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LIVING WITH WATER IN BELFAST - AN INTEGRATED PLAN FOR DRAINAGE AND WASTEWATER MANAGEMENT IN GREATER BELFAST

Habitats Regulations Assessment Report

NI2252 LWWP HRA
Living with Water Programme
Drainage and Wastewater
Management Plan for Belfast
F01
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1 INTRODUCTION

This report has been prepared by RPS on behalf of the Department for Infrastructure (DfI) Living with Water Programme Division. The purpose of the report is to document a shadow Habitats Regulations Assessment (HRA) that RPS has conducted on behalf of DfI.

This HRA Report shall inform the Competent Authority to assist them in fulfilling their duties in accordance with The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995, as amended (the 'Habitats Regulations').

This report documents evaluation and analysis seeking to establish firstly, whether or not a decision to adopt the draft Living With Water in Belfast, An Integrated Plan for Drainage and Wastewater Management in greater Belfast, hereafter referred to as 'the Plan', is likely to have a significant effect on any European site, and secondly, if likely significant effects cannot be excluded at the screening stage to undertake an assessment of implications of those identified effects on the relevant European sites to determine whether or not adoption of the Plan will result in adverse effects on the integrity of the sites concerned.

The assessment firstly considers the Plan by itself and secondly in combination with other relevant plans or projects and has been undertaken in view of best scientific knowledge and in view of the conservation objectives of the sites concerned.

A Strategic Environmental Assessment (SEA) Environmental Report has also been prepared in accordance with the European Communities Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (SEA Directive) and in accordance with the Environmental Assessment of Plans and Programmes Regulations (Northern Ireland) 2004 (S.R. 280/2004).

2 METHODOLOGY

2.1 Published Guidance on HRA

The Environment and Heritage Service of the then, Department of the Environment for Northern Ireland, published '*Habitats Regulations guidance notes for competent authorities'* (EHS, 2002). Their purpose was to help competent authorities and others with an interest in such sites interpret and implement the Habitats Regulations, and were intended to provide a framework for making judgements under the Regulations in order to promote consistency amongst decision-makers.

In addition to the guidelines published by the Department, the European Commission has published a number of documents which provide a significant body of guidance on the requirements of Appropriate Assessment, most notably including, '*Assessment of Plans and Projects Significantly Affecting Natura 2000 sites - Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC'* (EC, 2001), which sets out the principles of how to approach decision making during the process. These guidelines have been followed in the preparation of this report. The following list identifies these and other pertinent guidance documents:

- Communication from the Commission on the Precautionary Principle., Office for Official Publications of the European Communities, Luxembourg (EC, 2000);
- Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg (EC, 2000b);
- Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities, Brussels (EC, 2001);
- Habitats Regulations Guidance Notes for Competent Authorities. Environment and Heritage Service. Belfast (EHS, 2002) [*not available online*];
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. Publications Office of the European Union, Luxembourg (EC, 2007);
- The Appropriate Assessment of Plans in Northern Ireland. RSPB, Belfast (RSPB, 2008);
- Estuaries and Coastal Zones within the Context of the Birds and Habitats Directives - Technical Supporting Document on their Dual Roles as Natura 2000 Sites and as Waterways and Locations for Ports. Publications Office of the European Union, Luxembourg (EC, 2009);
- Interpretation Manual of European Union Habitats. Version EUR 28. Publications Office of the European Union, Luxembourg (EC, 2013);
- Guidance on Energy Transmission Infrastructure and EU nature legislation. Publications Office of the European Union, Luxembourg (EC, 2018);
- European Commission Notice C(2018) 7621 'Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC', Office for Official Publications of the European Communities, Luxembourg (EC, 2019); and

- Institute of Air Quality Management 'A guide to the assessment of air quality impacts on designated nature conservation sites (Version 1.1)' (IAQM, 2020).

2.2 Likely Significant Effect

The Commission's 2018 Notice (EC, 2019) advises that the appropriate assessment procedure under Article 6(3) is triggered not by the certainty but by the likelihood of significant effects, arising from plans or projects regardless of their location inside or outside a protected site. Such likelihood exists if significant effects on the site cannot be excluded. The significance of effects should be determined in relation to the specific features and environmental conditions of the site concerned by the plan or project, taking particular account of the site's conservation objectives and ecological characteristics.

The requirement that the effect in question be 'significant' exists in order to lay down a *de minimis* threshold – thus, plans or projects that have no appreciable effect on the site are thereby excluded. A likely significant effect is triggered when:

- there is a probability or a risk of a plan or project having a significant effect on a European site;
- the plan is likely to undermine the site's conservation objectives; and
- a significant effect cannot be excluded on the basis of objective information.

The threshold for a Likely Significant Effect (LSE) is treated as being above a *de minimis* level. A *de minimis* effect is a level of risk that is too small to be concerned with when considering ecological requirements of an Annex I habitat or a population of Annex II species present on a European site necessary to ensure their favourable conservation condition. If low level effects on habitats or individuals of species are judged to be in this order of magnitude and that judgment has been made in the absence of reasonable scientific doubt, then those effects are not considered to be likely significant effects.

EHS (2002) notes that any effect that may reasonably be predicted as a consequence of a plan or project that may affect the conservation objectives of the features for which the site was designated but excluding *de minimis* or inconsequential effects.

2.3 Mitigation Measures

In determining whether or not likely significant effects will occur or can be excluded in the Stage 1 appraisal, measures intended to avoid or reduce the harmful effects of the proposed development on European sites, (i.e. "mitigation measures") or best practice measures have not been taken into account in this screening stage appraisal. This approach is consistent with EU guidance and the case law of the Court of Justice of the European Union (CJEU):

EC (2001) states that "project and plan proponents are often encouraged to design mitigation measures into their proposals at the outset. However, it is important to recognise that the screening assessment should be carried out in the absence of any consideration of mitigation measures that form part of a project or plan and are designed to avoid or reduce the impact of a project or plan on a Natura 2000 site". This direction in the European Commission's guidance document is unambiguous in that it does not permit the inclusion of mitigation at screening stage.

In April 2018, the Court of Justice of the European Union issued a ruling in case C-323/17 *People Over Wind & Peter Sweetman v Coillte Teoranta* ("People Over Wind") that Article 6(3) of Directive 92/43/EEC 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.

The judgment in People Over Wind is further reinforced in EC (2019) which refers to CJEU Case C-323/17.

2.4 Consideration of *ex-situ* Effects

EC (2019) advises that Member States, both in their legislation and in their practice, allow for the Article 6(3) safeguards to be applied to any development pressures, including those which are external to European sites but which are likely to have significant effects on any of them.

The CJEU developed this point when it issued a ruling in case C-461/17 *Brian Holohan and Others v An Bord Pleanála* ("Holohan") that determined inter alia that Article 6(3) of Directive 92/43/EEC must be interpreted as meaning that an appropriate assessment must on the one hand, catalogue the entirety of habitat types and species for which a site is protected, and, on the other, identify and examine both the implications of the proposed project for the species present on that site, and for which that site has not been listed, and the implications for habitat types and species to be found outside the boundaries of that site, provided that those implications are liable to affect the conservation objectives of the site.

In that regard, consideration has been given in this Habitats Directive appraisal to implications for habitats and species located both inside and outside of the European sites considered in the screening appraisal with reference to those sites' Conservation Objectives where effects upon those habitats and/or species are liable to affect the conservation objectives of the sites concerned.

2.5 Conservation Objectives

The conservation objectives ("COs") for each European site are to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the site has been selected.

The favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing;
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and
- the conservation status of its typical species is favourable.

The favourable conservation status (or condition, at a site level) of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and

- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

2.6 In-combination Effects

Article 6(3) of the Habitats Directive requires that in-combination effects with other plans or projects are also considered. As set out in the Commission's 2018 Notice (EC, 2019), significance will vary depending on factors such as magnitude of impact, type, extent, duration, intensity, timing, probability, cumulative effects and the vulnerability of the habitats and species concerned.

In addition, other plans or projects which are completed, approved but uncompleted, or proposed have been considered. EC (2019) specifically advises that "as regards other proposed plans or projects, on grounds of legal certainty it would seem appropriate to restrict the in-combination provision to those which have been actually proposed, i.e. for which an application for approval or consent has been introduced".

3 THE PLAN

3.1 Background

Established around the mouths of the Lagan and Farset Rivers and Belfast Lough, most of Belfast lies in a 'bowl' surrounded by hills on three sides: Divis Mountain and Cave Hill to the west and north; Castlereagh Hills to the south; and Craigantlet Hills to the east. This leaves the city exposed to flooding from both rivers and the sea as well as from flash flooding caused by storm water unable to drain away quickly enough.

Much of the Belfast storm drainage and sewerage network was built in the late 19th and early 20th Century and this Victorian system is now coming under increasing pressure, both in terms of its condition and its capacity. It is not only under pressure from the increase in connections to the sewerage network but also from the increase in surface water which also finds its way into our sewers and rivers.

The Living with Water Programme ("LWWP") is taking a new long-term strategic approach to drainage which will:

- protect against flooding by managing the flow of water through a catchment from source to sea;
- enhance the environment through effective wastewater management and the provision of enhanced blue / green spaces to benefit local communities; and
- grow the economy, by providing the necessary capacity in our sewer and wastewater treatment systems to allow development and house building.

This new approach will be taken forward for Belfast through the development and delivery of Living With Water in Belfast, An Integrated Plan for Drainage and Wastewater Management in greater Belfast. Whilst DfI is leading the LWWP, there are many key stakeholders involved from across central and local government, with support from the private sector. All are working together to develop drainage solutions that move away from conventional and expensive hard engineering solutions towards a more integrated and sustainable approach to managing water through the urban area.

3.2 Strategic Context

The Long-Term Water Strategy for Northern Ireland (2015-2040) - Sustainable Water - sets out a range of initiatives to deliver the Executive's long-term goal of a sustainable water sector in Northern Ireland. The Strategy encourages a sustainable and integrated approach to managing the different water needs in a way which promotes regional development without compromising the environment or increasing flood risk.

The Long-Term Water Strategy seeks to develop cross-departmental working and stakeholder partnerships within the water sector which aligns closely with the approach of the Plan. The Strategy references the need for the development of a SDIP for Belfast and the development of guidance for similar plans across Northern Ireland.

It is essential to have a sustainable water sector which supports the Regional Development Strategy 2035 and the Sustainable Development Strategy to promote economic growth and which also ensures that we do all that we can to protect the environment and reduce the risk of flooding throughout Northern Ireland.

Northern Ireland must also meet the requirements of a number of Directives designed to protect and improve the quality of the water environment, such as, the Water Framework, Urban Wastewater Treatment, Bathing

Waters, Groundwater and Floods Directives. The Strategy focuses on complying with these Directives and the Plan provides the vehicle to deliver the necessary improvements.

The Plan is central to the delivery of the Floods Directive, Water Framework Directive and the Northern Ireland Executive's Regional Development Strategy, Sustainable Development Strategy and the Long-Term Water Strategy

3.3 Themes

3.3.1 Wastewater

The Belfast sewerage system was originally built by Victorian engineers in the 19th Century. It was designed as a combined system with both sewage and storm water flowing through the same pipes. Its main purpose was to take wastewater to the nearest river. Nowadays environmental standards require wastewater to undergo appropriate treatment before being returned to the environment.

Separate foul and storm sewers have been a mandatory requirement in all new developments for over 30 years. However, a high percentage of our sewers, particularly in our town centres remain combined, carrying both storm water and sewage in one pipe. This means that rainwater is often pumped and treated unnecessarily like sewage. Excessive rainfall can overload sewerage systems which can result in out of sewer flooding and pollution.

Combined sewer overflows ("CSOs") are a necessary part of the drainage system to reduce the risk of overloading of sewers. They allow rainwater, mixed with sewage, to rise inside the sewer and eventually enter a separate pipe which discharges directly to a river or coastal water.

If there was no sewer overflow in place, this sewage would force its way out of the network of pipes to the surface causing out-of-sewer flooding. CSOs should only operate during heavy rainfall when the discharge is dilute, however where CSOs spill too frequently and cause pollution these are categorised as unsatisfactory intermittent discharges which must be rectified.

The wastewater collected in our sewerage networks is pumped to a wastewater treatment works, where it is filtered and treated, before being discharged safely into Belfast Lough. Depending on the environmental standards, there can be up to six stages in the sewage treatment process. Figure 3.1 shows the locations of the six treatment works that discharge into Belfast Lough along with the corresponding sewerage network areas they serve.

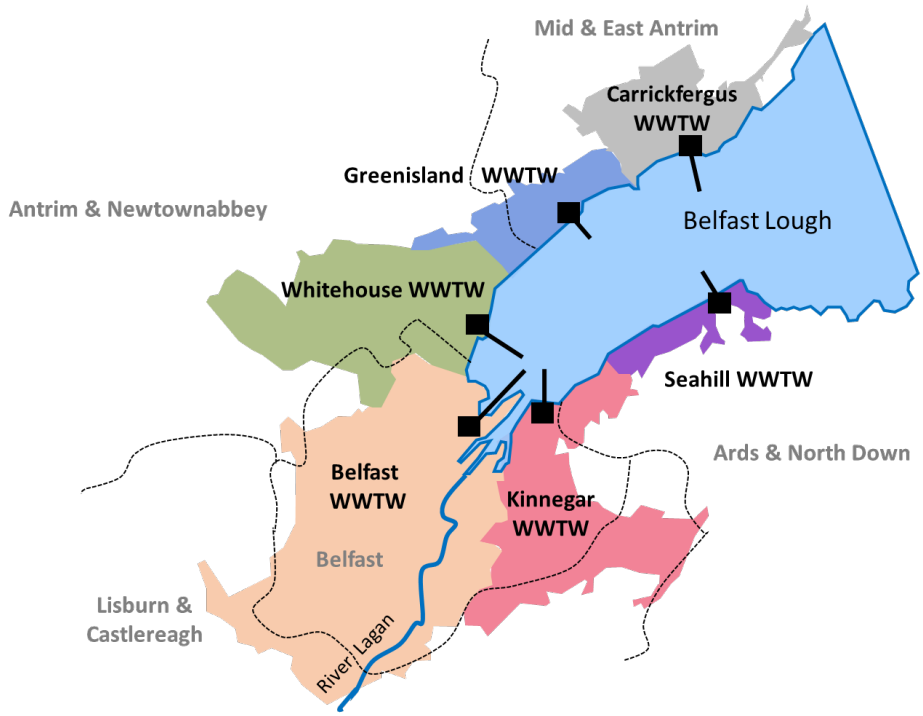

Figure 3.1: Belfast Sewerage Networks and Treatment Works

The sewerage and drainage infrastructure serving Belfast is nearing capacity and needs significant upgrades to facilitate future growth and development. Our sewerage and drainage systems are now at 'breaking point' and require significant levels of additional investment. Signs that the drainage systems and treatment works are becoming increasingly overwhelmed and failing include: more regular instances of flooding; increased sewerage spills and pollution; and sewer collapses and sewer blockages.

Current estimates indicate that without investment, there is a risk that no new connections to the sewerage network may be permitted in Belfast from 2021. In some parts of Greater Belfast, NI Water has already had to impose an embargo on new sewerage connections to due to a lack of capacity that may take until 2025 to resolve, even if the Plan is fully funded.

Significant investment is needed at Belfast Wastewater Treatment Works and at the other five sites to provide additional treatment capacity and enhanced treatment to ensure discharges meet current environmental standards and ensure the water quality in Belfast Lough improves.

3.3.2 Road Drainage

The drainage of public roads, footways and public realm areas in Belfast is the responsibility of DfI Roads. These hard surfaces are usually drained via a system of gullies, drainage channels and drainage pipes which collect and discharge water to a nearby watercourse or sewer. Given the age of the infrastructure in Belfast, most of the surface water from roads is discharged into combined sewerage networks, where it is mixed with sewage and other pollutants and pumped to one of the six wastewater treatment works.

3.3.3 Private Drainage Systems

A significant length of drainage infrastructure is private and not maintained by Government and some cases may not be maintained at all. Some of this private drainage infrastructure ("PDI") conveys significant discharges from surface areas, designated watercourses, road drains, surface water sewers and combined sewer overflows.

A recent desk-based assessment estimates that there are around 87km of 'known' PDI in the Belfast area (excluding private open watercourses).

Over time the condition of drainage infrastructure deteriorates and without maintenance it will eventually fail leading to flooding and other types of disruption. The majority of PDI has been in existence for many decades and is more likely to be in poor condition, given that it is not surveyed and maintained by any of the existing public drainage providers.

3.3.4 Coastal and River Flood Defences

Belfast is currently protected from coastal and river flooding by seawalls around the harbour area and flood defences along the key rivers. Many of the rivers are culverted (piped) with flood walls constructed along the open sections.

However, these defences were within centimetres of being overtopped in January 2014 when Belfast Harbour experienced its highest recorded tidal surge.

As much of the city centre is between 1m to 2m below extreme tide levels, an extreme event would cause serious disruption to commerce, the transportation network, and the social fabric of the city. Any significant depth of tidal flooding within the city centre is likely to drain slowly as the capacity of the drainage network is exceeded. This also raises the likelihood of contamination as tidal flooding overwhelms and mixes with foul sewage and other contaminants. Flooding of the city centre is likely to cause major disruption for several days or even weeks, with increased clean-up and recovery consequences.

3.3.5 Increasing Risk of Flooding

The effects of flooding on human activity are wide ranging, with the potential to cause fatalities and injury, displacement of people, pollution and health risk, damage to buildings, adverse environmental impacts and severely compromising economic and social activities. Belfast and other areas of NI are at a serious risk of flooding.

3.3.6 Increasing Levels of Pollution

The pressure on Belfast's drainage infrastructure is beginning to have a negative impact on water quality in Belfast Lough. Continuous and intermittent discharges from sewerage system overflows and treatment facilities together with diffuse pollution from other sources including agriculture, have led to a deterioration in the water quality within the inner part of Belfast Lough. The Outer Belfast Lough area currently meets the WFD 'Good Status' target but the classification for both the Belfast Harbour and Inner Belfast Lough are below 'good' status. The poor water quality in Inner Belfast Lough has had a negative impact on the designated shellfish bed, increasing the number of Category C shellfish failures. Figure 3.2 below shows

the location of the designated shellfish waters, bathing waters and waste water treatment works within the Inner Lough Boundary.

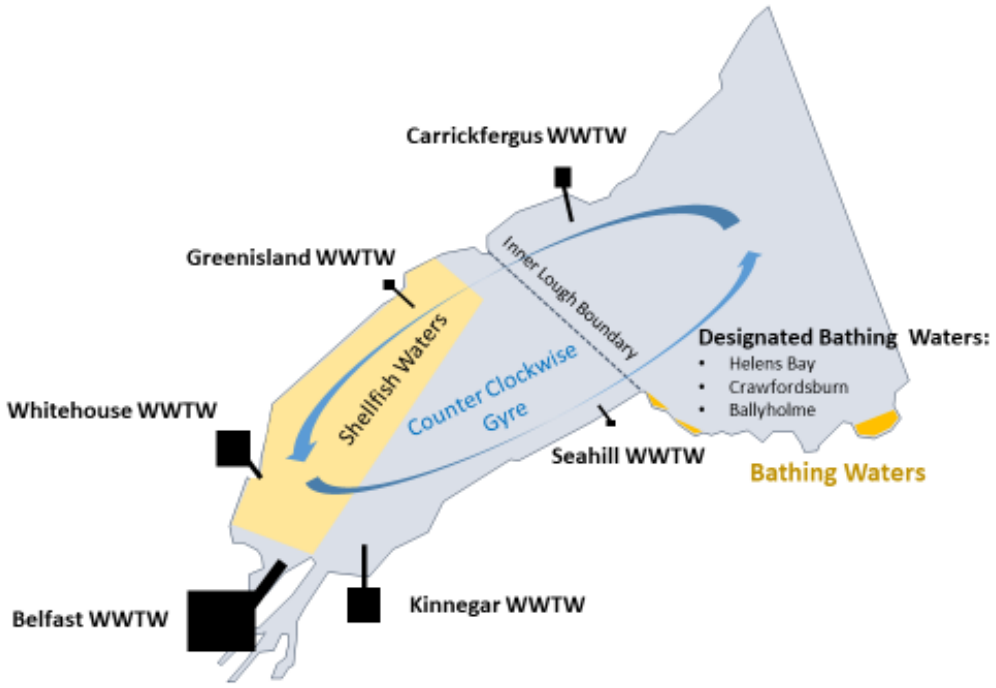

Figure 3.2: Inner Belfast Lough WWTWs

As an example, Whitehouse WWTW treats the wastewater for around 90,000 people and businesses in the Newtownabbey and Mallusk areas. The treated wastewater from this WWTW discharges directly onto a small beach on the shore of Belfast Lough where it flows over the beach before entering the water. On occasions when the wastewater flow arriving at the treatment works is in excess of what it can treat, combined sewer overflows also operate and discharge unscreened dilute sewage at the same location.

In January 2019 NI Water assessed that there was over 100 tons of sewage related debris on the beaches in the Whitehouse area, most of which has since been removed. However, this material will continue to accumulate until investment is secured and the unsatisfactory overflows are removed. The sewage related debris includes inappropriate material, such as wet wipes and hygiene products which are being flushed down toilets.

Following observations of sewage related debris on scaffolding erected over the Blackstaff River at Boucher Playing fields for an open air concert, it was considered this will only have been a small fraction of the sewage related debris discharged in the river from 23 upstream combined sewer overflows (CSOs) during the weeks before the concert, the rest will have continued down the Blackstaff River, into the River Lagan, over the Lagan Weir, into Belfast Harbour and then to Belfast Lough. Whilst the majority of this pollution is dispersed by rivers into the sea where it will go on to be a hazard to marine life, some of this is sorted by the sea and thrown back up onto beaches. These sources of pollution must urgently be addressed to protect and improve water quality in Belfast Lough.

3.4 Current Drainage Issues

Many of the drainage problems Belfast is experiencing at the minute throughout the city and surrounding suburbs include;

Agri Run-off Causing Pollution

Poor land management practices including over-use of fertilisers and pesticides can cause these pollutants to enter inland and coastal waters.

Waste from Livestock

Poor management of livestock can lead to animal waste polluting inland and coastal waters

Erosion

Natural erosion along the coastline / riverbank is caused by the action of waves, currents, tides, wind-driven water, or other impacts of storms.

Surface Water Flooding

Surface water or 'pluvial' flooding occurs when intense rainfall cannot drain away because there are no drainage systems or the existing systems become overwhelmed. This risk is increasing due to climate change and the reduction in green space caused by us paving over gardens to create parking spaces and new development

Risk of Tidal / Coastal Flooding

Tidal / coastal flooding occurs during exceptionally high tide or storm surge events when high winds push water onshore. In this type of flood event, water overwhelms low-lying land and often causes devastating damage to property. As much of Belfast city centre is between 1m to 2m below extreme tide levels, an extreme event would cause serious disruption to commerce, the transportation network, and the social fabric of the city

Risk of River / Fluvial Flooding

Fluvial flooding occurs when excessive rainfall, over a prolonged period, causes a river to overflow. The damage from a river flood can be widespread as the overflow affects smaller rivers downstream, often causing dams and dikes to break and swamp nearby areas.

Underdeveloped Landbank due to lack of Capacity

Development constraints can occur when there is a lack of capacity in the sewerage systems or treatment facilities to allow new connections. This can delay the redevelopment of disused brownfield sites which can often blight the urban landscape.

Out-of-Sewer Flooding

Out-of-sewer flooding is caused by a blockage, collapse or lack of capacity in the sewerage system. It is one of the worst kinds of flooding and causes major disruption and financial damage and distress to property owners.

Blockages / Asset Failure

Sewer blockages are often caused by a structural failure (collapse) or from inappropriate items being flushed into the sewers. One common type of blockage is a "fatberg" which forms when fats, oils and greases build up within the sewers and congeal with wet wipes and sanitary products.

Combined Sewer Overflows (CSO) Sewage Spills

A high percentage of our sewers, particularly those in our town centres, are combined i.e. they carry both storm water and sewage in one pipe. This means that rainwater is often unnecessarily pumped large distances and treated like sewage. Excessive rainfall can overload sewerage systems and cause out of sewer flooding and pollution. To prevent this, Combined Sewer Overflows (CSOs) are designed to reduce the risk of overloading of sewers by allowing rainwater, mixed with sewage, to discharge directly to a river or coastal water. The high volume of rainwater in the sewers and rivers during a storm event dilutes the sewage to minimise pollution. Unfortunately, however, some of our CSOs spill too frequently and cause pollution and damage to our environment.

Wastewater Treatment Works

Wastewater Treatment Works receive and treat wastewater before returning it safely to the environment. Depending on the environmental standards, there can be up to six stages in the sewage treatment process. Significant investment is, however, needed at Belfast Wastewater Treatment Works and at the other five sites that discharge into Belfast Lough in order to provide additional treatment capacity and enhanced treatment measures. These interventions are designed to ensure that discharges meet current environment standards and that the water quality in Belfast Lough is protected and improved.

Without addressing these issues outlined above, Belfast will continue to be at risk from flooding, environmental problems will increase, and the future development of the city could be threatened.

3.5 Living with Water Programme

The LWWP brief is to deliver a new integrated, strategic and long-term approach to drainage provision through the development and delivery of the Plan, together with the development of an integrated drainage investment planning guide for the rest of Northern Ireland.

The Plan is not just about investing in new drainage and wastewater infrastructure it is also about implementing new policies and procedures to promote sustainable solutions and providing blue/green infrastructure to help manage stormwater in a more natural way. The Plan therefore aims to deliver its objectives of Protect, Enhance and Grow by focusing on the following delivery areas:

1. **Policy Measures** – new policies and procedures to encourage greener drainage solutions and a collaborative approach to drainage and wastewater management;
2. **Catchment Based Solutions** – These potential measures are focused on managing rain water more naturally through the catchment by controlling runoff, reducing peak flows in the drainage systems and providing areas for flood storage. These measures include both blue/green infrastructure such as river restoration works and conventional hard engineered measures such as sewerage network improvements.

3. **Upgrades to Wastewater Treatment Works** – No amount of catchment based and blue/green solutions will remove the need for the effective treatment of the wastewater that we produce. Upgrades to WwTW within the Plan area are needed in terms of the volume of wastewater they can treat and the standard to which it is treated.

3.6 Geographical Scope

Although the Plan focusses on Belfast, its geographical scope extends to include the surrounding council areas to take in all the catchments feeding the six WWTW which discharge into Belfast Lough (see **Figure 3.2**). This will ensure that a strategic catchment-based approach will be delivered through the Plan to address flood risk and drainage issues in this wider area.

3.6.1 Integrated Drainage Investment Planning

A key component of the Plan is integrated drainage investment planning ("IDIP"). This process encourages the main drainage organisations and other stakeholders to work collaboratively, in ways that are not limited to drainage assets and individual responsibilities, to develop solutions that seek to resolve drainage and surface water management issues within a catchment in a holistic manner. To ensure thorough assessment of the wider geographical area covered by the Plan, four distinct catchment areas were identified:

3.6.1.1 Blackstaff Catchment

Extends west to include the portion of the Colin Glen catchment which is within the Belfast drainage area. The rest of the catchment drains to Dunmurry.

3.6.1.2 Connswater and Lagan Embankment Catchment

Extends eastwards to include Dundonald, which is within the Kinnegar WWTW drainage area, and north east to include the Seahill WWTW drainage area, so extends out to Crawfordsburn. Includes all contributing natural catchments. It excludes the Newtownbreda drainage area which discharges to the River Lagan.

3.6.1.3 North Foreshore Catchment

Extends north to include Carrickfergus drainage area. Also includes Mallusk / Newtownabbey, which are within the Whitehouse drainage area. Includes all contributing natural catchments.

3.6.1.4 Inner Belfast Lough (Wastewater Treatment)

Covers the 6 WWTW discharging into the lough – Carrickfergus, Greenisland, Whitehouse, Belfast, Kinnegar & Seahill.

Each of these study areas were assessed separately to identify the most beneficial drainage solutions for that area. Not all solutions are appropriate at every location. Consideration of constraints such as topography and flow of water through the catchment helped to identify the type of solutions which would be necessary at various locations within each study area. This allowed potential schemes to be developed and prioritised for further consideration.

An example of this is blue/green infrastructure schemes which, due to their size, may be more suited to locations at the top of catchment area, with hard engineered solutions more likely to be suitable further down the catchment area where locations may be constrained. However, to achieve maximum benefit it is vitally important to consider solutions for the entire catchment as the development of a blue/green scheme in an upper catchment area will have a positive impact lower down in the catchment. Both blue/green and hard engineered solutions should be designed to complement each other and be delivered in a co-ordinated manner.

A nine-step IDIP process was developed as shown in Figure 3.3 which provides a collaborative approach to wastewater management and drainage provision whilst ensuring that any proposed investment opportunities are outcome and solution driven.

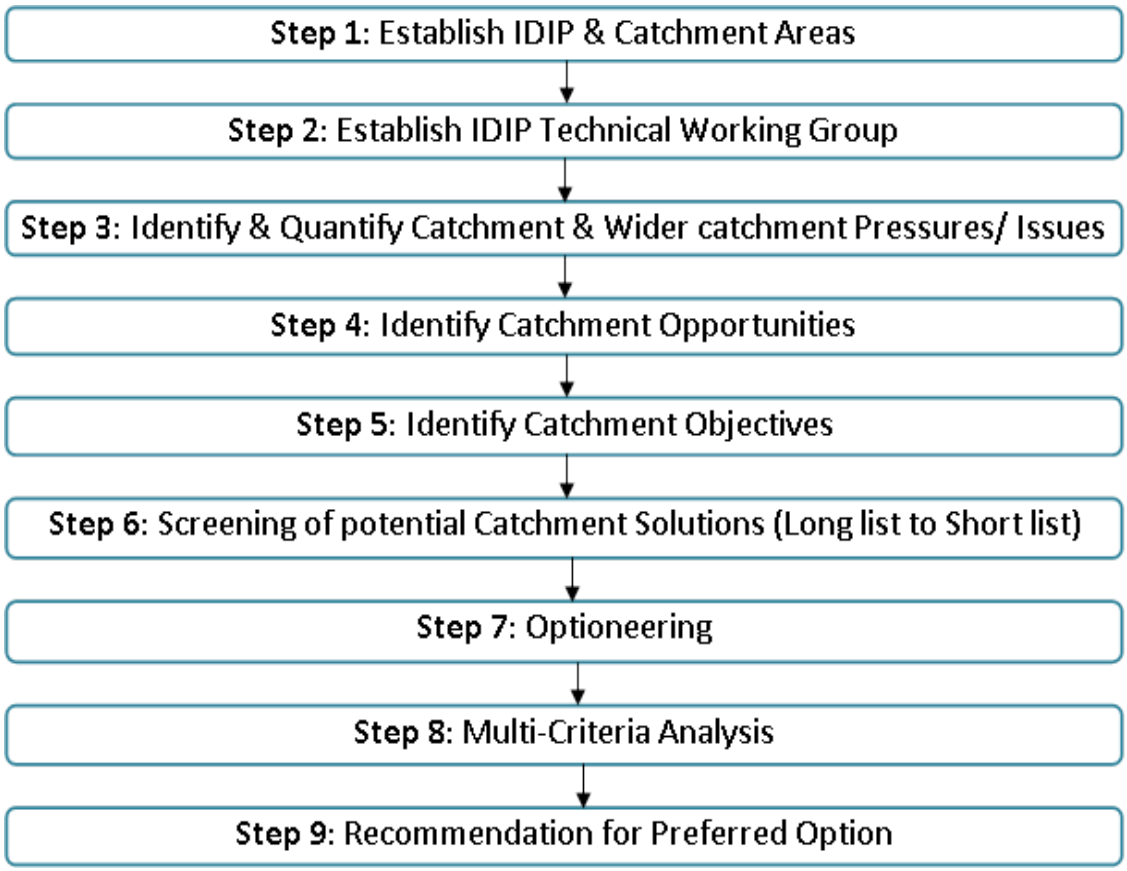

Figure 3.3: IDIP Process Flow Chart

3.7 Elements of the Plan that could be brought forward

Proposed solutions that could be brought forward form the Plan are separated out into the four IDIP study areas:

3.7.1 Blackstaff Study Area

The Blackstaff study area extends from Belfast Hills in the west, to Ligoniel in the north, to Malone in the east and Finaghy in the south. The main rivers are the Blackstaff, Forth, Woodvale, Lady Brook, Colin Glen and the Ballygomartin. All of the sewerage network drains to Belfast WWTW at Duncrue.

The Blackstaff catchment was further divided into 6 smaller sub-catchments based on river flow and the location of pressures.

3.7.1.1 Clowney Catchment

Belfast Hills

Managing the uppermost parts of the river catchments can reduce surface water runoff and increase water attenuation and retention. Woodland creation, riparian buffer strips and drain blocking slow the flows of surface water and store it. This work could potentially be taken forward in partnership with BCC, the National Trust and the Belfast Hills Partnership

Boodles Dam

Work between DfI and BCC in relation to the regeneration of Ligoniel Park is examining opportunities to reconnect an existing Mill Race to Boodles Dam and potentially provide up to 2,500m^3 temporary surface water storage, lowering the peak flows in the Forth River during a storm event and helping to reduce flood risk. Reconnection of the Mill Race should also help improve the water quality within the dam. This in time could be linked into BCC's PEACE IV programme and provide a link into the Belfast Hills.

Forth River / Springfield Dam

BCC's PEACE IV proposals include providing a 12km Community Greenway, along Forth River from Glencairn to Bog Meadows, and carrying out enhancements at a number of sites along the way including Springfield Dam and Park. Expanding the scheme to provide further integrated walking and cycling networks that feature river sections provides opportunities to reduce flood risk by incorporating attenuation features within the river channel, and utilising Springfield Dam together with the natural ravines in the area to temporarily store storm water.

Forth River / Clowney area

Combined sewerage improvements: NI Water propose to carry out works in this area to provide increased capacity within the combined sewerage network, together with appropriate screening at CSOs to mitigate against flood risk and improve water quality.

3.7.1.2 Farset Catchment

Belfast Hills

Managing the uppermost parts of the river catchments to reduce surface water runoff and to increase water attenuation and retention. Woodland creation, riparian buffer strips and drain blocking to slow the flow of surface water and store runoff. This work would be taken forward in partnership with BCC, the National Trust and the Belfast Hills Partnership

Ballysillan Playing Fields

Working in partnership with the Urban Villages Initiative1, BCC have produced a long-term development plan to create a thriving, welcoming and shared space at Ballysillan Playing Fields. DfI's together with the Executive Office and BCC are examining opportunities to extend the floodplain areas through the park. Such opportunities have the potential to reduce flood risk in the immediate area and further downstream and can provide environmental and aesthetic benefits. NI Water are also working with stakeholders to examine opportunities for surface water separation and improve local water quality.

Glenwood / Farset area

Combined sewerage improvements: NI Water propose to carry out works in this area to provide increased capacity within the combined sewerage network, together with appropriate screening at CSOs to mitigate against flood risk and improve water quality.

3.7.1.3 Ballymurphy Catchment

Belfast Hills

Managing the uppermost parts of the river catchments to reduce surface water runoff and to increase water attenuation and retention. Woodland creation, riparian buffer strips and drain blocking to slow the flows of surface water and store runoff. This work would be taken forward in partnership with BCC, the National Trust and the Belfast Hills Partnership

Whiterock / Falls Park

Opportunities identified within this area to create a number of offline storage ponds, as well as online attenuation works and river restoration / re-meandering of the Ballymurphy Stream / Turf Lodge Stream, that could help reduce the flood risk in the area by attenuating increased river flow and intercepting overland surface water. Potential also for river restoration works to the Ballymurphy Stream that could be tied into the development of BCC-owned green space to create a nicer amenity area and an area of biodiversity. Opportunities within Falls Park could see the creation of online and offline storage ponds and the possibility of storage within the existing football pitches through the re-grading of the area around the pitches.

Bog Meadows

There is potential within the Bog Meadows to provide further storm storage as well as linking in with BCC's PEACE IV proposals. Opportunity exists for the creation of an attractive walking and cycling area that also helps reduce flood risk and free up capacity within the downstream Blackstaff Culvert. Due to water quality issues within the Ballymurphy Stream, the river is currently disconnected from the Bog Meadows ponds. To enable potential reconnection pf the river, sewerage improvements are identified to address any unsatisfactory CSOs it receives.

Ballymurphy area

Combined sewerage improvements: NI Water propose to carry out works in this area to provide increased capacity within the combined sewerage network, together with appropriate screening at CSOs to mitigate against flood risk and improve water quality.

3.7.1.4 Glenmachan Catchment

Belfast Hills

Managing the uppermost parts of the river catchments to reduce surface water runoff and to increase water attenuation and retention. Woodland creation, riparian buffer strips and drain blocking to slow the flows of

surface water and store runoff. This work would be taken forward in partnership with BCC, the National Trust and the Belfast Hills Partnership.

Andersonstown

Opportunity to redevelop some BCC owned green space by opening up some of our forgotten buried rivers and incorporating storm attenuation features. This has the potential to create improved green spaces with attractive parklands and river walks, reduce flood risk and improve water quality.

Stockmans / Boucher

The Blackstaff River passes through Woodlands Playing Fields, Musgrave Park and Boucher Rd Playing Fields before being culverted for the remainder of its length to the River Lagan. Opportunities exist to create storage areas in these green spaces to allow the river to flood reimagining how we use these areas. Opportunities also exist for storm water storage in the redundant Upper Falls WWTW site. Combined, these could help reduce flood risk in the area and free up capacity within the watercourse.

Finaghy North

It is proposed that alterations are undertaken along the Ladybrook River to provide storage along the perimeter of the Radius Visteon Site. Should this work be coupled with storm separation, it could facilitate new connections to the sewerage network. Opportunities also exist to link this with the proposals for Stockmans/Boucher.

Finaghy South

Sewerage improvements and road drainage improvements are being undertaken at Sicily / Locksley Park junction in order to permanently reduce the risk of flooding within the Sicily Park and Marguerite Park areas of south Belfast.

3.7.1.5 Lower Blackstaff Catchment

Donegal Road

As part of any regeneration proposals in this area, there is potential for storage ponds to be created in the waste ground beside Monarch Street. This could help store storm water from the nearby Blackstaff culvert as well help create a nicer environment and an area for Biodiversity.

Belfast Transport Hub

DfI and developers have been examining opportunities to disconnect site storm drainage from the combined sewer network, attenuating it using SuDS, before discharging it into the Blackstaff River. This storm separation may, along with other sewer network improvements, assist NI Water in accepting the increased foul flows into the combined sewers that will result from the site being redeveloped.

Lisburn Road

Opportunities exist to create a storage pond in Drumglass Park. Working in partnership with BCC, this could create an improved parkland and possible wetland area.

Glenmachan Phase 2 Project (Boucher Tunnel & Sewer Improvements)

NI Water scheme to extend the existing deep storm water tunnel will reduce flood risk in nearby areas including the Sicily Park and significantly improve water quality in the area by addressing approximately 20 unsatisfactory sewer overflows.

Bankmore Square

Opportunity to provide localised storm water attenuation as part of the redevelopment of Bankmore St along the line of the proposals for the Belfast Rapid Transit Phase 2.

3.7.1.6 Colin Glen Catchment

Belfast Hills

Managing the uppermost parts of the river catchments to reduce surface water runoff and to increase water attenuation and retention. Woodland creation, riparian buffer strips and drain blocking would help slow the flows of surface water and store this runoff. This work would be taken forward in partnership with BCC, the National Trust and the Belfast Hills Partnership

Hannahstown

Linking to Blackstaff opportunities, there is the potential to carry out drainage network alterations to intercept and re-direct the surface water flow by providing capacity within the Ladybrook River

Colin Glen Corridor

River and floodplain restoration works are possible along the Colin Glen River in partnership with the Colin Glen Trust. Works could include instream structures (large woody debris dams etc.), river re-meandering, wash lands, and small storage / detention areas. Opportunities also exist for further storage areas along the Colin Glen River and Suffolk Playing Fields areas. Additional storage potential in the upper areas of this catchment by utilising existing waste management sites. Additionally, the Kinnegar Road Stream runs along the perimeter of Wedderburn Park and there is potential to provide storm water attenuation within the park by carrying out river meandering works and providing instream structures e.g. large woody debris dams.

3.7.2 Connswater & Lagan Embankment Study Area

This study area extends from the city centre in the west of the catchment towards Crawfordsburn in the north-east. It covers the areas of Malone and Stranmillis in the south west, Cregagh and Castlereagh in the south east and Dundonald in the east. The main rivers are the Lagan, Farset, Lower Blackstaff (relief culvert) Connswater, Knock, Loop, Enler, Tillysburn Stream, Knocknagoney Stream and Crawfordsburn River.

The Connswater & Lagan Embankment catchment was further divided into 5 smaller sub-catchments based on river flow and the location of pressures.

3.7.2.1 Lagan Catchment

York Street Interchange

Building on the proposals being taken forward by DfI Roads to redevelop the York Street interchange, there is an opportunity to increase runoff attenuation as part of the proposals.

Belfast Tidal Scheme

The proposed scheme extends from Belfast Harbour to Stranmillis Weir and will comprise a number of different forms of both permanent and temporary flood defences. Maps showing the line of the flood defences can be viewed at https://www.infrastructure-ni.gov.uk/topics/riversand-flooding/rivers-and-

flooding-projects. The height of the defences will also vary in relation to the surrounding ground level but will be of a consistent level in relation to the height above average sea level (Ordnance Datum).

Ravenhill Flood Alleviation Scheme

NI Water is progressing a capital improvement project to mitigate out of sewer flooding risk.

Sewerage network improvements

NI Water has identified a number of sewerage network improvements that will include CSO screening and the provision of additional storage, to mitigate against flood risk and improve water quality.

3.7.2.2 Connswater Catchment

Orangefield Stream Corridor

Dixon Park, Greenville Park and land owned by the Department of Education at the old Orangefield School that could complement the already good work carried out on the Connswater Greenway.

Knock River Corridor

Working with DoF in the grounds of Stormont Estate, potential river restoration and blue/green features. Opportunities exist along the Knock River near Cherryvalley, Gilnahirk Stream and Kingsway Stream including Gilnahirk Park and Tullycarnet Park. In addition, NI Water has identified a number of sewerage network improvements that will include CSO screening and the provision of additional storage, to mitigate against flood risk and improve water quality.

Connswater River Corridor

Potential has been identified to reduce storm water runoff, including during redevelopment of the Avoniel Leisure Centre, at Ballymacarrett Walkway, the King George V Playing Fields linked into Glentoran FC's plans for the re-development of the Oval Stadium, and NI Water's replacement of Sydenham WwPS. BCC and NI Water have already amended the timing of some works to help facilitate these works.

Loop River Corridor

Working in partnership with the National Trust to create a wetland area in the Lisnabreeny area, there is potential to provide further stormwater storage as part of the scheme. This could be linked to the potential within the Cregagh Glen area, and areas along the Loop River, to help store storm water and reduce surface water runoff, whilst improving the area in which we live. These areas include Cregagh Green and Playground, Loop River Park and Cherryvale Park. In addition, NI Water has identified a number of sewerage network improvements that will include CSO screening and the provision of additional storage, to mitigate against flood risk and improve water quality.

Castlereagh and Craigantlet Hills

Managing the upper most parts of the river catchments to reduce surface water runoff and increase water attenuation and retention. Woodland creation, riparian buffer strips and drain blocking to slow the flows and store flow. Given that most of the surrounding hillside is in private ownership, any potential works would need to be carried out in partnership with DAERA and linked to an Agri-Environmental scheme.

3.7.2.3 Holywood Catchment

Golf Course Stream Corridor

Potential for floodplain restoration works to help slow the flow of water through the catchment including Glenlyon Park and along the Croft Burn and Woodlands Stream. Potential opportunities in DAERA-owned lands at Redburn Park in the form of Natural Flood Management and areas of engineered storage. These works could be complemented by increased attenuation potential in the Loughview development proposals being considered by Ards and North Down Council.

Holywood Hills

Managing the uppermost parts of the river catchments to reduce surface water runoff and to increase water attenuation and retention. Woodland creation, riparian buffer strips and drain blocking to slow flows and store runoff. Given that most of the surrounding hillside is in private ownership, any potential works would need to be carried out in partnership with DAERA and linked to an AgriEnvironmental scheme.

Tillysburn Stream Corridor

Working with various organisations, including DfI Roads and BCC, there is the potential to allow surface water into storage areas within the proposed park and ride site at Tillysburn, and Knocknagoney Linear Park. Works to nearby watercourses in the form of floodplain restoration or instream structures have the potential to increase capacity. There is also potential for floodplain restoration works within land owned by the MOD at Palace Barracks that could slow the flow of water through the catchment.

Sewerage network improvements

NI Water has identified a number of sewerage network improvements in the Knocknagoney, Kinnegar and Holywood areas, that include increasing capacity, CSO screening and the provision of additional storage, to mitigate against flood risk and improve water quality.

3.7.2.4 Seahill Catchment

Craigantlet and Holywood Hills

This study area is surrounded by hills and there is potential to manage the uppermost parts of the river catchments to reduce surface water runoff and to increase water attenuation and retention and reduce diffuse pollution. Woodland creation, riparian buffer strips and drain blocking would help slow the flows of surface water, help store this runoff and reduce diffuse pollution. Given that most of the surrounding hillside is in private ownership, any potential works would need to be carried out in partnership with DAERA and linked to an Agri-Environmental scheme.

3.7.2.5 Dundonald Catchment

Craigantlet and Castlereagh Hills

This study area is surrounded by hills and there is potential to manage the uppermost parts of the river catchments to reduce surface water runoff and to increase water attenuation and retention and reduce diffuse pollution. Woodland creation, riparian buffer strips and drain blocking would help slow the flows of surface water, help store this runoff and reduce diffuse pollution. Given that most of the surrounding hillside is in private ownership, any potential works would need to be carried out in partnership with DAERA and linked to an Agri-Environmental scheme.

Dundonald Area

Working in partnership with LCCC to help deliver the Castlereagh Urban Integrated Development Framework (CUIDF). LCCC proposals for developments at Dundonald Leisure Park, within Dundonald Village and along the Enler River at Moat Park could be extended to introduce blue/green infrastructure to help solve flooding issues. River restoration works along the Enler River and various tributaries, including large woody debris dams, for example, as well as Natural Flood Management work at the Billy Neill Soccer Centre of Excellence, could all contribute to solving issues. BCC land along the Comber Greenway also has potential.

Sewerage network improvements

NI Water has identified a number of sewerage network improvements in the Dundonald area, that includes increasing capacity, CSO screening and the provision of additional storage, to mitigate against flood risk and improve water quality.

3.7.3 North Foreshore Study Area

The North Foreshore study area extends from Duncairn and Fortwilliam in the south to Newtownabbey in the west and Carrickfergus in the north. The terrain generally slopes south easterly towards Belfast Lough. The main rivers are the Ballymartin Water, Mile Water, Three Mile Water, Lisnalinchey Burn, Woodburn river, Copeland Water and Kilroot River, all of which discharge into Belfast Lough.

3.7.3.1 Fortwilliam Catchment

Cavehill Country Park / Belfast Castle / Belfast Zoo

Opportunities with Belfast Hills Partnership, BCC and National Trust to manage upper catchments to reduce runoff and increase water attenuation and retention. Woodland creation, riparian buffer strips and drain blocking to slow and store surface water.

Fortwilliam Stream Corridor

Building on any potential Natural Flood Management works in the Cavehill / Belfast Castle area there may be opportunities at Fortwilliam Golf Club to attenuate and store water along watercourses. This could be made into a feature of golf course or could be in some of the lesser used areas around the fringes of the course.

Premier Drive Stream River Corridor

Upper catchment management and opportunities at existing BCC owned green space at Northwood Linear Park and Loughside Recreation Centre and Playing Fields to divert and attenuate storm water to help address flood risk in the area.

Carr's Glen River Corridor

Opportunities at watercourses, reservoirs and dams that have connections back to Belfast's historic linen industry. Opportunities to work with BCC, along this river corridor to optimise these reservoirs (Waterworks and Alexandra Park) to store storm water and relieving capacity within the river. Opportunities for re-development of the former Carr's Glen Reservoir near NI Water's offices at Westland Road. These works along with the potential to use existing green space in areas like Grove Playing Fields etc. for storm attenuation and the potential for Natural Flood Management in the upper areas of Cave Hill could significantly reduce the flood risk in the area.

Sewerage network improvements

NI Water has identified a number of sewerage network improvements in the Fortwilliam area, that includes increasing capacity, CSO screening and the provision of additional storage, to mitigate against flood risk and improve water quality.

3.7.3.2 Whitehouse / Mallusk Catchment

Cavehill Country Park / Belfast Castle / Belfast Zoo / Carnmoney Hill / Collinward / Squires Hill / Mossley

This study area is surrounded by hills and there is potential to work with Belfast Hills Partnership, BCC and National Trust to manage the uppermost parts of the river catchments to reduce surface water runoff and to increase water attenuation and retention. Woodland creation, riparian buffer strips and drain blocking would help slow the flows of surface water and help store this runoff.

Glengormley Area

Potential to build on any upper catchment management works in the surrounding hills by working in partnership with Antrim and Newtownabbey Council to use existing green space like Burneys Lane Park, Lilian Bland Community Park, Braden Glen, Rathcoole Diamond Pitches, Valley Park, and NI Water's land at Valley Leisure Centre, to help attenuate storm water. These works could be tied in with Antrim and Newtownabbey Council's existing development plans.

Newtownabbey Area

There is potential to work with Antrim and Newtownabbey Council and the Woodland Trust to carry out river and floodplain restoration works, etc. in areas like Three Mile Water Conservation Park, Monkstown Wood and Glen Park. There is also the potential to include, for stormwater attenuation, etc., the site of the old UUJ campus as part of any future re-development plans. Opportunities should be taken to make full use of existing features like the former Mill Pond at Mossley Mill beside Antrim and Newtownabbey Council offices.

Sewerage network improvements

NI Water has identified a number of sewerage network improvements in the Whitehouse / Mallusk area, that includes increasing capacity, CSO screening and the provision of additional storage, to mitigate against flood risk and improve water quality.

3.7.3.3 Greenisland Catchment

Knockagh, Trooperslane

This study area is surrounded by hills and there is potential to manage the uppermost parts of the river catchments to reduce surface water runoff and to increase water attenuation and retention. Woodland creation, riparian buffer strips and drain blocking would help slow the flows of surface water and help store this runoff. Given that some of the surrounding hillside is in private ownership, any potential works would need to be carried out in partnership with DAERA and linked to an Agri-Environmental scheme.

Greenisland Catchment

There is potential to work with Mid and East Antrim Council and DfI Rivers on a number of areas within this catchment to help attenuate flows and build on any upper catchment management works that are developed. Areas include attenuation in Knockleigh Walk parkland as well as instream structures along

the Ashbourne Stream, Trooperslane Stream and Greenisland Golf Course streams. These could help improve and link to Mid and East Antrim council's Greenisland Greenway.

Sewerage network improvements

NI Water has identified a number of sewerage network improvements in the Greenisland area, that includes increasing capacity, CSO screening and the provision of additional storage, to mitigate against flood risk and improve water quality.

3.7.3.4 Carrickfergus Catchment

Woodburn to Lough Mourne

This study area is surrounded by hills and there is potential to manage the upper most parts of the river catchments to reduce surface water runoff and to increase water attenuation and retention. Woodland creation, riparian buffer strips and drain blocking would help slow the flows of surface water and help store this runoff. Given that some of the surrounding hillside is in private ownership, any potential works would need to be carried out in partnership with DAERA and linked to an Agri-Environmental scheme.

Carrickfergus Catchment

Carrickfergus is classified as one of the 12 identified areas of potential significant flood risk ("APSFR") in the Northern Ireland Flood Risk Assessment 2018 ("NIFRA") (DfI Rivers, 2019). Working in partnership with a number of organisations, like Mid and East Antrim Council, the Woodlands Trust, DfI Rivers and NI Water, etc., there is potential for river and floodplain restoration works to help store storm water in existing green spaces. These include areas such as NI Water owned reservoirs at South and North Woodburn, Lough Mourne and Copeland Reservoir, Mid and East Antrim Council Parkland at Woodburn Playing Fields, land near Prospect Steam, Salthill Park etc. Potential for further extension to this by including land at Ulidia Integrated College as well as road alterations in the Hawthorn Avenue area to transfer excess surface water into Salthill Park.

Sewerage network improvements

NI Water has identified a number of sewerage network improvements in the Carrickfergus area, that includes increasing capacity, CSO screening and the provision of additional storage, to mitigate against flood risk and improve water quality.

3.7.4 Inner Belfast Lough Study Area

In addition, works to upgrade the six WWTWs which discharge into Belfast Lough are also proposed. Works proposed include:

These improvements can be categorised into four areas:

- Transfers of sewage flows from existing catchments to treatment facilities that currently have capacity, to provide the required increase in capacity at the WWTW sites that offer the lowest overall cost after consideration of both whole life capital and operational costs;
- Upgrading the six WWTW to meet more stringent discharge standards based on environmental needs and to provide additional capacity for the new connections necessary to facilitate economic growth;
- Provide the increased treatment capacity necessary to facilitate the upgrade of the sewerage networks served by the six WWTW; and

- Upgrading the outfalls at Belfast, Whitehouse, Greenisland and Carrickfergus WWTW to meet where feasible current environmental treatment standards.

The proposed upgrades required at each of the six WWTW are summarised below:

3.7.4.1 Belfast

It is proposed that the upgrade needed to meet the objectives detailed above will be taken forward in phases; the first of which is due to commence in 2020;

- Phase 0 will see the treatment capacity of the WWTW increased in the short term to permit new connections to the sewerage network, where there are no other constraints, until Phase 1 is operational.
- Phase 1 will provide a further increase in capacity to cater for longer term growth projections and will allow the WWTW to meet enhanced environmental standards required to meet water quality objectives within Belfast Lough.

Phase 2 will include provision of an additional treatment stage to help meet water quality requirements specifically relating to aquaculture and shellfish along with the provision of additional storage to meet water quality requirements, and any odour control measures required.

3.7.4.2 Whitehouse

An upgrade is required to cater for growth in the catchment which will see the WWTW cross the certain thresholds that will necessitate a more stringent treatment standard The envisaged proposals will see a number of sub-catchment transfers, at approximately 10% of sewage loads, both to and from Whitehouse WwTW to help manage capacity constraints within the catchments along with the provision of an additional treatment stage and increased storage provision.

3.7.4.3 Greenisland

Greenisland WWTW has been identified as a site with land available allowing for a possible significant increase in treatment capacity. An opportunity exists to transfer some of the sewage loads from both Whitehouse WWTW (approximately 10% of its load) and Carrickfergus WWTW (approximately 10% of its load) catchments to Greenisland WWTW to free up capacity at both these wastewater facilities. A new treatment process is required to cater for the increased flow. As with the other sites, the WWTW will also require the provision of an additional treatment stage and increased storage provision.

3.7.4.4 Carrickfergus

Whilst there is expected to be no increase in treatment capacity required as a result of the catchment transfers, as with the other sites the WWTW will require the provision of an additional treatment stage and increased storage provision.

3.7.4.5 Kinnegar

Due to the age of the existing facilities, current population growth projections and the proposals to transfer some wastewater flow to the works, the WWTW requires a major upgrade. The WWTW will also require the provision of an additional treatment stage and increased storage provision.

3.7.4.6 Seahill

No major upgrade is anticipated at Seahill with any future work being routine maintenance.

3.7.4.7 Sea Outfalls

To better satisfy water quality objectives a new extended outfall is proposed for the treated wastewater discharging from Belfast WWTW. Under current proposals the current outfall will retained and refurbished for discharge of storm water.

Flows from Whitehouse WWTW currently discharge onto the shoreline and into the Shellfish Water Protected Area (SWPA). Two new outfalls are proposed; one for storm and one for final effluent. It is anticipated that the final effluent outfall will need to extend to the shipping channel beyond the SWPA.

The outfall at Greenisland WWTW is undersized and causes flooding of the site during periods of intense rainfall. The proposal is to provide separate new storm and final effluent outfalls.

Carrickfergus WWTW has two outfalls of different lengths which both discharge above mean low water at spring tide (MLWS) and are on the surface of the shore and seabed. These are to be replaced by new separate storm and final effluent outfalls which will be buried and discharge further into Belfast Lough.

4 STAGE 1 SCREENING APPRAISAL

4.1 Directly connected with or necessary to the management of the site

The Plan is intended to guide the integrated plan for flood risk and wastewater management in Greater Belfast. Refer to Section 3 for further details. On this basis, the Plan or any subsequent review of the Plan is not directly connected with or necessary to the management of any site as a European Site. As such, it will be subject to the assessment procedure under Article 6(3) of the Habitats Directive.

4.2 European Sites

Qualifying Interests of the European sites within the zone of influence of the Plan are listed in Table 4.1. Special Protection Areas (SPAs) in the zone of influence of the Plan are described in Table 4.1 are illustrated in Figure 4.1. Special Areas of Conservation (SACs) in the zone of influence of the Plan are described in Table 4.1 are illustrated in Figure 4.2. Ramsar sites in the zone of influence of the Plan are described in Table 4.1 are illustrated in Figure 4.3. These figures include the spatial extent of the potential projects that may fall out from the Plan and a 15km buffer around them. A distance of 15km is recommended in the case of plans, and derives from UK guidance (Scott Wilson *et al.,* 2006). This zone of influence has been adopted in the report.

4.2.1 Conservation Objectives

The conservation objectives for each site are to "maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species" for which the SAC has been selected or "to maintain each feature in favourable condition, as defined by a series of attributes and targets" for which the SPA has been selected.

The favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing;
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and
- the conservation status of its typical species is favourable.

The favourable conservation status (or condition, at a site level) of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

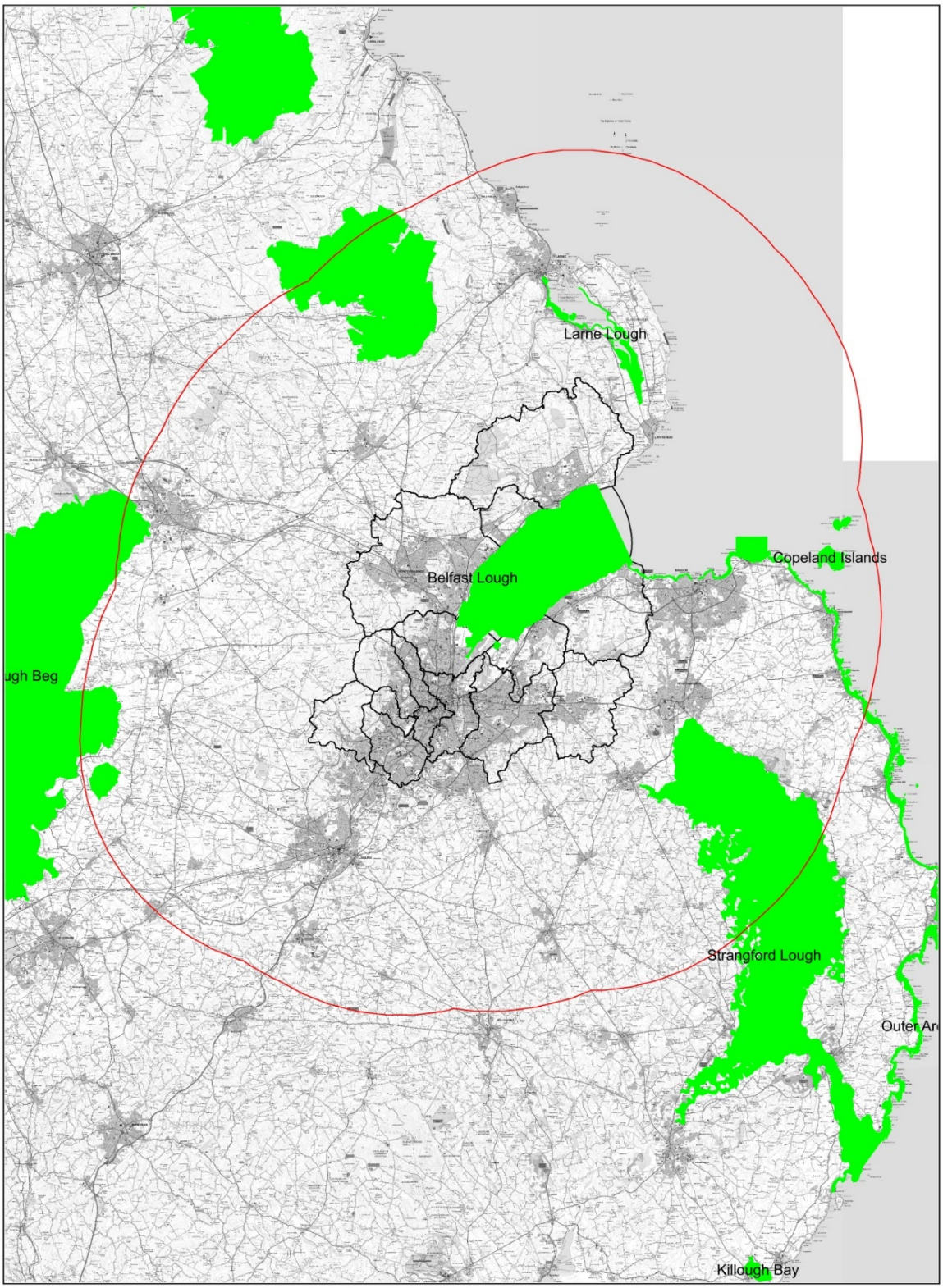

Figure 4.1: SPAs within the zone of influence of the Plan

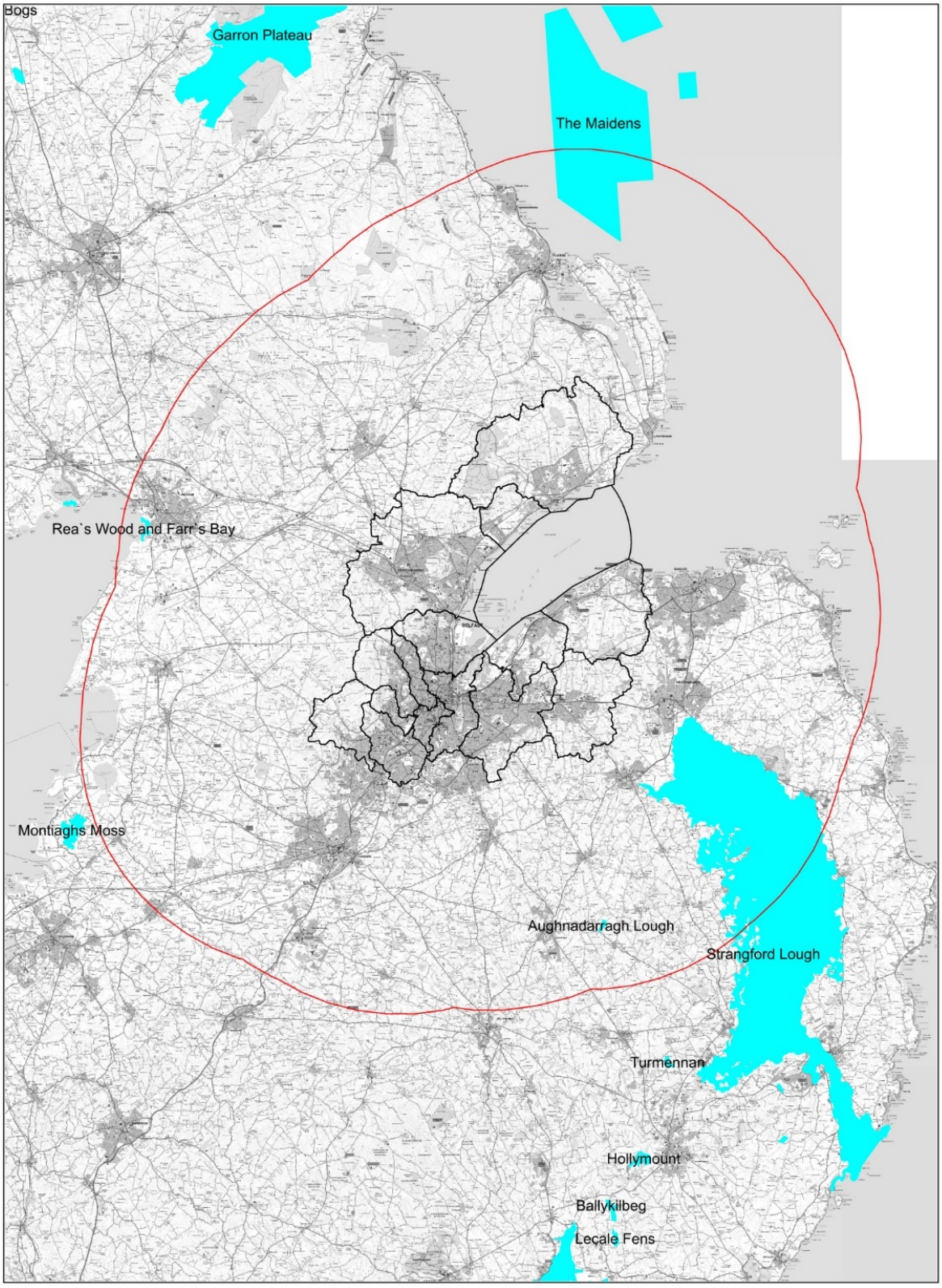

Figure 4.2: SACs within the zone of influence of the Plan

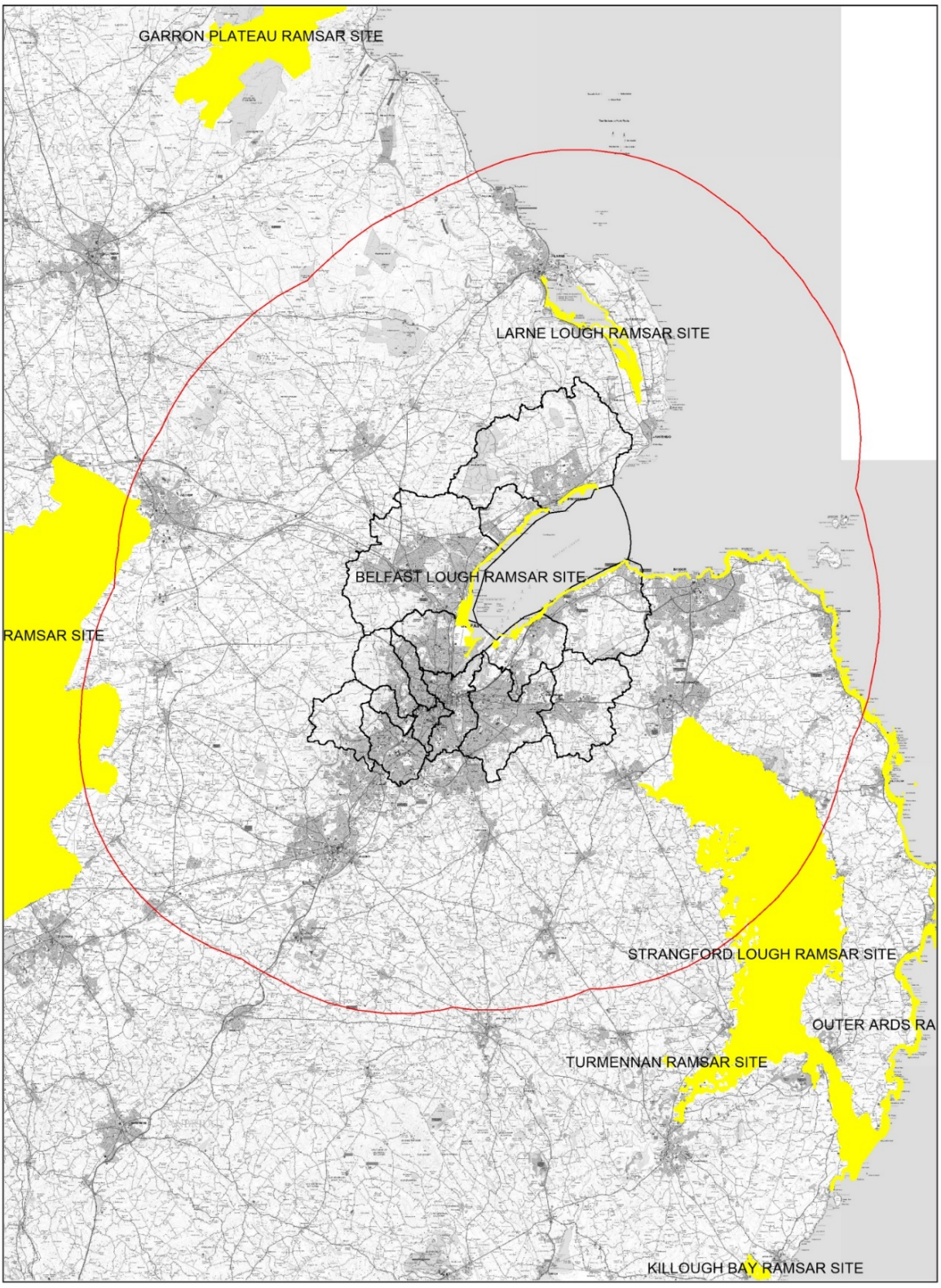

Figure 4.3: Ramsar sites within the zone of influence of the Plan

4.3 Establishing an Impact Pathway

The possibility of significant effects is considered in this report using the source-pathway-receptor model. 'Source' is defined as the individual elements of the proposed works that have the potential to affect the identified ecological receptors. 'Pathway' is defined as the means or route by which a source can affect the ecological receptor. 'Ecological receptor' is defined as the Qualifying Interests for which conservation objectives have been set for the European sites being screened. Each element can exist independently however an effect is created when there is a linkage between the source, pathway and receptor.

Possible direct and indirect effects are discussed under three themes:

- Habitat Loss
- Water quality and habitat deterioration
- Disturbance and Displacement

Table 4.2 summarises those potential projects for which an impact pathway can reasonably be anticipated. Table 4.3 links the potential projects with European sites for which a Likely Significant Effect might arise as a result of the impact pathway.

4.3.1 Habitat Loss

Loss or reduction in habitat area may occur where construction of facilities such as installation of new outfalls or upgrades to WwTW are built within or close to the boundaries of a European site. Hydrological or drainage effects may occur where hard engineering projects are located within wetland habitats.

4.3.2 Water Quality and Habitat Deterioration

Construction of some of the potential Plan projects may lead to pollution of downstream surface waters, bringing about a change in key indicators of conservation value such as decrease in water quality and deterioration of downstream wetland habitats in European sites. Changes in water quality are mainly caused by construction and/or ongoing maintenance and could cause direct or indirect effects. Any of the following would have deleterious effects on fish, plants and invertebrates if allowed to enter watercourses:

- Suspended sediment due to runoff of soil from construction areas
- Raw or uncured concrete and grouts
- Fuels, lubricants and hydraulic fluids for equipment used in construction

4.3.3 Disturbance and Displacement

Construction or operation of some of the potential Plan projects may lead to disturbance to key species of overwintering birds, particularly during construction and maintenance of WwTW and outfalls. In the marine environment, installation of the outfalls could give rise to underwater noise causing disturbance to cetaceans or pinniped species.

Disturbance and displacement effects include:

- Disturbance to key species
- Habitat or species fragmentation
- Reduction in species density

Table 4.1: Conservation Objectives and Qualifying Interests of European sites in the zone of influence of the Plan

Site Code	Site Name	Conservation Objectives & Qualifying Interests
UK0030244	Rea's Wood & Farr's Bay SAC	Conservation Objectives Specific Version To maintain (or restore where appropriate) the following features to favourable condition: Annex I Habitats; • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae*, *Salicion alvae*)
UK0030384	The Maidens SAC	Conservation Objectives Specific Version 2.0 (20/03/2017) To maintain (or restore where appropriate) the following features to favourable condition: Annex I Habitats; • Reefs [1170] • Sandbanks which are slightly covered by sea water all the time [1110] Annex II Species; • Grey seal *Halichoerus grypus* [1364]
UK0030399	North Channel cSAC	Annex II Species; • Harbour Porpoise *Phocoena phocoena* [1351]
UK0016618	Strangford Lough SAC	Conservation Objectives Specific Version 3.0 (20/03/2017) To maintain (or restore where appropriate) the following features to favourable condition: Annex I Habitats; • Mudflats and Sandflats not covered by seawater at low tide [1140] • Coastal Lagoons [1150] • Large shallow inlets and bays [1160] • Reefs [1170] Annex II Species; • Harbour Seal *Phoca vitulina* [1365]
UK9020271	Outer Ards SPA	Conservation Objectives Specific Version 4.0 (01/04/2015) To maintain each feature in favourable condition, as defined by a series of attributes and targets. Special Conservation Interests; • Arctic Tern (*Sterna paradisaea)* • Golden Plover (*Pluvialis apricaria)* • Light-bellied Brent Goose (*Branta bernicla hrota)* • Ringed Plover (*Charadrius hiaticula)* • Turnstone (*Arenaria interpres)* • Habitat Extent
UK9020091	Lough Neagh & Lough Beg SPA	Conservation Objectives Specific Version 4.0 (01/04/2015) To maintain each feature in favourable condition, as defined by a series of attributes and targets. • Common Tern (*Sterna hirundo)* • Great Crested Grebe (*Podiceps cristatus)*

Site Code	Site Name	Conservation Objectives & Qualifying Interests
		• Whooper Swan (*Cygnus cygnus)* • Bewick's Swan (*Cygnus columbianus bewickii)* • Golden Plover (*Pluvialis apricaria)* • Pochard (*Aythya ferina)* • Tufted Duck (*Aythya fuligula)* • Scaup (*Aythya marila)* • Goldeneye (*Buaephala alangula)* • Little Grebe (*Tachybaptus ruficollis)* • Comorant (*Phalacrocorax carbo)* • Greylag Goose (*Anser anser)* • Shelduck (*Tadorna tadorna)* • Wigeon (*Anas penelope)* • Gadwall (*Anas strepera)* • Teal (*Anas creaca)* • Mallard (*Anas platyrhynchos)* • Shoveler (*Anas clypeata)* • Coot (*Fulica atra)* • Lapwing (*Vanellus vanellus)* • Wintering waterfowl assemblage • Habitat Extent
UK9020221	Larne Lough SPA	Conservation Objectives Specific Version 4.0 (01/04/2015) To maintain each feature in favourable condition, as defined by a series of attributes and targets. • Light-bellied Brent Goose (*Branta bernicla hrota)* • Common Tern (*Sterna hirundo)* • Roseate Tern (*Sterna dougallii)* • Sandwich Tern (*Thalasseus sandvicensis*) • Habitat Extent
UK9020101	Belfast Lough SPA	Conservation Objectives Specific Version 3.0 (01/04/2015) To maintain each feature in favourable condition, as defined by a series of attributes and targets. • *Redshank (Tringa totanus)* • Great Crested Grebe (*Podiceps cristatus)* • *Habitat Extent*
UK9020290	Belfast Lough Open Water SPA	Conservation Objectives Specific Version 2.0 (01/04/2015) To maintain each feature in favourable condition, as defined by a series of attributes and targets. • Great Crested Grebe (*Podiceps cristatus)*

Site Code	Site Name	Conservation Objectives & Qualifying Interests
		• *Habitat Extent*
UK9020111	Strangford Lough SPA	Conservation Objectives Specific Version 4.0 (01/04/2015) To maintain each feature in favourable condition, as defined by a series of attributes and targets. • Light-bellied Brent Goose (*Branta bernicla hrota)* • Knot (*Calidris canutus)* • Common Tern (*Sterna hirundo)* • Arctic Tern *(Sterna paradisaea)* • Sandwich Tern (*Sterna sandvicensis)* • Redshank (*Tringa totanus*) • Waterfowl assemblage • Habitat Extent
UK9020320	East Coast (NI) Marine SPA	To maintain each feature in favourable condition; • Great Crested Grebe wintering population • Red-throated Diver • Sandwich Tern • Common Tern • Arctic Tern • Manx Shearwater • Eider Duck
UK12016	Lough Neagh & Lough Beg Ramsar site	Qualifies under the following criteria of the Ramsar Convention: Criterion 1 – by being the largest freshwater lake in the United Kingdom Criterion 2 – supports over 40 rare or local vascular plants which have been recorded for the site since 1970. Criterion 3 – regularly supports substantial numbers of individuals from particular groups of waterfowl which are indicative of wetland values, productivity and diversity. Criterion 4 – supporting an important assemblage of breeding birds including nationally and internationally important numbers of pochard, tufted duck, goldeneye, little grebe, great crested grebe, cormorant, mute swan, greylag goose, shelduck, wigeon, gadwall, teal, mallard, shoveler, scaup, and coot. Criterion 5 – supporting over 20,000 waterfowl in winter. 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. Criterion 7 –supporting a population of Pollan, one of the few locations in Ireland.
UK12002	Belfast Lough Ramsar	Qualifies under Criterion 3c by regularly supporting internationally important numbers of redshank in winter. The site also regularly supports nationally important numbers of shelduck, oystercatcher, purple sandpiper, dunlin, black-tailed godwit, bar-tailed godwit, curlew and turnstone. Belfast Lough as a whole

Site Code	Site Name	Conservation Objectives & Qualifying Interests
		is also used by several other waterfowl species including great crested grebe, scaup, eider, goldeneye and red-breasted merganser.
UK12013	Larne Lough Ramsar	Qualifies under Criterion 3c of the Ramsar Convention by regularly supporting internationally important numbers of Light-bellied Brent geese in winter. The site also qualifies under Criterion 2a by supporting an important assemblage of vulnerable and endangered Irish Red Data Book bird species.
UK12021	Strangford Lough Ramsar	Qualifies under Criterion 1 by virtue of supporting a variety of important wetland features. Areas of fringing saltmarsh and freshwater habitats support a diversity of wetland plant species. Strangford Lough supports one of the most extensive saltmarsh areas in Northern Ireland. The diversity of the marine habitats is internationally renowned. This site also qualifies under Criterion 2a by supporting an important assemblage of vulnerable and endangered wetland plants and animal species. These include a number of marine sponges, marine hydroids, marine mollusc and sea urchins which are either restricted to Strangford Lough in Northern Ireland or, in some cases unknown or very rare elsewhere in the British Isles. The site also qualifies under Criterion 3a by regularly supporting in winter over 20,000 waterfowl. Nationally important species contribute to this overall population of over-wintering waterfowl - bar-tailed godwit, black-tailed godwit, coot, curlew, dunlin, eider, gadwall, great-crested grebe, greylag goose, greenshank, goldeneye, golden plover, lapwing, mallard, mute swan, oystercatcher, pintail, red-breasted merganser, ringed plover, shelduck, shoveler, teal, turnstone and wigeon. It qualifies under Criterion 3c by regularly supporting, in winter, internationally important numbers of Light-bellied Brent Geese, Knot and Redshank. The final qualification under Criterion 3c is that the site regularly supports internationally important breeding populations of both Sandwich Tern and Common Tern along with nationally important numbers of Arctic Tern.
UK12018	Outer Ards Ramsar	Outer Ards Ramsar Site is a Wetland of International Importance because it qualifies under Criterion 6 for regularly supporting 1% of the individuals in a population of one species or subspecies of waterbird in any season

Table 4.2: Potential Projects and Pathways of Effect to European Sites

Project	Can an impact pathway be reasonably established between the potential project and a European site?		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
Blackstaff Catchment - Clowney			
Belfast Hills	No	Yes, in catchment of downstream European sites	No
Boodles Dam	No	Yes, in catchment of downstream European sites	No
Forth River / Springfield Dam	No	Yes, in catchment of downstream European sites	No
Combined Sewerage Improvements	No	Yes, in catchment of downstream European sites	No
Blackstaff Catchment – Farset			
Belfast Hills	No	Yes, in catchment of downstream European sites	No
Ballysillan Playing Fields	No	Yes, in catchment of downstream European sites	No
Combined Sewerage Improvements	No	Yes, in catchment of downstream European sites	No
Blackstaff Catchment – Ballymurphy			
Belfast Hills	No	Yes, in catchment of downstream European sites	No
Whiterock / Falls Park	No	Yes, in catchment of downstream European sites	No
Bog Meadows	No	Yes, in catchment of downstream European sites	No
Combined Sewerage Improvements	No	Yes, in catchment of downstream European sites	No
Blackstaff Catchment – Glenmachan			
Belfast Hills	No	Yes, in catchment of downstream European sites	No
Andersonstown	No	Yes, in catchment of downstream European sites	No
Stockmans / Boucher	No	Yes, in catchment of downstream European sites	No
Finaghy North	No	Yes, in catchment of downstream European sites	No
Finaghy South	No	Yes, in catchment of downstream European sites	No
Blackstaff Catchment – Lower Blackstaff			
Donegal Road	No	Yes, in catchment of downstream European sites	No
Belfast Transport Hub	No	Yes, in catchment of downstream European sites	No
Lisburn Road	No	Yes, in catchment of downstream European sites	No
Glenmachan Phase 2 Project	No	Yes, in catchment of downstream European sites	No
Bankmore Square	No	Yes, in catchment of downstream European sites	No
Blackstaff Catchment - Colin Glen			
Belfast Hills	No	Yes, in catchment of downstream European sites	No

Project	Can an impact pathway be reasonably established between the potential project and a European site?		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
Hannahstown	No	Yes, in catchment of downstream European sites	No
Colin Glen Corridor	No	Yes, in catchment of downstream European sites	No
Connswater & Lagan Embankment Catchment - Lagan			
York Street Interchange	No	Yes, in catchment of downstream European sites	No
Belfast Tidal Scheme	No	Yes, in catchment of downstream European sites	No
Ravenhill Flood Alleviation Scheme	No	Yes, in catchment of downstream European sites	No
Combined Sewerage Improvements	No	Yes, in catchment of downstream European sites	No
Connswater & Lagan Embankment Catchment - Connswater			
Orangefield Stream Corridor	No	Yes, in catchment of downstream European sites	No
Knock River Corridor	No	Yes, in catchment of downstream European sites	No
Connswater River Corridor	No	Yes, in catchment of downstream European sites	No
Loop River Corridor	No	Yes, in catchment of downstream European sites	No
Castlereagh and Craigantlet Hills	No	Yes, in catchment of downstream European sites	No
Connswater & Lagan Embankment Catchment – Holywood			
Golf Course Stream Corridor	No	Yes, in catchment of downstream European sites	No
Holywood Hills	No	Yes, in catchment of downstream European sites	No
Tillysburn Stream Corridor	No	Yes, in catchment of downstream European sites	No
Combined Sewerage Improvements	No	Yes, in catchment of downstream European sites	No
Connswater & Lagan Embankment Catchment – Seahill			
Craigantlet and Holywood Hills	No	Yes, in catchment of downstream European sites	No
Connswater & Lagan Embankment Catchment - Dundonald			
Castlereagh and Craigantlet Hills	No	Yes, in catchment of downstream European sites	No
Dundonald Area	No	Yes, in catchment of downstream European sites	No
Combined Sewerage Improvements	No	Yes, in catchment of downstream European sites	No
North Foreshore Catchment - Fortwilliam			
Cavehill Country Park / Belfast Castle / Belfast Zoo	No	Yes, in catchment of downstream European sites	No
Fortwilliam Stream Corridor	No	Yes, in catchment of downstream European sites	No
Premier Drive Stream River Corridor	No	Yes, in catchment of downstream European sites	No
Carr's Glen River Corridor	No	Yes, in catchment of downstream European sites	No

Project	Can an impact pathway be reasonably established between the potential project and a European site?		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
Combined Sewerage Improvements	No	Yes, in catchment of downstream European sites	No
North Foreshore Catchment – Whitehouse / Mallusk			
Cavehill Country Park / Belfast Castle / Belfast Zoo / Carnmoney Hill / Collinward / Squires Hill / Mossley	No	Yes, in catchment of downstream European sites	No
Glengormley Area	No	Yes, in catchment of downstream European sites	No
Newtownabbey Area	No	Yes, in catchment of downstream European sites	No
Combined Sewerage Improvements	No	Yes, in catchment of downstream European sites	No
North Foreshore Catchment – Greenisland			
Knockagh / Trooperslane	No	Yes, in catchment of downstream European sites	No
Greenisland	No	Yes, in catchment of downstream European sites	No
Combined Sewerage Improvements	No	Yes, in catchment of downstream European sites	No
North Foreshore Catchment - Carrickfergus			
Woodburn to Lough Moune	No	Yes, in catchment of downstream European sites	No
Carrickfergus	No	Yes, in catchment of downstream European sites	No
Combined Sewerage Improvements	No	Yes, in catchment of downstream European sites	No
Belfast Lough – Belfast WwTW			
Increase treatment capacity	No	Yes, in catchment of downstream European sites	Yes, in proximity to European sites
Additional treatment stage	No	No	No
Installation of new outfalls	Yes, within European sites	Yes, within European sites	Yes, within European sites
Belfast Lough – Whitehouse WwTW			
Sub-catchment transfers	No	No	No
Installation of new outfalls	Yes, within European sites	Yes, within European sites	Yes, within European sites
Belfast Lough – Greenisland WwTW			
Increase capacity	No	No	No
Transfer of sewage loads	No	No	No
Additional treatment stage	No	No	No

Project	Can an impact pathway be reasonably established between the potential project and a European site?		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
Installation of new outfalls	Yes, within European sites	Yes, within European sites	Yes, within European sites
Belfast Lough – Carrickfergus WwTW			
Additional treatment stage	No	No	No
Installation of new outfalls	Yes, within European sites	Yes, within European sites	Yes, within European sites
Belfast Lough – Kinnegar WwTW			
Major upgrade	No	Yes, in catchment of downstream European sites	Yes, proximity to European sites
Additional treatment stage	No	No	No
Increased storage provision	No	No	No
Belfast Lough – Seahill WwTW			
Routine maintenance	No	No	No

Table 4.3: European sites that could have LSEs as a result of the implementation of the Plan

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
Blackstaff Catchment - Clowney			
Belfast Hills		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Boodles Dam		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Forth River / Springfield Dam		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Combined Sewerage Improvements		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Blackstaff Catchment – Farset			

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
Belfast Hills		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Ballysillan Playing Fields		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Combined Sewerage Improvements		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Blackstaff Catchment – Ballymurphy			
Belfast Hills		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Whiterock / Falls Park		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA	

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
		Outer Ards SPA	
		Outer Ards Ramsar Site	
		North Channel SAC	
		East Coast (NI) Marine SPA	
Bog Meadows		Belfast Lough Ramsar Site	
		Belfast Lough SPA	
		Belfast Lough Open Water SPA	
		Outer Ards SPA	
		Outer Ards Ramsar Site	
		North Channel SAC	
		East Coast (NI) Marine SPA	
Combined Sewerage Improvements		Belfast Lough Ramsar Site	
		Belfast Lough SPA	
		Belfast Lough Open Water SPA	
		Outer Ards SPA	
		Outer Ards Ramsar Site	
		North Channel SAC	
		East Coast (NI) Marine SPA	
Blackstaff Catchment – Glenmachan			
Belfast Hills		Belfast Lough Ramsar Site	
		Belfast Lough SPA	
		Belfast Lough Open Water SPA	
		Outer Ards SPA	
		Outer Ards Ramsar Site	
		North Channel SAC	
		East Coast (NI) Marine SPA	
Andersonstown		Belfast Lough Ramsar Site	
		Belfast Lough SPA	
		Belfast Lough Open Water SPA	
		Outer Ards SPA	
		Outer Ards Ramsar Site	
		North Channel SAC	

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
		East Coast (NI) Marine SPA	
Stockmans / Boucher		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Finaghy North		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Finaghy South		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Blackstaff Catchment – Lower Blackstaff			
Donegal Road		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Belfast Transport Hub		Belfast Lough Ramsar Site Belfast Lough SPA	

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
		Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Lisburn Road		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Glenmachan Phase 2 Project		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Bankmore Square		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Blackstaff Catchment - Colin Glen			
Belfast Hills		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site	

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
		North Channel SAC	
		East Coast (NI) Marine SPA	
Hannahstown		Belfast Lough Ramsar Site	
		Belfast Lough SPA	
		Belfast Lough Open Water SPA	
		Outer Ards SPA	
		Outer Ards Ramsar Site	
		North Channel SAC	
		East Coast (NI) Marine SPA	
Colin Glen Corridor		Belfast Lough Ramsar Site	
		Belfast Lough SPA	
		Belfast Lough Open Water SPA	
		Outer Ards SPA	
		Outer Ards Ramsar Site	
		North Channel SAC	
		East Coast (NI) Marine SPA	
Connswater & Lagan Embankment Catchment - Lagan			
York Street Interchange		Belfast Lough Ramsar Site	
		Belfast Lough SPA	
		Belfast Lough Open Water SPA	
		Outer Ards SPA	
		Outer Ards Ramsar Site	
		North Channel SAC	
		East Coast (NI) Marine SPA	
Belfast Tidal Scheme		Belfast Lough Ramsar Site	
		Belfast Lough SPA	
		Belfast Lough Open Water SPA	
		Outer Ards SPA	
		Outer Ards Ramsar Site	
		North Channel SAC	
		East Coast (NI) Marine SPA	
Ravenhill Flood Alleviation Scheme		Belfast Lough Ramsar Site	

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
		Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC	
Combined Sewer Improvements		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC	
Connswater & Lagan Embankment Catchment - Connswater			
Orangefield Stream Corridor		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Knock River Corridor		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Connswater River Corridor		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC	

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
		East Coast (NI) Marine SPA	
Loop River Corridor		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Castlereagh and Craigantlet Hills		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Connswater & Lagan Embankment Catchment – Holywood			
Golf Course Stream Corridor		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Holywood Hills		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Tillysburn Stream Corridor		Belfast Lough Ramsar Site Belfast Lough SPA	

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
		Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Combined Sewerage Improvements		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Connswater & Lagan Embankment Catchment – Seahill			
Craigantlet and Holywood Hills		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Connswater & Lagan Embankment Catchment - Dundonald			
Castlereagh and Craigantlet Hills		Strangford Lough Ramsar Site Strangford Lough SPA Strangford Lough SAC	
Dundonald Area		Strangford Lough Ramsar Site Strangford Lough SPA Strangford Lough SAC	
Combined Sewerage Improvements		Strangford Lough Ramsar Site Strangford Lough SPA Strangford Lough SAC	
North Foreshore Catchment - Fortwilliam			

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
Cavehill Country Park / Belfast Castle / Belfast Zoo		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Fortwilliam Stream Corridor		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Premier Drive Stream River Corridor		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Carr's Glen River Corridor		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Combined Sewerage Improvements		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA	

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
		Outer Ards Ramsar Site	
		North Channel SAC	
		East Coast (NI) Marine SPA	
North Foreshore Catchment – Whitehouse / Mallusk			
Cavehill Country Park / Belfast Castle / Belfast Zoo / Carnmoney Hill / Collinward / Squires Hill / Mossley		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Glengormley Area		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Newtownabbey Area		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Combined Sewerage Improvements		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
North Foreshore Catchment - Greenisland			
Knockagh / Trooperslane		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Greenisland		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Combined Sewerage Improvements		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
North Foreshore Catchment - Carrickfergus			
Woodburn to Lough Moune		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Carrickfergus		Belfast Lough Ramsar Site Belfast Lough SPA	

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
		Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Combined Sewerage Improvements		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Belfast Lough – Belfast WwTW			
Increase treatment capacity			
Additional treatment stage		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	
Installation of new outfalls	Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA	Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA
Belfast Lough – Whitehouse WwTW			
Sub-catchment transfers			
Installation of new outfalls	Belfast Lough Ramsar Site Belfast Lough SPA	Belfast Lough Ramsar Site Belfast Lough SPA	Belfast Lough Ramsar Site

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
	Belfast Lough Open Water SPA	Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	Belfast Lough SPA Belfast Lough Open Water SPA
Belfast Lough – Greenisland WwTW			
Increase capacity			
Transfer of sewage loads			
Additional treatment stage			
Installation of new outfalls	Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA East Coast (NI) Marine SPA	Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA East Coast (NI) Marine SPA
Belfast Lough – Carrickfergus WwTW			
Additional treatment stage			
Installation of new outfalls	Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA East Coast (NI) Marine SPA	Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC East Coast (NI) Marine SPA	Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA East Coast (NI) Marine SPA
Belfast Lough – Kinnegar WwTW			
Major upgrade		Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA Outer Ards SPA Outer Ards Ramsar Site North Channel SAC	Belfast Lough Ramsar Site Belfast Lough SPA Belfast Lough Open Water SPA East Coast (NI) Marine SPA

Project	European sites that could experience a likely significant effect		
	Habitat Loss	*Water quality and habitat deterioration*	*Disturbance and Displacement*
		East Coast (NI) Marine SPA	
Additional treatment stage			
Increased storage provision			
Belfast Lough – Seahill WwTW			
Routine maintenance			

4.4 Summary of Screening Stage

The screening exercise was completed in compliance with the relevant European Commission and national guidelines to determine whether or not adopting the draft Plan is likely to have a significant effect on any European site.

From the findings of the screening exercise, the possibility of Likely Significant Effects upon European site considered cannot be discounted for a number of potential projects, in light of their Qualifying Interests and Conservation Objectives. This conclusion was reached without having to consider the Plan in combination with any other plans or projects.

As outlined in Table 4.1, seventy one potential projects that could come forward under the Plan during the plan period were screened for appropriate assessment, or subjected to a test of likely significance. These potential projects are outlined in Section 3.7. Of these, the possibility of likely significant effects could be discounted for nine potential projects. For sixty two potential projects that could come forward under the Plan, likely significant effects could not be discounted as outlined in Table 4.3.

- The possibility of likely significant **Habitat Loss** effects cannot be discounted for three European sites without further evaluation and analysis, or the application of measures intended to avoid or reduce the harmful effects of the potential projects on European sites.
- The possibility of likely significant **Water Quality and Habitat Deterioration** effects cannot be discounted for eight European sites without further evaluation and analysis, or the application of measures intended to avoid or reduce the harmful effects of the potential projects on European sites.
- The possibility of likely significant **Disturbance and Displacement** effects cannot be discounted for two European sites without further evaluation and analysis, or the application of measures intended to avoid or reduce the harmful effects of the potential projects on European sites.

Having regard to the methodology employed and the findings of the screening stage exercise, it is concluded that an appropriate assessment of the implications of the Plan on European sites is required, in view of their conservation objectives and in combination with any other relevant plans or projects.

5 STAGE 2 APPRAISAL FOR APPROPRIATE ASSESSMENT

Appropriate Assessment is the process which identifies the impact of a plan or project, either alone or in combination with other projects or plans, on the integrity of a European site with respect to the conservation objectives of the site and to its structure and function; and considers whether it can be concluded that there will be no adverse effects on the integrity of the European site (EC, 2001). If the information provided suggests that adverse effects are likely then it is necessary to devise mitigation measures to avoid, where possible, adverse effects.

5.1 Potential Adverse Effects

Based on the potential projects as described in Section 3.4, potential adverse effects have been identified (where likely significant effects could not be discounted) on a range of European sites under three impact themes as set out in Table 4.3.

Possible direct and indirect effects are discussed under three themes:

- Habitat Loss
- Water quality and habitat deterioration
- Disturbance and Displacement

5.1.1 Habitat Loss

5.1.1.1 Direct Habitat Loss

Installation of outfalls will have overall a very small physical footprint in terms of actual habitat removal, however, habitat loss in a European site may occur in an area containing qualifying Annex I habitat types. This is likely to undermine the sites conservation objective to maintain the habitat area of the qualifying habitat type.

The vast majority of the projects and works proposed will not result in direct habitat loss to any European site.

5.1.1.2 Habitat Damage and Disturbance

Movements of machinery and personnel during construction can cause compaction and damage leading to the degradation of habitat quality. Placement of excavated material directly on the habitat surface can also lead to damage, including during temporary storage and also when the excavated deeper soil and surface vegetated material is lifted for replacement in excavations.

Marine, wetland and peatland habitats depend on specific hydrological conditions and are particularly vulnerable to disturbance. For example, peat soils can be locally destabilised construction of projects.

5.1.1.3 Spread of Invasive Species

Invasive species can have a major negative impact on native biodiversity. When non-native species become invasive, they can transform ecosystems and threaten native and endangered species. The most prominent negative effect of invasive species, in terms of ecology, is competition with native biota and alteration of habitats.

Habitat removal, in particular along riparian corridors, can encourage the spread of invasive species by the creation of edge effects, and the direct introduction of non-native plant species by transfer of vector material on construction vehicles or equipment or washed downstream.

As numerous projects proposed within the Plan involve green/blue and hard engineering along watercourses, the potential to spread invasive species which may be present is very high. This is especially true for species such as Himalayan balsam (*Impatiens glandulifera*) and Japanese knotweed (*Fallopia japonica*) which are easily spread if disturbed.

The spread of invasive species within a European site may occur if transferred there at construction stage or if vector material is washed downstream. This is likely to undermine the sites conservation objective to keep invasive or negative indicator species at a very low level.

5.1.2 Water Quality and Habitat Deterioration

Given the nature of the Plan and the projects proposed within it, it is unsurprising that all of the projects link, in some way, to European sites downstream.

5.1.2.1 Sedimentation

Excavation works related to the installation of both blue/green and hard engineering projects, and the associated storage of excavated spoil material, can pose a significant risk for sediment release into surface water drainage channels, streams and rivers. Ground damage from construction vehicles and machinery can also cause rutting and increased erosion of soils. Access tracks used during construction may affect surface run-off patterns, creating alternative flow paths, promoting erosion and localised flooding. Hydrological connectivity between a construction site and a downstream European site is a key factor which affects the risk of erosion and subsequent delivery of sediment to a designated wetland site.

Some of the key concerns with elevated levels of sediment include the impact on spawning fish, through issues including the sedimentation of spawning gravels, clogging of fish gills and reduction in dissolved oxygen (Acornley & Sear, 1999; Sear *et al*., 2008; Collins *et al.,* 2011).

5.1.2.2 Hydrocarbons

Hydrocarbons are products made from crude oil such as machinery fuels and lubricants. Leaks of these contaminants into watercourses can have serious impacts on aquatic species, particularly fish. Oil spillage and leaks are a common source of hydrocarbon contamination of groundwater and surface water (Manoli and Samara, 1999). A pollution event can occur as a result of poorly maintained vehicles and machinery including portable generators and accidental spillage during re-fuelling of same.

When hydrocarbons are released into the environment as a result of accidental spillages, there may be some fractions that float on top of the water, forming a thin surface film. Other heavier fractions may sink through the water column and accumulate in the sediment at the bottom of the waterbody, which may affect bottom feeding fish and organisms.

The release of hydrocarbons into the aquatic environment can result in chronic impacts upon water dependent species downstream in a European site. The potential impacts include disruption to neurosensors, abnormal behaviour and development issues as well as direct impacts upon fertility. Oil spills can reduce the capacity of a water body to exchange oxygen as well as result in oil coating the gills

of aquatic species causing lesions on respiratory surfaces. This can result in significant respiratory difficulties for aquatic organisms. Benthic invertebrates can be adversely affected if fractions of hydrocarbons settle and accumulate in sediments. This can result in the mortality of populations and prevent future colonisation (Bhattacharyya *et al.,* 2003).

5.1.3 Disturbance and Displacement

The main potential impact from the proposed projects is disturbance and displacement of overwintering birds as a result of the installation of the new outfalls at Belfast, Whitehouse, Greenisland and Carrickfergus.

Some bird species may be temporarily displaced from suitable habitat by the presence of machinery and personnel during construction. Indirect loss of wintering habitats for bird species of conservation concern in Ireland (Colhoun and Cummins, 2013) may occur if they do not use traditional feeding or roosting sites during installation of a new outfall.

Construction of new outfalls may have some effects in limiting the use of areas close to outfalls by foraging or roosting birds. No studies have been found that suggest wide scale displacement effects that might affect any species at a population scale. Nevertheless, it is recommended that consideration is given to the timing of works and the potential impacts in areas which are important for overwintering birds, in particular species listed as Conservation Interest for the European Sites.

5.1.4 In-combination Effects

5.1.4.1 Living with Water in Belfast (Plan)

Article 6(3) of the Habitats Directive requires that in-combination effects with other plans or projects are considered. Some projects may be brought forward within the same geographical location and thus have more potential for in-combination effects. This section looks at the projects that may be developed within the Plan period, within the same vicinity, therefore giving the potential for in-combination effects.

There is potential for in-combination disturbance and displacement effects to occur in the Belfast Lough European sites between the Belfast WwTW, Carrickfergus WwTW, Greenisland WwTW and Whitehouse WwTW projects if any of them were to be progressed and constructed at the same time. Refer to Section 5.1.3 for a discussion on disturbance and displacement effects.

5.1.4.2 River Basin and Flood Risk Management Plans

Table 5.1 lists River Basin and Flood Risk Management Plans that have been considered for in-combination effects with implementation of the Plan. Where these Plans have been subject to a Habitats Regulations Assessment, the outcome of this assessment has been summarised in the table.

None of the River Basin or Flood Risk Management Plans considered are predicted to result in adverse effects on the respective European sites considered in each of the assessments, in many cases with the application of plan level mitigation strategies and the safeguarding regime of lower level screening for appropriate assessment or appropriate assessment as the case may be at a project level prior to projects being consented.

When the implementation of these plans are considered in combination with Plan, and taking into consideration the measures intended to avoid or reduce the harmful effects of the plan on European sites

proposed both in the Plan and in each of these respective plans, adverse effects on the integrity of the European sites considered in this assessment are not predicted.

Table 5.1: River Basin Management Plans considered for in-combination effects

Plan / Programme	High Level Description	Key Objectives and Policies	Effects on European sites
Draft 2nd River Basin Management Plan 2018-2021 (2017) (Ireland)	Aims to set out river basin management planning in Ireland. This leads on from the 1st Cycle River Basin Management Plans: 2009-2014.	Details the most recent water quality results and the outcomes of the risk characterisation process. Informs on the significant pressures for at-risk water bodies. Sets out the environmental objectives of the WFD and the priorities. Outlines the key measures aimed at meeting our environmental objectives. Outlines measures to be taken to improve stakeholder engagement.	A NIS was prepared for the 2nd cycle RBMP, which concludes that actions arising out of the RBMP shall be required to include measures preventing pollution or other environmental effects likely to adversely affect the integrity of European Sites, and where applicable projects arising from the implementation of the RBMP will themselves be subject to screening for AA and where relevant, AA.
Neagh Bann River Basin Management Plan	Describes existing condition of waters in the international River Basin District, the objectives for improving their condition and the measures to be used to deliver these improvements. • Establish a framework for the protection of water bodies at River Basin District (RBD) level • Preserve, prevent the deterioration of water status and where necessary improve and maintain "good status" of water bodies in that RBD • Promote sustainable water usage	Aims to improve water quality and quantity within inland surface waters (rivers and lakes), transitional waters coastal waters and groundwater and meet the environmental objectives outlined in Article 4 of the Water Framework Directive Identifies and manages water bodies in the RBD Establishes a programme of measures for monitoring and improving water quality in the RBD Involves the public through consultations RBMPs are prepared and reviewed every six years. The first RBMPs covered the period 2010 to 2015.	The plan was subject to HRA prior to its adoption. The outcome of this assessment found that the plan was unlikely to give rise to any significant effects upon Natura 2000 sites at this stage.
North Eastern River Basin Management Plan	Describes existing condition of waters in the River Basin District, the objectives for improving their condition and the measures to be used to deliver these improvements. • Establish a framework for the protection of water	Aims to improve water quality and quantity within inland surface waters (rivers and lakes), transitional waters coastal waters and groundwater and meet the environmental objectives outlined in Article 4 of the Water Framework Directive	The plan was subject to HRA prior to its adoption. The outcome of this assessment found that the plan was unlikely to give rise to any significant effects upon Natura 2000 sites at this stage.

Plan / Programme	High Level Description	Key Objectives and Policies	Effects on European sites
	bodies at River Basin District (RBD) level • Preserve, prevent the deterioration of water status and where necessary improve and maintain "good status" of water bodies in that RBD • Promote sustainable water usage	Identifies and manages water bodies in the RBD Establishes a programme of measures for monitoring and improving water quality in the RBD Involves the public through consultations RBMPs are prepared and reviewed every six years. The first RBMPs covered the period 2010 to 2015.	
Northern Ireland Flood Risk Management Plans	Flood Risk Management Plans (FRMPs) are a key requirement of the Floods Directive (Directive 2007/60/EC on the assessment and management of flood risks) and are aimed at reducing the potential adverse consequences of significant floods on human health, economic activity, cultural heritage and the environment. The FRMPs are coordinated at the River Basin District level to align with the Water Framework Directive's River Basin Management Plans and focus on managing the flood risk in the twenty Significant Flood Risk Areas (SFRAs). FRMPs have been prepared for the North Western, North Eastern and Neagh-Bann River Basin Management areas. Note these FRMPs are now under review to become the NI FRMP, which will aim to manage flood risk in the 12 now labelled Areas of Potentially Significant Flood Risk (APSFR).	The FRMPs (and new FRMP) address all aspects of flood risk management, focusing on prevention, protection and preparedness and take into account the characteristics of the particular river catchments in which the SFRAs (now APSFRs) are located. Key elements contained within the FRMPs include: A description of the objectives set for the management of flood risks. Identification of structural and non-structural measures for achieving those objectives within each SFRA (now APSFR) and their priority. A summary of the information and consultation measures taken in connection with the preparation of the FRMPs and a description of the coordination process with the Republic of Ireland's Office of Public Works in relation to our shared International River Basin Districts.	The approaches proposed within the Plans are grouped under three main measures: • Prevention • Preparedness • Protection The HRA of FRMPs found that approaches proposed under Prevention result in no potential significant impacts to the integrity of any European sites. Approaches proposed under Preparedness result in no potential significant impacts to the integrity of any European sites. Approaches proposed under Protection include the possibility of structural approaches, and may result in potentially significant impacts upon European sites, but that at a project level, structural approaches will require consent including project level HRA and targeted mitigation as necessary to ensure no adverse effect on integrity.
River Basin – Local Management Area Action Plans	Local Management Area Action Plans implement the WFD River Basin Management Plans within the	Local Management Areas (LMAs) were derived from surface water bodies. They were created to manage and	The various specific LMA Action Plans have not been subject to HRA.

Plan / Programme	High Level Description	Key Objectives and Policies	Effects on European sites
	2010 to 2015 planning cycle. The action plans detail the local measures identified to improve the water environment. Action Plans are available for the following Management Areas: • Lagan • Strangford • Belfast Lough • Larne Lough	improve water quality at a local level through local involvement.	

5.1.4.3 Land Use Area Plans

Table 5.2 lists Land Use Area Plans that have been considered for in-combination effects with implementation of the SDIP. Where these Plans have been subject to a Habitats Regulations Assessment, the outcome of this assessment has been summarised in the table.

None of the Land Use Area Plans considered are predicted to result in adverse effects on the respective European sites considered in each of the assessments, in many cases with the application of plan level mitigation strategies and the safeguarding regime of lower level screening for appropriate assessment or appropriate assessment as the case may be at a project level prior to projects being consented.

It is noted that a number of draft Local Development Plans have been published by local authorities, these plans, given their draft state, do not include for all the specifics in respect of allocations or zoning of sites for development which are likely to come forward. As such the extent to which the potential for significant effects arising upon European sites can be accurately assessed is largely limited to the draft strategy and policies. Where such plans are not available in draft form no assessment of the potential for in-combination effects can be undertaken. It is further noted that where plans are unadopted and not yet subject to inspection the potential for such effects to arise is not yet certain.

When the implementation of these plans are considered in combination with SDIP, and taking into consideration the measures intended to avoid or reduce the harmful effects of the plan on European sites proposed both in the SDIP and in each of these respective plans, adverse effects on the integrity of the European sites considered in this assessment are not predicted.

Table 5.2: Land Use Area Plans considered for in-combination effects

Plan / Programme	High Level Description	Key Objectives and Policies	Effects on European sites
Regional Development Strategy for Northern Ireland 2025	A Strategy to guide the future development of Northern Ireland to 2025. The RDS will be material to decisions on planning applications and appeals.	The 8 aims of the RDS are: • Support strong, sustainable growth for the benefit of all parts of Northern Ireland • Strengthen Belfast as the regional economic driver and Londonderry as the principal city of the North West • Support our towns, villages and rural communities to maximise their potential • Promote development which improves the health and well-being of communities • Improve connectivity to enhance the movement of people, goods, energy and information between places • Protect and enhance the environment • Take actions to reduce our carbon footprint and facilitate adaptation to climate change • Strengthen links between north and south, east and west, with Europe and the rest of the world	The Plan was not subject to HRA.
The Regional Development Strategy 2035 – Shaping Our Future	The strategy aims to take account of the economic ambitions and needs of the Region, and put in place spatial planning, transport and housing priorities that will support and enable the aspirations of the Region to be met.		The Strategy was subject to HRA. This assessment concluded that subject to the strategy appropriately taking account of the predicted potential effects upon European designated sites, the strategy would have little potential to give rise to any significant adverse effects on Natura 2000 sites.

Plan / Programme	High Level Description	Key Objectives and Policies	Effects on European sites
A Planning Strategy for Rural Northern Ireland	This document considers the inter-relationships between town and country and seeks to present a clear vision for the future development of the rural area.	Strategic Objectives: • to protect and enhance the natural and man-made environment; • to meet the future development needs of the rural community; • to facilitate regeneration of the rural economy; • to accommodate change, while maintaining the character of the countryside; • to revitalise rural towns and villages in order to make them more attractive places in which to live and work; and • to promote a high quality of design new development	The Plan was not subject to HRA, however European sites are broadly addressed at Regional Policy CON 1.
Ards and Down Area Plan 2015	The purpose of the Plan is to inform the general public, statutory authorities, developers and other interested bodies of the policy framework and land use proposals that will be used to guide development decisions within Ards Borough and Down District over the Plan period 2000 -2015.	Identifies issues of relevance to the area and outlines principles for future development of area	The Plan was subject to HRA, undertaken by NIEA. While a number of Natura 2000 sites were identified as requiring AA, it was concluded that the Plan would not result in any significant adverse effects upon any European designated sites.
Belfast Local Development Plan 2035 – Draft Plan Strategy	The purpose of the Plan is to inform the general public, statutory authorities, developers and other interested bodies of the policy framework and land use proposals that will be used to guide development decisions within the Plan area for the period up to 2035. It is noted that the draft form of this plan does not include	Identifies issues of relevance to the area and outlines principles for future development of area.	The draft plan was subject to HRA by SES on behalf of the Belfast City Council. This assessment concluded that significant uncertainty remains as to the potential for significant effects, given the plans draft status, and as such any further detail to be included within the finalised plan, will be further addressed within the updated HRA

Plan / Programme	High Level Description	Key Objectives and Policies	Effects on European sites
	for all specific allocations likely to come forward.		and will ensure that no significant effects arise upon any European sites.
Belfast Metropolitan Area Plan 2015	The purpose of the Plan is to inform the general public, statutory authorities' developers and other interested bodies of the policy framework and land use proposals that will be used to guide development decisions within the Belfast Metropolitan Area over the Plan period. The Plan will help to give effect to the Regional Development Strategy. The Plan covers Belfast City, Lisburn City, Carrickfergus Borough, Castlereagh Borough, Newtownabbey Borough and North Down Borough Councils.	Identifies issues of relevance to the area and outlines principles for future development of area.	The Plan was subject to HRA, undertaken by the Department for the Environment Northern Ireland. While a number of Natura 2000 sites were deemed to require Appropriate Assessment, it was concluded that the Plan would not result in any significant adverse effect upon any European designated sites.

6 AVOIDANCE AND MITIGATION

The section sets out the strategic approach to mitigation to address potential adverse effects on the integrity of European sites outlined in Table 4.3. The mitigation hierarchy (Table 6.1) highlights the need to focus on the avoidance and minimising aspects of mitigation.

Table 6.1: Mitigation Hierarchy

Avoidance	Seek options that avoid harm to ecological features (for example, by locating project on an alternative site).
Mitigation	Adverse effects should be avoided or minimised through mitigation measures, either through the design of the project or subsequent measures that can be guaranteed – for example, through a condition or planning obligation
Compensation	Where there are significant residual adverse ecological effects despite the mitigation proposed, these should be offset by appropriate compensatory measures.
Enhancement	Seek to provide net benefits for biodiversity over and above requirements for avoidance, mitigation or compensation

Where a likely significant adverse effect has been identified (or cannot be discounted) during Plan level HRA, mitigation measures can be implemented to address the adverse effect. This section outlines the mitigation measures proposed.

6.1 Avoidance

Avoidance measures will be carried out at the earliest opportunity at the project stage. DfI has adopted the mitigation hierarchy (Table 6.1) in their approach to the development of infrastructure in order to avoid impacts on the integrity of European sites within the Natura 2000 network.

In developing future projects DfI will seek to find options that avoid impacts on European sites and infrastructure that is developed through the implementation of the Plan will be subject to Constraints Studies. Through these processes, significant direct and indirect effects on European sites can be identified and avoided where possible. Any future projects developed as a result of the draft Plan will be subject to examination of constraints and project level AA.

Screening for and/or appropriate assessment will be carried out on all relevant projects and where impacts are identified that may prevent achieving conservation objectives for the features of any given European site, mitigation measures will be proposed to ensure that does not happen. This will be informed by detailed ecological survey and assessment, so that sensitive receptors are avoided. Avoidance of European sites, including SACs and SPAs, will always be a key consideration in future projects.

Notwithstanding the dynamic nature of the plan, all projects that are developed through the plan will be subject to appropriate assessment at a project level where this is required.

Assessment of impacts for a project where the design details are known and where the location of infrastructure has been confirmed through constraints studies and route selection process will allow for accurate prediction of effects on European sites, their protected species and habitats.

6.2 Mitigation

Appropriate Assessment of individual projects will include timely consultation with relevant planning and environmental authorities, the evaluation of up to date mapping, designations and development plans, policies, and a consideration of any relevant sectoral guidance.

Where avoidance is not possible adverse effects on site integrity will be avoided through project specific mitigation measures, either through the design of the project or subsequent measures that can be guaranteed – for example, through a condition or planning obligation. Mitigation measures shall aim to ensure that no adverse effect on the integrity of a European site.

Where impacts are identified at project level, appropriate mitigation will be developed to ensure the resulting impacts of the construction and operation of a project do not adversely affect the integrity of a European site in view of the site's conservation objectives.

The following measures will be incorporated into future project specific HRAs and EcIAs, where appropriate. This list of mitigation measures is not designed to be exhaustive and shall be supplemented by project and site-specific mitigation developed by project level Appropriate Assessment and Environmental Impact Assessment.

6.2.1 Habitat Loss

Direct habitat loss within European sites will be avoided for new-build infrastructure and avoided where reasonably practicable for refurbishment of infrastructure within European sites.

Where construction occurs within a designated site, sensitive construction techniques will be used to minimise the potential impact, on such as the use of bog mats for machinery access.

Ecological monitoring will be undertaken at sensitive sites during construction as appropriate. Such sites will be identified on a case by case basis.

Restricted working areas will be imposed to ensure minimal disturbance to sensitive habitats.

Re-distribute vegetation and soil stripped from the construction areas to provide a seedbank and do not re-seed with Perennial Ryegrass.

Land within the working area will be reinstated to its former condition or as near as is reasonably practicable.

6.2.2 Water Quality

In all cases where works have the potential to impact on protected surface water or riparian habitats within or upstream of a European site, measures must be put in place to manage and minimise the risk of escape of elevated levels of suspended solids or polluting substances into watercourses.

Develop, implement and enforce an Erosion and Sedimentation Control Plan (ESCP) where risks are identified to downstream European sites.

The ESCP must include sufficient pollution control measures to prevent run-off, silt, hydrocarbons or any other harmful substances or substrates from entering any surrounding surface waters.

Storage facilities would contain and prevent the release of fuels, oils and chemicals associated with plant, refuelling and construction equipment into the environment.

All protective coatings used would be suitable for use in the aquatic environment and used in accordance with best environmental practice.

Develop, implement and enforce a Water Pollution Prevention and Environmental Emergency Response Plan for all work sites. This should include good site practices as described in NIEA Pollution Prevention Guidance (DAERA, 2016) and applicable CIRIA Technical Guidance (CIRIA, 2001; CIRIA, 2006) including methods and procedures to deal with any spills and the timely reporting of incidents.

- Silty water will be collected in settlement ponds prior to discharge to watercourses.
- All works involving open cut crossings shall be carried out during the period May to September to avoid interruption of salmonid spawning runs, spawning, incubation of eggs and the early developmental stages.
- Where appropriate and practical, bank vegetation and bed material which has been removed shall be stored to facilitate its replacement when channel works in the vicinity of a watercourse have been completed.
- Works in the vicinity of a watercourse shall be carried out with reference to a water quality protection or surface water management plan for each site which shall ensure that:
    - All necessary measures shall be taken to minimise the generation and release of sediments into all watercourses.
    - Levels of suspended solids in watercourses shall be monitored during the works.
    - Precautions shall be put in place to avoid spillages of diesel, oil or other polluting substances.

6.2.3 Disturbance and Displacement

6.2.3.1 Birds

Site clearance involving the cutting or destruction of vegetation and hedgerows shall not take place in the bird breeding season between March 1st and August 31st inclusive.

Mitigation measures to reduce disturbance effects on feature species birds may include but not be limited to:

- Timing of works (e.g. avoiding works in the vicinity of SPAs with over wintering birds between the months of November and March inclusive).
- Avoid working simultaneously with other projects which could also cause disturbance.
- Screening of works to reduced disturbance impacts.

6.2.3.2 Marine Mammals

Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise (JNCC, 2010) and appropriate legislation (i.e. The Habitats Regulations (as amended) and Wildlife (NI) Order 1985 (as amended)) will be followed for marine based activities.

7 CONCLUSION

Having regard to the relevant legislation and the methodology followed and conclusions of a screening stage exercise, a shadow HRA of the Plan was prepared to document an appropriate assessment of the implications of the Plan on European sites in view of their conservation objectives.

The HRA considered three broad impact themes and focused on the following possible LSEs as outlined in Table 4.3:

- The possibility of likely significant **Habitat Loss** effects cannot be discounted for three European sites without further evaluation and analysis, or the application of measures intended to avoid or reduce the harmful effects of the potential projects on European sites.
- The possibility of likely significant **Water Quality and Habitat Deterioration** effects cannot be discounted for ten European sites without further evaluation and analysis, or the application of measures intended to avoid or reduce the harmful effects of the potential projects on European sites.
- The possibility of likely significant **Disturbance and Displacement** effects cannot be discounted for three European sites without further evaluation and analysis, or the application of measures intended to avoid or reduce the harmful effects of the potential projects on European sites.

Having conducted further investigation and analysis; and having applied measures appropriate at a plan level intended to avoid or reduce the harmful effects of the implementation of the plan on European sites; and taking into consideration the safeguarding regime of lower level screening for appropriate assessment or appropriate assessment as the case may be at a project level for each of the projects brought forward from the Plan prior to those projects being consented under the planning code; it is concluded that implementation of the Plan will not adversely affect the integrity of any European site.