

Contents

Executive Summary	iii
1. Introduction and Background	1
1.1 Introduction	1
1.2 Northern Ireland Water (NI Water).....	1
1.3 Water Resource and Supply Resilience Plan and Drought Plan.....	1
1.4 Legislative Requirements for Habitats Regulations Assessment (HRA)	5
1.5 The Potential Effects at the Plan / Strategy Level.....	6
1.6 Purpose of the Report	6
2. Methodology	8
2.1 Introduction	8
2.2 Screening Steps	9
2.3 Identifying Potential Effects of the options and Geographical Scope	9
2.4 Interpretation of a 'Likely Significant Effect' (LSE)	10
2.5 Consideration of Likely Significant Effects In Combination	10
2.6 Standard Mitigation Measures to Avoid Likely Significant Effects	10
3. European/International Sites Potentially Affected by the Options Proposed	13
4. Stage 1 Screening Assessment Overview	14
4.1 WR & SR Plan Introduction.....	14
4.2 WR & SR Plan Options Where No Likely Significant Effects are Predicted	17
4.3 WR & SR Plan Options Where Likely Significant Effects are Predicted	17
4.4 In combination Assessment.....	17
4.5 WR & SR Plan Summary of HRA Screening	18
4.6 Drought Measures	38
4.7 Drought Plan Summary of Stage 1 HRA Screening	38
5. Stage 2 – Appropriate Assessment	40
5.1 River Faughan and Tributaries SAC	40
5.2 River Foyle and Tributaries SAC	43
5.3 Lough Foyle SPA and Ramsar	45
5.4 Fairy Water Bogs SAC and Ramsar site.....	47
5.5 Tully Bog SAC	48
5.6 Lough Neagh and Lough Beg SPA and Ramsar	48
5.7 Upper Ballinderry River SAC	51
Appendix A. References	55

Executive Summary

Northern Ireland Water (NI Water) aims to have a secure, resilient water supply network that will provide protection against drought and emergency situations. This is achieved through an overarching Water Resource & Supply Resilience Plan (WR & SR Plan).

The WR & SR Plan identifies eight options, three of which will contribute in meeting the projected Supply Demand Balance over the WR & SR Plan period and five of which would contribute to a secure, resilient water supply network in the short, medium and long term. The WR & SR Plan also includes a Drought Plan which covers the drought management procedures that are to be implemented during periods of drought and determines the procedures to be implemented either to temporarily reduce demand or increase supply during droughts.

A number of the water resource management options have the potential to result in effects to internationally important nature conservation sites. Under the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995, a Habitats Regulations Assessment (HRA) of the WR & SR Plan is required where a plan or project may have a likely significant effect (LSE) on such sites.

Three water resource options and five resilience options comprising the WR & SR Plan and 13 potentially impacted internationally/European important nature conservation sites within the study area were subject to Stage 1 HRA screening. For four of the resilience options, LSEs could be confidently discounted, as no, or only very weak source-receptor-pathways were identified. For the remaining resilience option and all three water resource options, it was determined that standard mitigation (such as noise and vibration management plans, best practice pollution prevention control guidelines and timing restrictions) would be needed to discount LSE. These options could not be screened out from further assessment, in accordance with a decision reached by the Court of Justice of the European Union (CJEU) in *People Over Wind and Sweetman v Coillte Teoranta (C-323/17)* (the Sweetman judgment). These options within the WR & SR Plan were therefore identified as requiring Stage 2 Appropriate Assessment (AA).

The following internationally/European important nature conservation sites were included in the Stage 2 Appropriate Assessment:

- River Faughan and Tributaries SAC;
- River Foyle and Tributaries SAC;
- Lough Foyle SPA and Ramsar;
- River Foyle and Tributaries SAC;
- Fairy Water Bogs SAC and Ramsar site;
- Tully Bog SAC;
- Lough Neagh and Lough Beg SPA and Ramsar; and
- Upper Ballinderry River SAC.

With standard good practice construction methods, and sensitive siting of the works based on baseline survey information, it is anticipated that the potential for likely significant effects would be avoided/eliminated. In brief these measures would include:

- Sensitive siting HDD compounds utilising pre-construction surveys information;
- Industry standard good practice to prevent pollution and sedimentation entering the river and avoid significant impacts to water quality;

Water Resource & Supply Resilience Plan

- Good practice construction measures to avoid the likelihood of direct mortality (i.e. restricting speed and time of day for site traffic movements, timing of construction activities, ensuring excavations are covered overnight or incorporate slopes to allow egress and incorporating buffers around known features such as holts or resting places to ensure that there is no encroachment); and
- Implementation of an Invasive Species Management Strategy to prevent, reduce, control the effects of invasive species.

1. Introduction and Background

1.1 Introduction

Water as a resource is often taken for granted. Urbanisation, population growth, increased living standards, growing competition for water and pollution put pressure on water resources. In Northern Ireland each average person uses around 145 litres of clean, treated water every day. 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). Many important habitats and species are dependent on water in the environment and can be affected by changes to water resources and quality due to resource use and also as a result of climate change affecting weather patterns.

Habitats and species of international and European importance are protected under Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora (hereafter referred to as the Habitats Directive) and Directive 2009/147/EC on the Conservation of Wild Birds (codified version of Directive 79/409/EEC as amended) (hereafter referred to as the Birds Directive). Ramsar sites have international legislative protection (which extends beyond Europe).

The requirements of the European directives and international convention are implemented through the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 and the Conservation of Habitats and Species Regulations 2017.

1.2 Northern Ireland Water (NI Water)

NI Water is the appointed statutory undertaker for the supply of water and sewerage services to the population of Northern Ireland. 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. It supplies around 560 million litres of clean water a day and provides sewerage services for approximately 780,000 domestic, agricultural and business customers throughout Northern Ireland, servicing almost 1.8 million people (Northern Ireland Water, undated).

1.3 Water Resource and Supply Resilience Plan and Drought Plan

1.3.1 Background

Jacobs was appointed to produce a Water Resource and Supply Resilience Plan (WR & SR Plan) (Jacobs, 2016) for NI Water. A WR & SR Plan sets out how the water company intends to maintain the balance between supply and demand for water over the long-term and the operational and management options and activities available to respond to short-term critical events such as droughts and freeze-thaw issues. The WR & SR Plan identifies eight resource and resilience options (hereafter referred to as the options) for the short, medium and long term to ensure a positive supply demand balance for all zones and provide a more resilient system to maintain a consistent level of supply across all zones. A Drought Plan is also included within the WR & SR Plan which identifies what supply side and demand side measures need to be implemented to maintain the water supply level of service at the target supply reliability of 97.5% (with water shortages permitted for 1 year in 40 on average). A description of the WR & SR Plan and the Drought Plan is given below.

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.

Drought Plan: 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 WR & SR Plan is based on the assets available to the company now and will be updated as changes to the infrastructure occur.

Water Resource & Supply Resilience Plan

According to the Technical Guidance Water Resource & Supply Resilience Plan (Department of Regional Development, 2014), the WR & SR Plan should ensure that water resources are used in an efficient and sustainable manner over the long term, giving due consideration to short-term operational issues that may occur. Where a shortfall of supplies available to meet potential demands for water is identified, a set of options must be identified to restore the balance between supplies and water demands. The supply demand balance underpinning the WR & SR Plan should take due account of:

- the aims and objectives of the Water Framework Directive (WFD) in promoting the sustainable and efficient use of water resources;
- future pressures on water resources from the effects of climate change on available resources and water use;
- what customers want and are prepared to pay for; and
- environmental considerations and constraints.

Development of the WR & SR Plan involved initial studies to review the Water Resource Zones identified in the NI Water Resource Management Plan (2012) which split Northern Ireland into seven Water Resource Zones (WRZs) and determines if they are robust. Work undertaken to date has reported that NI Water has made significant improvements in the resilience of the water infrastructure since the previous 2012 Water Resource Management Plan. The average volume of water needed in the supply system has reduced from around 735 mega litres per day (ML/d) in 2001/2002 to 570 ML/d in 2014/2015 (a 24% reduction) through sustained investment in water mains to reduce leakage, along with reduced demand particularly in the industrial sector. NI Water has also invested in upgrading its water mains infrastructure which allows it to transfer drinking water between towns and cities throughout Northern Ireland.

Consultation was undertaken on a draft version of the HRA Screening Report (Jacobs, 2017) and the outputs helped to inform the scope of the Final WR & SR Plan.

1.3.2 Option Development

1.3.2.1 Unconstrained Options

The WR & SR Plan was developed through an iterative process taking cognisance of multiple criteria including feasibility, environmental considerations and cost. In the early stages of WR & SR Plan development, a series of workshops were held to identify a list of 'unconstrained options'. The unconstrained list included 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. These options were subject to an option screening process to produce a smaller set of 'constrained options' for further evaluation. Four criteria were used in this process: environmental impact; technical suitability; water availability/resilience; and promotability. The objective of screening the unconstrained options was to identify and exclude 'showstoppers' where there were unacceptable risks, based on a review of readily available information or knowledge of similar schemes. Options were screened out where constraints deemed that option to clearly not be feasible.

1.3.2.2 'Constrained Options'.

The options that were not screened out, make up the 'constrained options'. The constrained list of options is set out in Table 1-1. The constrained options were taken forward for further appraisal and investigated in more detail and with reference to environmental assessments undertaken in line with the SEA process, as well as capital and operational expenditure, implementation periods and planning. A Least Cost Model and a Multi-Criteria Analysis were developed to assess the options further. The outputs define, in part, the final WR & SR Plan (see section 1.3.2.3).

Water Resource & Supply Resilience Plan

Table 1.1: Constrained Options List comprising the remaining feasible options carried through from the Unconstrained List for further assessment. The options which were not taken forward as preferred options are highlighted.

Option Ref	Option Name	Outcome
1	Derg Bankside Storage	Not selected
2	Lough Neagh, New WTW and Trunk Main Transfer	Not selected
3	Rationalise small West WRZ sources and supply from increased Killyhevlin WTW	Not selected
4	New Groundwater Sources in Fermanagh	Not selected
5	Killyhevlin WTW to Lough Bradan Trunk Main	Not selected
6	Carmoney WTW to Strabane Trunk Main	Inclusion in final WR & SR Plan
7	Caugh Hill WTW to Strabane Trunk Main	Not selected
8	Castor Bay WTW to Ballydougan SR Trunk Mains Upgrade	Inclusion in final WR & SR Plan
9	Booster upgrade on Carland to Cookstown Trunk Main	Inclusion in final WR & SR Plan
10	Further Leakage Reductions	Not selected
11	HH water audits	Not selected
12	Targeted non-HH water audits (key accounts)	Not selected
13	Rainwater harvesting - external daily us	Not selected
14	Water efficient white goods discount vouchers	Not selected
15	Incentives for bathroom retrofit	Not selected
16	Improved specification of water fittings in new homes	Not selected
17	Schools water audit and retrofit	Not selected
18	Free water saving devices	Not selected
19	Hotel & Hospitals water audit and retro	Not selected
20	Hotel Water Audits and installation of water saving devices	Not selected
21	Collaborated water & energy efficient retrofit programme delivered by third parties	Not selected
22	Social housing refurbishment	Not selected
23	Farm Audits	Not selected

1.3.2.3 Resilience Options

NI Water's supply system can be vulnerable to particular events such as climatic events, outages and industrial action. All of these can compromise the security of supply for its customers. A number of potential resilience issues have been identified and options developed to address these issues.

Screening of resilience options was carried out in tandem with the WR & SR Plan development but underwent a different Screening process. Similar to the water resource options, the resilience options were assessed against SEA objectives and E&S valuation was undertaken. Environmental impacts for the options were identified as either low or moderate risk. The resilience options considered are set out in Table 1-2.

Water Resource & Supply Resilience Plan

Table 1.2: Resilience Options Dossiers List. The Resilience Options not taken forward as preferred options are highlighted.

Option Ref	Option Name	Outcome
1	Dorisland Resilience	Not selected
2	North East WRZ Resilience	Not selected
3	Lough Fea WTW & Moyola WTW Resilience	Inclusion in final WR & SR Plan
4	Ballinrees Resilience	Inclusion in final WR & SR Plan
5	Killyhevlin to Lough Bradan Resilience Trunk Main	Not selected
6	Upgrade Killyhevlin WTW	Inclusion in final WR & SR Plan
7	Killyhevlin to Belleek Trunk Main	Not selected
8	Cabragh SR to Glencuil SR Trunk Main	Not selected
9	Seagahan to Clay Lake Trunk Main	Inclusion in final WR & SR Plan
10	West WRZ Resilience, Trunk Main Upgrades and Links	Inclusion in final WR & SR Plan

1.3.3 WR & SR Plan Options

The unconstrained and constrained lists were refined following the processes described in section 1.3.2 to arrive at a preferred WR & SR Plan, described below.

The WR & SR Plan includes a variety of options (including pipelines, trunk mains (TMs), Water Treatment Works (WTW), pipeline upgrades, water storage reservoirs etc.) to reduce the vulnerability of NI Water's services and increase resilience of its water assets in order to continue to meet the projected demand for water as indicated above.

Options within the WR & SR Plan include demand management and water resource options. The demand management options involve options such as household or business audits and water conservation measures which were screened as not having any potential for significant effects on international nature conservation sites.

Ultimately, three water resource options were assessed as potential feasible options for meeting the supply demand deficit:

Resource (Supply Demand Balance) Options:

- Carmoney WTW to Strabane Trunk Main
- Castor Bay WTW to Ballydougan SR Trunk Mains Upgrade
- Booster Upgrade on Carland to Cookstown (increase transfer capacity with a booster upgrade consisting of a pump at Carland service reservoir and a pump near properties between Carland and Cookstown)

The HRA screening assessment of these options informed the SEA options assessment and the selection of options to be taken forward as part of the preferred WR & SR Plan.

Water Resource & Supply Resilience Plan

Five resilience options were also identified to reduce the vulnerability of NI Water's services and increase resilience of its water assets in order to continue to meet the projected demand for water. These resilience options will be considered further during the WR & SR Plan period and some of these options may be taken forward for implementation. The resilience options comprised the following:

Resilience Options:

- Lough Fea WTW & Moyola WTW Resilience Link
- Upgrade Killyhevlin WTW
- Seagahan to Clay Lake Transfer
- West WRZ Resilience, Trunk Main Upgrades and Links
- Ballinrees Resilience

1.3.4 Drought Plan Options

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.

The demand management and redistribution of water within the network measures were screened out as not having potential for significant adverse effects on international nature conservation sites. The use of increased abstraction within licence conditions was also considered to be covered through the existing licence provisions and the review of consent process and these measures were screened out of the Drought Plan HRA.

1.4 Legislative Requirements for Habitats Regulations Assessment (HRA)

Habitats and species are protected under the European Commission Habitats Directive and Birds Directive. These apply to proposed plans or projects that may have a likely significant effect (LSE) on European sites, which include Special Areas of Conservation, (SACs) and Special Protection Areas (SPAs), within the Natura 2000 Network.

Article 6 of the Habitats Directive states:

'Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to an appropriate assessment of its implications for the site in view of the site's conservation objectives... competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the public.'

Ramsar sites are wetland sites of international importance designated under the Ramsar Convention. These internationally important wetland sites such as estuaries, lakes and marshes, provide important waterfowl habitat.

The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 transposed the Habitats Directive into national law and came into force on 30 November 1995. The Regulations have been subsequently amended

several times and the Conservation of Habitats and Species Regulations 2017 consolidate all the various amendments made to the 1995 Regulations in respect of Northern Ireland.

Habitats Regulations Assessment (HRA) is the process by which the requirements of these directives are practically implemented in order to ensure and demonstrate compliance. It appraises potential for plans or projects to significantly affect European sites. In accordance with national planning policy and best practice guidelines, Ramsar sites are also assessed in this HRA.

This report has been prepared in accordance with the requirements of NI Water, as the competent authority, to undertake an HRA as set out in the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995. It considers the potential of the options within the WR & SR Plan and the Drought Plan to adversely affect internationally important nature conservation sites (European sites) either alone or in combination with other plans or projects.

The HRA process will be continued as the WR & SR Plan proposed scheme designs are developed and more detailed assessments under the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 will ultimately be carried out at a project level as and when appropriate using the results from the intervening screening documents.

1.5 The Potential Effects at the Plan / Strategy Level

The production of a plan itself does not adversely affect any European site. Neither does a plan usually authorise any project that could have such an effect. Most projects that may result from the provisions of a plan will require some form of consent or other authorisation; this is the case with WR & SR Plan. As such, each individual project contained within WR & SR Plan will be subject to the requirements of the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995.

Guidance from the European Commission (EC), the judgment of the European Court of Justice in the case of EC v the UK, case C – 6/04 and the opinion of the Advocate General in that case, are helpful in understanding how the EC believes plans could have a significant effect on a European site. Based on this guidance, a plan may affect a European site by:

- proposing or resulting in particular types of change that are inherently damaging;
- proposing or resulting in a magnitude of change that would be damaging because it would be so large;
- proposing or resulting in change in locations where the effects of change would be damaging;
- proposing or resulting in a magnitude of change that in the proposed location would be damaging;
- resulting in cumulative or combined effects that would be damaging, either from a programme of similar or different proposals within the WR & SR Plan itself, or a combination of such proposals in the WR & SR Plan and in other plans or projects;
- blocking options for future plans and proposals;
- providing the justification for damaging change; and
- failing to foresee damaging effects that would occur later in a programme.

1.6 Purpose of the Report

This presents the findings of the Stage 1 HRA Screening and identifies the international/European sites that could potentially be affected by the options and assesses, as far as possible, those options that may result in LSE and therefore require an assessment of potential 'adverse effects' to site integrity (Stage 2: Appropriate

Water Resource & Supply Resilience Plan

Assessment). This report also presents the finding Stage 2: Appropriate Assessment to establish whether there are solutions that would avoid or have a lesser effect on European sites.

2. Methodology

2.1 Introduction

HRA is a multi-stage process which first determines LSE and assesses the likelihood for an adverse effect on the integrity of a European site. This process is often referred to as AA; however, AA also forms one stage of the HRA (Stage 2) and is preceded by an initial 'screening stage' (Stage 1) that identifies LSE on European sites. The result of the screening stage ultimately then determines whether or not AA is needed. Table 2.1 below shows the overall HRA process.

Table 2.1: Stages in HRA (European Commission, 2001)

Stage	Task	Outcome
Stage 1	Screening	<i>"The process to identify the likely impacts of a project upon a European site, either alone or in combination with other plans and projects and consider whether the impacts are likely to be significant."</i>
Stage 2	Appropriate Assessment	<i>"The consideration of the impacts on the integrity of the European site, either alone or in combination with other plans and projects, with regard to the site's structure and function and its conservation objectives. Where there are adverse impacts, an assessment of mitigation options is carried out to determine adverse effect on the integrity of the site. If these mitigation options cannot avoid adverse effects, then development consent can only be given if Stages Three and Four are followed".</i>
Stage 3	Assessment of alternative solutions	<i>"Examining alternative ways of achieving the objectives of the project to establish whether there are solutions that would avoid or have a lesser effect on European sites".</i>
Stage 4	Imperative Reasons of Overriding Public Interest (IROPI)	<i>"This is the assessment where no alternative solution exists and where adverse effects remain. This stage aims to assess whether the development is necessary for IROPI and, if so, the potential compensatory measures that would be needed to maintain the integrity of the European site".</i>

This report focuses on the Appropriate Assessment or Stage 2.

The purpose of the screening stage of an HRA is to identify all aspects of a plan or project which would potentially have an effect on a European site, either alone or in combination with other aspects of the same plan or other plans or projects (Table 2.1). Where no effect is anticipated (usually because there are no 'pathways' between the plan or project and a European site, or because an effect is considered to be not significant) the plan or project can be eliminated from further consideration (European Commission, 2001).

Where it is not possible to rule out the risk of effects to a European site, the plan or project will be taken forward to the next stage of the HRA (Stage 2 AA).

The purpose of the Stage 2: "Appropriate Assessment" is to consider the effect of the project or plan, either alone or in combination with other projects or plans, on the integrity of the European/Ramsar site, with respect to the site's structure, function and its conservation objectives. Its objective is to assess if the integrity of the site will or will not be adversely affected.

2.2 Screening Steps

Individual options were subject to screening. This screening assessment involved identifying all elements of each option that had the potential (alone or in combination) to result in LSE to a European site. Source-receptor-pathways (e.g. via air, water, proximity etc.) for LSEs (e.g. pollution, siltation, noise) were identified, either directly or indirectly, to a European site.

Those options identified during the screening as having pathways to European sites were assessed to identify if the effect could be significant to the site.

The screening exercise applied the precautionary principle with all decision-making being transparent and objective. Plans and projects were only screened out where it could be demonstrated with sufficient certainty that there would be no LSE on a European site. Where the potential to affect a European site was identified, high level information was provided in order to assist in conducting an AA of the option.

Where standard mitigation was required to discount LSE, such as habitat loss or large-scale disturbance, an option was taken forward to Stage 2 (AA) in accordance with the decision reached by the Court of Justice of the European Union (CJEU) in *People Over Wind and Sweetman v Coillte Teoranta* (C-323/17) (see Section 2.6 below).

2.3 Identifying Potential Effects of the options and Geographical Scope

The guidance document 'Strategic Environmental Assessment and Habitats Regulations Assessment – Guidance for Water Resources Management Plans and Drought Plans' (Baker et al., 2012) has been used when assessing whether the options would be likely to affect European sites.

The proposed Constrained and Resilience options could affect European sites as a result of construction or operational impacts. Such impacts associated with the proposed works could be direct (e.g. construction activity within a European site) or indirect (e.g. impacts to European sites downstream of an abstraction point) and result in LSEs to a European site.

Table 2.2 lists the main impacts that could arise as a result of option implementation, including construction and operational impacts. The table provides illustrative distances within which each effect can be experienced.

For this screening assessment, each option was assessed separately using the source-pathway-receptor model. All European sites were assessed to determine if they were within the Zone of Influence (ZoI) of the proposed project. This involved assessing the proposed works and the potential impacts that could result, the potential pathways to any European sites (e.g. rivers, air, groundwater) and the Qualifying Interests (QI) of the European sites.

Where the options involved groundwater or river abstraction, discharges (fluvial or coastal) or off-shore works, European sites located within the same sites or with other hydrological links were identified and considered in the screening assessment. In addition, general search areas were increased for the reasons listed below.

- Any SACs within 10 km of the proposed development were listed because 10 km is the maximum potential ranging distance of mobile QI species from SACs according to best scientific knowledge (specifically otter territories typically extend this far).
- Any SPAs within 20 km of the proposed development were listed because 20 km is the maximum ranging distance for SPA QI bird species from SPAs according to best scientific knowledge (specifically certain goose species may forage this far from core SPA wetlands).

2.4 Interpretation of a 'Likely Significant Effect' (LSE)

A likely effect is one that cannot be ruled out on the basis of objective information. The test is a 'likelihood' of effects rather than a 'certainty' of effects. In the Waddenzee case (case C-127/02) the European Court of Justice ruled that a project should be subject to AA *"if it cannot be excluded, on the basis of objective information, that it will have a significant effect on the site, either individually or in combination with other plans and projects"*. This establishes that 'likely', in this context, should not simply be interpreted as 'probable' or 'more likely than not', but rather whether a significant effect can objectively be ruled out.

Where a project is likely to undermine the site's conservation objectives, it must be considered likely to have a significant effect on the site. The assessment of that risk must be made in the light of the characteristics and specific environmental conditions of the site concerned. Thus, an effect that would undermine the conservation objectives would be a significant effect and the likelihood of it occurring is a case-by-case judgement, taking account of the precautionary principle and the local circumstances of the site.

2.5 Consideration of Likely Significant Effects In Combination

The requirement of the Habitats Directive is to undertake an AA of a plan if it would be likely to have a significant effect on a European site *"either individually or in combination with other plans or projects"*. The Directive recognises that in some cases, the effects of a plan on its own would be either unlikely or insignificant. Nevertheless, the Directive also recognises that those plans and projects which are unlikely to have a significant effect or effects alone may have a significant effect or effects in combination with each other or with other plans and projects. This could occur if, when their individual effects are added together, including how they come forward over time, the effects in-combination are likely to be significant.

2.6 Standard Mitigation Measures to Avoid Likely Significant Effects

Until recently, standard mitigation measures such as siltation/water pollution, noise and vibration, visual disturbance controls could be introduced during the screening stage by a plan-making body to remove the likelihood of significant effects. Thus, the aspects of the plan (or project) which could have caused such effects would no longer do so and would therefore not be subject to AA.

However, in April 2018, a decision was reached by the Court of Justice of the European Union (CJEU) in *People Over Wind and Sweetman v Coillte Teoranta (C-323/17)* (the Sweetman judgment) which stated that:

"... Article 6(3) of the Habitats Directive must be interpreted as meaning that, in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site."

To comply with the Sweetman judgment, where mitigation was considered necessary to avoid significant effects to European sites, the option was taken forward to Stage 2 (AA). Timing construction works to avoid sensitive periods of the year; restricted construction activity to habitats or areas that are not integral to the maintenance of a site's favourable conservation status etc. are considered to be mitigation measures that would trigger the need for Stage 2 AA.

As most of the options are not supported by detailed design proposals (e.g. final pipeline routes have not yet been confirmed, or construction techniques and timings have not been agreed), there are opportunities to 'design out' the potential for significant effects to European sites (e.g. changing a pipeline route so that it avoids a European site). A design change of this nature would be considered an inherent aspect of the work plan that would not necessarily trigger the need for Stage 2, AA.

Table 2.2: Potential Impacts of WR & SR Plan Options (Baker et al, 2012)

Broad categories of potential effects on European sites, with examples	Examples of operations responsible for effects (Distance assumptions shown in italics)
<p>Physical loss</p> <ul style="list-style-type: none"> - Destruction (including offsite effects, e.g. foraging habitat) - Smothering 	<p>Development of built infrastructure associated with scheme, e.g. pipelines, temporary weirs, access routes.</p> <p><i>Physical loss is only likely to be significant where the boundary of the scheme extends within the boundary of the European site, or within an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated).</i></p>
<p>Physical damage</p> <ul style="list-style-type: none"> - Sedimentation/silting - Prevention of natural processes - Habitat degradation - Erosion - Trampling - Fragmentation - Severance/barrier effect - Edge effects 	<p>Development of built infrastructure associated with scheme, e.g. reservoir embankments, water treatment plant, pipelines, pumping stations.</p> <p>Recreation e.g. cycling, walking, horse-riding, water-sports associated with scheme benefits, e.g. reservoirs.</p> <p><i>Physical damage is only likely to be significant where the boundary of the scheme extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated).</i></p>
<p>Non-physical disturbance</p> <ul style="list-style-type: none"> - Noise - Visual presence - Human presence - Light pollution 	<p>Noise from vehicular traffic during construction of scheme.</p> <ul style="list-style-type: none"> • Noise from construction traffic is only likely to be significant where the transport route to and from the scheme is within 3-5 km of the boundary of the European site¹. <p>Plant and personnel involved in construction and operation of schemes e.g. for maintenance, plus non-operational activities such as recreation associated with scheme e.g. reservoirs.</p> <ul style="list-style-type: none"> • These effects (noise, visual/human presence) are only likely to be significant where the boundary of the scheme extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated). <p>Development of built infrastructure associated with scheme, which includes artificial lighting.</p> <p><i>Effects from light pollution are only likely to be significant where the boundary of the scheme is within 500 m of the boundary of the European site. From a review of Environment Agency internal guidance on HRA and various websites it is considered that effects of vibration and noise and light are more likely to be significant if development is within 500 m of a European site.</i></p>
<p>Water table/availability</p> <ul style="list-style-type: none"> - Drying - Flooding/storm water 	<p>Changes to water levels and flows due to water abstraction, storage and drainage interception associated with inland schemes.</p> <p><i>These effects are only likely to be significant where the boundary of the scheme extends within the same ground or surface water</i></p>

¹ A series of studies carried out in the Netherlands have shown that road noise levels above 42-43dB and 47dB results in a rapid fall in population of woodland and grassland breeding bird species, with disturbance distances varying between species from 20 to 1700 meters from the road (at 5000 cars a day) and up to 3.53 km at 50,000 cars a day. The most recent study is Reijnen et al. (1997).

Water Resource & Supply Resilience Plan

Broad categories of potential effects on European sites, with examples	Examples of operations responsible for effects (Distance assumptions shown in italics)
<ul style="list-style-type: none"> - Changes to surface water levels and flows - Changes in groundwater levels and flows - Changes to coastal water movement 	<p><i>catchment as the European site. However, these effects are dependent on hydrological continuity between the scheme and the European site and sometimes, whether the scheme is up or down stream from the European site.</i></p>
<p>Toxic contamination</p> <ul style="list-style-type: none"> - Water pollution - Soil contamination - Air pollution 	<p>Air emissions associated with vehicular traffic during construction of schemes.</p> <ul style="list-style-type: none"> • This effect is only likely to be significant where the transport route to and from the scheme is within 200 m of the boundary of the European site².
<p>Non-toxic contamination</p> <ul style="list-style-type: none"> - Nutrient enrichment (e.g. of soils and water) - Algal blooms - Changes in salinity - Changes in thermal regime - Changes in turbidity - Changes in sedimentation/silting - Air pollution (dust) 	<p>Changes to water salinity, nutrient levels, turbidity, thermal regime due to water abstraction, storage, or inter-catchment transfers.</p> <ul style="list-style-type: none"> • These effects are only likely to be significant where the boundary of the scheme extends within the same ground or surface water catchment as the European site. However, these effects are dependent on hydrological continuity between the scheme and the European site and sometimes, whether the scheme is up or down stream from the European site. This level of information is not available until data such as groundwater modelling is collected to accompany planning applications. <p>Emissions of dust during earthworks, construction of plant and tunnel/pipeline construction associated with schemes.</p> <ul style="list-style-type: none"> • This effect is only likely to be significant where the construction works for the scheme are within 500 m of the boundary of the European site³.

² For deposition of air pollutants associated with construction transport for some of the schemes, the Highways Agency guideline measure of 200 m from a road has been applied with respect to the roads likely to be used. *Design Manual for Roads and Bridges (DMRB), Volume 11*. Highways Agency. 2003.

³ This distance is based on information relating to dispersion of dust particles (in Appendix 1A of Annex 1 to the *Minerals Policy Statement 2: Controlling and Mitigating the Environmental Effects of Minerals Extraction in England*, ODP, March 2005). Large dust particles (greater than 30 µm) will mostly deposit within 100 m of the source. Intermediate-sized particles (10–30 µm) are likely to travel up to 200–500 m. Smaller particles (less than 10 µm) may travel 1 km or more from their source. Large particles are associated with nuisance from deposition while smaller particles can have human health effects. It is assumed that dust deposition from a scheme could be significant up to 500 m from European site boundaries (an average distance has been assumed since the size of dust particles arising from schemes is unknown). However, this will also be dependent on the volume of dust produced from the scheme, the particle size and rate of deposition and coverage of the European site. The DMRB Volume 11, Part 1 Air Quality, Annex F notes that the most sensitive species at European sites appear to be affected by dust deposition at levels above 1000 mg/m²/day, which is five times greater than the level at which most dust deposition may start to cause a perceptible nuisance to humans. Most species appear to be unaffected until dust deposition rates are at levels considerably higher than this. Information from the Dibden Bay Container Terminal Public Inquiry indicated that vegetation soiling from dust from large construction sites operating for a year or more could occur at up to 100 m without mitigation and 25 m with mitigation (Technical Statement TS/AQ1, ABP, 2000).

3. European/International Sites Potentially Affected by the Options Proposed

This section lists the European/international sites considered in the Stage 1 HRA Screening Report (Jacobs, 2017) report. At the screening stage thirteen European/international sites were initially identified as requiring consideration in the HRA screening assessment. Ramsar sites (international sites), in all cases were coincident with the European sites (SACs and SPAs). All sites considered are listed below in Table 3.1

Table 3.1: European/international sites considered by the screening assessment

SACs	SPAs	Ramsar Sites
River Foyle and Tributaries Tully Bog River Faughan and Tributaries River Roe and Tributaries Upper Ballinderry River Teal Lough Fairy Water Bogs Lough Nageage	Lough Neagh and Lough Beg Lough Foyle	Lough Neagh and Lough Beg Lough Foyle (includes the River Faughan and River Roe) Fairy Water Bogs

While conservation objectives are specific to each site, certain generic objectives tend to apply, including:

- maintaining the population of the habitat/species as a viable component of the site;
- maintaining the distribution of the habitat/species within the site;
- maintaining the distribution and extent of any supporting habitat;
- maintaining the structure, function and supporting processes of habitats supporting the species; and
- ensuring there is no significant disturbance of species for which a site has been designated.

The following section gives an overview of the screening assessment (Section 4) and the sites selected to be taken forward to Stage 2 Appropriate Assessment (Section 5).

4. Stage 1 Screening Assessment Overview

4.1 WR & SR Plan Introduction

This section describes the Stage 1 (screening) of the HRA and assesses the WR & SR Plan options detailed in Section 1.3 against the international/European sites identified above (Section 3).

The screening assessment covered:

- three water resource options (see Figure 1); and
- five resilience options (see Figure 2)⁴⁵.

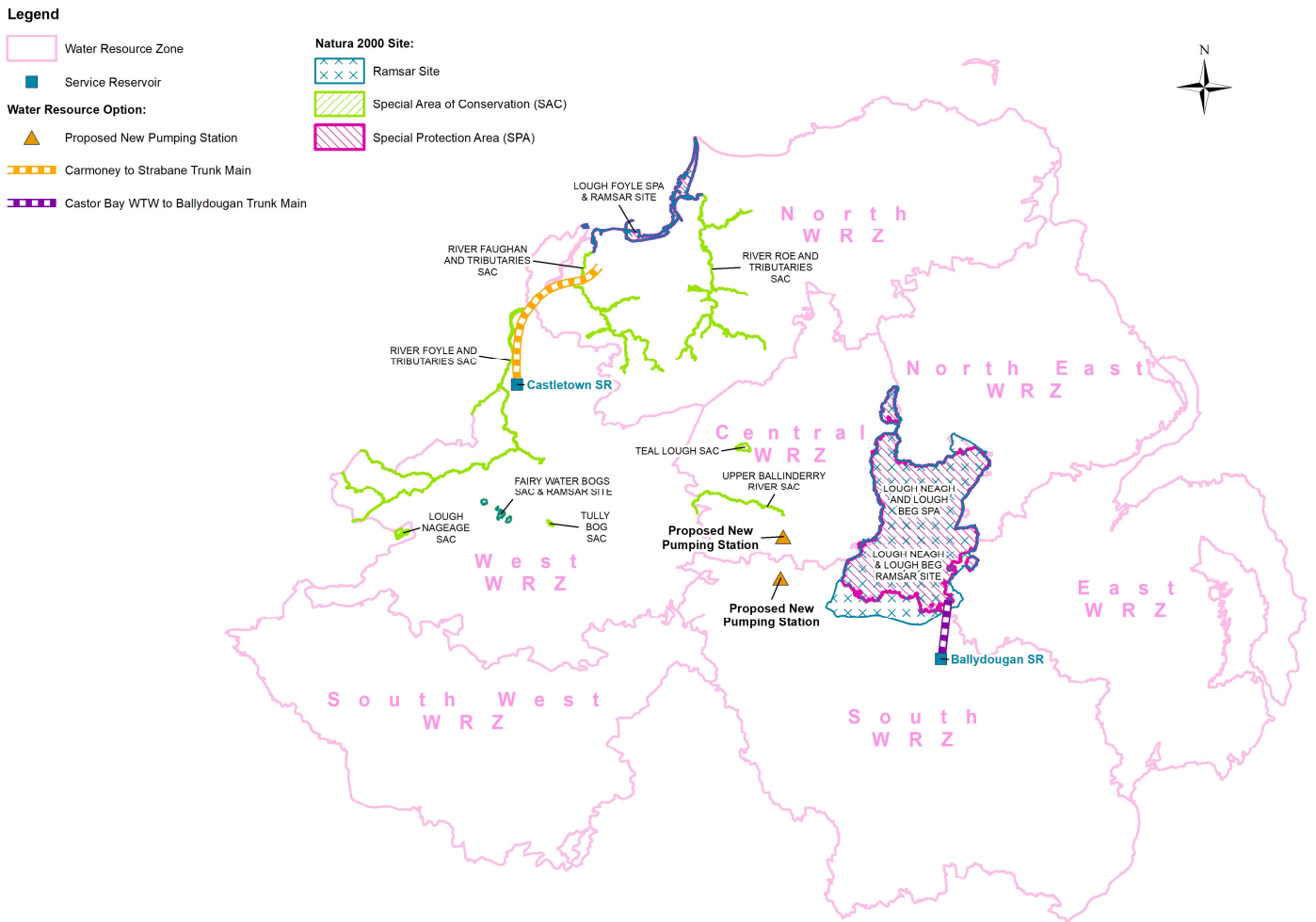
Assessment tables for the international/European sites can be found below (Table 4.1).

⁴ It should be noted that all pipeline routes are indicative and more detailed routing studies will be undertaken at the project stage.

⁵ Some pipeline options will include pumping stations along the main.

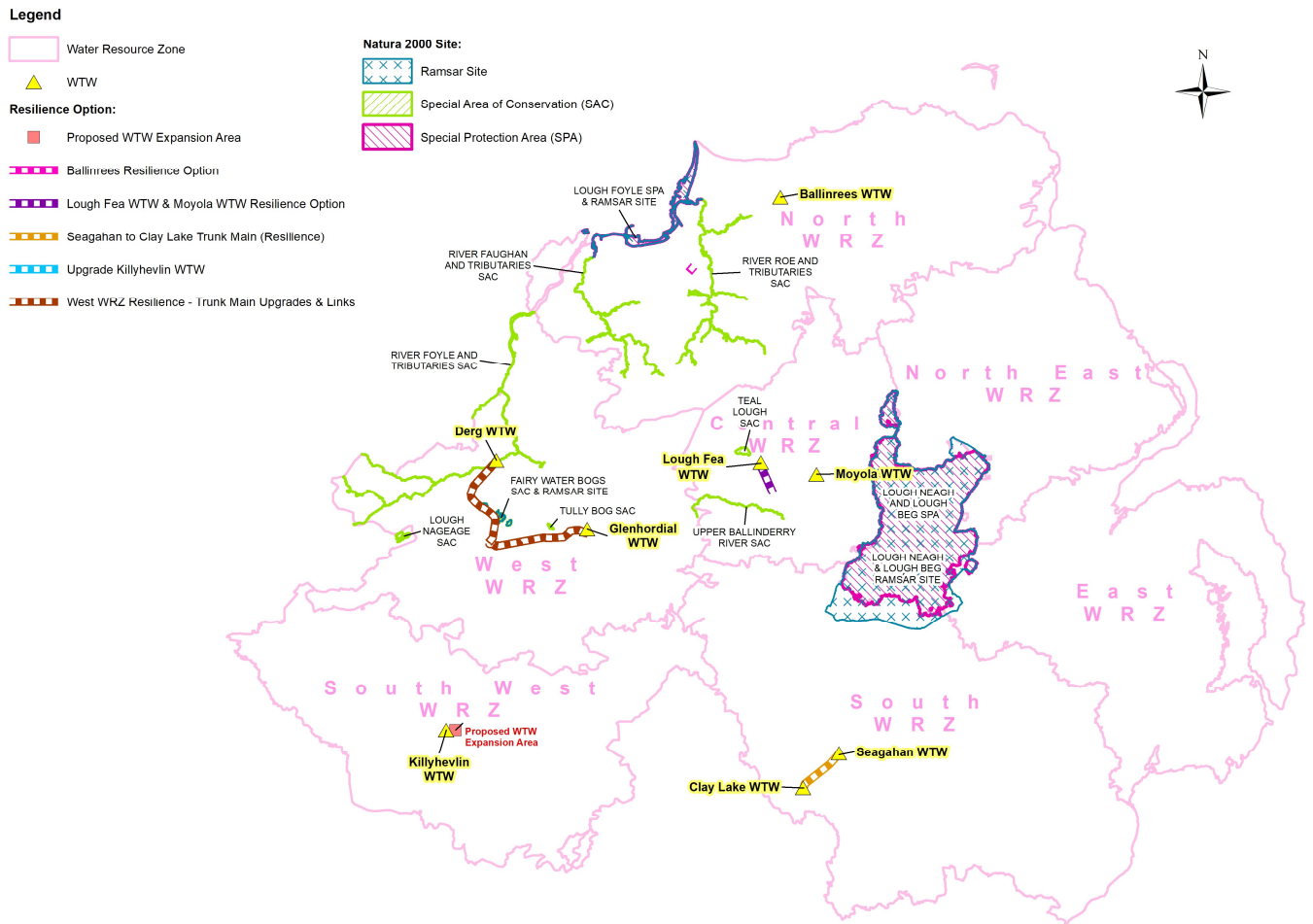
Water Resource & Supply Resilience Plan

Figure 4-1 Natura 2000 sites and Water Resource Zone Options



Water Resource & Supply Resilience Plan

Figure 4-2 Natura 2000 sites and Resilience Options



4.2 WR & SR Plan Options Where No Likely Significant Effects are Predicted

For four options LSEs could be confidently excluded, as no, or very weak source-receptor-pathways were identified. The following options could therefore be screened out from further assessment:

- Lough Fea WTW & Moyola WTW Resilience Link;
- Ballinrees Resilience;
- Upgrade Killyhevlin WTW; and
- Seagahan to Clay Lake Transfer.

Assessments for these options can be seen in Table 4.1.

4.3 WR & SR Plan Options Where Likely Significant Effects are Predicted

For the remaining four options, source-receptor-pathways were identified as 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 LSE. These options could not be screened out from further assessment, in accordance with the Sweetman judgment. LSE were therefore identified for the following options (and the options therefore advanced to Stage 2 (AA):

- Water resource Options:
 - Carmoney WTW to Strabane Trunk Main;
 - Castor Bay WTW to Ballydugan SR Trunk Mains Upgrade; and
 - Booster Upgrade on Carland to Cookstown Trunk Main.
- Resilience Option
 - West WRZ Resilience, Trunk Main Upgrade and Links.

The assessment for the options advanced to Stage 2 is provided in Table 4.2.

4.4 In combination Assessment

To comply with the Habitats Regulations, a HRA must assess whether a plan or project would be likely to have a significant effect on a European site 'either individually or in combination with other plans or projects.' This requirement mandates that consideration be given to instances where the effects of a plan or project would be either unlikely or insignificant when acting alone but may result in LSEs when acting in combination with the effects from other plans and projects.

This Screening study has therefore considered the potential for the project to have LSE on European sites in combination with other plans and projects. Where an effect presented no risk of LSEs acting alone, but potential LSEs could not be discounted for a combination of effects, the European site should be advanced to Stage 2 (AA) and the significance of the in-combination effects identified, assessed in detail. In-combination effects are those that may arise from the project in-combination with other plans and projects that are completed, as well as those proposed and consented, but not yet built and operational. Plans or projects that are proposed (but not yet approved) were also considered (EC, 2018).

A desk top review of the planning applications and any proposed developments with feasible spatial or temporal overlap with the proposed project was undertaken. This provided an indication of major infrastructure projects, current road schemes and projects requiring EIA that might have spatial or temporal overlap with the WR & SR Plan.

Water Resource & Supply Resilience Plan

At this stage, no significant in combination effects were identified between the WR & SR Plan's resource and resilience options that might result in LSE to European sites through interaction with each other, or external plans and projects.

However, due to a lack of project-level information, including information on spatial location, detailed design and timescales, it is not possible to identify and assess every potential for 'in combination' effects at the plan level. Project level HRA would be carried out at the planning stage which would consider stand-alone effects, cumulative effects and effects in combination with other relevant plans and projects. The general scope of issues for the consideration of in combination effects at project level, include temporary habitat loss and disturbance effects associated with construction and water quality issues.

4.5 WR & SR Plan Summary of HRA Screening

As part of the assessment of potential options for consideration for the WR & SR Plan, all of the three water resource options considered were found likely to result in an LSE to an international/European site and needed to be taken forward to Stage 2 (AA). Of the five resilience options, one was identified as requiring Stage 2 assessment if taken forward in the WR & SR Plan. This was on the basis that standard mitigation measures were required to discount LSE and on the application of the Sweetman judgment. The other four resilience options were found to have no or only very weak pathways to a European site, so these options were screened out.

Water Resource & Supply Resilience Plan

Table 4.1: Screening results of options included in the draft WR & SR Plan and screened out

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
Ballinrees Resilience					
<p>Elements:</p> <ul style="list-style-type: none"> • Pumps • Pipe 	<p>EU Site: River Roe and Tributaries SAC</p> <p>Distance: 2.3 km</p> <p>QIs:</p> <ul style="list-style-type: none"> • Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles • Atlantic salmon (<i>Salmo salar</i>) • Water courses of plain to montane levels with the <i>Ranunculus fluitans</i> and <i>Callitriche-Batrachion</i> vegetation 	<p>All pathways</p> <p>The River Roe and Tributaries SAC is not hydrologically linked to the option. There is therefore no potential LSE as a result of pollution or siltation effects from construction works. As the SAC is 2.3 km from the proposed works no qualifying habitat will be lost and no qualifying species will be disturbed. As a result, no effects pathways and no LSEs are predicted.</p>	No	No	<p>No potential LSE identified - this Option does not require Stage 2 HRA</p>
	<p>EU Site: Lough Foyle Ramsar and SPA</p> <p>Distance: 7.5 km</p> <p>QIs:</p> <ul style="list-style-type: none"> • Bewick's swan (<i>Cygnus columbianus bewickii</i>) • Whooper swan (<i>Cygnus cygnus</i>) • Golden plover (<i>Pluvialis apricaria</i>) • Bar-tailed godwit (<i>Limosa lapponica</i>) • Assemblage species • Waterfowl assemblage • Supporting wetland habitat 	<p>Water Quality</p> <p>The Lough Foyle SPA and Ramsar site lies 7.5 km downstream of the proposed pipeline. There is potential for changes in water quality downstream of the works to affect the supporting wetland habitat of the site. The 7.5 km river extent between the pipeline crossing and the SPA would provide significant dispersal and diffusion of any pollutants, which are likely to be small-scale for works (and plant requirements) of this nature. A significant, or pervasive pollution event, or the disturbance of contaminated land is not anticipated and further, works for option 6 upriver would be mitigated to avoid impacts to water quality. The pathway to significant impacts on the SPA is therefore considered to be very weak.</p>	No	No	

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
Lough Fea WTW & Moyola WTW Resilience					
Elements: <ul style="list-style-type: none"> • Pipes • Pump 	EU Site: Teal Lough SAC Distance: 2.8 km QI: Blanket Bog *	All pathways No potential LSEs from the construction of the proposed Lough Fea pipeline are anticipated for the Teal Lough SAC. Due to the physical separation of the Option from the site, the QI (blanket bog) will not be affected. There will be no habitat loss or changes in water quality as there are no pathways to the SAC from the proposed works. Teal Lough SAC is located 2.8 km from the proposed works and there are no hydrological connections between the European site and the Option. The QI habitat, blanket bog, will not be affected by the proposed construction works as there are no effects pathways. Therefore, no LSEs are predicted.	No	No	No potential LSE identified - this Option does not require Stage 2 HRA
	EU Site: Upper Ballinderry River SAC Distance: (2.9 km) QIs: <ul style="list-style-type: none"> • Water courses of plain to montane levels with the <i>Ranuncion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation • Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) • Otter (<i>Lutra lutra</i>) 	Water quality There is no potential for LSEs from the construction of this proposed option on the Upper Ballinderry River SAC. The site is 2.9 km away from the proposed development and the pipeline and associated new pump are not hydrologically connected to the SAC. Further the existing mains will be used. On this basis, no impact pathways exist to the 'water courses of plain to montane levels with the <i>Ranuncion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation' or Freshwater pearl mussel features.	No	No	
		Disturbance The area also supports a significant presence of otters. Otters are semi-aquatic and utilise aquatic environments for hunting and shelter on land for resting and breeding. Otter also roam over considerable	No	No	

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
		distances, so it is feasible that an otter could enter the option's zone of influence during construction works and experience disturbance. While a theoretical effect pathway exists, it is considered to be a very weak one. Otter are far more likely to be utilising the river and its associated riverine flora and fauna and adjacent semi-natural vegetation and woodland almost 3km away. The risk of excluding otter from important habitat, or the option affecting significant numbers of otter is considered to be very low. On this basis, LSE is discounted.			
Upgrade Killyhevin					
<u>Elements:</u> <ul style="list-style-type: none"> • Trunk main • Pump 	<u>EU Site:</u> Lough Nageage SAC <u>Distance:</u> 4.5 km <u>QIs:</u> <ul style="list-style-type: none"> • White clawed crayfish (<i>Austropotamobius pallipes</i>) 	<u>All pathways</u> Lough Nageage is situated upstream of the proposed works and will not be affected by the construction of the trunk main. The QI (white clawed crayfish) will not be impacted and the conservation objectives will not be affected. No LSEs are predicted.	No	No	No potential LSE identified - this Option does not require Stage 2 HRA
Seaghan to Clay Lake Trunk Main					
<u>Elements:</u> <ul style="list-style-type: none"> • Trunk Main 	None identified	<u>All pathways</u> The closest site is 18 km from the option and no effects pathways could be determined. Therefore, no LSEs on any international/European site can be identified as a result of this option. No LSEs are predicted.	No	No	No potential LSE identified - this Option does not require Stage 2 HRA

Water Resource & Supply Resilience Plan

Table 4.2 Screening results of options included in the draft WR & SR Plan and screened in

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
Carmoney to Strabane Trunk Main					
<p>Elements:</p> <ul style="list-style-type: none"> • Trunk Mains • Pumps 	<p>EU Site: River Faughan and Tributaries SAC</p> <p>Distance: 0 m</p> <p>QIs:</p> <ul style="list-style-type: none"> • Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles • Otter • Atlantic salmon 	<p>Habitat Loss</p> <p>Option 6 involves crossing the River Faughan and Tributaries SAC, designated for otter and Atlantic salmon. There is potential for a direct loss of supporting habitat, such as resting sites and spawning grounds under the option's footprint. In-river ground disturbance could act as a deterrent/barrier to migrating salmon, potentially fragmenting habitat by restricting access to upriver spawning grounds. If Horizontal Directional Drilling (HDD) is used, habitat loss will largely be avoided, except for the land required for the HDD compounds. The scale of land-take required would not be significant to otter at population level, unless important areas were lost. Therefore, surveys would be required to ensure compounds, trenching and work areas would not destroy habitat of value (e.g. holts). If HDD is not used, surveys would be required, and in-river works would need to be subject to seasonal constraints to avoid impacts to the salmon run. Under both construction scenarios, mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p>	Yes, in the absence of mitigation	No	<p>Mitigation is required to discount LSE. Therefore, this Option requires Stage 2, AA</p>

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
		<p><i>Changes to Water Quality</i></p> <p>Construction activities could result in the discharge of pollutants and generate polluted storm water runoff that could affect surface water quality in the River Faughan. Salmon in particular require very good water quality, free of excessive sedimentation. As otter depend on the availability of prey (lamprey, salmon, trout and frogs) normally associated with high water quality, there is the potential for both direct and indirect effects to otters. If HDD is used to cross the river, impacts will be largely avoided. However, works adjacent to the river, would need to adhere to industry standard best practices to prevent pollution and sedimentation entering the river and avoid significant impacts to water quality. Mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p>	Yes, in the absence of mitigation	No	
		<p><i>Mortality</i></p> <p>There is a risk of species mortality through road traffic accidents and entrapment in pipes and pits etc. Mitigation is needed to discount LSE, including the placement of caps on pipes and pits, providing escape routes and requirements to check pipes/pits regularly. Also, pre-construction surveys to identify otter holts and avoid physical interactions with the species. Mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p>	Yes, in the absence of mitigation	No	

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
		<p><i>Disturbance</i></p> <p>Construction of the trunk main would generate noise and vibration in the riparian area. Otters are sensitive to noise and visual stimuli and could alter foraging behaviour to avoid habitat that is less appealing, through noise/lighting and human presence around watercourses. Noise can result in otter deserting an area. A loss of resting, foraging or breeding grounds could lead to reduced distribution, species fitness and breeding success. In-river works could also expose salmon to underwater noise and vibration, which could be very disruptive to salmon during sensitive life periods. If HDD is used, impacts will be largely avoided. However, basic mitigation measures, including pre-works survey and suitable exclusion zones where necessary around breeding holts, would need to be applied and developed where necessary to ensure the avoidance of disturbance to otters and their resting sites during river side works. Mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p>	Yes, in the absence of mitigation	No	
		<p><i>Invasive species</i></p> <p>A change in native vegetation along river banks brought about by the accidental introduction of an invasive species could result in habitat loss. An invasive Species Management Plan should be developed, outlining good biosecurity practice. Mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p>	Yes, in the absence of mitigation	No	

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
	<p>EU Site: River Foyle and Tributaries SAC</p> <p>Distance: 430 m</p> <p>QIs:</p> <ul style="list-style-type: none"> • Atlantic salmon • Otter • Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation 	<p>Habitat Loss</p> <p>The trunk main is proposed to cross six tributaries upstream of the River Foyle and Tributaries SAC. If the construction method is HDD, potential habitat loss would be restricted to the land needed for the HDD compounds and work areas. Effects at population level from this scale of habitat loss would be unlikely, but basic surveys would be required to ensure compounds, trenching and construction does not destroy habitat of value (e.g. holts). In-river works would need to be scheduled to avoid the salmon run to avoid upriver disruption to the run. Consequently, mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p> <p>Changes in Water Quality</p> <p>Construction activities upriver could result in discharge of pollutants and could generate polluted storm water runoff that could affect surface water quality. If HDD is used to cross the river, impacts will be largely avoided by vastly restricting the strength of the hydrological pathway to the three QIs downstream. Nonetheless, works adjacent to the river would need to adhere to best management practices to prevent pollution entering the river. Mitigation is required upriver to discount LSE and the requirement for Stage 2 is triggered.</p>	Yes, in the absence of mitigation	No	Yes
			Yes, in the absence of mitigation	No	

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
		<p><i>Disturbance</i></p> <p>Construction of the trunk main would generate noise and vibration and visual stimuli in the riparian area and potentially, within the river environment. Habitat fragmentation is a risk if foraging access to the other tributaries is prevented. The in-river works upstream could also expose salmon to underwater noise and vibration, which could be very disruptive to salmon during sensitive life periods. In light of the strong pathways to disturbance impacts on the salmon and otter features of this site, basic mitigation measures, including pre-works survey and suitable exclusion zones where necessary around breeding holts, would need to be applied and developed where necessary to ensure the avoidance of disturbance to critical habitat. Even for trenchless/HDD construction, impacts to otter could occur in close proximity to HDD drilling compounds, bore sites or busy work areas. Mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p>	Yes, in the absence of mitigation	No	
	<p><u>EU Site:</u> Lough Foyle SPA and Ramsar</p> <p><u>Distance:</u> 2.5-4.2 km from the proposed Avish Hill pumps and 9.5 km downstream from the pipeline river crossing.</p> <p><u>QIs: (wintering)</u></p>	<p><i>Disturbance</i></p> <p>The Avish Hill pumps are proposed to be constructed 2.5 km from this SPA, designated for over-wintering birds. A theoretical pathway to effects does exist where birds foraging outside the SPA could encounter the works. The risk of significant, population level impacts is very low. Firstly, exposure would be minimal; the SPA's wading birds are more likely to be focused on the extensive intertidal mud-flats and</p>	No	No	

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
	<ul style="list-style-type: none"> • Bewick's swan • Whooper swan • Golden plover • Bar-tailed godwit • Light-bellied brent goose (<i>Branta bernicla hrota</i>) • Assemblage species 	<p>sand-flats saltmarsh that the site is designated for. The number of foraging birds that might enter the project's Zol would be small and secondly, the implications would be minimal, as the project area is easily avoided by a slight behavioural response. The works would not exclude the SPA birds from important areas of habitat and wouldn't intrude upon the SPA at all. No LSE anticipated.</p>			
		<p><i>Changes in Water Quality</i></p> <p>The pipeline will cross the River Faughan 9.5 km upstream of the SPA. An effect pathway exists via the hydrological connection of the river with the SPA. The habitats and dependent species of the SPA are vulnerable to pollution and contaminated water. The 9.5 km river extent between the sites would provide significant dispersal and diffusion of any pollutants, which are likely to be small-scale for works (and plant requirements) of this nature. A significant, or pervasive pollution event, or the disturbance of contaminated land is not anticipated however, works for option 6 upriver would be mitigated to avoid impacts to water quality. Although the pathway to significant impacts on the SPA is considered to be very weak mitigation is proposed and therefore the requirement for Stage 2 is triggered.</p>	Yes, in the absence of mitigation	No	

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
		<p>Habitat Loss</p> <p>There is potential for inland foraging habitat of qualifying species such as brent geese and whooper swans to be lost under the footprint of the proposed Avish Hill pumps. However, the small area and extent of habitat lost comparative to the vast availability of habitat available within the SPA is not likely to significantly affect the qualifying species. No LSE anticipated.</p>	No	No	
<p>West WRZ Resilience Trunk Main Upgrades and Links</p>					

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
<p>Elements:</p> <ul style="list-style-type: none"> • Ring connection • New Trunk Main • Upgraded Trunk Main • Pumps (x2) 	<p>EU Site: River Foyle and Tributaries SAC</p> <p>Distance: 0 m</p> <p>QIs:</p> <ul style="list-style-type: none"> • Atlantic salmon • Otter <p>Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation</p>	<p>Habitat Loss</p> <p>There is potential for direct loss of supporting habitat, such as resting sites and spawning grounds during upgrades to the existing trunk main and if the pipeline crosses the river directly. This would represent a temporary loss of habitat to accommodate the works (with subsequent recovery), but effects could be significant if valuable habitat was disturbed (e.g. otter holts or spawning gravels). In-river ground disturbance could also act as a deterrent/barrier to migrating salmon and restrict access to upriver spawning grounds. If HDD is used, this would avoid some physical disturbance effects; habitat loss would be limited to the land required for the HDD compounds and the work areas. This is likely not to represent a significant loss <i>unless</i> important habitat is lost. Therefore, basic surveys would be required to ensure compounds, trenching and construction does not destroy habitat of value. Any drilling within the SAC or close to the river should supervised by an ecologist following surveys. Any in-river works would be subject to seasonal constraints to avoid the salmon run. Under both scenarios, mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p>	Yes, in the absence of mitigation	No	<p>Mitigation is required to discount LSE. Therefore, this Option requires Stage 2, AA</p>
		<p>Water quality</p> <p>This SAC contains aquatic species that are susceptible to pollutants or sediment laden runoff that could be generated from construction works on the river bank, or within the river.</p>	Yes, in the absence of mitigation	No	

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
		If HDD is used to cross the river, impacts will be largely avoided. However, works adjacent to the river, would need to adhere to best management practices to prevent pollution and sedimentation entering the river and avoid significant impacts to surface water quality. Mitigation is required to discount LSE and the requirement for Stage 2 is triggered.			
		<p>Disturbance</p> <p>There is potential for disturbance to QI species during the upgrade works of the existing trunk main. A construction noise and vibration management plan would be required to discount LSEs from disturbance to the SAC features.</p> <p>Mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p>	Yes, in the absence of mitigation	No	
		<p>Invasive species</p> <p>For works within an SAC, an Invasive Species Management Strategy should be put in place to prevent, reduce, control the effects of invasive species. Mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p>	Yes, in the absence of mitigation	No	
	<p>EU Site: Fairy Water Bogs SAC and Ramsar site</p> <p>Distance: 50 m</p> <p>QIs:</p>	<p>All pathways</p> <p>Provided the trunk main will be constructed within the existing road, there will be no LSEs to the SAC or Ramsar site. No LSEs are predicted.</p>	No	No	

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
	Active raised bogs *				
	<p>EU Site: Tully Bog SAC</p> <p>Distance: 1.3 km</p> <p>QIs: Active raised bogs*</p>	<p>All pathways</p> <p>There will be no effects on the Tully Bogs SAC. There is no source-receptor-pathway for this site, therefore the qualifying habitat will not be affected. No LSEs are predicted.</p>	No	No	
Castor Bay WTW to Ballydougan SR Trunk Mains Upgrade					
<p>Elements:</p> <ul style="list-style-type: none"> • Trunk main 	<p>EU Site: Lough Neagh and Lough Beg SPA and Ramsar</p> <p>Distance: 45 m</p> <p>QIs:</p> <p>Breeding</p> <ul style="list-style-type: none"> • Common tern (<i>Sterna hirundo</i>) • Great crested grebe (<i>Podiceps cristatus</i>) <p>Wintering</p> <ul style="list-style-type: none"> • Bewick's swan (<i>Cygnus columbianus</i>) • Golden plover (<i>Pluvialis apricaria</i>) • Whooper swan (<i>Cygnus cygnus</i>) 	<p>Disturbance</p> <p>There is potential for construction works (noise and vibration, lighting, movement) of the new trunk mains to cause disturbance to the qualifying species.</p> <p>Breeding birds:</p> <ul style="list-style-type: none"> • Common tern breed on islands on Lough Neagh. The most important natural island is Pagan Island located in the south east corner of the Lough which holds around 45 breeding pairs (Lough Neagh Wetlands, 2008). Given the location of the proposed new trunk mains there is the potential to cause disturbance to breeding common tern. The significance of the disturbance effect will be determined following breeding bird surveys at project level. 	Yes, in the absence of mitigation	No	Mitigation is required to discount LSE. Therefore, this Option requires Stage 2, AA

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
	<ul style="list-style-type: none"> • Great crested grebe (<i>Podiceps cristatus</i>) (also on passage) • Goldeneye (<i>Bucephala clangula</i>) • Pochard (<i>Aythya farina</i>) • Scaup (<i>Aythya marila</i>) • Tufted duck (<i>Aythya fuligula</i>) • Waterfowl assemblage • Supporting wetland habitat. 	<ul style="list-style-type: none"> • Great crested grebe nest in reed beds in Lough Neagh. The significance of the disturbance effect to breeding great crested grebe will be determined following breeding bird surveys at project level. In the absence of information on the location of great crested grebe nest sites along the lake shore, a precautionary approach should be adopted. Staged construction could be undertaken to avoid disturbance to both QI species. The northern section of the pipeline near the lake shore will be constructed outside of the breeding season of great crested grebe (March to August). The southern section of the pipeline will be constructed outside of the non-breeding season of wintering birds (September to March). The pipeline will be constructed to consider all temporal and spatial sensitivities. <p>Wintering birds:</p> <ul style="list-style-type: none"> • Construction activities (noise and vibration, lighting, movement) have the potential to result in disturbance to wintering birds such as whooper swan, Bewick's swan, greylag geese and waders which may forage in the agricultural grassland near the proposed works. The significance of the disturbance effect to wintering birds will be determined following wintering bird surveys at project level. Construction noise and vibration management plan will be implemented to mitigate against these effects. Screens will also be used to 			

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
		<p>limit disturbance. However, provided the works are undertaken during April-September, the wintering QIs will not be affected by disturbance.</p> <p>Mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p>			
		<p>Habitat Loss</p> <p>Breeding birds:</p> <ul style="list-style-type: none"> Habitats important to breeding great-crested grebe and common tern will not be affected. Common tern breed on islands within Lough Neagh and great crested grebe breed in reed beds within or along the margins of the lake. The proposed pipeline will be constructed within the field on the shores of the lake. Therefore, no habitat loss (or LSE) is predicted. <p>Wintering birds:</p> <ul style="list-style-type: none"> There is potential for a loss of supporting habitat for wintering birds (agricultural grassland) to accommodate the trunk main and works areas. This would represent a temporary loss of habitat (with subsequent recovery). Effects could be significant if large areas of valuable or rare habitat was lost. This is not anticipated. Given the vast availability of similar habitat within the hinterland, this minimal predicted loss would not be problematic in terms of habitat availability. No LSE anticipated. 	No	No	
			No	No	

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
		<p>Water Quality</p> <p>Best practice methods including pollution prevention guidelines during construction will be implemented to mitigate against changes to water quality.</p>	Yes, in the absence of mitigation	No	
Booster upgrade on Carland to Cookstown Trunk Main					
<p>Elements:</p> <ul style="list-style-type: none"> • Increase the transfer capacity through the addition of booster pumps • Addition of booster pumps 	<p>EU Site: Upper Ballinderry River SAC</p> <p>Distance: 80m</p> <p>QIs:</p> <ul style="list-style-type: none"> • Otter • Freshwater pearl mussel • Water courses of plain to montane levels with the <i>Ranuncion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation 	<p>Habitat loss</p> <p>Works near the water body, such as clearing areas of scrub or tall vegetation to facilitate new pipeline or work areas could result in the loss of otter habitat. This could impair their ability to survive, breed, reproduce. Depending on the nature and scale of works near the river, survey reports and mitigation plans would probably be required to discount LSE. Mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p>	Yes, in the absence of mitigation	No	<p>Mitigation is required to discount LSE. Therefore, this Option requires Stage 2, AA</p>
		<p>Water quality</p> <p>At the northern Cookstown end of the transfer, the connection is made at Sandholes Road (UKWP, 2016). The existing pump station on Sandholes Road is located just c.18 m south of the Upper Ballinderry River SAC, which is designated for aquatic habitats and species that are sensitive to pollutants and sedimentation. In the absence of mitigation, construction activities (laying new pipeline) could result in the discharge of pollutants and generate polluted storm water runoff that could affect surface water quality in the</p>	Yes, in the absence of mitigation	No	

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
		<p>river. Freshwater pearl mussel in particular is very sensitive to increased sediment loading and pollution. Both pearl mussel and water courses with vegetation features are in 'Unfavourable condition' (2016/ 2017) due to water quality issues (including silt, water pollution (direct or diffuse) (Reid et al., 2011). Works adjacent to the river would need to adhere to best management practices to prevent pollution and sediment entering the river. Mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p> <p><i>Fluvial dynamics</i></p> <p>Water courses with vegetation are vulnerable to changes in fluvial dynamics that can be caused by abstractions. The increase in transfer capacity (facilitated by booster pumps) could be associated with increased abstraction from a site within the SAC and this could impact fluvial dynamics in the river. Pearl mussels could be impacted if sections of the river bed dried out, or reduced flows lead to reduced water quality. Significant impacts are not considered likely as the transfer is supplied from Lough Neagh, 15 km to the east and baseline supply demand balance has informed a level of surplus in the Water Resource Zone. Changes in fluvial dynamics would be local to the abstraction point. No LSEs are predicted.</p> <p><i>Invasive species</i></p> <p>The invasive giant hogweed (<i>Heracleum mantegazzianum</i>) is present along the riverbanks in the lower reach of the river, close to Cookstown (DARDNI, 2009). An Invasive Species</p>			

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
		<p>Management Strategy should therefore be put in place to prevent, reduce, control the effects of invasive species. Mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p> <p>Disturbance</p> <p>Construction works could also cause indirect impacts (through disturbance) to foraging otter and any otter breeding sites close by. A construction noise and vibration management plan would be required to discount LSEs from disturbance, including surveys to show whether otters are present in the area. Mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p>			
		<p>Disturbance</p> <p>Construction works could also cause indirect impacts (through disturbance) to foraging otter and any otter breeding sites close by. A construction noise and vibration management plan would be required to discount LSEs from disturbance, including surveys to show whether otters are present in the area. Mitigation is required to discount LSE and the requirement for Stage 2 is triggered.</p>	Yes, in the absence of mitigation	No	
	<p>EU Site: Lough Neagh and Lough Beg SPA and Ramsar</p> <p>Distance: 12.5km</p> <p>QIs:</p> <p>Breeding</p> <ul style="list-style-type: none"> • Common tern • Great crested grebe <p>Wintering</p> <ul style="list-style-type: none"> • Bewick's swan • Golden plover • Whooper swan • Goldeneye 	<p>Disturbance</p> <p>For the extent of the route, this SPA would be approximately 15km away from construction works and 12.5km at the closest point (south of the route at Carland. The SPA is designated for both breeding and over-wintering birds. A theoretical pathway to effects does exist where birds foraging outside the SPA could encounter construction works. The risk of significant, population level impacts due to disturbance is very low. Firstly, exposure would be minimal; birds from the SPA are more likely to be focused on the extensive intertidal mud-flats and sand-flats saltmarsh that the site is designated for or foraging close to nesting sites. The number of foraging birds that might enter the project's ZoI would be small and secondly, the implications would be minimal, as the project</p>	No	No	

Water Resource & Supply Resilience Plan

Option Elements	European site, Distance from option, qualifying interest(s) (QIs)	Potential for effects on qualifying interests	Effect from option alone?	Effect in combination with other Plans/ Projects?	Is option likely to have a significant effect on European site(s)?
	<ul style="list-style-type: none"> • Great crested grebe (also on passage) • Pochard • Scaup • Tufted duck • Waterfowl assemblage • Supporting wetland habitat. 	<p>area is easily avoided by a slight behavioural response. The works would not exclude the SPA birds from important areas of habitat and wouldn't intrude upon the SPA at all. No LSE anticipated.</p>			

4.6 Drought Measures

The types of measures in the Drought Plan include the following:

1. demand management actions - involving water efficiency measures;
2. network rezoning actions - involving moving water within the existing network;
3. supply side drought options - involving temporary increase in abstraction within existing licence conditions or bringing back into use of disused but licenced abstractions; and
4. drought order options - where abstraction may be temporarily increased outside licence conditions or compensation flows reduced.

Type 1 and 2 measures will not be included in this assessment and have been screened out as no LSE on international/European sites can result from these demand management and rezoning actions. Demand management measures include restrictions on consumer use and hosepipe bans and as such, are not anticipated to have impacts on European designated sites. Rezoning of water supplies within an existing network will also not have a negative effect on international/European sites.

Type 3 measures would be within existing consent conditions and can be assumed to be acceptable in terms of impacts on international/European sites. A formal review of consents process would be required to determine if any of these existing consents could have significant adverse effects on international/European sites and is therefore outside the scope of this assessment.

This HRA therefore only considers the Type 4 Drought Order measures proposed within the Drought Plan. These measures can involve increase in supply through abstraction and/or the reduction in compensation flow downstream of the source.

4.7 Drought Plan Summary of Stage 1 HRA Screening

Given the level of uncertainty over the Type 4 measure to be taken forward, LSEs 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 frequency and temporary duration of drought order measures means that the environmental risks are considered to be low, however, it is not possible to provide sufficient certainty required for HRA screening.

It is therefore 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. Mitigation, either temporary or permanent can be implemented to reduce impacts, or aid recovery post drought at stage 2 of the HRA and the residual risk of effects assessed. Mitigation should be site and time specific and developed in consultation with stakeholders. Where the Stage 1 HRA shows that the drought option results in LSEs, Stage 2 AA would be required to determine whether the LSEs would have an Adverse Effect on Site Integrity (AESI). Where adverse significant effects are identified, an assessment of mitigation measures will need to be considered as is carried out to avoid the AESI. Mitigation measures may be possible on a temporary basis which could limit the nature of impact or aid recovery post drought. The mitigation will need to be site and time specific and will be developed in consultation with stakeholders. This assessment of drought orders would need to be undertaken in advance of the orders being required to ensure sufficient time for assessment, as well as any lead in time for access arrangements or construction works to be implemented. It is important that these are undertaken sufficiently in advance to ensure mitigation can be identified or alternatives considered if needed.

Water Resource & Supply Resilience Plan

The Drought Plan sets out a process for identifying its component options. Where, in the course of the HRA process, it is established that Adverse Effects on Site Integrity cannot be avoided, alternative options that do not present this risk would be pursued.

5. Stage 2 – Appropriate Assessment

The following sections provide the details of Stage 2: Appropriate Assessment for those sites “screened in” during the Stage 1 Screening Assessment. At this stage it is assumed that “in-combination effects” have been screened out at Stage 1 (see Section 4.4 and Table 4.2) and are therefore not discussed any further in this document.

5.1 River Faughan and Tributaries SAC

5.1.1 Qualifying Interests and Conservation Objectives

As stated in the Screening Assessment (see Table 4.2) the qualifying interests of the River Faughan and Tributaries SAC are as follows:

- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles;
- Otter; and
- Atlantic salmon.

The Conservation Objective for this site is:

- To maintain (or restore where appropriate) the
 - Atlantic salmon;
 - Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles; and
 - Otter.

For each SAC feature, there are a number of component objectives which are outlined in the Table below. These include a series of attributes, measures and targets which form the basis of Condition Assessment. The results of this will determine whether the feature is in favourable condition or not.

Table 5.1: River Faughan and Tributaries SAC Conservation Objectives

Feature	Objective
Atlantic salmon	Maintain and if possible, expand existing population numbers and distribution (preferably through natural recruitment), and improve age structure of population.
	Maintain and if possible, enhance the extent and quality of suitable Salmon habitat - particularly the chemical and biological quality of the water and the condition of the river channel and substrate.
Old Sessile Oak Woodlands with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	Maintain and where feasible expand the extent of existing oak woodland but not at the expense of other SAC (ABC) features. (There are areas of degraded heath, wetland and damp grassland which have the potential to develop into Oak woodland)
	Maintain and enhance Oak woodland species diversity and structural diversity.
	Maintain the diversity and quality of habitats associated with the Oak woodland, e.g. fen, swamp, grasslands, scrub, especially where these exhibit natural transition to Oak woodland
	Seek nature conservation management over adjacent forested areas outside the ASSI where there may be potential for woodland rehabilitation.
	Seek nature conservation management over suitable areas immediately outside the ASSI where there may be potential for woodland expansion.

Water Resource & Supply Resilience Plan

Feature	Objective
Otter	Maintain and if possible, increase population numbers and distribution.
	Maintain the extent and quality of suitable Otter habitat, in particular the chemical and biological quality of the water and all associated wetland habitats

5.1.2 Potential for Effects on Qualifying Interests and Avoidance/Embedded Design Measures

The HRA Screening Assessment identified that the proposed Carmoney to Strabane Trunk Main option had the potential to result in likely significant effects on River Faughan and Tributaries SAC. These comprised of:

- Habitat loss;
- Changes to Water Quality;
- Mortality;
- Disturbance; and
- Invasive species.

The following sections provide details on the likely significant effects via the pathways identified during the HRA screening process and the likely avoidance measures and/or embedded design measure that can be utilised to ameliorate likely significant effects on the River Faughan and Tributaries SAC.

5.1.2.1 Habitat Loss

Option 6 Carmoney to Strabane Trunk Main option involves crossing the River Faughan and Tributaries SAC. There is potential for a direct loss of supporting habitat for qualifying interests, such as otter holts/resting sites or salmon spawning grounds under the option's footprint. Loss of in channel habitat could act as a deterrent/barrier to migrating salmon, potentially fragmenting habitat by restricting access to upriver spawning grounds. In addition, habitat loss within the channel could affect prey availability for otter. The footprint of this option may also result in the loss of qualifying interest of Old Sessile Oak Woodlands on bankside of the River Faughan within the SAC.

For this option it is currently anticipated that Horizontal Directional Drilling (HDD) would be the preferred construction method for the purposes of this assessment. Employing this construction method, it is assumed that habitat loss within the SAC will be largely avoided, except for the land required for the HDD compounds. Given the reduced scale of the construction works it is likely that HDD compounds could be sited as such to avoid the loss of supporting habitat (holts, resting places and spawning sites) for qualifying interests such as otter and Atlantic salmon. Similarly, Old Sessile Oak Woodland along the River Faughan and its tributaries within the SAC are sparsely distributed along their length therefore, it is likely that the Carmoney to Strabane Trunk Main option and associated HDD compounds can be sited to avoid this habitat type.

Taking the above into consideration it is anticipated that with the implementation of HDD and sensitive siting of compounds there would be no likely significant effects on the Qualifying Interests of River Faughan and Tributaries SAC as a result of Carmoney to Strabane Trunk Main option in terms of habitat loss.

5.1.2.2 Changes to Water Quality

Construction activities relating to the Carmoney to Strabane Trunk Main option and associated HDD compounds could result in the discharge of pollutants and/or sediments and generate polluted surface water runoff that could affect water quality in the River Faughan and Tributaries SAC. Atlantic salmon require good water quality, free of excessive pollution or sedimentation for successful spawning and hatching of eggs. Therefore, pollution and sedimentation as a result of runoff during construction could result in significant effects on the Atlantic salmon in the SAC in terms of a reduction in population and distribution. In conjunction the otter population and

distribution along the River Faughan and tributaries depend on the availability of prey items normally associated with high water quality (lamprey, salmon, trout and frogs). Therefore, pollution and sedimentation as a result of runoff during construction could result in the reduction of prey availability and may result in significant effects on the otter within the SAC in terms of a reduction in population and distribution.

For this option it is currently anticipated that Horizontal Directional Drilling (HDD) would be the preferred construction method for the purposes of this assessment therefore impacts on water quality will be largely avoided. In addition, works adjacent to the river, would need to adhere to industry standard good practice to prevent pollution and sedimentation entering the river and avoid significant impacts to water quality. These measures will align with standard Pollution Prevention Guidelines and Guidance for Pollution Prevention.

Taking the above into consideration it is anticipated that with the implementation of HDD, and industry standard best practices to prevent pollution and sedimentation entering the watercourses, there would be no likely significant effects on the Qualifying Interests of River Faughan and Tributaries SAC as a result of Carmoney to Strabane Trunk Main option in terms of changes to water quality.

5.1.2.3 Direct Mortality

The Carmoney to Strabane Trunk Main option presents a risk of direct mortality for otter through: destruction of holts and laying up sites/couches, site traffic collisions and entrapment within excavations and site materials such as pipes. With the implementation of HDD impacts on key areas of River Faughan and tributaries within the SAC can be largely avoided. Good practice construction measures would further reduce the risk of likely significant effects through direct mortality including:

- Restricting speed and time of day for site traffic (daytime movements only);
- Covering deep excavations overnight to avoid animals being trapped;
- Where excavations cannot be covered overnight ensure that at least one aspect is battered to allow egress of potentially trapped animals;
- Capping of pipes to prevent access for animals that may become trapped; and
- Regular checks of pipes and excavations for trapped animals and ensure that mitigation measure described above are still in place and effective.

In conjunction with pre-construction surveys to identify otter holts and resting up sites it is anticipated that construction works can be sited to largely avoid key otter habitats and minimise the likelihood of physical interactions with the species.

Taking the above in to consideration it is anticipated that with the implementation of HDD, and industry standard good practices to prevent direct mortality of otter, there would be no likely significant effects on the Qualifying Interests of River Faughan and Tributaries SAC as a result of Carmoney to Strabane Trunk Main option.

5.1.2.4 Disturbance

Construction of the Carmoney to Strabane Trunk Main option would generate noise and vibration in the riparian area. Otters are sensitive to noise and visual stimuli (i.e. lighting and human presence around watercourses) therefore otter could alter foraging behaviour to avoid more disturbed habitat that is less appealing. Therefore, disturbance as a result of noise and visual stimuli could result in significant effects on the otter population within in the SAC in terms of a reduction in population and distribution. Similarly, any in channel works could also expose Atlantic salmon to underwater noise and vibration at sensitive times of year for spawning and migration. Therefore, disturbance as a result of noise and vibration could result in significant effects on the Atlantic salmon population within in the SAC in terms of a reduction in population and distribution.

With the implementation of HDD impacts on Atlantic salmon would be largely avoided. The implementation of HDD in conjunction with pre-construction surveys to identify otter holts and resting up sites it is anticipated that construction works can be sited to largely avoid key otter habitats and minimise the likelihood of disturbance. In

addition, suitable exclusion zones where necessary would be identified around breeding holts and their resting sites during river side works to further avoid disturbance. Consideration would also be given to the restriction of night time operations and the requirement for lighting. If lighting of the construction work is required it would be designed in such a way to avoid or minimise any light spill on the surrounding environment.

Taking the above into consideration it is anticipated that with the implementation of HDD, and industry standard good practices to prevent disturbance, there would be no likely significant effects on the Qualifying Interests of River Faughan and Tributaries SAC as a result of Carmoney to Strabane Trunk Main option.

5.1.2.5 Invasive species

A change in native vegetation along river banks brought about by the accidental introduction of an invasive species could result in likely significant effects on the Qualifying Interest of the SAC in terms of a reduction in diversity and distribution of certain habitat types. To ensure that likely significant effects are avoided industry good practice should be adhered to and an invasive Species Management Plan should be developed, outlining good biosecurity practice.

5.2 River Foyle and Tributaries SAC

5.2.1 Qualifying Features and Conservation Objectives

As stated in the Screening Assessment (see Table 4.2) the qualifying interests of the River Foyle and Tributaries SAC are as follows:

- Otter;
- Atlantic salmon; and
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation.

The Conservation Objective for this site is:

- To maintain (or restore where appropriate) the
 - Otter;
 - Atlantic salmon; and
 - Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation.

For each SAC feature, there are a number of component objectives which are outlined in Table 5.2 below. These include a series of attributes, measures and targets which form the basis of Condition Assessment. The results of this will determine whether the feature is in favourable condition or not.

Table 5.2: River Faughan and Tributaries SAC Conservation Objectives

Feature	Objective
Atlantic salmon	Maintain and if possible, expand existing population numbers and distribution (preferably through natural recruitment), and improve age structure of population.
	Maintain and if possible, enhance the extent and quality of suitable salmon habitat - particularly the chemical and biological quality of the water and the condition of the river channel and substrate.
	Maintain and if possible enhance extent and composition of community.

Water Resource & Supply Resilience Plan

Feature	Objective
Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation.	Improve water quality, Improve channel substrate quality by reducing siltation.
	Maintain and if feasible enhance the river morphology
Otter	Maintain and if possible, increase population numbers and distribution.
	Maintain the extent and quality of suitable otter habitat, in particular the chemical and biological quality of the water and all associated wetland habitats

5.2.2 Potential for Effects on Qualifying Interests and Avoidance/Embedded Design Measures

The HRA Screening Assessment identified that the proposed Carmoney to Strabane Trunk Main and West WRZ Resilience Trunk Main Upgrades and Links options had the potential to result in likely significant effects on the River Foyle and Tributaries SAC. These comprised of:

- Habitat loss;
- Changes to Water Quality;
- Mortality;
- Disturbance; and
- Invasive species.

As described in Section 5.1.2 HDD is the preferred construction method for Carmoney to Strabane Trunk Main option. Similarly, HDD is the preferred construction method for the West WRZ Resilience Trunk Main Upgrades. Based on this assumption it anticipated that likely significant effects on the Qualifying Features of the SAC can be largely avoided by employing this construction method. and the

As discussed in detail in Sections 5.1.2.1 to 5.1.2.4 standard good practice construction methods would also be adhered to further eliminate the potential for likely significant effects. In brief these would include:

- Sensitive siting HDD compounds utilising pre-construction surveys information;
- Industry standard good practice to prevent pollution and sedimentation entering the river and avoid significant impacts to water quality;
- Good practice construction measures to avoid the likelihood of direct mortality (i.e. restricting speed and time of day for site traffic movements, timing of construction activities, ensuring excavations are covered overnight or incorporate slopes to allow egress and incorporating buffers around known features such as holts or resting places to ensure that there is no encroachment); and
- Implementation of an Invasive Species Management Strategy to prevent, reduce, control the effects of invasive species.

Taking the above in to consideration it is anticipated that with the implementation of HDD, and industry standard good practices as described, there would be no likely significant effects on the Qualifying Interests of River Foyle and Tributaries SAC as a result of Carmoney to Strabane Trunk Main option or the West WRZ Resilience Trunk Main Upgrades.

5.3 Lough Foyle SPA and Ramsar

5.3.1 Qualifying Features and Conservation Objectives

The boundary of Lough Foyle SPA is entirely coincident with that of the Lough Foyle Ramsar.

As stated in the Screening Assessment (see Table 4.2) the qualifying interests of the Lough Foyle SPA are as follows:

- The site qualifies under Article 4.1 of EC Directive 79/409 on the Conservation of Wild Birds by regularly supporting, in winter, internationally important numbers of the following 3 species: Whooper Swan *Cygnus cygnus* (the five year peak mean for the period 1991/92 to 1995/96 was 890, which comprises 5.6% of the international population); Light-bellied Brent Goose *Branta bernicla hrota* (the five year peak mean for the period 1991/92 to 1995/96 was 3730 which comprises 18.7% of the international population) and Bar-tailed Godwit *Limosa lapponica* (the five year peak mean for the period 1991/92 to 1995/96 was 1896 which comprises 1.9% of the international population); and
- The site also qualifies under Article 4.2 of the Directive by supporting over 20,000 migratory waterfowl. Peak numbers averaged 36,599 birds in the five years between 1991/92 and 1995/96. This total includes the internationally important species listed above and the following waterfowl species which are nationally important in an all Ireland context: Red-throated Diver *Gavia stellata* (an average of 27 birds, 2.7% of the all-Ireland wintering population), Great Crested Grebe *Podiceps cristatus* (220, 7.3%), Mute Swan *Cygnus olor* (97, 1.8%), Bewick's Swan *C. columbianus* (78, 3.1%), Greylag Geese *Anser anser* (67, 1.7%), Shelduck *Tadorna tadorna* (287, 4.1%), Teal *Anas crecca* (751, 1.2%), Mallard *Anas platyrhynchos* (1694, 3.4%), Wigeon *Anas penelope* (8107, 6.5%), Eider *Somateria mollissima* (50, 2.5%), Red-breasted Merganser *Mergus serrator* (73, 3.7%), Oystercatcher *Haematopus ostralegus* (2045, 4.1%), Golden Plover *Pluvialis apricaria* (4999, 2.5%), Grey Plover *P. squatarola* (43, 1.1%), Lapwing *Vanellus vanellus* (3084, 1.2%), Knot *Calidris canutus* (412, 1.1%), Dunlin *Calidris alpina* (4847, 3.9%), Curlew *Numenius arquata* (2152, 2.5%), Redshank *Tringa totanus* (791, 3.2%) and Greenshank *T. nebularia* (30, 3.3%).

In addition to the above Lough Foyle Ramsar is designated under the following criterion:

- Ramsar Criterion 1a: good representative example of a wetland complex, including intertidal sand and mudflats with extensive seagrass beds, saltmarsh, estuaries and associated brackish ditches;
- Ramsar Criterion 1c: good representative example of a wetland, which plays a substantial hydrological, biological and ecological system role in the natural functioning of a river basin which is located in a trans-border position;
- Ramsar Criterion 2a: support an appreciable assemblage of rare, venerable or endangered species or sub species or plant or animal. A range of notable fish have been recorded for the Lough Foyle and the lower reaches of some of its lower tributaries including Atlantic salmon and Shad.
- Ramsar Criterion 3a,3b and 3c- These criteria relate directly to the wintering bird interest as per the SPA citation detailed above.

The Conservation Objective for this site is:

- To maintain or enhance the population of the qualifying species;
- To maintain or enhance the range of habitats utilised by the qualifying species;
- To ensure that the integrity of the site is maintained;
- To ensure there is no significant disturbance of the species; and
- To ensure that the following are maintained in the long term by:
 - Population of the species as a viable component of the site;

Water Resource & Supply Resilience Plan

- Distribution of the species within site;
- Distribution and extent of habitats supporting the species; and
- Structure, function and supporting processes of habitats supporting the species.

5.3.2 Potential for Effects on Qualifying Interests and Avoidance/Embedded Design Measures

The HRA Screening Assessment identified that the proposed Carmoney to Strabane Trunk Main option had the potential to result in likely significant effects on the River Foyle SPA and Ramsar. These comprised of:

- Disturbance;
- Changes to Water Quality; and
- Habitat Loss.

As described in HRA screening assessment Table 4.2 the Carmoney to Strabane Trunk Main option is located 2.5–4.2 km from the proposed Avish Hill pumps and 9.5 km downstream from the pipeline river crossing of the SPA/Ramsar Site. Therefore, direct significant impacts on the Qualifying Interest of the SPA or Ramsar will be avoided. The assessment in the following section focuses on potential indirect pathways that may impact functional land beyond the boundary of the SPA/Ramsar site.

5.3.2.1 Disturbance

The Avish Hill pumps are proposed to be constructed 2.5 km from the SPA/Ramsar. A potential pathway for likely significant effects on Qualifying Interests exists where wintering birds foraging outside the SPA and could encounter these works. The risk of significant impacts that would adversely affect the favourable conservation status of wintering bird populations within the SPA/Ramsar site is very low. Firstly, disturbance would be minimal as wintering birds are more likely to be focused on the extensive intertidal mud-flats and sand-flats saltmarsh located within the SPA/Ramsar. In addition, the number of foraging birds that might enter the project's Zol would be small. Secondly, the implications would be minimal, as the project area is easily avoided by a slight behavioural response by the birds. The works would not exclude the SPA birds from important areas of habitat and wouldn't intrude upon the SPA or Ramsar site. Industry standard good practice to minimise disturbance would also be implemented during the works to further eliminate the potential for likely significant effects such as: sensitive timings of work, restriction/avoidance of night time working, sensitive lighting of construction areas and providing appropriate buffers around sensitive habitats.

Taking the above into consideration it is anticipated that with the implementation of Carmoney to Strabane Trunk Main option and industry standard good practices to prevent disturbance, there would be no likely significant effects on the Qualifying Interests of the River Foyle SPA and Ramsar.

5.3.2.2 Changes to Water Quality

The pipeline will cross the River Faughan 9.5 km upstream of the SPA/Ramsar site. An effective pathway exists via the hydrological connection of the River Faughan with the SPA/Ramsar site. Construction work for this option could result in the discharge of pollutants and/or sediments and generate polluted surface water runoff that could affect water quality within the SPA/Ramsar site. The habitats and dependent species of the SPA/Ramsar site are vulnerable to pollution and contaminated water. The 9.5 km river extent between the sites would provide significant dispersal and diffusion of any pollutants, which are likely to be small-scale for works (and plant requirements) of this nature. In addition, works adjacent to the river, would need to adhere to industry standard good practice to prevent pollution and sedimentation entering the river and avoid significant impacts to water quality. These measures will align with standard Pollution Prevention Guidelines and Guidance for Pollution Prevention.

Taking the above in to consideration it is anticipated that with the implementation of industry standard best practices to prevent pollution and sedimentation entering the watercourses, there would be no likely significant

Water Resource & Supply Resilience Plan

effects on the Qualifying Interests of the River Faughan SPA/Ramsar site as a result of Carmoney to Strabane Trunk Main option in terms of changes to water quality.

5.3.2.3 Habitat Loss

There is potential for inland foraging habitat of qualifying species such as brent geese and whooper swans to be lost outside the boundary of the SPA/Ramsar site under the footprint of the proposed Avish Hill pumps. Therefore, there is a potential pathway for significant likely effects on functional habitat for the SPA/Ramsar site. However, the small area and extent of habitat lost comparative to the availability of habitat within the SPA/Ramsar site is not likely to significantly affect the qualifying species. In addition, the habitat likely to be lost is over 2km from the SPA/Ramsar site and is unlikely to represent core functional habitat for qualifying species.

Taking the above in to consideration it is anticipated there would be no likely significant effects on the Qualifying Interests of the River Faughan SPA/Ramsar site as a result of Carmoney to Strabane Trunk Main option in terms of changes to habitat loss.

5.4 Fairy Water Bogs SAC and Ramsar site

5.4.1 Qualifying Features and Conservation Objectives

As stated in the Screening Assessment (see Table 4.2) the qualifying interest of the Fairy Water Bogs SAC is active raised bog. The conservation objective for this site is: To maintain (or restore where appropriate) the active raised bog to favourable condition.

For each SAC feature, there are a number of component objectives which are outlined in the Table below. These include a series of attributes, measures and targets which form the basis of Condition Assessment. The results of this will determine whether the feature is in favourable condition or not.

Table 5.4: Fairy Water Bogs SAC Conservation Objectives

Feature	Objective
Raised bog	Maintain the extent of intact lowland raised bog and actively regenerating raised bog vegetation.
	Maintain and enhance the quality of the lowland raised bog community types including the presence of notable species.
	Seek to expand the extent of actively regenerating raised bog vegetation into degraded (non-active) areas of cutover bog.
	Maintain the diversity and quality of other habitats associated with the active raised bog, e.g. acid grassland, fen and swamp, especially where these exhibit natural transition to the raised bog.
	Maintain the hydrology of the raised bog peat mass. Seek nature conservation management over suitable areas immediately outside the SAC where there may be potential for lowland raised bog rehabilitation.

In addition to the above Fairy Water Bogs Ramsar site is designated under the following criterion:

- Ramsar Criterion 1a: good representative example of lowland raised bog. In western Europe most of the relatively intact raised bogs occur in the UK and Ireland. Three examples of bogs - Bomackatall, Claragh and Kilmore Robinson - are included in this composite site.

5.4.2 Potential for effects on Qualifying Interests and Avoidance/Embedded Design Measures

The currently it is anticipated that the preferred construction method for the West WRZ Resilience Trunk Main Upgrades and Links will be to restrict construction to within the existing road network. Therefore, there is no pathway for likely significant effects on the Qualifying Interests of Fairy Water Bogs SAC/Ramsar site.

5.5 Tully Bog SAC

5.5.1 Qualifying Features and Conservation Objectives

As stated in the Screening Assessment (see Table 4.2) the qualifying interest of the Tully Bog SAC is active raised bog. The conservation objective for this site is: To maintain (or restore where appropriate) the active raised bog to favourable condition.

For each SAC feature, there are a number of component objectives which are outlined in the Table below. These include a series of attributes, measures and targets which form the basis of Condition Assessment. The results of this will determine whether the feature is in favourable condition or not.

Table 5.5: Tully Bog SAC Conservation Objectives

Feature	Objective
Active Raised bog	Maintain the extent of intact lowland raised bog and actively regenerating raised bog vegetation.
	Maintain and enhance the quality of the lowland raised bog community types including the presence of notable species.
	Seek to expand the extent of actively regenerating raised bog vegetation into degraded (non-active) areas of cutover bog.
	Maintain the diversity and quality of other habitats associated with the active raised bog, e.g. acid grassland, fen and swamp, especially where these exhibit natural transition to the raised bog.
	Maintain the hydrology of the raised bog peat mass. Seek nature conservation management over suitable areas immediately outside the SAC where there may be potential for lowland raised bog rehabilitation.

5.5.2 Potential for effects on Qualifying Interests and Avoidance/Embedded Design Measures

The currently it is anticipated that the preferred construction method for the West WRZ Resilience Trunk Main Upgrades and Links will be to restrict construction to within the existing road network. Therefore, there is no pathway for likely significant effects on the Qualifying Interests of Tully Bog SAC.

5.6 Lough Neagh and Lough Beg SPA and Ramsar

5.6.1 Qualifying Features and Conservation Objectives

As stated in the Screening Assessment (see Table 4.2) the qualifying interests of the Lough Neagh and Lough Beg SPA are as follows:

- The site qualifies under Article 4.1 of EC Directive 79/409 by regularly supporting internationally important numbers of wintering bewick's swan *Cygnus columbianus* (the five year ' peak mean for the period 1989/90 to 1993/94 was 251 which comprises 1.5% of the Western and Central Europe population and 10% of the Irish population) and whooper swan *Cygnus cygnus* (the five year peak mean

Water Resource & Supply Resilience Plan

for the period 1989/90 to 1993/94 was 923 which comprises 5.4% of the total Icelandic breeding population and 6.5% of the Irish population). The site also qualifies under Article 4.1 by regularly supporting nationally important numbers of breeding common tern *Sterna hirundo* (200 pairs in 1995 which comprise 7.4% of Irish population).

- The site qualifies under Article 4.2 of the Directive as a wetland of international importance by regularly supporting over 20,000 waterfowl in winter. The five year peak mean for the period 1989/90 to 1993/94 was 79,915 birds including nationally and internationally important numbers of the following species: 32,165 pochard *Aythya ferina* (9.2% of north-west European population, 80.4% of Irish population), 23,476 tufted duck *Aythya fuligula* (3.1% of north-west European population, 58.7% of Irish population) and 12,479 goldeneye *Bucephala alancula* (4.2% of north-west European population, almost 100% of Irish population), 390 little grebe *Tachybaptus ruficollis* (26% of Irish population), 741 great crested grebe *Podiceps cristatus* (24.7% of Irish population), 781 cormorant *Phalacrocorax carbo* (3.9% of Irish population), 1,375 mute swan *Cygnus olor* (22.9% of Irish population), 129 greylag goose *Anser anser* (3.4% of Irish population), 165 shelduck *Tadorna tadorna* (2.3% of Irish population), 3,447 wigeon *Anas penelope* (2.8% of Irish population), 114 gadwall *Anas strepera* (19% of Irish population), 1,868 teal *Anas creaca* (2.9% of Irish population), 4,982 mallard *Anas platyrhynchos* (10% of Irish population), 173 shoveler *Anas clypeata* (2.7% of Irish population), 2,557 scaup *Aythya marila* (85.2% of Irish population) and 6,676 coot *Fulica atra* (26.7% of Irish population).

In addition to the above Lough Neagh and Lough Beg Ramsar site is designated under the following criterion:

- Ramsar Criterion 1: The site qualifies under Criterion 1 of the Ramsar convention by being the largest freshwater lake in the United Kingdom;
- Ramsar Criterion 2: supports over forty rare or local vascular plants which have been recorded for the site since 1970. The most notable are eight-stamened waterwort, marsh pea, Irish lady's tresses orchid, alder buckthorn, narrow small-reed and holy grass;
- Ramsar Criterion 3: site regularly supports substantial numbers of individuals from particular groups of waterfowl which are indicative of wetland values, productivity and diversity (see SPA citation details);
- Ramsar Criterion 4: supporting an important assemblage of breeding birds including, in nationally important numbers, great crested grebe, gadwall, pochard, tufted duck, snipe and redshank. Other important breeding wetland species include shelduck, teal, shoveler, lapwing and curlew (see SPA citation details);
- Ramsar Criterion 5: regularly supporting over 20,000 waterfowl in winter including nationally and internationally important numbers (see SPA citation details);
- Ramsar Criterion 6: regularly supports internationally important numbers of wintering Bewick's and whooper swans and under Article 4.1 by regularly supporting nationally important numbers of breeding common tern (see SPA citation details);
- Ramsar Criterion 7: Supporting a population of Pollan, one of the few locations in Ireland and one of the two known locations in the UK (the other is Lower Lough Erne). The Pollan, a salmonid fish that is common in Lough Neagh, also survives in low numbers in Loughs Erne, Ree and Derg.

The Conservation Objective for this site is:

- To maintain or enhance the population of the qualifying species;
- To maintain or enhance the range of habitats utilised by the qualifying species;
- To ensure that the integrity of the site is maintained;
- To ensure there is no significant disturbance of the species; and
- To ensure that the following are maintained in the long term by:
 - Population of the species as a viable component of the site;

Water Resource & Supply Resilience Plan

- Distribution of the species within site;
- Distribution and extent of habitats supporting the species; and
- Structure, function and supporting processes of habitats supporting the species.

5.6.2 Potential for effects on Qualifying Interests and Avoidance/Embedded Design Measures

The HRA Screening Assessment identified that the proposed Castor Bay WTW to Ballydougan SR Trunk Main Upgrade and Booster upgrade on Carland to Cookstown Trunk Main option had the potential to result in likely significant effects on the Lough Neagh and Lough Beg SPA and Ramsar site. These comprised of:

- Disturbance;
- Habitat Loss; and
- Changes to Water Quality.

As described in HRA screening assessment Table 4.2 the Castor Bay WTW to Ballydougan SR Trunk Mains Upgrade option is located 45 m from Lough Neagh and Lough Beg SPA and Ramsar site. With the Booster upgrade on Carland to Cookstown Trunk Main option 12.5 km from the Lough Neagh and Lough Beg SPA and Ramsar site. Therefore, direct significant impacts on the Qualifying Interest of the SPA or Ramsar will be avoided. The assessment in the following section focuses on potential indirect pathways that may impact Qualifying Interests of the SPA/Ramsar site.

5.6.2.1 Disturbance

There is potential for construction works (noise and vibration, lighting, movement) of the new trunk mains to cause likely significant effects through disturbance to the qualifying species of the SPA/Ramsar site in terms of breeding and wintering birds. Common tern breed on islands on Lough Neagh and great crested grebe nest in reed beds in the lake. The most important natural island is Pagan Island located in the south east corner of the Lough which holds around 45 breeding pairs (Lough Neagh Wetlands, 2008). Given the location of the proposed new trunk mains there is the potential to cause disturbance to breeding common tern. The significance of the disturbance effect will be determined following breeding bird surveys at project level. . Likely significant effects of disturbance to breeding great crested grebe and common tern will be determined following breeding bird surveys at project level. In the absence of this information on the location of great crested grebe nest sites along the lake shore, a precautionary approach should be adopted. Staged construction could be undertaken to avoid disturbance to both species. The northern section of the pipeline near the lake shore will be constructed outside of the breeding season of great crested grebe (March to September). The southern section of the pipeline will be constructed outside the wintering season of wintering birds (October to March). Construction activities (noise and vibration, lighting, movement) have the potential to result in disturbance to wintering birds such as whooper swan, Bewick's swan, greylag geese and waders which may forage in the agricultural grassland near the proposed works. Disturbance effects will be determined following wintering bird survey at project level. Construction noise and vibration management plan will be implemented to mitigate against these effects. Acoustic/visual screens will also be used to limit disturbance. However, provided the works are undertaken during April-September, the wintering birds would not be affected by disturbance.

For the extent of the Booster upgrade on Carland to Cookstown Trunk Main option route, the SPA would be approximately 15km away from construction works and 12.5km at the closest point (south of the route at Carland). A potential pathway for likely significant effects on Qualifying Interests exists where wintering birds foraging outside the SPA and could encounter these works. The risk of significant impacts that would adversely affect the favourable conservation status of wintering bird populations within the SPA/Ramsar site is very low. Firstly, disturbance would be minimal as wintering birds are more likely to be focused on the extensive intertidal mud-flats and sand-flats saltmarsh located within the SPA/Ramsar. In addition, the number of foraging birds that might enter the project's ZoI would be small. Secondly, the implications would be minimal, as the project area is easily avoided by a slight behavioural response by the birds. The works would not exclude the SPA birds from important areas of habitat and wouldn't intrude upon the SPA or Ramsar site A theoretical pathway to

effects does exist where birds foraging outside the SPA could encounter construction works. The risk of significant, population level impacts due to disturbance is very low.

In addition to the above, industry standard good practice to minimise disturbance would also be implemented during the works to further eliminate the potential for likely significant effects such as: sensitive timings of work, restriction/avoidance of night time working, sensitive lighting of construction areas and providing appropriate buffers around sensitive habitats.

Taking the above into consideration it is anticipated that with the implementation of Castor Bay WTW to Ballydougan SR Trunk Main Upgrade and Booster upgrade on Carland to Cookstown Trunk Main option and industry standard good practices to prevent disturbance, there would be no likely significant effects on the Qualifying Interests of the Lough Neagh and Lough Beg SPA and Ramsar site.

5.6.2.2 Habitat Loss

There is potential for inland foraging habitat for wintering birds to be lost outside the boundary of the SPA/Ramsar site to accommodate the trunk main and works areas (agricultural grassland). Therefore, there is a potential pathway for significant likely effects on functional habitat for the SPA/Ramsar site. This would represent a small area of temporary habitat loss comparative to the availability of habitat within the SPA/Ramsar site is not likely to significantly affect the qualifying species. In addition, the habitat likely to be lost is over 12 km from the SPA/Ramsar site and is unlikely to represent core functional habitat for qualifying species.

Taking the above into consideration it is anticipated there would be no likely significant effects on the Qualifying Interests of the Lough Neagh and Lough Beg SPA and Ramsar site as a result of Carmoney to Strabane Trunk Main option or Upgrade and Booster upgrade on Carland to Cookstown Trunk Main option in terms of habitat loss.

5.6.2.3 Changes to water quality

With the implementation of industry standard best practices to prevent pollution and sedimentation entering waterbodies/watercourses, there would be no likely significant effects on the Qualifying Interests of the Lough Neagh and Lough Beg SPA and Ramsar site as a result of Carmoney to Strabane Trunk Main option or Upgrade and Booster upgrade on Carland to Cookstown Trunk Main option in terms of changes to water quality.

5.7 Upper Ballinderry River SAC

5.7.1 Qualifying Features and Conservation Objectives

As stated in the Screening Assessment (see Table 4.2) the qualifying interests of the Upper Ballinderry SAC are as follows:

- Fresh water pearl mussel *Margaritifera margaritifera*; and
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
- Otter.

The Conservation Objective for this site is:

- To maintain (or restore where appropriate) the
 - Fresh water pearl mussel *Margaritifera margaritifera*; and
 - Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
 - Otter.

Water Resource & Supply Resilience Plan

For each SAC feature, there are a number of component objectives which are outlined in the Table below. These include a series of attributes, measures and targets which form the basis of Condition Assessment. The results of this will determine whether the feature is in favourable condition or not.

Table 5.7: Upper Ballinderry River SAC

Feature	Objective
Fresh water pearl mussel	Maintain and if feasible enhance population number through natural recruitment...
	Improve age structure of population.
	Improve water quality
	Improve channel substrate quality by reducing siltation.
	Ensure host fish population is adequate for recruitment
Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation	Maintain and if feasible enhance extent and composition of community.
	Improve water quality
	Improve channel substrate quality by reducing siltation
	Maintain and if feasible enhance the river morphology.
Otter <i>Lutra lutra</i>	Population numbers and distribution to be maintained and if possible, expanded.
	Maintain the extent and quality of suitable Otter habitat, in particular the chemical and biological quality of the water, and all associated wetland habitats

5.7.2 Potential for effects on Qualifying Interests and Avoidance/Embedded Design Measures

The HRA Screening Assessment identified that the proposed Booster upgrade on Carland to Cookstown Trunk Main had the potential to result in likely significant effects on the Upper Ballinderry River SAC. These comprised of:

- Habitat loss;
- Changes to Water Quality;
- Fluvial dynamics;
- Invasive species; and
- Disturbance.

The following sections provide details on the likely significant effects via the pathways identified during the HRA screening process and the likely avoidance measures and/or embedded design measure that can be utilised to ameliorate likely significant effects on the Upper Ballinderry River SAC.

5.7.2.1 Habitat Loss

Construction of the Booster upgrade on Carland to Cookstown Trunk Main would require the clearing areas of potential suitable otter habitat to facilitate the new pipeline or work areas. This could result in destruction of holts and laying up sites/couches, which may result in result in significant effects on otter within the SAC in terms of a reduction in population and distribution.

In conjunction with pre-construction surveys to identify otter holts and resting up sites it is anticipated that construction works can be sited to largely avoid key otter habitats and minimise the likelihood of physical interactions with the species.

Taking the above into consideration it is anticipated that with the implementation of HDD, and industry standard good practices to prevent direct mortality of otter, there would be no likely significant effects on the Qualifying Interests of Upper Ballinderry River SAC as a result of Booster upgrade on Carland to Cookstown Trunk Main.

5.7.2.2 Changes in water quality

At the northern Cookstown end of the transfer, the connection is made at Sandholes Road (UKWP, 2016). The existing pump station on Sandholes Road is located just c.18 m south of the Upper Ballinderry River SAC, which is designated for aquatic habitats and species that are sensitive to pollutants and sedimentation. In the absence of mitigation, construction activities (laying new pipeline) could result in the discharge of pollutants and generate polluted storm water runoff that could affect surface water quality in the river. Freshwater pearl mussel in particular is very sensitive to increased sediment loading and pollution. Both pearl mussel and water courses with vegetation features are in 'Unfavourable condition' (2016/ 2017) due to water quality issues (including silt, water pollution (direct or diffuse) (Reid et al., 2011). Any works adjacent to the river, would need to adhere to industry standard good practice to prevent pollution and sedimentation entering the river and avoid significant impacts to water quality. These measures will align with standard Pollution Prevention Guidelines and Guidance for Pollution Prevention.

Taking the above into consideration it is anticipated that with the implementation of industry standard best practices to prevent pollution and sedimentation entering the watercourses, there would be no likely significant effects on the Qualifying Interests of SAC as a result of Booster upgrade on Carland to Cookstown Trunk Main in terms of changes to water quality.

5.7.2.3 Fluvial dynamics

Water courses with vegetation are vulnerable to changes in fluvial dynamics that can be caused by abstractions. The increase in transfer capacity (facilitated by booster pumps) could be associated with increased abstraction from a site within the SAC and this could impact fluvial dynamics in the river. Pearl mussels could be impacted if sections of the river bed dried out, or reduced flows lead to reduced water quality. Significant impacts are not considered likely as the transfer is supplied from Lough Neagh, 15 km to the east and baseline supply demand balance has informed a level of surplus in the Water Resource Zone. Changes in fluvial dynamics would be local to the abstraction point. Therefore, there would be no likely significant effects on the Qualifying Interests of the SAC as a result of the Booster upgrade on Carland to Cookstown Trunk Main in terms of fluvial dynamics.

5.7.2.4 Invasive species

The invasive giant hogweed (*Heracleum mantegazzianum*) is present along the riverbanks in the lower reach of the river, close to Cookstown (DARDNI, 2009). A change in native vegetation along river banks brought about by the accidental introduction/spread of an invasive species could result in likely significant effects on the Qualifying Interest of the SAC in terms of a reduction in diversity and distribution of certain habitat types. To ensure that likely significant effects are avoided industry good practice should be adhered to and an Invasive Species Management Plan should be developed, outlining good biosecurity practice.

Taking the above into consideration it is anticipated that with the implementation of an appropriate Invasive Species Management Plan, there would be no likely significant effects on the Qualifying Interests of the SAC as a result of the Booster upgrade on Carland to Cookstown Trunk Main in terms of accidental introduction/spread of an invasive species.

5.7.2.5 Disturbance

Construction works for this option could cause likely significant effects through disturbance to foraging otter and any otter holts/resting places. Utilising pre-construction otter surveys information to identify/map otter holts and resting up sites it is anticipated that construction works can be sited to largely avoid key otter habitats and minimise the likelihood of disturbance. In addition, suitable exclusion zones where necessary would be identified around breeding holts and their resting sites during river side works to further avoid disturbance. Consideration would also be given to the restriction of night time operations and the requirement for lighting. If lighting of the construction work is required it would be designed in such a way to avoid or minimise any light spill on the surrounding environment.

Taking the above into consideration it is anticipated that with the implementation of HDD, and industry standard good practices to prevent disturbance, there would be no likely significant effects on the Qualifying Interests of Ballinderry River SAC as a result of the Booster upgrade on Carland to Cookstown Trunk Main.

5.8 Stage 2 Appropriate Assessment Summary

The following internationally/European important nature conservation sites were included in the Stage 2 Appropriate Assessment based on likely significant effects being "screened in" at Stage 1:

- River Faughan and Tributaries SAC;
- River Foyle and Tributaries SAC;
- Lough Foyle SPA and Ramsar;
- River Foyle and Tributaries SAC;
- Fairy Water Bogs SAC and Ramsar site;
- Tully Bog SAC;
- Lough Neagh and Lough Beg SPA and Ramsar; and
- Upper Ballinderry River SAC.

As outlined in the previous sections with the implementation of standard good practice construction methods, and sensitive siting of the works based on baseline survey information, it is anticipated that the potential for likely significant effects would be avoided/eliminated. In brief these measures would include:

- Pre-construction ecological surveys at project level including otter surveys to identify/map otter holts and resting up sites, wintering bird surveys and breeding bird surveys;
- Sensitive siting HDD compounds utilising pre-construction surveys information;
- Industry standard good practice to prevent pollution and sedimentation entering the river and avoid significant impacts to water quality;
- Good practice construction measures to avoid the likelihood of direct mortality (i.e. restricting speed and time of day for site traffic movements, timing of construction activities, ensuring excavations are covered overnight or incorporate slopes to allow egress and incorporating buffers around known features such as holts or resting places to ensure that there is no encroachment); and
- Implementation of an Invasive Species Management Strategy to prevent, reduce, control the effects of invasive species.

Appendix A. References

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