and Lee rivers). These fish will, however, migrate through the eligible region and there will, through the proposed work plans, be an opportunity to detect these. The total estimated budget for these activities to be undertaken outside the eligible region equates to €72,000[128].

[126] Per Letter of Offer (dated 19th November 2018).
[127] It is anticipated that 27 posts (20 full-time and 7 part-time) will be associated with the delivery of the Sea Monitor 2 project, of which 24 will be new posts created by the project.
[128] Source: Stage 2 Application Form/Business Plan.

8.4 Anticipated Project Objectives, Outputs & Results

8.4.1 Objectives

The Sea Monitor 2 project partnership has established the following objectives:

Table 8.4: Sea Monitor 2 Project Objectives[129]

Project management	Appointment of: • Project Board • Principal Investigator • Project Administrator • Financial Administrator • Clerical Officer • Annual progress reporting	 • April 2018 • June 2018 • June 2018 • June 2018 • June 2018 • January 2019, 2020 and 2021
Five models supporting marine conservation and planning	• Definition of the scope of five models • Modelling progress reporting • Study models final report	• June 2018 • Quarterly from June 2018 • December 2021
Marine Management Plans	• Definition of Common skate management plan (species & habitats) • Draft action plan circulated to stakeholders • Final Common skate plan	• December 2018 • March 2021 • December 2021
	• Definition of Foyle salmon management plan (species & habitats) • Draft action plan circulated to stakeholders; • Final Foyle plan	• December 2018 • March 2021 • December 2021
	• Definition of Clyde salmon management plan (species & habitats) • Draft action plan circulated to stakeholders • Final Clyde plan	• December 2018 • March 2021 • December 2021
Output sharing communications and stakeholder engagement	• Two Knowledge Transfer workshops • Three draft marine management plans circulated for stakeholder input • Three final marine management plans • Produce 8 peer-reviewed publications	• December 2021 • December 2020 • December 2021 • December 2024

8.4.2 Outputs & Results

Per the Letter of Offer (dated 19th November 2018), the anticipated (approved) Sea Monitor 2 Project Outputs are as follows:

Programme Output Code	Name of Output	Programme Output Indicator Target[130]	Sea Monitor 2 Project Target
2.212	Models developed to support the conversation of habitats and species	5	5
2.213	Marine management plans for designated protected areas complete	6	3

[129] NB: The Lead Partner confirmed that the project's objectives/targets, as presented in this subsection, are up to date (as of May 2019). However, during consultation, the Lead Partner advised that, in some instances, the estimated completion dates are no longer realistic or have elapsed. The project's objectives/targets have not been restated to account for new estimated completion dates.

[130] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

Additional conditions specified in the Letter of Offer (dated 19th November 2018) that may relate to impacts include:

- The extension of the COMPASS network of buoys between Malin and Islay (as proposed in the application) must be fully interoperable and compatible with the COMPASS network in operation, administration and management and does not, in any way, duplicate the COMPASS network locations, and that all INTERREG VA marine projects will freely and openly share foreground data and information for the purposes of those projects.

8.5 Contribution to the Priority's Specific Objectives & Result Indicators

This section considers the Sea Monitor 2 project's key achievements (as of April 2019) and the extent to which the Sea Monitor 2 project has:

- Contributed to the achievement of the Priority's Specific Objectives;
- Contributed to the achievement of the targets for the Result Indicators;
- Contributed to:

  - EU 2020 objectives;
  - The Atlantic Strategy; and
  - The horizontal principles of equality and sustainable development.

and where appropriate, the section:

- Identifies any external factors that have impacted, positively or negatively, on the project's ability to contribute to the achievement of the Specific Objective.

8.5.1 Key Achievements (to April 2019)

Discussion with the Sea Monitor 2 project partnership indicates that the project was launched in April 2019, although there were, however, some concerns amongst the project partners about the project's stipulated timeframe. It is understood that there were delays obtaining formal acceptance of the partnership agreement due to this.

Further discussion with the project partnership indicates that this consequently resulted in the loss of a sampling season and there were then concerns about the ability to appropriately proof data across two migration seasons.

In order to resolve this issue, it is understood that the Joint Secretariat submitted a modification request to the Steering Committee (by written procedure) requesting an additional 9 months to enable the planned data gathering and that this request was subsequently approved.

In addition, the Sea Monitor 2 project partners cite the project's key achievements (as of April 2019) as being:

Period	Dates	Key Achievements
6[131]	1st November 2018 – 31st January 2019	• The first Project Board meeting was held on the 20th December 2018. The first Project Steering Group meeting was held in January 2019. • Meeting with other relevant INTERREG VA funded projects (COMPASS, MarPAAM and CatchmentCARE), SEUPB and the sponsoring departments[132] was held.
7	1st February 2019 – 30th April 2019	• A request to extend the project by nine months to December 2022 was made to SEUPB. • The official launch was on the 10th of April 2019. • Project Partnership Agreement anticipated to be signed during period 8 - no spend incurred, nor activities toward implementation undertaken, by project partners until this is signed.

8.5.2 Project Output Indicators

Discussion with the Sea Monitor 2 project partnership indicates that whilst the anticipated (approved) project outputs have, as of May 2019, not been achieved (nor was it expected of the project at this stage in its implementation, as they have a 2023 delivery date), the project is being implemented as planned and making positive progress towards achieving its outputs.

Programme Output Code	Name of Output	Programme Output Indicator Target[133]	Programme Output Code	Status (as of May 2019)
2.212	Models developed to support the conversation of habitats and species	5	2.212	0
2.213	Marine management plans for designated protected areas complete	6	2.213	0

8.5.3 The Priority's Result Indicator Targets & Specific Objectives

Given the very early stage of the project's implementation and the fact that the project has yet to achieve its anticipated (approved) project outputs, the Sea Monitor 2 project is, therefore, at May 2019, making only very marginal progress towards the Priority's Result Indicator Targets and Specific Objectives. However, this should be expected at this stage of the project's implementation (as they have a 2023 delivery date), and should not be considered a concern.

8.5.4 EU2020 Objectives

Whilst the Sea Monitor 2 project is not overtly focused on economic growth, it does seek to encourage 'sustainable' growth through the project activities being implemented, thereby contributing towards preventing environmental degradation and the unsustainable use of resources.

[131] NB: The Sea Monitor 2 project's Letter of Offer (dated 19th November 2018) was received during this period, signalling the commencement of the project. The project partnership, therefore, reported no key achievements prior to this period (i.e. during periods 1-5).
[132] Department of Agriculture, Environment and Rural Affairs (DAERA) and Department of Communications, Climate Action and Environment (DCCAE).
[133] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

8.5.5 The Atlantic Strategy

The Sea Monitor 2 project aims to support the develop of the 'blue economy' by addressing important gaps in the understanding and knowledge of marine systems e.g. in relation to the sustainability of commercial marine developments, as identified in the Scottish Government's National Marine Plan and the Irish Government's 'Harnessing Our Ocean Wealth' - the Integrated Marine Plan for Ireland.

The Sea Monitor 2 project, therefore, has the potential to contribute towards the following priority area and associated objectives identified in the Atlantic Strategy Action[134]:

Priority	Specific Objectives
2: Protect, secure and develop the potential of the Atlantic marine and coastal environment	• Improving maritime safety and security • Exploring and protecting marine waters and coastal zones • **Sustainable management of marine resources** • The exploitation of the renewable energy potential of the Atlantic area's marine and coastal environment

8.5.6 The Horizontal Principals

The Sea Monitor 2 project aims to protect and improve the quality of the environment - a key component of sustainable development and as such it is anticipated that it will serve to contribute (at least in part) to the EU's three Horizontal Principals, per the following discussion:

Sustainable Development	The Sea Monitor 2 project is founded upon the need for sustainable solutions to environmental issues. The Sea Monitor 2 project partnership note that the proposed outputs align to a key objective of the EU's Sustainable Development Strategy, namely *"to improve management and avoid overexploitation of natural resources, recognising the value of ecosystem services".* Specifically, the Sea Monitor 2 project will contribute towards the following operational objectives of the EU's Sustainable Development Strategy: • Improving the management and avoiding overexploitation of renewable natural resources such as fisheries, biodiversity and restoring degraded marine ecosystems. • Halting and contributing to a significant reduction in the worldwide rate of biodiversity loss. In meeting these objectives, the Sea Monitor 2 project will provide information to policymakers and managers to evaluate the potential impacts of natural and manmade factors on mobile marine species of commercial or special conservation interest. It is anticipated that the marine management plans and modelling outputs from the Sea Monitor 2 project will improve the understanding of sustainability and will, therefore, support informed management interventions on a range of species of high conservation interest. As part of the project, the Sea Monitor 2 project partnership will utilise Sustainable Development Indicators (SDIs) to measure project performance and knowledge exchange activity. For example, as part of the project monitoring process, the partnership will adopt an SDI Conceptual Framework model, developing indicators that align with EU, UK and Irish Sustainable Development Strategies. Integration of project outputs with policy will ensure that the indicators are associated with relevant Government commitments, relate to principles for sustainable development and connect with the key challenges outlined in the Co-operation Programme. Furthermore, a set of indicators will be used to measure communication and awareness-raising with stakeholders.

[134] As set out in Appendix I.

	The project partnership has also reviewed the processes that will be used in the delivery of the Sea Monitor 2 project against the relevant articles in Directive 85/337/EEC (as amended by 97/11/EEC). It concluded that the processes used to deliver the Sea Monitor 2 project will have no significant negative effects, either alone or in combination, on the environment by virtue of their nature, size or location. The project partnership notes that the processes utilised will have 'neutral' to 'minor' environmental impacts, whilst the outputs will have very significant positive environmental benefits.
Equal opportunity and non-discrimination	Each of the project partners has robust non-discrimination policies as a component part of their operational policy. Equality of opportunity has, therefore, been systematically considered in all aspects of the project definition, design and delivery process (including management, monitoring and communication). The project partnership will adhere to its legal obligation in accordance with Article 16 of the EU General Regulation (1083/2006) and Section 75 of the Northern Ireland Act 1998. The Sea Monitor 2 project partners will develop a project focussed Equality Statement (ES) which will align with the non-discrimination policies of the partner organisations and will act as a governing document for the Project Board and associated Project Steering Group where it will be a standing item on the Agenda. Specific considerations will be given to: • The composition of the Project Board will be non-discriminatory, will reflect equality of sex, age, religious persuasion and physical ability. Members will be chosen purely on experience and abilities in relevant aspects of project management. Where representation is considered to be at risk, the Project Board will seek members through channels agreed in the Equality Statement. • Provision of Equality Training for the Project Board and all staff. • Staff (and trainee) recruitment/training policy – all recruitment/training opportunities will be publicly advertised, and measures put in place to facilitate less able-bodied applicants. The Sea Monitor project will comply fully with the Disability Discrimination Order. • Procurement exercises and contracts - in order to promote equality principles there will be a dedicated clause for contractors/suppliers to fully respect the equality agenda as agreed by the Project Board.
Equality between men and women	Each of the project partners has clear policies on equality between men and women. Indeed, it is noted that several of the project partners have developed their equality policies through engagement with Athena SWAN[135] (e.g. UoG and QUB have obtained silver Athena Swan awards in recognition of the innovative equality policies that they have in place). The project partnership commits to ensuring that there are equal recruitment opportunities for both women and men.

8.5.7 Contribution to Other Strategies

The Sea Monitor 2 project has been designed to address the knowledge gap that exists in the information retained in relation to MPAs (the information is particularly weak for large mobile marine species). In doing so, it is closely aligned with a number of key EU directives and regional strategies, such as:

- Marine Strategy Framework Directive (MSFD);
- Biodiversity and Habitats Directives;
- UN Convention on Biological Diversity and Strategic plan 2011–2020 - Strategic Goals C and E i.e. 'Improving the status of biodiversity by safeguarding ecosystems, species and genetic diversity' and 'Enhancing biodiversity implementation through participatory planning, knowledge management and capacity building' respectively;
- OSPAR Convention; and

[135] Athena SWAN is a charter established and managed by the UK Equality Challenge Unit. It recognises and celebrates good practices in higher education and research institutions towards the advancement of gender equality: representation, progression and success for all.

- EU Biodiversity Strategy 2011.

8.6 Effectiveness of the Cross-Border Collaboration & Partnership Working

This section considers aspects of the Sea Monitor 2 project's collaborative and partnership working including:

- The effectiveness and added value of the Sea Monitor 2 project's cross-border collaboration in relation to the specific objectives;
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The Sea Monitor 2 project partners note that there were previous projects that involved tagging, tracking and migration studies, as these were identified as critical areas and species for which there was insufficient knowledge to inform management and allocate resources or protect sensitive habitats or species. The project partnership has, therefore, designed the Sea Monitor 2 project to:

- Address the gaps identified from such projects;
- Continue to utilise systems and infrastructure developed as part of such projects; and/or
- Take forward systems and techniques into new areas or applications.

The partnership report that this will be achieved through the following activities:

Joint development	The Sea Monitor 2 project has been jointly developed by a collaborative partnership that represents the key stakeholders in policy development, marine management protection and research within the programme's eligible area. The formation of the project partnership was specifically designed to ensure that the scope of the project reflects scientific monitoring, academic research and management needs in all jurisdictions. Collectively the project partners have previously worked together on large scale projects and have planned the work packages and strategic elements of this project based on identified needs arising from such previous collaborations e.g. IBIS[136], SALSEA-Merge[137], OBSERVE[138] etc. On a smaller scale, individual project partners have previously collaborated on multiple bilateral projects. This integrated approach reflects the unique skill sets of each partner. These are detailed below: • LA – research and management of Foyle living resources, fish stock assessment, salmonid tracking, and tagging. • MI – undertake, coordinate, promote and assist in marine research and development (including oceanography, marine mapping, fish stock assessment, research vessels, marine monitoring equipment deployment and database specialists). • AFBI – salmon monitoring and research, tagging, tracking, hydro-dynamic modelling. • QUB - marine vertebrates (e.g. tracking, spatial and trophic ecology, population genetics, restoration, and conservation biology). Terrestrial

[136] An £8m cross-border project (funded through the INTERREG IVA Programme) to help protect aquatic resources across Northern Ireland, the Border Region of Ireland and Western Scotland.
[137] A three-year €5.5 million scientific project (funded through the 7th Framework Programme for Research and Technological development) to investigate the migration and distribution of salmon in the North-East Atlantic.
[138] A project initiated by the DCCAE, in partnership with the Department of Culture, Heritage and the Gaeltacht (DCHG), to provide robust data with which to inform conservation and management by assessing the importance of habitats for whales and dolphins.

	ecology (e.g. dune systems, terrestrial vertebrates, GIS, environmental policy and economics, habitat mapping). • UoG – avian and fish biological research. • UCC – sea mammal expertise, tracking, spatial ecology etc. • GMIT – cetacean biology and research, tracking and tagging and marine surveys. • The University of California, Davis (USA) - world-leading animal biotelemetry (tracking) expertise. It will also contribute significant time (e.g. visiting research fellows and joint projects) and infrastructure to the project. • Dalhousie University (Canada) - ocean Tracking Network bringing world-leading expertise on large-scale acoustic tracking programs and technical support. The project partnership recognises that the flow of information and data sharing between partners (or work plan partner groupings) will be key to the successful delivery of the project.
Joint implementation	Each of the project partners has clearly defined roles and responsibilities. As previously discussed, the overall management will be exercised by the Project Board, which will advise and direct the project and monitor and audit progress throughout. A Project Steering Group, which will include representation from each partner organisation, will sit beneath the Board and meet on a monthly basis to monitor progress at an activity level.
Joint staffing	As previously discussed, the LA will take responsibility for the overall management and delivery of the project. A project team will be appointed by the LA, which will be led by a Principal Investigator (or Project Officer) who will have overall responsibility for the delivery of the science and administration functions. This individual will be supported by a Programme Administrator, a Finance Officer and a Clerical Officer (who will have collective responsibility for the day-to-day administration and financial control/probity of the project). In terms of joint staffing, each of the activities proposed will be led by a partner with a particular area of expertise (e.g. GMIT will lead on the cetacean spatial modelling, UCC on the seal spatial usage modelling and MI will lead on data and technical support providing a lot of the baseline information for the development of the models and management plans with habitat mapping, and data handling etc.).

In addition to the above, the Sea Monitor 2 project partnership has adopted a collaborative and partnership working approach by being involved in 'synergy meetings' with other EU funded projects e.g. the COMPASS and MarPAMM projects (as per Section 5 and 7 respectively). As part of this, the various partnerships have agreed to, amongst other things, prepare joint communication publications such as ezines and to potentially host a joint conference/seminar in November 2019.

8.7 Barriers to Cross-Border Cooperation

This section considers whether the Sea Monitor 2 project has encountered any barriers to cross-border cooperation that the priority axis is not addressing.

From the outset, the Sea Monitor 2 project partners were mindful that there were many potential constraints[139] and risks that could have a significant impact on the delivery of the Sea Monitor 2 project and given this have developed a strategic risk register with potential mitigation measures.

[139] At the outset potential constraints were identified as falling under headings such as general, technical/environmental, financial, organisational, economic, social, management, legal or timing.

8.8 Best Practice & Learning

This section considers whether the Sea Monitor 2 project has resulted in any areas of best practice and learning.

Whilst it is (at May 2019) too early for the Sea Monitor 2 project to have resulted in any areas of best practice and learning, the project partners anticipate that there will be significant knowledge transfer derived from the project. For example, in relation to the acoustic tagging of highly mobile marine species, it is anticipated that MI will install acoustic tracking equipment on glider technology and track salmonids in nearshore and offshore waters during the early migration as juvenile fish. This is considered by the project partnership to be a very innovative way of monitoring salmonid migrations and partitioning mortality at the earliest stages of the salmon migration. It is anticipated that technology and expertise developed by University of California, Davis (USA) and Dalhousie University (Canada) will be utilised to undertake this activity – this new technology will enhance, and even replace older and more expensive survey methods.

To ensure that knowledge and expertise from the University of California, Davis (USA) and Dalhousie University (Canada) is transferred to those project partners that are located in the EU, the project partnership will, as part of the Sea Monitor 2 project, facilitate a (Continuing Professional Development) course between the project partners. The project partnership also proposed to facilitate knowledge transfer conferences, which will be broader than the project partners and will involve other key stakeholders in marine environmental research and conservation across Scotland, Ireland and Northern Ireland.

In addition to the above, given that many of the project partners (e.g. LA, AFBI and MI) are involved in other INTERREG VA funded projects (such as COMPASS), it is anticipated that there will be, wherever possible, shared learning between projects and no duplication of resources.

8.9 Mainstreaming Activities

This section considers whether the implementation of the Sea Monitor 2 project has led to any mainstreaming of cross-border delivery of environmental work.

Whilst it is (at May 2019) too early for the Sea Monitor 2 project to have led to any mainstreaming of cross-border delivery of environmental work, the project partners anticipate that:

- The physical infrastructure for marine telemetry and oceanographic monitoring will enable tracking and monitoring of key species of concern in the programme area (and adjacent areas of interest and the related environmental conditions) beyond the project's lifetime.
- The plans developed as part of the project will have long term influence on future management, policy and legal issues relating to these species and their environment.

All of the partner organisations in Sea Monitor 2 have (as of May 2019) expressed a willingness to continue supporting the fields of marine conservation, marine monitoring and sustainability beyond the lifetime of the project.

9. SWELL - SHARED WATERS ENHANCEMENT AND LOUGHS LEGACY

9.1 Introduction

This section of the report considers the Shared Waters Enhancement & Loughs Legacy (SWELL) project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 3 – Improve Water Quality in Transitional Waters.

9.2 Project Overview

Environmental pressures do not recognise international boundaries and borders. The only mechanism therefore for delivering improved water quality in shared waters such as in Carlingford Lough and Lough Foyle, is to consider each Lough catchment as a single ecosystem impacted by polluters on both sides of the border.

The Water Framework Directive (WFD) was established to protect and prevent further deterioration of inland surface waters, estuaries and coastal waters and implement a framework to enhance and return these aquatic ecosystems to at least "Good Status"[140]. There has been a significant investment to improve wastewater infrastructure on both sides of the border in recent years with respect to UWWTD compliance. However, the shift in emphasis to a catchment-wide approach under the WFD requires substantial further investment to deliver the classification targets and associated environmental benefits. Compliance with the Water Framework Directive (WFD) therefore requires an integrated approach to the sustainable management and protection of water resources across multiple sectors and national boundaries.

For the purpose of the project, the term shared water bodies is defined as shared transitional and coastal water bodies in the Carlingford and Lough Foyle catchments i.e.:

1. Lough Foyle Coastal Water;
2. Foyle Harbour and Faughan Transitional HMWB;
3. Upper Foyle Transitional Water;
4. Carlingford Lough Coastal Water; and
5. Newry Estuary Transitional HMWB.

The following preliminary data was provided by NIEA as an indication of the 2015 classification status and it is assumed that this will form the basis for the second River Basin Management Plan (RBMP) cycle.

[140] The WFD is implemented on the basis of hydrologically discrete River Basin Districts, which have been identified and classified according to their physical and biological characteristics, by the Regulating Authority of each EU Member State. These classifications are used to identify waterbodies within the District that are 'at risk' of failing to meet the environmental objective of "Good Status". A Programme of Measures is then developed, as part of a River Basin Management Plan (RBMP), to identify and reduce pollutants and ensure the waterbody achieves "Good Status". The WFD requires Member States to review RBMP's on a six-yearly cycle, across three cycles (2009-2015, 2016-2021 and 2022-2027) during which management measures must be implemented to achieve the target "Good Status" in all waters. Northern Ireland and Ireland share three International River Basin Districts with many river systems flowing across the border. The drainage catchments of Carlingford Lough and Lough Foyle fall within the Neagh Bann and North Western International River Basin Districts respectively. The Regulating Agencies (NIEA & EPA respectively) commenced working together during the first planning cycle to develop common environmental targets for the cross-border basins to ensure that activities in one jurisdiction complement water quality improvement activities in the neighbouring area. The Regulating Agencies have commenced preparation of the second cycle of RBMP's covering the period up to 2021. These will describe the main pressures and activities affecting water quality status, set out the environmental objectives and identify the measures needed to achieve these objectives. There is now general acceptance that the first cycle of RBMPs set over ambitious targets for water quality improvements which coincided with the recent economic downturn on both sides of the border. Therefore, although water quality compares favourably with other EU Member States, it falls short of the ultimate "Good Status" target for all waters.

Table 9.1: Carlingford Lough Catchment - 2015 Classification Data			
		Carlingford Lough Coastal Waterbody	**Newry River Transitional Heavily Modified Waterbody**
Biological	Phytoplankton	High	High
	Macroalgae	High	High
	Angiosperms	High	Moderate
	Benthic Invertebrates	Moderate	Good
Physico-chemical	Oxygen	High	High
	Nutrients	Moderate	Poor
	Specific Pollutants	**Fail**	No Data
Chemical Status	Priority Substances	**Fail**	**Fail**
Invasive Species		Good	High
Overall Final Classification		**Moderate**	**Moderate Ecological Potential**

The rest of the contributing catchment, including the Newry Canal, Newry River and Clanrye River are of 'moderate' overall classification status. Spate rivers draining to Carlingford Lough from Co. Louth are currently of unassigned classification.

Table 9.2: Lough Foyle Catchment - 2015 Classification Data				
		Lough Foyle Coastal Waterbody	**Foyle Harbour and Faughan Transitional Heavily Modified Waterbody**	**Upper Foyle Transitional Water**
Biological	Phytoplankton	Good	Good	Good
	Macroalgae	High		
	Angiosperms	High	Moderate	
	Benthic Invertebrates	Good	High	Good
Physico-chemical	Oxygen	High	High	High
	Nutrients	Good	Poor	Poor
	Specific Pollutants	**Fail**	Fail	No Data
Chemical Status	Priority Substances	**Pass**	**Fail**	**No Data**
Invasive Species		Good	High	High
Overall Final Classification		**Moderate**	**Moderate Ecological Potential**	**Moderate Ecological Potential**

The rest of the contributing catchment, including major contributors such as the Upper Foyle transitional water, River Faughan, Mourne River and River Finn are of 'moderate' classification. The River Roe is classified as 'good' however the Roe Estuary transitional water is classified as 'moderate' before it discharges to the Lough.

Subsequently, given that the Foyle and Carlingford river catchments extend both sides of the border, a cross-border management approach is essential to ensure the maximum environmental benefit and provide the necessary water quality improvements. However, despite good progress on the implementation of the WFD to date, the status of the shared transitional and coastal waters falls short of the required "Good Status". Significantly more work and investment are therefore required to tackle the complex issues and deliver the required water quality improvements with appropriate solutions.

The Shared Waters Enhancement & Loughs Legacy (SWELL) project represents a cross-border partnership comprising NI Water, Irish Water, Agri-Food & Biosciences Institute (AFBI), Loughs Agency and East Border Region (EBR), working collaboratively to improve water quality within the shared waters of Carlingford Lough and Lough Foyle, through the improvement of municipal wastewater assets. By adopting a cross-border management approach, the Partnership aims to ensure maximum environmental benefit and provision of the necessary water quality improvements within the shared waters.

In line with the principles of the WFD, SWELL seeks to undertake a holistic approach to sustainable water use within the catchments of Carlingford and Foyle, balancing social and economic factors with the need to protect and improve the water environment.

The SWELL project partnership brings together for the first time, key state-owned regulated water companies with sole responsibility for wastewater services on both sides of the border – Northern Ireland Water (as Lead Partner) and Irish Water. It is anticipated that the project will provide an opportunity for the two Companies to prioritise and align works in a coordinated way to make an impact on the shared water bodies on the island of Ireland.

The SWELL Partnership aims to utilise best practice and tap into their individual areas of expertise to effectively achieve its anticipated outputs and results. Through strategic catchment investigation and modelling, SWELL aims to deliver optimised, sustainable capital upgrades to wastewater assets with added value through innovation and knowledge sharing to the benefit of the entire region.

SWELL comprises two separate projects within the Carlingford and Foyle catchments. Each of the two projects consists of distinct work packages for the upgrade of existing Water Company assets, and include a number of key activities including catchment studies, ecosystem modelling and capital work to deliver improvements to water company assets. The capital works will likely include significant asset modifications.

It should be noted that prior to confirming specific work packages, the SWELL project partners conducted catchment investigation and modelling during the early stages of the SWELL project life cycle. At the time of its application, eight preliminary sites were identified. However, several potential 'reserve' sites had also been identified. Subsequently, following the commencement of the project, and following the modelling stage for each site, the SWELL project partners developed 'Second Stage Business Cases' for the identified sites. The Business Cases assessed the costs, benefits and the risks associated with alternative options that had the potential to deliver the programme outputs, and also sought to identify solutions that were sustainable. Final solution confirmation was on the basis of a qualitative and quantitative assessment of options including whole life costings and full consideration of operational requirements and the economic and technical viability of first-time sewerage facilities for small agglomerations.

All capital upgrade options were formulated on the basis of providing a solution in accordance with relevant statutory requirements, codes of practice and latest Water Company design guides, specifications and asset standards. Investment decisions were based on qualitative and quantitative assessment of alternative options including whole life costings and full consideration of operational and maintenance requirements. Net Present Costs over a 40-year assessment period were used as the basis for the monetary evaluations, with the following general minimum design life requirements:

- Civil and structural works – 45 years;
- Mechanical and electrical works – 15 years;
- Instrumentation, control and automation – 7 years.

Sludge removal and disposal were accounted for in accordance with the Water Company Wastewater Sludge Strategy Policy and Procedures.

Subsequently, following the completion of Phase I of the project, two of the preliminary sites (at Culmore and Castlefinn) were identified as not meeting the criteria and were replaced by projects at Donemana Wastewater Treatment Work and Carrigans Wastewater Treatment Works.

Going forward in Phase 2 of the SWELL project, the project will consist of the following:

1. The first project will focus on carrying out assessments and capital improvements within the Carlingford Lough drainage basin within the eligible areas of (1) Newry, Mourne & Down and (2) Louth. Preliminary solutions identified include for proposals at:

Warrenpoint Wastewater Treatment Works (NIW)	It is proposed to construct a new Works based on the conventional activated sludge process to cope with significantly increased growth within the catchment and more stringent discharge requirements. The upgrade shall be delivered in 2 phases, with Phase 1 being carried out under the SWELL Project to include for the construction of a new inlet works to alleviate the loss of untreated wastewater loading and new activated sludge tanks to alleviate overloading problems.
Newpoint Wastewater Pumping Station (Warrenpoint) (NIW)	It is proposed to install new coarse screens on the incoming sewer and new overflow screening to reduce the impact of unacceptable sewage load spilling to the adjacent Newry River.
Omeath Network Improvements (IW)	It is proposed to upgrade network capacity so that the overflow points at the Pier and main outfall location are minimised (they currently overflow regularly) or possibly abandoned. This will involve surface water separation (to be confirmed in a study) and storm flows directed to the new WwTW for stormwater handling and discharges via the long sea outfall.

2. The second project will focus on the Lough Foyle drainage basin within the eligible areas of (1) Derry City & Strabane and (2) Donegal. Preliminary solutions identified include:

Strabane Wastewater Treatment Works (NIW)	It is proposed to augment/enhance the treatment capability of the existing works by the construction of a new inlet works (including new inlet reception chamber, screw lift pumping station, fine screening, inlet storm and foul transfer pumping and overflow screening facilities).
Donemana Wastewater Treatment Works (NIW)	It is proposed to construct a new Works based on the rotating biological contactor process to cope with residential growth within the catchment and more stringent discharge requirements. Sludge and storm storage shall also be provided.
Lifford Wastewater Treatment Works (IW)	It is proposed to upgrade the defective overflow to limit spills to the Foyle, lay a section of upsized sewer to increase downstream capacity, upgrade the pumping station and rising main and limit spills and provide secondary treatment at the WwTW site. Sludge thickening and storage facilities are also necessary
Killea Wastewater Treatment Works (IW)	It is proposed to provide storm storage to minimise unscreened overflows along with upgrades to controls at the main pumping station. Installation of a balancing tank, tertiary treatment and sludge storage facilities are also required. Use of nonconventional, environmentally sustainable reed beds will be investigated.
Carrigans Wastewater Treatment Works (IW)	It is proposed to decommission the existing Carrigans WwTW septic tank and construct a new pumping station and rising main to transfer flow to St Johnston WwTW. Septicity control is to be provided on the rising main.

All solutions will endeavour to use the latest in innovative treatment technologies in order to reduce carbon footprint, increase operational efficiency and drive down energy costs. Following the completion of Phase I, the SWELL partners have identified the following potential for innovation:

NI Water:	The SWELL project aims to trial innovative technologies at Warrenpoint WwTW. These will focus on the operational capability of the works and the impact of the treatment train on the receiving Newry Estuary in response to variable incoming loads. The technologies will look at methods to remotely sensor and monitor the works operational capability to BOD5 and E. coli consents on a continuous monitoring basis, given the sensitive receiving waters status. This will give a good operational sample database in relation to incoming load and works performance at a scale not currently achievable. In combination, NI Water intends to trial a technology alternative to ultraviolet disinfection, to reduce the power and carbon footprint of tried and tested UV disinfection. Use of this technology in combination with continuous sensing technology has the potential to be incorporated as "live loading" data into the ecosystem models and be used as a calibration and validation tool of said models. It can also be used to ascertain retrospective scenario testing in response to pollution incidents.
Irish Water:	Irish Water intends to trial innovative technology to maximise flow control and storage in existing networks to allow better flow management. The aim is to implement live flow control to manage issues such as septicity control in dry weather conditions while also being able to predict when a change is required in flow settings to utilise network storage capacity. The technology to be implemented will monitor both long and short term weather forecast information linked with hydraulic models, network flow and storage information. It is intended to build an understanding of responses to weather events to enable more efficient use of storage and pumping for a range of various flow conditions. It is hoped that the technology will reduce the frequency and volume of spills from SWOs taking account of flood risk, downstream networks and WwTW operation. Building on this technology, Irish Water intends to assess and test a suitable Intelligent pump control system and remote-controlled actuated valve arrangements to achieve the live control on the network. In addition, it is hoped that the technology will be used to optimise alarm systems.

It is hoped that value engineering of final solutions may result in a capital delivery budget to be used to fund a number of smaller scale, innovative, demonstration trials. These additional solutions will be further investigated during the early stages of the project and implemented accordingly. These may include measures to reduce specific pollutants as identified under WFD or low carbon, reduced energy solutions.

The SWELL Project builds on the work carried out by the Regulating Authorities in both jurisdictions, by developing ecosystem models to simulate various sources of pollution and their impact on water quality. It is anticipated that this unique modelling approach will facilitate validation of optimised solutions to meet the required programme outputs and results indicators.

The project execution strategy is well defined and has been split up into four key stages, each with component work packages that are all intrinsically linked to deliver the project outcomes. The project stages are as follows:

1. Catchment Investigation	A desktop analysis of existing monitoring data will be compiled to inform a risk-assessed baseline sampling study. The data gathered will be used to calibrate existing models and enable focus on areas where anthropogenic pollution is having an impact. This analysis will augment the business cases and capital expenditure proposals.
2. Ecosystem Modelling	An ecosystem model will be used to simulate the effects of the catchment in response to the hydrological cycle. Models will be integrated to link various sources of pollution and simulate their effect on water quality. Modelling will facilitate validation of construction proposals to derive the necessary level of "Asset Discharge Improvements".

3. Capital Delivery (outputs)	Business Case development will be undertaken in parallel with the modelling programme to ensure sustainable solutions are delivered. Optioneering and economic appraisal will be refined on completion of the modelling programme. Upgrade of wastewater assets will take consideration of any necessary constraints and will promote sustainable, innovative technologies to reduce operating cost and drive carbon efficiency
4. Project Closure & Legacy	The project will undertake modelling calibration and validation post improvements to demonstrate achievement of the output indicators and contribution towards the results indicator. Added value is provided by the legacy model which can enable identification of further residual measures to improve water quality, beyond the lifecycle of the SWELL Project.

In terms of specific roles and responsibilities:

- The partnership formed in November 2014 is founded on a signed Memorandum of Understanding between NIW and IW.
- NI Water as Lead Partner has the combined professional 'in-house' skillset, including Asset Management, Quality and Compliance, Health and Safety, Engineering Procurement, Finance & Regulation and Customer Services Delivery disciplines. As Lead Partner, NIW will establish a jointly staffed Programme Management Office to provide the direction, leadership, coordination and overall management required to ensure that the shared resources and expertise are utilised effectively from project initiation through to completion and handover.
- IW is responsible for all public water services, involving the supply of drinking water and the collection, treatment and disposal of wastewater. IW operates wastewater assets through Service Level Agreements with local authorities, who provide day-to-day operations of assets under the management of IW.
- NIW and IW will be responsible for the procurement and construction delivery of the capital upgrade solutions identified and optimised by the catchment investigation and modelling phases of the project.
- Specialist scientific investigation and modelling will be undertaken by AFBI, a leading provider of scientific research and the Loughs Agency, a North-South co-operation body. AFBI will have overall responsibility for the scientific elements of the SWELL Project that are outside the realms of standard engineering practices. They will undertake the catchment studies, associated analysis and ecosystem model development[141].
- The Loughs Agency is a cross-border statutory organisation with responsibility for salmon, inland fisheries, marine tourism and shellfisheries development within the Foyle and Carlingford catchments. They provide core expertise and local resource to the project with regard to water quality, catchment investigation and fisheries management.
- With almost 30 years' experience of working on EU funded projects on a cross-border basis, EBR will oversee the financial and non-financial management aspects of the project to ensure full compliance with INTERREG rules and procedures.

A dedicated Programme Management Office (PMO) has been set up to manage and control the day-to-day running of the SWELL Project to ensure that it stays on track with respect to time, cost and quality. Progress will be evaluated and monitored throughout the full project lifecycle to ensure that the project is on track to deliver the target outputs and results. To undertake this, it is proposed to use an established project management technique such as Earned Value Analysis (EVA) to continuously monitor the project. Using this approach, the PMO will be able to monitor the project plan, actual work and work completed value to see if the project is on track. EVA shows how much of the budget and time should have been spent, considering the amount of work done to date. It differs from the general budget versus actual costs incurred assessment model in that it requires the cost of work in progress to be quantified. This will allow the PMO to compare how much work has been completed, against how much was expected to be finished at a given point in time.

[141] AFBI's existing Soil and Water Assessment Tool (SWAT) models will be updated and used in conjunction with updated Water Company Drainage Area Plan (DAP) models, which predict volume and frequency of intermittent discharges from sewerage networks.

Seven work plans have been developed.

Table 9.3: Summary of SWELL Project Work Plans (Per Progress Reports)
1. Management
2. Catchment Investigation & Modelling (implementation)
3. Delivery of Business Cases and Construction Planning (implementation)
4. Project Evaluation (implementation)
5. Construction of Assets (NIW – investment)
6. Construction of Assets (IW – investment)
7. Communication

Of note, NI Water and Irish Water have committed to taking ownership of any constructed assets delivered by the project and all responsibilities relating to operation and maintenance activity on these assets beyond the lifetime of the project. The legacy ecosystem model developed as an output from the project will be held under the custody of Loughs Agency, as the cross-border body with responsibility for water quality within Carlingford Lough and Lough Foyle.

9.3 Project Budget

The SWELL project received a Letter of Offer (dated 31st January 2017) offering a grant of up to a maximum of €3,282,786.52 (ERDF + Government Match Funding) to be expended and claimed by 30th April 2018[142], towards total anticipated project costs of €3,282,786.52.

However, the LoO noted that it was anticipated that the project would be implemented in two phases. The 31st January 2017 LoO addressed the funding required to achieve Phase 1. Phase 1 of the project was considered to be a necessary first phase to establish the detailed works required to achieve the Programme Outputs which it is anticipated will be addressed by the work undertaken during Phase 2.

It was then anticipated that the successful completion of Phase 1 would result in a further application for grant funding for Phase 2 of not more than €32,011,331.13.

It was anticipated that Phase 1 would deliver the following approved outputs ('Project Outputs'):

1. A baseline catchment area investigation by April 2018 as set out in the project partners' Business Plan;
2. Detailed plans to support future investments to achieve the Programme Outputs;
3. Work would commence to develop an appropriate ecosystem model.

As outlined in Section 9.2, the SWELL project achieved these outputs during late 2018. Subsequently, it is understood that the suggested Phase 2 was subject to a further project assessment and funding decision, which ultimately was successful.

Given this, SEUPB issued a second Letter of Offer (dated 21 January 2019). The new LoO indicates that inclusive of Phases 1 and 2, the project budget (to be expended and claimed by 31 December 2022) is as follows:

Table 9.4: Anticipated Project Costs	
Summary Budget	**Total Project Costs (€)**
Staff Costs	€3,288,911.32
Office and Administration Costs	€493,336.60
External Expertise and Services	€5,917,197.40
Travel and Accommodation Costs	€107,927.72
Equipment Costs	€627,205.89
Infrastructure and Works	€24,613,025.31
Total	**€35,047,604.24**

[142] The period of assistance was for 42 months starting on 1st November 2014 and completing on 30th April 2018.

Table 9.5: Anticipated Project Funding	
Funding Sources	**Total Value (€) (Public)**
Cash Contribution (Partner Supplied/other grant)	
Government Match Funding	€5,257.140.66
ERDF	€29,790,463.58
Total Grant Funding	**€35,047,604.24**
Total Project Costs	**€35,047,604.24**
Intervention rate (% ERDF)	85%

9.4 Anticipated Project Objectives, Outputs & Results

9.4.1 Objectives

SWELL has set the following objectives:

1. Undertake scientific catchment investigations and modelling to inform the implementation of the most sustainable and beneficial capital improvements.
2. Demonstrate that NIW and IW through collaborative working comply with their required action to improve the Water Framework Directive (WFD) status.
3. Leave a tangible legacy model to address remediation of any residual pollution through the appropriate WFD Programme of Measures.
4. Utilise sustainable treatment technologies and innovative solutions and lay a foundation for continued future cross-region knowledge sharing between NIW, IW and Scottish Water.

9.4.2 Outputs & Results

The programme-specific objective is to improve water quality in the catchments of Carlingford Lough and Lough Foyle. The envisaged result will be an increased percentage of the shared waters with good or high quality. Marine modelling has been identified in the Citizen's Summary Call Document as the optimum method of identifying the most effective interventions and improvements required for wastewater assets that impact on the shared waters.

It is anticipated that the SWELL project will deliver the following output indicators contained in the Cooperation Programme document:

1. Deliver two (2) sewerage network and wastewater treatment projects to improve water quality in shared transitional waters.
2. Provide improved wastewater treatment for 10,000[143] additional population equivalent[144].

[143] The project partners note that this figure is a minimum requirement and it may be exceeded if they can demonstrate better value for money.

[144] Within the guidance document on monitoring and evaluation of the ERDF fund the EC define the additional population served by improved wastewater treatment as follows: *"Number of persons whose wastewater is transported to wastewater treatment plants through wastewater transportation network as a result of increased waste water treatment/transportation capacity built by the project, and who were previously not connected or were served by sub-standard wastewater treatment. It includes improving wastewater treatment level. The indicator covers persons in households with actual (i.e. not potential) connection to the wastewater treatment system."*

Per the project partners' Letter of Offer (dated 31st January 2017), the anticipated SWELL Project Outputs are as follows:

Programme Output Code	Name of Output	Programme Output Indicator Target[145]	SWELL Project Target
CO19	People benefit from improved wastewater treatment	10,000	10,000
2.311	2 Sewage network and wastewater treatment projects completed to improve water quality in shared transitional waters	2	2

It is anticipated that these outputs will be achieved through strategic assessment and catchment modelling on a cross-border basis, to identify and deliver optimised capital upgrades to water company assets. The Partners will utilise best practice, knowledge and expertise to effectively deliver the outputs with added value being provided through the demonstration, promotion and implementation of sustainable wastewater treatment solutions.

The results indicator is: *"The percentage of the shared transitional waters in the region with good or high quality. The current baseline is 0% and the target for 2023 is 100%."* It should be noted that the SWELL project partners have stated that given the nature of the result indicator, it will be influenced not only by projects funded by the Programme but will also be influenced by other policy and funding initiatives external to the Programme. The project partners consider the results indicator to be an unachievable project target given the level of funding and external pressures[146].

Nonetheless, the SWELL project partners intend to deliver a programme of measures to improve water quality and thus contribute towards the achievement of *"good status"* of the receiving waters. However, according to the project partners, the project will not guarantee any improvement will be made to WFD status by the year 2023 but will instead contribute towards it. According to the project partners, there are several external reasons, beyond the control of the water companies, as to why this is the case, including:

- Diffuse pollution e.g. agriculture, forestry, shipping;
- Industrial discharges;
- Climate change i.e. more intense and sporadic rainfall events;
- Changes in catchment practices e.g. Rural Development Programmes, Nitrates Directive;
- Waterbodies take time to react to chemical changes and the timeframe after which improvements are made may not demonstrate overall WFD improvement within the target deadline (2022).

The project will aim to mitigate these risks and demonstrate through modelling actions necessary to improve overall water quality as a legacy to the project. The project will undertake its own more intensive sampling regime to set a benchmark for quality and to target the areas for expenditure. At the end of the funding period (2023), the wastewater assets improvements will be measured to see their overall improvement to general water quality and to ratify any modelling. However, it should be noted that the project partners note, as a caveat, that climate effects and catchment practices may alter the closing results of any closing water quality sampling at the end of the funding period.

SWELL intends to demonstrate achievement of the required outputs through "Asset Discharge Improvements" with the measurement of 10,000 population equivalent being confirmed by pre and post-construction monitoring, in line with the Urban Wastewater Treatment Directive (UWWTD). Asset Discharge Improvement is defined as follows:

[145] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.
[146] Source: SWELL Project Execution Plan (15th May 2017)

- "Asset Discharge" refers to any water company-owned discharge pipe which is part of the sewage treatment system or sewerage network; whilst
- "Improvement" refers to the discharge standard in that interventions will demonstrate improved effluent quality and/or reduced volume discharged as measured on a 'before and after' capital upgrade basis.

This is the only measure by which partners have control. The actual population equivalent receiving improved treatment will be measured by on-site water quality sampling prior to and after the construction of the capital upgrades.

The following table details how the proposed upgrade solutions will contribute to the 10,000 PE[147] output indicator and will be used to monitor the progression and performance of the capital delivery work packages towards the achievement of this indicator.

Catchment	Work Package	Method for Reduction	Estimated ADI (PE)	Contribution 10,000 PE
Carlingford	Newpoint SPS	Increased Flow to Treatment	1,577	16%
	Warrenpoint WwTW		2,815	28%
	Omeath DAP	Improved Treatment	158	2%
Foyle	Strabane WwTW	Increased Flow to Treatment	1,530	15%
	Donemana WwTW		1,108	11%
	Lifford WwTW	Improved Treatment	2,261	22%
	Killea WwTW		311	3%
	Carrigans WwTW		296	3%

9.5 Contribution to the Priority's Specific Objectives & Result Indicators

This section considers the SWELL project's key achievements (as of May 2019) and the extent to which the SWELL project has:

- Contributed to the achievement of the Priority's Specific Objectives;
- Contributed to the achievement of the targets for the Result Indicators;
- Contributed to:
  - EU 2020 objectives;
  - The Atlantic Strategy; and
  - The horizontal principles of equality and sustainable development.

and where appropriate, the section:

- Identifies any external factors that have impacted, positively or negatively, on the project's ability to contribute to the achievement of the Specific Objective.

9.5.1 Key Achievements (to May 2019)

At INTERREG VA application stage, the SWELL Partnership had identified key agglomerations that had the greatest potential to improve water quality within the Carlingford Lough and Lough Foyle catchments. Identification was on the basis of expert knowledge on network and treatment capability, age of the plant, compliance history and operational performance. However, subsequently, during Phase 1 of the SWELL Project, baseline catchment investigations and flow & load surveys were undertaken to justify site selection and to enable the development of Business Cases for the identified sites to demonstrate cost-effectiveness and value for money of proposed capital upgrade solutions.

[147] The Project partners advise that Population Equivalent (PE) will be measured in terms that are defined in the Urban Wastewater Treatment Directive: *"population equivalent" is a measurement of organic biodegradable load, and a population equivalent of 1 (1 p.e.) is the organic biodegradable load having a five-day biochemical oxygen demand (BOD5) of 60 g of oxygen per day".*

In total, 10 Business Cases were undertaken to maximise funding potential, with the following 8 preferred sites (considered as most likely to deliver the required water quality improvements, results and outputs), submitted for Government Departmental and SEUPB approval:

Catchment	Work Package
Carlingford	Newpoint SPS
	Warrenpoint WwTW
	Omeath DAP
Foyle	Strabane WwTW
	Donemana WwTW
	Lifford WwTW
	Killea WwTW
	Carrigans WwTW

The 8 sites selected are considered[148] to represent key agglomerations having the greatest potential to improve water quality within the Carlingford Lough and Lough Foyle catchments. Identification was on the basis of expert knowledge on network and treatment capability, age of the plant, compliance history and operational performance. The project partners have a high level of confidence regarding the negative impact of the named problem sites and a belief that their rectification will make a significant positive contribution towards the results indicator.

Discussion with the project partnership indicates that the sites located in Northern Ireland are (at May 2019) at construction stage (contractor procured), whilst those located in Ireland are at the design stage, as illustrated below:

Work Package	Status (as of May 2019)
Donemana WwTW	At the construction stage
Newpoint SPS	
Strabane WwTW	
Warrenpoint WwTW	
Carrigans WwTW	At the design stage
Killea WwTW	
Lifford WwTW	
Omeath DAP	

It is understood that NIW appointed a contractor through its established contractor framework early in the design stage, which expedited the design process.

In addition to the significant catchment investigation and ecosystem modelling work that has been undertaken to identify the 8 Phase 2 sites, the SWELL project partners cite the project's key achievements (as of November 2018) as being:

Period	Dates	Key Achievements
1	18th November 2014 – 28th February 2015	• NI Water & Irish Water developed a Memorandum of Understanding (MoU) with the intention to submit a joint application to the Special European Union Programmes Body (SEUPB) for the opportunity to avail of European funding under INTERREG VA. • Work activities are undertaken by NI Water in conjunction with Partners and Consultant support included: - Project Scoping & Planning; - Data collection, Collation & Review – NIEA / EPA / Rivers Agency / DAERA Marine;
2	1st March 2015 – 31st May 2015	

[148] Source: SWELL Project Business Plan (April 2018 version)

Period	Dates	Key Achievements
		- Baseline Mapping to provide an overview of the status area & WFD classifications; - Development of modelling methodology.
3	01.06.2015 - 31.08.2015	• Initiated development of Project Execution Plan • Catchment planning in conjunction with AFBI.
4	01.09.2015 - 30.11.2015	• Development and submission of Stage 1 application.
5	01.12.2015 - 29.02.2016	• Site visits / condition inspections / optioneering / capital cost estimates • Concept design & solution development • Development of Environmental Drivers of solutions within receiving waters • Development and submission of stage 2 business case including work plans & Partnership Agreement
6	01.03.2016 - 31.05.2016	• Further project Execution Plan development
7	01.06.2016 - 31.08.2016	• Development of SWELL Brand
8	01.09.2016 - 30.11.2016	• Further project Execution Plan development
9	01.12.2016 - 28.02.2017	• Re-assessment of the Project Execution Plan • ArcGIS catchment mapping • Researching options for innovation • Develop a high-level programme for Phase 1 & 2 deliverables.
10	01.03.2017 - 31.05.2017	• Meeting with partner representative to discuss a common platform for use by the project and exploring ArcGIS capabilities • IW ToR for Consultant Appointment, procurement options, drafting technical requirements and outputs.
11	01.06.2017 - 31.08.2017	• Commencement of procurement exercise of Consultant appointment • SWELL & Environmental Regulator Meeting to establish a Technical working group.
12	01.09.2017 - 30.11.2017	• Ascertain requirements for Flow and Load Surveys to meet asset discharge improvements (ADI) • Identification and site visits for potential upgrade sites to meet ADI. • Meetings with Internal Stakeholders (operations, scientific) to discuss potential improvements. • Meeting with Norway/Sweden INTERREG delegation • Population Equivalent calculations for Business Plans • Compilation of asset data and performance of sites
13	01.12.2017 - 28.02.2018	• Early Contractor involvement Scoping Meetings and Site Visits • Development of Ecosystem Modelling Standard. Technical workshop held to detail the scope of report and draft to be produced • Refinement of PE Calculations including meeting with AMU to agree PE's • NIEA Meetings to discuss proposals on discharge consents • Business Cases in development and Options review initiated • Irish Water and Phase 1 Consultant continued work to develop business cases for each site identified in the Stage 1 documentation. • Procurement of Phase 2 consultant support - Document review complete and to be issued to the market week ending 3/3/18 • Scientific Officer continued baseline sampling alongside AFBI staff in Foyle and Carlingford catchments
14	01.03.2018 - 31.05.2018	• Stage 1 Business Case Development • PE Review with Asset Management and Sign-off • Stage 2 Business Case Development • ECI Contractor meeting to review options and finalised concept designs

Period	Dates	Key Achievements
		• Flow and Load extended to mid-March • Flow and Load Data analysis/validations and Initial ADI estimations • ECI contractor cost profiling and cost certainty • SWELL Phase 1 and Phase 2 Forecasting • Business Cases (including Options Costing, Net Present Cost Calculations and Sensitivity Analysis) and Business Plan submitted to SEUPB for approval; • Business Case and Business Plan amendments following comments from Government Departments (DfI, DAERA) • Irish Water PMO Specialist for the SWELL project appointed, with a start date of 28th May. • During the period all AFBI activities continued as expected. There was a special emphasis on capital procurement and engagement with NIW's external consultants.
15	01.06.2018 - 31.08.2018	<u>Phase 1 Items</u> • NIW: Business Case review and amendments as per comments (DAERA/DfI/NIEA) • The 2nd issue of Business Cases • PE Review and Approvals with Asset Management Unit in NI Water <u>Phase 2 Items</u> • SWELL Programme realignment; • Budget Reprofiling; • Development of Contract Documents for each of the NIW Sites; • ECI contractor meetings to Value Engineer the capital cost; • Value for Money reports for NIW sites; • Ecosystem Modelling Standard - 3rd Draft under review; • AFBI - This was a period of providing data for the model builds and testing and commissioning new equipment. • Technical modelling workshops were also held to bring together all partners and external consultants working on all elements of the Ecosystem Modelling. • Irish Water - SWELL Infrastructure Programmes Project Specialist started in the position on 27th August. • Note: Phase 2 activities from May 2018 onwards will be claimed in period 16.
16	01.09.2018 - 30.11.2018	NIW: • Ongoing development of Contract Documents and Value for Money reports being prepared for all approved sites (Phase 2 item). • Design review meetings (incl. HAZOP's) with all ECI Contractors to refine scope and value engineer cost (Phase 2 item). • Submission of NIEA, NIE and Planning Applications for all approved sites. • Development of Phase 2 MPRs and amendments to the Project Execution Plan. • DAP studies ongoing - installation of logging equipment in progress (Strabane equipment installed, Warrenpoint equipment to be installed in December 2018, Culmore planned to install in January 2019) IW: • Irish Water is playing a proactive role in the development of the T1 Catchment Investigation & Modelling work package.

Period	Dates	Key Achievements
		• Appointment of Phase 2 Consultant to oversee the delivery of works at the four Irish Water sites. • The Irish Water SWELL Infrastructure Programmes Project Specialist is progressing through the Design Phase. AFBI: • Throughout this Period AFBI continued with work testing and commissioning equipment to be deployed within both sea loughs and catchments. • AFBI hosted a Modelling technical workshop on the 13th of September 2018 and a stakeholder workshop on the 14th of September 2018.

9.5.2 Project Output Indicators

Discussion with the SWELL project partnership indicates that whilst the anticipated (approved) project outputs have, as of May 2019, not yet been achieved (albeit, it was not expected of the project at this stage in its implementation, as they have a 2023 delivery date), the project is being implemented as planned and making positive progress towards achieving its outputs.

Programme Output Code	Name of Output	Programme Output Indicator Target[149]	SWELL Project Target	Progress (as of May 2019)
CO19	People benefit from improved wastewater treatment	10,000	10,000	-
2.311	2 Sewage network and wastewater treatment projects completed to improve water quality in shared transitional waters	2	2	-

The Project Partners' description (as of November 2018) of the level of achievement against its 'project-specific objectives' is described below:

Project Specific Objectives	Level of Achievement	Explanations
1. A baseline catchment area investigation by August 2017 as set out in the business plan;	Fully achieved	Baseline surveys of both catchments were undertaken between October 2017 and January 2018. The data collected through the course of these surveys provided a 'snapshot' of the state of the catchment and marine water quality during the sampling period. All samples have been analysed and summary reports have been submitted on eMS.
2. Detailed business plan to support future investments to achieve programme outputs.	Fully achieved	Business Cases were submitted for approval to SEUPB and other government departments.

In addition, as of November 2018, the SWELL project partners indicate that they have not yet engaged with its various target groups, as illustrated below:

Table 9.6: Performance against Target Groups Reached (as of November 2018)			
Target Group	**Target**	**Achieved**	**% Achieved**
General Public	25,000	0	0%
Local public authority	5	0	0%
Infrastructure and (public) service provider	6	0	0%
Interest groups including NGOs	5	0	0%

[149] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

9.5.3 The Priority's Result Indicator Targets & Specific Objectives

Given the early stage of the project's implementation and the fact that the project has yet to achieve its anticipated (approved) project outputs, the SWELL project is, therefore, at May 2019, making only marginal progress towards the Priority's Result Indicator Targets and Specific Objectives. However, this should be expected at this stage of the project's implementation (as they have a 2023 delivery date), and should not be considered a concern.

9.5.4 EU2020 Objectives

The SWELL project is working collaboratively to improve water quality within the shared waters of Carlingford Lough and Lough Foyle, through the improvement of municipal wastewater assets. By adopting a cross-border management approach, the Partnership aims to ensure maximum environmental benefit and provision of the necessary water quality improvements within the shared waters.

In line with the principles of the WFD, SWELL seeks to undertake a holistic approach to sustainable water use within the catchments of Carlingford and Foyle, balancing social and economic factors with the need to protect and improve the water environment.

Whilst the SWELL project is not overtly focused on economic growth, it does seek to encourage sustainable growth: promoting a more resource-efficient, greener and more competitive economy. In doing so, the project should serve to help prevent environmental degradation, biodiversity loss and unsustainable use of resources.

9.5.5 The Atlantic Strategy

The 'Atlantic Strategy' is the EU's Maritime Strategy for the Atlantic Ocean area. It provides for a coherent and balanced approach that is consistent with the EU 2020 agenda. It is largely focused on helping communities living and working on the Atlantic coast deal with new economic realities, but also recognises that the EU shares responsibility for stewardship of the world's oceans. Broadly speaking the strategy cover the coasts, territorial and jurisdictional waters of the five EU Member States with an Atlantic coastline – France, Ireland, Portugal, Spain and the United Kingdom.

The SWELL project has the potential to contribute to the Atlantic Strategy's various themes in a number of ways. However, in particular, the project aims to better manage human activities in the Atlantic thereby delivering a healthy and productive ecosystem. The ecosystem approach is the basis for marine management in both the Common Fisheries Policy and the Marine Strategy Framework Directive.

9.5.6 The Horizontal Principals

The SWELL project aims to protect and improve the quality of the environment - a key component of sustainable development and as such it is anticipated that it will serve to contribute (at least in part) to the EU's three Horizontal Principals, per the following discussion:

Sustainable development	Sustainable Development relates to the achievement of a better quality of life through the efficient use of resources, which realise continued social progress and maintain stable economic growth and care for the environment. The SWELL project partners fully anticipate that they will deliver the project in line with the principles of the EU Sustainable Development Strategy and related strategies for each jurisdiction. For example; • The SWELL Project, in line with WFD principles, seeks to undertake a holistic approach to sustainable water use within the catchments of Carlingford and Foyle, balancing social and economic factors with the need to protect and improve the water environment. • The development of ecosystem models under the SWELL Project is anticipated to enable the identification of sources of pollution on a

catchment-wide basis and thus facilitates better-targeted remediation to arrive at more sustainable risk-based solutions. The ecosystem models that will be created align with the upcoming second cycle RBMPs Programme of Measures stated aim to reduce pollution by the development of modelling tools to better understand the natural dynamics and science of catchments.

- The following table outlines the primary long-term aspirations of the SWELL project with regard to environmental, social and economic benefits and thereby demonstrates a sound balance between the three pillars of sustainable development:

Environmental Benefits	- Reduced pollution - Improved water quality - Existing habitat enhancement - Enhancement and protection of aquatic wildlife - Effective and more sustainable use of water resources. - Sustainable solutions resulting in reduced carbon emissions
Social Benefits	- Improved visual amenity - Cleaner, safer waterways - Greater opportunity for leisure and amenity use - Greater stakeholder involvement - Better information on issues relating to the water environment. - Healthier citizens
Economic Benefits	- Provides a cost-effective approach to water protection. - New visitors/tourism - New recreational facilities - Fewer healthcare costs - Increased land/property values; - Reduced OPEX costs; - Benefits to the shellfish industry - Jobs created/safeguarded

- The ecosystem models are the mechanism for identifying and optimising sustainable solutions for the Carlingford and Foyle catchments. To ensure ongoing value for money, these planned solutions will be confirmed by re-visiting the Business Cases post completion of the comprehensive catchment studies and modelling, to further optimise solutions on a whole lifecycle costing basis to deliver the most sustainable solutions.
- The SWELL Project will incorporate the use of sustainable practices as part of any finalised solution design, in accordance with current NIW and IW policy. Such practices include for re-use of existing assets where possible, the use of materials with minimum embodied carbon that are locally sourced to reduce transport and promote the local economy and the efficient use of wastewater treatment technologies that have reduced energy requirements.
- Sustainability during the construction process will include for the provision of measures to minimise and/or segregate site waste for recycling where possible, pollution (through noise, air, water and run-off) and disruption and ensure the health, safety and welfare of local residents and construction site staff;
- As a further indication of their commitment to the promotion of sustainable development the SWELL Project will seek endorsement as a partner on the Bioregional One Planet Living Initiative, which is founded on an action plan to demonstrate adherence to the following ten principles of sustainability:

  - Health and happiness;
  - Equity and local economy;
  - Culture and community;
  - Land Use and wildlife;
  - Sustainable water;
  - Local and sustainable food;
  - Sustainable materials;
  - Sustainable transport;
  - Zero waste;
  - Zero carbon.

<table>
<tr><td>Equal opportunities and non-discrimination</td><td>The SWELL project partners advise that each is committed to delivering the SWELL Project in full accordance with the principles detailed by the following pieces of legislation:

<table><tr><td>Northern Ireland</td><td>- Section 75 of the Northern Ireland Act 1998 (NI)
- Section 49A of the Disability Discrimination Act 1995</td></tr><tr><td>Ireland</td><td>- Employment Equality Act 1998,
- National Disability Authority Act 1999
- Equal Status Act 2000.</td></tr></table>
It is anticipated that each Company will promote equality of opportunity and good relations in all areas of the project with all individuals being treated in a fair and equal manner and in accordance with the law regardless of gender, marital status, race, religious belief, political opinion, ethnic origin, age, disability or sexual orientation. Good practice will be promoted through Equality Screening and the provision of an Equality Impact Assessment if deemed necessary.

In addition, the Partners have identified a number of specific measures to promote equality and encourage cross-border, cross-community and all-inclusive involvement in the delivery of the various capital delivery work packages around the eligible area. This will include:

• Extensive stakeholder engagement and organisation of public information meetings prior to construction commencement. Particular emphasis on targeting vulnerable groups within the local community that may suffer greater adverse impact from the construction activities e.g. elderly, disabled or non-English speakers.
• Working with local schools on both sides of the border and both sides of the community (including special needs schools).
• Contractually applied social benefit clauses on the employment of local/unemployed/ disabled people.

Furthermore, contractors will be required to register or adhere to the principles of the Considerate Constructors Scheme, an initiative set up in 1997 by the UK Construction Industry to improve its image. The Scheme's Code consists of five sections, two of which, Community and Workforce, have particular regard for how the site or company is dealing with equality and diversity.</td></tr>
<tr><td>Equality between men and women</td><td>As noted above, throughout project delivery the partners are seeking to ensure that no individual is discriminated against based on all equality considerations, including gender. These principles are being applied to all project participants, employees and beneficiaries.</td></tr>
</table>

9.5.7 Contribution to Other Strategies

As discussed, compliance with WFD requires an integrated approach to the sustainable management and protection of water resources across multiple sectors such as wastewater, agricultural, industrial, forestry, etc. Since the WFD impacts on a diverse range of environmental strategies, it is linked to a wide range of EU Directives, including:

- Birds & Habitats Directives;
- Water Use Directives (Bathing Water, UWWTD & Drinking Water);
- Environmental Regulation Directives (Industrial Emissions, Pollution Prevention & Impact Assessment);
- Priority Substances, Nitrates & Groundwater Directives;
- Use of Pesticides and Sewage Sludge Directives; and
- Flooding and Marine Strategy Framework.

In addition:

- Climate change impacts will be considered during the formulation of design flows and assessed as part of the modelling study.
- Sludge removal and disposal will be in accordance with the Water Company Wastewater Sludge Strategy Policy and Procedures.

Of note, the ecosystem model that is anticipated to be developed will seek to identify at the sub-catchment scale source apportionment of pollution in order to deliver targeted remediation. This will help to identify the predominant sources that are causing water quality issues and represent them in GIS format. This aligns to the UK SAGIS Tool modelling framework which was developed through UWKIR research project WW02: Chemical Source Apportionment under the WFD. The primary objective of this research was to develop a common modelling framework as the basis for deriving robust estimates of pollution source contributions that would be used to support both water company business plans and the EA River Basin Planning process.

The SAGIS Tool quantifies the loads of pollutants to surface waters in the UK from 12 point and diffuse sources including wastewater treatment works discharges, intermittent discharges from sewerage and runoff, agriculture, soil erosion, mine water drainage, septic tanks and industrial inputs.

Diffuse sources of nutrient pollution are incorporated into SAGIS from the Phosphorus and Sediment Yield Characterisation In Catchments (PSYCHIC) model (developed by a consortium of academic and government organisations led by ADAS Water Quality).

9.6 Effectiveness of the Cross-Border Collaboration & Partnership Working

This section considers aspects of the SWELL project's collaborative and partnership working including:

- The effectiveness and added value of the SWELL project's cross-border collaboration in relation to the specific objectives;
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The SWELL project partners indicate that, prior to this project, there was minimal engagement/partnership working between the regions, and in particular between NIW and IW, in relation to the development of WWTWs. The SWELL project is, therefore, considered to be significant in terms of adding value on a cross-border basis.

9.7 Barriers to Cross-Border Cooperation

This section considers whether the SWELL project has encountered any barriers to cross-border cooperation that the priority axis is not addressing.

To date (May 2019), the project partners have not encountered any significant barriers to cross-border cooperation; including engagement with local community and stakeholders. The SWELL project partners suggest that in conjunction with the other partners, the partnership demonstrates a genuine cross-border commitment to the project and provides the best combination of knowledge and expertise to deliver the outputs through the application of joint development, implementation, staffing and financing.

9.8 Best Practice & Learning

As of May 2019, one of the main achievements of, or lessons learnt from, the SWELL project has been NIW's ability to appoint a contractor through its established contractor framework early in the design stage. Discussion with the project partners suggests that this not only expedited the design process (as previously highlighted), but it offered a number of benefits, such as:

- More informed project costs that are based on actual prices rather than theoretical prices;
- The experience of the contractor has also ensured that new technologies and/or innovative processes (where appropriate) were incorporated into the design stage; and
- The involvement of the contractor at an early stage ensured that the risk was transferred from NIW to the contractor sooner than would have been the case had the contractor been appointed later in the process.

Further discussion with the project partners suggests that the progress made by NIW in the design stage (as set out above) was used to inform IW's development of the projects in Ireland. For example, it is understood that NIW provided IW with relevant design schemes for a standard WWTWs in an effort to expedite the design and construct of the projects.

In addition to the above, the project partners also anticipate that:

- SWELL will leave a legacy of knowledge that will be shared among many parties within Northern Ireland, Ireland and Scotland. From innovative wastewater treatment solutions to the formation of a unique modelling strategy that has never before been attempted on the Island of Ireland. The project offers a great opportunity for knowledge sharing and best practice for future adaptation of technologies and processes.
- The project will act as a benchmark for future modelling and the sustainable targeted remediation outputs will inform the programme of measures to meet WFD "Good" status.
- AFBI in conjunction with the Regulating Bodies may seek to operationalise the models in the future by coupling with meteorological forecasting to allow near real-time management response to changing pressures. This use of self-learning and cognitive science can be used to create Artificial Neural Networks to predict overall water quality and to react to catchment processes in real-time. As discussed further in Section 9.9 (below), it is envisaged that the utilisation of remote technologies during the sampling programme can be left as a legacy to the study to help monitor and improve WFD status and inform aquaculture activities in the Loughs.

9.9 Mainstreaming Activities

Whilst it is (at May 2019) too early for the SWELL project to have led to any mainstreaming of cross-border delivery of environmental work, the project partners anticipate that:

- A legacy model, with built-in source apportionment, will be an output of the SWELL project that can be used to drive further improvements to ecology and water quality and can be used to deliver the target 'Good' status by 2027;
- The SWELL project proposes an ambitious modelling strategy which will develop on previous work undertaken by AFBI and Loughs Agency. The ecosystem model aims to link various types of models and refine the previous work undertaken in catchments and add more resolution, calibration and validation. The modelling is summarised below[150]:

    - Catchment and river modelling;
    - 3D hydrodynamic modelling;
    - Biogeochemical modelling;
    - Shellfish simulation models; and
    - Sewerage network spill models.

[150] Source: SWELL Project Execution Plan (15th May 2017)

Under the Sustainable Mariculture in Northern Irish Sea Ecosystems (SMILE) project, AFBI was granted a non-transferable license for the use of bespoke versions of Ecowin, developed for the sea Loughs (Lough Foyle, Larne Lough, Belfast Lough, Strangford Lough, and Carlingford Lough), including the right to install EcoWin on multiple computers, and to use the model results. However, the inclusion of NIW (and potentially IW) drainage area models (sewerage network spill models) is an omission from any current ecosystem model. The SWELL project, therefore, represents an opportunity to link rainfall dependant discharges to a catchment and hydrodynamic model so that the best environmental solutions can be achieved. The tools used will have to carefully monitor the integration of rainfall data between the NIW developed Infoworks models and the tool proposed by the catchment model. It is anticipated that the model will leave a legacy in that the appropriate measures required for improving water quality (and thus improve WFD status) can be implemented through the outputs of the model. This will be of particular interest to the regulatory bodies on both sides of the border as it will give them accurate and specific information with which to introduce the most cost-effective improvements to improve overall water quality. The model outputs can then be used to inform the WFD Programme of Measures within the RBMP six yearly cycles.

- Furthermore, the catchment investigation and modelling exercise will leave a tangible legacy model to inform further targeted action required to address the residual pollution from external sources. For example, whilst NIEA & EPA have developed models as a supplementary measure to assess the cumulative impacts of discharges on a catchment scale (e.g. SIMCAT, as a one dimensional simplified river model can support setting discharge consents to achieve water quality targets), it is limited in that estuarine transitional and coastal waters and the discharges to them are not simulated. However, due to these modelling limitations with SIMCAT software, it is envisaged that the SWELL Project will add value by developing an ecosystem modelling approach to simulate the range of polluters and their response to the hydrological cycle in the Carlingford and Foyle catchments. This represents a complex and specialist area of modelling and aims to link the river basin catchments to the coastal areas. This full coupling and integration of marine, sewerage network drainage area & diffuse catchment models will take cognisance of the catchment as an ecosystem, where one intervention impacts another and respective legislation e.g. Marine Strategy Framework Directive, Habitats Directive & Priority Areas under the WFD.
- The legacy model should, therefore, be an output of this project that can be used to drive further improvements to ecology and water quality. It is envisaged that AFBI will seek to make these models as operational as possible by coupling with Meteorological forecasting to allow near real-time management response to changing pressures.
- In addition, the utilisation of remote technologies during the sampling programme can be left as a legacy to the study to help monitor and improve the overall WFD status and also to inform aquaculture activities in the loughs;
- The models developed under the SWELL project will be held by the government under the custody of Loughs Agency, as the cross-border body responsible for water quality for the Loughs. The models will be developed using open-source software and will be updated and revalidated beyond the funding period by AFBI, as part of their normal statutory responsibilities. Public ownership of models and use of peer-reviewed and continually developing open source software is a key element in the selection of the project partners' modelling strategy. The strategy thus enables access for all government bodies to input and benefit from the outputs of the model and encourages cross-departmental and cross-border collaboration to solve water quality issues
- The modelling Strategy will also align to UK practice, more specifically to the Department of Environment, Food and Rural Affairs (DEFRA) Catchment Based Approach (CaBA). The objectives of the CaBA are:

    - To deliver positive and sustained outcomes for the water environment by promoting a better understanding of the environment at a local level; and
    - To encourage local collaboration and more transparent decision-making when both planning and delivering activities to improve the water environment.

  Adopting this approach will promote the development of more appropriate River Basin Management Plans – which underpin the delivery of the objectives of the WFD, and will also provide a platform

for engagement, discussion and decisions of much wider benefits including tackling diffuse agricultural and urban pollution, and widespread, historical alterations to the natural form of channels.

- Ultimately, on completion of the project, the ecosystem model will provide a sustainable legacy tool for cross-border use by water companies, environmental regulators and other stakeholders to enable future targeted improvements and build on the skills, relationships and investment planning techniques gained through the project.

Furthermore, NIW and IW, as state-funded regulated companies, are solely responsible for the delivery of wastewater services in Northern Ireland and Ireland respectively. As such, the ownership of any constructed assets delivered by the SWELL Project will be taken over by each Water Company, to become part of their portfolio of assets.

All capital upgrade solutions will be designed in accordance with relevant statutory requirements, codes of practice and latest Water Company design guides, specifications and asset standards. Treatment capacity shall be suitable for a 25-year project horizon, with the following general minimum design life requirements:

- Civil and structural works – 50 years;
- Mechanical and electrical works – 15 years;
- Instrumentation, control and automation – 10 years.

Operational and maintenance activity on these assets that continue beyond the lifetime of the project will become the responsibility of each Water Company. It is anticipated that the replacement of existing poorly performing assets by newer, more efficient alternatives will ultimately result in reduced overall power consumption and operational & maintenance requirements, with associated operational expenditure saving to the Water Company.

In addition, it is anticipated that equipment bought during the course of the SWELL Project such as meteorological gauging equipment, hydrological gauging equipment and buoys will be maintained and operated by AFBI after the project ceases. This equipment will be used to further validate the models post project and should form a valuable legacy for the two sea loughs. This data will be made available for all EU funded projects both during and after the SWELL project ceases.

10. SOURCE TO TAP

10.1 Introduction

This section of the report considers the Source to Tap (StT) project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 4 – Improve Freshwater Quality in Cross-Border River Basins.

10.2 Project Overview

The Erne and Derg catchments straddle the Northern Ireland and Ireland border and are predominantly rural. Peatlands and forestry dominate in the upper catchments, with grassland-based agriculture and pasture in lower areas. The NIEA and the EPA agree Water Framework Directive (WFD) status and objectives for all cross-border water bodies[151]. A number of Drinking Water Protected Areas (DWPAs) have been designated in both catchments.

Regulatory compliance has been threatened at a number of Northern Ireland Water (NIW) and Irish Water (IW) Water Treatment Works (WTWs) in these shared catchments (Derg WTWs, River Derg and Killyhevlin WTWs, Lough Erne) in relation to colour, turbidity and the pesticide MCPA[152]. More specifically:

- Derg WTWs has failed to achieve compliance with MCPA regulatory standards in recent years, and the Drinking Water Inspectorate Northern Ireland (DWI NI) issued a Provisional Enforcement Order requiring mitigation measures.
- Similar issues were identified for NIW's Belleek WTWs and IW's Ballyshannon WTWs, both supplied from the Erne System.

These risks arise because raw water abstracted from watercourses often contains contaminants such as pesticides, organic colour and sediments, which run off the land and must be removed in WTWs to produce drinking water to acceptable water quality standards.

It is more cost-effective to reduce contaminants in run-off from the land as this results in reduced:

- Capital investment requirements;
- Carbon outputs; and
- Operational costs required to remove pollutants at WTWs.

There is the added benefit of improving water quality which provides improved wildlife habitats. For example, the Erne and Derg catchments are economically significant salmonid fisheries and they support endangered freshwater pearl mussel populations – both of which require high water quality.

In addition to the above, risks to drinking water sources have been identified in these catchments in the Drinking Water Safety Plans (DWSPs).

[151] The two catchments lie in the north western International River Basin District (IRBD), which is in its second River Basin Management Plan (RBMP) cycle (2015-2021).

[152] MCPA is a selective herbicide specifically designed to kill weeds without harming crops and is a common active ingredient in both agricultural and domestic herbicide products. MCPA is widely used for controlling the growth of weeds like the Common Soft Rush, which has flourished in grassland following wet weather periods in recent years. MCPA does not bind to soil particles so it is prone to leaching, directly into watercourses or via land drains. Once in the water it can take 3-4 weeks to break down without treatment. NIW frequently detects high levels of MCPA in rivers and lakes and at abstraction points in many drinking water sources in Northern Ireland. This MCPA is removed in the water treatment process and drinking water is of a high-quality standard. (Source: NIW website).

The StT project has been developed to address these issues by:

- Exploring sustainable, cost-effective measures to reduce pollution in shared catchments;
- Contributing to improvements in cross-border raw water quality; and
- Securing safe drinking water sources.

The StT project partnership is led by NIW and is made up of IW, AFBI, UU, the Rivers Trust (TRT) and East Border Region Ltd. (EBR).

The StT project partnership suggests that, in the absence of the project, it is likely that raw water quality will continue to decline due to the aforementioned pressures, which would result in:

- Costly water treatment solutions at WTWs; and
- The maintenance of water quality, as part of WFD status, being prevented.

The main aim of the StT project is to deliver sustainable solutions to the pollution of drinking water sources by developing a Sustainable Catchment Area Plan (SCAMP) for the Erne and Derg cross-border catchments.

Whilst sustainable catchment management has been implemented elsewhere, the StT project partnership proposed that the project will support the implementation of sustainable catchment management across two jurisdictions[153].

It is anticipated that the SCAMP will supplement the existing WFD's programme of measures and will contribute to WFD objectives, including improving water body classifications. It is also anticipated it will contribute to the Drinking Water Directive (DWD) objective of reducing risks and ensuring safe drinking water.

The StT project partnership intends to:

- Address certain key pollutants in two specific catchments, namely Erne and Derg; and
- Assess the effectiveness of project measures using a two-stage monitoring programme (field and catchment scale), utilising auto-samplers[154] as the best cross-border option. Key aspects of this approach are described below:

  - **Stage 1:** Field-scale investigation to determine timing and pathways of MCPA loss from soils and the hydrological drivers of MCPA loss to surface waters under controlled conditions. It is proposed that the AFBI CEntral NITrogen (CENIT) site in Hillsborough, County Down site will be used to investigate MCPA losses in overland flow and drainage flow and the hydrological drivers involved.

  - **Stage 2:** Comparison of paired sub-catchments – one which implements incentive measures (across a larger (circa 120 km^2) sub-catchment of a river system to investigate the efficacy of MCPA measures at the meso-catchment scale) and one as a control (business-as-usual) (this would involve focused paired sub-catchment investigations within a river system on mini-catchments of 5-20 km^2).

    It is also proposed that education and advisory programmes covering multiple river catchments and based upon the outcomes of the mini and mesoscale investigations will be undertaken. The aim of this aspect will be to increase awareness and uptake of good MCPA practice across the wider macro-catchments.

It is anticipated that involving the local community in the delivery of the StT's project objectives will result in behavioural change and the upskilling of community members in river monitoring, which will, in turn, ensure the future legacy of the project outputs and long-term sustainability benefits.

[153] The newly formed IW has not delivered integrated catchment management approaches (to date), whilst NIW has only carried out small-scale SCAMP initiatives.
[154] Sampling every 7 hours across a weekly cycle ('24-7') using an autosampler to implement higher frequency monitoring in a reduced spatial area to capture rainfall events.

Sustainable Catchment Management initiatives, such as that proposed by the StT project partnership, are now widely considered as the first stage of treatment, though the financial payback varies depending on catchment size, risks, water quality and treatment process. StT project has, therefore, been designed with consideration of river catchments as complex systems, affected by agricultural intensification and other activities, and which require focussed management interventions.

The following seven work plans have been developed:

Table 10.1: Summary of StT Project Work Plans (Per Progress Reports)	
Work plan[155]	**Work plan lead**
1. Management	NIW
2. Community Activities (Community Engagement)	TRT
3. UKWIR[156] Catchment Characterisation and Benefits Assessment	AFBI
4. Development, Implementation and Delivery of the Land Incentive Scheme (LIS)	NIW and IW
5. Peat Restoration Pilot Project - Implementation and Monitoring of Effectiveness	NIW
6. Forestry Best Practice Pilots Workplan Development, Implementation and Monitoring of Effectiveness	NIW and IW
7. Water quality monitoring and evaluation	AFBI

An StT Programme Board has been in place since 2015, which includes Director-level representatives from NIW and IW.

A Project Steering group comprised of representatives of all project partners and the Project Manager (within NIW) will oversee the implementation of the StT project. The Steering group met monthly during project start-up and intends to meet at two-monthly intervals thereafter to review progress against project milestones and finances.

The Project Manager will be supported by a project team, including a Finance/Administrative Manager (within NIW) and 3 x StT project officers (StTPOs)[157], and will provide the overall direction, governance and leadership to ensure the project adheres to the project programme and that shared resources and expertise are utilised effectively.

A Project Advisory Group, comprising representatives of a wide range of stakeholder organisations[158], has been established to guide decision-making and ensure efficient knowledge transfer between the StT project and other external organisations, initiatives etc.

A Benefits Realisation Plan has been developed to identify the key delivery milestones and expected target dates. The StT project partnership anticipates this will be used to monitor and review performance in meeting scheduled milestones and deliverables. The Benefits Realisation Plan will be the basis for evaluating project impacts and realisation of benefits.

10.3 Project Budget

The total proposed StT project costs are €4,909,921, of which €4,173,433 (85%) is anticipated to be funded from the INTERREG VA Programme[159].

[155] The forestry and peat interventions (work plans 5 and 6 respectively) will be facilitated by Coillte and Forest Service NI who control access and operational processes in the study catchments.
[156] UK Water Industry Research.
[157] Within IW (x1) and TRT (x2).
[158] E.g. SEUPB, NIEA, EPA, Department of Environment, Community and Local Government (DECLG), College of Agriculture, Food and Rural Enterprise (CAFRE), Forest Service NI, Coillte, Scottish Water and the Department of Agriculture, Food and the Marine (DAFM).
[159] Per Letter of Offer (dated 7th February 2019).

Table 10.2: Anticipated Project Costs	
Proposed Project	**Total Project Costs**
Staff Costs[160]	€2,347,225.63
Office and Administration Costs	€352,083.66
Travel and Accommodation	€263,727.25
External Expertise and Services	€250,712.93
Equipment	€264,431.25
Infrastructure and Works	€1,431,740.54
Total	**€4,909,921.26**

Table 10.3: Anticipated Project Funding		
Funding Sources	**Value (€)**	**Source**
Cash Contribution (Partner Supplied/other grant)	€0	N/A
In-kind Contribution (Partner Supplied)	€0	
Sub-Total	**€0**	
Central Government Match Funding	€736,488.22	
ERDF	€4,173,433.04	
Total Grant Funding	**€4,909,921.26**	
Total	**€4,909,921.26**	
Intervention Rate (% ERDF)	**85%**	

There will be no revenue generated during the StT project.

10.4 Anticipated Project Objectives, Outputs & Results

10.4.1 Objectives

The StT project partnership has established the following objectives[161]:

Table 10.4: StT Project Objectives
To deliver, by December 2021, the following: 1. A SCAMP. 2. A Learning and Outreach Plan in the Erne and Derg Catchments through StTPOs to effect changes in attitude to the protection of water quality and the water environment. 3. Best practice forestry pilot projects in the Erne and Derg Catchments to reduce forestry impacts where there is a risk to raw water quality. 4. Restoration in the Erne and Derg Catchments of previously afforested peat bog areas adjacent to watercourses on Forest Service NI land to provide buffer zones preventing sediment run-off into rivers. 5. Trialling a cross-border pilot Land Incentive Scheme in selected sub-catchments within the Derg catchment, encouraging changes in current land management practices to reduce pesticide, colour, turbidity and diffuse pollution pressures, thereby improving overall water quality[162]. 6. Information sharing of outcomes with stakeholders on the island of Ireland and Scotland. 7. UK Water Industry Research (UKWIR) cost-benefits assessments to inform the SCAMP and future SCAMP projects beyond the life of the StT Project.

[160] It is anticipated that 8 new posts (5 full-time and 3 part-time) will be created in total by the COMPASS project.
[161] Source: Stage 2 Application Form/Business Plan.
[162] The StT project partnership proposed that financial incentives will be distributed through the pilot LIS to encourage changes in practice to reduce pesticide and sediment losses. Assessments will be carried out by the StTPOs who will make recommendations for improvements to reduce pollution or contaminants. If land managers are eligible and successfully apply under the terms of the scheme, they will complete the work and the StTPOs will re-visit to check if work has been satisfactorily completed to allow the land manager to receive payment. Once completion compliance checks have been made, payment will be released.

10.4.2 Outputs & Results

Per the Letter of Offer (dated 3rd July 2017), the anticipated (approved) StT Project Outputs are as follows:

Programme Output Code	Name of Output	Programme Output Indicator Target[163]	StT Project Target
2.411	Cross-border drinking water 'Sustainable Catchment Area Management Plan' research and pilot project	1	1

Additional conditions specified by the Steering Group (per the Letter of Offer, dated 3rd July 2017) that may relate to impacts include:

- Produce an Environmental Impact Register highlighting how the project considers and assesses the proposed activities encompassing sustainable practices[164].
- A sustainable mechanism for the delivery of the Incentive Based Scheme should be submitted to SEUPB for assessment and prior approval (including assessment of any State Aid implications)[165].

The results indicator is *"the percentage of cross-border freshwater bodies in 'good' or 'high' quality"*. The stated baseline value for 2014 (start of the Programme period) is 32%, whilst the target value for 2023 is 65%. The StT project partners envisage that the project will make a positive contribution towards the results indicator as the project will:

- Deliver a SCAMP for drinking water protection at source in the Erne and Derg catchments. It is anticipated that this will, in turn, improve the quality and reliability of raw water received at water abstraction points by reducing the risks from contamination and ensuring the delivery of safe, clean drinking water.

10.5 Contribution to the Priority's Specific Objectives & Result Indicators

This section considers the StT project's key achievements (as of May 2019) and the extent to which the StT project has:

- Contributed to the achievement of the Priority's Specific Objectives;
- Contributed to the achievement of the targets for the Result Indicators;
- Contributed to:
  - EU 2020 objectives;
  - The Atlantic Strategy; and
  - The horizontal principles of equality and sustainable development.

and where appropriate, the section:

- Identifies any external factors that have impacted, positively or negatively, on the project's ability to contribute to the achievement of the Specific Objective.

[163] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.
[164] It is understood that the StT project partnership has (in agreement with the SEUPB) prepared an Environmental Impact Register.
[165] It is understood that the StT project partnership provided the SEUPB with further detail in relation to the Incentive Scheme (although as of May 2019, this has yet to be approved by the SEUPB).

10.5.1 Key Achievements (to May 2019)

Discussion with the project partnership indicates that, as of May 2019, activities are underway that will contribute to the delivery of the project's anticipated (approved) outputs. Notably, the project partnership has been undertaking weekly water sampling and analysis in the Finn and Derg catchments. It is also understood that the pilot Land Incentive Scheme was launched on the 25th July 2019 in Castlederg and the event was attended by 82 landowners (further details are included in the table below). Community engagement has also been supported via social media e.g. Twitter, Facebook and Instagram.

In addition, the StT project partners cite the project's key achievements (as of December 2018) as being:

Period	Dates	Key Achievements
1	1st October 2016 – 31st December 2016	• This was a period of mobilisation for the project where all partners were working 'at risk'. NB: The project partners note that the main issue at this stage was the delay in the receipt of the Letter of Offer arising from the Brexit decision and the subsequent uncertainties around funding[166]. • A Project Manager was recruited by NIW (on a temporary basis). • A mobilisation meeting was held on the 12th September 2016 and a Steering Group meeting was held on 8th December 2016. • Staff from NIW, IW, EBR and the Rivers Trust attended a meeting in Coventry with Severn Trent Water Ltd. to discuss their Land Incentive Scheme. • Work commenced on the specification and call for tender documents for the pilot land incentive scheme.
2	1st January 2017 – 31st March 2017	• A Letter of Offer was signed on the 3rd February and submitted to SEUPB on the 7th February 2017. • The Partnership Agreement was finalised on the 16th of March 2017. • The (permanent) Project Manager took up the post on the 1st of April 2017. • The Project Board met on the 1st February 2017 and the project Steering Group met on the 13th January and the 27th February 2017. • The project risk register and environmental impact register were established. • UU and AFBI met to discuss catchment selection and carried out their first field trip to the Derg catchment. This first field visit had two objectives: – To scope the practicalities of hydrometric and water quality monitoring on the tributaries; and – To gauge the level of land use and settlement related to monitoring the effectiveness of the LIS. • AFBI also carried out some work on the preparation for the analysis of MCPA and for the CENIT site. • TRT started work on the recruitment process for its project officers and also did some preliminary work on the learning and outreach strategy and the mapping portal.
3	1st April 2017 – 30th June 2017	• The Finance/Admin Manager took up the post on the 19th June 2017. • An environmental impacts register was established and reviewed at both the Steering Group and Project Board meetings.

[166] It is understood a draft Letter of Offer was received in December 2016 and the project partners were then involved in answering queries on it.

Period	Dates	Key Achievements
		• Project Board (24th April 2017) and Project Steering Group meetings (7th April, 5th May and 28th June) were held. • A number of work package areas were progressed e.g. meetings held to discuss the collection of socio-economic data and a field trip to the Derg catchment (9th May 2017) to look at potential sites for water quality monitoring and to consider where MCPA was being sprayed within the catchments. • In terms of procurement, NIW progressed the procurement of the specialist for the pilot LIS and the Call for Tender went out in June 2017.
4	1st July 2017 – 30th September 2017	• The Project Officers (TRT and IW), Researcher (Ulster) and the new Finance Admin Manager (NIW) started in post. • Visits were made to Ballinderry Rivers Trust and Seaghan Water Treatment Works to show the project officers the work undertaken by farmers to protect the rivers from sediment runoff and to understand the water treatment process. • The tender for the pilot LIS was awarded to RSK Adas 25th August 2017. • A start-up meeting for the branding and design work procured by TRT was attended by the Project Manager. • A Steering Group meeting was held on the 6th September 2017. • A meeting was held to discuss data requirements and licensing issues between AFBI and NIW GIS experts. • 4x GIS training sessions (12.09.17, 20.09.17, 26.09.17 and 10.10.17) were undertaken with the Project Officers. • The draft Learning and Outreach Plan was completed in this period. • Work was progressed on the selection of catchments for the monitoring of the pilot LIS, with larger-scale catchments being selected within the Derg and possible control catchments identified in the Strule catchment. • It was agreed that the CENIT study would be delayed by 1 year to allow the willow riparian strips at the site to fully establish themselves before MCPA is sprayed. NB: the project partnership noted that this change will have no knock-on impact for any other task, as the data from the CENIT study is only required to interpret the catchment monitoring data close to the end of the project.
5	1st October 2017 – 31st December 2017	• A Launch Event was planned for the 8th December 2017 but was cancelled due to heavy snow. • The StT project website and all social media channels were launched on 8th December 2017. • The Learning and Outreach Plan was finalised. • The project officers held meetings with a number of organisations providing education such as the Derrygonnelly field centre, the NIW Education team and OPAL citizen science. • The monitoring sites for the pilot LIS were agreed as the Finn (control) and the Derg (intervention). • Discussions were held with NIW and Loughs Agency about the use of their sites for the monitoring stations. • The method for MCPA analysis was finalised. • A Steering Group meeting was held on the 4th October 2017 and a Project Board meeting was held on the 18th October 2017. • The first External Advisory Group meeting was held on the 1st December 2017. • The first roadshow event was held on the 19th December at Erneside Shopping Centre. • RSK Adas continued its work on the development of the pilot LIS on behalf of NIW. Two consultation events were held in November 2017 for stakeholders in Belfast and Dublin. NB: The

Period	Dates	Key Achievements
		pilot LIS review highlighted the need for a meeting with SEUPB to discuss the level of aid intensity within the scheme. It was recommended that the level be set at 100% in line with other schemes to ensure there was good uptake by the farmers.
6	1st January 2018 – 31st March 2018	• A Project Board meeting was held on the 20th February 2018 and Project Steering Group meeting was held on the 17th January 2018. • Procurement of the equipment for the automatic monitoring stations was completed and contracts were awarded by AFBI for the procurement of automatic samplers and the installation of kiosks and electricity at the sampling sites. • The project officers organised and delivered 7 project roadshows, including those held in Pettigo, Erneside and Cavan. • A meeting with SEUPB took place in January 2018 in relation to the level of aid intensity within the LIS. SEUPB agreed to go back to the Steering Committee to request a change to the level of aid intensity to 100%.
7	1st April 2018 – 30th June 2018	• The project manager promoted the project through a number of presentations to external audiences and groups. • The project officers held a number of information exchange events to help develop a community vision for the Erne and Derg catchments and promoted the project at agricultural shows. • An educational booklet has been developed. • Two Steering Group meetings (18th April and 27th June) and a Project Board (24th May) were held. An External Advisory Group meeting was also held on the 20th June 2018. • A spatial sampling survey was carried out at 11 sites in the Derg catchment from the end of March to end of June. This involved AFBI and UU staff and the Project Officers in collecting samples. • AFBI recruited for the HSO post, which was successfully filled. • MCPA was applied to the CENIT site in April and 202 samples were collected and analysed by AFBI lab staff. • Learning and Outreach Plan - in this period, the venues for the Information Exchange Events were identified and eight (2 x Derg and 6 x Erne) of the sixteen events were held. • AFBI finalised the risk maps for the Derg and Erne catchments - these focussed on the risks arising from the application of MCPA and sediment run-off as well as from forestry and peat practices. • The pilot LIS development was finalised and was presented to the Steering Group on the 18th April.
8	1st July 2018 – 30th September 2018	• HSO post started in AFBI on the 9th July 2018. • A Project Board meeting was held on the 12th September 2018. • The pilot Land Incentive Scheme was launched on the 25th July in Castlederg and the event was attended by 82 landowners. NB: issues with GDPR[167] were identified, in terms of the personal data being collected as part of the scheme. • Farm visits commenced on the 6th August 2018. During this period, 45 farm visits were completed and Water Efficiency Management Plan (WEMP) production commenced. • A site meeting was held with Forest Service NI to explore potential peat pilot sites. Further discussions were held on the procurement of the peat and forestry work packages with the NIW procurement team. • The School Education Programme format was finalised by TRT (it was proposed that the programme would contain 5 units, each

[167] The General Data Protection Regulation (EU) 2016/679 ('GDPR') is a regulation in EU law on data protection and privacy.

Period	Dates	Key Achievements
		lasting one hour and that they would be set out in a School Activity Booklet and accompanied by PowerPoint slides in the classroom). The Programme was advertised on the 'Learn' section of the StT project website and all 160 schools in the project area were contacted directly. The Programme was booked by 7 schools (to be delivered in late 2018 and 2019).
9	1st October 2018 – 31st December 2018	• A Project Steering Group meeting was held on the 17th October 2018 and an External Advisory Group meeting was held on the 5th December 2018. • Work progressed on the GDPR implications of the pilot Land Incentive Scheme and in resolving the issues around the collection and sharing of data by the partners. This included discussions around the flow of data between partners, discussions on who had data controller and processor roles and discussions on a common consent form and a privacy notice. TRT collaborated with NIW on the preparation of a Data Sharing Agreement that would enable the lawful transfer of LIS personal data between Partners and set out the condition of use. • By the end of P9, 87 farm visits were completed, 47 WEMPs were in preparation and 8 WEMPs had been completed and returned to landowners. NB: The Irish Water project officer was not able to carry out any LIS visits due to the GDPR issues. • The School Education Programme was booked by 10 schools (in total). • Site visits were undertaken by UU, NIW and IW staff to look at potential sites for the forestry and peat pilots. NB: a peat site was not identified for restoration by Forest Service during this period due to issues with GDPR on the pilot LIS (which delayed the start of work on the peat pilot). • Samples were collected at the AWQMS until 12th December 2018 and analysed by AFBI. • Work has continued on the catchment characterisation reports for the Derg and Erne catchments. • A presentation was made to the North West River Basin District Stakeholder Group on the aims and objectives of the StT project.

10.5.2 Project Output Indicators

Discussion with the StT project partnership indicates that whilst the anticipated (approved) project outputs have, as of May 2019, not been achieved (nor was it expected of the project at this stage in its implementation, as they have a 2023 delivery date), the project is being implemented as planned and making positive progress towards achieving its outputs.

Programme Output Code	Name of Output	Programme Output Indicator Target[168]	StT Project Target	Status (as of May 2019)
2.411	Cross-border drinking water 'Sustainable Catchment Area Management Plan' research and pilot project	1	1	0

In addition, as of December 2018, the project partners had engaged with 5 target groups, including general public from agricultural shows, farmers (at the launch of pilot LIS), press and radio articles and school children (from visits undertaken in September 2018).

[168] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

10.5.3 The Priority's Result Indicator Targets & Specific Objectives

Given the early stage of the project's implementation and the fact that the project has yet to achieve its anticipated (approved) project outputs, the StT project is, therefore, at May 2019, making only marginal progress towards the Priority's Result Indicator Targets and Specific Objectives. However, this should be expected at this stage of the project's implementation (as they have a 2023 delivery date), and should not be considered a concern.

10.5.4 EU2020 Objectives

Europe 2020, as per Appendix I, is the EU's response to the Great Recession, which was the period of general economic decline observed in world markets during the late 2000s and early 2010s.

The Strategy contained five measurable EU targets for 2020 that were anticipated to steer the process and be translated into national targets, two of which were for:

- **Employment** – 75% of the population aged 20-64 should be employed.
- **Climate change and energy -** The "20/20/20" climate/energy targets should be met (including an increase to 30% of emissions reduction if the conditions are right).

The StT project partnership considers that the project has contributed, or has the potential to contribute, towards these measures as follows:

- A number of new posts have been created as a result of the project, namely: Project Manager, Finance and Administrative post (in NIW), Project Officer posts (x3) and HSO post (in AFBI). It is anticipated that the project will provide the opportunity for these individuals to gain new experience and build capacity within their respective organisations.
- If the contaminants in the raw water reaching the Water Treatment Works can be reduced, it may decrease the costs of electricity required in the treatment process and/or the costs of regenerating the activated carbon as often to remove the herbicides. The StT project partnership notes, however, that it is difficult at this stage to predict the extent to which the project will contribute towards this specific measure.

10.5.5 The Atlantic Strategy

The 'Atlantic Strategy' is, as set out Appendix I, the EU's Maritime Strategy for the Atlantic Ocean area. Following the development of the Atlantic Strategy document, an Action Plan was developed, with the intention that it should be implemented through to 2020. The StT project has the potential to contribute towards the following priority area and associated objectives identified in the Action Plan:

Priority	Specific Objectives
1: Promote entrepreneurship and innovation	• **Sharing knowledge between higher education organisations, companies and research centres;** • Enhancement of competitiveness and innovation capacities in the maritime economy of the Atlantic area; • Fostering adaptation and diversification of economic activities by promoting the potential of the Atlantic area.

The StT project aims to continually share knowledge between higher education organisations, companies and research centres. This will be facilitated by the partners involved in the project (AFBI, UU etc.) through, for example, the External Advisory Group, where a range of relevant stakeholders from both jurisdictions meet to exchange ideas and knowledge. In addition, the Programme Manager has also attended meetings with other organisations e.g. Water Catchment Partnership and Strannooden Group Water Scheme Pilot to raise awareness of the StT projects.

10.5.6 The Horizontal Principals

The StT project aims to empower local communities to become environmental stewards to address pollution at source and to encourage more efficient and greener use of drinking water resources - a key component of sustainable development and as such it is anticipated that it will serve to contribute (at least in part) to the EU's three Horizontal Principals, per the following discussion:

Sustainable development	The StT project partnership advises that by improving the quality of raw water sources for the Erne and Derg WTWs, local communities will accrue environmental, economic and social benefits. Secure and wholesome drinking water supplies are inextricably linked with population health and a prosperous economy for all sections of society. The StT project partnership proposed that an ecosystem services approach will assess the broader environmental, economic and social benefits of the catchment management initiatives undertaken in the StT project (using the UKWIR industry-standard benefit assessment framework). **Environmental** The StT project partnership advises that the protection and improvement of drinking water supplies through prevention of pollution at source, reducing the need for elaborate, costly and capital-intensive drinking water treatment, is central to this project. This StT project aligns closely with the EU Sustainable Development Strategy's key objectives for natural resource protection and public health, and the priority of promoting a more resource-efficient, greener and more competitive economy. The StT project will also address environmental enhancement and recovery of degraded environments, and it fits with the guiding principle in the Northern Ireland Sustainable Development Strategy to 'live within environmental limits, respecting the limits of the planet's resources and ensuring that the natural resources needed for life are unimpaired and remain so for future generations'. The Northern Ireland Sustainable Development Strategy also recognises the role of communities in improving the quality of the local environment. The StT project partnership proposed to contribute towards this by incentivising behavioural change amongst landowners and involving and up-skilling local community stakeholders. The StT project is based on responsible, sound science, using methodologies proven in previous projects and research by the partners and others, for developing best practice in protecting drinking water sources (e.g. through piloting new techniques to trap sediments from forestry practices). Also, as part of the StT project, there will be re-establishment of peatland on previously afforested sites in order to create buffer strips next to watercourses. The project partners anticipate this will restore native habitats and increase biodiversity, prevent erosion due to forestry operations and improve hydrology and water quality within the sub-catchments. Additionally, peatlands increase the environment's capacity to store carbon and help mitigate climate change. Drinking water treatment is capital-intensive and involves substantial chemical and energy usage. The construction of treatment plants is also expensive, and they produce significant greenhouse gas emissions. It is anticipated that this project will incentivise alternative practices to reduce pollutant loads and soil erosion at source in upstream catchments, which will reduce the need for elaborate treatment, and therefore further reduce emissions and environmental impact. **Economic** The cost of public water treatment is ultimately borne by society. The project partners anticipate that the catchment protection and restoration measures to be

	undertaken by the StT project will reduce ongoing water treatment costs and future capital investment requirements. It is anticipated that such impacts will support a move to an efficient, competitive and truly sustainable development model. **Social** The project partners anticipate that the stakeholder engagement, up-skilling and incentives elements of the StT project will adopt a 'bottom-up' approach, thereby empowering the local community to engage in the protection of freshwaters on which they depend for their drinking water, and by doing so contribute to a strong, healthy and just society. Inclusivity is a key feature of this approach - reaching all sections of society and demographic groups to foster sustainable communities. The project partners anticipate that good governance will be promoted through building new partnerships in cross-border areas and building capacity amongst the local community. It is anticipated that cross-community relations will be enhanced by bringing disparate stakeholder groups together to address fundamental environmental concerns in the common interests of all concerned.
Equal opportunities and non-discrimination	The StT project partners advise that beneficiaries of improved drinking water sources span all demographic classes in the regional population. Community engagement and upskilling will be delivered to all demographic groups without distinction through a spectrum of initiatives (including social media, contact with community groups, representatives and networks, published material, website, and schools), thereby ensuring compliance with the horizontal equality theme. The availability of a secure wholesome water supply underpins local economies and is, therefore, essential to providing and sustaining employment across all sectors of society. Benefits arising from the project outputs will provide opportunities for all, regardless of religious belief, political opinion or racial group. In addition, the application criteria for the pilot LIS will comply with Section 75 of the Equality Act and implementation will be open and transparent.
Equality between men and women	As noted above, throughout project delivery the partners are seeking to ensure that no individual is discriminated against based on all equality considerations, including gender. These principles are being applied to all project participants, employees and beneficiaries.

10.5.7 Contribution to Other Strategies

The StT project partnership considers that the project aligns closely with the WFD and the integrated Community Policy on water by:

- Promoting sustainable water use;
- Reducing pollution/emissions of hazardous substances;
- Controlling transboundary water problems using cross-border solutions/joint management of water bodies straddling the border;
- Securing drinking water supplies;
- Involving the public; and
- Coordinating measures at the river basin level.

In addition, the StT project is closely aligned with a number of key EU directives and regional strategies, such as:

- Drinking Water Directive (98/83/EC), which has an objective to reduce risks and ensure the delivery of safe drinking water.
- 'Sustainable Water', A Long-Term Water Strategy for Northern Ireland (2015-2040).

- IW's Water Services Strategic Plan (2015-2040) - which (along with the above strategy) refers to the sustainable management of drinking water.
- Directive 2009/128/EC (Sustainable Use of Pesticides).
- The UK National Action Plan for the Sustainable Use of Pesticides (Plant Protection Products) (Department for Environment, Food & Rural Affairs, 2013).
- The National Action Plan for the Sustainable Use of Pesticides (Pesticide Registration & Control Division, DAFM, 2013).
- Code of Good Agricultural Practice for the prevention of Pollution of Water, Air and Soil (DARD, 2008).
- The EU's 'Good Agricultural Practice for Protection of Waters' Regulations (S.I. No. 31 of 2014).
- 'Foodwise 2025' - A 10-year vision for the Irish agri-food industry (2015).
- 'Going for Growth' - A Strategic Action Plan in support of the Northern Ireland agri-food industry (2013).
- 'Delivering Our Future, Valuing Our Soils: A Sustainable Agricultural Land Management Strategy for Northern Ireland'.

10.6 Effectiveness of the Cross-Border Collaboration & Partnership Working

This section considers aspects of the StT project's collaborative and partnership working including:

- The effectiveness and added value of the StT project's cross-border collaboration in relation to the specific objectives;
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The StT project partnership delivers cross-border value by enabling NIW and IW to:

- Jointly plan and deliver catchment activities;
- Save resources through synergies delivered through the project; and
- Share expertise with other partners.

In addition, the StTPOs will liaise with NIEA Catchment Officers (in Northern Ireland) and the Local Authority Water and Communities Office (LAWCO) in Ireland in relation to cross-border WFD issues.

In doing so, StT project partnership is of the view that this creates the potential to generate future initiatives and results in permanent sustainability benefits at cross-border level.

In addition, as of May 2019, the StT project partnership anticipates that new ways of working/partnerships/relationships will be developed with the CABB project (per Section 4), thereby maximising the benefits in the cross-border area and avoiding duplication of effort:

- NIW is a project partner in the CABB project, which focuses on restoring larger areas of blanket-bog on previously unforested peatlands to restore habitats and protect priority species. The peatland restoration proposed as part of the StT differs. It involves restoration to functioning bogs of multiple smaller, previously forested sites, where sediment run-off into rivers is an issue. It is anticipated that the StT project will, therefore, improve water quality by retaining sediments through natural filtration by peat, preventing problems with colour and turbidity.

- It is proposed that the forestry trials aspect of the StT project will focus on techniques to improve water quality by trapping sediments, whereas the CABB project aims to restore habitats with only one small element being on forested land in the Erne catchment.

10.7 Barriers to Cross-Border Cooperation

This section considers whether the StT project has encountered any barriers to cross-border cooperation that the priority axis is not addressing.

From the outset, the StT project partners were mindful that there were many potential constraints[169] and risks that could have a significant impact on the delivery of the StT project and given this have developed a strategic risk register with potential mitigation measures. However, at May 2019, the project partners indicate that they have encountered no barriers to cross-border cooperation that the priority axis is not addressing.

10.8 Best Practice & Learning

This section considers whether the StT project has resulted in any areas of best practice and learning.

Whilst it is (at May 2019) too early for the StT project to have resulted in any areas of best practice and learning, the project partners anticipate that the StT Project Manager will liaise with the Water Catchment Partnership, a working partnership with representatives from Ulster Farmers Union, the Voluntary Initiative, NIW, NIEA and CAFRE, in order to maximise opportunities for knowledge sharing on pesticide best practice.

10.9 Mainstreaming Activities

This section considers whether the implementation of the StT project has led to any mainstreaming of cross-border delivery of environmental work. Whilst it is (at May 2019) too early for the StT project to have led to any mainstreaming of cross-border delivery of environmental work, the project partners anticipate that:

- Skills will be developed, and networks will be established, which will enable local communities (in both Northern Ireland and Ireland) to continue to protect the local water supply beyond the project period. For example:
  - Volunteers involved in the StT will be trained in biological water quality monitoring, thereby enabling the public to play an active and meaningful role in monitoring and protecting their local freshwater environment from which their drinking water is sourced. Upon project completion, it is anticipated that they will, therefore, have a greater knowledge of the river catchment, the risks to water quality and the measures needed to protect that resource.
  - The provision of training and community raising awareness as part of the StT project will support the establishment of a Rivers Trust in the Derg catchment in the future. In partnership with the Erne RT, it is anticipated it would continue the work beyond of the project beyond its lifetime.
- The StT project will demonstrate alternative sustainable approaches to drinking water protection, which will inform different policy approaches throughout Northern Ireland, Ireland, Scotland and the rest of the UK.
- By demonstrating the effectiveness of catchment management initiatives in improving raw water quality at source in the catchment, the SCAMP will inform future business plans and investment decisions for both NIW and IW. For example, by implementing measures such as the pilot LIS (and monitoring its effectiveness), evidence will be produced by the StT project which can be used to demonstrate to policymakers the importance of protecting raw drinking water supplies at the source.
- The StT project website will be handed over to TRT for long-term maintenance and development, thereby providing a resource for disseminating knowledge across organisations in the UK and Ireland with similar interests and objectives.
- In the final year of the project, the StTPOs will seek to secure funding to recruit a StTPO into the Erne Rivers Trust.

[169] At the outset potential constraints were identified as falling under headings such as general, technical/environmental, financial, organisational, economic, social, management, legal or timing.

11. CATCHMENTCARE

11.1 Introduction

This section of the report considers the CatchmentCARE project, which was awarded grant funding under Priority Axis 2 - Environment, Specific Objective 4 – Improve Freshwater Quality in Cross-Border River Basins.

11.2 Project Overview

Land use activities can impact on aquatic ecosystems across jurisdictions. Given that Northern Ireland and Ireland share three International River Basin Districts, there is a requirement for a coordinated, cross-border approach when implementing the EU WFD[170].

Difficulties associated with the spatial fit and institutional interplay (due to differences between administrative, political and International River Basin Districts' boundaries) pose a significant challenge for cross-border management. For example, while agencies in both Northern Ireland and Ireland are adopting risk-based approaches to the targeting of resources and measures for the WFD[171], there is limited coordination of these activities to ensure the approaches are compatible. In developing these risk-based approaches, the use of different models, datasets and scales will impact on the ability to implement and manage cross-border strategies both now and in the future.

In addition, there has been a notable failure to incorporate catchment and water body heterogeneity successfully into catchment management, with administrative and operational constraints limiting a greater focus on targeted mitigation strategies. The CatchmentCARE project partnership – involving key stakeholders that have been involved in delivering programmes to support the cross-border coordinated protection of aquatic ecosystems – identified a specific need for intervention in the following three catchments:

Blackwater catchment	Throughout much of the Blackwater catchment, agriculture poses a significant threat to water quality due to its relatively high intensity and its location on impermeable drumlin soils (which have high connectivity to water bodies). For example, the EPA estimates that 85% of the phosphorus in the southern half of the catchment is coming from diffuse agricultural sources. In addition, wastewater treatment works (WWTWs) are also having an impact on, for example, the Clontibert Stream, Mountain Water and Blackwater. The high export of nutrients and sediment from agricultural land and WWTWs, in conjunction with poorly drained soils, means there is potential for willow and riparian zones to break the hydrological connectivity and reduce contaminant export. Previous studies[172] highlighted the contribution of point source nutrients to rivers during periods of low flow in the summer, with Willow being used as a proven (cost-effective) technology for reducing the risk associated with the export of nutrients from small WWTWs. The Blackwater catchment has also been subject to significant arterial and land drainage, which has altered the hydromorphology of the river. Numerous artificial barriers on tributaries such as Benburb, Butterwater and Emyvale are also impacting on the hydromorphology and passage of fish. Further assessment of the benefits of removing these barriers is required.

[170] As previously discussed, the WFD was established to protect and prevent further deterioration of inland surface waters, estuaries and coastal waters and implement a framework to enhance and return these aquatic ecosystems to at least "Good Status". The WFD is implemented on the basis of hydrologically discrete River Basin Districts, which have been identified and classified according to their physical and biological characteristics, by the Regulating Authority of each EU Member State. The management of cross-border catchments is specifically recognised in Article 3.3 and 3.4 of the WFD, which specifies that member states are required to coordinate activities within international river basin districts.
[171] NIEA utilises Critical Risk Mapping and EPA utilises Catchment Investigative Assessment.
[172] E.g. through the Blackwater TRACE project.

Finn catchment	The Finn River has been designated as an Area of Special Scientific Interest for Atlantic Salmon and Otter. However, recent River Hydromorphology Assessment Technique (RHAT) assessments have indicated the hydromorphology is at 'moderate' status for habitat in much of this catchment. In-stream and riparian water body quality improvement actions are, therefore, required. In addition, alien invasive plants such as Japanese Knotweed and Himalayan Balsam are present in the riparian zones. Whilst the physiochemical status of the river on the Ireland side of the border is high, the macroinvertebrate element is poor. This, therefore, suggests that the stream is impacted by other pressures, such as chemical escapes from land-use practices or potentially from hydromorphological impacts. In the part of the Finn catchment that is in Northern Ireland, the river is failing due to fish. There is, however, no clear evidence, as to why this is the case.
Arney catchment	The status of Upper Lough MacNean deteriorated from 'Good' to Moderate status between 2010 and 2014. The elements that determined the status were macrophytes, phytoplankton and nutrients and it was dissolved oxygen that caused the change to Moderate status. Also, the status of Lower Lough MacNean deteriorated from 'Good' to 'Bad' status between 2010 and 2014.

The WFD includes a reference to both surface-water and groundwater bodies. The current distribution of boreholes in the border region is, however, inadequate to satisfy the monitoring requirements of the WFD. While current groundwater modelling predictions provide some estimates of the impact of land use on groundwater quality, there is a need for these estimates to be verified through a water quality monitoring programme. In addition, very little is known about the interaction of groundwater bodies with surface water bodies.

Furthermore, with the implementation of a range of policies, regulation and initiatives related to the environment and sustainable land use in both jurisdictions, there has been an intensification of the knowledge requirements of all local, regional and national stakeholders. This poses a particular challenge in border areas, as stakeholders often have to consider information from two separate jurisdictions.

The CatchmentCARE project has been developed to:

- Provide a platform to integrate the two risk-based approaches being implemented in Northern Ireland and Ireland;
- Add value to the Critical Risk Mapping and the Catchment Investigative Assessment and to examine how these approaches can be integrated on a cross-border basis;
- Facilitate a greater focus on catchment heterogeneity by identifying and targeting actions that are specific to the land-use pressures impacting on aquatic ecosystems in the Finn, Arney and Blackwater catchments;
- Add value to the stakeholder engagement activities carried out by Catchment Officers (NIEA) and Community Water Officers (in Local Authority Water and Community Office (LAWCO) in Ireland) in the catchments; and
- Liaise with the LAWCO coordinator for the border region and with the NIEA Water Management Unit to ensure the proposed CatchmentCARE project activities add value to the WFD Programme of Measures (POMs).

The CatchmentCARE project partnership is led by Donegal County Council (DCC) and is made up of the Inland Fisheries Ireland (IFI), the Loughs Agency (LA), the Agri-Food and Biosciences Institute (AFBI), Ulster University (UU), Armagh, Banbridge and Craigavon Borough Council (ABCBC), British Geological Survey (BGS) and Geological Survey of Ireland (GSI).

The CatchmentCARE project partnership intends to:

- Establish 3 water quality improvement projects in the Finn, Blackwater and Arney Catchments; and
- Develop and implement 50 cross-border groundwater monitoring wells (by installing 51 boreholes[173] across the region).

[173] NB: Boreholes need to be installed in multiplies of 3 i.e. 17 x 3 = 51 boreholes.

The CatchmentCARE project partnership proposed that this will be achieved through the following actions[174]:

3 policy actions	It is proposed that the three policy actions will be delivered through 3 studies focused on: 1. Refining the current nutrient management advice to farms through the implementation of 1 farm-scale survey on selected farms. 2. Completing 1 evaluation of the cost and feasibility of achieving the WFD objectives in the three catchments. 3. Delivering 1 scoping study on the feasibility of establishing a willow supply chain in the border region.
6 catchment actions	It is proposed that the 6 catchments and water body actions will include: 1. Delivering over €3m worth of hydromorphology work across the three catchments. In addition to existing EPA and NIEA data, the project partnership identified action locations within each catchment, which will be refined during the initial scoping phase of the project in order to maximise impact. 2. Implementing 1 programme to upgrade WWTW of <250 Population Equivalent (PE)[175]. The upgrades will involve the use of willow plantation for bioremediation of WWTW effluent. 3. Implementing 1 scheme to reduce the internal loading of phosphorus (P) in selected lakes through the addition of P binding material[176]. 4. Installing 51 groundwater boreholes, which will make a contribution to the monitoring and evaluation of the various actions implemented through the project. 5. Reducing the risks posed by chemical escapes from land use in the Finn catchment. A series of best practice solutions will be developed following a monitoring programme at selected sites. 6. Providing nutrient management advice to farmers through farmer discussion groups, farm adviser workshops and open days (NB: this is linked with policy action 1, per above).
3 community actions	It is proposed that 3 interlinked actions focused on enhancing the capacity of stakeholders to contribute to achieving GES status will be delivered. These are detailed below: 1. Implement 1 incentive-based scheme to support community organisations to implement initiatives that stimulate a 'bottom-up' approach to knowledge exchange and capacity building between multiple stakeholders. 2. Support and enhance local community development-based strategies and approaches to support sustainable land use in the three catchments e.g. three cross-border catchment networks. 3. Develop and implement 1 Communication and Engagement Plan in parallel with stakeholder and community engagement.

[174] At the time of its application for funding, the CatchmentCARE project partnership proposed a Scoping and Action Targeting work package for a duration of 18 months. This was intended to refine the number and location of actions in order to deliver most impact. Those specified in the table below provide the indicative actions that were identified at the time of the application, which remain valid as of May 2019.

[175] PE is a term specified by the European Commission (EC) Urban Waste Water Treatment Directive. 1 PE is equivalent to 60 grams of BOD (Biochemical Oxygen Demand) per head per day. In this way the loadings from both domestic and industrial inputs may be equated together. Much of the PE information, however, has been assessed by a variety of other means such as house counts.

[176] NB The Evaluation Team has been advised at July 2019 that NIEA and EPA have concern in relation to this action. It is understood that NIEA's Water Regulation team would not be in a position to consent to the dosing of materials to control/immobilise phosphorous levels in lakes as it is likely to have an adverse effect on the aquatic ecosystem. This has been raised within the steering group and NIEA is to pick it up with EPA.

Each of the above was selected based on three critical criteria, namely:

Measurable impact on water quality	The CatchmentCARE project partnership has selected actions that have the highest probability of contributing to an improvement in water quality. This selection is based on the best available science, evidence from other projects and on the project partners experience working on previous projects[177]. In addition, actions were selected based on there being a suitable metric for measuring the contribution to improving water quality.
Transferable beyond the three catchments	The CatchmentCARE project partnership notes that while the establishment of three water quality improvement projects will make a significant contribution to achieving the objectives of the WFD, addressing all threats to water quality within these catchments is logistically and financially impractical within the lifetime of this project. However, it is anticipated that a strong integrated Communication and Engagement Plan will ensure that the skills and knowledge generated will be transferred to community, policy, governance and scientific stakeholders.
Contribution to a project legacy	The CatchmentCARE project partnership notes that the project is focused on ensuring a long-lasting legacy by increasing catchment resilience to further threats to water quality and by building the capacity of stakeholders (government and its agencies, communities etc.) to support sustainable land use in the catchments.

The aim of the CatchmentCARE project is to establish 3 water quality improvement projects and install 51 boreholes through a series of 6 interrelated 'objectives':

1. Implement actions to reduce the impact of land use activity on the ecology, physio-chemical and hydro morphology of the catchments.
2. Implement 51 boreholes across the border region.
3. Assess the impact of catchment land use on groundwater and its contribution to achieving GES in surface waters.
4. Develop soil type and farm type-specific nutrient advice for cross-border catchments.
5. Assess the costs and feasibility of achieving the WFD targets in the three catchments.
6. Using the knowledge and skill arising from objectives 1-5, improve the capacity of stakeholders to support sustainable land use in the catchments.

The following seven work plans have been developed:

Table 11.1: Summary of CatchmentCARE Project Work Packages

Work Package[178]	Description[179]
1. Management	This work package will be led by Donegal County Council and relates to all aspects of governance and oversight relating to project delivery.
2. Scoping and Action Targeting	The CatchmentCARE project partnership notes that existing available information does not provide the level of detail required for targeted implementation of actions within sub-catchments at the scale of fields, farms, river reaches and point source inflows. Targeting actions at this scale will, therefore, increase the cost-effectiveness of the interventions and improve the likelihood of contributing to an improvement in water body status. In addition, it is anticipated that the proposed scoping study (as set out above) will facilitate the integration of the different actions (e.g. surface water monitoring with groundwater monitoring) and with the communication work package.
3. Water Body Actions in Catchments	This work package will deliver actions within rivers and lakes that are identified during work package 2. This work package will focus on improving in-stream habitats, river connectivity, riparian zones and on reducing the internal loading of phosphorus in lakes. It is anticipated that existing river surveys of some sections of the Finn and Blackwater catchments will also be used.
4. Catchment Land Use Actions	This work package will undertake actions aimed at reducing the impact of WWTW and diffuse agricultural pollution in each catchment. It is proposed that the focus will be on 'breaking' the hydrological connection between the land and water bodies using strategically targeted willow and riparian zones.

[177] Such as the Blackwater TRACE project, Lough Melvin Nutrient Reduction programme and Teagasc Agricultural Catchments Programme.
[178] Per Progress Reports.
[179] Per Stage 2 Application Form/Business Plan.

Table 11.1: Summary of CatchmentCARE Project Work Packages	
Work Package[178]	**Description[179]**
5. Groundwater	It is anticipated that the installation of 51 boreholes will bring significant added value to the establishment of 3 river improvement projects in the Finn, Blackwater and Arney catchments. This work package will, therefore, install 51 boreholes across the border region, characterise the aquifers, conduct a baseline survey of water quality and investigate the interaction with surface water bodies.
6. Project Legacy	This work package will focus on enhancing the capacity of stakeholders and assess the costs and feasibility of achieving the WFD targets in the three catchments. It will also evaluate lag-times in response, ecological recovery trajectories, future land use intensification, climate change, disproportionate costs etc. and their impact on achieving the objectives of the WFD in these catchments.
7. Communication	This work package will implement a range of activities targeted at stakeholders at local, regional, national and international levels. It is anticipated that stakeholder capacity (local, NGOs and Government) will impact on a community's ability to make the changes required to implement the WFD; achieve sustainable agriculture and housing, and develop a thriving rural economy in the catchment areas.

The CatchmentCARE project will establish a Project Steering Committee, which will be chaired by the Lead Partner and will comprise two representatives of each partner organisation. In addition to the partner representatives, the Northern Ireland Environment Agency (NIEA), the Environmental Protection Agency (EPA) and the Scottish Environment Protection Agency (SEPA) will be invited to participate as observers on the committee.

The Project Steering Committee meets on a quarterly basis. It plays a central role in:

- Managing project risks;
- Ensuring best practice is used in all aspects of the project;
- Co-ordinating stakeholder engagement;
- Reviewing project progress and taking corrective decisions where required;
- Integrating each of the project actions; and
- The management of the project budget and deliverables.

Given the complexity of the project, three sub-committees of the Project Steering Committee have been established:

WFD coordination	Led by the Loughs Agency, this subcommittee will seek to inform future decision making and policy processes in relation to the sector, while also considering the legacy of the project. The EPA and NIEA will also be invited to sit on this sub-committee.
Catchment Community	Led by ABCBC, this sub-committee will take responsibility for sharing any new knowledge gained through the course of the project with NGOs and the community sector. This will allow for new learning amongst these groups and increase their expertise when dealing with river restorations and conservation.
Technical Advisory	Led by AFBI, this subcommittee will seek to address the challenges and difficulties involved in implementing the WFD. It will concentrate on all scientific aspects of the project. It will also engage with NGOs and Statutory Agencies.

A Project Manager (within Donegal County Council) is responsible for:

- Ensuring that the technical aspects of the project are delivered and that there is internal project coherence across all work packages.
- Reporting to the Project Steering Committee and for preparing all documentation for submission to the Project Steering committee in conjunction with work package leads.
- Preparing quarterly progress reports for submission to the SEUPB.

In addition to the Project Manager, the following posts make up the core project team:

- 1 x Assistant Project Manager/Education Officer (ABCBC) – who will be responsible for the communication plan, education/capacity building with stakeholders and for the coordination of all education packages across the 3 catchments. This role will also provide direct support to the Project Manager, particularly in relation to reporting to the Steering Committee and the SEUPB.
- 1x Staff Officer (Donegal County Council).
- 1 x Clerical Officer (Donegal County Council).
- 4 x Clerical Officers – across all project partners.
- 1 x geographic information system (GIS)/Data Manager - (Donegal County Council).

The project will be monitoring and evaluated on an ongoing basis by way of indicators and targets, with the interim progress reports including an assessment of the extent to which targets are achieved.

11.3 Project Budget

The total proposed CatchmentCARE project costs are €13,792,436, of which €11,723,570 (85%) is anticipated to be funded from the INTERREG VA Programme[180].

Table 11.2: Anticipated Project Costs	
Proposed Project	**Total Project Costs**
Staff Costs	€5,739,890.10
Office and Administration Costs	€860,982.96
Travel and Accommodation	€694,998.15
External Expertise and Services	€2,116,046.05
Equipment	€667,306.96
Infrastructure and Works	€3,713,211.33
Total	**€13,792,435.55**

Table 11.3: Anticipated Project Funding		
Funding Sources	**Value (€)**	**Source**
Cash Contribution (Partner Supplied/other grant)	€0	N/A
In-kind Contribution (Partner Supplied)	€0	
Sub-Total	**€0**	
Central Government Match Funding	€2,068,865.37	
ERDF	€11,723,570.18	
Total Grant Funding	**€13,792,435.55**	
Total	**€13,792,435.55**	
Intervention Rate (% ERDF)	**85%**	

There will be no revenue generated during the CatchmentCARE project.

[180] Per Letter of Offer (dated 31st October 2017).

11.4 Anticipated Project Objectives, Outputs & Results

11.4.1 Objectives

The CatchmentCARE project partnership has established the following objectives[181]:

Table 11.4: CatchmentCARE Project Objectives[182]	
Objective	**Timeframe (month/year)**
1. Project Mobilisation/Management	
• Develop and manage a partnership agreement	10.2016 – 12.2016
• Establishment of Catchment Care Project Steering Committee	10.2016 – 12.2016
• Establishment of three sub-committees of the Project Steering Committee	10.2016 – 12.2021
• The organisation of Project Steering Committee Meetings	10.2016 – 12.2021
• Appointment of a Project Manager	10.2016 – 12.2016
• Financial and Activity reporting	01.2017 – 12.2021
• Development, monitoring and review of Project Risk Register	10.2016 – 12.2021
• Publication of Project Final Report	09.2021 – 12.2021
• Post Project Evaluation Report	09.2021 – 12.2021
• Project Integration Management	10.2016 – 12.2021
2. Communications and Engagement	
• Internal Communications	10.2016 – 12.2021
• Partnership Level	01.2017 – 09.2021
• Regional (within the 3 catchments)	10.2016 – 10.2021
• Regional (Emergency services)	01.2017 – 10.2021
• Regional, National Local Media and Website Development and maintenance	03.2017 – 10.2021
• Stakeholder Communications	09.2017 – 09.2021
• Design, development and implementation of an incentive-based scheme for communities based in selected catchments	03.2017 – 03.2020
• Raising community awareness 07.2019 12.2021	07.2017 – 12.2021
3. Scoping and Action Targeting[183]	
• Feasibility of lake remediation via Phosphorus-fixing	01.2017 – 07.2018
• Rivers – Prioritising instream works	01.2017 – 12.2018
• Rivers – Prioritising riparian works	01.2017 – 012018
• Groundwater Programme	10.2016 – 10.2017
• Hydrological connectivity & Point Source Pollution	10.2016 – 04.2018
• Catchment and Farm Scale nutrient management studies	10.2016 – 04.2018
• Control of chemical export from land-use activities	10.2016 – 04.2018
4. Waterbody Actions in Catchments	
• Improve the Ecological Status of lakes	01.2018 – 10.2021
• Instream Works	06.2017 – 12.2021
• Riparian Works	06.2017 – 12.2021
• Control of chemical escape from land use	01.2017 – 12.2021
5. Catchment Land Use Actions	
• Assessment of tertiary treatment to reduce point source pollution burdens from small WWTWs	01.2017 – 12.2021

[181] Source: Stage 2 Application Form/Business Plan (Appendix 23 – Gantt Chart).
[182] NB: The Lead Partner confirmed that the project's objectives/targets, as presented in this subsection, are up to date (as of May 2019). However, during consultation, the Lead Partner advised that, in some instances, the estimated completion dates are no longer realistic or have elapsed. The project's objectives/targets have not been restated to account for new estimated completion dates.
[183] NB: It is understood that the CatchmentCARE project partnership (in agreement with the SEUPB) extended the timeframes associated with each of the activities under this objective until July 2019.

Table 11.4: CatchmentCARE Project Objectives[182]	
Objective	**Timeframe (month/year)**
• Construction and development of diffuse pollution HSA mitigation scheme using SRC willow biomass	01.2017 – 12.2021
• Feasibility of Establishing a Willow Supply Chain and support for diffuse pollution mitigation activities	01.2017 – 12.2021
6. Groundwater	
• Site Selection 10.2016 05.2017	10.2016 – 05.2017
• Characterising the shallow geology and aquifers using surface geophysics	05.2017 – 09.2018
• Borehole drilling, construction and monitoring 06.2017 12.2020	06.2017 – 12.2020
• Analysis of aquifer properties within the three catchments 08.2017 08.2018	08.2017 – 08.2018
• Baseline hydrochemistry in the three catchments 09.2017 09.2020	09.2017 – 09.2020
• Interpretation 04.2020 10.2021	04.2020 – 10.2021
7. Project legacy	
• Evaluation of Farm Nutrient Management Practices	01.2018 – 01.2021
• Evaluation of the Lag-Time in Achieving WFD Nutrient Targets for Lakes and Rivers	01.2018 – 10.2021
• Evaluation of the cost-effectiveness and cost-benefit of achieving the WFD objectives	01.2018 – 10.2021
• Community and School Involvement	01.2018 – 10.2021
• Change attitude and farming practices in areas with soils vulnerable to nutrient loss	01.2017 – 10.2021 01.2017 – 10.2021

11.4.2 Outputs & Results

Per the Letter of Offer (dated 31st October 2017), the anticipated (approved) CatchmentCARE Project Outputs are as follows:

Programme Output Code	Name of Output	Programme Output Indicator Target[184]	CatchmentCARE Project Target
2.412	Develop and implement cross-border groundwater monitoring wells	50	50
2.413	Establish 3 river water quality improvement projects	3	3

Additional conditions specified by the Steering Group (per the Letter of Offer, dated 31st October 2017) that may relate to impacts include:

- The need for an Environmental Impact Register to ensure the project minimises its own impact on the environment[185].
- The project is to provide further detail in relation to the Incentive Scheme so that it can be approved in advance of its use to ensure there are no issues in relation to double funding[186].
- The project is to provide confirmation that the boreholes will be maintained after the funding period so that they can be used for ongoing groundwater monitoring[187].

The results indicator is *"the percentage of cross-border freshwater bodies in 'good' or 'high' quality".* The stated baseline value for 2014 (start of the Programme period) is 32%, whilst the target value for

[184] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.
[185] It is understood that the CatchmentCARE project partnership has (in agreement with the SEUPB) prepared an Environmental Impact Register.
[186] It is understood that the CatchmentCARE project partnership provided the SEUPB with further detail in relation to the Incentive Scheme (although as of May 2019, this has yet to be approved by the SEUPB).
[187] This can only occur once boreholes have been installed. As of May 2019, no boreholes have been drilled.

2023 is 65%. The CatchmentCARE project partners envisage that the project will have a positive contribution towards the results indicator as the project will:

- Establish 3 water quality improvement projects in the Finn, Blackwater and Arney Catchments; and
- Develop and implement 50 cross-border groundwater monitoring wells (by installing 51 boreholes across the region).

In doing so, the CatchmentCARE project's actions will contribute to the improvement of the established baseline conditions of water quality, the physical structure and aquatic habitats, while also seeking to enhance the capacity of stakeholders within the three catchment areas.

11.5 Contribution to the Priority's Specific Objectives & Result Indicators

This section considers the CatchmentCARE project's key achievements (as of May 2019) and the extent to which the CatchmentCARE project has:

- Contributed to the achievement of the Priority's Specific Objectives;
- Contributed to the achievement of the targets for the Result Indicators;
- Contributed to:
    - EU 2020 objectives;
    - The Atlantic Strategy; and
    - The horizontal principles of equality and sustainable development.

and where appropriate, the section:

- Identifies any external factors that have impacted, positively or negatively, on the project's ability to contribute to the achievement of the Specific Objective.

11.5.1 Key Achievements (to May 2019)

Discussion with the project partnership indicates that, as of May 2019, activities are underway that will contribute to the delivery of the project's anticipated (approved) outputs. Notably, the project partnership has, in line with its work packages, been undertaking research activities to identify areas that require further monitoring e.g. establishing the toxicity of metal salts, which will contribute to the fixing of phosphorous levels within the lakes.

It is understood that site surveys and assessments have been undertaken in order to evaluate future project impacts, whilst site plans are being prepared for land improvements (e.g. planting of native plant species and the installation of stock fencing) that will assist the project partners to prepare their River Water Quality Improvement Projects (NB: the project partners are seeking relevant landowner agreements).

It is also understood that some boreholes have been identified and work will commence on drilling once the relevant approvals are in place.

In addition, the CatchmentCARE project partners cite the project's key achievements (as of December 2018) as being:

Period	Dates	Key Achievements
1	1st October 2017 – 31st December 2017	• Project Manager appointed by Donegal County Council (on a temporary basis). • Representatives from Donegal County Council attended SEUPB's Lead Partner Training Workshop on the 17th October 2017. • The Partner kick-off meeting was held on 21st November 2017. • Scoping and Action Targeting Workshop was held on the 14th December 2017 at Lough Neagh Discovery Centre.
2	1st January 2018 – 31st March 2018	• Project Manager appointed by Donegal County Council (on a permanent basis – 1st March 2018). • Staff officer appointed to the project on the 1st March 2018. • Donegal County Council, in collaboration with all project partners, progressed the Partnership Agreement to a final stage. • A Project Steering Committee was established. • Site identification and preparation for willow planting at the Hillsborough Farm. • Definitive locations for the boreholes that met the established scientific objectives and site selection criteria were identified in both Northern Ireland and Ireland, namely Magilligans, Newtownstewart and Letterkenny (specifications for the drilling were in the initial stages). NB: progress was slower than desired due to a month of very bad weather preventing site visits to finalise site selection. Land access agreements were made 'in principle'. • Discussions with local outdoor groups took place to identify using the boreholes as a teaching aid. • Discussions around modelling pollution sources and nitrate legacy issues were undertaken.
3	1st April 2018 – 30th June 2018	• Detailed planning for the Partners meetings (19th April, 17th May 2018 and 26th June 2018) was undertaken, including the establishment of a Project Steering Committee. • Project Launch - 14th June 2018, in An Grianan Hotel, Burt. • Finance Manager was appointed. • In relation to the groundwater work package: – Initial assessments of the geology of proposed locations were undertaken and available data was assessed. – Borehole depths and screened intervals were proposed. – Land access agreements were drafted, and early discussions took place with landowners.

Period	Dates	Key Achievements
4	1st July 2018 – 30th September 2018	• The Project Steering Committee and associated Sub Committees for the project were developed, along with associated Terms of Reference. • A GIS Manager and a Technician were appointed. • In relation to the Scoping and Action Targeting work package, fish surveys in Arney (NI 20 sites and RoI 20 sites) and Blackwater (NI 60 sites) network were completed. • For work package 5, sites for the planting of SRC Willow buffer strip at the AFBI Hillsborough farm were identified using Lidar data and through discussions with the farm manager. • Water Quality Samplers were set up in the Whitehill catchment and began (collection of 1 composite water sample per day for analysis).
5	1st October 2018 – 31st December 2018	• Meetings were held with key stakeholders such as Stranooden GWS (national pilot), the Source to Tap project, LAWCO/LAWRO, Rivers Trust, NIEA, EPA etc. • Project Steering Committee and associated Sub Committees meetings were held. • The HSO Nutrient Management and Water Quality posts were appointed, along with the Catchment Project Officer (with IFI). • ABCBC's Riparian Officer engaged with local farmers and organisations to gain access to land to complete habitat surveys and soil sampling. • Draft education plan was completed.

11.5.2 Project Output Indicators

Discussion with the CatchmentCARE project partnership indicates that whilst the anticipated (approved) project outputs have, as of May 2019, not been achieved (albeit, it was not expected of the project at this stage in its implementation, as they have a 2023 delivery date), the project is being implemented as planned and making positive progress towards achieving its outputs.

Programme Output Code	Name of Output	Programme Output Indicator Target[188]	CatchmentCARE Project Target	Status (as of May 2019)
2.412	Develop and implement cross-border groundwater monitoring wells	50	50	0
2.413	Establish 3 river water quality improvement projects	3	3	0

11.5.3 The Priority's Result Indicator Targets & Specific Objectives

Given the early stage of the project's implementation and the fact that the project has yet to achieve its anticipated (approved) project outputs, the CatchmentCARE project is, therefore, at May 2019, making only marginal progress towards the Priority's Result Indicator Targets and Specific Objectives. However, this should be expected at this stage of the project's implementation (as they have a 2023 delivery date), and should not be considered a concern.

11.5.4 EU2020 Objectives

Whilst the CatchmentCARE project is not overtly focused on economic growth, it does seek to encourage 'sustainable' growth through the project activities being implemented, thereby contributing towards preventing environmental degradation and the unsustainable use of resources.

[188] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

11.5.5 The Atlantic Strategy

The CatchmentCARE project does not contribute to the aims and objectives of the 'Atlantic Strategy'.

11.5.6 The Horizontal Principals

The CatchmentCARE project aims to protect and improve the quality of the environment - a key component of sustainable development and as such it is anticipated that it will serve to contribute (at least in part) to the EU's three Horizontal Principals, per the following discussion:

Sustainable development	The following outlines the primary long-term aspirations of the CatchmentCARE project in relation to environmental, social and economic benefits: **<u>Environmental Sustainability Energy & Climate Change:</u>** • The emplacement of willow crops as a method of tertiary treatment for small WWTW will become a local source of renewable fuel for communities. It will also reduce greenhouse gases attributed to producing, transporting and burning other fossil fuels. • Built Environment and Land Use – the proposed Catchment Land Use Actions will focus on land use activities that are negatively impacting on water quality. It will implement actions to improve land use, biodiversity, habitats and species in the catchment. Improving in-stream conditions, hydromorphology and riparian zones will also positively contribute to the attenuation of floodwaters. • Waste – it is anticipated that the use of willows on selected small WWTW will minimise waste to the environment and increase the recycling of nutrients. • Biodiversity - the proposed improvements in catchment habitats will include removal of riparian invasive species. These activities will support improved water quality, habitats and wildlife populations and enhance the landscape of the catchments. • Natural Resources - phosphorus is a limited natural resource and its overuse, and the impact it has on water quality needs to be managed. Good nutrient management is key to the efficient use of Phosphorus. **<u>Social Sustainability:</u>** • Health and well-being and equality outcomes – the CatchmentCARE project will promote a greater awareness of the aquatic environment, which will enhance health and well-being by encouraging river walks and other outdoor activities. Three new Riparian Local Nature Reserves will be developed which will encourage stakeholders to actively explore the catchment. There will be opportunities for all abilities to engage in educational and knowledge exchange activities (e.g. talks, active outdoor events etc.). • Sustainable Communities - communities will benefit socially, environmentally and economically through improved land use, innovation, biodiversity and tourism through water quality and catchment resilience. The aim, through knowledge transfer, education and capacity building, is to establish the intrinsic value and uniqueness of the individual catchments from a heritage and biodiversity perspective and engender a spirit of partnership, cohesion, sharing and integration, between all stakeholders, in securing improved water quality and the ultimate survival of the cross-border catchments. • Culture - lakes and rivers are part of the cultural identity of rural communities. The CatchmentCARE project, therefore, aims to build upon the sense of shared ownership that water bodies bring to a community. • Safer Communities – it is anticipated that the project partners and other key stakeholders will be active and visible on the ground, both throughout the project and beyond its lifetime. This will, in turn, deter anti-social behaviour and will also enhance community safety and reduce the fear of crime. This

	will be of particular importance in remote sparsely populated parts of the catchments. **<u>Economic Sustainability:</u>** • Economic Development – it is anticipated that the restoration of aquatic ecosystems will contribute towards a sustainable tourism industry in the local regions. This will be achieved by improving nutrient efficiency on farms, increasing the profit margin of farmers and by providing them with a viable land-use alternative (in the form of willow for biomass production). These may have a knock-on effect such as, for example, the potential establishment of a supply chain for willows (thereby creating local job opportunities) and low carbon approaches to new enterprise and economic developments. It is anticipated that improvements to aquatic ecosystems will also increase opportunities for angling, water sports and tourism. • Societal Benefits – It is anticipated that providing stakeholders with education and information will be central to delivering new skills and the catchment specific knowledge that is required by stakeholders to take advantage of these economic and funding opportunities. For example, the project aims to engage up to 150 volunteers in citizen science activities and 50 farmers in environmentally friendly farming practices that will facilitate the continuation of catchment improvements post project. In addition, an education programme specifically for schools will be delivered to 30 schools across the three catchments. The project will actively raise public awareness of the project through radio, press releases and articles.
Equal opportunities and non-discrimination & Equality between men and women	Each of the CatchmentCARE project partners is committed to delivering the project in full accordance with their internal policies and proofing systems to ensure that they meet the legislative requirements related to equality. It is anticipated that the project will establish 'bottom-up' community organisations/networks that will be open to all members of the community to participate in. All sectors of the community, including target groups, will have equal access to the actions, events, and documents arising out of the CatchmentCARE project. All organised activities will be based in facilities that are accessible to people with disabilities and every care will be taken to ensure full participation is open to all societal groups. The project will comply with the EU Sustainable Development Strategy and ensure that the principle of equity is adhered to during all project activities.

11.5.7 Contribution to Other Strategies

The CatchmentCARE project has been designed to complement the existing structure established to implement the WFD. In doing so, it is closely aligned with a number of key EU directives and regional strategies, such as:

- WFD;
- The Nitrates Action Programme (in Northern Ireland and Ireland) - which implements the EU Nitrates Directive;
- The Rural Development Programmes (in Northern Ireland and Ireland);
- Sustainable Land Use Strategy for Northern Ireland;
- The Phosphorus Regulation in Northern Ireland; and
- The programme of work associated with the 2nd cycles of River Basin Management Plans (RBMP).

11.6 Effectiveness of the Cross-Border Collaboration & Partnership Working

This section considers aspects of the CatchmentCARE project's collaborative and partnership working including:

- The effectiveness and added value of the CatchmentCARE project's cross-border collaboration in relation to the specific objectives;
- Whether any new ways of working/partnerships/relationships have been created as a result of activities carried out within the project.

The project partnership has been specifically designed to provide expertise on the main issues related to water body quality improvement, such as:

- Hydro morphology (IFI and Loughs Agency);
- Water quality (AFBI);
- Catchment management (UU);
- Stakeholder engagement (ABCBC); and
- Groundwater (BGS).

As lead partner, Donegal County Council's extensive expertise in project, financial and technical management of EU cross-border projects (e.g. North-South Shared Aquatic Resource project[189]) ensures that the cross-border integrated management of the project and governance arrangements will deliver a robust and efficient project.

Donegal County Council has been involved in delivering the Water Framework Directive since it was adopted in 2000 and was it appointed as the Coordinating Local Authority in the North-Western International River Basin District[190].

In addition, discussion with the project partnership indicates that the following key aspects of the project illustrate the effectiveness and added value of the CatchmentCARE project's cross-border collaboration in relation to the specific objectives:

- Adding value to the stakeholder engagement activities carried out by Catchment Officers (NIEA) and Community Water Officers (in LAWCO in Ireland) in the catchments.
- Liaising with the LAWCO coordinator for the border region and with the NIEA Water Management Unit to ensure the CatchmentCARE project activities add value to the WFD Programme of Measures (POMs).
- Engaging with stakeholder organisations and community groups across the border, including via the three sub-committees e.g. a draft Community Incentive Scheme has, as of May 2019, been prepared (the project partnership is awaiting SEUPB approval of the same), which will seek to, amongst other things, encourage cross-border capacity building.

[189] Funded under the INTERREG IIIA Programme.
[190] Until new governance arrangements were put in place in late 2015.

11.7 Barriers to Cross-Border Cooperation

This section considers whether the CatchmentCARE project has encountered any barriers to cross-border cooperation that the priority axis is not addressing.

From the outset, the CatchmentCARE project partners were mindful that there were many potential constraints[191] and risks that could have a significant impact on the delivery of the CatchmentCARE project and given this have developed a strategic risk register with potential mitigation measures.

In particular, the project partnership notes that there may be challenges associated with demonstrating the project's contribution to improvements in water quality, as there are factors outside the control of this project partnership that may also have a significant impact on whether this target is achieved or not. It is, however, noted that the experience and expertise of the project partners in delivering similar large-scale catchment projects will be central to mitigating this risk (and others).

In addition, the CatchmentCARE project partners note that one of the key risks to cross-border cooperation not evident at the time of its application for funding was the uncertainty associated with the UK's potential withdrawal from the EU ('Brexit'). Whilst the nature and extent of any future arrangements between the EU and the UK are yet to be agreed, the CatchmentCARE project partners report that future environmental legislation across Ireland and Northern Ireland may diverge post 'Brexit', with different regulatory regimes and standards applying across the UK (Northern Ireland) and the EU (Ireland). This may potentially impact on the relationship between the CatchmentCARE project partners (and in turn, project delivery), as each will be required to adhere to the relevant legislation in their respective jurisdiction.

11.8 Best Practice & Learning

This section considers whether the CatchmentCARE project has resulted in any areas of best practice and learning. Whilst it is (at May 2019) too early for the CatchmentCARE project to have resulted in any areas of best practice and learning, the project partners anticipate that they will:

- Share knowledge and information, where possible, with other EU funded projects e.g. the SWELL Source to Tap projects (as per Section 9 and 10 respectively).
- Draw upon their existing links (via the project's sub-committees) with the following initiatives to ensure that national and international best-practice in catchment waterbody quality improvement actions are available to the CatchmentCARE project:
  - The UK Demonstration Test Catchment;
  - The Teagasc Agricultural Catchment programme;
  - Science-Policy working group on reducing nutrient emissions from Agriculture in NW European Catchments;
  - US Phosphorus Research Coordination Network; and
  - The UK Catchment for Water Quality Forum.

[191] At the outset potential constraints were identified as falling under headings such as general, technical/environmental, financial, organisational, economic, social, management, legal or timing.

11.9 Mainstreaming Activities

This section considers whether the implementation of the CatchmentCARE project has led to any mainstreaming of cross-border delivery of environmental work.

Whilst it is (at May 2019) too early for the CatchmentCARE project to have led to any mainstreaming of cross-border delivery of environmental work, the project partners anticipate that:

- Stakeholders will be provided with the skills and knowledge to contribute to improvements in water quality post the project lifetime. Central to this strategy will be the project's ability to link the catchment, policy and community actions directly with knowledge exchange and capacity building events for local, regional and national stakeholders e.g. it is anticipated that the Schools Educational Programme will provide a conduit for informing the general public about water quality and to support behavioural changes (before and after 'attitudinal surveys' are planned, which will present any evidence of how the project has changed behaviours).
- Through a combination of current best science and stakeholder knowledge, the most appropriate waterbody quality improvement actions will be selected and targeted within each catchment. Incorporating stakeholders into the project activities will also build their capacity to facilitate change in the catchments beyond the project period.
- The incentive scheme actions will provide communities with enhanced ownership of their respective catchments.
- The outputs of the project will be transferable to all cross-border catchments. For example, the development and implementation of this project will generate significant knowledge and expertise in waterbody quality improvement actions in the participating organisations and stakeholder networks. The CatchmentCARE project partnership anticipates that this will, in turn, enable (through the development of tools, best practice guidelines etc.) this knowledge and expertise to be transferred to other catchments.
- Financial sustainability will be achieved through the ability of the partner organisations with responsibility for water quality to secure stable and sufficient long-term financial resources, and to allocate them in a timely manner and appropriate form, to cover the full costs of long-term future water quality measures.

The long-term goal is the uniformity of policy, practice and delivery by all responsible organisations in water quality in a cross-border catchment.

12. CONCLUSIONS AND RECOMMENDATIONS

12.1 Conclusions

9 projects have been supported under Priority Axis: Environment, representing a cumulative ERDF commitment of €73.8 million against a budget of €72m (102% commitment). Across the 9 projects, should all proceed to plan, each of the Programme outputs within this priority will be met.

At the Objective level:

- Two projects are being implemented under Objective 2.1 (Recovery of protected habitats and species), with a total ERDF allocation of €12.2m. Both projects (CANN and CABB) will carry out a range of conservation activities through the development of 35 Conservation Action Plans in total.
- Four projects are being implemented under Objective 2.2 (Manage marine protected areas and species), with a total ERDF allocation of €15.9m. These projects (COMPASS, SWIM, MarPAMM and Sea Monitor 2) focus on diverse areas of marine conservation through the development of a bathing water quality prediction model and the delivery of a fully coherent network of monitoring buoys across the regional seas of Northern Ireland, Ireland and Western Scotland.
- One project is being implemented under Objective 2.3 (Improvement of water quality in transitional waters), with a total ERDF allocation of €29.8m. This project (SWELL) which is led by Northern Ireland Water has been approved to deliver a two-phased approach. Phase 1 has been successfully completed and focused on catchment investigation, which has, in turn, has informed Phase 2;
- Two projects are being implemented under Objective 2.4 (Improvement of freshwater quality in river basins), with a total ERDF allocation of €15.9m. These projects (Source to Tap and Catchment Care) will focus on improving freshwater quality in a number of cross-border river basins.

This section summarises (in line with the SEUPB's requirements) the preceding analysis, and in doing so, provides answers, in as far as possible (at this juncture), to the following questions:

- To what extent have the Specific Objectives been achieved?
- To what extent have the targets for the Result Indicators been achieved?
- Comment on the effectiveness and added value of cross-border collaboration in relation to the specific objectives?
- What external factors have impacted, positively or negatively, on the achievement of the Specific Objective?
- What new ways of working/partnerships/relationships have been created as a result of activities carried out within the priority axis?
- Have any key areas of best practice and learning been identified?
- What level of mainstreaming has occurred for cross-border delivery of environmental work?
- Are there barriers to cross-border cooperation that the priority axis is not addressing?
- What is the contribution of the priority axis to:
  - EU 2020 objectives;
  - The Atlantic Strategy; and
  - The horizontal principles of equality and sustainable development?

12.1.1 The extent to which the Specific Objectives & Result Indicators have been achieved

As per Sections 3 - 11, discussion with each of the project partnerships indicates that various activities are underway on each of the projects and they are making positive progress towards achieving their respective outputs. Some notable key achievements reported by project partnerships include:

Table 12.1: Notable Key Achievements	
CANN	Further to the project partners' original work plan, an additional work plan within the CANN project was approved by Steering Committee on 24 July 2018. As a result, it is now anticipated that the CANN project will deliver additional (from those originally proposed) outputs on an important cross-border site, comprising: • 500 additional hectares of habitats supported in order to attain a better conservation status bringing the projected total to 3,650 ha; • 2 additional Conservation Action Plans (Cuilcagh Mountain SAC in Northern Ireland and Cuilcagh Anierin Uplands SAC in Ireland) bringing the project total to 27 conservation action plans (exceeding the output target of 25). A highlight for the CANN project has been the discovery of a rare snail Vertigo moulinsiana which has been found in large numbers on one of the project sites. Field visits to other sites have been undertaken in order to update habitat maps, and data collection work is underway in order to inform the draft conservation action plans which will directly contribute to the programme outputs once completed. In addition, there has been a significant level of liaison with local stakeholders to inform the public of the activities and actions that will be undertaken and the benefits that the project will bring. This has included consultation and dissemination of information to landowners and other local interested parties. On an overall basis, this has been received positively. However, in one specific area, there has been a number of tensions between the project and a small group of local landowners. This has unfortunately culminated in the project withdrawing from one of the original selected sites (Boleybrack Mountain in Co. Leitrim). Fortunately, the project team had gathered sufficient data to produce a draft Conservation Action Plan for this particular site (albeit no conservation actions will take place), which will provide a legacy for future action beyond the lifetime of the project. The SEUPB is currently working with the Lead Partner on a strategy to transfer some of the works to different sites. Any significant changes will be reported to the Steering Committee and relevant approvals sought. Importantly, 12 draft Conservation Action Plans have been developed and the Accountable Departments in each jurisdiction are working with the SEUPB to provide feedback on the plans. SEUPB is developing mechanisms for final sign off and verification of the outputs as per programme requirements. Of further note, during September 2018, the CABB and CANN projects delivered a joint event showcasing activities undertaken to that date and demonstrated their commitment to joined-up working.
CABB	Since its commencement, the CABB project has undertaken several surveys and mapping exercises in order to gain a more thorough understanding of the habitats and species located within the project and programme area. This work is assisting the project in its development of the Conservation Action Plans (CAPs) which will ultimately result in the achievement of the outputs. However, it is noted that the mapping exercises have taken longer than first envisaged (after the project partners encountered some issues with sub-contractors), with it now estimated that the mapping will be completed by August 2019. This will likely impact on the project delivery timeframes for some of the CAPs. Nonetheless, at May 2019, the CAP for Garron Plateau is being produced in a first draft format and RSPB Scotland has produced some draft sections of the CAPs for Shiel Farm and Airds Moss. Positively, work is ongoing at all of the sites, with it anticipated that this work will provide improvements of the habitats within this project area. Activities including drain blocking

	and predator fencing are underway. General fencing and scrub removal at the Montiaghs Moss site has been completed and this has enabled successful grazing of cattle at the site. The capital works at Dungonnell catchment have been completed. The project has reported that 493ha of blanket bog will be positively impacted by drain blocking and should move the land into 'favourable' condition.
COMPASS	The project partnership has been undertaking surveys, fish tagging, data collection (via acoustic moorings) and examining scientific models e.g. collecting data on the movement of Humpback Whales across the region. Sensors have also been deployed at various locations (further details are included in Section 5). It is understood that the project successfully conducted its first Glider mission (underwater autonomous vehicle) on the Malin Shelf.
SWIM	The partnership has identified and agreed on the beaches that will be monitored (discussed further in Section 6) and weather stations and river level sensors have been deployed. It is understood that weather monitoring, water sampling, flow meter data collection, and other relevant data is now being collected (and being transmitted back to the project team), including that being captured by a weather station that was installed at a local primary school (St. Patrick's School in Glenariff in Waterfoot). Further discussion with the project partnership suggests that the location of this particular weather station will provide an excellent opportunity for learning. The project partnership advised that a substantial amount of historical data has also been provided by Met Eireann to inform the development of the scientific model. In addition, the general public can access the project's interactive website, where data is collected and analysed in preparation for the development of the models. Furthermore, software developers have commenced work on the App that will be made available to the public, whilst the real-time signage is, as of May 2019, being procured.
MarPAMM	The project partnership has been undertaking various data collection and research activities, including surveys and the collection of video footage. For example, as part of the Benthic habitat mapping and modelling work package, video footage collected on the project survey was analysed and SAMS commenced testing on UAV (Unmanned Aerial Vehicle) and new anodes and cable were purchased to facilitate testing.
Sea Monitor 2	The project's Letter of Offer was issued during November 2018 and the project was launched in April 2019. All members of the administrative team took up their posts in early 2019. Positively, the project partnership has already made initial contact with other relevant INTERREG VA funded projects (COMPASS, MarPAMM, and CatchmentCARE), SEUPB and the sponsoring departments[192].
SWELL	At INTERREG VA application stage, the SWELL Partnership had identified key agglomerations that had the greatest potential to improve water quality within the Carlingford Lough and Lough Foyle catchments. Identification was on the basis of expert knowledge on network and treatment capability, age of the plant, compliance history, and operational performance. However, subsequently, during Phase 1 of the SWELL Project, baseline catchment investigations and flow & load surveys were undertaken to justify site selection and to enable the development of Business Cases for the identified sites to demonstrate the cost-effectiveness and value for money of the proposed capital upgrade solutions. In total, 10 Business Cases were developed to maximise funding potential, with the following 8 preferred sites (considered as most likely to deliver the required water quality improvements, results, and outputs), submitted for Government Departmental and SEUPB approval:

[192] Department of Agriculture, Environment and Rural Affairs (DAERA) and Department of Communications, Climate Action and Environment (DCCAE).

	<table><tr><th>Catchment</th><th>Work Package</th></tr><tr><td rowspan="3">Carlingford</td><td>Newpoint SPS</td></tr><tr><td>Warrenpoint WwTW</td></tr><tr><td>Omeath DAP</td></tr><tr><td rowspan="5">Foyle</td><td>Strabane WwTW</td></tr><tr><td>Donemana WwTW</td></tr><tr><td>Lifford WwTW</td></tr><tr><td>Killea WwTW</td></tr><tr><td>Carrigans WwTW</td></tr></table> The 8 sites are considered to represent key agglomerations with the greatest potential to improve water quality within the Carlingford Lough and Lough Foyle catchments. Identification was on the basis of expert knowledge on network and treatment capability, age of the plant, compliance history, and operational performance. The project partners have a high level of confidence regarding the negative impact of the named problem sites and a belief that their rectification will make a significant positive contribution towards the results indicator. Discussion with the project partnership indicates that the sites located in Northern Ireland are at construction stage (contractor procured), whilst those located in Ireland are at the design stage, as illustrated below: <table><tr><th>Work Package</th><th>Status (as of May 2019)</th></tr><tr><td>Donemana WwTW</td><td rowspan="4">At the construction stage</td></tr><tr><td>Newpoint SPS</td></tr><tr><td>Strabane WwTW</td></tr><tr><td>Warrenpoint WwTW</td></tr><tr><td>Carrigans WwTW</td><td rowspan="4">At the design stage</td></tr><tr><td>Killea WwTW</td></tr><tr><td>Lifford WwTW</td></tr><tr><td>Omeath DAP</td></tr></table>
Source to Tap	The project partnership has been undertaking weekly water sampling and analysis in the Finn and Derg catchments. It is also understood that the pilot Land Incentive Scheme was launched on the 25th July 2018 in Castlederg and the event was attended by 82 landowners (further details are included in Section 10). Community engagement has also been supported via social media e.g. Twitter, Facebook, and Instagram.
CatchmentCARE	The project partnership has, in line with its work packages, been undertaking research activities to identify areas that require further monitoring e.g. establishing the toxicity of metal salts, which will contribute to the fixing of phosphorous levels within the lakes. It is understood that site surveys and assessments have been undertaken in order to evaluate future project impacts, whilst site plans are being prepared for land improvements (e.g. planting of native plant species and the installation of stock fencing) that will assist the project partners to prepare their River Water Quality Improvement Projects (NB: the project partners are seeking relevant landowner agreements). It is also understood that some boreholes have been identified and work will commence on drilling once the relevant approvals are in place.

Notwithstanding the above, further discussion with each of the project partnerships indicates their anticipated (approved) project outputs have, as of May 2019, not been achieved (albeit, it was not expected of the projects at this stage in their implementation, as they have a 2023 delivery date). This is illustrated in the table overleaf:

Table 12.2: Extent to which Approved Outputs have been achieved (by Project)

Name of Output (by Project)	Programme Output Indicator Target[193]	Project Target	Status (as of May 2019)
CANN			
Nature and biodiversity Surface area of habitats supported in order to attain a better conservation status (hectares)	4,500ha	3,650ha	0
Conservation Action Plans	25	27	0
CABB			
Nature and biodiversity Surface area of habitats supported in order to attain a better conservation status (hectares)	4,500ha	2,228ha	0
Conservation Action Plans	25	8	0
COMPASS			
A network of buoys for regional seas, including telemetry and oceanographic monitoring (e.g. for seals, cetaceans and salmonids)	1	1	0
Models developed to support the conversation of habitats and species	5	3	0
SWIM			
System for the prediction of bathing water quality and install real-time signage	1	1	0
MarPAMM			
Models developed to support the conversation of habitats and species	5	4	0
Marine management plans for designated protected areas complete	6	6	0
Sea Monitor 2			
Models developed to support the conversation of habitats and species	5	5	0
Marine management plans for designated protected areas complete	6	3	0
SWELL			
People benefit from improved wastewater treatment	10,000	10,000	0
2 Sewage network and wastewater treatment projects completed to improve water quality in shared transitional waters	2	2	0
StT			
Cross-border drinking water 'Sustainable Catchment Area Management Plan' research and pilot project	1	1	0
CatchmentCARE			
Develop and implement cross-border groundwater monitoring wells	50	50	0
Establish 3 river water quality improvement projects	3	3	0

Given the early stage of each project's implementation and the fact that the projects have yet to achieve their anticipated (approved) project outputs, the nine projects are, therefore, at May 2019, making only marginal progress towards the Priority's Result Indicator Targets and Specific Objectives as illustrated below. However, this should be expected at this stage of the projects' implementation (as they have a 2023 delivery date), and should not be considered a concern.

[193] NB Appendix II provides an overview of the specific indicators relevant to Priority Axis 2, with associated targets, definitions and reporting details.

Table 12.3: Progress towards the Priority's Result Indicator Targets and Specific Objectives				
Specific Objective	**Result Indicator**	**Baseline**	**Target**	**Change between baseline and target (as of May 2019)**
1.1 To promote cross-border co-operation to facilitate the recovery of selected protected habitats and priority species	The percentage of selected protected habitats in or approaching favourable condition	1%	10%	0%
1.2 To develop cross-border capacity for the monitoring and management of marine protected species in the region	Cross-border capacity for monitoring and management of marine protected areas and species	A little collaboration	A lot of collaboration	0
1.3 To improve the water quality in shared transitional waters	The percentage of shared transitional waters in the region with good or high quality	0%	100%	0%
1.4 To improve freshwater quality in cross-border river basins	The percentage of cross-border freshwater bodies in cross-border river basins with good or high quality	32%	65%	0%

During consultation with the project partnerships, the uncertainty associated with the UK's potential withdrawal from the EU ('Brexit') was highlighted as an external factor that may impact on the achievement of the Specific Objectives. Whilst the nature and extent of any future arrangements between the EU and the UK are yet to be agreed, some of the project partners reported that future environmental legislation across Ireland, Northern Ireland and Scotland may diverge post 'Brexit', with different regulatory regimes and standards applying across the UK (Scotland and Northern Ireland) and the EU (Ireland). This may potentially impact on the relationship between the project partners (and in turn, project delivery), as each will be required to adhere to the relevant legislation in their respective jurisdiction.

12.1.2 Effectiveness and added value of cross-border collaboration

Each of the project partnerships has demonstrated that their respective projects are jointly:

- Developed;
- Implemented;
- Staffed; and
- Financed.

The effectiveness and added value of the cross-border collaboration are further demonstrated by the fact that three of the projects supported under Objective 2.2 (the COMPASS, MarPAMM and Sea Monitor 2 projects) have adopted a collaborative and partnership working approach by holding 'synergy meetings' with each other. As part of this, the various partnerships have agreed to, amongst other things, prepare joint communication publications such as ezines and to potentially host a joint conference/seminar in November 2019. The Evaluation Team notes that this approach aligns with the objectives of the MSFD (as per Section 1), which states that the need for a coherent approach across the region is particularly relevant in this area because of the shared waters.

Similarly, discussion with the CABB project partnership suggests that the project partners engage in 'information share days' with, for example, NPWS, NIEA, DAERA and the various project partners involved in the CANN project. The purpose of this engagement is to discuss common issues and share pertinent information. It is understood that the project partnership hosted one of these days in October 2018 at Montiagh's Moss SAC.

12.1.3 New ways of working/partnerships/relationships created

Some specific new ways of working/ partnerships/ relationships have been created. For example, as part of the StT and CatchmentCARE projects, there is liaison with NIEA Catchment Officers (in Northern Ireland) and the Local Authority Water and Communities Office (LAWCO) in Ireland in relation to cross-border WFD issues. In doing so, project partnerships are of the view that this creates the potential to generate future initiatives and results in permanent sustainability benefits at cross-border level.

In addition, the SWELL project partners suggest that, prior to this project, there was minimal engagement/partnership working between the regions, and in particular between NIW and IW, in relation to the development of WWTWs. The SWELL project is, therefore, considered to be significant in terms of adding value on a cross-border basis.

12.1.4 Key areas of best practice and learning identified

Some specific areas of best practice and learning have been set out below:

- As per Section 5, the COMPASS project benefits from having members of NGOs on its Advisory Group. As of May 2019, one of the main achievements of, or lessons learnt from, this project has been the successful interaction with stakeholders and civil society (or 'citizen science'). For example, as part of the project's Salmonid research, fishermen have played an important supporting role in catching trout and salmon for tagging and deploying equipment. The COMPASS project partnership notes that this results in a number of direct benefits:
  - Catching fish by fly appears to cause the least distress to the fish;
  - Using fishermen at sea to deploy equipment brings additional knowledge and expertise to the project; and
  - This method provides an important opportunity to involve and engage a broader stakeholder group.
- As part of the Source to Tap project, the Project Manager is liaising with the Water Catchment Partnership, a working partnership with representatives from Ulster Farmers Union, the Voluntary Initiative, NIW, NIEA and CAFRE, in order to maximise opportunities for knowledge sharing on pesticide best practice.

12.1.5 Level of mainstreaming that has occurred

Perhaps unsurprisingly (given the stage of implementation), it is too early for each project to have achieved any mainstreaming of cross-border delivery of environmental work (albeit many of the projects have set out their plans for such activity beyond their respective project period).

12.1.6 Barriers to cross-border cooperation

The preceding analysis indicates that, from the outset, each of the project partnerships was mindful that there were many potential constraints[194] and risks that could have a significant impact on the delivery of their respective projects and given this had developed strategic risk registers with potential mitigation measures.

[194] At the outset potential constraints were identified as falling under headings such as technical, financial, organisational, economic, social, management, legal, timing or environmental.

However, some specific barriers to cross-border cooperation identified at this stage include:

- The uncertainty associated with the UK's potential withdrawal from the EU ('Brexit'), which may potentially impact on the relationship between the project partners (and in turn, project delivery), as each will be required to adhere to the relevant legislation in their respective jurisdiction.
- For the MarPAMM project partnership, one of the key risks to cross-border cooperation not evident at the time of its application for funding has been the delay between making a finance claim to the SEUPB and that finance being made available to individual project partners. One of the MarPAMM project partners is a registered charity (BWI), which relies heavily on having sufficient cash flow to deliver its project activities. The MarPAMM project partners note that cash flow issues for this particular partner pose a risk to project delivery, which may delay the implementation of those work packages that BWI is involved in. This, in turn, has the potential to impact on cross-border cooperation between the project partners. It is, however, understood that the Lead Partner is working with the BWI to ensure that it has sufficient cash flow on a quarterly basis to deliver its allocated work packages.
- The SWIM project partners identified that a key risk to cross-border cooperation was the delay associated with the partners agreeing a Collaborative Agreement (or Partnership Agreement) and a Data Sharing Agreement. It was noted that the delays associated with each partner agreeing to such arrangements have impacted on project delivery, with delays in the implementation of certain work packages. This, in turn, has impacted on the extent of cross-border cooperation between the project partners. Discussion with the SWIM project partners indicates that the two agreements have now been agreed and that the project partnership has undertaken activities to progress the project in a timely manner.

12.1.7 Contribution of the Priority Axis to Policy Objectives

Each of the project partnerships has demonstrated that their respective projects are closely aligned (where applicable) with EU 2020 objectives; the Atlantic Strategy and the EU's horizontal principles of equality and sustainable development. In addition, each of the project partnerships has demonstrated that their respective projects are closely aligned with a number of key EU directives and regional strategies (where applicable). For example:

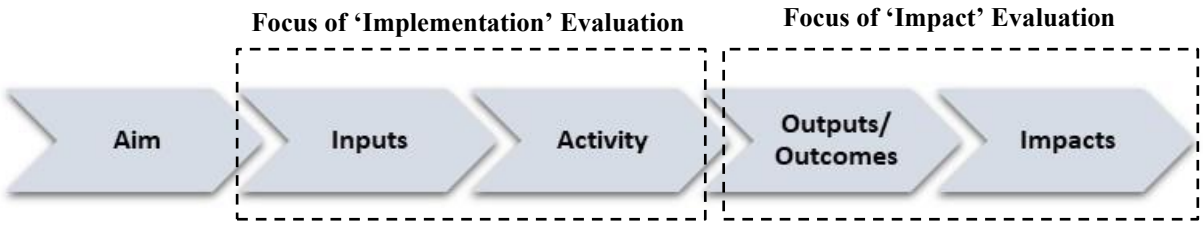
Objective 2.1	• EU 2020 Strategy • EU Birds and Habitats Directive • EU Biodiversity Strategy • The Prioritised Action Frameworks (PAFs) of the three countries and in particular selected protected sites and species of cross-border relevance
Objective 2.2	• EU Atlantic Strategy and Action Plan • Marine Strategy Framework Directive • EU Marine strategies
Objective 2.3	• EU Water Framework Directive
Objective 2.4	• EU Water Framework Directive (including integrated river basin management plans)

12.2 Recommendations

1. By way of aiding post-project evaluation, SEUPB should ensure that all objectives, outputs and result indicators established for all future programmes adhere to the 'SMART' criteria.

2. The 'logic chain' to Evaluation illustrates the intrinsic linkages between an intervention's aims, inputs, activities, outputs and outcomes (as depicted in Figure 12.1). However, the Evaluation Team understands that SEUPB has commissioned two separate evaluations – an 'Implementation' Evaluation and 'Impact' Evaluation - which focus on assessing the progress made by the Priority (and projects supported therein) at different stages of the logic chain.

Figure 12.1: The logic chain to Evaluation



However, given the interlinkages that exist between each stage of the logic chain, the Evaluation Team is of the view that a more rounded, holistic approach should be taken to Evaluation which would require the assessment of the implementation and impact made by the Priority axis as part of one evaluation. For example, in a scenario in which an intervention does not achieve its anticipated outputs/outcomes or impacts, this would naturally lead to the question as to why such a scenario arose. Based on the logic chain to Evaluation, such a scenario could have arisen as a result of the implementation of the activities of the intervention which, in turn, may have been influenced by the scale and quality of inputs utilised to deliver the activities. Therefore, any rationalisation as to why an intervention's outturns are achieved (or otherwise) requires a 'joined-up' approach to Evaluation focused on each stage of the logic chain.

Appendix I – Overview of Key Strategies

EU2020 Objectives

Europe 2020 – A Strategy for smart, sustainable and inclusive growth – is the EU's response to the Great Recession, which was the period of general economic decline observed in world markets during the late 2000s and early 2010s. The Strategy aimed to ensure that Europe emerged stronger from the economic and financial crisis.

Europe 2020 put forward three mutually reinforcing priorities:

- **Smart growth**: developing an economy based on knowledge and innovation.
- **Sustainable growth**: promoting a more resource-efficient, greener and more competitive economy.
- **Inclusive growth**: fostering a high-employment economy delivering social and territorial cohesion.

Of particular relevance to Priority Axis 2: Environment, sustainable growth means building a resource-efficient, sustainable and competitive economy, exploiting Europe's leadership in the race to develop new processes and technologies, including green technologies, accelerating the roll-out of smart grids using ICTs, exploiting EU-scale networks, and reinforcing the competitive advantages of our businesses, particularly in manufacturing and within our SMEs, as well through assisting consumers to value resource efficiency. Such an approach will help the EU to prosper in a low-carbon, resource-constrained world while **preventing environmental degradation, biodiversity loss and unsustainable use of resources**.

The Strategy contained five measurable EU targets for 2020 that were anticipated to steer the process and be translated into national targets: for employment; for research and innovation; for climate change and energy; for education; and for combating poverty. They represented the direction that it was considered Europe should take.

- 75% of the population aged 20-64 should be employed.
- 3% of the EU's GDP should be invested in R&D.
- The "20/20/20" climate/energy targets should be met (including an increase to 30% of emissions reduction if the conditions are right).
- The share of early school leavers should be under 10% and at least 40% of the younger generation should have a tertiary degree.
- 20 million fewer people should be at risk of poverty.

The Atlantic Strategy

The 'Atlantic Strategy' is the EU's Maritime Strategy for the Atlantic Ocean area. It provides for a coherent and balanced approach that is consistent with the EU 2020 agenda. It is largely focused on helping communities living and working on the Atlantic coast deal with new economic realities, but also recognises that the EU shares responsibility for stewardship of the world's oceans. Broadly speaking the strategy cover the coasts, territorial and jurisdictional waters of the five EU Member States with an Atlantic coastline – France, Ireland, Portugal, Spain and the United Kingdom.

The Strategy is based around five themes. Actions within each will contribute to the overriding objective of creating sustainable jobs and growth.

Theme	Proposed Actions
Implementing the ecosystem approach	Management of human activities in the Atlantic must deliver a healthy and productive ecosystem. The ecosystem approach is the basis for marine management in both the Common Fisheries Policy and the Marine Strategy Framework Directive. However, the implementation processes for ensuring sustainable fisheries and achieving a good environmental status are still largely separate in practice and will require additional effort in the Atlantic Ocean area. Therefore, the strategy for the Atlantic must focus on developing the following aspects: • Fisheries have been a central plank in economies on both sides of the Atlantic. However, single-species management must make way for multi-species long-term plans that take into account the wider ecosystem. • Aquaculture, which can satisfy EU demand for healthy and sustainably produced fish products over and above the level that can be provided by capture fisheries. The strategy, therefore, promotes spatial planning as a tool for implementing the ecosystem approach in the Atlantic Ocean area. Such a process should strengthen coherence, connectivity and resilience of marine protected areas in the Atlantic in line with the EU biodiversity action plan. • Finally, Atlantic oceanic circulation drives changes in European terrestrial as well as marine ecosystems. Forecasting future changes in Europe's climate and adapting to these changes will never be achieved without a better understanding of the Atlantic. This calls for sustainable observation systems, from space and at sea, of key marine variables.
Reducing Europe's carbon footprint	As climate change mitigation is an integral part of all EU policies, the strategy focuses on the following elements: • The Atlantic has stronger winds than the other seas that wash Europe's shores. Not only does this offer clean energy but it can also contribute to reducing dependency on distant sources of fossil fuel. By 2020, around 20% of the European offshore wind installed capacity could be located in the Atlantic basin. • The potential of the Atlantic's powerful waves and strong tides needs to be exploited as well. The predictable nature of energy from tides can complement the fluctuating energy from wind. However successful deployment of large scale offshore renewable energy will only happen if grid connections are ensured to link the main production centres to the consumption. • Changes in maritime transport will also contribute to the carbon footprint reduction in the Atlantic.
Sustainable exploitation of the Atlantic seafloor's natural resources	This strategy aims to focus on the following aspects in order to develop the sustainable exploitation of the Atlantic seafloor's natural resources: • Tackling the challenges in commodity markets and on raw materials by emphasising the need to increase investment in Europe's natural assets whilst ensuring that minerals are extracted under safe conditions that respect the environment and workforce. • Marine research institutes on both sides of the Atlantic are well placed to deepen understanding of what the rich biodiversity of the ocean can offer further for food, fuel and pharmaceuticals whilst preserving its ecosystem functions. • Access to the data produced by research institutes and other public authorities has not always been easy in the past. The EU's marine knowledge 2020 initiative will support business and conservation authorities by providing a unique access point for marine data harmonised over sea-basins, so reducing the cost of assembling the data necessary to design, build and operate coastal or offshore infrastructure. Unlocking the patrimony of marine data will not only make existing business processes more competitive but will stimulate innovation by opening access to previously excluded researchers and small businesses.

Theme	Proposed Actions
Responding to threats and emergencies	The EU needs to be prepared for threats and emergencies in the Atlantic whether they are caused by accidents, natural disasters or criminal activity. The following aspects are priorities for the Atlantic Ocean area: • The adoption of important legislative measures on maritime safety; • In addition, early warnings require continuous monitoring of the sea, fast transmission of information, coordination of response teams and mobilisation of expert advice. • The Atlantic is Europe's lifeline for trade. Europe's security of supply must be absolutely secure and the trafficking of arms, people and drugs must stop.
Socially inclusive growth	Whilst there is considerable variation along the Atlantic coast, many communities need to cope with a decline in employment in fisheries and shipbuilding, the shift of mass tourism to sunnier climes and the tendency of elderly people to choose the coast for retirement. The challenge is to ensure that new high-added-value jobs are created at the coast and at the same that those who seek employment in the new economy have the right skills to do them. • Wider mutual recognition of training, including the next generation of marine scientists, re-training and professional qualifications are required to retain maritime expertise and restore the attractiveness of maritime professions. • Regional clustering of maritime industries with educational establishments can ensure a skilled workforce and promote labour mobility within sectors. The advent of new communication technologies means that a critical mass of industries and researchers in geographically separate locations can set up virtual clusters. The strategy has a focus on encouraging the development of these clusters through territorial cooperation projects. • Discerning tourism can help regenerate some Atlantic coastal areas but it needs to attract all-year-round trade rather than summertime only in order to support quality jobs. The Atlantic's rough natural beauty, rich biodiversity, traditional seafood cuisine and Celtic culture are assets that can be readily exploited. Nautical activities are an important source of revenue and a creator of high-value jobs, however, the Atlantic coast has a major deficit in berths especially for large recreational vessels. The Atlantic strategy incorporates the opportunities for development in this field.

Following the development of the Atlantic Strategy document, an Action Plan was developed, with the intention that it should be implemented through to 2020. These action areas are designed to meet the challenges of the Atlantic strategy and deliver smart, sustainable and socially inclusive growth and jobs. It comprises an indicative set of action areas for research and investment to tackle common challenges. Addressing these priorities can promote innovation, contribute to the protection and improvement of the Atlantic's marine and coastal environment, improve connectivity and create synergies for a socially inclusive and sustainable model of regional development.

Priority	Specific Objectives
1: Promote entrepreneurship and innovation	• Sharing knowledge between higher education organisations, companies and research centres; • Enhancement of competitiveness and innovation capacities in the maritime economy of the Atlantic area; • Fostering adaptation and diversification of economic activities by promoting the potential of the Atlantic area.
2: Protect, secure and develop the potential of the Atlantic marine and coastal environment	• Improving maritime safety and security • Exploring and protecting marine waters and coastal zones • Sustainable management of marine resources • The exploitation of the renewable energy potential of the Atlantic area's marine and coastal environment
3: Improve accessibility and connectivity	• Promoting cooperation between ports.
4: Create a socially inclusive and sustainable model of regional development	• Fostering better knowledge of social challenges in the Atlantic area; • Preserving and promoting the Atlantic's cultural heritage.

The Horizontal Principals

The EU's three Horizontal Principals are as follows:

Sustainable development	This principle seeks to ensure that the Programme supports activity that promotes sustainable development and creates sustainable communities by safeguarding and requiring the sustainable use of, existing resources to enhance the long-term management of, and investment in, human, social and environmental resources for future generations. As noted in Section 1, the Programme has selected "preserving and protecting the environment and promoting resource efficiency" as one of the themes within the Programme. Suggested specific actions include taking into account environmental protection requirements, resource efficiency, climate change mitigation and adaptation, disaster resilience and risk prevention and management, in the selection of operations. In addition, other priority investment areas such as research and innovation and local regeneration are likely to have a positive impact on the achievement of sustainable development objectives.
Equal opportunities and non-discrimination	In accordance with Section 75 of the Northern Ireland Act 1998, the Employment Equality Act (1998) and the Equal Status Act (2000), as amended by the Equality Act (2004) in Ireland and the Equality Act (2006) in Scotland, operations part-financed by the Programme shall comply with and, where appropriate, contribute to Community policy and legislation on equal opportunities and non-discrimination. Accordingly, the Programme will have due regard for the need to promote equality of opportunity: • Between persons of different religious belief, political opinion, racial group, age, marital status or sexual orientation: • Between men and women generally; • Between persons with a disability and persons without; • Between persons with dependants and persons without; and • Without prejudice to the above, have regard to the desirability of promoting good relations between persons of different religious belief, political opinion or racial group.
Equality between men and women	The Programme shall pursue the objective of equality between men and women and take appropriate steps to prevent any discrimination during the preparation, implementation, and monitoring and evaluation stages of the programme. Gender equality aims to ensure that men and women enjoy the same rights and opportunities; with equal value and weighting attributed to the different behaviour, aspirations and needs of women and men

Appendix II – Guidance Relating to Output Indicators

INTERREG VA - United Kingdom - Ireland is a European Territorial Cooperation programme that aims to promote greater economic, social and territorial cohesion. The eligible region for this programme comprises Northern Ireland, the Border Region of Ireland, and Western Scotland.

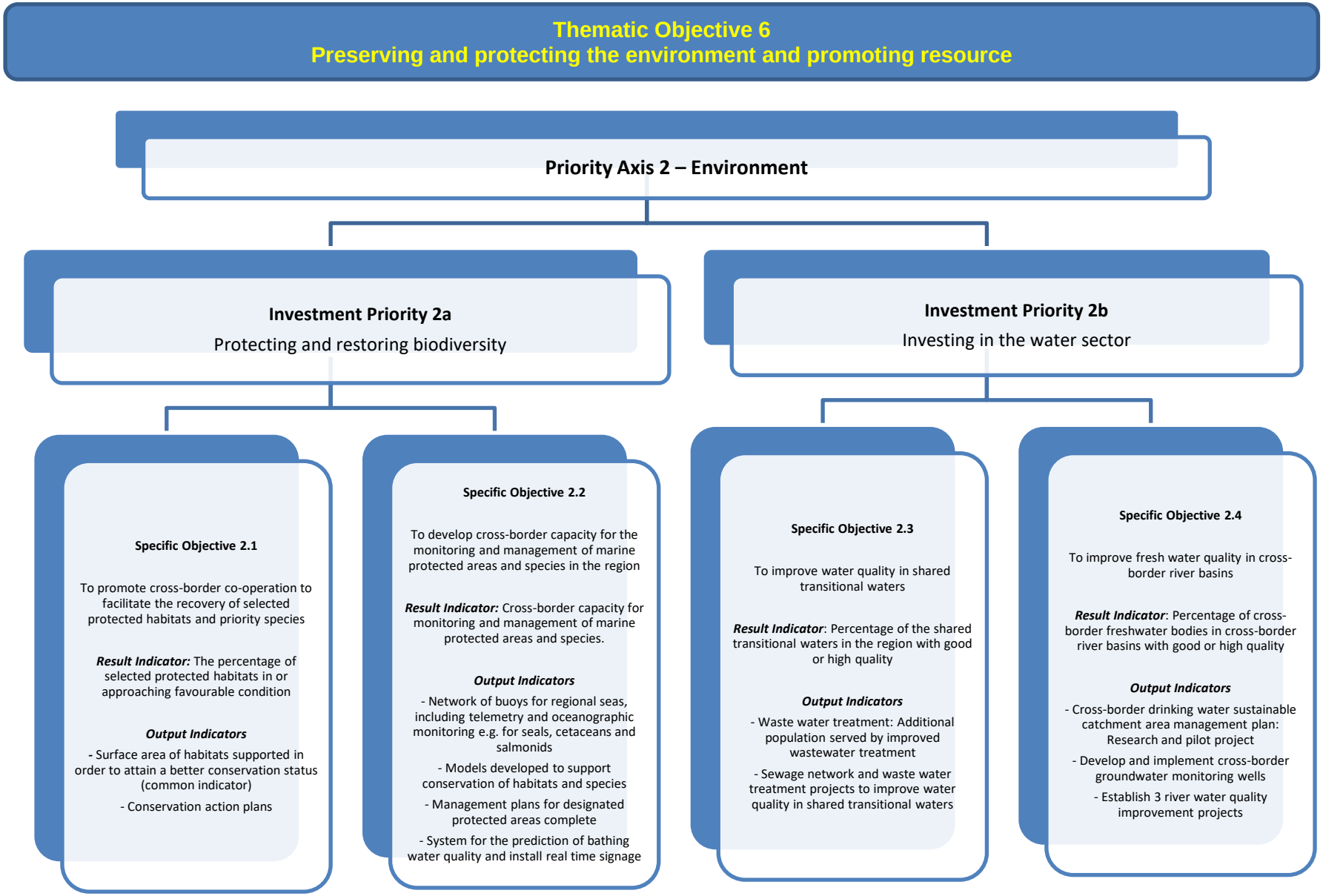
The following strategic areas of investment have been prioritised by the Member States for the 2014-2020 period:

Smart Growth Priority: Thematic Objective 1	Strengthening Research, Technological Development and Innovation - The programme will contribute to the objective within EU2020 of increasing the spend on Research and Development (R&D) to 3% of GDP by 2020, by establishing increased cross-border R&D competence building, for Life and Health Sciences and Renewable Energy. Additionally, R&D into renewable energy technologies may contribute to EU2020 targets and lead to reductions in the use of carbon resources and emissions.
Sustainable Growth Priority: Thematic Objective 6	**Preserving and Protecting the Environment and Promoting Resource Efficiency**- The inclusion in the programme of the protection and preservation of habitats and species, an emphasis on water and marine management will contribute to enhancing the region's sustainability and is congruent with the priority for sustainable growth outlined in strategy EU2020.
Sustainable Growth Priority: Thematic Objective 7	Promoting Sustainable transport and removing bottlenecks in key network infrastructures – The promotion of electric vehicles; greenways; and multimodal transport links have the purpose of reducing the reliance upon carbon forms of transport in the region and underpins the EU2020 strategic objective of creating sustainable growth.
Inclusive Growth Priority: Thematic Objective 9	Promoting Social Inclusion, Combating Poverty and any discrimination. The needs analysis of the region has identified inequalities in health care provision for those citizens living in the border area. The inclusion of improved access to cross-border health services is in line with the EU 2020 strategy to generate inclusive growth.

This appendix provides descriptions and definitions for the output indicators under specific objectives 2.1-2.4 presented in the new INTERREG VA Programme 2014 – 2020.

Priority axes (PA) are the building blocks of programmes; the PAs are defined as follows: PA 1 – Research and Innovation, **PA 2 – Environment**, PA 3 – Sustainable Transport, and PA 4 – Health. This document includes a diagram highlighting the investment priorities, specific objectives, result and output indicators, as well as descriptions and definitions of the specific objectives 2.1 - 2.4 output indicators in detail[195].

[195] Source: Output Indicator Guidance.


Thematic Objective 6
Preserving and protecting the environment and promoting resource
Priority Axis 2 – Environment
Investment Priority 2a
Protecting and restoring biodiversity
Investment Priority 2b
Investing in the water sector
Specific Objective 2.1
To promote cross-border co-operation to facilitate the recovery of selected protected habitats and priority species
Result Indicator: The percentage of selected protected habitats in or approaching favourable condition
Output Indicators
- Surface area of habitats supported in order to attain a better conservation status (common indicator)
- Conservation action plans
Specific Objective 2.2
To develop cross-border capacity for the monitoring and management of marine protected areas and species in the region
Result Indicator: Cross-border capacity for monitoring and management of marine protected areas and species.
Output Indicators
- Network of buoys for regional seas, including telemetry and oceanographic monitoring e.g. for seals, cetaceans and salmonids
- Models developed to support conservation of habitats and species
- Management plans for designated protected areas complete
- System for the prediction of bathing water quality and install real time signage
Specific Objective 2.3
To improve water quality in shared transitional waters
Result Indicator: Percentage of the shared transitional waters in the region with good or high quality
Output Indicators
- Waste water treatment: Additional population served by improved wastewater treatment
- Sewage network and waste water treatment projects to improve water quality in shared transitional waters
Specific Objective 2.4
To improve fresh water quality in cross-border river basins
Result Indicator: Percentage of cross-border freshwater bodies in cross-border river basins with good or high quality
Output Indicators
- Cross-border drinking water sustainable catchment area management plan: Research and pilot project
- Develop and implement cross-border groundwater monitoring wells
- Establish 3 river water quality improvement projects

Specific Objective 2.1: To promote cross-border co-operation to facilitate the recovery of selected protected habitats and priority species

The EU is committed to the protection of biodiversity, and to halting biodiversity loss within the EU by 2020. Member States will designate sites as Special Areas of Conservation (SACs) and adopt conservation measures involving if need be, appropriate management plans and other measures which correspond to the ecological requirements of the natural habitat types and the species of Community interest. The aim is to protect vulnerable habitats and species across their natural range in Europe and ensure that they are restored to, or maintained at, a favourable conservation status.

The conservation status distinguishes between a 'favourable' and an 'unfavourable' status of natural habitats. Article 1(e) of the Council Directive 92/43/EEC[196] provides clear requirements that indicate a 'favourable' status:

The conservative status of a natural habitat will be taken as 'favourable' when:

- its natural range and areas it covers within that range are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable as defined as follows:

    - population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
    - the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future;
    - there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Specific Indicators

The following is a list of the indicators relevant to Objective 2.1, with associated targets, definitions and reporting details.

The overall aim of Objective 2.1 is to improve the condition of protected habitats in the eligible region and increase the number of habitats in or approaching favourable condition.

[196] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora [1992] OJ No L 206/7. Retrieved 22/10/2014 from http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31992L0043&from=EN

Indicator CO23	The surface area of habitats supported in order to attain a better conservation status (common indicator)
Measurement Unit	Hectares
Target Value (2023)	4,500
Definition	Surface of restored or created areas aimed to improve the conservation status of threatened species. The operations can be carried out both in or outside of Natura 2000[197] areas, capable of improving the conservation status of targeted species, habitats or ecosystems for biodiversity and the provisioning of ecosystem services. Areas that receive support repeatedly should be counted only once. **Conservation Status** A technical paper for reporting on Article 17[198] states that Conservation Status is given as one of three classes: • Favourable • Unfavourable inadequate (change in management or policy is required to return the habitat type or species to favourable status but there is no danger of extinction in the foreseeable future) • Unfavourable bad (serious danger of becoming extinct, at least regionally) There is also an 'Unknown' class which can be used where there is insufficient information available to allow an assessment. The conservation status distinguishes between a 'favourable' and an 'unfavourable' status of natural habitats[6].
	• Better status An 'improvement' of the conservation status of a habitat describes the change from 'unfavourable' to 'favourable'[199] status.
Achievement	Achievement should be recorded upon completion of activities in the supported areas and an improvement demonstrated.

[197] **Natura 2000** is a network of nature protection areas in the territory of the European Union. It is made up of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) designated respectively under the Habitats Directive and Birds Directive. The network includes both terrestrial and marine sites (Marine Protected Areas (MPAs)).

[198] http://bd.eionet.europa.eu/activities/Reporting/Article_17/Documents/ART17%20public%20consultation%20guide.pdf

[199] Article 1(e) of the Council Directive 92/43/EEC[199] provides clear requirements that indicate a 'favourable' status. For more details see page 11.

Indicator 2.111	Conservation action plans
Measurement Unit	Number of action plans
Target Value (2023)	25
Definition	Guidance on Article 17 does not have a clear structure for conservation action plans, however, it does cover management plans[200]. Management plans are considered as operational instruments that set practical measures to achieve the conservation objectives for the sites in the network. Action plans are generally associated with management plans and implement the action necessary to achieve the goals set out in management plans. A comprehensive management plan should: • indicate the habitat types and/or species and their localities for which conservation measures are planned; • identify the actual status of the habitat types and species and the desired status which should be reached through the conservation measures; • define clear and achievable conservation objectives; and • identify the necessary measures together with the means and a time schedule which can contribute to meeting those objectives. **Conservation action plans** The Action plan should be a document compliant with Article 17 guidance and Natura 2000 plans[201], the following points should be noted: • The preference is for conservation action to follow on from sites where conservation plans are developed. It is recognised however that conservation actions can be delivered on sites without management plans provided they will still deliver an improvement in condition. • The output indicator relates to the improvement in the qualifying interest e.g. a site is 100ha and of that it supports 75ha of qualifying feature e.g. 75ha of lowland raised bog with associated 25ha of other habitats such as wet woodland. The output indicator would be 75ha in this case. • Plans can also include works on land not directly supporting a qualifying interest but would deliver improvement in the condition that would then be eligible e.g. fencing or drain-blocking would improve grazing or water levels across a site and therefore bring whole site improvements • Habitat mapping – Any mapping must fit in with EU requirements, namely EUNIS.
Achievement	Plans should be developed, actions agreed by SEUPB and implemented before the plan can be confirmed as contributing to output indicator.

[200] https://circabc.europa.eu/sd/d/.../Art17%20-%20Guidelines-final.pdf
[201] http://ec.europa.eu/environment/nature/natura2000/index_en.htm

Specific Objective 2.2: To develop cross-border capacity for the monitoring and management of marine protected areas and species in the region

The second specific objective of this investment priority will be to promote effective cross-border collaboration to ensure high quality coastal and marine waters across the region. The marine environment is a precious heritage that must be protected, preserved and, where practicable, restored with the ultimate aim of maintaining biodiversity and providing diverse and dynamic oceans and seas which are clean, healthy and productive. The Directive 2008/56/EC3 enshrines in a legislative framework the ecosystem approach to the management of human activities having an impact on the marine environment, integrating the concepts of environmental protection and sustainable use.

Increased co-operation in this area can mitigate climate change impact. The need for a coherent approach across the region is particularly relevant in this area because of the shared waters.

Specific Indicators

The following a list of the indicators relevant to Objective 2.2, with associated targets, definitions and reporting details.

The overall aim of Objective 2.2 is to develop the capacity for monitoring and managing marine protected areas and species.

Indicator 2.211	**Establish a Network of buoys for regional seas, including telemetry and oceanographic monitoring e.g. for seals, cetaceans and salmonids**
Measurement Unit	Number of networks
Target Value (2023)	1
Definition	**Network of buoys** A buoy Network provides real-time, high-frequency environmental data from strategic locations around the coast to monitor the marine environment. It allows for monitoring of oceanographic conditions and the provision of a more robust understanding of factors driving movement of migratory fish and marine mammals in sensitive near-shore waters. Establish a network of buoys for regional seas, including telemetry and oceanographic monitoring e.g. for seals, cetaceans and salmonids at a minimum, but may also monitor other species.
Achievement	The network must be operational and collecting data before it can be included as the achievement of the output indicator.

Indicator 2.212	**Models developed to support conservation of habitats and species**
Measurement Unit	Number of models
Target Value (2023)	5
Definition	Any model that is developed using robust scientific evidence and can be used to support decisions regarding the conservation of habitats or species.
Achievement	Models might take different forms but should be reasonable in approach and relevant to the proposal.

Indicator 2.213	Marine management plans for designated protected areas complete
Measurement Unit	Number of management plans
Target Value (2023)	6
Definition	**Designated protected areas** Marine Protected Areas (MPAs) or conservation areas are locations which receive protection because of their recognised natural, ecological[202] and/or cultural values. Special Protected Areas (SPAs) with marine components are defined as those sites with qualifying Birds Directive species or regularly occurring migratory species that are dependent on the marine environment for all or part of their lifecycle, where these species are found in association with intertidal or subtidal habitats.
	Marine management plans Like any other Protected Areas, Marine Protected Areas are designed to conserve a selection of marine biodiversity (species and habitats). Marine management plans support a strategic approach to their protection.
	Marine management strategies These strategies will be specific activities undertaken as proposed in the marine management plan for the designated area.
Achievement	Plans should be developed using a collaborative approach and inclusive of statutory departments and other relevant stakeholders' comments. It must be demonstrated that the aim is for the plan to become formally adopted before being counted as output.

Indicator 2.214	System for the prediction of bathing water quality and install real-time signage
Measurement Unit	Number of systems
Target Value (2023)	1
Definition	**Bathing water quality** Bathing water quality is categorized into one of 4 classes: **excellent**, **good**, **sufficient** and **poor** based on the original Directive's criteria[203]. Rainfall is acknowledged as having a primary influence in causing episodes of high faecal coliform concentration in bathing water, a principal indicator of poor water quality. This pollution occurs through two key pathways; increasing run-off from agricultural land and from combined sewer overflows (CSOs) spilling during times of heavy rainfall. This occurs throughout the UK, but in particular, areas that experience higher rainfall, such as the west coast of Scotland and Northern Ireland. **The revised Bathing Water Directive (2006/7/EC)[204]** requires the Member States to identify popular bathing areas and monitor the bathing waters for indicators of microbiological pollution throughout the bathing season. The new Directive ensures timely information of the public during the bathing season, with an obligation for the Member States to disseminate actively and promptly information on bathing water quality.
	Real-time signage Models using parameters such as rainfall will be used to predict the water quality on a daily basis and this information must be made available to people using the beach. Water quality predictions will be updated daily during the bathing water season. Advice will be disseminated via electronic signage and other appropriate channels of communication.
Achievement	At a minimum, a modelling system will be developed to predict bathing water quality and being used to provide bathing advice before being counted as an output. Advice will be disseminated via electronic signage and other appropriate channels of communication.

[202] Ecology is the branch of biology which studies the interactions among organisms and their environment.

[203] European Commission. (2014). *Environment: Bathing water*. Retrieved from http://ec.europa.eu/environment/water/water-bathing/signs.htm

[204] EP and Council Directive 2006/7/EC of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC [2006] OJ L64/37. Retrieved from http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006L0007&from=EN

Specific Objective 2.3: To improve water quality in shared transitional waters

The specific objective of this investment priority will be to improve water quality in cross-border river catchment areas and shared transitional and coastal waters in the region in accordance with the EU Water Framework Directive (WFD; Directive 2000/60/EC). The WFD classification scheme for water quality includes five status classes: high, good, moderate, poor and bad. 'High status' is defined as the biological, chemical and morphological conditions associated with **no** or **very low** human pressure. This is also called the 'reference condition' as it is the best status achievable - the benchmark. The general objective of the WFD is to achieve 'good status'[205] for all surface waters by 2015[206].

Specific Indicators

The following is a list of the indicators relevant to Objective 2.3, with associated targets, definitions and reporting details. The aim of Objective 2.3 is to improve the quality of shared transitional waters.

Indicator CO19	**Wastewater treatment: additional population served by improved wastewater treatment**
Measurement Unit	Population equivalent/PE
Target Value (2023)	10,000
Definition	**Population served by improved wastewater treatment** The number of persons whose wastewater is transported to wastewater treatment plants through wastewater transportation network as a result of increased wastewater treatment/transportation capacity built by the project, and who were previously not connected, or were served by sub-standard wastewater treatment. It includes improving wastewater treatment level.
Achievement	Population served should relate to and be recorded after completion of the wastewater treatment projects under indicator 2.311. Data should be obtained to allow a gender breakdown of the additional population being served by improved wastewater treatment.

[205] 'Good status' means both 'good ecological status' and 'good chemical status'.

[206] European Commission. (2014). *Environment: Ecological status and intercalibration*. Retrieved from http://ec.europa.eu/environment/water/water-framework/objectives/status_en.htm

Indicator 2.311	Sewage network and wastewater treatment projects to improve water quality in shared transitional waters
Measurement Unit	Projects completed[207]
Target Value (2023)	2
Definition	**'improve' water quality** To raise water quality status from 'moderate' to at least 'good status'[208]. The need for improved water quality and how it is to be rated originates from the EU Water Framework Directive (WFD; Directive 2000/60/EC). The WFD classification scheme for water quality includes five status classes: high, good, moderate, poor and bad. 'High status' is defined as the biological, chemical and morphological conditions associated with **no** or **very low** human pressure. This is also called the 'reference condition' as it is the best status achievable - the benchmark. The general objective of the WFD is to achieve 'good status' for all surface waters by 2015[209]. The types of activities expected under this indicator include: Research and development in wastewater treatment technologies, including the use of sustainable technologies with direct relevance to the shared transitional waters. The creation of demonstration sites in the catchment areas to illustrate best practice wastewater treatment methodologies.
	Shared transitional waters Transitional waters are those waters between the land and the sea. They often encompass river mouths and so show the transition from freshwater to marine conditions. Depending on the tidal influence from coastal waters, but also on the freshwater influence from upstream, transitional waters are often characterised by frequently changing salinity[210]. Shared / Cross-border transitional water bodies are Lough Foyle and Carlingford Lough in the eligible region.
Achievement	The additional population counted under indicator CO19 should be served as a result of the sewage network and wastewater treatment projects from indicator 2.311. Projects should be completed and operational before they can be counted under indicator 2.311.

[207] Upon completion of agreed work programme, pending approval from SEUPB.
[208] Good status' means both 'good ecological status' and 'good chemical status'.
[209] European Commission. (2014). *Environment: Ecological status and intercalibration*. Retrieved from http://ec.europa.eu/environment/water/water-framework/objectives/status_en.htm
[210] http://www.wiser.eu/background/transitional-waters/

Specific objective 2.4: To improve freshwater quality in cross-border river basins

The Groundwater Directive (2006/118/EC) establishes a regime which sets groundwater quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater. The directive establishes quality criteria that take account of local characteristics and allows for further improvements to be made based on monitoring data and new scientific knowledge. The directive thus represents a proportionate and scientifically sound response to the requirements of the Water Framework Directive (WFD) as it relates to assessments on chemical status of groundwater and the identification and reversal of significant and sustained upward trends in pollutant concentrations. Member States will have to establish the standards at the most appropriate level and take into account local or regional conditions.

The Groundwater Directive complements the Water Framework Directive (WFD).

Specific Indicators

The following is a list of the output indicators relevant to Objective 2.4, with associated targets, definitions and reporting details.

The overall aim of Objective 2.4 is to improve the baseline condition of water quality, physical structure and habitat in a number of cross-border catchment areas. This will contribute towards the achievement of targets relating to good water quality and ecological status of all water bodies (rivers, lakes, groundwater, transitional).

Indicator 2.411	**Cross-border drinking water Sustainable Catchment Area Management Plan: Research and Pilot project**
Measurement Unit	Project completed
Target Value (2023)	1
Definition	**Sustainable catchment area management plan** Improvement of the quality and reliability of raw water received at raw water abstraction points through reducing the risks from contamination and ensuring the delivery of safe, clean drinking water.
	Drinking water The Council Directive (98/83/EC of 3 November 1998 on the quality of water intended for human consumption) concerns the quality of water intended for human consumption. Its objective is to protect human health from adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean. The Directive laid down the essential quality standards at EU level. A total of 48 microbiological, chemical and indicator parameters must be monitored and tested regularly which needs to be reported to the European Commission every three years[211].
	The research project and pilot project are two separate elements to this indicator. The research will be relevant to and inform the objectives of the pilot project. The research and pilot elements of the project are integrated and must support the achievement of the objectives. The results from the pilot project should be used to inform any theoretical based research or modelling.
Achievement	Both the research and pilot elements on this project should be completed and quality assured by SEUPB before any output activity can be recorded.

[211] European Commission. Environment: Drinking water. Retrieved from http://ec.europa.eu/environment/water/water-drink/legislation_en.html

Indicator 2.412	Develop and implement cross-border groundwater monitoring wells
Measurement Unit	Wells installed
Target Value (2023)	50
Definition	**Monitoring Wells** Monitoring wells are installed for the longer term and serve the purpose to characterise and assess groundwater vulnerability (resource and quality) and potential land-use impacts. Project data generated will also support reporting requirements under the EU Water Framework Directive programme and the Nitrates Directive[212]. Groundwater wells should be located on both sides of the Northern Ireland/Ireland border to support monitoring of the river catchment activities. It would be ideal if the location of some or all of the groundwater monitoring wells supported the achievement of indicator 2.411 and/or indicator 2.413.
Achievement	Wells should be operational (collecting data) before this activity can be considered complete.

Indicator 2.413	Establish 3 river water quality improvement projects
Measurement Unit	Projects completed
Target Value (2023)	3
Definition	**River water quality improvement** A comprehensive and integrated series of actions aimed at improving river water quality. River catchment activities should be limited to river catchments where the area is on both sides of the Northern Ireland/Ireland border.
Achievement	Projects should involve a collaborative approach. The quality improvement plans should include an agreed work plan which should be completed and verified by SEUPB before projects can be considered 'complete' and recorded as an achievement.

[212] Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources [1991] OJ L375/1. Retrieved from http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31991L0676&from=EN