

Draft Strategic Environmental Assessment

Environmental Report

26th July 2019

Consultation Details

This document can be made available in a range of alternative formats. Please contact us with your requirements.

Contact details are:

Conor Courtney
NI Water
Westland House,
Head Office,
40 Old Westland Road,
BELFAST.
BT14 6TE

Email: WaterResourcePlanning@niwater.com

Telephone: 028 90354813 Ext: 20516

If you require any technical clarification on any of the documents please also use these contact details.

How to respond

The consultation will run for nine weeks to 27 September 2019. Please send any representations to the Department for Infrastructure (DfI), who will review these before sending them to NI Water for comment. If you wish to make representations on the draft Plan or supporting documents please do so by 27 September 2019 using the below contact details:

Email: waterpolicy@infrastructure-ni.gov.uk

Eddie Dobbin
Water Resource & Supply Resilience Plan Response
Department for Infrastructure
Room 1-20
Clarence Court
10-18 Adelaide Street
Belfast BT2 8GB

The information you provide in your response to this consultation, excluding personal information, may be published or disclosed in accordance with the Freedom of Information Act 2000 (FOIA) or the Environmental Information Regulations 2004 (EIR).

If you want the information that you provide to be treated as confidential, please tell us why, but be aware that, under the FOIA, we cannot guarantee confidentiality.

For information regarding your personal data, please refer to the DfI Privacy Notice at <https://www.infrastructure-ni.gov.uk/dfi-privacy>.

For further details on confidentiality, the FOIA and the EIR please refer to <https://www.ico.org.uk>

Notes

The draft Plan is based on best practice and technical guidance in the industry.

NI Water has not excluded any information from the draft Plan for either commercial confidentiality or for national security interests under Article 71(10) of the Water & Sewerage Services (Northern Ireland) Order 2006.

The Water and Sewerage Services Act (Northern Ireland) 2016, permits NI Water to combine the Water Resource Management Plan and the Drought Plan in a Water Resource & Supply Resilience Plan (WR&SR Plan).

Freedom of Information 2000 & the Environmental Information Regulations [EIRs] 2004

Following the consultation period, once all the comments have been reviewed and addressed as appropriate, NI Water will publish a summary of the consultation responses. . Your response, with your personal details extracted or redacted (in line with the requirements of the Data Protection Act 2018 and General Data Protection Regulation) under Section 40 of the Act or Regulation 13 of the EIR, (as appropriate), may be disclosed on request. NI Water/ The Department can refuse to disclose information only in exceptional circumstances. Before you submit your response, please read the paragraphs below on the confidentiality of consultations and they will give you guidance on the legal position about any information given by you in response to this consultation.

The Freedom of Information Act gives the public a right to request any non-personal, non-environmental, recorded information held by a public authority, including NI Water and the Department in this case.

The Environmental Information Regulations 2004 extends this right of request to “[environmental information](#)” for example, information about land development, pollution levels, energy production, and waste management.

This right of access to information, subject to exemption or exception, includes information provided in response to a consultation. NI Water/the Department cannot automatically consider as non-disclosable information supplied to it in response to a consultation. However, it does have the responsibility to decide whether any information provided by you in response to this consultation, should be made public or treated as non-disclosable.

This means that information provided by you in response to the consultation is unlikely to be treated as exempt from release to the wider public domain, except in very particular circumstances.

The Lord Chancellor’s Code of Practice on the Freedom of Information Act provides that:

- NI Water/the Department should only accept information from third parties in confidence if it is necessary to obtain that information in connection with the exercise of any of the NI Water / Department’s functions and it would not otherwise be provided;
- NI Water/the Department should not agree to hold information received from third parties ‘in confidence’ which is not confidential in nature;
- Acceptance by NI Water/the Department of confidentiality provisions must be for good reasons, capable of being justified to the Information Commissioner.

For further information about confidentiality of responses, please contact the

Information Commissioner’s Office at:

Information Commissioner’s Office – Northern Ireland

3rd Floor

14 Cromac Place

Belfast

BT7 2JB

Tel: (028) 90278757 / 0303 123 1114

Email: ni@ico.org.uk

Website: <https://ico.org.uk/about-the-ico/who-we-are/northern-ireland-office/>

Contents

Glossary and Acronyms	vi
1 Introduction	1
1.1 Overview	1
1.2 Need for the Plan	1
1.3 Water Resource Management and Drought Plans	1
1.4 Strategic Environmental Assessment	1
1.5 Other Assessments	2
1.6 Structure of the Report	4
2 The Scope of the Plan and the SEA Process	5
2.1 The Study Area of the Plan and SEA	5
2.2 The Need for the Plan	6
2.3 Identification of the WR&SR Plan Feasible Options	7
2.4 The SEA Process and Integration with the WR&SR Plan development	9
3 Baseline Environmental Conditions	10
3.1 Introduction	10
3.2 Population Local Economy and Human Health	10
3.3 Tourism and Recreation	11
3.4 Material Assets	13
3.5 Biodiversity, Flora and Fauna	14
3.6 Landscape, Townscape and Visual Amenity	19
3.7 Air Quality and Noise	21
3.8 Climate	22
3.9 Water Environment	24
3.10 Cultural Heritage and Archaeology	26
3.11 Geology and Soils	27
3.12 Sustainability Issues	29
3.13 Summary of key issues in the North WRZ	31
3.14 Summary of key issues in the North East and East WRZ	32
3.15 Summary of key issues in the West and South West WRZ	34
3.16 Summary of key issues in the Central and South WRZ	36
4 SEA Methodology	39
4.1 SEA Scoping and Consultation	39
4.2 SEA Objectives	39
4.3 Option Development	40
4.4 Unconstrained Options Screening Assessment	41
4.5 Constrained Feasible Options Assessment	41
4.6 Supply Resilience Enhancements	43
4.7 Environmental Valuation of impacts and benefits	43
4.8 Plan Scenario Assessment and Preferred Plan selection	44
4.9 Cumulative Effects	44

4.10	HRA & Other Assessments Approach	45
4.11	Approach for other Assessments.....	46
5	Comparison of Alternatives	47
5.1	Alternative Options	47
5.2	Identification of Constrained Feasible Water Resource Management Options	47
5.3	Constrained Feasible Options Assessment.....	48
5.4	Modelling of Feasible Options and selection of options	48
5.5	Identification of Alternative Plan Scenarios	49
5.6	Assessment of alternative scenarios	50
5.7	Selection of Preferred Plan	51
5.8	Drought Plan	52
5.9	Supply Resilience Enhancements	54
6	Environmental Assessment of the Preferred Plan	55
6.1	Introduction	55
6.2	Preferred Plan	55
6.3	Assessment of the Preferred Plan and mitigation requirements	56
6.4	Cumulative Effects	59
6.5	Cumulative Assessment Summary	62
6.6	Water Framework Directive (WFD): Plan-Level Assessment.....	62
6.7	Drought Plan	69
6.8	Other Assessments.....	70
6.9	Limitations and uncertainties with the assessment undertaken	72
7	Implementation and Monitoring	73
7.1	Objectives, Targets and Indicators	73
7.2	Monitoring Plan	73
7.3	Environmental Action Plan.....	76
8	Conclusions.....	80
	Reference List.....	82

Appendices

Appendix A. Review of Legislation, Policies, Plans and Programmes

Appendix B. Scoping Consultation Responses

Appendix C. Habitats Regulation Assessment

Appendix D. Water Framework Directive Assessment

Appendix E. Equality Impact Assessment

Appendix F. Regulatory Impact Assessment

Appendix G. Rural Needs Impact Assessment

Glossary and Acronyms

Term	Definition
Abstraction	The process of taking water from any source, including rivers and aquifers.
Area of Outstanding Natural Beauty	A national designation to protect areas of the countryside of high scenic quality that cannot be selected for National Park status due to their lack of opportunities for outdoor recreation (an essential objective of National Parks).
Aquifer	A water-bearing rock that groundwater can be extracted from.
Biodiversity Action Plan	An agreed plan for a habitat or species, which forms part of the UK's commitment to biodiversity.
Cumulative effect	The combined effects from several plans, programmes or policies.
Deficit	The amount of water shortage between supply and demand.
Environmental Report	The report that documents the effects of measures outlined in a plan.
Invasive species	Non-native species that out-compete native species to the detriment of an ecosystem.
Ramsar Site	An international designation for an important wetland site under the Ramsar Convention.
Special Area of Conservation	An international designation for habitats and/or species under the EC Habitats Directive.
Special Protection Area	A site of international importance for birds, designated as required by the EC Birds Directive. SPAs are designated for their international importance as breeding, feeding and roosting habitat for birds.
Strategic Environmental Assessment	The application of EIA to earlier, more strategic, tiers of decision making policies, plans and programmes. The application has become statutory under both UK and European legislation.
Scoping Report	A document produced as part of an environmental assessment that sets out the scope of the potential effects.
Site of Special Scientific Interest	Nationally designated sites for their flora, fauna, geological or physiographical features.
Water resource management	The management of water sources and demands to minimise any deficit between the two.
Water Resource Management Plan	A plan designed to identify water deficits and outline measures that can reduce the deficit.
Water Resource and Supply Resilience Plan	The plan determining how NI Water will deal water deficits and ensure it can meet supply demand needs in Northern Ireland, and remain sustainable and resilient in unforeseen circumstances.
Water Resource Zone	The largest possible zone in which all resources, including external transfers, can be shared and all customers experience the same risk of supply failure from a resource shortfall.

Term	Definition
AISC	Average Incremental Social Costs
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
ASSI	Area of Special Scientific Interest
ATC	Area of Townscape Character
AQMA	Air Quality Management Areas
BAG	Benefits Assessment Guidance
DAERA	Department of Agriculture, Environment and Rural Affairs
DI	Distribution Input
EAP	Environmental Action Plan
EBSD	Economics of Balancing Supply and Demand
GHG	Greenhouse Gas
LMA	Local Management Authorities
MCZ	Marine Conservation Zones
MI/d	Mega litres per day
NIEA	Northern Ireland Environment Agency
Ni Water	Northern Ireland Water
NNR	National Nature Reserve
PC	Price Control - The price control agreement between NI Water and the Utility Regulator for the next business plan
PPPs	Policies, Plans and Programmes
PPS	Planning Policy Statement
RAG	Red Amber Green
RBD	River Basin District
RBMP	River Basin Management Plan
RDS	Regional Development Strategy
SAC	Special Area of Conservation
SDB	Supply Demand Balance
SEA	Strategic Environmental Assessment
SLNCI	Sites of Local Nature Conservation Importance
SPA	Special Protection Area
The Plan	Water Resource and Supply Resilience Plan
UKCP09	UK Climate Projections 2009
UKWIR	UK Water Industry Research
WFD	Water Framework Directive
WRMP	Water Resource Management Plan
WR&SR Plan	Water Resource and Supply Resilience Plan
WRZ	Water Resource Zone

1 Introduction

1.1 Overview

Water as a resource is often taken for granted, yet it is the world's most precious asset, covering two thirds of the earth's surface. It is vital for human health and well-being making up 75% of the human body. Urbanisation, population growth, increased living standards, growing competition for water, and pollution put pressure on water resources, and these pressures are provoked by climate change and variations in natural conditions.

In Northern Ireland each person uses around 145 litres of clean, treated water every day¹. Water is also important to many sectors of the economy and is used for growing crops, producing electricity and manufacturing goods. These activities rely on a balance between water supply (sources of water) and water demand (users of water).

1.2 Need for the Plan

NI Water is the appointed statutory undertaker for the supply of water and sewerage services to the population of Northern Ireland.

NI Water is required under the Water and Sewerage Services Act (NI) 2016 to produce a combined Water Resource and Supply Resilience Plan in line with the price Control period (PC15 - 2015-2021). NI Water has dual status as a government-owned company and a non-departmental public body. It operates according to conditions outlined in its licence. The Department for Infrastructure is the sole shareholder of NI Water.

1.3 Water Resource Management and Drought Plans

NI Water is meeting these legislative requirements through provision of an overarching Water Resource and Supply Resilience Plan (WR&SR Plan).

The WR&SR Plan seeks to provide water to customers to maintain a defined level of service and identifies the actions required to achieve this over the next 25 years while meeting wider objectives for resilience and sustainability.

The Drought Plan can be found in Chapter 5 of the WR & SR Plan and it sets out the actions required to maintain water supplies to customers for the very rare events that are more severe than the level of service. The plan is based on the assets available to the company now, and will be updated as changes to the infrastructure occur.

1.4 Strategic Environmental Assessment

The Plan requires a Strategic Environmental Assessment under both the European Directive (2001/42/E) and the Environmental Assessment of Plans and Programme Regulations (S 163 2004). Article 3 (2) of the SEA Directive makes SEA mandatory for plans or programmes which;

(a) are prepared for agriculture, forestry, fisheries, energy, transport, industry, tourism, land use, telecommunications, waste management, or water management;

(b) are wholly prepared within one part of the UK (including NI); and

(c) may set a framework for future development consents that could require Environmental Impact Assessment.

¹ Statistic taken from 'Why save water at home' [Accessed 23/06/2016] <https://www.niwater.com/why-save-water-at-home-audit/>

Northern Ireland Environment Agency (NIEA) described Strategic Environmental Assessment (SEA) as “a system for incorporating environmental considerations into certain plans and programmes at an early stage of the plan or programme development”.

The objective of SEA, as stated in the SEA Directive (Article 1), is ‘to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development’. Therefore, this SEA process will ensure that environmental considerations are taken into account in the development of the WR&SR Plan when identifying the preferred options; and the impacts of a plan or programme on the environment against a baseline situation². The SEA involves collecting information, defining alternatives, identifying environmental effects, developing mitigation measures and revising proposals in light of the predicted environmental effects. The intention is that the SEA is fully integrated into the plan-making process from the earliest stages and is taken into account when identifying the preferred WR&SR Plan.

This final Environmental Report provides the results of the assessment, together with recommendations to improve the environmental outcomes and monitor the effects of the plan. The purpose of this Environmental Report is to inform decision-makers, including the public, as to how the WR&SR Plan is likely to impact on the environment and the measures required to mitigate significant environmental effects going forward.

The SEA includes five main stages based on the steps, which are shown alongside the WR&SR Plan steps in Figure 2-2³. The SEA process helps to inform the development and refinement of plan options. This final version of the Environmental Report also documents the responses from the consultation at the scoping stage and the changes that have occurred since its publication.

1.5 Other Assessments

1.5.1 Habitats Regulation Assessment (HRA)

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (the Habitats Directive) and Directive 2009/147/EC on the conservation of wild birds (the Birds Directive) provide the framework for the designation and protection of ‘European sites’ for the protection of Europe’s most valuable and threatened habitats and species. The Conservation of Habitats and Species Regulations (Northern Ireland) 2010 (the Habitats Regulations) transpose the Directives into NI law.

This network of European sites is known as the ‘Natura 2000 Network.’ The network comprises Special Protection Areas (SPA) and Special Areas of Conservation (SAC). SACs are designated under the ‘Habitats Directive’ for supporting habitats or species listed on Annex I or II of the Habitats Directive. SPAs are designated under the ‘Birds Directive.’ Ramsar⁴ sites are also included within the regulations as Northern Ireland policy affords them the same level of protection as European sites.

Under the Habitats Regulations, NI Water as the ‘competent authority’ have a general duty, in the exercise of any of their functions, to have regard to undertake Habitats Regulations Assessment (HRA) of its Draft WR&SR Plan.

If a proposed plan or project is likely to have a significant effect on a European site, alone or in combination with other plans or projects, an appropriate assessment of the implications must be undertaken to consider the potential implications for the Natura 2000 site. The competent authority must only agree to a plan or project after ascertaining that it will not adversely affect the integrity of the site concerned. In some cases, where a potential impact cannot be avoided, designed out or

² The baseline describes the condition of the environment in the absence of the plan

³ Based on the steps outlined in ‘Strategic Environmental Assessment and Habitats Regulations Assessment – Guidance for Water resources Management Plans and Drought Plans’ UKWIR 2012

⁴ Ramsar sites are wetlands of global importance, listed under the Convention on Wetlands of international importance. Whilst most Ramsar sites overlap with Natura 2000 sites, some have distinct boundary difference.

mitigated, and no alternative is available there must be an imperative reason for overriding public interest (IROPI) to allow the plan to go ahead. In this instance, the Habitats Directive recommends a hierarchy of: avoidance, mitigation and compensatory measures. The four stage HRA process is illustrated in Table 1-1.

Table 1-1: HRA Process

HRA Stage	Description
Stage 1: Screening	Identification of the likely effects, alone or in-combination with other projects or plans, and consideration as to whether these effects are likely to be significant.
Stage 2: Appropriate Assessment	Assessment of the effects of the WR&SR Plan (alone and in combination with other plans and projects) on European sites. Conclusions can be made as to whether the WR&SR Plan will affect site integrity, taking into account potential alternative solutions and mitigation measures.
Stage 3: Assessment of Alternative Solutions	Identification of alternatives and consideration of their effects in comparison to those in the WR&SR Plan.
Stage 4: Assessment where no alternatives exists and adverse effects remain	An assessment of imperative reasons of overriding public interest and compensatory measures.

Stage One of the HRA has been completed and is summarised in Section 6.8.1. For full details of the HRA see Appendix C.

1.5.2 Water Framework Directive Assessment (WFD)

Directive 2000/60/EC on Establishing a Framework for Community Action in the field of Water Policy ('The Water Framework Directive') requires any new development to ensure the fundamentals of the Directive are not compromised. The Directive came into force in Northern Ireland in 2003 through the implementation of the Water Environment (Water Framework Directive) (Northern Ireland) Regulations 2003 and aims to achieve the following;

- Enhance the status of, and prevent further deterioration to aquatic ecosystems and their dependant terrestrial ecosystems and wetlands;
- Promote sustainable water use based on the long-term protection of available water resources;
- Reduce discharges and emissions of water pollutants to surface and groundwater, especially by 'priority' and 'priority hazardous' substances;
- Mitigate the effects of flood and droughts and thereby provide a sufficient supply of good quality surface water and groundwater.

The legislation resulted in the creation of a process known as Water Framework Directive (WFD) assessment, which is required to be carried out on individual schemes in order to help ensure compliance and will be taken into consideration in Section 6.6 of this report.

1.5.3 Equality Impact Assessment (EQIA)

Section 75 of the Northern Ireland Act (1998) places a statutory requirement on each public authority to have regard to the need to promote equality of opportunity between and have regard to promoting good relations between;

- (a) Persons of different religious belief, political opinion, racial group, age, marital status or sexual orientation;
- (b) Men and women generally;
- (c) Persons between a disability and persons without; and
- (d) Persons with dependants and persons without.

An Equal Opportunity Screening Analysis has been carried out in regard to the plan to determine what effect the plan will have on vulnerable members of society. The results of the screening analysis can be found in Appendix E.

1.5.4 Regulatory Impact Assessment (RIA)

The Northern Ireland Better Regulation Strategy requires ‘all government departments, arm’s length bodies and other bodies’ to consider RIA as part of the development process of policies and plans. The RIA will determine the economic costs and benefits of the plan, particularly in relation to business. The RIA can be found in Appendix F.

1.5.5 Rural Needs Impact Assessment

The Rural Needs Act (Northern Ireland) 2016 places a duty on public authorities to have consider rural needs when developing, adopting, implementing or revising policies, strategies and plans and designing and delivering public services. A Rural Needs Impact Assessment will be carried out in relation to this plan to consider whether there is a differential impact on rural areas, and, where appropriate, make adjustments to take account of particular rural circumstances. The Rural Needs Impact Assessment can be found in Appendix G.

1.6 Structure of the Report

In order to demonstrate that the report meets the requirement of the SEA Directive, the table below illustrates the relevant requirements against the contents of this environmental report:

Table 1-2 Structure of the Environmental Report

Section	Description	SEA Regulation Requirements
Non-technical Summary	A summary in non-technical language of the content of the SEA Environmental Report.	Annex I
1 Introduction	Introduction to the WR&SR Plan and the need for the plan, the SEA process and legislative requirements, other relevant legislation and environmental assessments and the purpose of the report.	Article 3 (2) (3) (4), Annex I, Annex II (1)
2 Scope of the Plan and SEA Process	Defines the study area and the need for the plan. Identifies the WR&SR Plan options and the interrelationship of the SEA and WR&SR Plan process.	Article 4 (1), Annex I, Annex II (1)
3 Baseline Environmental Conditions	Defines the baseline situation across the Plan area in the absence of the Plan.	Article 5 (1) (2), Annex I
4 SEA Methodology	Describes the SEA process and objectives. Outlines the methodology followed at each stage of the scoping and environmental assessment process.	Article 4 (1), Article 5 (1) (2) (3) (4), Article 6 (2) (4), Article 7 (1), Annex I, Annex II (1) (2)
5 Comparison of Alternatives	An assessment of the potential, reasonable alternatives to the draft WR&SR Plan considered, and a description of how the Preferred Plan was selected in light of environmental effects.	Article 5 (1), Annex I
6 Environmental Assessment of the Preferred Plan	Assesses the ‘Preferred Plan’ under each SEA topic and objective, considering the key issues scoped in to the SEA at the scoping stage. Outlines mitigation requirements and cumulative effects with other plans and programmes. Summarises the results of the WFD assessment and other assessments. Determines limitations and uncertainties of the assessment.	Article 5 (1) (2) (3) (4), Article 9 (1), Article 7 (1), Annex I, Annex II (1) (2)
7 Implementation and Monitoring	Summarises the proposed monitoring measures required by SEA regulations.	Article 10 (1), Annex I
8 Conclusion	Overall conclusions from the SEA.	

2 The Scope of the Plan and the SEA Process

2.1 The Study Area of the Plan and SEA

The WR&SR Plan and SEA cover NI Water's operating area. NI Water's 2012 Resource Management Plan (WRMP) divided Northern Ireland into five Water Resource Zones for the purposes of resource planning. For the current WR&SR Plan, an initial review of these WRZs was undertaken and seven WRZs were identified based on the level of interconnectivity in the network.

The West WRZ has been divided into the West WRZ and South West WRZ to better reflect the operation of the supply system so that the optimum solution could be identified through the assessment process. The original South and East WRZs have been split into three zones: North East, East and South, which better reflect the operation of the supply system. Supply to Belfast has been combined into the new East WRZ as there is extensive interconnectivity in this area.

2.1.1 North WRZ

The North WRZ includes the north of County Antrim and County Londonderry as well as much of County Tyrone. The main demand centres within the zone are Derry/Londonderry City and the towns of Coleraine and Portrush on the north coast, along with supply to surrounding smaller towns and rural areas such as Dungiven, Ballymoney, Ballycastle and Rathlin Island. This WRZ is supplied by multiple river sources including the River Faughan, Lower Bann, River Bush and several smaller stream sources.

2.1.2 North East WRZ

The North East WRZ is within County Antrim and is supplied from Lough Neagh and a number of smaller river and reservoir sources. The main demand centre within the zone is Ballymena, but there are a number of smaller towns and villages in the zone, namely; Cushendall, Carnlough, Larne, Ballyclare and Antrim.

2.1.3 East WRZ

The East WRZ includes South County Antrim and North of County Down, is supplied from Lough Neagh, Silent Valley Reservoirs and a system of combined impounding reservoirs near Carrickfergus. The main demand centres within this zone are Belfast, Lisburn, Bangor and Downpatrick, along with supply to surrounding smaller towns and rural areas.

2.1.4 West WRZ

The West WRZ includes both County Derry/Londonderry and County Tyrone. The main demand centres are the towns of Omagh and Strabane and there are a number of other small towns and villages such as Fintona. There are multiple sources including the rivers Derg, Strule and Camowen as well as minor lough sources at Loughs Bradan, Macrory and Fingean supply this WRZ.

2.1.5 South West WRZ

The South West WRZ covers the supply area in County Fermanagh. The sources for this water resource zone are Lower Lough Erne and the River Erne which drains Upper Lough Erne. The WRZ is largely rural with a number of small villages and towns but there is one main demand centre which is the town of Enniskillen.

2.1.6 Central WRZ

The Central WRZ includes parts of County Tyrone and Country Antrim. The main demand centres within the zone are the towns of Magherafelt and Cookstown with a number of smaller towns and rural areas such as Maghera, Draperstown and Pomeroy. The sources for this zone are the River Moyola and Lough Neagh and Lough Fea.

2.1.7 South WRZ

The South WRZ contains areas of County Down and County Armagh. The WRZ is supplied from Lough Neagh and a number of upland reservoir and lough sources. The main demand centres within the zone are Newry, Armagh, Portadown, Craigavon, Lurgan and Dungannon, along with supply to surrounding smaller towns and rural areas including Markethill, and Kilkeel.

For the purpose of this environmental assessment the WRZs are split into the following 4 groupings, as illustrated in Figure 2-1.

- North
- North East and East
- West and South West
- Central and South

These groupings were determined due to similar characteristics such as demographics and population densities, tourism, landscape and heritage features and district council boundaries.

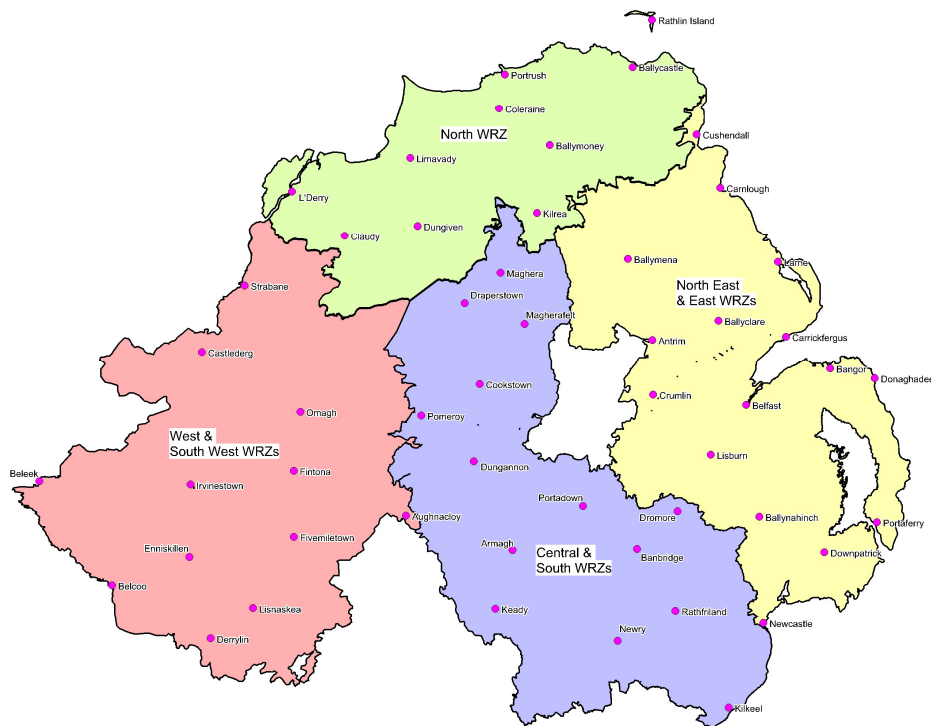


Figure 2-1 Water Resource Zone Groupings

2.2 The Need for the Plan

The WR&SR Plan process identified the baseline supply and demand over the plan period and potential of options for the short, medium and long-term to ensure a consistent supply demand balance of water for Northern Ireland. The options considered are based on early indications for the current plan which suggested that there will be three water zones with supply demand imbalances; Central WRZ. West WRZ and South WRZ. Therefore, options identified were developed with the aim of increasing the resilience of the water supply system to maintain this consistent level of supply across all zones.

2.3 Identification of the WR&SR Plan Feasible Options

The WR&SR Plan considers the interventions required to balance supply and demand, increase the resilience of its water assets and reduce the vulnerability of its supply in all areas. Table 2-1 includes a list of the generic option types for balancing supply and demand this was used to identify potential options to address supply and resilience for the three potential deficit zones.

Table 2-1 Generic Option Types

Option Group	Option Type	Option Description
New Reservoirs	Dam	A barrier that impounds water or underground streams.
	Bankside Storage	Abstracting water from an existing stream or river and stored in a nearby reservoir. This allows abstraction to be stopped for some time, when the river is unacceptably polluted or when flow conditions are low due to drought.
	Pumped Storage	Two separate reservoirs, an upper and a lower one. Water is pumped into the upper reservoir to be stored until there is higher demand.
Surface Water Abstractions	New Surface Water Abstraction	Abstracting water from a river in winter when flows are high and storing it in a reservoir until summer demand.
Water Treatment Works	Water Treatment Works Expansion	Expanding the capacity of the water treatment works to increase water outputs.
	Increase Water Treatment Works Output	Improving the water treatment works efficiency to reduce water losses.
Groundwater Sources	Extending licence	Extending an existing licence at a borehole to allow for additional abstraction.
	New Source	Extending an existing licence at a borehole to allow for additional abstraction.
Demand Management	Education and awareness	The use of press campaigns and marketing to raise awareness of water management and to encourage water savings.
	Water Efficiency	Reducing consumption by encouraging efficient devices such as dual flush toilets and low water use showers.
	Metering	Installation of water meters to encourage water savings.
	Leakage Management	Assessment and repair of pipelines to reduce leakage from existing network.
Water Transfer	New Trunk Main Transfer	Strategic transfer of surplus water by addition to or upgrading the existing trunk main network.
Other	Effluent Reuse	Reuse of water that would have been discarded into the environment; for example: for agricultural irrigation.
	Desalination	Estuarine - taking estuary water
		Coastal - taking coastal water
		Brackish water - boreholes near the coast or Estuaries
	Aquifer Storage	Injection of potable water back into an aquifer for later recovery and use.
Catchment Management	Achieving improvements in raw water quality (and drinking water quality) by managing diffuse pollution within an integrated catchment plan, rather than through energy-intensive treatment processes to deliver progressively marginal reductions in pollution from discharges of wastewater. Measures can also support retention of water in the catchment and contribute to environmental and supply resilience.	

A long list of 52 unconstrained options was subject to a screening process including environmental constraints as well as technical suitability, water availability and promotability aspects. This process resulted in a list of 23 constrained feasible options being carried forward for further assessment and consideration for inclusion in the WR&SR Plan. The constrained feasible options are listed in Table 2-2.

Table 2-2 Constrained List of Feasible Water Resource Options

Option Group	Option Name	Target WRZ
New Reservoir Locations	Derg Bankside Storage	West
New Surface Water Abstractions	Lough Neagh, New WTW and Trunk Main Transfer	Central / West
Groundwater Options	New Groundwater Sources in Fermanagh	West/ South West
Water Transfers	Carmoney WTW to Strabane TM	North/ West
	Caugh Hill WTW to Strabane TM	North/ West
	Killyhevlin to Lough Bradan TM	West/ South West
	Castor Bay WTW to Ballydougan SR TMs Upgrade	East/ South
	Rationalise small West WRZ sources and supply from increased Killyhevlin WTW	West/ South West
	Booster Upgrade on Carland to Cookstown TM	Central
Leakage Management Options	Further Leakage Reductions	All
Water Efficiency Options	Household water audits	All
	Targeted non-household water audits (key accounts)	All
	Rainwater harvesting and water butts - Storage of rainwater for garden use	All
	Incentives for new water saving appliances	All
	Incentives for new water saving fittings	All
	Promotion of water efficient white-goods and sanitary wear in new build houses	All
	Schools water audit and retrofit	All
	Free water saving devices	All
	Hospital and Hotel Audits & Retrofit programme	All
	Hotel efficiency packs	All
	Collaborated water & energy efficient retrofit programme delivered by third parties	All
	Social housing refurbishment subsidy	All
	Farm Audits	All

2.3.1 Identification of Resilience Options

Ten options were identified with the aim of increasing the resilience of Northern Ireland’s water assets. The resilience options are listed in Table 2-3. After SEA analysis and further multi-criteria assessment, five options were proposed for consideration by NI Water during the plan period.

Table 2-3 List of Resilience Options identified

Option Group	Option Name	Target WRZ
Water Transfer Options	Dorisland Resilience	East
	North East WRZ Resilience	North East
	Lough Fea WTW & Moyola WTW Resilience	Central
	Ballinrees Resilience	North
	Killyhevlin to Lough Bradan TM	West/ South West
	Upgrade Killyhevlin WTW	South West
	Killyhevlin to Belleek Resilience TM	South West
	Cabragh SRs to Glencuil SR TM	Central/ South West
	Seagahan to Clay Lake TM	South
	West WRZ Resilience, TM Upgrades and Links	West

2.4 The SEA Process and Integration with the WR&SR Plan development

The SEA process and the WR&SR Plan process have been highly iterative from the very early stages of the plan making process. This is illustrated in Figure 2-2.

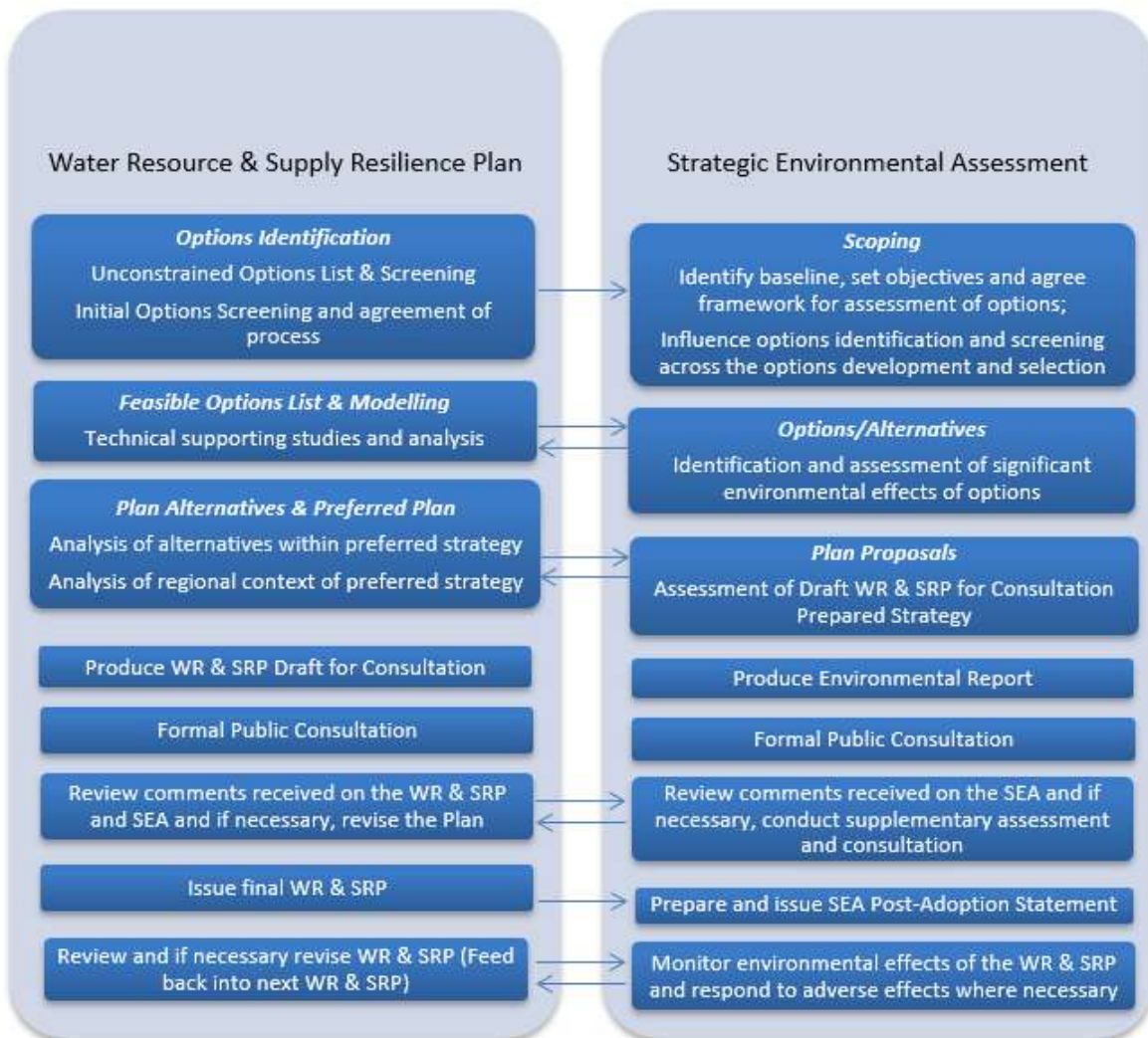


Figure 2-2: SEA and WR&SR Plan Stages Integration

3 Baseline Environmental Conditions

3.1 Introduction

This chapter describes the baseline environment of the study area. The baseline is the set of existing environmental conditions and is considered in terms of how the baseline is likely to develop over the plan period in the absence of the proposed plan. The environmental baseline is recognised as dynamic and subject to pressures and trends such as from climate change or policy measures aimed at achieving specific objectives. The baseline provides a benchmark to assess the predicted environmental effects.

The SEA Scoping Report outlined the environmental sensitivities and trends that are considered relevant to water resource management at the strategic scale. This was based on baseline datasets, which have been made readily available on environment agency web sources and other GIS information. The SEA topics and objectives are reviewed in relation to each water resource zone as discussed in Section 2.

3.2 Population Local Economy and Human Health

3.2.1 Introduction

According to the 2011 census, it was estimated that there were 1.84 million living in Northern Ireland. The population is expected to increase within the Plan area. This will put increased demand on water supplies. This section also includes public health and wellbeing, which is linked to social deprivation. Deprivation across Northern Ireland is illustrated in Figure 3.1 below.

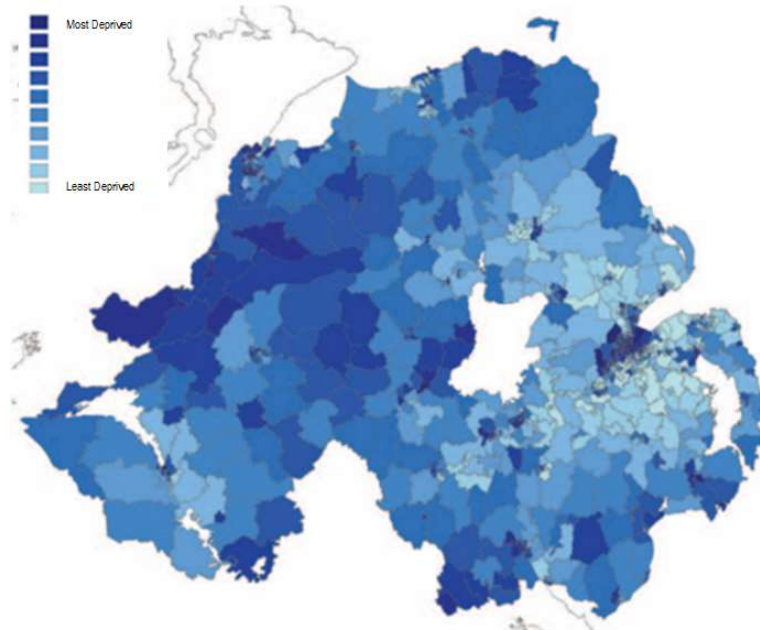


Figure 3-1 NI Deprivation⁵

3.2.2 North WRZ

The population in this water resource zone is 251,453; the principle urban areas being Derry/Londonderry, Coleraine and Ballymoney as well as several small seaside towns. Derry/Londonderry (109,105 people) is the biggest city in the North West and has the highest level of

⁵ Northern Ireland Multiple Deprivation Measure 2010, NISRA, Available at: <https://www.google.co.uk/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=northern+ireland+deprivation+map>

unemployment in Northern Ireland and in the UK, at 7.7%⁶. The North WRZ had the highest percentage of people (74%) in Northern Ireland who deemed themselves to be in good health.

3.2.3 North East and East WRZ

The population in these combined water resource zones is 945,229 (237,494 in the North East and 707,735 in the East). The North East WRZ contains the port town of Larne as well as the larger urban areas Newtownabbey, Ballymena and Antrim. The East Water Resource Zone is by far the most populous WRZ as it includes Belfast (with a population of 283,166) and Lisburn (123,579 people), as well as other urban areas including Carrickfergus and Castlereagh. Good transport networks and commuting distance to Belfast and other urban and industrial towns contribute to population trends in this area.

The North East and East WRZ have relatively low unemployment rates when compared with the rest of the region; with the exception of Belfast, which has an unemployment level of 6.3%. Lowest unemployment levels in the region are in Lisburn and Castlereagh with 2.7%.

3.2.4 West and South West WRZ

The population in these combined water resource zones is 155,040 (92,055 in the West and 62,985 in the South West); the principle urban areas being Omagh, Strabane and Enniskillen. These WRZs are the most rural areas of Northern Ireland.

Figures suggest that in the west of Northern Ireland unemployment levels are highest, with Strabane remaining the area with the second highest unemployment rate (6.6%)⁷. The lowest percentage of people (69%) in the West of Northern Ireland deemed themselves to be in good health.

3.2.5 Central and South WRZ

The South Water Resource Zone is the second most populous with 404,624 residents and the Central WRZ is the smallest WRZ in terms of area and contains the lowest population of 84,151. The principle urban areas are Newry, Armagh, Dungannon, Cookstown and Magherafelt. The Southern WRZ has good transport networks and commuting distance to both Belfast and Dublin. The Central WRZ is relatively rural with less transport links.

Armagh and Newry also have relatively high unemployment levels of 4.0 - 4.6%.

3.2.6 Future Baseline

The population throughout the study area is predicted to increase during the life of the Plan. The number of residents is predicted to increase by 5.3 percent by 2024 (i.e. 98,200 people) reaching 1,938,700 people. Population growth is projected for each Local Government District, ranging from 1.5 per cent in Derry/Londonderry City and Strabane (i.e. 2,200 people) to 10.4 per cent (i.e. 21,400 people) in Armagh City, Banbridge and Craigavon. The current population distribution and future population growth are considered as part of the demand side predictions for the WR&RP to determine the potential requirements for the water supply which needs to be addressed in the Plan.

3.3 Tourism and Recreation

3.3.1 Introduction

Tourism and recreation are important to the health and well-being of people living within the study area but they also contribute significantly to the local economy. There is a strong interrelationship between recreation and tourism and other receptors in the context of water resource planning, for

⁶ Local level unemployment rates have been sourced from Northern Ireland Neighbourhood Information Services, Claimant Count Annual Averages (administration geographies) 1992-2014 and are based on figures from 2014.

⁷ Figures taken from Department of Enterprise, Trade and Investment (DETI) published in Derry Journal (March 2015). Available at: <http://www.derryjournal.com/news/derry-still-unemployment-capital-of-north-1-6639771>

example; some recreation activities are dependent on water quality and quantity. Boating, canoeing and other water sports rely on certain flows of water and the water quality is essential for the health of bathers and other water users. The quality of the water environment is also important for other recreation activities include walking and fishing.

The picturesque landscape of Northern Ireland offers many opportunities for recreational pursuits and attracts visitors from across the country and further. 20% of Northern Ireland's land area is AONB; these AONBs are magnets for tourism and are at the heart of local council's economic development plans.

3.3.2 North WRZ

The Northern Water Resource Zone includes the north coast of Antrim, which is one of the most popular tourist attractions in Northern Ireland as it hosts the Giants Causeway, World Heritage Site. The attraction was the most popular in Northern Ireland in 2015 with 851,000 visitors. The north coast of Antrim includes three Areas of Outstanding Natural Beauty; Binevenagh, Causeway Coast and part of Antrim Coast and Glens. These three AONB's are grouped as the 'Causeway Coast and Glens'. To the south of this WRZ is a small part of the Sperrin AONB.

Tourists and visitors are attracted to the sandy beaches, sand dunes, seaside towns, distinct cliff line, wild open expanse of moorland, headlands, bays and valleys, Rathlin Island, Northern Ireland's only inhabited offshore island, as well as Dunluce Castle, the historical village of Bushmills and the Walled City of Derry/Londonderry. The natural environment is the key product of the area with recreational walking and cycling. Wildlife reserves and national nature trails attract day trippers and tourists to the area. The main water based recreation activities within the area include sailing, surfing/body boarding, canoeing, kayaking, scuba diving, as well as recreational boat tours to explore Rathlin Island bird sanctuary, seal colony and puffin sanctuary.

3.3.3 North East and East WRZ

The North East Water Resource Zone includes the remainder of the Antrim coast and Glens AONB. The dramatic coastline with its harbours, magnificent glens with fast flowing rivers have special character appreciated by local people and many visitors who travel every year.

The East Water Resource Zone contains Northern Ireland's capital city, Belfast. 1.2 million trips were made to Belfast in 2014. One of the main focal points for water-based activity within the area is the Lagan River, where many people enjoy rowing, canoeing and kayaking. Lagan Valley is also an AONB. The National Nature Reserve around Strangford Lough at Strangford and Lecale AONB attracts people who enjoy walking and various water sports and recreational activities on the lough.

Both WRZs border Lough Neagh where similar water sports and recreational activities are enjoyed by tourists and day-trippers.

3.3.4 West and South West WRZ

The Sperrin AONB covers a significant area of the West Water Resource Zone. It stretches from the Strule Valley in the west to the perimeter of the Lough Neagh lowlands. It contains vast expanses of moorland, narrow glens and deep valleys. In the south, the Burren area is noted for its lakes, sandy eskers and other glacial features. The area is rich in historic and archaeological heritage and folklore and a popular attraction to visitors. Areas such as Gortin Lakes in the heart of the Sperrins are popular for water sports such as canoeing, and there are various quiet roads and paths for cycling as well as many popular hill walking routes.

The South West Water Resource Zone is the only zone without an AONB in Northern Ireland, but is also a popular area with tourists and visitors. Lough Erne and the Fermanagh Lakelands are a very popular tourist locations and popular activities include canoeing, kayaking, golfing, fishing and walking trails.

3.3.5 Central and South WRZ

The Central WRZ also includes part of the Sperrin AONB. Lough Neagh borders the east of the Central WRZ. The lough is a popular destination for tourists and day-trippers. Kayaking, boating, fishing and other water sports are popular among visitors to the area.

The South Water Resource Zone also borders Lough Neagh and also includes 2 AONBs; Ring of Gullion and Mourne. Both are highly popular tourist areas for hill walking, rock climbing, cycling, fishing, canoeing, sailing and bird watching with the natural beauty of the mountains and beaches. With easy travelling distance between Belfast and Dublin, these are popular attractions for tourists and day-trippers.

3.3.6 Future Baseline

Tourists (external and local) made over 4.5 million overnight trips to Northern Ireland in 2015 and contributed £760 million to the regional economy⁸. Tourism and its contribution to the regional economy has increased over recent years and this trend is likely to continue. (NISRA, 2016)

Recreation is also likely to increase as population numbers increase in the Plan area and as there is an increasing trend for walking and outdoor activities.

3.4 Material Assets

3.4.1 Introduction

'Material assets' is a very broad encompassing category which could cover almost every physical or non-physical sector of the environment that could be said to have material value. For the purposes of the SEA infrastructure such as roads, rail, ports, airports, buildings and viable land for agriculture and business are included. Infrastructure can affect water quality and require increased water treatment. Strategic infrastructure can affect a variety of environmental areas such as landscape, land use and water quality in aquifers and rivers. Plan proposals can involve significant infrastructure development requiring land and could affect existing infrastructure.

The use of raw materials and the generation of waste are also significant to material assets construction can use a significant amount of non-renewable resources. The Plan proposals have the potential to produce waste through abandonment or demolition of existing structures, and during construction of new infrastructure for example spoil waste from excavations or packaging from new materials.

Viable agricultural land is a key asset to the Northern Ireland economy; approximately 75% of Northern Ireland's land is used for agriculture. Forestry is also a significant asset to Northern Ireland. Forests and woodlands provide important habitats, natural resources and diversity to landscapes. NI has the lowest level of tree cover (8%) of any UK regional territory or EU member state⁹.

Water resource infrastructure can involve land take affecting agricultural and forestry land. Also water resources and water quality are influenced by agricultural and forestry operations and land use within river and groundwater catchments and can affect availability and suitability of water for supply.

3.4.2 North WRZ

The North WRZ has a particularly large amount of forestry coverage compared to other areas of Northern Ireland. Within this Water Resource Zone, forests and woodland areas include Gortnamyagh Forest situated at the top of the Sperrins (AONB) Mountains, Ballypatrick Forest and the popular tourist attraction Dark Hedges, Armoy.

⁸ Source taken from Northern Ireland Government website, Accessed 22/07/2016. Available at: <https://www.northernireland.gov.uk/news/hamilton-announces-new-ps80k-business-competition-tourism>,

⁹ Forestry Commission, 2016, Woodland Area, Planting and Restocking, Accessed 22/07/2016, Last updated: 16/06/2016. Available at: <http://www.forestry.gov.uk/forestry/inf-d-7a9k9x>

3.4.3 North East and East WRZ

The North East and East WRZ contains the smallest area of forest of all 4 WRZ groupings, however, significant forestry is present, including Glenariff Forest Park, Ballymena, Lagan Valley Regional Park, Lisburn which is Northern Ireland's only Regional Park and Tollymore Forest Park, Newcastle from which the oak wood was used for the interiors of the Titanic.

3.4.4 West and South West WRZ

The West and South West Water Resource Zones have the highest coverage of registered forestry and woodland in Northern Ireland, approximately twice as much as the North East and East WRZs. Forest Parks include Crom Estate in Fermanagh (South West WRZ) which is one of Northern Ireland's most important Nature Conservation Areas, Cladagh Glen and the Marble Arch Nature Reserve located in the valley that occupies the Cladagh River.

3.4.5 Central and South WRZ

The Central WRZ also contains forested areas around the Sperrins AONB. In the South WRZ, again one of the least densely populated with forestry significantly important forest parks are located, including Slieve Gullion Forest Park, Gosford Forest Park and Kilbroney Forest Park in Rostrevor, which are key for tourism and recreation in Northern Ireland, particularly for its mountain biking trails which host multiple competitions and attract thousands of competitors each year.

3.4.6 Future Baseline

Resource depletion is becoming an increasingly significant issue at a global and national level.

Registered forest and woodlands are recognised for the significant part they play in tourism and recreation as well as enhancing and protecting habitats and biodiversity. Given the role forestry plays in carbon offsetting, and the current low levels of afforestation at present it is expected that the area covered by forest will not increase significantly but the level of protection will remain high.

3.5 Biodiversity, Flora and Fauna

3.5.1 Introduction

Northern Ireland is recognised to support a highly diverse range of habitats reflecting its geological diversity. There are a number of ecologically significant sites designated for conservation and protection within Northern Ireland. Some of these are internationally designated as Special Protection Areas (SPA), Special Area for Conservation (SAC) and Ramsar sites. SPA's and SAC's are Natura 2000 sites and form the basis of the HRA Assessment found in Appendix C. Others are nationally designated including National Nature Reserves (NNR) and Sites of Special Scientific Interest (SSSI).

- Special Protection Areas (SPA) - there are currently 17 designated in Northern Ireland.
- Special Areas of Conservation (SAC) – there are currently 57 designated in Northern Ireland.
- Ramsar Sites - there are currently 21 designated in Northern Ireland.
- Nature Reserves - there are currently 48 designated in Northern Ireland.
- Marine Nature Reserves – there is currently 1 designated (Strangford Lough) in Northern Ireland.
- Marine Conservation Zone (MCZ) – 4 MCZ's have been designated under the Marine Conservation Act (NI) 2013.
- Areas of Special Scientific Interest (ASSI) – there are currently 385 notified in Northern Ireland.
- Sites of Local Nature Conservation Importance (SLNCIs) – there are currently 864 listed in Northern Ireland.

- Areas of Outstanding Natural Beauty – there are currently 9 designated in Northern Ireland.
- World Heritage Site – there is currently 1 designated in Northern Ireland (see also Geology section).

Water dependent sites, habitats and associated species are potentially of particular relevance for water resource planning and are listed in the Table 3.1 below.

Table 3-1 Water dependent sites, habitats and species

Water Dependent Site	Annex I Water Dependent Habitat	Annex II Water Dependent Species
River Foyle and Tributaries SAC	<ul style="list-style-type: none"> • Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation 	<ul style="list-style-type: none"> • Atlantic salmon • Otter
River Roe and Tributaries SAC	<ul style="list-style-type: none"> • Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation 	<ul style="list-style-type: none"> • Atlantic salmon • Otter
Upper Ballinderry River SAC	<ul style="list-style-type: none"> • Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation 	<ul style="list-style-type: none"> • Otter • Freshwater pearl mussel
Lough Melvin SAC	<ul style="list-style-type: none"> • <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinia caeruleae</i>) • Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflora</i> and/or of the <i>Isoet-Nanojuncetea</i> 	
Upper Lough Erne SAC/SPA/Ramsar	<ul style="list-style-type: none"> • Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation • Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion alvae</i>) 	<ul style="list-style-type: none"> • Otter
Teal Lough SAC	<ul style="list-style-type: none"> • Blanket bog * 	
Deroran Bog SAC	<ul style="list-style-type: none"> • Active raised bog 	
Pettigoe Plateau SAC/Ramsar	<ul style="list-style-type: none"> • Active blanket bog • Natural dystrophic lakes and ponds • Northern Atlantic wet heaths with <i>Erica tetralix</i> • Oligotrophic to mesotrophic standing water with vegetation belonging to <i>Littorelletea uniflorae</i> and/or of the <i>IsoUto-Nanojuncetea</i> 	
Slieve Beg SAC/Ramsar	<ul style="list-style-type: none"> • Active blanket bog • Natural dystrophic lakes and pools 	
Cranny Bogs SAC	<ul style="list-style-type: none"> • Active raised bogs 	
Tully Bog SAC	<ul style="list-style-type: none"> • Active raised bog 	
River Faughan and Tributaries SAC/Ramsar		<ul style="list-style-type: none"> • Atlantic salmon
Lough Neagh and Lough Beg SPA/Ramsar		<ul style="list-style-type: none"> • Great-crested grebe • Greylag goose • Shelduck • Wigeon

		<ul style="list-style-type: none"> • Whooper swan • Bewick's swan • Golden plover • Pochard • Scaup • Gadwall • Teal • Coot • Lapwing • Goldeneye • Cormorant
Donegal Bay SPA		<ul style="list-style-type: none"> • Light-bellied brent goose • Great northern diver • Common scoter
Lough Foyle SPA/Ramsar		<ul style="list-style-type: none"> • Whooper swan • Bewick's swan • Golden Plover • Bar-tailed godwit • Light-bellied brent geese
Belfast Lough Open Water SPA/Ramsar		<ul style="list-style-type: none"> • Great-crested grebe
Slieve Beagh – Mullaghfad – Lisnaskea SPA		<ul style="list-style-type: none"> • Hen harrier
	<p>Sites only with Water Dependent Habitats:</p> <ul style="list-style-type: none"> • River Foyle and Tributaries SAC • River Roe and Tributaries SAC • Upper Ballinderry River SAC • Lough Melvin SAC • Upper Lough Erne SAC/SPA/Ramsar • Teal Lough SAC • Deroran Bog SAC • Pettigoe Plateau SAC/Ramsar • Slieve Beg SAC/Ramsar • Cranny Bogs SAC • Tully Bog SAC 	

Considerable biodiversity value lies outside the designated sites and there are a number of protected species and rare habitats in Northern Ireland, which have the potential to be affected by the WR&SR Plan. The Northern Ireland Biodiversity Strategy¹⁰ identifies the important habitats within Northern Ireland; the 8 habitat/ecosystem categories are as follows:

- Mountains, Moors and Heathlands – 13% of Northern Ireland
- Woodlands – 10% of Northern Ireland
- Semi-Natural Grasslands 18.5% of Northern Ireland
- Enclosed Farmland – 44% of Northern Ireland
- Open Waters and Wetlands – 7% of NI Water
- Urban – 7.5% of Northern Ireland
- Coastal Margins – 0.25% of Northern Ireland
- Marine – 50% of Northern Ireland's Biodiversity

As a key part of the NI Biodiversity Strategy, 37 Habitat Action Plans (HAPs) have been published for priority habitats requiring conservation actions. These identify the important habitats and species that have declined in coverage over recent decades and are now considered to be rare and threatened.

¹⁰ Biodiversity Strategy for Northern Ireland to 2020 (DAERA 2015)

Priority habitats are those habitats which require conservation action because of their decline, rarity and importance. Priority habitats are susceptible to impacts from development and resource use.

Northern Ireland priority habitats include woodlands, uplands, grasslands, wetlands and coastal habitats, which are considered to include Northern Ireland's most important natural heritage. These habitats are also increasingly recognised as providing a range of ecosystem services such as the provision of clean air, water, flood protection, recreation and tourism, which are of wide benefit to society.

Northern Ireland Environment Agency (NIEA) Biodiversity Hazard mapping highlights those areas where priority habitats are most likely to occur. This mapping will need to be considered in the further assessment and development of plan proposals but has not been available for consideration for the SEA and WR&SR Plan development.

The Northern Ireland Priority Species includes species which require conservation action because of their decline, rarity and importance in an all-Ireland and UK context. The list is expected to be reviewed and updated on an annual basis. The 2015 Northern Ireland Priority Species list currently stands at 481 species.

A large number of priority species are dependent on priority habitat although some species are found outside and can also be sensitive to development.

Guidelines for consideration of priority habitats and species are set out in NIEA Standing Advice No.13 and 16¹¹. These are expected to be followed for all Plan development proposals along with the requirements to consider statutory designated sites.

Local Biodiversity Action Plans are implemented throughout Northern Ireland to develop actions for preventing biodiversity loss including loss from the spread of invasive species. Invasive species are defined as those that have been introduced to this country (non-native) which have a tendency to spread to a degree determined to be of damage to the environment, human economy or human health. Sometimes the invasive species can dominate lowering the value of the overall ecosystem and marginalising native species. Development can contribute to the spread of invasive species and in particular development involving the transfer of raw water across catchments can be a means of species transfer.

Fish are dependent on clean water and suitable flows. They are a good indicator of the condition of the overall water environment. Recent improvements in water quality have improved the potential for fish; although droughts and low flows can cause fish kills. Modification of watercourses, such as channel straightening and bank protection can result in a lack of diversity of habitats, which further reduces fish potential.

3.5.2 North WRZ

Sites designated for biodiversity protection in the North WRZ are illustrated in Figure 3-3.

Key habitats present in the North WRZ are as follows:

Marine and Coastal Habitats: Littoral and sublittoral chalk at Antrim Coast/Rathlin Island, Coastal sand dunes at Murlough Bay.

Healthlands: Lowland heathland at Rathlin Island.

Wetlands: Blanket Bog found in various locations across County Antrim.

¹¹ NIEA Priority Habitat Standing Advice No.13 April 2015 & NIEA Priority Species Standing Advice No.16 May 2015

3.5.3 North East and East WRZ

Sites designated for biodiversity protection in the North East and East WRZs are illustrated in Figure 3-4 and Figure 3-5 respectively.

There are a number of key habitats in the North East and East WRZ falling into the following categories:

Woodlands: Wet woodland found at Rea's Wood along the Antrim Loughshore, Parklands such as Belvoir Park and Lagan Valley in Belfast.

Wetlands: Blanket Bog found in various locations across County Antrim, Coastal and Floodplain grazing marsh as at Quoile Pondage in Downpatrick, and Lowland Raised Bog found at a number of locations around the Lough Neagh basin.

Marine and Coastal Habitats: Maritime cliff and slope north of Larne, Tidal Rapids and Maerl beds at Strangford Lough.

3.5.4 West and South West WRZ

Sites designated for biodiversity protection in the West and South West WRZs are illustrated in Figure 3-6 and Figure 3-7 respectively.

Several significant habitat groups are present in this South/West area:

Woodlands: Oakwood and Castle Crom and Castle Coole Parklands in County Fermanagh.

Wetlands: Fens at Upper Lough Erne and Eutrophic standing waters at Lower Lough Erne, Coastal and Floodplain grazing marsh at Lough Foyle.

Heathlands: Upland Heathland in western Fermanagh.

Grasslands: Purple Moor Grass and rush pasture communities, Calcareous grassland and associated invertebrate communities in County Fermanagh.

3.5.5 Central and South WRZ

Sites designated for biodiversity protection in the West and South West WRZs are illustrated in Figure 3-8 and Figure 3-9 respectively.

Some of the important habitats present in the Central and South WRZs are as follows:

Wetlands: Lowland Raised Bog around the Lough Neagh Basin and Marl Lakes at Tullybrick and Kiltubbrid Loughs in County Armagh.

Marine and Coastal Habitats: Coastal and Sand Dunes in the Bann Estuary.

Heathlands: Montane Heath found in the Mourne Mountains.

3.5.6 Future Baseline

The condition status of designated site and non-designated habitats are dependent on a variety of different factors including water quality, land use and management and climate and how these all interact. The Northern Ireland Biodiversity Strategy sets out plans to meet international obligations and local targets to protect biodiversity and ensure that the environment can continue to support our people and economy. It adopts an approach that emphasises the management of biological systems to deliver the materials and services upon which people depend – the ecosystem services approach. The Strategy aim is to manage natural and man-modified systems to deliver a multitude of outputs, which support society and the economy. Protection of individual species and habitats is both a tool for delivery and a result of this approach. However, the strategy also advocates a focus upon ensuring the interconnectedness and complexity of biological systems.

Therefore, future development and resource use will need to adhere to these goals and avoid or mitigate any potential impacts on habitats and species leading to biodiversity loss and also recognise that seeking positive enhancements to support ecosystems can provide wider benefits.

3.6 Landscape, Townscape and Visual Amenity

3.6.1 Introduction

Landscape and visual impacts are two related but separate assessments and it is important to clarify the difference between landscape and visual effects. The assessment of landscape effects relates to the degree of physical change to components of the landscape, and the consequential change in perceived landscape character. Visual effects are the considered levels of intrusion or change to an existing view arising from development.

The SEA scoping stage has been based on nationally designated sites, including Areas of Outstanding Natural Beauty (AONBs). At present under the terms of the Nature Conservation and Amenity Lands Order (NI) 1985, the only designation currently used in Northern Ireland to identify areas of high landscape quality is that of Area of Outstanding Natural Beauty (AONB). The designation of Natural Park can also be made, but as yet, no area in Northern Ireland has been designated as such.

There are currently 9 AONBs designated within Northern Ireland as follows:

- Antrim Coast and Glens
- Binevenagh
- Causeway Coast
- Ring of Gullion
- Lagan Valley
- Lecale Coast
- Mourne
- Sperrin
- Strangford

Although Northern Ireland is relatively small in area, it has a wide range of different landscapes. This diversity in landscape is recognised in the 130 different Landscape Character Areas that have been identified by NIEA. These areas reflect the diversity and interaction of geology, soil, climate and humankind within Northern Ireland.

Areas of Townscape Character (ATC) exhibit distinct character and intrinsic qualities, often based on the historic built form or layout in many cities, towns and villages in Northern Ireland. Planning Policy Statement (Addendum) is in place to ensure that development proposals respect the appearance and qualities of each townscape area and maintain or enhance their distinctive character. ATCs are listed in Local Area Plans.

3.6.2 North WRZ

The landscape in the North Water Resource Zone includes part of or all of 4 Areas of Outstanding Natural Beauty. The landscape ranges from the dramatic basalt cliffs and headlands of Causeway Coast AONB which includes a UNESCO World Heritage Site; the Giant's Causeway to the distinctive blanket bog and upland, rolling hills of the Sperrins. The coastal areas with sandy beaches and picturesque villages, Rathlin Island and fishing villages have a distinct character.

3.6.3 North East and East WRZ

The North East WRZ is a valley landscape consists of wide, open rolling farmland with drumlins. To the south of the zone towards Lough Neagh on the flat floodplain there are frequent wetlands, peat and birch woodland, and many habitats of ecological value. Away from the main urban townland of Ballymena and some towns and villages, the area is relatively rural and tranquil. The combination of cliffs and bays on the north east coast retain strong local character; distinctively rugged with broad expanses of peat bog and large coniferous forests.

In the East Zone Belfast Lough encompasses a U-shaped valley between the sea and the Belfast Hills and the Castlereagh Hills. This coastal strip has been highly developed with heavy industry defining the historic core of Belfast and its relationship with the docks. The landscape is much more urbanised than the other areas of the study with many key urban settlements: Belfast, Lisburn, Bangor, Downpatrick, Newcastle and Carrickfergus. Parks and natural features are key to the landscape character of the area. Examples are Lagan Valley AONB which includes Lagan Valley Regional Park, Cave Hill Country Park, and Black Mountain. Belfast Castle and Carrickfergus Castle form key landmarks in the area. Further East, the area takes in rural lowlands. This is crossed by a number of main roads connecting towns such as Ballynahinch and Downpatrick across the landscape. Along the east is the Strangford and Lecale AONB; the narrow Ards Peninsula is fringed by small coastal villages. The area is characterised by its biodiverse mudflats and islands, and the Anglo-Normal medieval heritage of Lecale.

3.6.4 West and South West WRZ

This area is made up of much of County Tyrone and County Fermanagh.

Tyrone's landscape ranges from the Omagh Basin, framed by the Sperrins and the west Tyrone Hills and Valleys. The Omagh Basin is a lowland area around the urban area of Omagh. The area is composed of rounded drumlins with several rivers between, including the Camowen River and the Owenreagh. The area has a dispersed settlement pattern. West Tyrone consists of low hills with gentle summits, flat-bottomed valleys of the Derg River and the Fairy Water, open peat bogs, rough grazing and large forests, including Northern Ireland's largest forest, Killeter Forest. Much of the Sperrin AONB is within the West WRZ, characterised by dramatic summits, scenic valleys, moorland features, bog land and fast flowing streams.

Fermanagh's landscape ranges from limestone and sandstone escarpments along the Erne, and Northern Ireland's only karst landscape with caves, sinkholes and limestone pavements, which is recognised by Global Geopark Status. It is a significantly remote and rural landscape. The area also includes lowlands with intricate patterns of small fields bounded by hedges, significant areas of peatland, woodland and commercial coniferous forest. Fermanagh's landscape is depicted by Lower and Upper Lough Erne, a complex of islands, peninsulas, small loughs and inlets. Ancient woodlands are still present on many of the islands and fringes of the lough.

3.6.5 Central and South WRZ

The landscape of the Central WRZ ranges from the rolling hills of the Sperrins AONB to the gently lying lowlands to the west of Lough Neagh. The landscape in between is undulating and the field pattern is irregular. Land use is predominately rural outside the main urban centres of Cookstown and Magherafelt. There is a dense network of back roads linking the various towns and villages.

In the Southern WRZ the landscape is defined by rolling drumlins between Cookstown and Dungannon. The landscape ranges from overgrown hedgerows, to marshy floodplains. Key picturesque landscapes in this WRZ are Gullion AONB and Mourne AONB. The Ring of Gullion is centred on Slieve Gullion, a scenic granite mountain which is an extinct volcano giving it distinct, steep rocky mountains. The Mourne Mountains are the highest in Northern Ireland with Slieve Donard rising to 852m AOD. The terrain is rocky and steep with areas of upland moorland and rough pasture. Newry City is one of the main urban areas in this zone and is situated in the valley of these two mountain ranges. The drumlin belt includes the road, rail and canal transport corridor; a principle north-south transport route linking Belfast and Dublin.

3.6.6 Future Baseline

Landscape is a very important resource to the Northern Ireland economy, with the potential for transformation due to developments in sectors such as agriculture, forestry, transport, tourism and recreation¹².

¹² Northern Ireland Land Matters Taskforce, (2015) Towards a Land Strategy for Northern Ireland. Accessed 12/09/2016. Available at: http://www.nienvironmentlink.org/cmsfiles/Towards-a-Land-Strategy-for-NI_2015-Main-Report.pdf

Climate change may have an effect on the landscape in Northern Ireland; drier summers may lead to drying out of large areas of upland bogs, rivers, lakes and loughs or flooding of waterbodies resulting in losses of important species.

Given the influence from tourism and climate change effects, landscape in Northern Ireland will be under increasing pressure. It is expected that the focus on planning, management and protection of Northern Ireland's landscape will increase and future development will have to further mitigate effects on landscape.

3.7 Air Quality and Noise

3.7.1 Introduction

Air quality and noise levels are often associated with industry and traffic movements.

Increases in the number of traffic movements through construction and operation can affect local air quality and noise levels. Road closures and diversions that cause disruption to traffic patterns can locally alter air quality and noise patterns. The WR&SR Plan will not have any significant long-term impacts on air quality and noise, only short term impacts during construction.

There are 26 active Air Quality Management Areas (AQMA) declared in Northern Ireland with the potential to have short term impacts as a result of the Plan.

3.7.2 North WRZ

There is one AQMA within the North WRZ in Dungiven. Air Quality and noise levels are not considerably problematic in this area, with noisiest places and poorer air quality within urban areas and around busy road junctions. The Causeway Coast and Glens AONB's have lower noise levels and considerably better air quality.

3.7.3 North East and East WRZ

There are three AQMA within the North East WRZ; Elmfield, Ballykeel and Dunclag, and 5 in the East WRZ; 4 of which are in Belfast; M1/Westlink Corridor, Cromac Street, Upper Newtownards Road, and Ormeau Road and 1 in Dundonald; Normandy Court. Urban areas, motorways and busy junctions suffer from poor air quality and noise levels in comparison to the more rural areas. The North Down coast, Strangford Lough and the surrounding area have better air quality and lower noise levels.

3.7.4 West and South West WRZ

There are six AQMA within this area, all of which are in the West WRZ. The South West WRZ is much more rural and resultantly has significantly less air and noise pollution. The six AQMA are in urbanised areas including Derry/Londonderry; (Infirmary Road/ Creggan Road and Buncrana Road/Racecourse Road), Strabane, Newtownstewart, Castlederg, and Limavady. The rural areas around the Sperrins AONB are amongst the more tranquil and quiet places.

3.7.5 Central and South WRZ

There are 11 AQMA in this area, two in the Central WRZ; Magherafelt and The Moy, and 9 in the South WRZ. The South WRZ has significantly poorer air quality. The AQMA are located in more urban areas around busy road junctions in Dungannon, Armagh, Portadown, Lurgan and Newry.

3.7.6 Future Baseline

Air quality is likely to decrease around busy junctions as traffic levels increase. However, this is likely to be partly offset by improvements in technology and junction improvements to ease congestion. The

AQMAs have identified actions required to improve air quality in these areas. Therefore, there is likely to be a net improvement for air quality over time.

Noise levels are likely to increase in urban areas and around busy network junctions as traffic levels increase. There will also be increased noise associated with new developments including new road and rail links. Improved technology may partly offset these impacts as cars become inherently quieter, particularly with regard to tyre noise and quieter road surfaces are continually being developed.

Air Quality and Noise has been scoped out of assessment in terms of impacts on quality limits or standards but is considered in terms of temporary nuisance for nearby properties or sensitive receptors during construction.

3.8 Climate

3.8.1 Introduction

The climate of Northern Ireland is characterised by equability, a consequence of the moderating effect of the Atlantic Ocean bringing relatively mild winters and cool summers. The climate of Northern Ireland is already changing, with air temperatures rising and the number of hot days increasing, with drier summers and wetter winters. Average temperatures are expected to rise by approximately 2°C, summer rainfall to decrease by up to 13%, winters to be 9% wetter and sea levels to begin to rise (approximately 14.5 cm above 1990 levels for Belfast)¹³¹⁴.

It is accepted that greenhouse gases from anthropogenic interference are contributing to climate change. The Paris Agreement 2015, signed by nearly 200 countries, limits increases in global temperatures to 2°C. To support the achievement of this goal the EU (including UK and Ireland) has committed to reducing greenhouse gas emissions by 40% by 2030. The UK Climate Change Act 2008 sets a target of a reduction in greenhouse gas emissions of 80% by 2050 on 1990 levels. This is supported by a series of 5 yearly carbon budgets, in effect interim targets, which the UK must achieve. In June 2016, the 2030 carbon budget was set as a 57% reduction in greenhouse gas emissions on 1990 levels. There is no NI specific target, however, NI must contribute to the UK effort. By 2014 Northern Ireland had reduced emissions on 1990 levels by 17.4% contributing to the overall reduction of 36% by the UK as a whole. However it is impossible to make a direct comparison between countries, as each country has a number of differences in the make-up of their emission sectors.

The biggest single source of water in Northern Ireland is from Lough Neagh. However there are also a number of impoundments, which provide significant quantities of the country's water supply. The reliance on impoundment reservoirs to meet demand in some areas mean there is the potential for increased water stress over prolonged periods of dry weather when little water is available for storage. Increased temperatures and variations to precipitation rates and frequency could exacerbate this.

The climate is important for water resource management because it will increase the complexity of managing water resources by affecting the amount of water available and the demand for water. Rainfall is the main source of additional water into the system, (effluent is the other major contributor and a small amount of groundwater) and temperature affects the amount of water leaving the system either directly through evaporation or indirectly through uptake from plants and animals. Lower flows and higher water temperatures can also impact on the water quality. These factors can have significant implications for water resource management and the WR&SR Plan.

The UK Climate Change Risk Assessment (Northern Ireland) includes an assessment of the "risks to public water supplies from drought and low river flows". In Northern Ireland the action defined for this

¹³ SNIFFER, 2007, Preparing for a Changing Climate in Northern Ireland

¹⁴ UKCP09, 2010, UK Climate Predictions: Briefing Report

is to “sustain current actions” while the equivalent status for England and Wales is “more action needed”.

The SEA focuses on the climate change adaptation and resilience in terms of what this means for the environment. Is there an increase to the vulnerability of the environment to adapt to climate change due to the plan or does the plan contribute directly or indirectly to climate change resilience. Consideration of technical aspects of resilience of supply and effects on demand are a core part of the plan and clearly environmental effects and water supply are closely linked.

The SEA also considers the impact of the options and the WR&SR Plan on climate change mitigation in terms of carbon emissions and the implications for the WR&SR Plan carbon footprint.

3.8.2 North WRZ

The North WRZ includes the north of County Antrim as well as much of County Tyrone. The main demand centres within the zone are Derry/Londonderry City and the towns of Coleraine and Portrush on the north coast, along with supply to surrounding smaller towns and rural areas such as Dungiven, Ballymoney, Ballycastle and Rathlin Island. This WRZ receives above average rainfall (~2,000 mm/yr) when compared with the whole of Northern Ireland (1,099 mm/yr). This WRZ is supplied by multiple river sources including the River Faughan, Lower Bann, Bush River and several smaller stream sources. With a reliance on river sources to meet demand, any change to precipitation can impact on the availability of water for abstraction. Rising temperatures and seasonal variations to rainfall can result in lower flows during critical periods of demand and also a reduction in water quality.

3.8.3 North East and East WRZ

The North East WRZ is within County Antrim and is supplied from Lough Neagh and a number of smaller river and reservoir sources. The main demand centre within the zone is Ballymena, but there are a number of smaller towns and villages in the zone, namely Cushendall, Carnlough, Larne, Ballyclare and Antrim. Lough Neagh provides approximately 40% of Northern Ireland’s water supply. Increases in temperature can lead to greater rates of evaporation from the Lough, lower water quality and changes to the precipitation patterns can impact on the volumes of water draining to the Lough.

The East WRZ includes South County Antrim and North of County Down is supplied from Lough Neagh, Silent Valley Reservoirs and a system of combined impounding reservoirs near Carrickfergus. The main demand centres within this zone are Belfast, Lisburn, Bangor and Downpatrick, along with supply to surrounding smaller towns and rural areas; approximately 50% of Northern Ireland’s population is contained within this WRZ. This WRZ experiences lower than average (<800 mm/yr) rainfall for Northern Ireland.

3.8.4 West and South West WRZ

The West WRZ includes both County Derry/Londonderry and County Tyrone. The main demand centres are the towns of Omagh and Strabane and there are a number of other small towns and villages such as Fintona. There are multiple sources including the rivers Derg, Strule and Camowen as well as minor lough sources at Lough Bradan, Macrory and Fingrean supply this WRZ. This WRZ receives above average rainfall (~2,000 mm/yr) when compared with the whole of Northern Ireland (1,099 mm/yr). A reduction in supply resulting from increases in temperature and hence evaporation, or changes in precipitation, as a result of climate change will pose additional pressures on these limited supplies.

The South West WRZ covers the supply area in County Fermanagh. The sources for this WRZ are Lower Lough Erne and the River Erne which drains Lower Lough Erne. The WRZ is largely rural with a number of small villages and towns but there is one main demand centre, the town of Enniskillen. This WRZ receives above average rainfall (~2,000 mm/yr) when compared with the whole of Northern Ireland (1,099 mm/yr). As with other WRZs, an increase in temperature and changes to

precipitation patterns could reduce the availability of water, through reduced flows, higher evaporative rates and reduced water quality.

3.8.5 Central and South WRZ

The Central WRZ includes parts of County Tyrone and County Antrim. The main demand centres within the zone are the towns of Magherafelt and Cookstown with a number of smaller towns and rural areas such as Maghera, Draperstown and Pomeroy. The sources for this WRZ are the River Moyola, Lough Neagh and Lough Fea. Lough Neagh provides approximately 40% of Northern Ireland's water supply. As with the North East WRZ, increases in temperature can lead to greater rates of evaporation from the Lough, lower water quality and changes to the precipitation patterns can impact on the volumes of water draining to the Lough from its catchment.

The South WRZ contains areas of County Down and County Armagh. The WRZ is supplied from Lough Neagh and a number of upland reservoir and lough sources. The main demand centres within the zone are Newry, Armagh and Dungannon, along with supply to surrounding smaller towns and rural areas including Portadown, and Kilkeel. This makes up approximately 23% of the total population. The reliance on upland reservoirs/loughs to meet demand mean there is the potential for increased water stress over prolonged periods of dry weather when little water is available for storage. This WRZ receives lower annual rainfall (<800 mm/yr) than the average of Northern Ireland. Increased temperatures and variations to precipitation rates and frequency could exacerbate this. The increased temperature combined with greater drawdown can be detrimental to the water quality too.

3.8.6 Future Baseline

In general terms, summers in Northern Ireland are predicted to become hotter and drier, while winters become warmer and wetter. There is a lot of uncertainty about climate change due to the many variables affecting climate predictions. It is difficult to quantify with any certainty what the changes are likely to be and average numbers are usually associated with error bands. Under high emissions scenarios, headline figures for the 2050s for Northern Ireland are as follows:

- Summers will be hotter by up to 2.2°C in summer and 1.7°C in winter by 2050. The region will also experience increasing likelihood of extreme temperatures and heat waves. This will increase evaporation rates and can lead to deterioration in water quality.
- Average summer precipitation is projected to decrease by 13% by the 2050s and winter precipitation is likely to increase by 9%. These changes in precipitation will impact on the river flows, reducing them in summer months when demands are historically higher and increase the risk of flooding in the winter months.
- UKCP09 is the most up-to-date UK Climate Change Predictions published in 2009. It includes projections for sea level rise for Northern Ireland and suggests an increase of 14.5 cm in Belfast by 2050. There is the potential for saline intrusion into aquifers and lower lying surface water sources.

Climate change projections indicate an increase in extreme weather events in Northern Ireland including heat waves, flooding, heavy snowfalls, and strong winds. Not only can these events affect water quality and water quantity, they have the potential to affect water infrastructure and NI Water's ability to continue to provide reliable service to the population.

3.9 Water Environment

3.9.1 Introduction

This section considers the baseline water environment, including surface water and groundwater. These two topics have been combined within the baseline section because groundwater provides a large proportion of the baseflow in rivers. Northern Ireland's rivers, lakes, estuaries, seas and groundwater provide water to sustain many of our core social and economic activities whilst

providing drinking water to the population. Water quality and water quantity are key to protecting water bodies.

The water assessment considers water quality and water quantity, which are intrinsically linked; low flows generally reduce the capacity of a waterbody to dilute pollutants. Low flows and poor water quality can result in a number of impacts on; water-dependent habitats and species (including fish), water based recreation and the amount of water treatment required prior to human consumption.

In addition to contamination of water bodies, abstraction from water bodies can have a significant effect on the wider water environment. Whilst the pressures from groundwater abstractions in Northern Ireland are generally less than many parts of the UK and Ireland, any abstraction of groundwater has the potential to impact water levels or flows at nearby rivers, lakes or wetlands.

Water quality and water quantity will need to be considered during mitigation measures along with sediment management. The achievement and maintenance of WFD waterbody status in Northern Ireland will be a key objective.

The WFD places a responsibility on Member States to ensure that all inland and coastal waters reach at least 'good' status. To achieve the target a series of River Basin Management Plans (RBMP) have been developed which set out how organisations, stakeholders and communities will work together to ensure the protection, improvement and sustainable use of the water environment over 6 year cycles. This includes surface freshwaters, groundwater, and ecosystems such as wetlands which depend on groundwater, estuaries and coastal waters.

River Basin Districts have been developed which serve as the administrative areas for coordinated water management. The River Basin Districts relevant to the WR&SR Plan are as follows:

- Neagh Bann River Basin District
- North Western River Basin District
- North Easter River Basin District

The aim of the RBMPs is to:

- Improve the ecological health of waters and prevent further deterioration
- Support more sustainable use of water as a natural resource
- Create better habitats for wildlife in and around water
- Reduce or phase out discharges and emissions of hazardous substances
- Reduce the pollution of groundwater
- Contribute to mitigating the effects of floods and drought

River Basin Management Plans have identified the pressures which pose the greatest threat to the water environment. Abstractions were identified as one of the main pressures.

3.9.2 North WRZ

WFD classified watercourses within the North WRZ include the River Bush (Moderate to Good Status) and the River Bann (Poor Ecological Potential). In addition, the North Coast AONB beaches and the associated water sports attractions mean that the quality of Bathing Waters in the area is important for local tourism and recreation.

3.9.3 North East and East WRZ

WFD classified watercourses within this area include the Lagan Estuary (Poor to Moderate Ecological Potential) in the East WRZ and the River Main (Moderate Status) and the Kells Water (Moderate to Good Status) in the North East.

3.9.4 West and South West WRZ

WFD classified watercourses within this area include the Derg (Moderate – Good Ecological Status) and the Strule River (Moderate Ecological Potential) in the West WRZ and the Erne River (Moderate/Moderate Ecological Potential) and the Cladagh (Good) in the South West.

3.9.5 Central and South WRZ

WFD classified watercourses within this area include the Ballinderry River (Moderate Ecological Status) in the Central WRZ and the Clanrye River (Moderate to Good Ecological Status) and the River Bann (Poor to Moderate Ecological Potential) in the South WRZ.

3.9.6 Future Baseline

Water quality is routinely monitored as part of meeting WFD obligations. Goals are set for WFD waterbodies to improve their status to good or maintain good status by 2021. The river basin management plans set out measures to be implemented to achieve WFD objectives. In terms of general trends for the future WFD surface and ground water body quality status are expected to improve but this will require that development and abstractions comply with requirements to avoid waterbody deterioration and that they support the measures in the RBMPs.

Climate change could potentially have a negative effect on water quality and quantity if predictions are correct; hotter drier summers may reduce the volume of water in rivers as well as base flow, making dispersion of pollution or effluent more difficult. Wetter, stormier winters can also increase the risk of flooding. New developments can also affect the water environment through the loss of floodplain, increasing flooding and demand for water resources.

3.10 Cultural Heritage and Archaeology

3.10.1 Introduction

Northern Ireland has a rich cultural heritage. Evidence of thousands of years of human activity presents itself across the region in the form of tombs, forts and castles, churches, townhouses and farmhouses, industrial features, and parklands.

For the purposes of this SEA, archaeology can include known and unknown archaeology, buildings of historic and archaeological significance, industrial archaeology and conservations areas.

There are a number of known heritage assets in Northern Ireland:

- Sites and Monuments – approximately 16,000
- Monuments in State Care – 190
- Scheduled Historic Monuments – 1,972
- Historic Buildings – over 9,000
- Listed Buildings – 8,702
- Historic Landscapes and Townscapes - Areas of Significant Archaeological Interest and Conservation Areas – 10 and 60 respectively
- Industrial Heritage Sites – approximately 15,000
- Defence Heritage Features and Battlefields – 650 and 330 respectively
- Heritage Gardens Inventory – 154

Cultural heritage and archaeology are a focus for recreation and tourism in Ireland, playing a huge part in Irish folklore. Many of these cultural heritage sites are found outside the urban centres in more rural areas; these attractions are vital to sustaining the local tourist economies. The locations of some of these specific sites are identified below.

3.10.2 North WRZ

Antrim Coast and Glens and Causeway Coast AONBs are located in the North WRZ and as a result this is one of the most popular tourist areas in Northern Ireland. Dunluce Castle and Bonamargy Friary are also significant cultural heritage and archaeological sites along the North Coast. This WRZ also hosts the earliest known settlement of man in Ireland, Mountsandel Fort, Coleraine. These sites are vital to sustaining tourism and recreation in the area.

3.10.3 North East and East WRZ

In the North East WRZ Antrim Castle Gardens and Clotworthy House is a particularly popular cultural heritage site; hosting a significant number of events, activities, exhibitions and performances.

The East WRZ includes the capital city Belfast, so is therefore the most visited area by tourists in Northern Ireland. Many of the Christian heritage and archaeology sites are found across Northern Ireland in the form of cathedrals and churches are found in the East WRZ including Belfast Cathedral and St. Nicholas Church, Carrickfergus. The Priory, the remains of a Dominican Friary, the only ones of their type found in Northern Ireland are found in Newtownards in the East WRZ. The Lagan Canal and Union Bridge are important cultural heritage areas in the East WRZ.

3.10.4 West and South West WRZ

This area is particularly well known for its Stone Age archaeology. In the West WRZ, Goles Stone Row in the Sperrins AONB date back to the early Bronze Age and are central to the landscape and story of the region. The Fermanagh Lakelands in the South West WRZ is full of culture and heritage sites including Neolithic and early Christian Celtic burial and dwelling sites and a large number of crannogs.

3.10.1 Central and South WRZ

Beaghmore Stone Circles, 7 Bronze Age stone circles and alignments are a significant archaeological feature in the Central WRZ. Navan Fort in Armagh is one of Northern Ireland's most important ancient monuments located in the South WRZ. Newry Canal is an important cultural waterway in the South WRZ as the earliest summit-level canal in the UK.

3.10.2 Future Baseline

It is unlikely that there will be any significant changes to the baseline over the lifetime of the Plan provided it complies with the environmental regulations outlined in section Appendix A. The main change to the baseline may be an increase in the number of designated sites within the study area as further studies increase the understanding of the archaeological environment.

3.11 Geology and Soils

3.11.1 Introduction

Northern Ireland has a diverse geology that is intimately linked to the landscape, soils, water environment and in particular groundwater flow and resource. A high-level review of the geological characteristics has been completed for the scoping report based on information available on the Geological Survey of Northern Ireland website.

Geology has been scoped out as a receptor of the assessment at the scoping stage, as this is not expected to be affected by the options and actions for the WR&SR Plan, other than in relation to avoiding designated sites of geological interest (ASSIs). A brief description is provided as it is relevant background for understanding the hydrogeological and hydrological characteristics.

Soil types across the region are highly variable within and between regions and particularly the variation with topography and geology. However, where construction activities are considered that

require removal of topsoil, the soils will be assessed on an individual basis, looking in particular at the grade and quality of the topsoil that could be affected by the development. Agricultural land quality is classified through a six-grade classification system; the top three grades, 1, 2, and 3a are considered the 'best and most versatile'.

3.11.2 North WRZ

The only World Heritage Site in Northern Ireland, the Giant's Causeway is located in the North WRZ.

The main geological types are:

Drift

- Glacial Tills: these are sedimentary deposits originating from ice age meltwaters and cover much of this zone. Occasional blown sands are present mostly along coastal areas with alluvial sands and silts beneath surface waters. These do not represent a groundwater resource and can limit groundwater recharge.

Solid

- Basalt: Igneous rock comprising trachyte, syenite and tuff lies beneath much of the north water resource zone along the Causeway coast. Flow in the basalt occurs via fractures and groundwater movement tends to be local (short flow) although some limited regional flow may occur. They can represent moderately productive aquifers where well fractured.
- Chalk: Ulster White Limestone occurs at depth beneath some of the Causeway coast and towards Magilligan. Flow in the Chalk is dominated by fracture flow, mainly within karstic features and has high productivity potential. Western part of the formation is comprised mainly of mudstone and sandstone (Triassic and Jurassic), occasionally intruded by dolerite near Magilligan. Flow within the mudstone is limited to isolated fractures.
- Schist: Metamorphic rock containing pelite, psammite, marble and phyllite lies beneath much of County Tyrone. Occasional amphibolite and diamictite are also present beneath Dungiven and Ballycastle. Flow is restricted to the upper weathered horizons and fractures and has limited potential for groundwater supply away from such areas.

There are many ASSIs within the north zone which are designated for their geological value. The Causeway Coast, Antrim Coast and Glens and Binevenagh AONB all have geology as part of the characteristics of the designation.

3.11.3 North East and East WRZ

The main geological types are:

Drift

- Glacial Tills and boulder clays: These are sedimentary deposits originating from ice age meltwaters and cover parts of these zones. Within the river valleys alluvium deposits occur and peat deposits can be found on higher ground in the south.

Solid

- Basalt: Igneous rock extends beneath much of the North East Zone beyond Belfast. Flow in the basalt is through fractures and the rock provides only short flow although some limited regional flow may occur.
- Sandstone: Sedimentary rock comprising sandstone and interbedded shales and limestone which lies beneath the majority of the East Water Resource Zone. Considered to have a high proportion of shale reducing the potential for karstification although still facilitates a high degree of fissure flow and can provide a groundwater source.
- Clay and Lignite: Predominantly beneath Lough Neagh and do not represent a significant source of groundwater.

There are several ASSIs within the northeast and east zones, which are designated for their geological value.

3.11.4 West and South West WRZ

The main geological types are:

Drift

- Glacial sands and gravels: predominant throughout these zones with good water productivity potential locally, with intergranular flow.

Solid

- Sandstone: Interbedded with shale and limestone extend beneath much of the West WRZ. The majority of the bedrock is shale which restricts the flow to the upper weathered horizons and fractures. Limestone is present to the west, which contains evidence of karstic conditions and is highly fractured. These rocks can form productive aquifers.
- Mudstone: Present beneath Omagh and the east of the West WRZ has very limited potential for groundwater abstraction with flow restricted to upper weathered horizons and fractures.
- Sandstone and Limestone: These predominate in the South West WRZ also occasionally interbedded shale. They can form productive aquifers.

There are numerous ASSIs within the West and South West Zones which are designated for their geological value.

3.11.5 Central and South WRZ

The main geological types are:

Drift

- Glacial till and peat: predominant throughout much of the Central and South WRZs with peat deposits present in higher ground. Patchy areas of alluvial deposits are present in river valleys and near the coast.

Solid

- Basalt: Igneous rock lies beneath much of the Central WRZ beyond Belfast. Flow through the basalt is via fractures and the rock provides only short flow although some limited regional flow may occur.
- Sandstone: To the north of the Central WRZ and extends beneath much of the South WRZ which also comprises mudstone, red sandstone and conglomerates. Occasional thin limestone with limited evidence of karstic conditions. Can form productive aquifers.
- Granite: Coarse-grained igneous rock present to the west of Cookstown in the Central WRZ and Mourne Mountains in the South WRZ. These are unlikely to give rise to productive aquifers except where weathered or highly fractured.

There are numerous ASSIs within these zones that are designated for their geological value. The Mourne Mountains AONB geological interest is part of the basis for its designation.

3.11.6 Future Baseline

Changes in geology are generally considered to happen over very long timescales. On this basis, baseline forecasting is not considered to be critical with regards to geology and soils over the lifetime of the Plan.

3.12 Sustainability Issues

3.12.1 Introduction

The Department for Infrastructure published a Long Term Water Strategy for Northern Ireland in March 2016. This strategy proposes to deliver a sustainable water sector in Northern Ireland by

2040. The key challenges to delivering a sustainable service are through regional development and growth, climate change, drought and disaster resilience, and maintaining infrastructure.

NI Water recognises that maintaining and operating the water system can be difficult during normal climatic conditions, therefore during more extreme weather this becomes significantly more challenging. In light of this, NI Water aims to adapt to the extreme weather pressures in order to maintain their 'levels of service'.

NI Water also intends to mitigate its impact on climate change. Northern Ireland seeks to achieve 40% of its electricity consumption from renewable sources by 2020/21¹⁵. NI Water is committed to this target and is on track to meet it, expecting to increase electricity usage from green grid energy from currently around 13% to 40% by 2020/21. NI Water is actively working towards reducing greenhouse gas emissions through reducing the use of energy and fuel in operational process. It is difficult to assess renewable energy usage and emission reductions at a local level, however, the potential for the WR&SR Plan to contribute to NI Water meeting carbon targets will be considered in the assessment of the plan and the mitigation measures.

The EU Waste Framework Directive requires the UK to reduce waste going to landfill to 35 percent on 1995 levels by 2020. It also requires 70 percent of construction and demolition waste to be recycled by 2020. The Waste Regulations (Northern Ireland) 2011 transpose the revised Waste Framework Directive. Regulation 17 of these, introduces a duty on waste operators to comply with the waste hierarchy (set out in the Waste Framework Directive (2008/98/EC)). The Waste Hierarchy is applied to minimise waste generation and maximise re-use of materials on-site where possible and is illustrated in Figure 3-2.

NI Water is committed to reducing the amount of waste it produces and promotes the waste hierarchy. NI Water has stated it will fulfil its obligations as a signatory of the WRAP Objectives and the 'halving waste to landfill' commitment¹⁶.

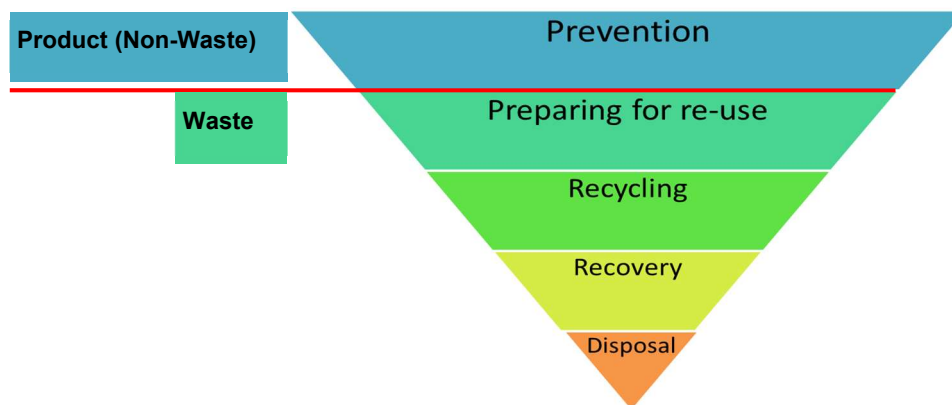


Figure 3-2 The Waste Hierarchy

The assessment will determine how each option and the plan will affect the achievement of NI Water's sustainability targets in relation to; adapting and mitigating climate change, maintaining levels of service in extreme weather events and reducing waste.

3.12.2 North WRZ

The North WRZ is relatively hydrologically secure and has a good supply demand balance.

¹⁵ Sourced from Economy-NI, Electricity Consumption and Renewable Generation Statistics. Accessed 11/05/2017. Available at: <https://www.economy-ni.gov.uk/articles/electricity-consumption-and-renewable-generation-statistics>

¹⁶ Sourced from NI Water Website, Our Environment. Accessed 27/07/2016. Available at: <https://www.niwater.com/our-environment/>

3.12.3 North East and East WRZ

These WRZs receive a significant proportion of their water from Lough Neagh so they are relatively secure hydrologically.

3.12.4 West and South West WRZ

Operational experience has indicated that the West WRZ is particularly susceptible to drought since it is a relatively hydrologically limited area. The Killyhevlin and Belleek sources are hydrologically secure, however, interconnectivity with the West WRZ is poor.

3.12.5 Central and South WRZ

The South WRZ receives a significant proportion of its water from Lough Neagh so is relatively secure hydrologically. There are some resilience issues in the Central WRZ in relation to supply that need further consideration.

3.12.6 Future Baseline

With targets set for 2020 to significantly reduce the waste sent to landfill and increase the percentage of waste (with particular targets for construction materials) it would appear that the management of material assets will be enhanced in the area, therefore, future development will need to adhere to these goals and mitigate any potential increased waste products.

Similar targets outlined for carbon emission reduction and increase in energy from renewable sources will require NI Water and other companies to reduce their carbon footprint. Climate change projections indicate that in the business as usual model sea levels and temperatures will rise, with more extreme weather events a consequence, therefore, NI Water and its infrastructure is expected to be at further risk to unforeseen events of drought, flooding, and freeze thaw.

The Long Term Water Strategy for creating sustainable and resilient water services by 2040 set out a clear objective for NI Water to ensure that the services they provide in the future are more sustainable and resilient in the context of demand increase and climate change and the expected increase in extreme weather events.

3.13 Summary of key issues in the North WRZ

The following key environmental issues are considered particularly relevant to the assessment in the North WRZ:

- **Waterbodies:** The importance of the area is reflected in the national and international designations. Increased abstraction on the Foyle and tributaries could affect many habitats that depend on certain water levels and quality.
- **AONBs:** There are 4 AONB's within the North WRZ boundary. Binevenagh, Causeway Coast and Antrim Coast and Glens are grouped as the 'Causeway Coast and Glens'. To the south of this WRZ is a small part of the Sperrin AONB. These are high quality landscapes that attract tourists and recreational users. The SEA needs to consider the impact of water resource options proposed within the AONBs, as these will need to be designed sympathetically to minimise visual intrusion or changes to the character of the landscape.
- **Tourist areas around North Coast including Giants Causeway:** Tourism is important for the local economy and is likely to place a greater pressure on water resources over summer months. Tourism is dependent on the landscape quality and attractiveness of the place. The beach resorts are also dependent on achieving water quality required by bathing. The SEA needs to ensure that the WR&SR Plan retains the landscape quality in tourist areas and around important heritage features. Options would need to demonstrate that there is no

impact on bathing water quality and would need to assess the risk of saline intrusion to the aquifer as sea levels rise.

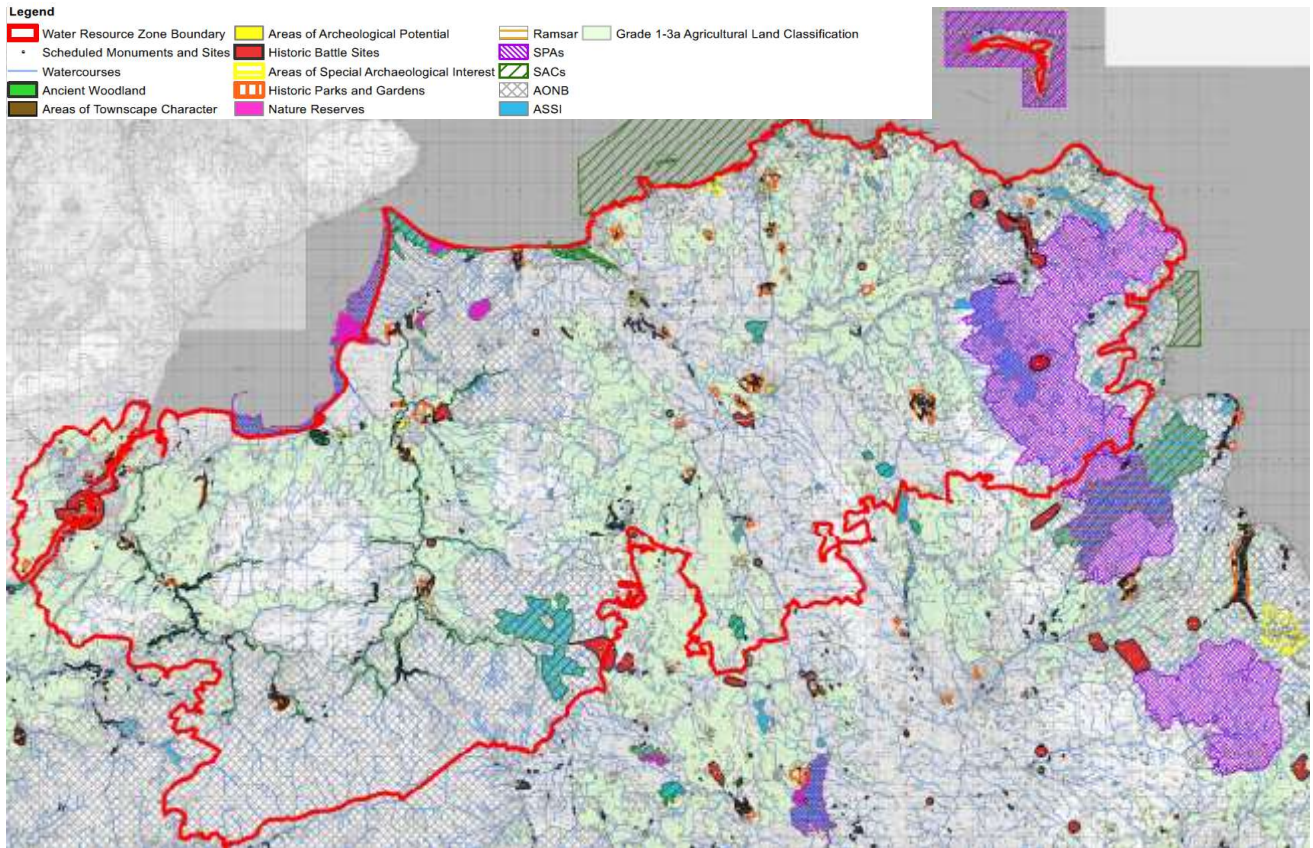


Figure 3-3 North WRZ Environmental Constraints

3.14 Summary of key issues in the North East and East WRZ

The following key environmental issues are considered particularly relevant to the assessment in the North East and East WRZ:

- AONBs:** The Antrim Coast and Glens AONB, Lagan Valley AONB and Strangford and Lecale AONB attract recreational users and tourists to these WRZs. These areas support various recreational activities such as water sports, which are reliant on the quality and quantity of water.
- Water Environment of Lough Neagh and surrounding recreational areas:** Both WRZ's border Lough Neagh where similar water sports and recreational activities are enjoyed by tourists and day-trippers.
- Wetlands:** Blanket Bog found in various locations across County Antrim and the Lough Neagh basin which could be affected by increased abstractions or changes in water levels and/or quality. The importance of this area is reflected in the national and international designations. The SEA needs to reflect the importance of these areas in both consideration of potential impacts from plan proposals and opportunities to protect and enhance to ensure that there is sufficient water available for important wetland habitats for the future and contribute to supply resilience.
- North Eastern farmland:** There is a large portion of rolling farmland with drumlins in this area with wetlands, peat and birch woodland, and many habitats of ecological value. The area retain strong local character; distinctively rugged with broad expanses of peat bog and large coniferous forests. The WR&SR Plan must consider the impacts of construction on this area

as well as the water availability to these farming areas as water demand increases with climate change.

- **Lagan Estuary Waterbodies:** This is an important habitat and cultural heritage area. The SEA needs to consider the impact to this water environment.
- **Strangford Lough Marine Environment and surrounding tourist areas:** The importance of this area is reflected in the national and international designations. The WR&SR Plan must consider the impacts of construction on this area as well as the water availability and water quality and how that might impact the recreational activities popular in the area.

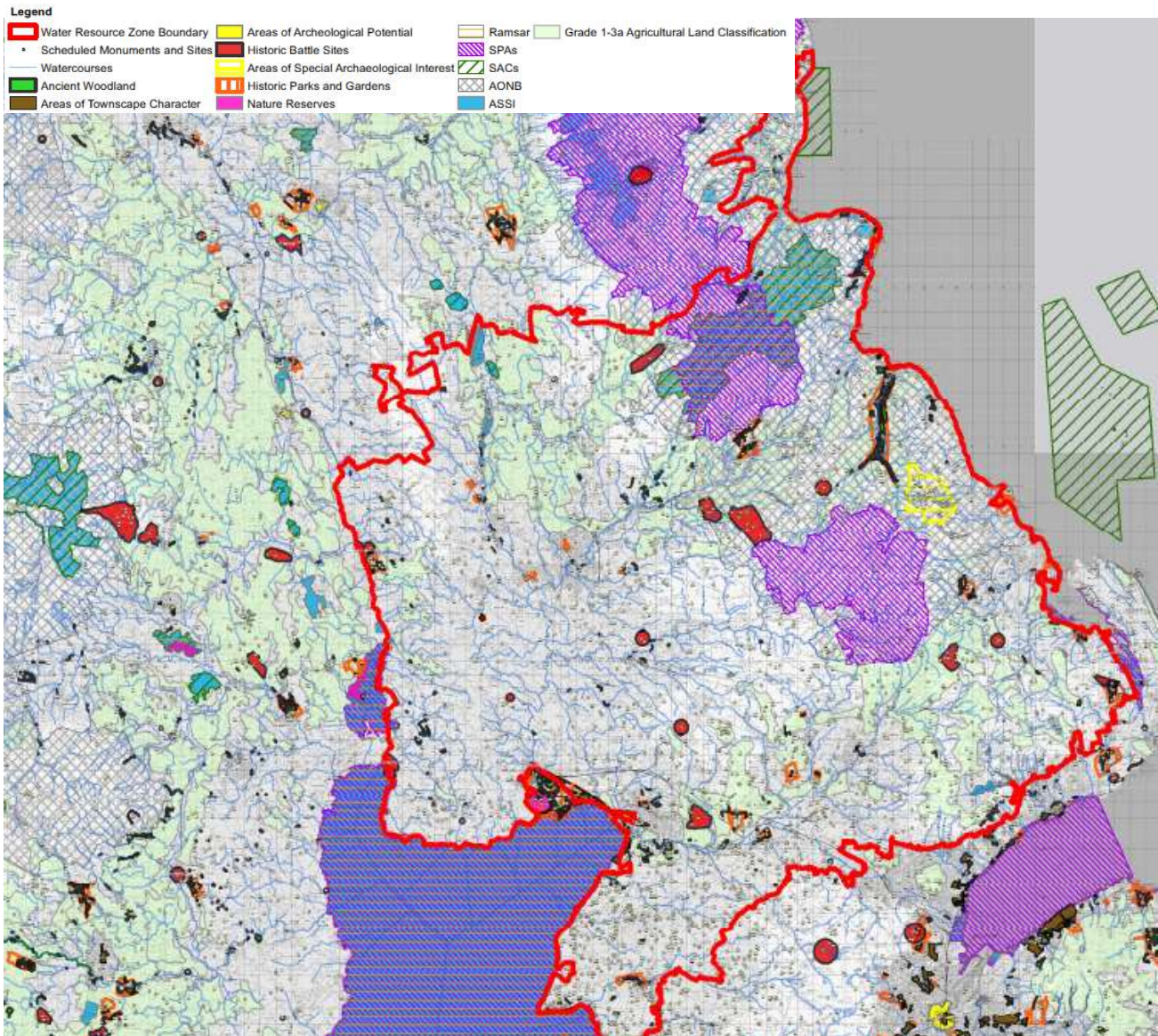


Figure 3-4 North East WRZ Environmental Constraints

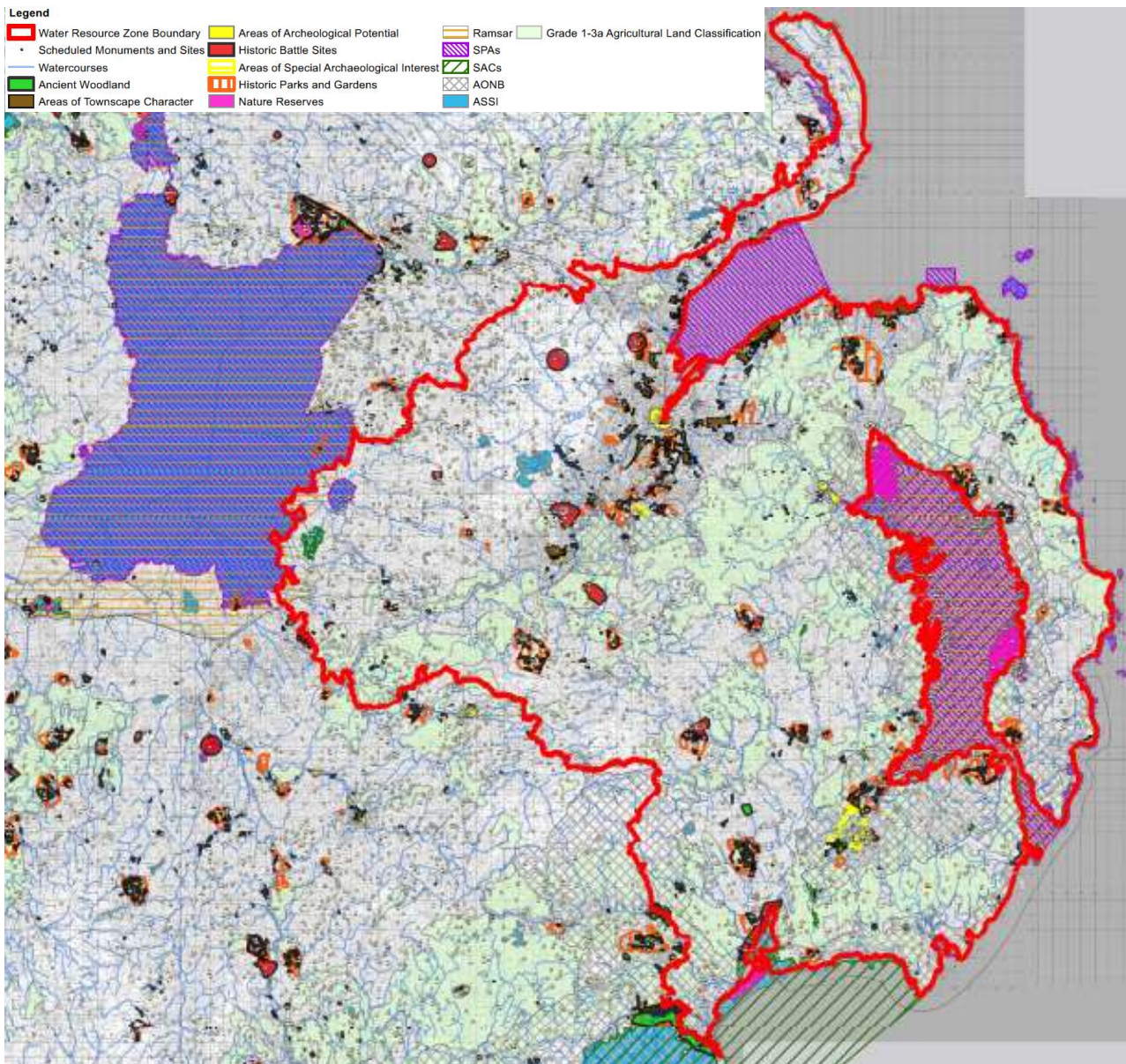


Figure 3-5 East WRZ Environmental Constraints

3.15 Summary of key issues in the West and South West WRZ

The following key environmental issues are considered particularly relevant to the assessment in the West and South West WRZ:

- Sperrin’s AONB:** A high quality landscape containing vast expanses of moorland, narrow glens and deep valleys that attracts tourists and is enjoyed for recreation. The area is rich in historic and archaeological heritage and folklore and a popular attraction to visitors. Areas such as Gortin Lakes in the heart of the Sperrins are popular for water sports such as canoeing, and there are a number of long distance paths crossing the area and villages that benefit from the tourist trade. The SEA needs to consider the impact of water resource options proposed within the AONB, as these will need to be designed sympathetically to minimise visual intrusion or changes to the character of the landscape.
- Tourist areas around Fermanagh Lakelands:** Tourism is important for the local economy and is likely to place a greater pressure on water resources over summer months. Water quality and quantity are important aspects for Lough Erne and the Fermanagh Lakelands as very popular tourist locations; popular activities include canoeing, kayaking, golfing, fishing

and walking trails, therefore, tourism is dependent on the landscape quality and attractiveness of the place. The SEA needs to ensure that the WR&SR Plan retains the landscape quality in tourist areas and around important heritage features. Options would need to demonstrate that there is no impact on bathing water quality and would need ensure no increased vulnerability to the effects of sea level rise.

- Fermanagh and Tyrone Landscape:** Tyrone’s landscape is composed of rounded drumlins, open peat bogs and rough grazing around the flat-bottomed valleys of the Derg River and the Fairy Water. Fermanagh’s significantly remote and rural landscape, intricate patterns of small fields bounded by hedges, significant areas of peatland, woodland is depicted by Lower and Upper Lough Erne, a complex of islands, peninsulas, small loughs and inlets. The remote and rural characteristic of the west must be considered in the WR&SR Plan and SEA.

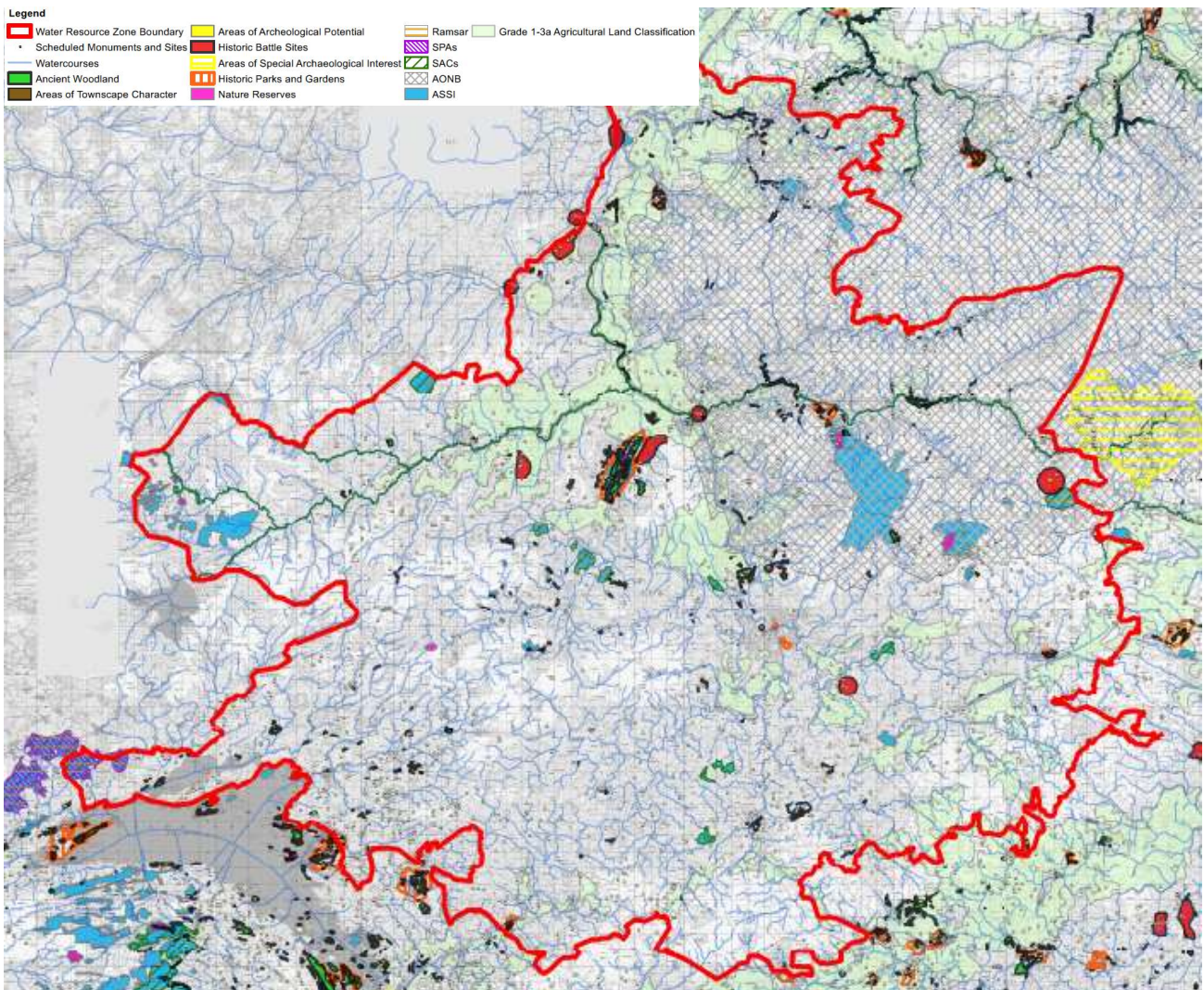


Figure 3-6 West WRZ Environmental Constraints

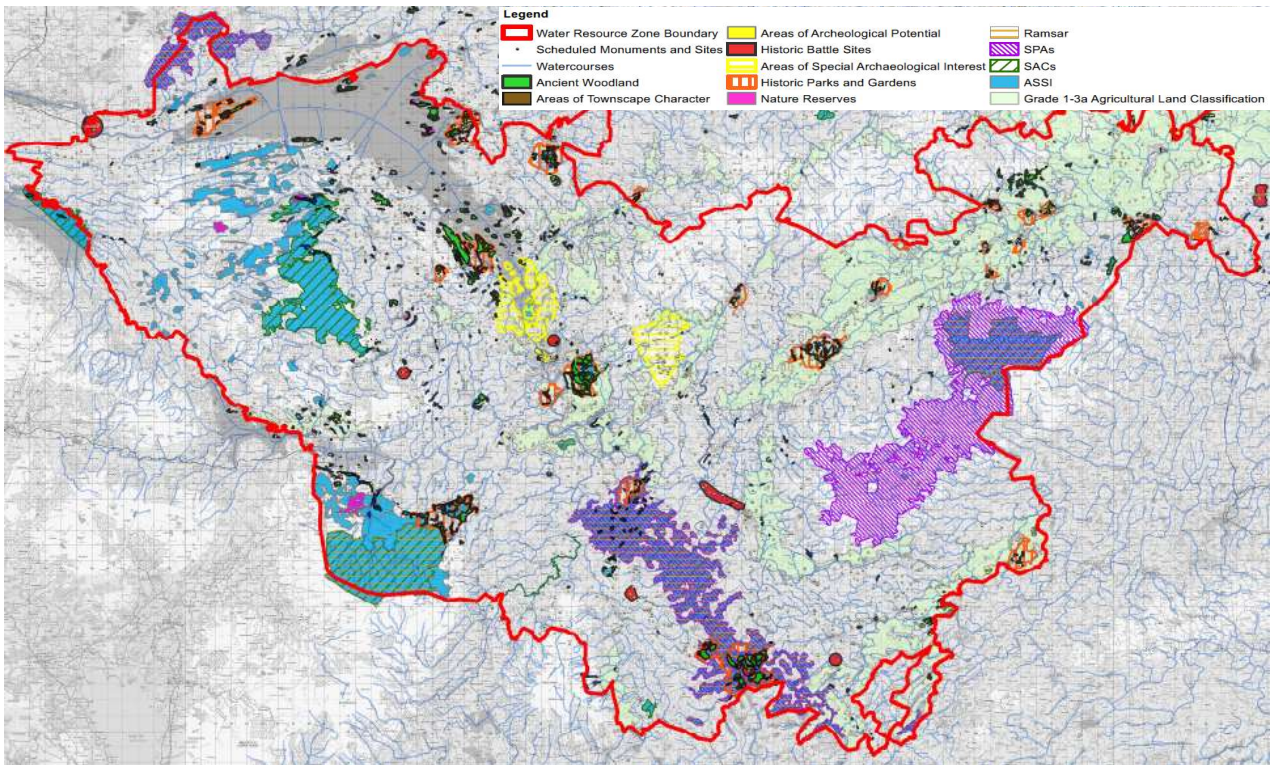


Figure 3-7 South West WRZ Environmental Constraints

3.16 Summary of key issues in the Central and South WRZ

The following key environmental issues are considered particularly relevant to the assessment in the Central and South WRZ:

- AONBs:** There are 3 AONB's within these WRZ; Sperrins in the Central and Ring of Gullion in the South. The Central WRZ also includes part of the Sperrin AONB. Both are highly popular tourist areas for hill walking, rock climbing, cycling, fishing, canoeing, sailing and bird watching with the natural beauty of the mountains therefore, the WR&SR Plan and SEA would need to consider the impacts on the landscape character and water quality in these areas.
- Lough Neagh wetlands:** The importance of the area is reflected in the national and international designations. Increased abstraction along at Lough Neagh could affect the wetland habitats such as the Lowland Raised Bog around the Lough Neagh Basin that depend on certain water levels and quality. The SEA would need to demonstrate that there is sufficient water available for the important wetland habitats and that this is sustainable in the future.

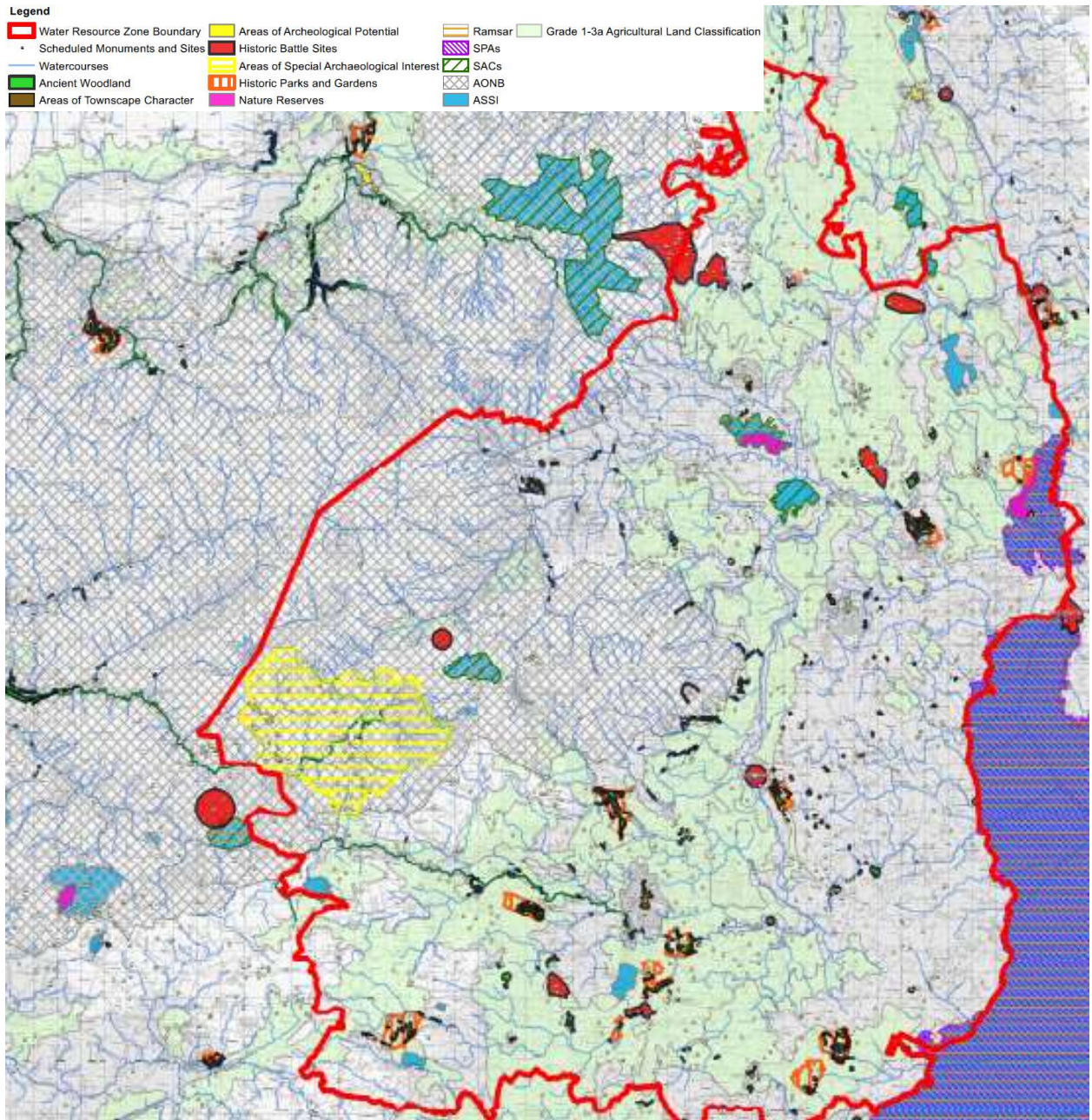


Figure 3-8 Central WRZ Environmental Constraints

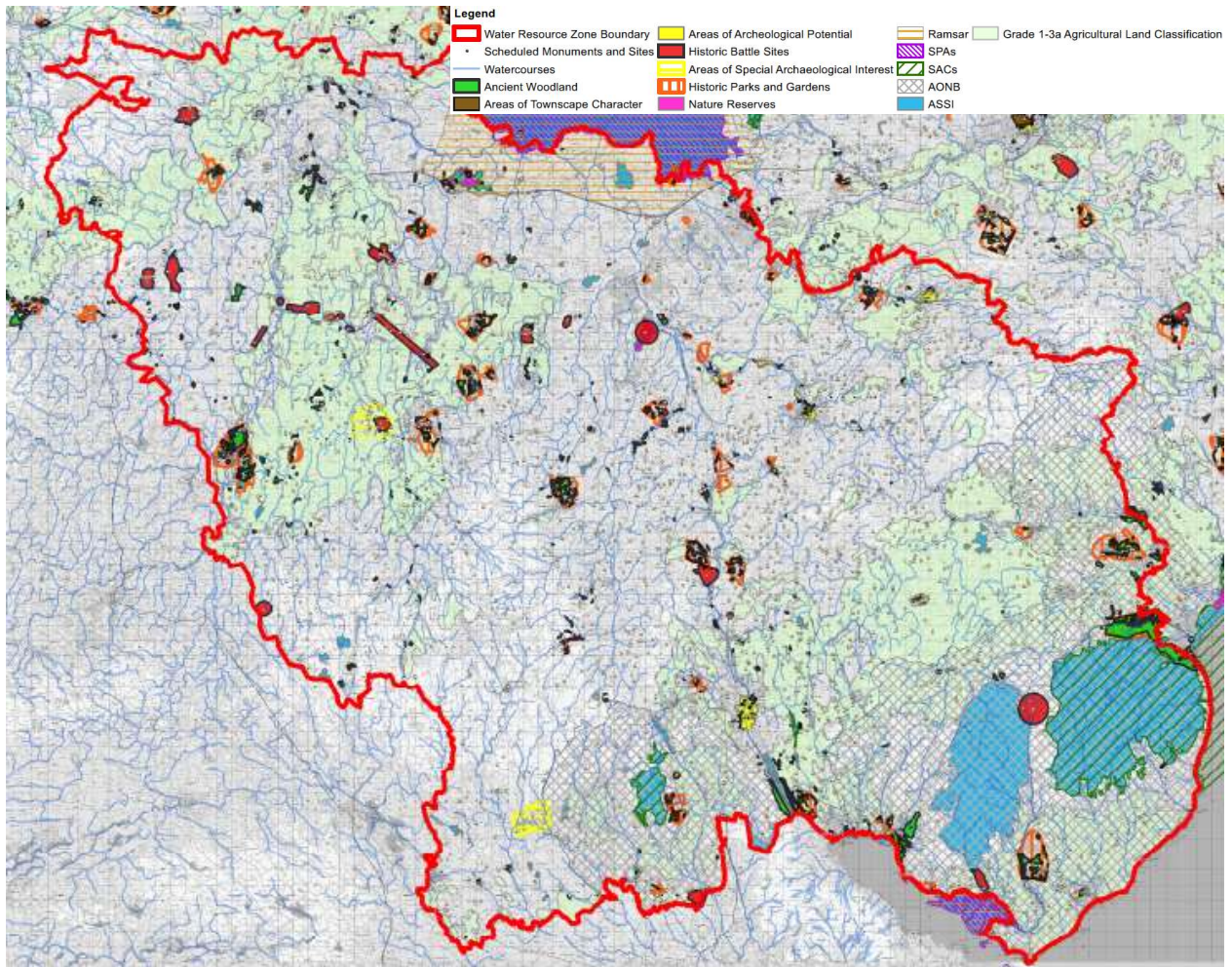


Figure 3-9 South WRZ Environmental Constraints

4 SEA Methodology

4.1 SEA Scoping and Consultation

A Scoping Report was issued for consultation to the Northern Ireland Environment Agency (the statutory consultation body) in October 2016.

The consultation on the scope of the SEA helped shape the Environmental Assessment and determine the level of detail to be included in the Environmental Report.

The results of the consultation process and how comments have been taken into account are described in Appendix B.

4.2 SEA Objectives

During the SEA scoping process a set of SEA objectives and criteria were established. The SEA objectives are set out in Table 4-1 below. The SEA objectives have been developed from the key issues identified within the Plans, Policies and Programmes and baseline reviews.

Table 4-1 SEA Objectives

SEA Theme	Objectives	Key Questions to inform the assessment of options and the plan as a whole
Population, Economy and Human Health	<ul style="list-style-type: none"> To protect public health and promote wellbeing and avoid disadvantaging any group or area. To protect and enhance recreational amenity and public access. To contribute to raising awareness of water conservation. 	<ul style="list-style-type: none"> Are there any health risks associated with the plan/options? Will the options/plan contribute to public health and quality of life? Would the options/plan provide access to clean water to everyone? Would the options/plan impact properties, or community facilities or access? Will the options cause traffic disruption during construction or operation? Does the plan help to raise public awareness of the need for water conservation?
Tourism and Recreation	<ul style="list-style-type: none"> To protect and enhance recreation and amenity facilities. 	<ul style="list-style-type: none"> Would the options impact on recreational or tourist facilities or access? Will the options affect water-based recreation?
Material Assets	<ul style="list-style-type: none"> To avoid conflict with strategic infrastructure, and support viable land use, businesses and sustainable resource use. 	<ul style="list-style-type: none"> Would the options affect existing critical infrastructure? Would the options result in waste from non-renewable materials which cannot be reused or recycled? Would the options have implications for businesses? Do the options conflict with existing or planned land-use?
Biodiversity, Flora and Fauna	<ul style="list-style-type: none"> To protect and enhance aquatic and terrestrial biodiversity including statutory and non-statutory sites, protected species, 	<ul style="list-style-type: none"> Could the options/plan affect internationally designated sites? Are there likely potential impacts on nationally importance statutory sites? Is there potential for direct loss and/or change to habitats as a result of

	fisheries and priority habitats.	<p>construction or operation of the options?</p> <ul style="list-style-type: none"> • Could this plan/options result in impacts to protected species? • Could the options contribute to the spread of invasive species?
Landscape, Townscape and Visual Amenity	<ul style="list-style-type: none"> • To maintain and enhance valued landscape character and visual amenity. 	<ul style="list-style-type: none"> • Would the options lead to the loss or alteration of trees, hedgerows or other landscape/townscape features? • Would the options potentially impact views from public rights of way, designated landscapes, parks or other valued places?
Climate	<ul style="list-style-type: none"> • To minimise the carbon footprint of the Company. • To contribute to climate change adaptability of the environment to resilience of water supply. 	<ul style="list-style-type: none"> • Would implementing the plan entail a significantly larger carbon footprint compared with alternative plan scenario? • Would the options/plan affect the resilience of the local environment to climate change?
Water Environment	<ul style="list-style-type: none"> • To protect and improve surface water and groundwater body status; including water quality and quantity. • Ensure sustainable levels of surface water and groundwater abstraction. 	<ul style="list-style-type: none"> • Would the options improve water treatment and water quality? • Would the options alter ground water levels and amount of water within aquifers? • Would the options protect or restore adequate levels of flow in rivers and streams and contribute to WFD objectives? How vulnerable are the options to potential future review of abstraction consents?
Cultural Heritage and Archaeology	<ul style="list-style-type: none"> • To conserve and enhance buildings, sites and features of archaeological and historic interest and their settings. 	<ul style="list-style-type: none"> • Would the options avoid damage to, and protect, designated assets? • Would the options maintain and enhance the historic environment, including palaeo-environmental deposits, which may be dependent on a high / stable water table?
Geology and Soils	<ul style="list-style-type: none"> • To protect and enhance soil quality and avoid conflict with identified mineral resources and ASSI's. 	<ul style="list-style-type: none"> • Would the options impact upon best and most versatile agricultural land (ALC grades 1 – 3a)? • Would the options impact upon ASSI's designated for geological significance?
Sustainability Issues	<ul style="list-style-type: none"> • To ensure resilience to natural events and disasters such as droughts, flood events and freeze/thaw. • To minimise the risk of flooding taking account of climate change. 	<ul style="list-style-type: none"> • Would the options contribute to the company's ability to supply water in extreme weather events such as during drought and also during flood events? • Would the options/plan reduce or contribute to environmental resilience to climate change?

4.3 Option Development

Initially a series of workshops were held to develop a list of 'unconstrained options'. The unconstrained list includes 53 options that could reduce the vulnerability of the water supply system and increase the

resilience of the water assets but before considering the practical and technical feasibility, cost or environmental constraints.

4.4 Unconstrained Options Screening Assessment

A screening assessment of the long list of unconstrained options identified a ‘constrained’ list of 23 feasible options to be taken forward; nine water resource options and 14 demand management options. This screening assessment involved a review of high level environmental risks alongside an assessment of technical feasibility, water availability and promotability for the screening process. The screening of the unconstrained list aimed to identify ‘showstoppers’ where there were unacceptable risks, based on a review of readily available information or knowledge of similar schemes.

The screening assessment was discussed with the statutory consultees at a workshop during the scoping stage of the SEA process. The main focus of the environmental assessment for option screening was the potential of an option to adversely affect an internationally or nationally designated site or to conflict with WFD objectives.

A Red, Amber, Green (RAG) ‘traffic light’ scoring methodology was used to record results, as illustrated in Table 4-2.

Table 4-2 Traffic Light Scoring System

Colour	Description
Red	Significant issues or sensitivities that affect the ability to implement this option. This could include options in areas where there is no further water available or where the option may have a significant detrimental impact on a designated site.
Amber	Some issues or sensitivities identified, which may not be showstoppers but which could result in risks or complicated design and implementation strategies. For example, this could be an option located within an Area of Outstanding Natural Beauty, where the option may need to be designed in a more sensitive way to gain approval. These options are not preferred but would be drawn on if additional options are required.
Green	No major issues or sensitivities identified at the strategy stage for this option. These will form the preferred list of options which are screened in to the constrained list.

This approach was based on qualitative assessment and provided a transparent approach to recording the screening process. The approach was agreed with the Northern Ireland Environment Agency and statutory consultees. The screening was based on options identified within the Water Resource Zones where supply deficit was most likely to occur in critical dry periods.

4.5 Constrained Feasible Options Assessment

The next step was to assess each option within the context of the environmental objectives identified within the SEA Scoping Report and the areas of potential deficit a. A range of relevant data sources were collected for each environmental area and information was used to characterise the options are detailed in Table 4-3.

Table 4-3 Data Collected for assessing ‘Constrained’ List of Feasible Options

SEA topic	SEA Receptor Information
People, Economy and Health	<ul style="list-style-type: none"> • Urban/Rural Settlement Areas • Population
Tourism and Recreation	<ul style="list-style-type: none"> • Areas of Outstanding Natural Beauty
Material Assets, infrastructure	<ul style="list-style-type: none"> • Commercial Forests • Major infrastructure (main roads, rail, canals, urban areas)

Biodiversity, Flora and Fauna	<ul style="list-style-type: none"> • Natura 2000 sites (SAC, SPA, Ramsar) and ASSIs • Nature Reserves • Water body ecological status
Landscape, Townscape and Visual Amenity	<ul style="list-style-type: none"> • Urban areas • Rural areas • Landscape Character Areas • Townscape Character Areas • Areas of Outstanding Natural Beauty
Air Quality and Noise	<ul style="list-style-type: none"> • Option characteristics and proximity to sensitive sites
Climate (climate change mitigation)	<ul style="list-style-type: none"> • Carbon footprint
Water Environment	<ul style="list-style-type: none"> • WFD Groundwater status • WFD Surface water ecological status/potential • RBMP measures and WFD objectives • Abstraction and wastewater discharge
Cultural Heritage and Archaeology	<ul style="list-style-type: none"> • Scheduled Monuments • Listed Buildings • Historic Parks and Gardens • Area of Archaeological Interest • Area of Archaeological Potential • Battlefields • Ancient woodlands - see biodiversity above
Geology and Soils and Land Quality	<ul style="list-style-type: none"> • Grade 1, 2 and 3a ALC land • Soil Types • Area of Special Scientific Interest (geological)
Sustainability/climate change adaptation/resilience Issues	<ul style="list-style-type: none"> • Flood Risk Zones • Climate change predictions for NI • Waste generation

Each option was analysed alongside these data sources using a Geographical Information System in order to determine the preferred options for the WR&SR Plan to be taken forward for further in-combination assessment in the form of plan scenarios.

This highlighted the relevant issues which would be considered in more depth in the Environmental Assessment. This was used to inform the option selection process so that the Preferred Plan included the best of a mix of options.

It was intended that the assessment of constrained options would be carried out against the ‘screened in’ SEA objectives identified in the scoping report. The potential effects likely to occur for each receptor were identified. Economy, Air Quality and Noise and Geology were scoped out of the assessment; however, some aspects of these areas were still assessed at an individual option level and alternative plans level; economic costs and benefits of each option and plan scenario, noise and disruption during construction and impacts of geological sites such as ASSIs.

The detailed analysis of each option identified potential significant effects which may arise directly or indirectly as a consequence of the proposed options and any mitigation that would be required if the option were taken forward. It included consideration of the level of certainty in the assessment and highlighted where further work would be required to further understand the environmental risks at the project level assessment.

Using this assessment, the sensitivity of the baseline environment was given a rating based on the:

- **Importance of any designations:** Is it a feature of international, national, regional or local importance?
- **Sensitivity to change:** How sensitive is the receptor to the options? Is it 'healthy' or 'at risk'? This will affect how the receptor responds to an impact and how quickly it can recover.

Table 4-4 Assessing the sensitivity of the baseline

Designation	Sensitivity to change				
	Very High	High	Moderate	Low	None
International / national	Critical	High	Moderate	Minor	Neutral
Regional	High	Moderate	Moderate	Minor	Neutral
Local	High	Moderate	Minor	Neutral	Neutral

The effects can be both adverse and beneficial as indicated by the colour and by the + and – symbol in the Table 4-5 below. The effects of each option were assessed both before and after the identified mitigation measures.

Table 4-5 Scale of effects

Baseline sensitivity	Significant loss or change to receptor		Moderate loss or change to receptor		Minor loss or change to receptor		No discernible loss or change to receptor
High	+++	---	++	--	+	-	0
Moderate	++	--	+	-	0	0	0
Low	+	-	0	0	0	0	0
None	0	0	0	0	0	0	0

4.6 Supply Resilience Enhancements

Alongside the production of the WR&SR Plan, NI Water undertook a separate planning exercise to focus on supply resilience. A number of resilience options have been assessed separately to, but in tandem with, the Plan options (for water resource management). These options have been assessed following the same methodology as Water Resource Options but will only be recommended as options to be given further consideration during the plan period.

Further investigation should be undertaken to define the exact need and scope of each recommended resilience option. Furthermore, each option should be considered in light of other studies and projects being undertaken by NI Water that improve resilience. This integrated approach will ensure that multiple schemes are not implemented in the same area to ultimately address the same problem.

4.7 Environmental Valuation of impacts and benefits

Environmental valuation was undertaken based on the SEA options assessment information. This used environmental economic approaches to monetise environmental and social costs and benefits including carbon (referred to as E&S costing) and these costs were incorporated into the option costs and contributed to the total costs and benefits considered by the EBSD (Economics of Balancing Supply and Demand) model.

The E&S costing was based on the following guidelines and methodologies:

- Benefits Assessment Guidance (BAG), Environment Agency, 2004;
- Water Resource Planning Guideline – The technical methods and instructions. Joint development by the Environment Agency, Ofwat, Defra and the Welsh Government, June 2012;
- BAG User Guide, eftec, January 2012; and
- BAG Worked Example, eftec, February 2012.

The aim was to capture and value significant residual impacts in relation to the categories examined. The general impact categories examined for costing included:

- Biodiversity and ecology, including water quality, designated conservation areas and habitats;
- Landscape amenity;
- Construction impacts (congestion costs);
- Energy and climate change.
- Financial loss to public;
- Personal disturbance;
- Health impacts;
- Carbon saving;
- Waste generated;
- Public awareness; and
- Social inequality.

Carbon footprint and associated carbon costings including embodied and operational carbon are as follows:

- **Embodied carbon** - greenhouse gas (GHG) emissions associated with a manufactured product or built asset (construction carbon). This includes the emissions generated from the extraction, transportation and processing of raw materials required to create them.
- **Operational carbon** - GHG emissions arising from performing operational activities made directly or indirectly by the company in the day-to-day business of delivering drinking water and removing wastewater.

Reporting for the GHG impact of the options under consideration is carried out using unit of mass of carbon dioxide equivalent (CO_{2e}) emissions, which allows for the emissions of the key GHG to be expressed in terms of their equivalent global warming potential in mass of CO₂.

4.8 Plan Scenario Assessment and Preferred Plan selection

The following steps were undertaken as part of the SEA assessment

- The E&S costings provided a direct input to the modelled costs used to identify plan scenarios:
- Plan scenarios were compared based on the SEA options assessment and consideration of in-combination impacts (double counting with costed elements was avoided);
- Selection of the preferred option with SEA input to the multi-criteria analysis;
- Assessment of the Preferred Plan against the SEA objectives to identify potential significant effects and mitigation measures required; and
- High-level assessment of the potential impacts of the Drought Plan which forms part of the WR&SR Plan.

4.9 Cumulative Effects

The SEA includes an assessment of cumulative effects between:

- Options within the plan;
- Other NI Water plans; and

- Other plans and programmes.

Cumulative effects include secondary or synergistic effects. These are reported in Section 6.4 and 6.5 of this SEA Environmental Report.

4.9.1 Potential In-Combination Cumulative Effects

The feasible options have been analysed in terms of potential environmental impacts as a result of options developed and operated in combination. Options requiring other options to be developed were identified as dependant and options determined to be incompatible or environmentally unacceptable when developed collectively were considered mutually exclusive.

4.9.2 Alternative Scenarios and Cumulative Effects

Overall and cumulative effects were considered as part of the comparison of alternative scenarios. The options selected for the Preferred Plan were then assessed in terms of their cumulative impacts to determine which may cause more adverse effects.

4.9.3 Cumulative Effects with other Plans and Programmes

SEA Regulations also require an assessment of the cumulative effects of the Preferred Plan with other relevant plans and programmes. Cumulative effects with water resource management plans and non-water resource related plans and programmes were considered. These have already been taken into account in the identification and assessment of individual options and their implications for the WR&SR Plan, through the review of policies, plans and programmes.

Cumulative assessments were undertaken with the following plans or programmes where possible:

- Regional Development Strategy and National Planning Policy Statements
- River Basin Management Plans
- Flood Risk Management Plans

4.10 HRA & Other Assessments Approach

4.10.1 Habitats Regulation Assessment (HRA)

All Natura 2000 sites (SPAs, SACs and Ramsar sites, including potential sites) has been subject to a HRA in line with the 2010 Regulations. HRA is carried out in parallel with the SEA and as illustrated in Figure 4-1. The HRA was undertaken iteratively to inform the screening of the unconstrained options list highlighting potential conflicts with internationally designated sites concerned. Then a stage 1 screening assessment was undertaken for the feasible options to determine potential for likely significant adverse effects on Natura 2000 sites measures to avoid or mitigate the impacts on Natura 2000 sites were determined as part of the option development. A stage 1 screening assessment was then undertaken on the Preferred Plan options.

An initial stage 1 screening assessment was also undertaken on the Drought Plan which accompanies the WR&SR Plan.

The draft HRA report is provided in Appendix C. Consultation responses on this report will be taken into consideration before finalisation of the WR&SR Plan.

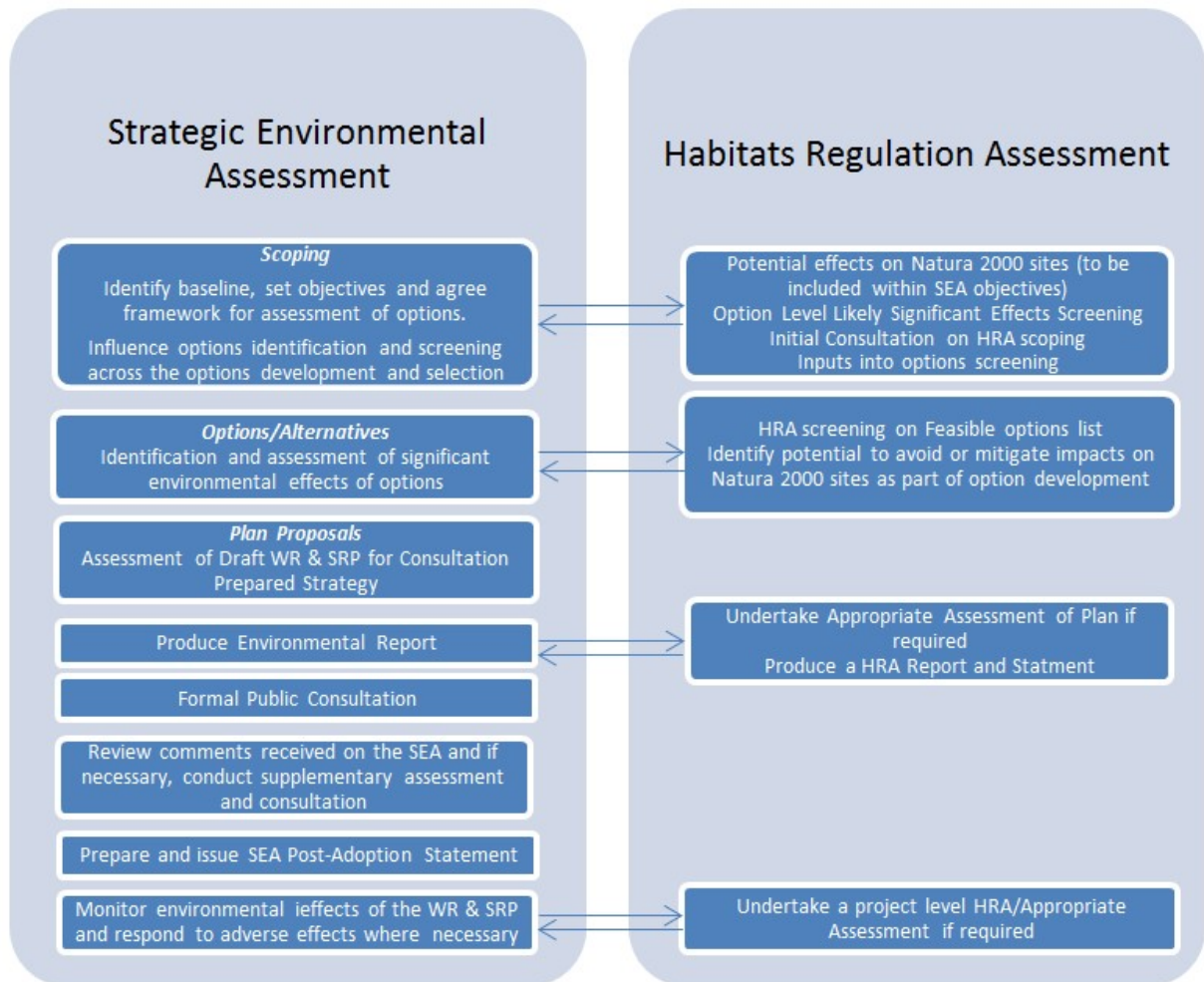


Figure 4-1 SEA and HRA interaction

4.11 Approach for other Assessments

The information collected for the SEA assessment covering the wide range of objectives along with the E&S costing provided a basis for specific assessments undertaken on the individual feasible options and the Preferred Plan covering:

- Equalities Impact Assessment (EQIA) - Screening assessment
- Regulatory Impact Assessment (RIA)
- Rural Needs Impact Assessment – Screening assessment

The conclusions from these assessments are provided in section 6 with the assessment reports in Appendices F, G and H respectively.

5 Comparison of Alternatives

5.1 Alternative Options

SEA requires that 'reasonable alternatives' are identified and assessed, and this was undertaken through consideration of individual alternative options in the screening and options appraisal process and by comparing combinations of options for the plan. This was undertaken through an iterative approach informing the development of the WR&SR Plan.

This chapter outlines the reasons for screening out alternative options and selecting the combination of options for the 'Preferred Plan'. The consideration of alternative options for the Plan takes into consideration a range of issues during screening; environmental, economic, technical feasibility and promotability. Table 5-1 details the options screened out for environmental reasons during the SEA Screening Assessment of the full list of unconstrained options using the RAG traffic light scoring system. None of the demand management options were screened out for environmental reasons. The main reasons for screening out demand management options were cost-feasibility and promotability. The assessment of all options is detailed in an unconstrained options report which was made available to statutory consultees at a workshop during the options screening and SEA scoping process.

Table 5-1 Options removed from unconstrained options list for environmental reasons

Option Category	Option Name	Reason for Exclusion
New Reservoir Locations	New Glenedra Dam	Concerns over the environmental restrictions from the ASSI & SAC and uncertainty of the availability of water.
	Glenedra Bankside Storage	Concerns over water availability, topography, environmental constraints and option lead-time.
	New Glendergan Dam	Concerns over the environmental implications and cross border catchment have ruled this option out.
New Surface Water Abstractions	New Abstraction from the Foyle	Concerns over the environmental implications, ability to abstract additional water from the Foyle (tidal reach) and Mourne rivers and shared catchment have ruled this option out.
	Raw Water Transfer from New Kesh Source to Lough Bradan	Option ruled out due to cross catchment issues with invasive species.
	Enlarge Lough Bradan Impoundment	Issues with existing water quality within the catchment potential environmental issues with deforestation.

5.2 Identification of Constrained Feasible Water Resource Management Options

Options screening identified 'feasible options', and from these feasible options a number of different plan scenarios were considered as part of developing the Preferred Plan.

The SEA assessment of each feasible option is described in section 5.3 below.

A valuation of the environmental costs and benefits assessment based on this options assessment was incorporated into the generation of plan scenarios as described in section 5.4 below.

Plan scenarios were then compared against SEA objectives on the basis of the combined plan options.

5.3 Constrained Feasible Options Assessment

Following the screening process, the feasible options were assessed further in terms of potential impacts on the environment based on the preliminary design information, environmental baseline data and potential mitigation. Environmental issues were taken into account in three ways during the feasible options assessment process:

- 1) Input into option design and refinement – with iterative input where potential environmental issues were addressed through amendments to options;
- 2) Assessment against SEA objectives to determine likely significant effects and identifying potential mitigation requirements; and
- 3) Input into costings to ensure environmental mitigation requirements were included in option costs.

Mitigation and enhancement considerations included:

- **Prevention** – changing the option design, location or operation to avoid significant impacts;
- **Reduction** – reducing risks to the environment and minimising the level of effects;
- **Enhancement** – identifying potential opportunities to improve environmental conditions.

Given the preliminary design of the feasible options, at this stage it is recognised that further studies would be needed to refine and develop options at later design stages, however for this assessment a reasonable ‘worst case’ has been considered for assessment and potential for mitigation has been taken into account. The potential for environmental effects have been identified both without mitigation and with mitigation (residual effects). The characteristics of the effects have been considered in terms of both short/long-term, temporary/permanent, and the main uncertainties in the assessment are identified.

5.4 Modelling of Feasible Options and selection of options

Modelling of the constrained list of feasible options has informed the selection of options for the Preferred Plan. An EBSD model, as used by other UK water companies for optimising their water resource plans, has been used. This is based on a dynamic programming algorithm to evaluate a range of candidate options in order to arrive at an optimum solution. The model aimed to produce the least cost set of options to meet the supply demand deficit and was restricted to selecting options which can be developed in time to meet the deficit. The model was also used as a basis for generating alternative plan scenarios by either restricting the candidate options and prioritisation.

5.4.1 Do minimum baseline scenario

The SEA has considered how the baseline environment is likely to change (i.e. the potential effects) over the Plan period without the Plan in place. This takes into account the pressures and trends that might influence the baseline environment. The ‘do minimum’ scenario is also known as ‘business as usual’.

The model combined the predicted population and household growth and the anticipated changes in water consumption within Northern Ireland in order to calculate the supply-demand balance of the current water supply situation without any additional investment in water supply, demand management or leakage reduction. It also takes into account climate change effects and the uncertainty in the population and consumption growth predictions. The resulting Supply Demand Balance (SDB) for demand years 2014/15, 2024/25, 2034/35 and 2042/43, for each of the SDB scenarios; normal year, dry year, dry year critical period and winter critical period, are presented in Table 5-2 below:

Table 5-2 Supply Demand Balance following ‘Do Nothing’ Plan Scenario

Supply/Demand Balance - 2014/15

SDB	WRZ							MI/d
Scenario	North	North East	East	South	South West	Central	West	TOTAL
NYAA	45.28	29.33	74.66	26.91	10.89	5.34	3.28	195.7
DYAA	31.69	28.46	70.84	23.39	10.47	4.88	0.75	170.5
DYCP	29.07	16.18	44.04	0.11	4.29	-0.02	-3.53	90.1
WCP	24.35	14.02	15.10	9.51	1.34	-1.84	-1.95	60.5

Supply/Demand Balance - 2024/25

SDB	WRZ							MI/d
Scenario	North	North East	East	South	South West	Central	West	TOTAL
NYAA	47.90	29.33	73.18	25.09	10.81	5.52	4.49	196.3
DYAA	33.39	28.43	69.22	21.40	10.38	5.05	2.40	170.3
DYCP	31.54	15.68	41.38	-3.81	4.03	-0.13	-1.91	86.8
WCP	30.12	14.42	18.73	8.55	1.43	-0.94	1.07	73.4

Supply/Demand Balance - 2034/35

SDB	WRZ							MI/d
Scenario	North	North East	East	South	South West	Central	West	TOTAL
NYAA	45.83	27.98	62.66	20.48	10.24	4.68	3.37	175.3
DYAA	30.37	27.05	58.58	16.69	9.81	4.19	1.71	148.4
DYCP	29.12	13.91	29.89	-9.15	3.27	-1.58	-2.74	62.7
WCP	28.03	13.06	8.16	3.90	0.87	-1.78	0.39	52.6

Supply/Demand Balance - 2042/43

SDB	WRZ							MI/d
Scenario	North	North East	East	South	South West	Central	West	TOTAL
NYAA	43.98	27.03	55.25	17.51	9.88	4.10	2.53	160.3
DYAA	27.77	26.08	51.10	13.68	9.44	3.60	1.21	132.9
DYCP	27.06	12.75	21.97	-12.94	2.81	-1.85	-3.30	46.5
WCP	26.18	12.10	0.73	0.92	0.50	-2.37	-0.11	37.9

5.5 Identification of Alternative Plan Scenarios

A range of Plan Scenarios were considered as part of selecting the WR&SR Plan including:

- **Do Nothing scenario:** No new options are implemented to improve SDB – this is represented in section 5.5 above.
- **Most Economic scenario:** This is the most economical way of reducing the deficit and would be used as a starting point for identifying the Preferred Plan.
- **Low Carbon scenario:** The model was run to identify the most carbon neutral plan without considering economic costs or environmental constraints.
- **Best Environmental scenario:** This is the most environmentally friendly way of reducing the deficit and would be taken into consideration when selecting the Preferred Plan.
- **Optimum Lead-in time:** The model was run to identify the fastest potential plan which would reduce the deficit without considering economic costs or environmental aspects.

A range of water resource supply and resilience scenarios which took into account a combination of these inputs were considered for the Preferred Plan and are detailed in Table 5-3.

Six core scenarios for meeting the supply demand deficit were compared. Only one option other than demand management was considered feasible for the South WRZ, the Castor Bay WTW to Ballydougan transfer. Similarly, only one option other than demand management was considered feasible for the Central WRZ. This option was therefore common to all plan alternatives meeting the deficit over the plan period. The SEA and the HRA screening identified potential impacts for this on the

Lough Neagh Ramsar site and nearby SPA/ASSI from pipeline construction. However, these are expected to be temporary short term impacts with mitigation including potential limitations on construction timing.

Demand management options were packed into three water efficiency packages. Water Efficiency Package 1 was selected by the model for all scenarios; the sub- options included in this package were:

- Targeted non-household water audits (key accounts)
- Schools water audit and retrofit
- Hotel & Hospitals water audit and retrofit
- Farm Audits

All demand management options were considered low risk, however Water Efficiency Package 1 options were considered overall to be more beneficial due to potential water and associated energy and carbon savings. They also provide potential for raising water conservation awareness. Water Efficiency Package 2 and 3 were not selected by the model due to high costs and lower reductions in the supply demand balance compared to Water Efficiency Package 1.

Alternative water resource options for meeting the deficit were considered for the West WRZ. These alternatives were considered through a multi-criteria analysis including supply resilience, deliverability and climate change adaptability as well as meeting SEA objectives. This multi-criteria analysis is reported in Chapter 13 of the WR&SR Plan and summarised in Table 5-3 below.

Environmental aspects were taken into account in the EBSD modelling through E&S and carbon cost input to the Average Incremental Social Costs (AISC).

5.6 Assessment of alternative scenarios

The 6 assessment scenarios are summarised in Table 5-3 below.

Table 5-3 Alternative supply resource scenarios

Plan Scenario	WRZ	Delivery	Option Name	SEA Risk Level	E & S + Carbon Costing
A1	All*	2017/18	Water Efficiency Package 1	Low	-£304,487
	West	2018/19	Carmoney to Strabane TM	Low	£691,361
	South	2019/20	Castor Bay WTW to Ballydougan TM	Moderate	£247,142
	South / West	2018/19	Booster Upgrades on Carland to Cookstown TM	Low	£31,979
	Total			Low	£665,969
A2	All*	2017/18	Water Efficiency Package 1	Low	-£304,487
	South	2019/20	Castor Bay WTW to Ballydougan TM	Moderate	£247,142
	West	2018/2019	Derg Bankside Storage	Moderate	£1,862,553
	South / West	2018/19	Booster Upgrades on Carland to Cookstown TM	Low	£31,979
	Total			Moderate	£1,837,187
A3	All*	2017/18	Water Efficiency Package 1	Low	-£304,487
	South	2019/20	Castor Bay WTW to Ballydougan TM	Moderate	£247,142
	West	2019/20	Killyhevlin to Lough Bradan TM	Low	£260,837
	South / West	2018/19	Booster Upgrades on Carland to Cookstown TM	Low	£31,979

	Total			Low	£235,471
A4	All*	2017/18	Water Efficiency Package 1	Low	-£304,487
	South	2019/20	Castor Bay WTW to Ballydougan TM	Moderate	£247,142
	West	2019/20	Lough Neagh, New WTW and Trunk Main Transfer	Moderate	£2,449,186
	South / West	2018/19	Booster Upgrades on Carland to Cookstown TM	Low	£31,979
	Total			Moderate	£2,432,820
A5	All*	2017/18	Water Efficiency Package 1	Low	-£304,487
	South	2019/20	Castor Bay WTW to Ballydougan TM	Moderate	£247,142
	West	2022/2023	New Groundwater Sources in Fermanagh	Moderate	£9,145,681
	South / West	2018/19	Booster Upgrades on Carland to Cookstown TM	Low	£31,979
	Total			Moderate	£9,120,315
A6	All*	2017/18	Water Efficiency Package 1	Low	-£304,487
	South	2019/20	Castor Bay WTW to Ballydougan TM	Moderate	£247,142
	West	2022/2023	Caugh Hill to Strabane TM	Moderate	£1,176,405
	South / West	2018/19	Booster Upgrades on Carland to Cookstown TM	Low	£31,979
	Total			Moderate	£1,151,039

*E&S modelled costs based on WRZ 5 &7

Following the multi criteria assessment, scenarios A1-A3 were taken forward for further appraisal. These options are discussed in more detail in Section 13.6.5 of the WR & SR Plan. As can be seen from the tables above, scenarios A1 and A3 were given a lower environmental risk. While the A1 and A3 scenarios were considered similar for environmental risk. A3 had a lower operational carbon footprint and cost but A1 was considered to provide greater supply resilience and as a combined set of options also greater potential for environmental climate change resilience and was therefore preferred overall. Scenario A2 included the Derg Bankside storage option. This has a higher environmental risk compared to the pipeline options, which was associated with potentially greater deliverability, lead time and supply resilience risks as identified in Section 13 of the WR & SR Plan.

Scenarios A4-A6 were eliminated as potential plan scenarios. Scenario A4 had the longest lead time due to the new source and water treatments works required at Lough Neagh. Scenario A5 included the new groundwater sources in Fermanagh which were associated with greater total environmental risk and carbon footprint reflected in the E&S costings. Scenario A6, despite also being a pipeline option similar to Scenarios A1 and A3 has a higher environmental risk due to higher carbon costs/footprint. The rationale for eliminating these options is discussed in more detail in Section 13.6.4.

5.7 Selection of Preferred Plan

The Plan has shown that all 7 of NI Water WRZs have sufficient water available for the Dry Year Annual Average. However, the critical period analysis has identified that for short periods 3 of the 7 zones (Central, South and West WRZs), have potential deficits that require investment to ensure supplies are maintained for the planned level of service.

The plan makes the following recommendations:

Water Resource Recommendations

- Carmoney to Strabane Transfer

- Castor Bay to Ballydougan Transfer
- Booster Upgrades on Carland to Cookstown Booster Trunk Main

Demand Management Recommendations (across all of Northern Ireland)

- Targeted non-household water audits (key accounts)
- Schools water audit and retrofit
- Hotel & Hospitals water audit and retrofit
- Farm Audits

5.8 Drought Plan

Droughts are a naturally occurring phenomenon and occur when lower than average rainfall causes a shortage of water. This shortage affects both the natural environment and sectors such as agriculture and water supply. The duration, timing and intensity of a drought can vary considerably, and these factors will combine to affect different sectors in different ways.

Droughts can have a local to national extent, and can be characterised as mild to severe. The range and unpredictability are a challenge for developing a definitive plan of actions, which will apply to all situations. The Drought Plan describes the drought management process designed to accommodate this in terms of actions escalating from routine monitoring activities to the inception of a drought incident team, who will shape the actions needed to respond to the event as it develops. The Drought Plan allows a flexible approach based on the precise circumstances of the time. It depends on timely routine data collection and monitoring, clearly defined responsibilities and active communications, within NI Water and with stakeholders and customers (see Table 5-4).

Table 5-4 Drought Stages

Drought actions	Dry Year	Developing Drought	Drought	Severe Drought
Monitoring data Rainfall River and reservoir levels SDB Environmental conditions	List baseline monitoring activity	List increased monitoring and data gathering as drought situation becomes more apparent	List increased monitoring and data gathering as drought situation worsens in preparation for drought orders	List increased monitoring and data gathering as drought situation worsens in preparation for drought orders
Triggers Rainfall River and reservoir levels Distribution Input (DI) SDB Environmental conditions	Describe triggers that could be used to identify normal risks – to be used to identify the end of a drought	Describe triggers used to identify drought situation	Describe triggers used to identify drought situation	Describe triggers used to identify drought situation
Management actions Communications Demand Supply	Normal operation of sources – company approach to minimising costs, carbon, etc.	Describe phasing of drought actions including communications plan activities. Management of sources to achieve DO’s under dry year conditions	Describe phasing of drought actions including communications plan activities	Describe phasing of drought actions including communications plan activities

Mitigation actions Environmental Customers			Describe possible mitigation activities needed as drought actions are introduced	Describe possible mitigation activities needed as drought actions are introduced
Example NI Water Actions	Routine monitoring	Increase WL monitoring Increased customer engagement Initiate planning for drought orders Initiate engineering options	Increased communications Enhanced leakage reductions Apply for Drought Orders Hose pipe bans	Determine and implement Drought Orders

The Drought Plan has been developed through a process, which assesses the issues within each Water Resource Zone (WRZ) and identifies the options to mitigate against drought risks. This has been assessed against each functional group of sources, defined where a single set of drought control triggers or curves can represent a collection of sources. This may be at finer detail than WRZ level.

Solutions have been developed locally for each functional group of sources and then crossed checked for consistency and to ensure measures, such as enhanced transfers, are achievable in drought conditions.

The summary of the stages in developing the drought plan is as follows:

- Characterise the sources and drought response;
- Review history of drought issues within the zone;
- Identify options for drought management actions;
- Develop control curves using the drought management actions (these help to understand effectiveness of actions);
- Identify monitoring requirements for production, water resource and environmental indicators.

Four broad types of measures are identified in the Drought Plan:

- 1) Demand management actions e.g. hosepipe bans and customers being requested to use less water;
- 2) Redistribution of water within the existing network e.g. rezoning of water;
- 3) Increased abstractions but within existing licence conditions; and
- 4) Abstractions outside of the licence (requiring drought orders) such as increase abstractions or reduce release of compensation flows from reservoirs into rivers.

There are two types of demand side drought actions that have been identified as standardised measures across all groups – see Table 5-5.

Table 5-5 Standardised Demand Side Drought Actions

Drought Stage	Drought Action*
3 - Drought Warning (Amber)	3% demand cutback from the introduction of hosepipe bans
4 – Drought (Red)	2% demand cutback from the introduction of other customer restrictions for non-essential use

For each functional group of sources, potential types of measures and actions are recommended for each drought level. Given the rarity and short duration of drought measures the focus for the SEA is to assess potential significance of these impacts and the requirement for mitigation measures in terms of the SEA biodiversity, population, economy and health objectives.

5.9 Supply Resilience Enhancements

The plan has identified a number of resilience issues particularly limited interconnectivity in key areas, water quality issues at source and over reliance on a chemical with limited availability for water treatment. The resilience options were assessed against SEA objectives similarly to the water resource options. The overall environmental risk levels for the majority of the options were identified as either low or moderate risk, as illustrated in Table 5-6. The impacts could be managed through appropriate route selection, investigation and mitigation to minimise long term impacts from pipeline construction.

The Resilience Options to be considered by NI Water during the Plan period are listed as follows:

- Lough Fea WTW & Moyola WTW Resilience Link;
- Upgrade Killyhevlin WTW;
- Seagahan to Clay Lake TM;
- West WRZ Resilience;
- Ballinrees Resilience.

Table 5-6 Resilience Options Environmental Summary

Option Name	Environmental Risk Category
Resilience options	
Lough Fea WTW & Moyola WTW Resilience	Low
Upgrade Killyhevlin WTW	Low
Seagahan to Clay Lake TM	Low
West WRZ Resilience, Trunk Main Upgrades and Links	Moderate
Ballinrees Resilience	Low

6 Environmental Assessment of the Preferred Plan

6.1 Introduction

This section describes the Preferred Plan as proposed in the WR&SR Plan, which is composed of a combination of the options selected via the process set out in Section 4. This section describes the outcomes of the assessment of the Preferred Plan, which identifies the potential significant environmental effects of the individual options selected as well as the Plan as a whole. This assessment includes possible cumulative effects both within the WR&SR Plan (more than one option contributing towards an effect on a common receptor) and with other plans and programmes. The overall assessment of the Plan is carried out against the SEA objectives.

6.2 Preferred Plan

The Preferred Plan was based on a model run of an optimal case aimed at producing a balanced and sustainable plan that would meet water demands and provide climate change resilience. The Preferred Plan options are listed in Table 6-1.

Table 6-1 Preferred Plan options

Option Type	Option	Resource Delivered (MI/d)	WRZ	Delivery Year
Demand Management Package 1				
Audits	Targeted non-household water audits (key accounts)	1.393	All	2017/2018
	Schools water audit and retrofit		All	
	Bathroom retrofit		All	
	Farm Audits		All	
Supply Demand Balance Requirements				
Trunk Main Transfer	Carmony to Strabane Trunk Main	3.3	North /West	2018/2019
	Castor Bay WTW to Ballydougan SR Trunk Main	20	East / South	2019/2020
	Booster Upgrade on Carland to Cookstown Trunk Main	2.6MI/d ¹⁷	Central	2019/2020

6.2.1 Resilience Options for further consideration

The Preferred Plan does not recommend any options for resilience but does put forward a number of options to be considered for implementation during the plan period. These are listed in Table 6-2.

¹⁷ Existing main has capacity to transfer 2.4MLD under gravity, proposed option will increase this to 5MLD capacity in total.

Table 6-2 Resilience options

Resilience Options for further consideration			
Option Type	Option	Resource Delivered (MI/d)	WRZ
Trunk Main Transfer	West WRZ Resilience, Trunk Main Upgrades and Links	14	North/West
	Lough Fea WTW & Moyola WTW Resilience	10	Central
	Upgrade Killyhevlin WTW	40	South West
	Seagahan to Clay Lake TM	5	South
	Ballinrees Resilience	20	North

6.3 Assessment of the Preferred Plan and mitigation requirements

Table 6-3 below summarises the environmental risks associated with both the demand management and supply demand balance proposals.

Table 6-3 Summary of Environmental Assessment

Option Type	Option	Key Environmental Risks	Residual risks considering mitigation	Post-Mitigation Risk Level
Demand Management Package 1				
Audits	Targeted non-household water audits (key accounts)	There is some potential for minor disruption from product fitting but participation will be voluntary.	Environmental impacts are expected to be beneficial due to carbon and water savings.	Low
	Schools water audit and retrofit			Low
	Bathroom retrofit			Low
	Farm Audits			Low
Supply Demand Balance Requirements				
Trunk Main Transfer	Carmony to Strabane Trunk Main	Pipeline construction related risks for traffic disruption and impacts on habitats, landscape and cultural heritage sites. Potential impacts involved with crossing SAC/ASSI watercourse; potential to impact the qualifying features of the designation.	Short term impacts from traffic disruption and land disturbance. Potential to avoid long term impacts through routing, good construction practices and quality reinstatement.	Low
	Castor Bay WTW to Ballydougan SR Trunk Main	Located within Ramsar site and within close proximity to SPA/ASSI, therefore potential for direct habitat loss and impacts on breeding and wintering birds.	Potential to avoid significant impacts on the Lough Neagh Ramsar site and SPA through timing restrictions and other potential impacts avoided through	Moderate

		Areas of ancient woodland, loss of farmland, road and river crossings.	detailed routing and good construction practice.	
	Booster Upgrade on Carland to Cookstown Trunk Main	Option within close proximity to cultural heritage sites including scheduled monuments/sites, listed buildings in addition to historic battlesites and ancient woodlands.	Small-scale development involving pumping stations, therefore environmental impacts can be reduced to a minimal with sensitive siting and design.	Low

6.3.1 Assessment of the Resilience options for further consideration and mitigation requirements

Table 6-4 overleaf summarises the environmental risks associated with the resilience options.

Table 6-4 Summary of Environmental Assessment

Resilience Options for further consideration				
Trunk Main Transfer	West WRZ Resilience, Trunk Main Upgrades and Links	Pipeline construction related risks for traffic disruption and impacts on landscape and cultural heritage sites. AONB and historic battle sites. Crossing SAC/ASSI watercourse.	Potential risk to designated sites and traffic disruption during construction would need to avoid battle site through routing amendment and minimise long term impacts through use of trenchless river crossings quality reinstatement and good construction practice.	Moderate
	Lough Fea WTW & Moyola WTW Resilience	Potential to affect cultural heritage sites, AONB, and ancient woodlands depending on route alignment.	Short term pipeline construction related risks for traffic disruption and but potential to avoid impacts on designated sites through routing and good construction management.	Low
	Upgrade Killyhevlín WTW	Location adjacent to existing WTW. Adjacent to Upper Lough Erne watercourse. Numerous cultural heritage sites within 1km. Ancient woodland sites within close proximity.	Potential construction risks to adjacent water course. Long term environmental impacts are expected to minimal with good design and construction practice.	Low
	Seagahan to Clay Lake TM	The pipeline is close to a small number of designations including an ASSI, scheduled	Minimal environmental impacts expected with sensitive routing and	Low

		monuments and listed buildings.	good construction management.	
	Ballinrees Resilience	Option within AONB and close proximity to SAC/ASSI designations and various cultural heritage sites.	Small-scale development involving pumping stations and a small pipeline, therefore environmental impacts can be reduced to a minimal with sensitive siting and design.	Low

Mitigation recommendations within this SEA include the need for further environmental assessment. As the options are progressed to future design stages it is expected that they will be assessed in greater detail, including further surveys, investigations and consultation to understand the local baseline environment.

The risks associated with these options will be addressed using a combination of the following mitigation measures:

- Undertake discussions with communities or relevant organisations to assess and promote the potential uptake of demand management measures;
- Sensitive design of permanent structures to fit into landscapes;
- Appropriate siting/re-routing taking account of environmental constraints;
- Reinstatement of land to ensure no net loss of habitat and minimal long-term land use change;
- Good construction management to minimise pollution risk;
- Use of trenchless technologies for sensitive crossings for WFD rivers and major infrastructure or other sensitive sites;
- Good traffic management avoiding interruption during peak traffic time and seasonal peaks;
- Project level assessments; ecological and protected and priority habitats and species, cultural heritage, archaeological, ground conditions, arboriculture, landscape and visual, drainage and screening for EIA/HRA/WFD as appropriate based on good practice and consultation with stakeholders; and
- Restricting construction time scales/ areas to prevent, for example; disturbance to nesting birds or to avoid other protected species at specific times.

6.3.2 Detailed Environmental Assessment

More detailed assessment tables describing the environmental impacts and mitigation measures for all options are available on request for any interested party. This information can be obtained directly from NI Water using the contact details below:

Conor Courtney
 Asset Strategy
 Northern Ireland Water
 Westland House
 40 Old Westland Road
 Belfast, BT14 6TE
 Conor.Courtney@niwater.com

6.4 Cumulative Effects

The SEA has assessed the cumulative effects of the Preferred Plan as detailed in Section 4.7.

6.4.1 Cumulative effects between water resource options in the WR&SR Plan

The cumulative effects between the options recommended within the WR&SR Plan have taken into account. This could include:

- Disturbance on traffic or people in the same area or road routes;
- Effects on the same receptor (e.g. a river or catchment);
- Effects on the same type of receptor (e.g. particular habitat types or protected landscapes)

Most effects for the water resource options are quite localised, therefore, the main potential for cumulative effects is with water transfer options. Table 6-5 illustrates that there is potential for cumulative effects on the same groundwater body between two preferred plan options during construction. Castor Bay WTW to Ballydougan Trunk Main and the Booster Upgrade on Carland to Cookstown TM options are both within the Cookstown groundwater body. However, these options are not in close proximity and the works proposed for the Booster Upgrades on Carland to Cookstown are small scale and localised and should not be intrusive. Given the distance between the options it is also unlikely that they would have other combined effects for example on the same transport routes resulting in additional traffic disruption, or construction effects occurring on the same surface watercourses. There is potential for impacts on similar habitat types but scope to avoid protected habitats and for loss to be minimised through appropriate reinstatement and mitigation..

Table 6-5 Cumulative effects between preferred plan Water Resource Options

Carmony to Strabane TM				
Castor Bay WTW to Ballydougan TM				
Booster Upgrade on Carland to Cookstown TM			Construction	Construction and Operation
Water Resource Options	Carmony to Strabane TM	Castor Bay WTW to Ballydougan TM	Booster Upgrade on Carland on Cookstown TM	

6.4.2 Cumulative Effects Assessment of preferred plan water resource options and Supply Resilience Enhancement Options

In the event that resilience options will be implemented during construction of the Plan options, the cumulative impacts assessment has been undertaken for the resilience options proposed for consideration in the Plan. The cumulative effects were assessed using the same methodology for the Water Resource options as demonstrated in Section 6.4.1.

Table 6-6 Cumulative effects between preferred plan Water Resource and Resilience Options

Carmoney to Strabane TM										
Castor Bay WTW to Ballydougan SR TM										
Carland to Cookstown Booster									Construction	Construction and Operation
Lough Fea WTW & Moyola WTW Resilience										
Upgrade Killyhevlin WTW										
Seagahan to Clay Lake TM										
West WRZ Resilience TM Upgrades and Links										
Ballinrees Resilience										
	Carmoney to Strabane TM	Castor Bay WTW to Ballydougan SR TM	Carland to Cookstown Booster	Lough Fea WTW & Moyola WTW Resilience	Upgrade Killyhevlin WTW	Seagahan to Clay Lake TM	West WRZ Resilience TM Upgrades and Links	Ballinrees Resilience		

Table 6-6 illustrates that if the resilience options were implemented there would be some cumulative effects. These are in relation to works proposed for:

- West WRZ Resilience TM Upgrades and Links and Upgrade Killyhevlin WTW which are within the same River Basin District;
- Ballinrees Resilience and Carmoney to Strabane TM being located within the same groundwater body; and
- Carland to Ballydougan Transfer which is located within the same groundwater body as Lough Fea WTW & Moyola WTW and Castor Bay to Ballydougan TM.

Further detail is provided in Section 6.6.

However, the cumulative impacts are unlikely to result in a significant residual impact, assuming adherence to mitigation measures. This is primarily due to the distance between the proposed works and the nature of the works on each individual WFD water body. Combined impacts on similar habitat types such as total lengths of hedgerows or numbers of trees affected can be addressed through mitigation to ensure no net loss of priority habitats in the implementation of individual schemes.

6.4.3 Cumulative effects with other plans and policies

The cumulative effects of the WR&SR Plan with other relevant plans and policies were assessed. The River Basin Management Plans are addressed through the WFD assessment. The main plan

identified with potential implications for or as a result of the plan was the Regional Development Strategy addressed below:

6.4.4 Regional Development Strategy

The Regional Development Strategy (RDS) is a strategy for the development of Northern Ireland up to 2035. It provides the context for:

- Strengthening the competitiveness of the regional economy and tackling social and economic disadvantage;
- Protecting and enhancing the physical, natural and man-made assets of the Region;
- Housing, transport, air and water quality, energy and waste strategies, and for infrastructure providers and public service providers; and
- Development plans and for guiding public and private investment decisions relating to land use.

The WR&SR Plan has relevance for the main aims of the RDS and the associated local development plans that facilitate the achievement of these objectives:

- **RG1:** Ensure adequate supply of land to facilitate sustainable economic growth by ensuring quality and viable sites are zoned for economic development uses such as water and sewerage infrastructure.
- **RG12:** Promote a more sustainable approach to the provision of water and sewerage services and flood risk management.

Other than potential short-term construction impacts for infrastructure provision, the improved water supply resilience provided through the WR&SR Plan is considered supportive to the RDS aims. Development promoted through the RDS can have implications for the WR&SR Plan although in terms of general water demand, the predicted population and economic growth over the plan period has been included in the WR&SR Plan SDB modelled scenarios and sensitivity testing.

It will be important that the WR&SR Plan proposals are subject to scheme specific consultation with planning authorities and highways authorities to ensure conflicts or combined effects with other development applications, and highways or service maintenance programmes are avoided.

Adherence to legislation including the following (detailed in Appendix A) is a requirement for the development of the WR&SR Plan options:

- The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2012
- Historic Monuments and Archaeological Objects (Northern Ireland) Order 1995
- Conservation (Natural Habitats etc.) Regulations (Northern Ireland) 2012
- Wildlife and Natural Environment Act (Northern Ireland) 2011

Compliance with the relevant policies and legislation and commitment to applying guidance and good practice can avoid potential cumulative impacts that developments facilitated by the WR&SR Plan and RDS may have on the environment. Programmes outside the scope of the WR&SR Plan that support water efficiency in development, the use of sustainable urban drainage systems for example and agricultural, forestry environmental schemes reducing water pollution are all important for improving sustainability.

No significant adverse cumulative effects with regional development plans or programmes have been identified for the WR&SR Plan.

6.5 Cumulative Assessment Summary

The cumulative assessment has determined that the NI Water WR&SR Plan should not result in any significant, long-term adverse effects. The assessment shows that there should be no incompatibilities with other plans or programmes.

6.6 Water Framework Directive (WFD): Plan-Level Assessment

The Northern Ireland Environment Agency (NIEA) requires an assessment of the impact of works/modifications to water bodies throughout Northern Ireland under the Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003¹⁸. The Directive has introduced a holistic approach to the management of water quality, requiring the protection of all aspects of the water environment including rivers, lakes, estuaries, coastal waters and groundwater. The Directive uses five status classifications for the water bodies: High, Good, Moderate, Poor and Bad. It also allows for extended deadlines or less stringent objectives to be set for WFD water bodies, should certain conditions be met.

The primary aim of the WFD is to improve/maintain 'Good Status' (or Good Potential for artificial or heavily modified water bodies). In addition, the WFD requires no deterioration in overall status or status of individual quality elements. The overall status/potential comprises a series of biological, physico-chemical and hydromorphological 'quality elements'.

Within Northern Ireland, the water bodies are divided into three River Basin Districts (RBDs), for which River Basin Management Plans have been created to outline the high level strategy for the district. The RBDs are then further divided into Local Management Areas (LMAs) encompassing the individual WFD water bodies.

The WFD outlines a number of objectives within Northern Ireland, including:

- provide at least as good status/potential for all water bodies;
- prevent deterioration in status/potential;
- promote sustainable development; and,
- achieve specific standards for protected areas.

The overall WFD water body comprises of a 'main water body' which, for the purposes of this report is defined as the watercourse identified on the NIEA mapping (NIEA, 2017), and then all tributaries feeding into this watercourse. The reported status/potential for the WFD water body covers all the watercourses within the catchment.

6.6.1 Overview

An initial assessment has been undertaken and has established that the proposed options are unlikely to have a significant impact on the WFD water bodies at both a catchment scale and a LMA scale.) Figure 6-1 and Figure 6-2 illustrate the location of each proposed option in relation to River Basin Districts and watercourses. Table 6-7 details the proposed options and the potentially impacted WFD water bodies (8 in total) and LMAs (3 in total). Table 6-8 details the underlying groundwater bodies for each option (3 in total).

¹⁸ The regulations have been transposed from European Union legislation, the Water Framework Directive (2000/60/EC) (as amended)

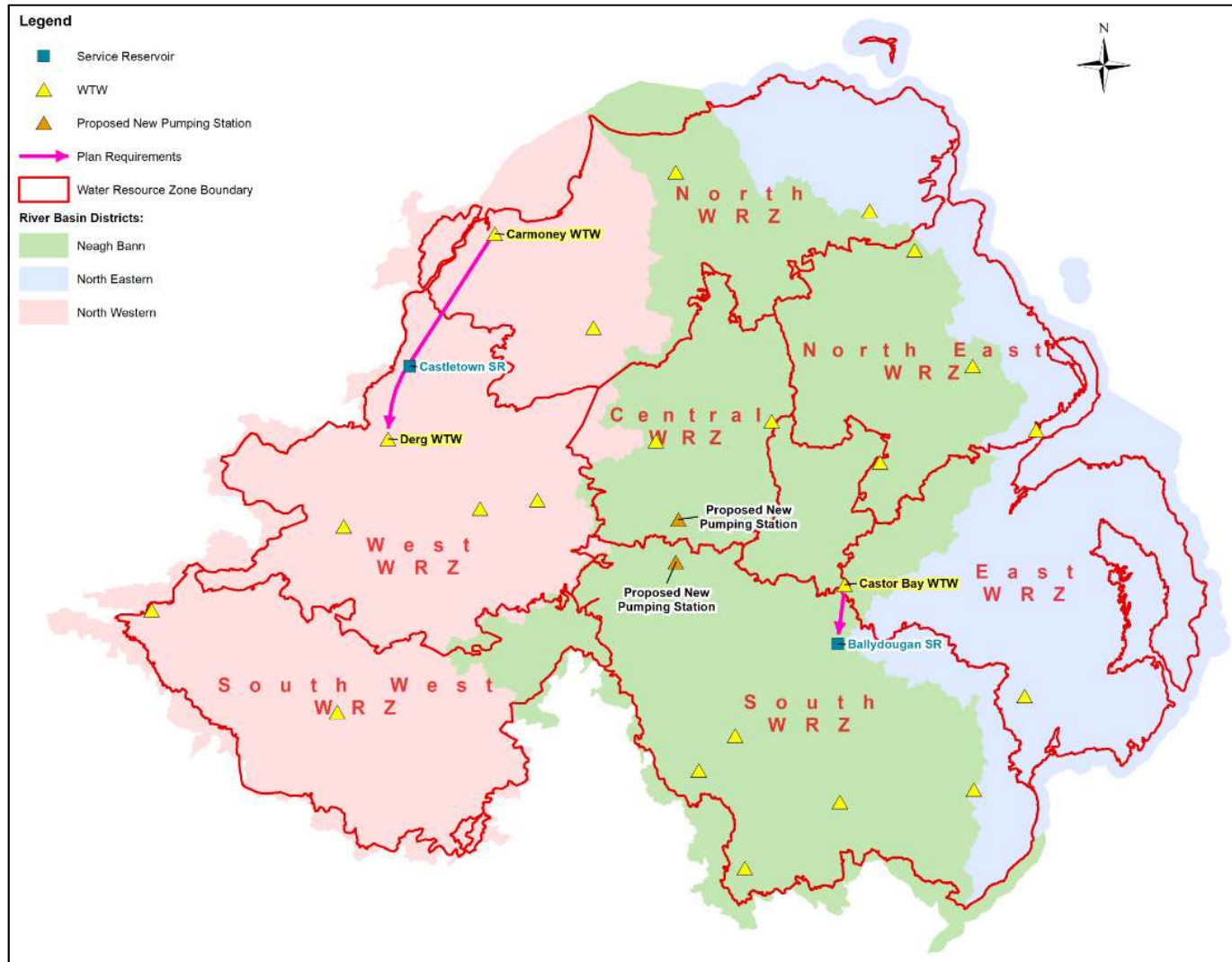


Figure 6-1 Preferred Plan option locations in relation to Watercourses and River Basin Districts

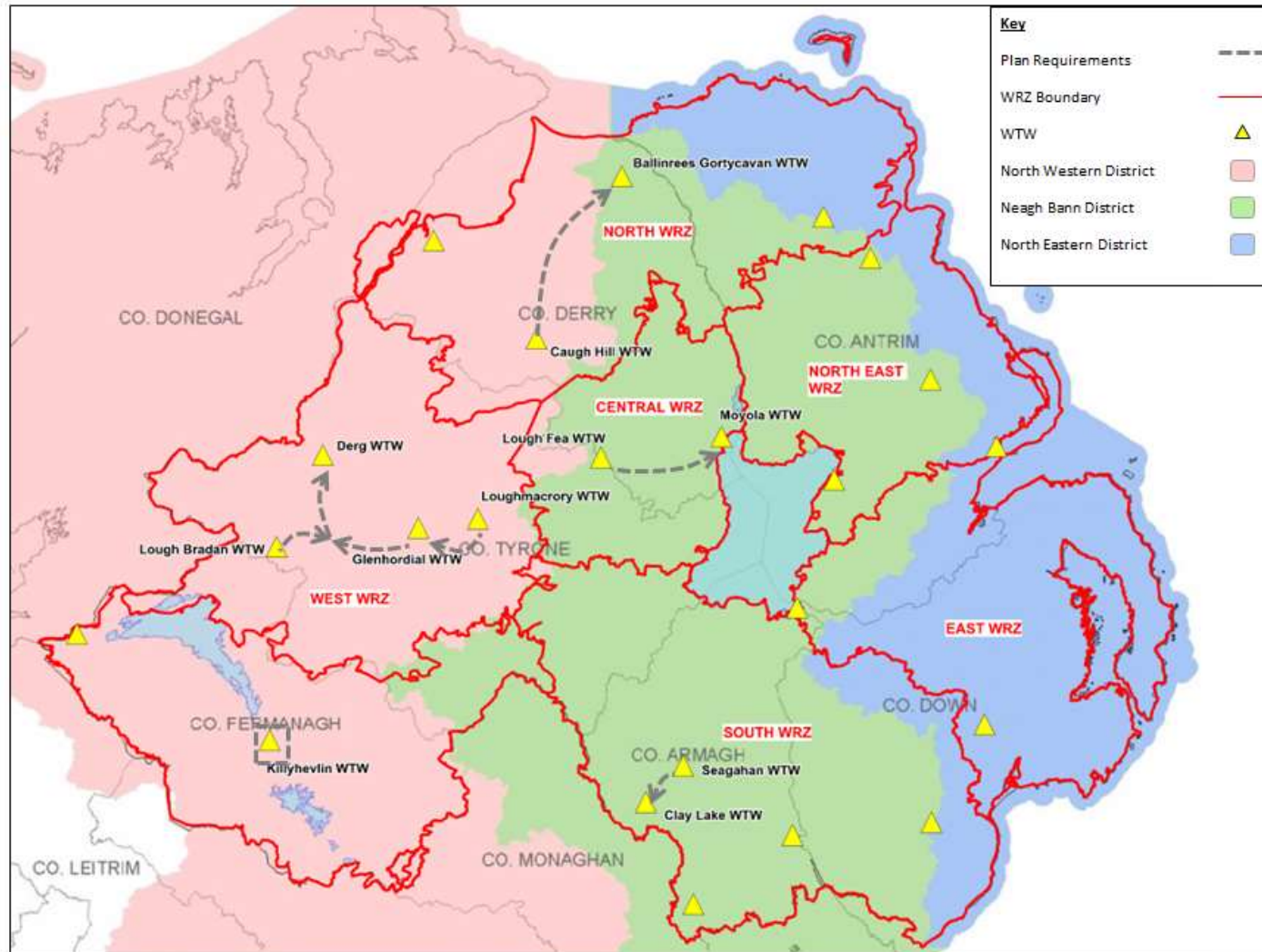


Figure 6-2 Preferred Plan Resilience option locations in relation to Watercourses and River Basin Districts

Table 6-7 and Table 6-8 indicate that no surface water bodies or groundwater bodies are impacted by more than one option.

However, Table 6-6 illustrates that if the resilience options were implemented there would be some cumulative effects in relation to works being carried out within the same River Basin District or groundwater body. However, the cumulative impacts are unlikely to result in a significant residual impact, assuming adherence to mitigation measures. This is primarily due to the distance between the proposed works and the nature of the works on each individual WFD water body.

6.6.2 Quality Element Assessment

For the initial assessment of the WR&SR Plan, the potential impacts identified on the biological quality elements include:

- a loss of in-channel and riparian habitat as a result of open trench construction methods on a number of watercourses; and,
- the existing intake structure on the River Derg or Strule and new outfall on the River Derg.

Additional discharges as a result of the maintenance operation of the outfall have the potential to modify flow on the River Derg, potentially leading to localised impacts on aquatic flora and fauna. This could be mitigated by inclusion of good practice principles during detailed design. With suitable mitigation incorporated into the design and during construction and the use for maintenance drawdown operations only, it is considered that these impacts would not have an impact at the WFD water body scale.

The potential impacts identified on the physico-chemical quality elements include:

- potential changes to nutrient and oxygen conditions on the River Derg (due to the operation of the new outfall from the bankside storage facility); and,
- impacts associated with potential sedimentation releases during construction of the trunk main pipeline options (using open trench methods).

Impacts on physico-chemical quality would typically be localised and primarily dependant on the dilution factor at the discharge points. When considered in line with the sensitivity of the watercourses and the short duration operation from reservoir drawdown, these are unlikely to affect physico-chemical classifications at a WFD water body scale.

The potential impacts identified on the hydromorphological quality elements include:

- the removal of the existing bank material and bed substrate;
- potential for increased erosion at 'weak points' in the bed and banks left following in-channel working; and
- loss of vegetated riparian corridors as a result of in-channel structures and trunk main pipeline installation.

This could lead to localised impacts on the lateral and longitudinal connectivity of the WFD waterbodies and the processes occurring within the channel (i.e. flow and sediment dynamics). The majority of the impacts would likely be localised and mitigated for by following good practice guidelines during the detailed design. The use of trenchless construction methods, proposed for larger WFD water bodies, eliminates direct hydromorphological impacts on the channels.

Overall, the assessment in Table 6-7 and Table 6-8 has indicated that, with the inclusion of appropriate mitigation measures, both the construction and operation of the WR&SR Plan would be anticipated to have no significant residual impacts. As a result, it would be unlikely that there would be any deterioration in the current WFD statuses/potential or prevention of the WFD water bodies from achieving Good.

However, it is recommended that additional work is undertaken to support the above assessment and also cover potential impacts to groundwater and transitional WFD receptors as part of individual project level assessments.

Table 6-7 Preferred Plan options and associated surface water bodies potentially impacted

Local Management Area	Faughan		Burn Dennet and Foyle		Ballinderry	Lough Neagh		
	River Muff	Faughan River (Carmoney)	Burngibbagh	Upper Foyle	Burn Dennet River	Glenmornan River	Closet River	Lough Neagh Peripherals
Carmoney to Strabane TM								
Castor Bay WTW to Ballydougan SR TM								
Booster Upgrades on Carland to Cookstown TM								

Table 6-8 Preferred Plan options and associated groundwater bodies potentially impacted

Local Management Area	Roe	Lough Neagh		Ballinderry
	Claudy	Antrim	Neagh	Cookstown
Carmoney to Strabane TM				
Castor Bay WTW to Ballydougan SR TM				
Booster Upgrades on Carland to Cookstown TM				

6.6.3 Further Assessments

The following additional work has been identified, which would need to be carried out related to WFD requirements during the detailed assessment for Preferred Plan scheme:

- a detailed WFD assessment for each proposed option covering fluvial, groundwater and transitional water bodies;
- detailed analysis of historical channel migration at each proposed river crossing to establish areas which may be sensitive to channel change and have the potential to put infrastructure (such as pipelines) at risk (i.e. from erosion).

Table 6-9 Proposed Plan and Resilience options and associated surface water bodies potentially impacted

Local Management Area	Derg and Mourne	Strule						Lower Lough Erne	Roe	Faughan		Burn Dennet and Foyle			Ballinderry	River Blackwater				Lough Neagh		
	Water Body Caughtment Impacted	The Black Water (Drumquin)	Camowen River (Omagh)	Strule River	Fairywater River (Dunwish)	Drumquin River	Fairy Water (Envagh)	Lower Lough Erne Kesh	Lower Lough Erne Devenish	River Muff	Faughan River (Carmoney)	Burngibbagh	Upper Foyle	Burn Dennet River (Milltown)	Glenmornan River	Lissan Water	Butter Water	Ballymacone River	Callan River (Tassagh)	Clay River	Closet River	Lough Neagh Peripherals
Carmoney to Strabane TM																						
Castor Bay WTW to Ballydougan SR TM																						
Booster Upgrade Carland to Cookstown TM																						
Lough Fea WTW & Moyola WTW Resilience																						
Ballinrees Resilience																						
Upgrade Killyhevlín WTW																						
Seagahan to Clay Lake TM																						
West WRZ Resilience TM Upgrades and Links																						

Table 6-10 Proposed Plan and Resilience options and associated groundwater bodies potentially impacted

Local Management Area	Derg and Mourne		Lower Lough Erne		Roe		Ballinderry		River Blackwater	Strule	Lough Neagh	
	Castledearg	Irvinestown	Castlecaldwell Forest	Claudy	Magiligan	Cookstown	Mineymore	Keady	Omagh	Antrim	Neagh	
Carmoney to Strabane TM												
Castor Bay WTW to Ballydougan SR TM												
Booster Upgrade on Carland to Cookstown TM												
Lough Fea WTW & Moyola WTW Resilience Option												
Ballinrees Resilience												
Upgrade Killyhevlin WTW												
Seagahan to Clay Lake TM												
West WRZ Resilience, TM Upgrades and Links												

6.7 Drought Plan

The Drought Plan identified a range of measures from environmental monitoring, management and communication measures, demand reduction management through to supply side increase and the use of drought orders to allow additional resources to be provided. These were characterised as measures that would be required rarely and for short periods. The drought risk and measures required were identified for each resource group within the WRZs varied according. The SEA focused on the measures with potential impacts on the population health and economy and the biodiversity objectives.

HRA screening has also been undertaken for the Drought Plan to identify potential requirement for a stage 2 HRA appropriate assessment.

A WFD assessment has not been undertaken for the Drought Plan at this stage as the recommendations are high level. It is expected that with the short-term nature and rarity of the measures proposed these are unlikely to have an effect on WFD water body status or conflict with achieving objectives. However, it is expected that WFD assessment would be undertaken along with other assessments required for individual measures proposed in advance of Drought Orders being required.

The assessment and potential mitigation measures and is summarised in the table below.

Table 6-11 Drought Plan Actions

Drought Action Type	Relevant Area	Frequency & duration within in 113 year simulation	Drought Level	Impact & Mitigation
Demand management actions				
3% demand cutback from introduction of hosepipe bans	All	Range depending on area	Drought level 3	Restrictions to customers with potential impact on specific groups but with potential for exemptions and application in accordance with UKWIR guidance ¹⁹ no significant effects.
2% demand cutback from introduction of other customer restrictions for non-essential use	All	Range depending on area	Drought level 4	Restrictions to customers with potential impacts on specific groups but with potential for exemptions and application in accordance with UKWIR guidance ²⁰ no significant effects.
Redistribution of water within the existing network e.g. rezoning of water				
Rezoning to transfer water to higher demand areas	Location specific	Range depending on area	Drought levels 1 - 3	Short term additional energy requirement potential - no significant impacts likely.
Increased abstractions but within existing licence conditions				

¹⁹ UKWIR document - Managing Through Drought: Code Of Practice And Guidance For Water Companies On Water Use Restrictions – 2013

²⁰ UKWIR document - Managing Through Drought: Code Of Practice And Guidance For Water Companies On Water Use Restrictions – 2013

Drought Action Type	Relevant Area	Frequency & duration within in 113 year simulation	Drought Level	Impact & Mitigation
Increase with licence abstraction or use of disused abstractions with licences in place	Location specific	Range depending on area	Drought levels 1-3	Potential additional environmental impacts on rivers in low flow conditions but within licence conditions. Mitigation to review impacts prioritising higher risk abstractions and determine need for WFD assessment.
Abstractions outside of the licence (requiring drought orders) such as increase abstractions or reduce release of compensation flows from reservoirs into rivers				
Reduce compensation flow from reservoirs	Location specific	Low frequency/probability of occurrence and short duration	Drought levels 3 and 4	Mitigation to screen for WFD assessment and undertake d HRA and identify any additional monitoring or mitigation required.

6.8 Other Assessments

6.8.1 Habitats Regulation Assessment (HRA)

The Stage 1 HRA screening assessment of the WR&SR Plan to identify potential for likely significant effects screened out 4 from requiring stage 2 Appropriate Assessment.

Likely Significant Effects could be confidently be excluded, as no, or very weak source-receptor-pathways were identified for the following options which could subsequently be screened out for further assessment:

- Lough Fea WTW & Moyola WTW Resilience Link;
- Ballinrees Resilience;
- Upgrade Killyhevlín WTW;
- Seagahan to Clay Lake Trunk Main.

Assessments for these options can be seen in Table 4.1.

For the remaining four options, it was determined that standard mitigation (such as noise and vibration management plans, best practice pollution prevention control guidelines, timing restrictions etc.), would be needed to discount Likely Significant Effects. These options could not be screened out from further assessment, in accordance with the Sweetman judgment. Likely Significant Effects were therefore identified for the following options (and the options therefore advanced to Stage 2 (AA):

- Carmoney to Strabane New Trunk Main;
- Castor Bay WTW to Ballydougan SR Trunk Mains Upgrade;
- West WRZ Resilience Link;
- Booster Upgrade on Carland to Cookstown TM.

Water resource options in the Plan and any resilience options taken forward in the plan period will require project level HRA to be undertaken to take account of detailed design and final route or site location.

Given the level of uncertainty over the measures to be taken forward in the Drought Plan, Likely Significant Effects could not be ruled out without further study of specific potential Drought Order options and considering the pathways to international/European sites and potential impacts on qualifying species. The low frequency and temporary duration of Drought Order measures means that the environmental risks might be considered low but it is not possible to provide sufficient certainty required for HRA screening.

It is recommended that Environmental Assessment Reports (EARs) and HRA be undertaken for potential Drought Order options where there is a potential for those options to result in LSEs on international/European sites. If LSE cannot be discounted at Stage 1 of the HRA, Stage 2 assessment of the relevant Drought option(s) would be required to clarify the potential for adverse effects on site integrity.

HRA will need to be undertaken as part of planning specific Drought Plan water supply measures. These should be undertaken in advance of Drought Orders being required. In the event that the HRA process identifies measures with likely significant effects that cannot be avoided through mitigation, alternative Drought Plan measures would be employed.

6.8.2 Water Framework Directive Assessment (WFD)

The WFD assessment considered the potential risks to WFD waterbodies affected by the individual options and options combined. The main risk identified related to the pipeline river crossings and the need for appropriate investigation and mitigation including the use of trenchless technologies where appropriate. This would avoid potential long-term impacts on river geomorphology. Option costs have included this approach as an assumption in the costings. The overall WR&SR Plan is therefore considered to be compliant with the WFD requirements. The WFD assessment is provided in section 6.6 and a report on the options is provided in Appendix D.

Drought Plan measures are considered unlikely to have long term impacts on WFD status given the likely frequency and duration however specific measures should be screened for requirements for WFD assessment.

6.8.3 Equalities Impact Assessment (EQIA)

The potential impacts of the Plan, and the plan options, on vulnerable groups identified in Section 75 of the Northern Ireland Act have been assessed as part of the overall SEA Environmental Assessment. A screening analysis was carried out to determine whether a detailed EQIA would be required. Nine categories were assessed as part of the analysis:

- Religious Belief
- Political Opinion
- Race
- Age
- Gender
- Disability
- Marital Status
- Sexual Orientation; and
- People with or without Dependents

The screening assessment determined that no vulnerable groups would be significantly affected by the Plan and that the Plan had the potential to benefit everyone in Northern Ireland through the additional water security provided for the future. The screening assessment on the Drought Plan identified that some measures involving temporary restrictions to water use such as hosepipe and car wash bans could affect specific ethnic groups where these types of activities were part of business/employment. The screening assessment identified that mitigation to avoid adverse impacts on these groups would be incorporated into the approach for implementing the Drought Plan. These included the development of a Communications Plan covering a consultation approach to identify any specific

exemptions required. A human rights assessment has been conducted as part of the screening assessment. The screening assessment is provided in Appendix E.

6.8.4 Regulatory Impact Assessment (RIA)

The screening assessment determined that there would be no significant impacts from the Plan on the wider economy, businesses or customers and that the Plan had potential provides general benefits through additional water security for the future. The screening for the Drought Plan identified that some measures involving temporary restrictions to water use such as hosepipe and car wash bans could affect specific business groups and sectors. The screening assessment identified that mitigation to avoid adverse impacts on these groups such as farm irrigation, car wash operators and other industrial businesses would be incorporated into the approach for implementing the Drought Plan. This mitigation included the development of a Communications Plan covering a consultation approach to identify any specific exemptions required. The screening assessment determined with the mitigation identified that there will be no major direct or indirect impacts on the wider economy or customers. The screening assessment is provided in Appendix F.

6.8.5 Rural Needs Impact Assessment

The screening assessment determined that rural areas would not be more affected by the Plan and the plan options and that all regional and local areas had the potential to benefit from the plan. The screening assessment is provided in Appendix G.

6.9 Limitations and uncertainties with the assessment undertaken

Limitations and uncertainties with the assessment undertaken involve the potential changes to the timing, space extent or degree of an impact. It must be noted, that a predicted impact may not actually occur in the event of changes in the baseline. Elements of uncertainty stem from:

- The potential for the plan and scheme proposals to change (in terms of how or where they are implemented);
- The potential for the baseline data and forecasting to change from the assumed current baseline and predictions of change;
- The predicted effectiveness of the mitigation and enhancement measures (including how they may be implemented and the level of reliability of mitigation).

Determining the uncertainties informs the need for further assessment.

7 Implementation and Monitoring

7.1 Objectives, Targets and Indicators

SEA Regulations require the development of an implementation and monitoring plan in order to identify the significant environmental effects at an early stage of development and therefore allow appropriate remedial action to be undertaken.

7.2 Monitoring Plan

The purpose of the monitoring plan is to allow NI Water to take a proactive approach to reviewing the predicted impacts of the WR&SR Plan and undertake additional mitigation if required. The monitoring plan will also encourage continual improvement towards the SEA objectives and the monitoring results can be used to inform the SEA during the next WR&SR Plan.

Indicators and targets have been set for the SEA objectives for monitoring the effects of the plan against the objectives following implementation of the plan. These are set out in Table 7-1 below.

It should be noted, that the targets within the monitoring plan refer to the potential effects of the plan and its options after implementation of any pre-determined mitigation measures. However, option mitigation and monitoring arrangements proposed at this stage will need to be reviewed in light of the findings of the detailed studies required at the project level.

Table 7-1 Monitoring Plan

Objectives	Target	Indicators
1. Population, Economy and Human Health		
<ul style="list-style-type: none"> To protect public health and promote wellbeing and avoid disadvantaging any group or area. 	Maintain and improve access to reliable drinking water meeting forecast demand.	<ul style="list-style-type: none"> Level of service. Frequency and duration of drought orders and temporary use bans. Development of communication plan for the implementation of the Drought Plan with appropriate consideration for all vulnerable groups (with reference to the Equalities Impact Assessment, Human Rights Assessment Regulatory Impact Assessment and Rural Needs Impact Assessment).
	Improve water access for vulnerable groups and general public.	<ul style="list-style-type: none"> As above; and Number of days/hours when water supply to people on the vulnerable groups register is disrupted.
	Minimise extent and period of disruption to traffic related to construction.	<ul style="list-style-type: none"> Duration of highways works.
	Minimise access restrictions and noise disturbance to people from construction and operation of schemes.	<ul style="list-style-type: none"> Number of complaints received relating to construction works.
<ul style="list-style-type: none"> To protect and enhance recreational amenity and public access. 	No net loss of important recreational amenity.	<ul style="list-style-type: none"> Number of public right of way closures/diversions. Length of paths created compared to loss.
	Generation of new recreational facilities.	<ul style="list-style-type: none"> Area of land/water made available for new recreational facilities.

<ul style="list-style-type: none"> To contribute to raising awareness of water conservation. 	<p>Raised awareness and increased publicity for issues.</p>	<ul style="list-style-type: none"> No. of properties/ business/schools/communities targeted with demand management initiative. Accessible summary documents available to public. Level of response and participation in the process.
<p>2. Tourism and Recreation</p>		
<ul style="list-style-type: none"> To protect and enhance recreation and amenity facilities. 	<p>No net loss of important recreational amenity.</p>	<ul style="list-style-type: none"> As for recreation above.
	<p>Generation of new recreational facilities.</p>	<ul style="list-style-type: none"> As for recreation above.
<p>3. Material Assets</p>		
<ul style="list-style-type: none"> To avoid conflict with strategic infrastructure, and support viable land use, businesses and sustainable resource use. 	<p>Minimise material consumption and waste during construction and operation of schemes.</p>	<ul style="list-style-type: none"> Site Waste Management Plans completed for construction works Proportion of material reused within site Tonnes of construction waste sent to landfill as a proportion of total waste produced.
	<p>No water treatment sludge sent to landfill.</p>	<ul style="list-style-type: none"> Tonnes of sludge reused or recycled Quality of WTW discharge and compliance with consents.
	<p>Minimise permanent loss of greenfield land including agricultural, forestry or other land uses.</p>	<ul style="list-style-type: none"> Area of greenfield land disturbed or lost.
	<p>No disruption to strategic infrastructure/services.</p>	<ul style="list-style-type: none"> Complaints/incidence of strategic infrastructure disruption or loss of strategic service.
<p>4. Biodiversity, Flora and Fauna</p>		
<ul style="list-style-type: none"> To protect and enhance aquatic and terrestrial biodiversity including statutory and non-statutory sites, protected species, fisheries and priority habitats. 	<p>No adverse effects on integrity of European, national or regional level designations; and where feasible seek to contribute to achieving favourable conservation status.</p>	<ul style="list-style-type: none"> For statutory designated nature conservation sites affected by water resource options; <ul style="list-style-type: none"> Area of each designated site/type affected and likely impact. Area of site with recorded change in condition (positive or negative). Plan for enhancement
	<p>No net loss of priority habitats or habitat connectivity as a result of the works, and where possible demonstrate habitat enhancement / creation.</p>	<ul style="list-style-type: none"> Area/length of priority habitat site affected vs restored
	<p>No reduction in ecological value of waterbodies</p> <p>Improved environmental resilience within water resource use catchments</p> <p>Reduced invasive species risk</p>	<ul style="list-style-type: none"> Review of potential sustainability reductions Review of potential for catchment management to improve water quality/retain water No. of investigations and upgrades for intake screens Review risks for spread invasive species and identify opportunities to remove/reduce.

5. Landscape, Townscape and Visual Amenity		
<ul style="list-style-type: none"> To maintain and enhance valued landscape character and visual amenity. 	<p>Improvement or no net change in landscape quality through landscape design and mitigation and enhancement.</p>	<ul style="list-style-type: none"> Total working area of pipelines through designated landscapes and non-designated landscapes. Development of protected landscape strategies to guide work in AONBs and other sensitive landscapes Land use/landscape features re-established monitoring over appropriate period – areas/km successfully restored to meet strategy requirements.
6. Climate		
<ul style="list-style-type: none"> To minimise the carbon footprint of the Company. 	<p>Minimise carbon emissions from construction – take into account in design.</p>	<ul style="list-style-type: none"> Carbon footprint (total tonnes) of construction.
	<p>Increase use of renewable/low carbon energy sources in new schemes – or identify where increases can be off set through use within existing operations.</p>	<ul style="list-style-type: none"> Percentage of energy supply from renewable sources/ or reduced energy use.
	<p>Minimise the annual carbon emissions from operation (tonnes and tonnes/MI).</p>	<ul style="list-style-type: none"> Carbon footprint (total tonnes) per year, predicted over plan period, lifetime of schemes and carbon intensity of water resource options (tonnes/MI).
<ul style="list-style-type: none"> To contribute to climate change adaptability of the environment and resilience of water supply. 	<p>Improve resilience of the environment and NI Water supply to climate change.</p>	<ul style="list-style-type: none"> Improved mix of water resource sources or flexibility of system. Reduced frequency of drought orders requiring change to normal abstractions/compensation releases.
7. Water Environment		
<ul style="list-style-type: none"> To protect and improve surface water and groundwater body status; including water quality and quantity. 	<p>Contribute to achieving WFD quality/resource objectives for surface water bodies and groundwater used for supply.</p>	<ul style="list-style-type: none"> See biodiversity above re reviews of potential sustainable abstractions and catchment management opportunities Number of investigations and contribution to catchment management schemes. Consider additional water quality and biological monitoring collection of data additional to WFD monitoring data where needed (See Biodiversity).
8. Cultural Heritage and Archaeology		
<ul style="list-style-type: none"> To conserve and enhance buildings, sites and features of archaeological and historic interest and their settings. 	<p>Avoid impact on cultural heritage designated sites and settings to minimise risks to buried archaeology.</p> <p>Avoid impacts on wetlands with potential for archaeological interest.</p> <p>Ensure approach to archaeological risk on proposed</p>	<ul style="list-style-type: none"> Number of scheduled monuments or other important archaeological remains and/or their settings adversely affected by water resource options. Number of schemes where options are re-routed to avoid designations. No. of schemes where archaeological interest found and no. where supervised excavations

	schemes is agreed with authorities.	required in areas sensitive for archaeology.
9. Geology and Soils		
<ul style="list-style-type: none"> To protect and enhance soil quality and avoid conflict with identified mineral resources and ASSI's. 	No Loss of statutory/non-statutory sites of geological interest.	<ul style="list-style-type: none"> Areas of Special Scientific Interest (ASSIs) affected by Water Resource options.
	Minimum disturbance or loss of high quality land as a result of the plan.	<ul style="list-style-type: none"> Areas of Agricultural Land Classification graded 1-3a affected by water resource options. Total area of soil removed and reinstated for agricultural use.
10. Sustainability Issues		
<ul style="list-style-type: none"> To ensure resilience to natural events and disasters such as droughts, flood events and freeze/ thaw. 	Maintain and improve access to reliable drinking water meeting throughout extreme weather events.	<ul style="list-style-type: none"> Levels of service. Number of days/hours when water supply is disrupted as a result of extreme weather or natural events. Review of direct and indirect vulnerability to extreme weather events.
<ul style="list-style-type: none"> To minimise the risk of flooding taking account of climate change. 	No net flood plan area (Ha) lost as a result of this plan, and where possible, increase functioning flood plain.	<ul style="list-style-type: none"> Number of projects where flood risk compensation was required or increase provided.

7.3 Environmental Action Plan

In addition to monitoring, there are a number of Plan related actions required to ensure findings from the SEA are taken forward. This includes linking the SEA findings and recommendations to the NI Water Business Plan to ensure the SEA requirements for the plan and the options implementation over the next 5-year period is supported with appropriate funding for monitoring, further environmental studies and mitigation.

This will be assisted by ensuring that as individual schemes are brought forward for implementation they are reviewed using the information from the SEA process. This will need to include the baseline information, the design assumptions and mitigation measures and further studies recommended. The key short-term and long-term actions are identified in the Environmental Action Plan (EAP) in Table 7-2. All projects will be subject to a review to determine appropriate level of additional consultation, environmental survey and assessment needed. The EAP also identifies actions that can contribute to long term environmental and supply resilience and contribute to developing future WR&SR plans.

Table 7-2 Environmental Action Plan

Ref no	Action	Target	Monitoring
Short term (during next 5 years) 2017-22			
EAP 1	<p>Link SEA issues and recommendations with project implementation</p> <p>Develop procedure to ensure project implementation documents include SEA/HRA/option information to provide starting point for early options development. Include good practice mitigation in project briefs e.g. measures to reduce the risk of significant dust</p>	All proposed schemes to be reviewed taking into account any assumptions and mitigation and further identified through the SEA.	<i>Update as part of annual review and use to update input into next</i>

Ref no	Action	Target	Monitoring
Short term (during next 5 years) 2017-22			
	<p>emissions during the construction and for other impacts as identified in the HRA.</p> <p>All projects to be reviewed through desk based screening to determine appropriate level of environmental survey and assessment to meet obligations (including permitted development projects) and determine need for EIA/planning permission.</p> <p>Reference to NIEA's Standing Advice for Protected Habitats and Species to form part of these reviews to ensure appropriate measures are taken to address impacts on protected or Priority habitats & species. In general, for all environmental issues, good practice guidance will inform the approach to these reviews.</p>		<i>WR&SR Plan and SEA.</i>
EAP 2	<p>Undertake further studies on the Preferred Plan schemes:</p> <ul style="list-style-type: none"> • Develop the baseline information • Detailed studies on option variants, pipeline routes along with further comparison with relevant alternatives; and • Mitigation studies. • HRA/Appropriate Assessment • WFD assessment where potential to cause deterioration needs to be ruled out. 	Ensure best environmental solutions considered with mitigation built into design and costing, and opportunities for enhancement are included in option design through consultation with relevant stakeholders.	
EAP 3	<p>Link SEA findings and mitigation recommendations to the next Business Plan.</p>	Ensure coordinated approach to delivery and funding through the Business Plan to support environmental protection, sustainability and resilience measures.	
EAP 4	<p>Develop additional mitigation for cumulative impacts/risks such as pipelines crossing the same waterbody/designated site, pipelines through AONB, traffic management, combined effects on same types of priority habitats e.g. connectivity considerations within landscape where many field boundaries are crossed.</p>	Ensure approaches and mitigation for cumulative landscape, habitat impacts, and waterbody impacts are taken into account as individual schemes are developed.	

Ref no	Action	Target	Monitoring
Short term (during next 5 years) 2017-22			
EAP 5	Undertake a review of potential sustainable abstractions to identify potential risk and plan for appropriate data collection/ monitoring.	Coordinated approach to developing new options addressing possible sustainable abstraction reductions supported by appropriate evidence.	
EAP 6	Review potential for catchment management actions related to supporting existing or possible future abstractions. Consider developing an ecosystems service approach to inform catchment management proposals.	Catchment management improving water quality, retention of water in catchment and habitat enhancement and potentially also carbon offsetting.	
EAP 7	Investigate drought plan options requiring additional abstraction or change to compensation flow to prepare Environmental Assessment Report and HRA in advance of a Drought Order being required. Screen for WFD assessment requirement. Develop Communications Plan for Drought Plan implementation including consultation approach and consideration of exemptions. Identify any amendments to procedures to ensure proposals and communications are aligned with UKWIR (UK Water Industry Research) good practice on drought plan consultation appropriate exemptions	Drought plan measures investigated, documents prepared demonstrating measures avoid/minimise adverse effects on Natural 2000/Ramsar/ ASSIs and comply with Habitats Regulations. Procedures for drought plan address requirements of potential vulnerable groups.	
EAP 8	Undertake monitoring and reporting of SEA targets as listed in Monitoring Plan on an annual basis and report within next SEAWR& SR Plan. Link with Environmental Strategy reporting where appropriate.	Annual monitoring as part of WR&SR Plan review and reporting within 5 year WRMP cycle.	
Medium to long term (5-25 years) 2023-2043			

Ref no	Action	Target	Monitoring
Short term (during next 5 years) 2017-22			
EAP 9	<p>Review the SEA objectives and targets as part of lessons learned for next WR&SR Plan cycle and update baseline.</p> <p>Feed information gathered through studies into the next cycle of options identification and appraisal.</p>	SEA objectives, baseline and option assumptions reviewed as part of next WR&SR Plan cycle and more developed options for consideration - to reduce assessment uncertainty and delivery risk.	<i>Update as required leading up to next cycle.</i>
EAP 10	Action results of catchment management and sustainable abstraction investigations. Consult with NIEA on updates to WFD/River basin management status/objectives and consider alongside early development of future WR&SR Plans.	WFD, Catchment management supporting water quality and resource sustainability.	
EAP 11	Consult with stakeholders to identify constraints, requirements and opportunities for the next cycle.	Specific actions identified for the next Plan cycle.	

8 Conclusions

Introduction

This environmental report provides a summary of the environmental effects of the NI Water WR&SR Plan. These effects were determined through the Strategic Environmental Assessment process to comply with the Planning (EIA) Regulations (Northern Ireland) 2012.

As part of the process, the baseline environment was assessed and key sensitivities identified. Relevant plans, policies and legislation were considered in terms of constraints, opportunities and priorities for the assessment. Together these provided the context for the assessment of the plan. A scoping report was issued to statutory consultees in October 2016 outlining the proposed SEA objectives and scope of the assessment. A summary of the consultation responses and actions are provided in Appendix B.

The SEA Assessment

The SEA and Plan were developed together using an iterative approach. Environmental assessment was included from the start of the options selection and appraisal process. A total of 53 options were developed, 22 options were selected as potential feasible supply demand balance options for the Plan; 8 water resource options and 14 demand management option. Feasible water resource options were selected based largely on removing options considered high risk in terms of meeting SEA objectives or not likely to be deliverable for other technical reasons. The feasible options taken forward were defined and developed further and were assessed in more detail against the SEA objectives and criteria to identify potential significant effects and mitigation requirements. A list of further resilience options have been developed and been subject to the same screening process. This resulted in a further 5 options been proposed to NI Water for further consideration throughout the Plan period.

The Preferred Plan includes a range of demand management measures and treated water transfers with which are aimed at addressing the predicted future supply demand deficit in critical dry year conditions. The demand management options provide largely positive long term effects through water and energy savings. These measures also provide potential for raising water conservation awareness.

The preferred plan options are treated water pipeline options which have the potential for construction impacts on biodiversity, the water environment, landscape and can cause traffic disruption. However with adequate route assessment and selection and mitigation, impacts can be reduced to short-term moderate to minor effects. Long term significant effects are expected to be avoided through appropriate routing, investigation prior to construction, management of construction and ensuring quality of reinstatement, for example to ensure no net priority habitat loss. Similarly, resilience options proposed for further consideration include treated water pipeline options and pumping stations which would result similar impacts and mitigation measures. The impacts of the resilience option involving upgrades to an existing WTWs are largely limited to local construction disturbance.

The assessment of the Drought Plan identified that potential impacts from demand management measures on some groups and business are expected to be avoided through the application of industry guidance on the drought management process and use of appropriate exemptions and consultation on specific proposals. Drought Plan measures also included potential to use reduce compensation flows from reservoirs resource in some drought conditions and increased abstraction but these would be expected to be low frequency and short duration.

Additional Assessments

A HRA has been undertaken on the draft Plan as part of the requirement to avoid significant adverse effects on European sites. Of the eight options in the Preferred plan, four were screened out as unlikely to result in a significant effect on European/International sites on their own and in-combination. The remaining four were screened in for Stage 2 Appropriate Assessment.

Project level HRA project may also be required for individual schemes as part of obtaining the required planning consents or determining permitted development.

The HRA for the Drought Plan could not rule out likely significant effects based on the information available. HRA would therefore be required on any specific measures planned involving increased abstraction or reduced compensation flow. These HRAs may identify need for appropriate assessment

and mitigation. In the event that assessment identified likely significant effects could not be avoided alternative drought measures would need to be employed.

The WFD assessment included a review of the existing ecological status associated with the relevant water bodies and compared this to site specific information about the options proposed. The assessment concluded that the final WR&SR Plan is unlikely to lead to deterioration in ecological status of waterbodies but identified that there is considerable uncertainty surrounding for options this plan level. Therefore, we have recommended provision for further assessment as part of the option design development, to provide further information on the potential risk to ecological status. All options would need further study to inform more detailed studies to confirm that they are technically, economically and environmentally feasible and then to inform design and planning approvals.

Cumulative Impacts

Potential cumulative effects of in-combination impacts were assessed. Potential impacts included options which would be constructed over the same period, within the same WRZ, impacting the same designation, watercourse or road. There were no anticipated cumulative effects between water resource recommendations Carmoney to Strabane Trunk Main and Castor Bay WTW to Ballydougan SR Trunk Main. However, there are potential for cumulative effects between Castor Bay WTW to Ballydougan SR Trunk Main and Booster Upgrades on Carland to Cookstown Trunk Main, which are both located within the Cookstown groundwater body. It is unlikely that these effects would be significant due the nature of the works at Carland and Cookstown which will be minor involving installation of booster pumps. There were also some cumulative impacts when resilience options were added into the assessment.

Ballinrees Resilience option and Carmoney to Strabane TM are within the same groundwater body; Claudy. Cumulative impacts with other plans and strategies were also considered as part of the SEA. River Basin Management Plans were taken into account in the WFD assessment and local development plans through the demand forecast based on predictions for population growth.

Mitigation and Recommendations

The SEA identified a range of mitigation measures and recommendations for further study to reduce the potential impacts of the Plan and ensure contribution to meeting objectives to improve supply and environmental resilience. Overall mitigation measures require the application of good practice and adherence to guidelines on development to avoid impacts on designated sites and non-designated interest and to take account of potential impacts of construction works on habitat connectivity and wetlands. An SEA monitoring plan and environmental action plan has been developed to provide a basis for feedback on performance for future WR&SR Plans.

Reference List

Committee on Climate Change, Northern Ireland, Climate change policy, Accessed 27/07/2016.

Available at: <https://www.theccc.org.uk/northern-ireland/>

DAERA/NIEA, Northern Ireland Local Authority Collected Municipal Waste Management Statistics,

Annual Report 2014/2015, [Accessed 06/07/2016] Available at <https://www.daera-ni.gov.uk/sites/default/files/publications/doe/lac-municipal-waste-2014-15.pdf>

Department for Communities (Formally known as Department for Social Development), A Strategy for Neighbourhood Renewal; Delivering Neighbourhood Renewal, Accessed 28/07/2016, Available at

www.communities-ni.gov.uk/sites/default/files/publications/dsd/people_and_place_delivering_neighbourhood_renewal.pdf

Department for Regional Development, 2014, Technical Guidance; Water Resource & Supply Resilience Plan

Department for the Economy, 2016, Electricity Consumption and Renewable Generation Statistics,

Accessed 11/05/2017, Available at: <https://www.economy-ni.gov.uk/articles/electricity-consumption-and-renewable-generation-statistics>

Department for the Economy, 2010, Strategic Energy Framework, Accessed 21/07/2016, Available at:

<https://www.economy-ni.gov.uk/sites/default/files/publications/deti/sef%202010.pdf>

Department for the Economy, 2016, Labour Force Survey. Available at: <https://www.economy-ni.gov.uk/articles/labour-force-survey>

Department of the Economy (formally known as Department of Enterprise, Trade and Investment), 2001, Northern Ireland Better Regulation Strategy

Department of the Environment, 2011, National Ecosystem Assessment, Northern Ireland Summary,

Accessed 08/07/2016, Available at: <http://uknea.unep-wcmc.org/LinkClick.aspx?fileticket=mYewbZ5ifj0%3D&tabid=82>

Department of the Environment, 2015, Valuing Nature, A Biodiversity Strategy for Northern Ireland

2020, Accessed 07/07/2016, Available at: <https://www.cbd.int/doc/world/gb/gb-nbsap-v3-p3-en.pdf>

Department of Infrastructure/Rivers Agency (Formerly DARD), Habitats Regulation Assessment.

Available at: <https://www.infrastructure-ni.gov.uk/sites/default/files/publications/dard/habitats-regulations-assessment.PDF>

DoE/NIEA, 2014, Northern Ireland Water Management Facts and Figures, Accessed 05/08/2016,

Available at: <http://www.nienvironmentlink.org/cmsfiles/policy-hub/files/documentation/Marine/water-facts-and-figures-booklet-2014-final-for-web.pdf>

Environment Agency, 2004, Benefits Assessment Guidance (BAG)

Environment Agency, 2009 Delivering water neutrality: measures and funding strategies. Available at

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/291739/scho1009bqzt-e-e.pdf Accessed 26/07/2016

Environment Agency, 2012, BAG, User Guide, eftec, January 2012

Environment Agency, 2012, BAG, User Guide, eftec, February 2012

Environment Agency, Ofwat, Defra and the Welsh Government, June 2012, Water Resource Planning Guideline – The technical methods and instructions

Equalities Commission, 2005, Practical Guidance on Equality Impact Assessment

European Commission, Directive (2008/98/EC) on Waste (Waste Framework Directive)

European Commission, Habitats Directive (92/43/EEC)

European Commission, SEA Directive (2001/42/EC) on 'assessment of the effects of certain plans and programmes on the environment'

European Commission, WFD Directive (2000/60/EC) on 'establishing a framework for community action in the field of water policy'

Forestry Commission, 2016, Woodland Area, Planting and Restocking, Accessed 22/07/2016, Last updated: 16/06/2016. Available at: <http://www.forestry.gov.uk/forestry/infd-7aqknx>

Geological Survey of Northern Ireland, Accessed 21/07/2016, Available at: <https://www.gsi.ie/>

Joint Nature Conservation Committee, Accessed: 06/07/2016 Available at: <http://jncc.defra.gov.uk/page-1527>

Landscapes for life, Areas of Outstanding Natural Beauty. Available at: <http://www.landscapesforlife.org.uk/visit-aonbs.html> Accessed 08/07/2016

NI Water Website, Our Environment. Accessed 27/07/2016. Available at: <https://www.niwater.com/our-environment/>

NI Water, How to save water, Accessed 23/06/2016, Available at: <https://www.niwater.com/why-save-water-at-home-audit/>

NI Water, Our Strategy for NI Water Accessed 05/07/2016, Available at: <http://www.niwater.com/sitefiles/resources/pdf/reports/pc15/pc15companystrategyweb.pdf>

Northern Ireland Environment Agency, River Basin Plan Interactive Map, Accessed: 21/07/2016, Available at: <http://maps.ehsni.gov.uk/wmuviewer/>

Northern Ireland Executive, 2008, Programme for Government 2008-2011.

Northern Ireland Government website, Accessed 22/07/2016. Available at: <https://www.northernireland.gov.uk/news/hamilton-announces-new-ps80k-business-competition-tourism>

Northern Ireland Land Matters Task Force, 2015, Towards a Land Strategy for Northern Ireland

Northern Ireland Neighbourhood Information Services, (*Various; Economy, Population, Human Health, Tourism*), Available at: <http://www.nisra.gov.uk/>

Office of Deputy Prime Minister, 2005, A Practical guide to Strategic Environmental Assessment Directive

ODPM, Scottish Executive, Welsh Assembly Government and DOE (2005) A Practical Guide to the Strategic Environmental Assessment Directive.

Parliament of the United Kingdom, 1998, Northern Ireland Act

SNIFFER, 2007, Preparing for a Changing Climate in Northern Ireland, Accessed 04/07/2016, Available at: http://www.ukcip.org.uk/wp-content/PDFs/Preparing_CC_NI.pdf.

UK Climate Projections, 2010, UK Climate Change Projects: Briefing Report, Accessed 02/03/2017, Available at: <http://ukclimateprojections.metoffice.gov.uk/media.jsp?mediaid=87868&filetype=pdf>

UKWIR, 2013, Managing Through Drought: Code Of Practice And Guidance For Water Companies On Water Use Restrictions

Appendix A. Review of Legislation, Policies, Plans and Programmes

Appendix B. Scoping Consultation Responses

Appendix C. Habitats Regulation Assessment

Appendix D. Water Framework Directive Assessment

Appendix E. Equality Impact Assessment

Appendix F. Regulatory Impact Assessment

Appendix G. Rural Needs Impact Assessment