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Report in Support of Appropriate Assessment (AA) Screening and Natura Impact Statement (NIS)

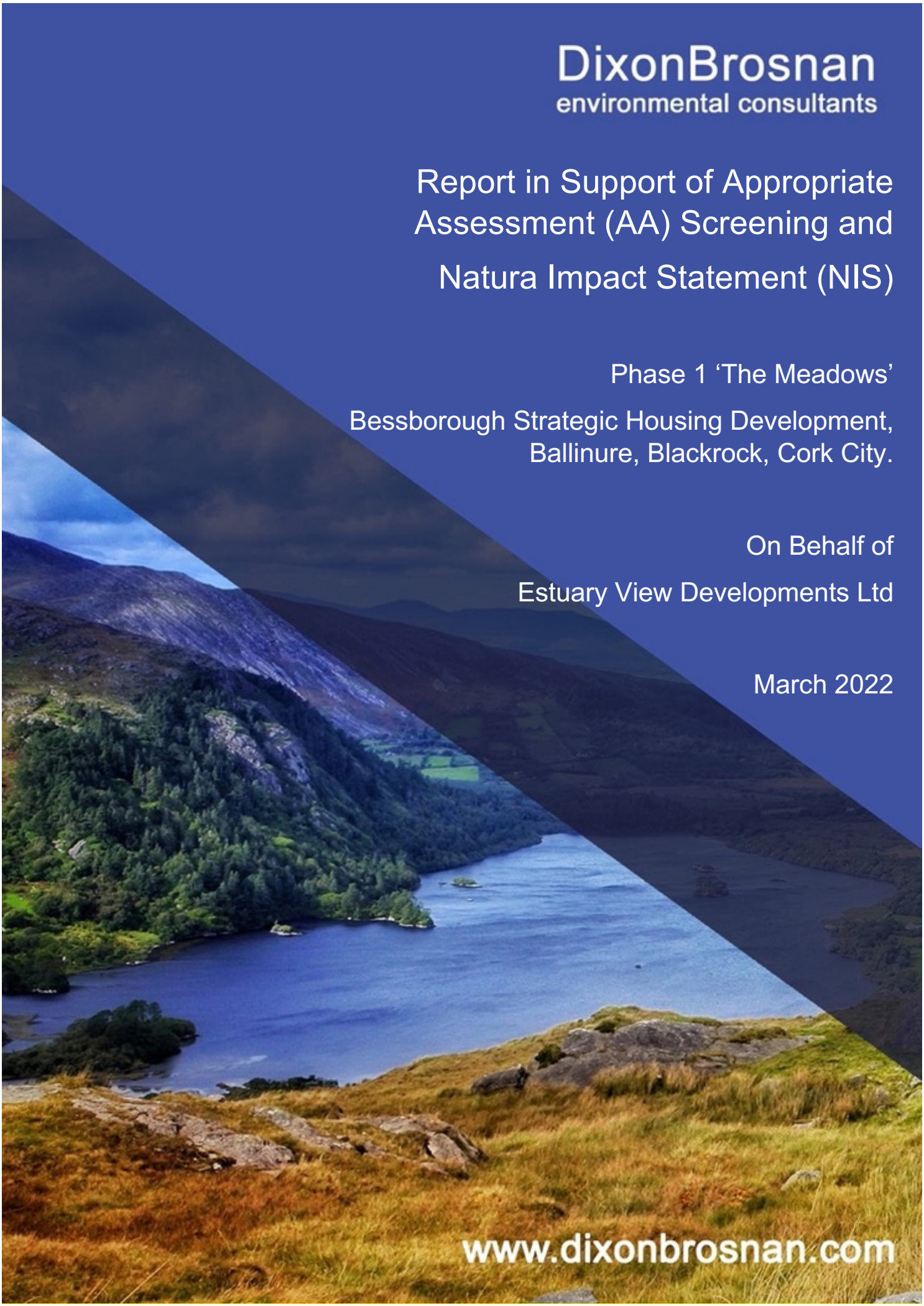
Phase 1 'The Meadows'

Bessborough Strategic Housing Development,
Ballinure, Blackrock, Cork City.

On Behalf of

Estuary View Developments Ltd

March 2022



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Project	Report in Support of Appropriate Assessment (AA) Screening and Natura Impact Statement (NIS) Phase 1 'The Meadows', Bessborough Strategic Housing Development, Ballinure, Blackrock, Cork City	
Client	Estuary View Developments Ltd	
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08/02/22	1st draft	Carl Dixon BSc MSc
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1. Introduction

1.1 Background

The information in this report has been compiled by DixonBrosnan Environmental Consultants, on behalf of the applicant. It provides information on and assesses the potential for the proposed Phase 1 'The Meadows', of the Bessborough strategic housing development (SHD) at Ballinure, Blackrock, Cork City to impact on any Natura 2000 sites within its zone of influence. The information in this report forms part of and should be read in conjunction with other pre-planning application consultation documentation.

The Birds Directive (2009/147/EC) and the Habitats Directive (92/42/EEC) put an obligation on EU Member States to establish the Natura 2000 network of sites of highest biodiversity importance for rare and threatened habitats and species across the EU. In Ireland, the Natura 2000 network of European sites comprises Special Areas of Conservation (SACs, including candidate SACs) and Special Protection Areas (SPAs, including proposed SPAs). SACs are selected for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds). SPAs are selected for the conservation of Annex I birds and other regularly occurring migratory birds and their habitats. The annexed habitats and species for which each site is selected correspond to the qualifying interests of the sites and from these the conservation objectives of the site are derived. The Birds and Habitats Directives set out various procedures and obligations in relation to nature conservation management in Member States in general, and of the Natura 2000 sites and their habitats and species in particular. A key protection mechanism is the requirement to consider the possible nature conservation implications of any plan or project on the Natura 2000 site network before any decision is made to allow that plan or project to proceed. Not only is every new plan or project captured by this requirement but each plan or project, when being considered for approval at any stage, must take into consideration the possible effects it may have in combination with other plans and projects when going through the process known as Appropriate Assessment (AA).

The obligation to undertake Appropriate Assessment (AA) derives from Article 6(3) and 6(4) of the Habitats Directive, and both involve a number of steps and tests that need to be applied in sequential order. Article 6(3) is concerned with the strict protection of sites, while Article 6(4) is the procedure for allowing derogation from this strict protection in certain restricted circumstances. As set out in Section 177U of the Planning and Development Act 2000 as amended, a screening for appropriate assessment of an application for consent for the proposed development must be carried out by the competent authority to assess, in view of best scientific knowledge, if the proposed development, individually or in combination with another plan or project is likely to have a significant effect on any European site. Each step in the assessment process precedes and provides a basis for other steps. The results at each step must be documented and recorded carefully so there is full traceability and transparency of the decisions made.

1.2 Aim of Report

The purpose of this report is to inform the AA process as required under the Habitats Directive (92/43/EEC) in instances where a plan or project may give rise to significant impacts on a Natura 2000 site. This report aims to inform the Appropriate Assessment process in

determining whether the development, both alone and in combination with other plans or projects, are likely to have a significant impact on the Natura 2000 sites in the proposed development site, in the context of their conservation objectives and specifically on the habitats and species for which the sites have been designated.

This report has been prepared with regard to the following guidance documents, where relevant.

- *Managing Natura 2000 Sites: The Provision of Article 6 of the Habitats Directive 92/43/EEC* (European Commission (EC), 2018);
- *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodical Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC* (European Commission (EC), 2001);
- *Guidance Document on Article 6(4) of the Habitats Directive 92/43/EEC* (European Commission, (EC) 2007);
- *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities* (Department of Environment, Heritage and Local Government, 2010 revision);
- *Appropriate Assessment under Article 6 of the Habitats Directive; Guidance for Planning Authorities. Circular NPW 1/10 and PSSP 2/10* (Department of Environment, Heritage and Local Government, 2010);
- *Guidelines for Good Practice Appropriate Assessment of Plans under Article 6(3) Habitats Directive* (International Workshop on Assessment of Plans under the Habitats Directive, 2011);
- *Commission notice Guidance document on wind energy developments and EU nature legislation*, (EC 2020);
- *Communication from the Commission on the precautionary principle. European Commission* (2000)
- *Assessment of plans & projects in relation to N2K sites – Methodological Guidance* (EC 2021);
- *Guidance document on the strict protection of animal species of Community interest under the Habitats Directive* (EC 2021) and
- CJEU Case C 164/17 Edel Grace Peter Sweetman v An Bord Pleanála.

1.3 Authors of Report

This report was prepared by Carl Dixon MSc (Ecological Monitoring) and Dr. Sorcha Sheehy PhD (Ecology/ornithology). Fieldwork was conducted by Carl Dixon MSc, Sorcha Sheehy PhD and Cian Gill MSc (Ecological Monitoring).

Carl Dixon MSc (Ecology) is a senior ecologist who holds an Honours Degree (BSc) in Ecology and a Masters (MSc) in Ecological Monitoring from UCC. He is a senior ecologist who has

over 25 years' experience in ecological assessment. Prior to setting up DixonBrosnan Environmental Consultants in 2000, Carl set up and ran Core Environmental Services which included Rural Environmental Protection Scheme (REPS) planning for landowners and ecological assessments. Carl has particular experience in freshwater ecology including electrofishing fish stock assessments and water quality assessments. He also has considerable experience in habitat mapping and mammal ecology including survey work and reporting in relation to badgers and bats. Other competencies include surveys for invasive species and bird surveys. Carl has extensive experience with regards to EIAR and NIS mitigation and impact assessment. He has particular experience in large-scale industrial developments with extensive experience in complex assessments as part of multi-disciplinary teams. Such projects include housing and commercial developments, gas pipelines, incinerators, electrical cable routes, oil refineries and quarries.

Dr. Sorcha Sheehy PhD (ecology/ornithology) is an experienced ecological consultant specialising in bird behaviour. Sorcha received a BSc in Applied Ecology from UCC and subsequently went on to receive a PhD in behavioural ornithology at UCC. During her PhD research, Sorcha studied bird-aircraft collision with a particular focus on bird behaviour, included field-based behavioural observations at airports, bird cadaver examination and collision classification and the use of radar tracking to model collision risk. Sorcha has worked for over 12 years in a professional ecology role and specialises in the coordination of ecology projects and assessments. She has coordinated and contributed to Habitats Directive Assessments (AA screenings and NIS) and Environmental Impact Assessment Reports (EIAR) for a range of small and large-scale projects with particular expertise in assessing impacts on birds. Notable projects include Arklow Bank Wind Park, Shannon Technology and Energy Park and Waste to Energy Facility Ringaskiddy.

Cian Gill MSc (Ecology) is a qualified ecologist with ten years' experience working with wildlife and ecology-based NGOs and public bodies in Ireland, the UK and the US. Past projects include invasive species planning for the city of Rosemount, Minnesota, and the Under The Sea project for Essex Wildlife Trust. Recent projects include ecological reports for Cork-based housing and private developments.

2. Regulatory Context and Appropriate Assessment Procedure

2.1 Regulatory Context

The Habitats Directive (Council Directive 92/43/EEC on the *Conservation of Natural Habitats and of Wild Fauna and Flora*) aims to maintain or restore the favourable conservation status of habitats and species of community interest across Europe. The requirements of these directives are transposed into Irish law through the European Communities (Birds and Natural Habitats Regulations; S.I. No. 477 of 2011).

Under the Directive a network of sites of nature conservation importance have been identified by each Member State as containing specified habitats or species requiring to be maintained or returned to favourable conservation status. In Ireland the network consists of SACs and SPAs, and also candidate sites, which form the Natura 2000 network.

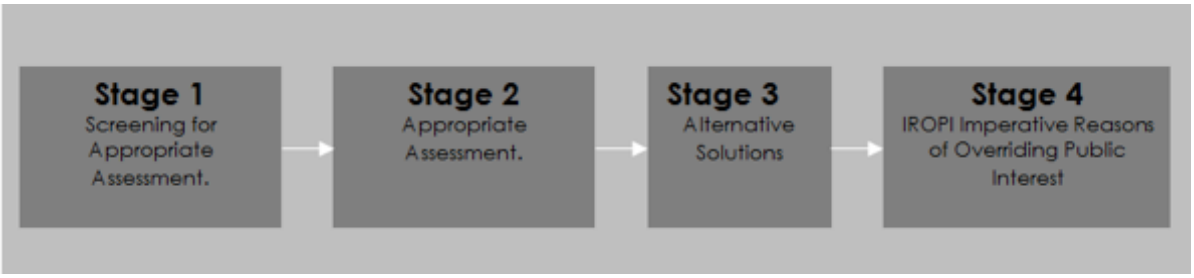
Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the *Conservation of Natural Habitats and of Wild Fauna and Flora* (as amended) (hereafter 'the Habitats Directive') requires that, any plan or project not directly connected with or necessary to the management

of a designated site, but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. A competent authority (e.g. the EPA or Local Authority) can only agree to a plan or project after having determined that it will not adversely affect the integrity of the site concerned.

The possibility of a significant effect on a designated or "European" site has generated the need for an appropriate assessment to be carried out by the competent authority for the purposes of Article 6(3). A Stage Two Appropriate Assessment is required if it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site. The first (Screening) Stage for appropriate assessment operates merely to determine whether a (Stage Two) Appropriate Assessment must be undertaken on the implications of the plan or project for the conservation objectives of relevant European sites.

2.2 Appropriate Assessment Procedure

The assessment requirements of Article 6(3) establish a stage-by-stage approach. This assessment follows the stages outlined in the 2001 European Commission publications "Assessment of plans and projects significantly affecting Natura 2000 sites: methodological guidance on the provisions of Articles 6(3) and 6(4) of the Habitats Directive 92/43/EEC" (2001) and Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (Draft) Office for Official Publications of the European Communities, Luxembourg (EC, 2015);



The stages are as follows:

Stage One: Screening — the process which identifies any appreciable impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant;

Stage Two: Appropriate assessment — the consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts;

Stage Three: Assessment of alternative solutions: The process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site. It is confirmed that no reliance is placed by the developer on Stage Three in the context of this application for development consent;

Stage Four: Assessment where no alternative solutions exist and where adverse impacts remain — an assessment of compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed (it is important to note that this guidance does not deal with the assessment of imperative reasons of overriding public interest). Again, for the avoidance of doubt, it is confirmed that no reliance is placed by the developer on Stage Four in the context of this application for development consent.

It is the responsibility of the competent authority to make a decision on whether or not the proposed development should be approved, taking into consideration any potential impact upon any Natura 2000 site within its zone of influence.

3. Receiving Environment

3.1 Existing site

The proposed development site is located in Blackrock, a suburban area approximately 4.5km southwest of Cork City (**Figure 1**). The National route N40 runs adjacent the southern boundary of the site. The Douglas Estuary to the south of the site forms part of the Cork Harbour Special Protection Area (SPA). It is a large, enclosed tidal channel which is dominated by estuarine habitats at low tide. Access to and from the site is via an existing access road, Bessborough Road. To the north and west of the proposed development site there is a mixture of industrial development and residential development. Mahon Golf course to east of the site is a prominent feature in the local landscape. The Bessborough site is characterised by a mix old and new buildings and large numbers of mature trees in a parkland setting. Two large fields are used for grazing horses and the band of woodland along the eastern boundary and the formal gardens are important local features in a landscape that is generally devoid of mature trees. Unused sections of the site are being colonised by scrub.

Figure 1. Location of proposed development

3.2 Proposed Development

Estuary View Enterprises 2020 Limited intend to apply to An Bord Pleanála for permission for a strategic housing development at Bessborough, Ballinure, Blackrock, Cork.

The development will consist of the construction of a residential development of 280 no. residential apartment units with supporting tenant amenity facilities, café, crèche, and all ancillary site development works. The proposed development includes 280 no. apartments to be provided as follows: Block A (6 no. studio apartments, 14 no. 1-bedroom, 34 no. 2-bedroom & 1 no. 3-bedroom over 1-6 storeys), Block B (37 no. 1-bedroom & 49 no. 2-bedroom over 6-10 storeys), Block C (31 no. 1-bedroom, 36 no. 2-bedroom & 6 no. 3-bedroom over 5-9 storeys) and Block D (30 no. 1-bedroom, 31 no. 2-bedroom & 5 no. 3-bedroom over 6-7 storeys).

The proposal includes a new pedestrian/cycle bridge over the adjoining Passage West Greenway to the east, connecting into the existing down ramp from Mahon providing direct access to the greenway and wider areas.

The proposed development provides for outdoor amenity areas, landscaping, under-podium and street car parking, bicycle parking, bin stores, 2 no. substations one of which is single storey free standing, a single storey carpark access building, public lighting, roof mounted solar panels, wastewater infrastructure including new inlet sewer to the Bessborough Wastewater Pumping Station to the west, surface water attenuation, water utility services and all ancillary site development works. Vehicular access to the proposed development will be

provided via the existing access road off the Bessboro Road. An overview of the proposed development site is shown in **Figure 2**. Site drawings are included in **Appendix 2** of this report.

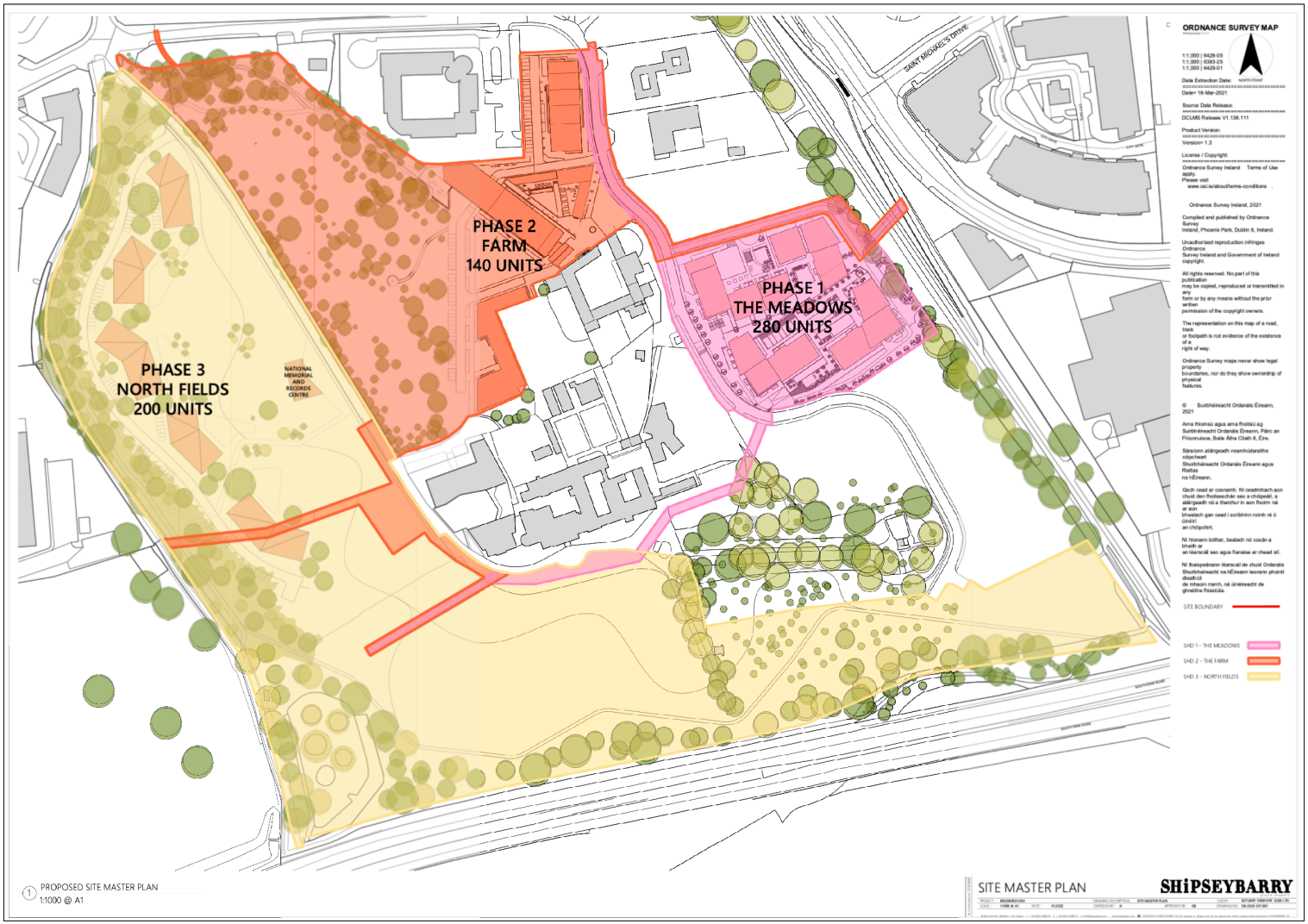


Figure 2. Masterplan and Phase 1 'The Meadows' site boundary | Source Shipsey Barry

3.3 Surface water

The proposed surface water management system will, as far as is feasible, be designed in accordance with the principles of Sustainable Drainage Systems (SuDS) as embodied in the recommendations of the Greater Dublin Strategic Drainage Study (GDSDS).

The GDSDS addresses the issue of sustainability by requiring designs to comply with a set of drainage criteria which aim to minimise the impact of urbanisation by replicating the runoff characteristics of a greenfield site. The criteria provide a consistent approach to addressing both rate and volume of runoff as well as ensuring the environment is protected from pollution that is washed off roads and buildings. These drainage design criteria are as follows:

- Criterion 1 - River Water Quality Protection ▪ Criterion 2 - River Regime Protection
- Criterion 3 - Flood Risk Assessment
- Criterion 4 - River Flood Protection

The requirements of SuDS are typically addressed by provision of the following:

- Interception storage
- Treatment storage (not required if interception storage is provided)
- Attenuation storage
- Long term storage (In discussion with Cork City Council there is no requirement for long term storage)

The proposed surface water network will include a storm drainage pipe network, attenuation storage structures and several SuDS features which will aid the reduction of runoff volumes by slowing surface water flows, providing the opportunity for evapotranspiration, and providing the opportunity for infiltration to ground. Both the interception and attenuation storage requirements of GDSDS will be sufficiently met.

An assessment of the potential SuDS measures that could be incorporated within the site was conducted using the SuDS Manual, CIRIA 753 as guidance. The following SuDS features have been identified as applicable and will be provided within the proposed scheme:

- Green Roofs: will be provided throughout the site, on flat roofs, where possible. The green roof will be an extensive type with sedum planting at the surface with a drainage layer beneath. The drainage layer will convey flows to discharge locations. It is not proposed to restrict the discharges from the roofs. Where possible discharges from roofs will be tied into planters or permeable paving substrata via diffusers.
- Permeable Paving: will be provided for all paved areas, excluding the access road, the car park ramp and the pedestrian link corridor. Permeable paving will be a Type B as per SuDS Manual, CIRIA 753, a combination of infiltration and piped drainage.
- Tree Pits/Bioretention Planters: will be provided in every feasible location where there is a proposed tree or planter. The tree pits will contain engineered soil-filled tree boxes with drainage pipes beneath to link trees together and tie in with the proposed surface

water sewer. The bioretention planters will consist of a shallow landscaped depression at the surface with a drainage layer beneath.

- StormTech Attenuation Tank: will be provided at the natural low point, at the south of the site for final storage of runoff volumes before discharging to the existing surface water network at a controlled rate.

- Permavoid Geocellular Units: will be provided at the base of the raised podium build up, which will provide storage and conveyance of surface water volumes. The raised podium will consist of impermeable surfaces and permeable surface (i.e., tree pits/bioretention planters).

The SuDS features will be designed to work in sequence thereby creating a treatment train. The proposed SuDS layout is shown on see Drawing No. 21207-JBB-PH1-XX-DR-C-04003 and the overall drainage arrangement is shown on Drawing No. 21207-JBB-PH1-XX-DR-C-04001, both included in **Appendix 2** of this report.

Manholes will be constructed on all pipe-runs at changes in sewer direction, changes in gradients, at significant sewer connections and at a maximum spacing of 90m on all straight sections of pipework The gravity surface water sewers have been designed using MicroDrainage design software.

A new 225mmØ surface water outfall pipe will convey the restricted flows from the site in a westerly direction across the overall Bessborough site connecting to the existing 750mmØ surface water sewer upstream of its connection to the existing 1350mmØ surface water pipe which in turn discharges to the Douglas Estuary further to the south.

A legal wayleave is in place across the Bessborough lands immediately to the west of the Phase 1 development to facilitate this connection.

The controlled discharge from the proposed development (a maximum of 24.8 l/sec) will be minimal in the context of the capacity of the existing 750mm and 1350mm pipes and given that this controlled outflow matches existing greenfield runoff from the site in a 100-year storm event these flows will not create a significant increase in the flow to the estuary.

The proposed route of this sewer is shown on Drawing No. 21207-JBB-PH1-XX-DR-C-04007 (**Appendix 2**).

3.4 Foul Water

Cork City Council / Irish Water drainage records show an existing 375/450mmØ foul sewer located to the west of the Phase 3 lands which runs north to south before discharging to the Bessborough Wastewater Pumping Station (WWPS). From the WWPS a 350mmØ rising main heads east crossing through the greenfield area in the ownership of the applicant before turning north along the Blackrock to Passage West Greenway.

A feasibility study of the local area has revealed that there is an existing a 150mmØ foul sewer in the road adjacent to the western boundary of the Phase 1 site which runs north to south before turning in a westerly direction and connecting to the WWPS. This sewer was constructed under planning reference 03/27028.

Following a Pre-Connection Enquiry, Irish Water (IW) issued a Confirmation of Feasibility (COF) stating that the site can be serviced by its wastewater infrastructure network. This COF is included in **Appendix 3** of this report.

IW have advised that the proposed connection should be made directly to the WWPS, via a new inlet sewer. The WWPS is almost at design loading capacity. However, Irish Water has a project underway to replace the existing pumps which will increase the pump rate and provide sufficient capacity to accommodate this development and subsequent phases of this development. This upgrade project is scheduled to be completed by Q4 2022 and the proposed connection could be completed as soon as possibly practicable after this date.

The proposed designs were progressed in accordance with Irish Water's Code of Practice for Wastewater Infrastructure and were submitted to Irish Water for review and consideration for design acceptance as per the requirement of the SHD process.

The wastewater collection within the development will be via a network of gravity sewers. The wastewater flows will be collected and will be conveyed in in a westerly direction, from the south-western boundary of the proposed development site and will connect directly to the WWPS. A legal wayleave is in place across the Bessborough lands immediately to the west of the proposed development site to facilitate this connection.

The final connection from the western edge of the lands to the existing WWPS will be undertaken using directional-drilling techniques to ensure that the existing western boundary wall to the lands will remain undisturbed during construction.

The wastewater collection system is designed and will be constructed in accordance with Irish Water's Code of Practice for Wastewater Infrastructure to ensure self-cleansing velocities will be achieved on all pipe runs. The pipes proposed as part of this design have been sized in accordance with IW-CDS-5030-03 (Revision 2 2020).

Manholes will be constructed on all pipe-runs at changes in sewer direction, changes in gradients, at significant sewer connections and at a maximum spacing of 90m on all straight sections of pipework. The gravity wastewater sewers have been designed using MicroDrainage design software. The foul sewer layout plans are attached on Drawing No's. 21207- JBB-PH1-XX-DR-C-04001 (**Appendix 2**).

4. Stage1 - Screening

4.1 Overview

4.1.1 Introduction

This section contains the information required for the competent authority to undertake screening for AA for the proposed development.

The aims of this section are to:

- Determine whether the proposed development is directly connected with, or necessary to, the conservation management of any Natura 2000 sites;

- Provide information on, and assess the potential for the proposed development to significantly effect on Natura 2000 Sites (also known as European sites); and
- Determine whether the proposed development, alone or in combination with other projects, is likely to have significant effects on Natura 2000 sites in view of their conservation objectives.

The proposed development is not directly connected with, or necessary to the conservation management of any Natura 2000 sites.

4.1.2 Source-Pathway-Receptor Model

The likely effects of the proposed development on any European site has been assessed using a source-pathway-receptor model, where:

- A 'source' is defined as the individual element of the proposed works that has the potential to impact on a European site, its qualifying features and its conservation objectives.
- A 'pathway' is defined as the means or route by which a source can affect the ecological receptor.
- A 'receptor' is defined as the SCI of SPAs or QI of SACs for which conservation objectives have been set for the European sites being screened.

A source-pathway-receptor model is a standard tool used in environmental assessment. In order for an effect to be likely, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism results in no likelihood for the effect to occur. The source-pathway-receptor model was used to identify a list of European sites, and their QIs/SCIs, with potential links to European sites. These are termed as 'relevant' European sites/QIs/SCIs throughout this report.

4.1.3 Likely Significant Effect

The threshold for a Likely Significant Effect (LSE) is treated in the screening exercise as being above a de minimis level. The opinion of the Advocate General in CJEU case C-258/11 outlines:

"the requirement that the effect in question be 'significant' exists in order to lay down a de minimis threshold. Plans or projects that have no appreciable effect on a European site are thereby excluded.

If all plans or projects capable of having any effect whatsoever on the site were to be caught by Article 6(3), activities on or near the site would risk being impossible by reason of legislative overkill."

In this report, therefore, 'relevant' European sites are those within the potential ZoI of activities associated with the construction and operation of the proposed development, where LSE pathways to European sites were identified through the source-pathway-receptor model.

4.1.4 Screening Process

The Screening for Appropriate Assessment will incorporate the following steps:

Definition of the zone of influence for the proposed works;

- Identification of the European sites that are situated (in their entirety or partially or downstream) within the zone of influence of the proposed works;
- Identification of the most up-to-date QIs and SCIs for each European site within the zone of influence;
- Identification of the environmental conditions that maintain the QIs/SCIs at the desired target of Favourable Conservation Status;
- Identification of the threats/impacts – actual or potential that could negatively impact the environmental conditions of the QIs/SCIs within the European sites;
- Highlighting the activities of the proposed works that could give rise to significant negative impacts; and
- Identification of other plans or projects, for which in-combination impacts would likely have significant effects.

4.1.5 Zone of Influence

The Zone of Influence (ZoI) comprises the area within which the proposed development may potentially affect the conservation objectives or qualifying interests (QI) of a Natura 2000 site. There is no recommended zone of influence, and guidance from the National Parks and Wildlife Service (NPWS) recommends that the distance should be evaluated on a case-by-case basis with reference to the nature, size and location of the project, the sensitivities of the ecological receptors, and the potential for in-combination effects (cumulative).

In ecological and environmental impact assessment, for an effect to occur there must be a risk enabled by having a source (e.g. construction works at a proposed development site), a 'receptor' (e.g. SAC or other ecologically sensitive feature), and a pathway between the source and the receptor (e.g. a watercourse which connects the proposed development site to the SAC). A 'receptor' is defined as the Special Conservation Interest (SCI) of SPAs or Qualifying Interest (QI) of SACs for which conservation objectives have been set for the European sites being screened.

Consideration is therefore given to the source-pathway-receptor linkage and associated risks between the proposed development and Natura 2000 sites. For a significant effect to occur there needs to be an identified risk whereby a source (e.g. contaminant or pollutant arising from construction activities) affects a particular receptor (i.e. Natura 2000 site) through a particular pathway (e.g. a watercourse which connects the proposed development with the Natura 2000 site).

The identification of risk does not automatically mean that an effect will occur, nor that it will be significant. The identification of these risks means that there is a possibility of environmental or ecological damage occurring. The level and significance of the effect depends upon the nature of the consequence, likelihood of the risk and characteristics of the receptor.

The precautionary principle is applied for the purposes of screening to ensure that consideration and pre-emptive action is undertaken where there is a lack of scientific evidence. It is noted that mitigation measures are not taken into account in the AA screening assessment process.

4.2 Desktop Review

A desktop review facilitates the identification of the baseline ecological conditions and key ecological issues relating to Natura 2000 sites and facilitates an evaluation assessment of potential in-combination impacts. Sources of information used for this report include reports prepared for the Cork City area and information from statutory and non-statutory bodies. The following sources of information and relevant documentation were utilised:

- National Parks & Wildlife Service (NPWS) - www.npws.ie
- Environmental Protection Agency (EPA) – www.epa.ie
- National Biodiversity Data Centre (NBDC) – www.biodiversityireland.ie
- Cork City Biodiversity Action Plan 2009-2014;
- Cork City Development Plan 2015-2021 (Cork City Council, 2015);
- Birdwatch Ireland - http://www.birdwatchireland.ie/
- Invasive Species Ireland - http://www.invasivespeciesireland.com/
- Best Practice Guidance for Habitat Survey and Mapping (Heritage Council, 2011)
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (National Roads Authority, 2009).
- Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) European Union, 2017 and
- Cork City D0033-01 Wastewater Treatment Plant (WWTP) Annual Environmental Report 2020 (Irish Water 2021)

4.3 Natura 2000 Sites within Zone of Influence

In accordance with the European Commission Methodological Guidance (EC 2018), a list of Natura 2000 sites that can be potentially affected by the proposed development has been compiled. All candidate SACs (cSAC) and SPAs sites within the zone of influence of the proposed development have been identified in **Table 2** and shown in **Figure 3**.

The Cork Harbour SPA is located approximately 250m south of the of the proposed development site. The Great Island Channel SAC is located approximately 4.7km west of the proposed development site. Both Natura 2000 sites are located within the Cork Harbour estuarine complex and are hydrologically connected to one another. During construction and operation, surface water runoff from the site will be discharged to the Douglas Estuary, which forms part of the Cork Harbour SPA. Therefore, surface water runoff during the construction and/or operational phases of the proposed development could potentially discharge impact on Cork Harbour SPA. Habitats within or in the vicinity of the proposed development site could potentially provide *ex situ* foraging habitat for SCI birds. Therefore, noise and activity during the construction and operational phases could potentially impact on SCI species. The proposed 1 to 10 storey buildings at the site could potentially present a collision risk to SCI

bird species overflying the area. During operation, wastewater from the proposed development will be diverted to the Cork City WWTP and discharged to Cork Harbour, potentially impacting on Cork Harbour SPA.

Therefore, a source-pathway-receptor link exists between the source (proposed development) and the receptor (Cork Harbour SPA (site code 004030)) via a potential pathway (reductions in water quality, spread of invasive species and disturbance during the construction and/or operational phases and collision during the operational phase).

Although unlikely given the distance involved, surface water and wastewater discharges from the proposed development could potentially impact on the Great Island Channel SAC via Cork Harbour. Therefore, a source-pathway-receptor link has been identified between the source (proposed development) and the receptor (Great Island Channel SAC (site code 001058)) via a potential pathway (surface water runoff during construction/operational phase, the spread of invasive species during construction and wastewater discharge during the operational phase).

Given the distances involved and the lack of hydrological connection, no pathway for impact has been identified between the proposed development site and any other Natura 2000 site.

Table 1. Natura 2000 sites and their location relative to the proposed development site

Natura 2000 Sites	Site Code	Distance at closest point and potential source-pathway-receptor link	Qualifying Interests (* denotes a priority habitat)
Special Area of Conservation (SAC)			
Great Island Channel SAC	001058	4.7km. A source-pathway-receptor link has been identified between the source (proposed development site) and the receptor (Great Island Channel SAC) via a potential pathway (impacts on water quality and spread of invasive species during construction or operational phase).	**Habitats** 1140 Mudflats and sandflats not covered by seawater at low tide 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
Special Protection Area (SPA)			
Cork Harbour SPA	004030	250m. A source-pathway-receptor link has been identified between the source (proposed development site)	**Birds** A056 Shoveler *(Anas clypeata)* A149 Dunlin *(Calidris alpina)* A140 Golden Plover *(Pluvialis apricaria)* A050 Wigeon *(Anas penelope)* A028 Grey Heron *(Ardea cinerea)* A069 Red-breasted Merganser *(Mergus serrator)*

Natura 2000 Sites	Site Code	Distance at closest point and potential source-pathway-receptor link	Qualifying Interests (* denotes a priority habitat)
		and the receptor (Cork Harbour SPA) via a potential pathway (impacts on water quality, disturbance or spread of invasive species during construction or operational phase and collision risk).	A142 Lapwing *(Vanellus vanellus)* A130 Oystercatcher *(Haematopus ostralegus)* A141 Grey Plover *(Pluvialis squatarola)* A052 Teal *(Anas crecca)* A054 Pintail *(Anas acuta)* A157 Bar-tailed Godwit *(Limosa lapponica)* A162 Redshank *(Tringa totanus)* A183 Lesser Black-backed Gull *(Larus fuscus)* A179 Black-headed Gull *(Chroicocephalus ridibundus)* A004 Little Grebe *(Tachybaptus ruficollis)* A160 Curlew *(Numenius arquata)* A182 Common Gull *(Larus canus)* A048 Shelduck *(Tadorna tadorna)* A017 Cormorant *(Phalacrocorax carbo)* A193 Common Tern *(Sterna hirundo)* A005 Great Crested Grebe *(Podiceps cristatus)* A156 Black-tailed Godwit *(Limosa limosa)* **Habitats** Wetlands

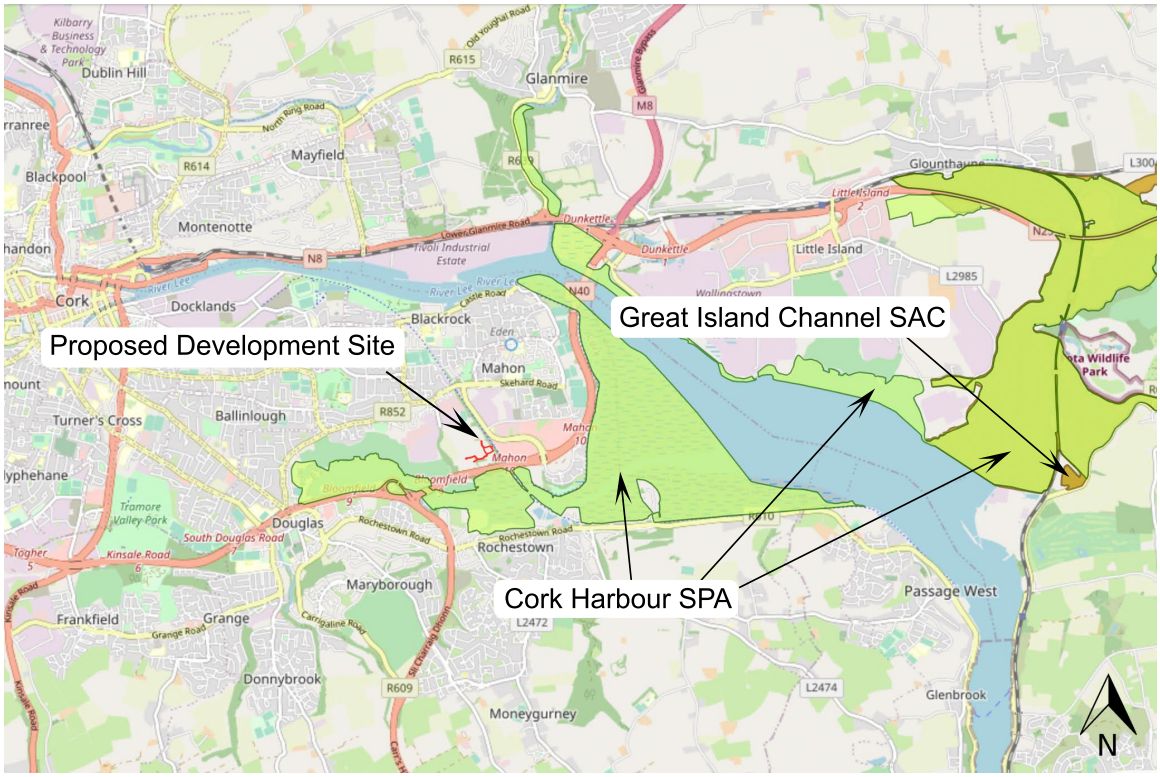


Figure 3. Natura 2000 sites within zone of influence of the proposed development site | Source EPA Envision Mapping | Not to scale

4.3.1 Cork Harbour SPA (site code 004030) Site Synopses

Cork Harbour is a large, sheltered bay system, with several river estuaries - principally those of the Rivers Lee, Douglas, Owenboy and Owennacurra. The SPA site comprises most of the main intertidal areas of Cork Harbour, including all of the North Channel, the Douglas Estuary, inner Lough Mahon, Monkstown Creek, Lough Beg, the Owenboy River Estuary, Whitegate Bay, Ringabella Creek and the Rostellan and Poulnabibe inlets.

Owing to the sheltered conditions, the intertidal flats are often muddy in character. These muds support a range of macro-invertebrates, notably *Macoma balthica, Scrobicularia plana, Hydrobia ulvae, Nepthys hombergi, Nereis diversicolor* and *Corophium volutator*. Green algae species occur on the flats, especially *Ulva* sp. Cordgrass (*Spartina* sp.) has colonised the intertidal flats in places, especially where good shelter exists, such as at Rossleague and Belvelly in the North Channel. Salt marshes are scattered through the site and these provide high tide roosts for the birds. Some shallow bay water is included in the site. Rostellan Lake is a small brackish lake that is used by swans throughout the winter. The site also includes some marginal wet grassland areas used by feeding and roosting birds.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Little Grebe, Great Crested Grebe, Cormorant, Grey Heron, Shelduck, Wigeon, Teal, Mallard, Pintail, Shoveler, Redbreasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Blackheaded Gull, Common Gull, Lesser Black-backed Gull and Common Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Cork Harbour is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl. Of particular note is that the site supports internationally important populations of Black-tailed Godwit (1,896) and Redshank (2,149) - all figures given are five-year mean peaks for the period 1995/96 to 1999/2000. Nationally important populations of the following 19 species occur: Little Grebe (57), Great Crested Grebe (253), Cormorant (521), Grey Heron (80), Shelduck (2,009), Wigeon (1,791), Teal (1,065), Mallard (513), Pintail (57), Shoveler (103), Red-breasted Merganser (121), Oystercatcher (1,809), Golden Plover (3,342), Grey Plover (95), Lapwing (7,569), Dunlin (9,621), Bartailed Godwit (233), Curlew (2,237) and Greenshank (46). The Shelduck population is the largest in the country (over 10% of national total). Other species using the site include Mute Swan (38), Whooper Swan (5), Pochard (72), Gadwall (6), Tufted Duck (64), Goldeneye (21), Coot (53), Ringed Plover (73), Knot (26) and Turnstone (113). Cork Harbour is an important site for gulls in winter and autumn, especially Black-headed Gull (3,640), Common Gull (1,562) and Lesser Black-backed Gull (783), all of which occur in numbers of national importance. Little Egret and Mediterranean Gull, two species which have recently colonised Ireland, also occur at this site.

A range of passage waders occurs regularly in autumn, including such species as Ruff (5-10), Spotted Redshank (1-5) and Green Sandpiper (1-5). Numbers vary between years and usually a few of each of these species over-winter.

Cork Harbour has a nationally important breeding colony of Common Tern (102 pairs in 1995). The birds have nested in Cork Harbour since about 1970, and since 1983 on various artificial structures, notably derelict steel barges and the roof of a Martello Tower. The birds are monitored annually and the chicks are ringed.

Cork Harbour is of major ornithological significance, being of international importance both for the total numbers of wintering birds (i.e. > 20,000) and also for its populations of Black-tailed Godwit and Redshank. In addition, it supports nationally important wintering populations of 22 species, as well as a nationally important breeding colony of Common Tern. Several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Little Egret, Golden Plover, Bar-tailed Godwit, Ruff, Mediterranean Gull and Common Tern. The site provides both feeding and roosting sites for the various bird species that use it. Cork Harbour is also a Ramsar Convention site and part of Cork Harbour SPA is a Wildfowl Sanctuary.

A full site synopsis for the Cork Harbour SPA is included as **Appendix 1** of this report.

4.3.2 Great Island Channel SAC (Site Code 001058)

Great Island Channel comprises the north-eastern part of Cork Harbour. It includes all of the Great Island Channel, the intertidal areas between Fota Island and Little Island, and also the estuary of the Dungourney and Owennacurra Rivers as far as Midleton. The North Channel is on average 1km wide but extends for about 9km from east to west. The area is well sheltered, and the intertidal sediments are predominantly fine muds. In addition to the estuarine habitats, the site includes some wet grassland areas which are used by roosting birds, as well as some broad- leaved woodland at Fota Island. Compared to the rest of Cork Harbour, the Great Island Channel is relatively undisturbed, with aquaculture the main activity. The site is of ecological importance for its examples of intertidal mud and sand flats and Atlantic salt meadows of the estuarine type. Both habitats are fairly extensive in area and of moderate to good quality.

A full site synopsis for the Great Island Channel SAC is included as **Appendix 1** of this report.

4.3.3 Natura 2000 sites – Features of interests and conservation objectives.

The EU Habitats Directive contains a list of habitats (Annex I) and species (Annex II) for which SACs must be established by Member States. Similarly, the EU Birds Directive contains lists of important bird species (Annex I) and other migratory bird species for which SPAs must be established. Those that are known to occur at a site are referred to as ‘qualifying interests’ and are listed in the Natura 2000 forms which are lodged with the EU Commission by each Member State. A ‘qualifying interest (QI)’ (or ‘special conservation interest (SCI)’ in the case of SPAs) is one of the factors (such as the species or habitat that is present) for which the site merits designation. The National Parks and Wildlife Service (NPWS) are responsible for the designation of SACs and SPAs in Ireland.

The conservation objectives for the Great Island Channel SAC are detailed in: NPWS (2014) *Conservation Objectives: Great Island Channel SAC 001058. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.*

The NPWS state that the conservation objectives for Great Island Channel SAC should be used in conjunction with those for Cork Harbour SPA as appropriate.

The conservation objectives for Cork Harbour SPA site are detailed in: NPWS (2014) *Conservation Objectives: Cork Harbour SPA 004030. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.*

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and SACs and SPAs are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network. European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status sites designated as SACs and SPAs. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level. Favourable conservation status of a habitat is achieved when its natural range, and area it covers within that range, is stable or increasing, and the ecological factors that 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 species and habitats listed as QIs/SCIs for the Great Island Channel SAC and Cork Harbour SPA and specific conservation objectives are included in **Tables 2 and 3**.

Table 2. Qualifying Interests (QIs) for the Great Island Channel SAC

Habitat Code	Habitat	Conservation objective
1140	*Mudflats and sandflats not covered by seawater at low tide*	Maintain
1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	Restore

Restore = Restore favourable conservation condition, Maintain = Maintain favourable conservation condition

Table 3. Special Conservation Interests (SCIs) for the Cork Harbour SPA

Species code	Species	Scientific name	Conservation objective
A004	Little Grebe	*Tachybaptus ruficollis*	Maintain
A005	Great Crested Grebe	*Podiceps cristatus*	Maintain
A017	Cormorant	*Phalacrocorax carbo*	Maintain
A028	Grey Heron	*Ardea cinereal*	Maintain
A048	Shelduck	*Tadorna tadorna*	Maintain
A050	Wigeon	*Anas Penelope*	Maintain
A052	Teal	*Anas crecca*	Maintain
A054	Pintail	*Anas acuta*	Maintain
A056	Shoveler	*Anas clypeata*	Maintain

Species code	Species	Scientific name	Conservation objective
A069	Red-breasted Merganser	*Mergus serrator*	Maintain
A130	Oystercatcher	*Haematopus ostralegus*	Maintain
A140	Golden Plover	*Pluvialis apricaria*	Maintain
A141	Grey Plover	*Pluvialis squatarola*	Maintain
A142	Lapwing	*Vanellus vanellus*	Maintain
A149	Dunlin	*Calidris alpina*	Maintain
A156	Black-tailed Godwit	*Limosa limosa*	Maintain
A157	Bar-tailed Godwit	*Limosa lapponica*	Maintain
A160	Curlew	*Numenius arquata*	Maintain
A162	Redshank	*Tringa totanus*	Maintain
A179	Black-headed Gull	*Chroicocephalus ridibundus*	Maintain
A182	Common Gull	*Larus canus*	Maintain
A183	Lesser Black-backed Gull	*Larus fuscus*	Maintain
A193	Common Tern	*Sterna hirundo*	Maintain
A999	Wetland and Waterbirds		Maintain

Restore = Restore favourable conservation condition, Maintain = Restore favourable conservation condition

To acknowledge the importance of Ireland's wetlands to wintering waterbirds, “Wetland and Waterbirds” may be included as a Special Conservation Interest for some SPAs that have been designated for wintering waterbirds and that contain a wetland site of significant importance to one or more of the species of Special Conservation Interest. Thus, a further objective is to maintain or restore the favourable conservation condition of the wetland habitat within the Cork Harbour SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.

4.4 Site Surveys

4.4.1 Habitats

Habitat surveys were carried out on the 3 June, 21 June and 22 June 2021 as well as the 3 and 4 February 2022. Habitat mapping was carried out in line with the methodology outlined in the Heritage Council Publication, *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011). The habitats within the proposed development site were classified using the classification scheme outlined in the Heritage council publication *A Guide to Habitats in Ireland* (Fossitt, 2000) and cross referenced with Annex I Habitats where required. The habitats recorded on site are described below in **Table 4** and their location illustrated in **Figure 4.** No Annex I habitats were recorded within the proposed development site.

Table 4. Habitats within Phase 1 'The Meadows' development site boundary and their ecological value

Habitat	Comments
Buildings and artificial surfaces BL3	This habitat type includes the road at the eastern edge of Phase 1 'The Meadows'. The road is not used and is being recolonized by vegetation, including Fescue *Festuca sp.,* Bramble *Rubus fruticosus*, Rosebay Willowherb *Chamaenerion angustifolium*, and immature Willow *Salix spp.* Other species noted include Groundsel *Senecio Vulgaris,* Bramble *Rubus fruticosus* and Teasel *Dipsacus fullonum*. These species are common within this area and this habitat is of limited ecological value. This is not an Annex I habitat and is not a qualifying habitat for Natura 2000 sites.
Treelines WL2/ Broadleaved woodland WD1	There is a mature treeline along the western boundary of the study area on the boundary of Phase 1 'The Meadows' which has developed on an earth bank. The trees are mature and a treeline is detailed at this location on the 6" First Edition maps (1829-1842. Although the treeline is prominent, in places it is sufficiently wide to be classified as a narrow strip of broadleaved woodland. A mix of native and non-native species are present. Species noted include Sessile Oak *Quercus petraea* Hawthorn *Crataegus monogyna,*, Sycamore *Acer pseudoplatanus*, Ash *Fraxinus excelsior,* Wych Elm *Ulmus glabra,* Elderberry *Sambucus nigra* and Silver Birch *Betula pendula*. The understory is dominated by Bracken *Pteridium aquilimum* and Bramble, with patches of Hogweed *Heracleum sphondylium*, Germander Speedwell *Veronica chamaedrys*. Buddleia *Buddleja davidii* also common. The proposed footbridge location extends on the eastern side of the Blackrock-Passage greenway which runs parallel with this eastern boundary of the Phase 1 'The Meadows' site. *Rhododendron ponticum* was recorded in this area. This is not an Annex I habitat and is not a qualifying habitat for Natura 2000 sites
Scrub WS1/Dry meadow and grassy verge GS2/Recolonising bare ground ED3	The Phase 1 'The Meadows' development site is dominated by a complex mosaic of common habitats which typically develop on land which is not actively used. Interspersed with areas of scrub there are isolated patches of Dry meadow and grassy verge habitat with Yorkshire Fog *Holcus lanatus* and Cocksfoot *Dactylis glomerata*. There are dense thickets of scrub, and this habitat will continue to encroach on grassland areas and areas of recolonizing bare ground in the absence of active management. Bramble and *Willow Salix sp.* are the dominant scrub species with Gorse also noted. Sycamore is also becoming established. Other species noted within the habitat include Teasel *Dipsacus fullonum*, Rosebay Willowherb *Epilobium angustifolium*, Common Figwort *Scrophularia nodosa*, , Soft Rush *Juncus effusus*, Dogwood *Cornus sanguinea*, Curled Dock *Rumex crispus, Greater Bird's-Foot Trefoil Lotus pedunculatus* and Spear Thistle *Cirsium vulgare.* Bee Orchid (*Ophrys apifera)* which has widespread but local distribution was also recorded within this area. As scrub will continue to develop in the absence of development, this species is unlikely to persist in the absence of active management as it requires open conditions. Early successional species and scrub provide local resources for invertebrates, birds and mammals. Dry meadow and grassy verge habitat loosely corresponds to the annexed habitat, 'lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)

Habitat	Comments
	(6510)'. The dry meadow and grassy verge habitat within the study area is not a valuable example of this habitat type.
Scrub WS1	A more pronounced and uneven line of scrub adjoins the treeline along the western boundary. It is dominated by Bramble with Bracken also noted. This is not an Annex I habitat and is not a qualifying habitat for Natura 2000 sites
Scattered trees and parkland WD5/Recolonising bare ground ED3	A small area of this habitat is located within the centre of the site. It consists of maintained grassland with a mix of mature and immature trees. Notable trees include a large mature ash and a mature Monteray Cypress. A small area of disturbed ground is being recolonised by common ruderal species and the non-native species Montbretia is common,
Improved agricultural grassland GA1	Part of the Phase 1 'The Meadows' development site boundary runs west through a large field dominated by low value improved grassland. Grassland in the more southerly field has died back. Species including Perennial Rye Grass *Lolium perenne*, Nettle *Urtica diocia* and Broad Leaved Dock *Rumex obtusifolius.* Only a small area of this habitat will be affected. This habitat is common and supports a limited flora. This is not an Annex I habitat and is not a qualifying habitat for Natura 2000 sites
Broadleaved woodland WD1	The small area of broadleaved woodland is located on the western edge of the Phase 1 'The Meadows' site. It supports a mixture of native and non-native species, however non-native species predominate. Species noted include Beech, Sycamore, and Ash. The understory is poorly developed with Holly *Ilex europeas* and occasional Hazel *Corylus avellana* and Willow *Salix sp.* noted. The ground layer is heavily shaded and includes Soft Shield Fern *Polystichum setiferum*, Hogweed *Heracleum sphondylium*, Primrose *Primula vulgaris*, Woodrush *Luzula spp*., Bluebell *Hyacinthoides non-scripta*, Ivy *Hedera hibernica,* Bramble *Rubus fruiticosus* and Hartstongue Fern *Asplenium scolopendrium*. A notable feature is a large eutrophic pond in the southern corner of this woodland. On wetter ground on the periphery of the pond Willow *Salix sp.* is common with, Pendulous Sedge *Carex pendula* and Soft Rush *Juncus effuses* also noted. Cherry Laurel *Prunus laurocerasus* and Winter Heliotrope *Petasites fragrans* are common with a scattered distribution and Wild Clematis *Clematis vitalba* was also recorded. A large stand of mature Japanese Knotweed *Fallopia japonica* was recorded in the northern section of the woodland. Rhododendron *Rhododendron ponticum* was also recorded in proximity to the pond. A review of historical mapping shows that this area of woodland was present on the 6" First Edition maps. Notwithstanding the preponderance of non-native tree species, older woodlands are generally of higher ecological value as mature trees can support bat roosts and a more diverse flora, including woodland indicator species. A small area of this habitat will be affected. Woodland within the study area is dominated by non-native species. Relatively poor habitat structure but of local value in the context of a urbanised landscape. This is not an Annex I habitat and is not a qualifying habitat for Natura 2000 sites

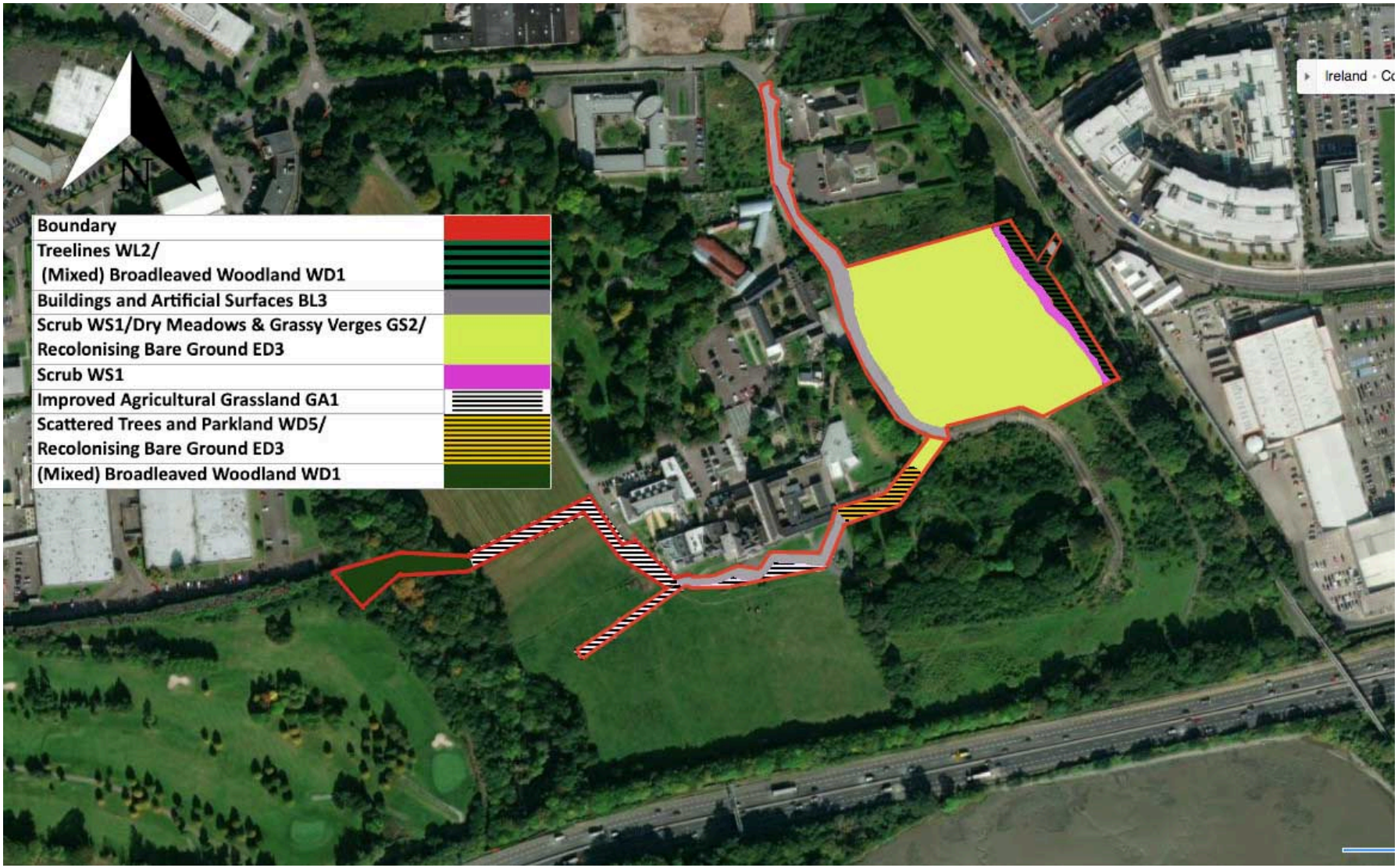


Figure 4. Habitats recorded within proposed development site

4.4.2 Birds

Breeding bird surveys were carried out on the 28 April and 22 June 2021 based on the BTO Common Breeding Bird Survey (BBS) (Gilbert *et al.* 1998 and Bibby *et al.* 2000) which aims to capture a snapshot of breeding bird activity within the survey area. Any birds observed during other survey e.g. habitat surveys/bat surveys were also recorded.

Winter bird surveys were carried out during winter 2020/2021. Winter bird surveys were carried out on the 20 November 2020, 9 December 2020, 8 January 2021, 15 February 2021, 25 February 2021 and 26 February 2021. This survey was loosely based on Wetland Bird Survey (WeBS) and also that for the Irish Wetland Bird Survey (I-WeBS), as outlined in Gilbert *et al.* (1998). In place of the "look see" method, counts were carried out for 1 hour per visit. The focus of winter bird surveys was wintering waterfowl and waders. However all birds were recorded during the site survey.

Certain bird species are listed by BirdWatch Ireland as Birds of Conservation Concern in Ireland (BOCCI). These are bird species suffering declines in population size. BirdWatch Ireland and the Royal Society for the Protection of Birds have identified and classified these species by the rate of decline into Red and Amber lists (Gilbert *et al.* 2021). Red List bird species are of high conservation concern and the Amber List species are of medium conservation. Green listed species are regularly occurring bird species whose conservation status is currently considered favourable. Bird species listed in Annex I of the Birds Directive (2009/147/EC) are considered a conservation priority. Species recorded within the site are shown in **Table 5**.

Winter Birds

Winter bird surveys were carried out at the proposed development site during winter 2020/2021. An initial assessment determined that the only suitable winter bird foraging/roosting habitat within the larger Bessborough site was located in a large, agricultural field located approximately 200m west of Phase 1 'The Meadows' site. The dominance of scrub habitat at the Phase 1 'The Meadows' development site means that this area does not provide suitable habitat for foraging/roosting waterfowl/waders.

Small numbers of Herring Gull, Lesser Black-backed Gull were recorded overflying the site at a height during several survey days, but no waterfowl, waders or gulls were recorded during winter bird surveys. Personal communication from Bessborough staff indicate that the agricultural fields located partially within the boundary of Phase 2 'The Farm' were historically used by Curlew *Numenius arquata*, but it has been several years since these birds were recorded onsite.

Breeding Birds

Breeding bird surveys were carried out at the proposed development site on 28 April and 22 June 2021. The proposed development site supports several common bird species. However, the numbers and diversity of threated species such as BOCCI Red List and Amber List species was low. No Annex I species were recorded within the proposed development site.

Table 5. Birds recorded during breeding bird surveys of the proposed development site

Species		Birds Directive Annex	BOCCI	
		I	Red List	Amber List
Turdus merula	Blackbird			
Cyanistes caeruleus	Blue Tit			
Fringilla coelebs	Chaffinch			
Phylloscopus collybita	Chiffchaff			
Prunella modularis	Dunnock			
Regulus regulus	Goldcrest			X
Parus major	Great Tit			
Corvus cornix	Hooded Crow			
Garralus glandarius	Jay			
Pica pica	Magpie			
Turdus viscivorus	Mistle Thrush			
Erithacus rubecula	Robin			
Turdus philomelas	Song thrush			
Phylloscopus trochilus	Willow Warbler			X
Columba palumbus	Wood Pigeon			
Troglodytes troglodytes	Wren			

The breeding birds recorded within the proposed development site boundary are listed in **Table 5**. No Red List species were recorded within the Phase 1 'The Meadows' site. Two Amber List species i.e., Willow warbler *Phylloscopus trochilus* and Goldcrest *Regulus regulus* were recorded during the breeding season. The remaining species recorded were common Green List species e.g. Blackbird *Turdus merula*, Robin *Erithacus rubecula* Wren *Troglodytes troglodytes* and Great tit *Parus major.* The vegetation cover both as scrub with the site boundary and the large treeline on the eastern boundary of the site means that the Phase 1 'The Meadows' site supports a high number of nesting birds, in particular Blackbird. The areas of grassland both within the Phase 1 'The Meadows' site and as well as a larger area of grassland and patches of recolonising vegetation within the proposed development site provide a range of foraging habitat for these woodland edge bird species. No Annex I species were recorded breeding within the proposed development site.

4.4.3 Invasive Species

Non-native plants are defined as those plants which have been introduced outside of their native range by humans and their activities, either purposefully or accidentally. Invasive non-

native species are so-called as they typically display one or more of the following characteristics or features: (1) prolific reproduction through seed dispersal and/or re-growth from plant fragments; (2) rapid growth patterns; and, (3) resistance to standard weed control methods.

Where a non-native species displays invasive qualities and is not managed it can potentially: (1) out compete native vegetation, affecting plant community structure and habitat for wildlife; (2) cause damage to infrastructure including road carriageways, footpaths, walls and foundations; and, (3) have an adverse effect on landscape quality. The NBDC lists a number of both aquatic and terrestrial high impact invasive species which have been recorded within grid square W77, the 10km grid square in which the proposed development site is located (**Table 6**).

Table 6. High impact invasive species recorded in W77

Common Name	Latin Name
Canada Goose	*Branta canadensis*
Ruddy Duck	*Oxyura jamaicensis*
Cherry Laurel	*Prunus laurocerasus*
Common Cord-grass	*Spartina anglica*
Knotweed	*Fallopia japonica x sachalinensis = F. x bohemica*
Giant Hogweed	*Heracleum mantegazzianum*
Giant Knotweed	*Fallopia sachalinensis*
Giant-rhubarb	*Gunnera tinctoria*
Indian Balsam	*Impatiens glandulifera*
Japanese Knotweed	*Fallopia japonica*
Parrot's-feather	*Myriophyllum aquaticum*
Rhododendron	*Rhododendron ponticum*
Harlequin Ladybird	*Harmonia axyridis*
American Mink	*Mustela vison*
Brown Rat	*Rattus norvegicus*
Fallow Deer	*Dama dama*
Feral Ferret	*Mustela furo*
House Mouse	*Mus musculus*
Sika Deer	*Cervus nippon*

Source NBDC database 28/01/22

The control of invasive species in Ireland comes under the Wildlife (Amendment) Act 2000, where it states that

'Any person who— [...] plants or otherwise causes to grow in a wild state in any place in the State any species of flora, or the flowers, roots, seeds or spores of flora, ['refers only to exotic species thereof']][...] otherwise than under and in accordance with a licence granted in that behalf by the Minister shall be guilty of an offence.'

The Birds and Natural Habitats Regulations 2011 (SI 477 of 2011), Section 49(2) prohibits the introduction and dispersal of species listed in the Third Schedule, which includes Japanese Knotweed *Fallopia japonica*, as follows: *"any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow [….] shall be guilty of an offence."*

The Third Schedule species, Japanese Knotweed and Himalayan Knotweed *Persicaria wallichii* were recorded at several locations within the proposed development site. The third schedule invasive species Himalayan Balsam *Impatiens glandulifera* was recorded immediately south of the Phase 1 'The Meadows' site boundary. Although not within the proposed development area, it is recommended that this plant be eradicated.

Japanese Knotweed is a member of the Polygonaceae (docks and rhubarb family), native to Japan and northern China. It has however, become widely distributed throughout Europe, North America, Canada, New Zealand and Australia. Himalayan Knotweed which is a closely related species rarely exceeds 1.5m in height while Japanese Knotweed can reach 3m in height. Dispersal typically occurs through rhizome fragments being transported in soil by humans or to a lesser extent, through passive mechanical means such as in floodwaters. Dispersal is also achieved through vegetative reproduction from plant fragments. The plant typically occurs along roadsides, riverbanks and waste ground in Ireland where it forms dense, monotypic stands. Japanese and Himalayan Knotweed cause a range of problems due to prolific and dense growth habit including blocking sight- lines on roads, damage to paving and structures, erosion of riverbanks and flood defence structures, damage to archaeological sites, loss and displacement of native habitats and species.

Himalayan balsam (*Impatiens glandulifera*) is an invasive terrestrial plant species that was first introduced in the UK in 1839 as an ornamental garden plant. Since it was introduced, it has spread to most parts of Ireland. Due to the nutrient poor soil and cold temperatures in its home range, the Himalayas, it has adapted to develop thousands of seeds, which are dispersed widely as the ripe seedpods shoot their seeds up to 7m (22ft) away. Due to our warmer climate and nutrient rich soils it has thrived here and became highly invasive. Once established in the catchment of a river the seeds, which can remain viable for two years, are transported further afield by water.

The location of third schedule invasive species within the proposed development site boundary is shown in **Figure 5**.

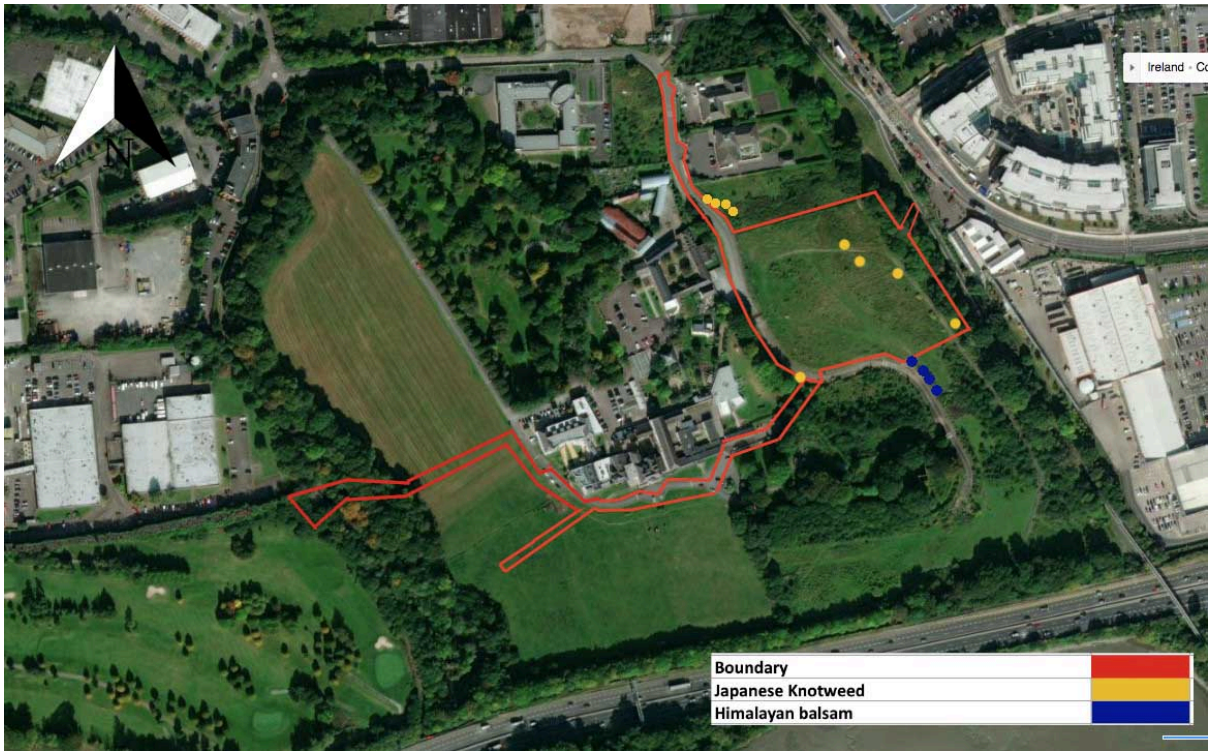


Figure 5. Third Schedule invasive species recorded within the Phase 1 'The Meadows' site boundary

Three other invasive species Buddleia *Buddleja davidii*, Wild Clematis *Clematis vitalba* and Winter Heliotrope *Arctostaphylos luciana* were recorded with a scattered distribution throughout the site.

Buddleia and Wild Clematis are listed as a medium impact listed species by the NBDC. These species are not included in the Third Schedule of the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011). Therefore, their presence at the site does not have the potential to lead to an offence under the Birds and Natural Habitats Regulations 2011 (S.I. 477 of 2011). However, the NBDC notes that under the right ecological conditions these species may have an impact on the conservation goals of a European site or impact on a water body achieving good/high ecological status under the Water Framework Directive (Directive 2000/60/EC). Buddleia and Wild Clematis is also included in the NRA *Guidelines on the Management of Noxious Weeds and Non-native Species on National Roads* (NRA 2010) as these species have been shown to have an adverse impact on landscape quality, native biodiversity or infrastructure; and is likely to be encountered during road schemes.

Winter Heliotrope is classified as a low impact invasive species by the NBDC. This species is not included in the Third Schedule of the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011). Therefore, its presence at the site does not have the potential to lead to an offence under the Birds and Natural Habitats Regulations 2011 (S.I. 477 of 2011). Winter Heliotrope is included in the NRA *Guidelines on the Management of Noxious Weeds and Non-native Species on National Roads* (NRA, 2010) as these species have been shown to have an adverse impact on landscape quality, native biodiversity or infrastructure; and are likely to be encountered during road schemes.

4.5 Water Quality data

4.5.1 Regional Hydrology and Local Water Quality

On a regional scale, the proposed development site is located within the Hydrometric Area No.19 which is the EPA classification for the catchments. The proposed site is within Glasheen_(Corkcity)_SC_010 sub-catchment, which is within the River Lee, Cork Harbour and Youghal Bay catchment under Water Framework Directive (WFD). Togher and Douglas are included in this hydrometric area. This Hydrometric Area falls within the Southwestern River Basin District which is the Water Framework Directive (WFD) designated catchment for the local area that also includes Togher and Douglas.

The largest urban centre in hydrometric area 19 is Cork City. Other suburbs areas within the hydrometric area includes Blarney, Midleton and Macroom**.** Hydrometric Area 19 is 1,732km^2 in area with ground elevations ranging from sea level to over 500mOD.

The European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy, commonly known as the Water Framework Directive (WFD). The WFD is an important piece of environmental legislation which aims to improve the water quality. The WFD classification scheme for water quality includes five status classes: high, good, moderate, poor, and bad.

'High status' is defined as the biological, chemical and morphological conditions associated with no or very low human pressure. This is also called the 'reference condition' as it is the best status achievable - the benchmark. Assessment of quality is based on the extent of deviation from these reference conditions. 'Good status' means a 'slight' deviation from this condition, 'moderate status' means 'moderate' deviation, and so on.

Lough Mahon water body in the vicinity of the site is categorised on the EPA Water Quality Map as a transitional waterbody. EPA sampling of watercourses dating latest from 2013 – 2018 WFD assessment indicates that it had a 'moderate' status. The Lough Mahon transitional water body and Douglas River estuaries are identified as being 'at risk' of not meeting the WFD objectives.

Local Hydrology & Water Quality

The proposed development site does not contain any mapped watercourse. The nearest watercourse to the proposed development site is River Douglas estuary which is located approximately 250m to the south of the site. River Douglas estuary flows in an easterly direction and discharges to transitional water body Lough Mahon through the south of the site. Currently the lands surrounding the development site are classified as urban in use and is underlain predominantly by made ground which means that the drainage system of the area has been heavily modified and likely discharges via soakaways. Most of the site appears to appears well drained. The main hydrological features associated with the site are presented in **Figure 6**.

Figure 6. Hydrological Features of the Area

Flood Risk

The National Flood Hazard Mapping website operated by the OPW (www.floodinfo.ie) has collated records of historic flooding events throughout Ireland. According to the National Flood Hazard Mapping there was no record of historic flooding at the site of the proposed development. The nearest floods to have occurred to the proposed development site occurred in Douglas in 2002 and 2012 and in Rochestown in 2014.

The development site is not identified as an area susceptible to flooding and no history of flooding at the site by the Cork City Development Plan and CFRAM mapping. The CFRAMS Map and Cork City Council Flood Map both indicate that the site lies outside of Flood Zones A and B and can therefore be considered to be located within **Flood Zone C.**

A site-specific Flood Risk Assessment has been carried out by J B Barry and Partners for the proposed development site and this FRA confirms that the site is located in Flood Zone C, the lowest flood risk designation. Therefore, the proposed development is deemed 'Appropriate' in accordance with the Office of Public Work (OPW) Flood Risk Management Guidelines.

Bedrock Aquifer

The Geological Survey of Ireland has classified the aquifer based on the groundwater resources and hydrological characteristic (such as the area extent, well yield, specific capacity and groundwater throughput). There are three main types of aquifers namely, Regionally Important Aquifer, Locally Important Aquifer and Poor Aquifer.

According to the GSI Mapping, the Phase 1 development site is underlain by 'Regionally Important Aquifer' which is Karstified bedrock dominated by diffuse flow (Rkd). In this type of aquifer groundwater flows mainly diffusely through solutional-enlarged fissures.

Groundwater Vulnerability

According to GSI, the Groundwater Vulnerability represents the intrinsic geological and hydrogeological characteristics that determine the ease at which groundwater may be contaminated by human activities. The vulnerability of the groundwater depends on the time travel of infiltrating water, the quantity of contaminants that reach the groundwater and the contaminant attenuation capacity of the geological materials through which the water and contaminants infiltrate. The final vulnerability rating of an area is determined by the permeability and thickness of the subsoils underlying the groundwater, and the type of recharge sources (diffuse or point source). Therefore, areas where the infiltrating water and contaminants move faster from land to groundwater with high permeability are more vulnerable.

According to the GSI the vulnerability classification for the proposed development site is 'High (H)' likely based on the presence of high permeability sand and gravel subsoils. There were no karst features identified adjacent to the site. The groundwater vulnerability map for the proposed development site is presented below in **Figure 7**.

Figure 7. Groundwater vulnerability

4.5.2 Urban Wastewater Treatment Directive

The Wastewater Discharge (Authorisation) Regulations 2007 (S.I. 684 of 2007) gives effect to the requirements of the Urban Wastewater Treatment Directive (Directive 91/271/EEC) and the Water Framework Directive (2000/60/EC) in Ireland. The Urban Wastewater Treatment Directive (UWWTD) lays down the requirements for the collection, treatment and discharge of urban wastewater and specifies the quality standards which must be met — based on agglomeration size — before treated wastewater is released into the environment.

The priority objective for this river basin planning cycle is to secure compliance with the Urban Wastewater Treatment Directive and to contribute to the improvement and protection of waters in keeping with the water-quality objectives established by this Plan. Achieving this objective entails addressing waste-water discharges and overflows where protected areas (i.e. designated bathing waters, shellfish waters and Freshwater Pearl-Mussel sites) or high-status waters are at risk from urban waste-water pressures.

As part of the proposed development, wastewater discharging from the proposed development will be conveyed to the Cork City WWTP (D0033-01) for treatment prior to discharging into the Cork Harbour at Lough Mahon. Cork Harbour is a Nutrient Sensitive Area listed in accordance with the Urban Wastewater Treatment (UWWT) Directive 91/271/EEC on Urban Wastewater Treatment Regulations 2001 (S.I. 48 of 2010).

4.6 Potential Impact of Proposed Development on Cork Harbour SPA and Great Island Channel SAC

4.6.1 Impacts from loss of habitat

Any habitat loss of Natura 2000 sites or deterioration in habitat quality would reduce the extent of habitat available for QI/SCI species. This could potentially decrease the viability of existing QI habitats and increase the pressure on existing habitat and may result in further deterioration.

The proposed development is not located within a designated site and the habitats recorded within the site do not correspond to habitats listed on Annex I of the Habitats Directive or to qualifying habitats for the Great Island Channel SAC. There are no suitable foraging habitats for SCI birds within the proposed development site boundary. Surveys throughout the winter of 2020/2021 did not record any SCI birds, waders or waterfowl within the Bessborough site. The habitats within the proposed development site may be utilised on occasion by common birds for feeding, however the areas to be affected are not critical feeding resources for these species in the context of the wider landscape.

No foraging/roosting habitat of value for species listed as SCIs for the Cork Harbour SPA will be affected. No breeding habitat for species listed as SCIs for the Cork Harbour SPA will be affected. Therefore, the proposed development will not result in any adverse effects on European sites due to habitat loss.

4.6.2 Impacts from surface water runoff during construction and operation

Surface water run-off during the construction and operational phase could potentially be contaminated with silt, hydrocarbons or other chemicals. This has the potential to impact on habitats and water quality within Cork Harbour SPA, which could impact on qualifying species which use these habitats, (A056 Shoveler *Anas clypeata*, A149 Dunlin Calidris alpine, A140 Golden Plover *Pluvialis apricaria*, A050 Wigeon *Anas penelope*, A028 Grey Heron *Ardea cinerea*, A069 Red- breasted merganser *Mergus serrator*, A142 Lapwing *Vanellus vanellus*, A130 Oystercatcher *Haematopus ostralegus*, A141 Grey plover *Pluvialis squatarola*, A052 Teal *Anas crecca*, A054 Pintail *Anas acuta*, A157 Bar-tailed Godwit *Limosa lapponica*, A162 Redshank *Tringa tetanus*, A183 Lesser Black-backed gull *Larus fuscus*, A179 Black-headed Gull *Chroicocephalus ridibundus*, A004 Little Grebe *Tachybaptus ruficollis*, A160 Curlew Numenius arquata, A182 Common Gull *Larus canus*, A048 Shelduck *Tadorna tadorna*, A017 Cormorant *Phalacrocorax carbo*, A193 Common Tern *Sterna hirundo*, A005 Great crested grebe *Podiceps cristatus* and A156 and Black-tailed Godwit *Limosa limosa*).

Therefore, the conservation objectives of the Cork Harbour SPA may be impacted by surface water runoff during construction and operation. Impacts from surface water runoff during the construction and operation have been screened in for further assessment.

Given the distance from the proposed development site, the dilution capacity available within Cork Harbour and the robust nature of estuarine habitats, no significant impact on water quality within Great Island Channel is predicted to occur during construction or operation. Therefore, the surface water discharges from the proposed development during construction or operation will have no impact on the conservation objectives for the Great Island Channel SAC.

4.6.3 Impacts from wastewater discharge during operation

The proposed development could potentially result in an increase in nutrients discharging to Cork Harbour via the Lough Mahon discharge for the Cork City Wastewater Treatment Plant (WWTP). Increased nutrients can potentially impact on estuarine habitats by changing baseline ecological conditions and increasing algal growth, which in turn could impact on feeding success for birds listed as qualifying interests for the Cork Harbour SPA.

Wastewater from the proposed development will be conveyed for treatment to Cork City (Carrigrenan) Wastewater Treatment Plant (WWTP). Treated effluent from the proposed development will ultimately discharge into the waters of the Lough Mahon which sections overlap with that of the Cork Harbour SPA.

The Cork City agglomeration is served by a wastewater treatment plant with a Plant Capacity Population Equivalent (P.E.) of 413,200. The agglomeration consists of one primary discharge point which discharges to the Lough Mahon. The WWTP obtained a discharge licence (Reg: D0033-01) from the Environmental Protection Agency and has assigned emission limit values (ELVs) for a range of parameters to ensure a high degree of protection to the Lough Mahon and surrounding waters.

Treated effluent from the proposed development will discharge from the Cork City WWTP via the main treated effluent line. The discharge licence assigns ELVs for biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), Total Nitrogen (Total N), Total Phosphorous (Total P) and pH. The ELVs are set based on the full design capacity (P.E 413,200) and are aimed at providing a high degree of protection to the receiving water body and to ensure the receiving waterbody is capable of accommodating the proposed discharge without causing or exacerbating a breach in the relevant standards.

The 2020 Annual Environmental Report for Cork City WWTP (D0033-01) was reviewed. **Table 8** provides a summary of the current operating conditions for the WWTP from the main effluent discharge obtained from the most recent Environmental Protection Agency Annual Environment Report 2020 (EPA 2021).

Table 8. Effluent Monitoring

Effluent Monitoring Summary	BOD (mg/l)	COD (mg/l)	TSS (mg/l)	Total P (mg/l)	Total N (mg/l)*	pH
WWDL ELV (Schedule A)	25.00	125	35.0	2.5	10	9
ELV with Condition 2 Interpretation included	50.00	250	87.5	3	12	9
No. of Sample results	261	261	261	25	25	261
Number of exceedances	N/A	NA	2	2	24	N/A

Effluent Monitoring Summary	BOD (mg/l)	COD (mg/l)	TSS (mg/l)	Total P (mg/l)	Total N (mg/l)*	pH
Number of sample results above ELV with condition 2 interpretation	N/A	N/A	N/A	1	22	N/A
Annual Mean (parameters where a mean ELV applies are shaded)	8.64	64.47	14.71	1.73	16.6	7.63
Overall Compliance (Pass/Fail)	**Pass**	**Pass**	**Pass**	**Fail**	**Fail**	**Pass**

The AER notes that the final effluent from the Primary Discharge Point was non-compliant with the Emission Limit Values in 2020. The non-compliances with the ELVs were in relation to Total P (mg/l) and Total N (mg/l). This non-compliance was because nutrient removal does not form part of the WWTP process. In relation to ongoing monitoring of water quality, the 2020 AER concluded the following:

- *The WWTP discharge was not compliant with the ELV's set in the wastewater discharge licence.*
- *The ambient monitoring results does not meet the required EQS. The EQS relates to the Oxygenation and Nutrient Conditions set out in the Surface Water Regulations 2009.*
- *The discharge from the wastewater treatment plant does not have an observable impact on the water quality.*
- *The discharge from the wastewater treatment plant does not have an observable negative impact on the Water Framework Directive status.*

Overall, the discharge from the Wastewater Treatment Plant does not have an observable negative impact on receiving water quality nor a negative impact on the Water Framework Directive Status.

Based on the planned occupancy, the P.E. for the proposed development has been conservatively calculated at 756 (280 units x 2.7 occupancy rate). This would increase the current WWTP load from 241,480 (based on 2020 EPA data) to 242,236 P.E. which is well within the 413,200 P.E. design capacity. Therefore, with the addition of emissions from the proposed development to the WWTP it would increase its operational load to 58.6% of its design capacity with a residual capacity of 41.4%. Thus, given the limited scale of the proposed development and the ability of the WWTP to cater for the additional loading, no significant impact will occur.

The addition of the effluent discharge from the proposed development to the Cork City WWTP is well within its design capacity and will not comprise the operational capability of the WWTP to treat effluent to comply with emission limit values. Therefore, the impacts from the proposed

development will be negligible given the current operating conditions at the WWTP. Likewise, minor increases in nutrient levels potentially discharged by the WWTP will not have a significant impact on feeding conditions for birds listed as qualifying interests or the conservation objectives of Cork Harbour SPA. Similarly, there will be no impact on estuarine habitats within the Great Island Channel SAC.

4.6.4 Impacts from disturbance

Potentially increased noise and disturbance associated with the site works could cause disturbance/displacement of fauna. If of sufficient severity, there could be impacts on reproductive success. Disturbance can cause sensitive species, such as birds, to deviate from their normal, preferred behaviour, resulting in stress, increased energy expenditure and, in some cases, species mortality.

The potential effects and impacts of disturbance have been widely recognised in wildlife conservation legislation, as has the need to develop conservation measures for birds whilst taking human activities into account. Article 4.4 of the Bird's Directive (79/409/EEC) requires member states to "*take appropriate steps to avoid… any disturbances affecting the birds, in so far as these would be significant having regard to the objectives of this Article*". This specifically relates to conservation measures concerning Annex I species.

The wintering birds listed as qualifying interests for the Cork Harbour SPA are strongly associated with estuarine shoreline areas or wetlands - habitat types absent from the proposed development site. Surveys throughout the winter of 2020/2021 indicated that there are no foraging/roosting sites for SCI birds within Phase 1 'The Meadows' or within the overall Bessborough masterplan site.

It is noted that the proposed development site is located adjacent to existing urban developments with the busy National Route N40 located between the proposed development site and the Cork Harbour SPA. This area is subject to noise disturbance and light pollution from existing retail/residential developments and an existing road network. During the construction stage, there will be short-term increases in disturbance within the proposed development site. However, construction noise and vibration are unlikely to propagate beyond the construction site boundary and no significant changes in noise levels within the Cork Harbour SPA will occur.

During operation, there is likely to be an increase in traffic and human activity within Phase 1 'The Meadows". However, given the distance of the SPA from the proposed development site and in the context of the existing noise environment, no significant changes in noise and disturbance are predicted within the Cork Harbour SPA.

No valuable habitat for SCI species was recorded within or adjacent to the proposed development site. The construction and operational phase of the project will increase noise and disturbance. However, in the context of the existing noise environment and given the lack of valuable habitat for SCI species on or near the proposed development site, no impact on birds listed as qualifying interests for the Cork Harbour SPA will occur. It is noted that there are no qualifying species for the Great Island Channel SAC and therefore there is no potential for disturbance effects.

4.6.5 Impacts from Collision Risk

Buildings are an obstacle to bird flight and collisions with buildings, especially their glass windows, are thought to be a major anthropogenic global threat to birds (Klem 1990, 2009, Machtans *et al.* 2013). While the estimates of collision mortality are stark (between 100 million and 1 billion in the US annually (Klem 1990, Dunn 1993)), a number of factors, such as total population size, natural mortality levels, and other human related influences, need to be considered in order to put the collision mortality rates into perspective. Modelling by some authors has found that vulnerability to collision with buildings and towers varied over more than four orders of magnitude among species (Arnold and Zink 2011). Species that migrated long distances or at night, were much more likely to be affected by collisions than year-round residents or diurnal migrants. However, no correlation has been established between relative collision mortality and long-term population trends for these same species.

Species which appear to be most vulnerable to collision are passerine species (Loss *et al.* 2013) and birds of prey (Thaxter *et al.* 2017). Birds which are less manoeuvrable, for example grebes, geese or swans, which are at a greater risk of collision with turbines or powerlines for example, are less likely to fly close to manmade structures due to their lack of manoeuvrability. Therefore, these species rarely collide with buildings. Loss *et al.* (2013), is the most comprehensive examination of species vulnerability to building collision. This study found several species exhibit disproportionately high vulnerability to collisions regardless of building type. All vulnerable species in this case were passerine species.

While building height appears to be a significant factor in collision risk, even on lower height buildings (i.e. below 11 storeys) bird mortality rates have been found to increase with the percentage and surface area of buildings covered by glass (Collins and Horn 2008, Hager *et al.* 2008, 2013, Klem *et al*. 2009, Borden *et al.* 2010) and the amount of light emitted from windows (Evans Ogden 2002, Zink and Eckles 2010). Large amounts of uninterrupted glazing on a building can produce a mirroring or transparent effect, causing glass to be completely invisible to birds. The amount of glazing combined with the artificial lighting at night can significantly increase bird collision risk. While the majority of collisions with buildings take place during daylight, there are many well-documented instances of bright lights at night disorienting large numbers of birds—usually night- migrating passerines but also seabirds—some of which may circle in the light, sometimes until dawn. Nocturnal mortality associated with circulation events is caused by collision with overhead wires and other structures.

Until relatively recently the focus of collision risk studies was on taller buildings (over 12 storeys) and structures such as wind turbines and communication towers. However, based on the sheer number of lower buildings (relative to tall buildings) and the increase in the use of glass for modern buildings, it has become clear the risks associated with building collision are not simply confined to tall buildings. While birds frequently collide with lower buildings, including 1-2 storey dwellings, the species which do are distinct from those which collide with high-rise, lit, glazed buildings. Passerine species are most at risk from low-rise building collision. There is no evidence that other species such as gulls, terns, waders, ducks or grebes, collide with low-rise buildings (i.e. less than 11 storeys). The largest risk associated with the buildings within Phase 1 'The Meadows' would potentially be due to the glazing and lighting elements of the development. There are no overhead wires or other structure associated with the proposed development. The proposed development does not include large expanses or uninterrupted glazing which could be potentially hazardous to birds. During

construction and operation lighting within outdoor shared areas (i.e. carpark, paths, roads etc), will be positioned and directed as not to unnecessarily intrude on adjacent habitats. The lack of larger areas of glass on the buildings also means that light emitted from the building at night will be minimised and unlikely to attract nocturnally migrating birds, which are the main source of documented nocturnal bird collisions.

While SCI birds for the Cork Harbour SPA will occasionally overfly inland habitats, the majority of commuting flights for Cormorants, ducks, waders and gulls are likely to take place within the estuarine habitats (i.e., the open water or mudflats) and not over the built-up environment in the vicinity of the proposed development site. There is no evidence to suggest that SCI species within Cork Harbour are particularly susceptible to buildings collision. While small numbers of gulls were occasionally recorded overflying the proposed development site at a height, no flocks of wading birds, waterfowl or gulls were recorded overflying the site during winter surveys. The proposed development site is approximately 250m from Cork Harbour SPA. Surveys indicate that there are no roosting or foraging sites within or in the vicinity of the proposed development site which could attract birds into the site and potentially put them on a collision path with the proposed buildings.

In the case of the proposed development site, given the lack of foraging/or roosting sites within or adjacent, the absence of large areas of glass, the proposed lighting design and its location within an existing urban setting means that no significant risk of collision for SCI species has been identified. Therefore, the collision risk posed by the proposed development is not significant and it will not impact on conservation objectives for the Cork Harbour SPA.

4.6.6 Impacts from spread of invasive species

The third schedule invasive species Japanese Knotweed and Himalayan Knotweed were recorded within the proposed development site. There is potential during the construction phase for invasive species to be spread within the boundary of the proposed development, thus impacting negatively on adjoining habitats. Although unlikely given the lack of watercourses at the proposed development site and the estuarine habitats within the Cork Harbour SPA, as a precautionary measures, potential impacts of the spread of invasive species on Cork Harbour SPA will be screened in for further assessment.

Given the distance of Great Island Channel SAC, the distance via a hydrological pathway and the robust nature of estuarine habitats within the SAC, no impact from the spread of invasive species is predicted to occur.

4.6.7 In-combination Impacts

In-combination (cumulative) impacts refer to a series of individual impacts that may, in combination, produce a significant effect. The underlying intention of this in- combination provision is to take account of in-combination impacts from existing or proposed plans and projects, and these will often only occur over time. It is proposed that a temporary off- site contractors carpark offsite will be utililsed during the construction period. This site is not included in this application; however, it has been included for the purposes of cumulative assessment.

The main threats to the conservation objectives of the Great Island Channel SAC qualifying habitats are climate change, intensive cattle grazing, intensive sheep grazing, paths, tracks,

cycling tracks, disposal of household / recreational facility waste, disposal of industrial waste reclamation of land, polderisation, modification of hydrographic functioning, erosion and invasive non-native species. In the absence of any significant potential impacts on the qualifying interests for Great Island Channel SAC no potential in-combination impacts from the proposed development have been identified.

As Cork Harbour is adjacent to a major urban centre and a major industrial centre, water quality is variable, with the estuary of the River Lee and parts of the Inner Harbour being somewhat eutrophic. However, the polluted conditions may not be having significant impacts on the bird populations. The Natura 2000 Standard Data Form for Cork Harbour SPA notes that there are no serious imminent threats to the wintering birds even though the intertidal areas receive polluted water. Oil pollution from shipping in Cork Harbour is a general threat. Aquaculture occurs though it is not known if this has significant impacts on the birds. Recreational activities are high in some areas, including jet skiing which causes disturbance to roosting birds. Extensive areas of estuarine habitat have been reclaimed since about the 1950s for industrial, port-related and road projects, and further reclamation remains a threat.

The area surrounding the proposed development site is largely retail/residential developments. This in combination with the proposed development could potentially lead to in-combination impacts within the Cork Harbour SPA. Potential in-combination impacts from surface water discharges during construction on Cork Harbour SPA have been screened in for further assessment.

4.7 Screening of Relevant Natura 2000 Sites and Qualifying Interests/Special Conservation Interests

4.7.1 AA Screening Overview

Potential impacts have been identified for the Cork Harbour SPA. Screening conclusions with regards to the qualifying species and habitats for relevant Natura 2000 sites are provided in **Table 9**. No significant effects on the conservation objectives of other Natura 2000 sites will occur. Sites/QIs/SCIs that are screened in for further assessment are highlighted in bold.

Table 9. Screening of relevant Natura 2000 sites

Natura 2000 Site	Qualifying Interest	Potential Impacts	Screened In/Out
Great Island Channel SAC (Site code 001058)	▪ 1140 Mudflats and sandflats not covered by seawater at low tide ▪ 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Given the absence of significant pathways (See **Section 4.6.1-4.6.7**), no significant impacts on qualifying habitats or the conservation objectives of this SAC are predicted to occur.	Screened out
Cork Harbour SPA (Site code 004030)	▪ **A056 Shoveler *Anas clypeata*** ▪ **A149 Dunlin *Calidris alpina*** ▪ **A140 Golden Plover *Pluvialis apricaria*** ▪ **A050 Wigeon *Anas penelope*** ▪ **A028 Grey Heron *Ardea cinerea*** ▪ **A069 Red- breasted merganser *Mergus serrator*** ▪ **A142 Lapwing *Vanellus vanellus*** ▪ **A130 Oystercatcher *Haematopus ostralegus*** ▪ **A141 Grey plover *Pluvialis squatarola*** ▪ **A052 Teal *Anas crecca*** ▪ **A05 Pintail *Anas acuta*** ▪ **A157 Bar-tailed Godwit *Limosa lapponica*** ▪ **A162 Redshank *Tringa totanus*** ▪ **A183 Lesser Black-backed gull *Larus fuscus*** ▪ **A179 Black-headed Gull *Chroicocephalus ridibundus*** ▪ **A004 Little Grebe *Tachybaptus ruficollis*** ▪ **A160 Curlew *Numenius arquata*** ▪ **A182 Common Gull *Larus canus*** ▪ **A048 Shelduck *Tadorna tadorna*** ▪ **A017 Cormorant *Phalacrocorax carbo*** ▪ **A193 Common Tern *Sterna hirundo***	Given the proposed surface water discharges to the Douglas Estuary, which is located within the Cork Harbour SPA, potential effects could occur due to impacts on water quality during construction and operation and the spread of invasive species during the construction phase.	Screened in

Natura 2000 Site	Qualifying Interest	Potential Impacts	Screened In/Out
	▪ **A005 Great crested grebe *Podiceps cristatus*** ▪ **A156 Black-tailed Godwit *Limosa limosa*** ▪ **A999 Wetlands and waterbirds**		

4.7.2 Screening conclusion

The aims of this screening section of this report were as follows:

- Determine whether the proposed development, alone or in combination with other projects, is likely to have significant effects on Natura 2000 sites in view of their conservation objectives.
- Provide information on and assess the potential for the proposed development to significantly impact on Natura 2000 Sites (also known as European sites).
- Determine whether the proposed development is directly connected with, or necessary to the conservation management of any Natura 2000 sites.

It has been objectively concluded that:

- The proposed development is not directly connected with, or necessary to the conservation management of any Natura 2000 sites.
- On the basis of objective information, the possibility of significant effects from the proposed development on European sites cannot be ruled out. There is potential for the proposed development to significantly impact the Cork Harbour SPA via impacts on water quality during construction and operation and the spread of invasive species during the construction phase.
- The proposed development, alone or in combination with other projects could potentially impact on SCI species within the Cork Harbour SPA.

On the basis of objective information and in view of best scientific knowledge, the possibility of significant effects from the proposed project on a European site, Cork Harbour SPA, cannot be ruled out and therefore an Appropriate Assessment is required.

The NIS has been prepared to inform and assist An Bord Pleanála, to assess, in view of best scientific knowledge, if the proposed development, individually or in combination with another plan or project is likely to have a significant effect on the European site.

5. Natura Impact Statement (NIS)

5.1 Introduction

Sections 3 and 4 of this report are relevant to informing the Natura Impact Statement (NIS) in that the proposed development and receiving environment is described in sufficient detail. In **Section 4**, the Zone of Influence (ZoI) of the proposed development and the European sites within the ZoI were identified. Likely significant effects on the Cork Harbour were identified in **Section 4**. This NIS now examines and analyses, in light of the best scientific knowledge, with respect to this Natura 2000 site within the zone of influence of the proposed development, the potential effect sources and pathways, how these could impact on the SCI species and whether the predicted effects would adversely affect the integrity of the Cork Harbour SPA.

Mitigation measures are set out within the NIS and ensure that any effects on the conservation objectives of the Cork Harbour SPA will be avoided during the proposed development such that there will be no risk of adverse effects on the Cork Harbour SPA.

5.2 Status of Special Conservation Interests (SCIs) for Cork Harbour SPA

Cork Harbour SPA is a large, sheltered bay system that is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl. It is amongst the top ten sites in the country. Owing to the sheltered conditions, the intertidal flats are often muddy in character but described principally as 'mixed sediment to sandy mud with polychaetes and oligochaetes'. These muds support a range of macro-invertebrates, notably *Macoma balthica, Scrobicularia plana, Peringia (Hydrobia) ulvae, Nepthys hombergi, Nereis diversicolor* and *Corophium volutator*, all of which provide a food source for many wintering waterbird species. Salt marshes are scattered through the site and these provide high tide roosts for waterbirds (NPWS 2014b).

The specific conservation objectives for species listed as conservation interests for the Cork Harbour SPA (**Table 10**) are to maintain a favourable conservation condition of the non-breeding/breeding waterbirds and to maintain the favourable conservation condition of the wetland habitat at Cork Harbour SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.

These species are listed as SCIs for the Cork Harbour SPA for the following reasons:

During winter the site regularly supports 1% or more of the all-Ireland population of each of the following species: Cormorant, Curlew, Bar-tailed Godwit, Wigeon, Teal, Little Grebe, Black-headed Gull, Common Gull, Lesser Black-backed Gullm Lapwing, Oystercatcher , Shelduck, Grey Heron, Great Crested Grebe, Pintail, Shoveler, Red-breasted Merganser, Grey Plover and Dunlin.

During winter the site regularly supports 1% or more of the biogeographical population of each of the following species: Black-tailed Godwit, Redshank and Golden Plover.

The site is selected for the breeding Annex I species Common Tern. In 1995, 102 pairs were breeding at this site. This exceeds the All-Ireland 1% threshold for this species.

The wetland habitats contained within Cork Harbour SPA are identified of conservation importance for non-breeding (wintering) migratory waterbirds. Therefore, the wetland habitats are considered to be an additional Special Conservation Interest.

Table 10. SCI species for which a potential impact has been identified – specific targets

Species/Habitats	Attribute	Measure	Target
Little Grebe Great Crested Grebe Cormorant Grey Heron Shelduck	Population trend	Percentage change	Long term population trend stable or increasing
Wigeon Teal Pintail Shoveler Red-breasted Merganser Oystercatcher Golden Plover Grey Plover Lapwing Dunlin Black-tailed Godwit Bar-tailed Godwit Curlew Redshank Black-headed Gull Common Gull Lesser Black-backed Gull	Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by each species, other than that occurring from natural patterns of variation
Common Tern	Breeding population abundance: apparently occupied	Number	No significant decline

Species/Habitats	Attribute	Measure	Target
	nests (AONs)		
	Productivity rate: fledged young per breeding pair	Mean number	No significant decline
	Distribution: breeding colonies	Number; location; area (hectares)	No significant decline
	Prey biomass available	Kilogrammes	No significant decline
	Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase
	Disturbance at the breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding common tern population
Wetlands	Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 2,587 hectares, other than that occurring from natural patterns of variation

5.3 Conservation Status of SCI Species

The Conservation Objectives Supporting document for Cork Harbour SPA (NPWS, 2014c) provides a review of the site conservation condition and population trends for Cork Harbour SPA with regard to species' all-Ireland and international trends. All-Ireland trends follow I-WeBS data 1994-2015 (Birdwatch Ireland 2022) while International trends follow Wetlands International (2012).

Table 11. Conservation Status of SCI species within Cork Harbour

Special Conservation Interests	BoCCI Category [1]	Site conservation condition[2]	Current All-Ireland Trend[3]	Current International Trend[4]
Shelduck	Amber	Unfavourable	Declining	Increasing
Wigeon	Amber	Unfavourable	Declining	Stable
Teal	Amber	Intermediate (Unfavourable)	Stable	Increasing
Pintail	Amber	Highly unfavourable	Stable	Increasing

Special Conservation Interests	BoCCI Category [1]	Site conservation condition[2]	Current All-Ireland Trend[3]	Current International Trend[4]
Shoveler	Red	Highly unfavourable	Stable	Increasing
Red-breasted Merganser	Amber	Highly unfavourable	Stable	n/c
Little Grebe	Green	Favourable	Increasing	Increasing
Great Crested Grebe	Amber	Unfavourable	Stable	Declining?
Cormorant	Amber	Highly unfavourable	Stable	Increasing
Grey Heron	Green	Intermediate	Stable	Increasing
Oystercatcher	Red	Intermediate (unfavourable)	Stable	Declining
Golden Plover	Red	Favourable	Declining	Declining
Grey Plover	Red	Highly unfavourable	Declining	Declining?
Lapwing	Red	Highly unfavourable	Declining	Stable
Dunlin	Red	Unfavourable	Declining	Stable
Black-tailed Godwit	Red	Favourable	Increasing	Increasing
Bar-tailed Godwit	Red	Favourable	Stable	Increasing
Curlew	Red	Unfavourable	Declining	Declining
Redshank	Red	Unfavourable	Stable	Stable/increasing
Black-headed Gull	Amber	Highly unfavourable	n/c	n/c
Common Gull	Amber	Highly unfavourable	n/c	n/c
Lesser Black-backed Gull	Amber	Highly unfavourable	n/c	n/c

1. Gilbert et al. 2021. 2. NPWS, 2014c, 3. Birdwatch Ireland I-WeBS 1994-2015, 4. Wetlands International (2012)

5.4 Assessment of Potential Impacts

All potential impacts would relate to direct and indirect impacts to relevant habitats and fauna of the Cork Harbour SPA. The assessment of impacts is based on the EC (2018) *Managing Natura 2000 Sites: The Provision of Article 6 of the Habitats Directive 92/43/EEC*, professional judgement and criteria or standards where available.

The potential impacts associated with the development are discussed in the following section with respect to their likelihood to have had or to have significant impacts on Natura 2000 sites. As part of the assessment direct, indirect and cumulative impacts were considered. Direct impacts refer to habitat loss or fragmentation arising from land-take requirements for development. Indirect and secondary impacts do not have a straight-line route between cause and effect, and it is potentially more challenging to ensure that all the possible indirect impacts of the project/plan – in combination with other plans and projects have been established.

As part of the assessment the potential for impacts associated with the development were reviewed as outlined below:

- Impacts from surface water runoff during construction
- Impacts from surface water runoff during operation
- Impacts from the spread of invasive species during construction

- In-combination impacts

5.4.1 Impacts on surface water quality during construction

Potential impacts on aquatic habitats which can arise from surface water emissions associated with the construction phase of the proposed development include increased silt levels in surface water run-off and inadvertent spillages of hydrocarbons from fuel and hydraulic fluid.

High levels of silt can impact on fish species. If of sufficient severity, adult fish could theoretically be affected by increased silt levels as gills may become damaged by exposure to elevated suspended solids levels. If of sufficient severity, aquatic invertebrates may be smothered by excessive deposits of silt from suspended solids. In areas of stony substrate, silt deposits may result in a change in the macro-invertebrate species composition, favouring less diverse assemblages and impacting on sensitive species. Cement can also affect fish, plant life and macroinvertebrates by altering pH levels of the water. Aquatic plant communities may also be affected by increased siltation. Submerged plants may be stunted and photosynthesis may be reduced. Such run-off if severe could potentially impact on water quality and thus could impact on aquatic species.

Inadvertent spillages of hydrocarbon and/or other chemical substances could introduce toxic chemicals into the aquatic environment via direct means, surface water run-off or groundwater contamination. Some hydrocarbons exhibit an affinity for sediments and thus become entrapped in deposits from which they are only released by vigorous erosion or turbulence. Oil products may contain various highly toxic substances, such as benzene, toluene, naphthenic acids and xylene which are to some extent soluble in water; these penetrate into the fish and can have a direct toxic effect. The lighter oil fractions (including kerosene, petrol, benzene, toluene and xylene) are much more toxic to fish than the heavy fractions (heavy paraffins and tars). In the case of turbulent waters, the oil becomes dispersed as droplets into the water. In such cases, the gills of fish can become mechanically contaminated and their respiratory capacity reduced (Svobodova *et al.* 1993). Aquatic plant communities may also be affected by increased siltation. Submerged plants may be stunted and photosynthesis may be reduced. Significant impacts on fish stocks or invertebrate prey could potentially impact on piscivorous species i.e., Cormorant and Common Tern or wading birds e.g. Golden Plover and Curlew due to a reduction in prey availability.

Significant hydrocarbon spillage is very unlikely. However, fuels and oils are required during the construction stage and it is necessary ensure that accidental leakage of these liquids does not occur. All fuels stored on site will be bunded and all chemicals will be stored in an appropriate tank. Mitigation measures for hydrocarbon storage and refueling are included in **Section 6.2** of this report. In the event of a minor hydrocarbon spill and in the context of the available dilution in Cork Harbour SPA, impacts are highly unlikely to occur. However, given the hydrological connection of the proposed development to Cork Harbour SPA, the precautionary principle has been applied and mitigation measures to prevent hydrocarbon (and other chemical) runoff during construction will be implemented.

Although unlikely given the distance from Cork Harbour SPA there is potential for silt and chemical contamination arising during construction works, particularly during groundworks and concrete pouring, to enter the Douglas Estuary. Therefore, in order to prevent any risk of impacts from siltation, a range of standard water protection measures have been included in

Section 6.2 of this report, to ensure there is no impact on the Cork Harbour SPA from silt or chemical contamination of surface water runoff during the construction phase.

Following mitigation, no significant impacts on water quality within the Cork Harbour SPA are predicted to occur during the construction phase. Therefore, the proposed development will have no impact on the integrity of Cork Harbour SPA due to surface water runoff during the construction phase.

5.3.2 Impacts from surface water runoff during operation

The surface water strategy for the development will incorporate SuDS features to reduce run-off and provide biodiversity benefits. Within the proposed development site, the surface water runoff will be collected to a range of source control SuDS before slowly discharging to a storm sewer which will convey the flows towards the natural low point at the south of the site (final storage - StormTech attenuation tanks). Surface water runoff directed to the SuDS features will therefore benefit from their pollutant removal qualities. However, to ensure water quality standards are met, dedicated attenuation facilities that are sized on the basis of a design storm with 100-year return period will be installed. The proposed rate of surface water discharge from the development will be limited to that of the greenfield runoff for a 100-year storm event. Grit-sump manholes will also be installed upstream of the two attenuation areas to remove grit from flows to the interceptor and attenuation areas.

The development site is not identified as an area susceptible to flooding and no history of flooding at the site by the Cork City Development Plan and CFRAM mapping. The CFRAMS Map and Cork City Council Flood Map both indicate that the site lies outside of Flood Zones A and B and can therefore be considered to be located within Flood Zone C. Surface water run-off discharge rates from the development sites may be increased due to the increase in the area of impermeable surfaces, shorter flow paths through pipes and reduced roughness co-efficient, however the implementation of SuDs features will maintain runoff rates at, or below, existing greenfield runoff rates. Greater run-off volumes generated by the impermeable surfaces will require stormwater storage within the site to provide protection against pluvial flooding events. Surface water attenuation storage has been incorporated into the design to safeguard against storms and associated flooding throughout the lifetime of the development. Further details on SuDS measures are included in **Section 3.3.** of this report.

To prevent any increased flooding at the proposed development, it is proposed to implement SuDS in order to limit the discharge from the site to the current greenfield discharge rates. The implementation of these SuDS measures will mitigate the risk of flooding outside of the development site.

Given the operational design measures proposed, the distance from the Cork Harbour SPA and the robust nature of estuarine habitats within the SPA, no significant impact on water quality is predicted to occur and there will be no impact on the conservation objectives of the Cork Harbour SPA due to operational surface water discharges.

5.3.3 Impacts from spread of invasive species

There is potential during the construction phase of the proposed works for invasive species to be spread outside the proposed development site and potentially negatively impact on terrestrial habitats adjoining or within Cork Harbour SPA.

Japanese Knotweed and Himalayan Knotweed were recorded growing within and in close proximity to the development area. Knotweed species are highly invasive, non-native species which was originally introduced as an ornamental plant but has since spread along transport routes and rivers to become a serious problem.

Three other invasive species Buddleia, Wild Clematis and Winter Heliotrope were recorded with a scattered distribution throughout the site These species are not included in the Third Schedule of the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011). Therefore, their presence at the site does not have the potential to lead to an offence under the Birds and Natural Habitats Regulations 2011 (S.I. 477 of 2011). However, the NBDC notes that under the right ecological conditions these species may have an impact on the conservation goals of a European site or impact on a water body achieving good/high ecological status under the Water Framework Directive (Directive 2000/60/EC).

An outline invasive species management plan (ISMP) has been included in **Appendix 4** of this report. This management plan will include all relevant provisions for site hygiene and appropriate disposal of contaminated soil and subsoil. Following the implementation of mitigation measures outlined in the ISMP, no impact on the integrity of Cork Harbour SPA from the spread of invasive species during construction will occur.

5.3.4 In combination Impacts

In-combination impacts refer to a series of individually modest impacts that may in combination produce a significant impact. The underlying intention of this in combination provision is to take account of in-combination impacts from existing or proposed plans and projects and these will often only occur over time. Other developments near site and potential in-combination impacts are identified in **Table 12**. In the absence of any significant impacts on qualifying interests or conservation objectives associated with this project no significant in-combination impacts have been identified.

Table 12. Other developments near site and potential cumulative impacts

Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Impact
River Basin Management Plan 2018-2021	The project should comply with the environmental objectives of the Irish RBMP which are to be achieved generally by 2021. • Ensure full compliance with relevant EU legislation • Prevent deterioration • Meeting the objectives for designated protected areas • Protect high status waters • Implement targeted actions and pilot schemes in focus sub-catchments aimed at: targeting water bodies close to meeting their objective	The implementation and compliance with key environmental policies, issues and objectives of this management plan will result in positive in-combination effects to European sites. The implementation of this plan will have a positive impact for the biodiversity. It will not contribute to in-combination or cumulative impacts with the proposed development.

Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Impact
	and addressing more complex issues which will build knowledge for the third cycle.	
Inland Fisheries Ireland Corporate Plan 2016 -2020	To ensure that Ireland's fish populations are managed and protected to ensure their conservation status remains favourable. That they provide a basis for a sustainable world class recreational angling product, and that pristine aquatic habitats are also enjoyed for other recreational uses. To develop and improve fish habitats and ensure that the conditions required for fish populations to thrive are sustained and protected. To grow the number of anglers and ensure the needs of IFI's other key stakeholders are being met in a sustainable conservation focused manner. EU (Quality of Salmonid Waters) Regulations 1988. All works during development and operation of the project must aim to conserve fish and other species of fauna and flora habitat; biodiversity of inland fisheries and ecosystems and protect spawning salmon and trout.	The implementation and compliance with key environmental issues and objectives of this corporate plan will result in positive on-combination effects to European sites. The implementation of this corporate plan will have a positive impact for biodiversity of inland fisheries and ecosystems. It will not contribute to in-combination or cumulative impacts with the proposed works.
Irish Water Capital Investment Plan 2014-2016	Proposals to upgrade and secure water services and water treatment services countrywide.	Likely net positive impact due to water conservation and more effective treatment of water.
Water Services Strategic Plan (WSSP, 2015)	Irish Water has prepared a Water Services Strategic Plan (WSSP, 2015), under Section 33 of the Water Service No. 2 Act of 2013 to address the delivery of strategic objectives which will contribute towards improved water quality and biodiversity requirements through reducing: • Habitat loss and disturbance from new / upgraded infrastructure; • Species disturbance; • Changes to water quality or quantity; and Nutrient enrichment /eutrophication.	The WSSP forms the highest tier of asset management plans (Tier 1) which Irish Water prepare and it sets the overarching framework for subsequent detailed implementation plans (Tier 2) and water services projects (Tier 3). The WSSP also sets out the strategic objectives against which the Irish Water Capital Investment Programme is developed. The current version of the CAP outlines the proposals for capital expenditure in terms of upgrades and new builds within the Irish Water owned assets. Therefore, no adverse significant in-combination effects are envisaged.

Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Impact
NPWS Conservation Management Plans	Conservation Management Plans have not been fully prepared for the European sites being assessed. However, conservation objectives along with supporting documents for the Cork Harbour SPA	The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site. The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level. The resultant effects of conservation objectives are a net positive and there is no potential for in combination effects on European sites.
WWTP discharges	Carrigtwohill and Environs WWTP, Carrigrennan WWTP, Midleton WWTP, Whitegate-Aghada WWTP, Midleton WWTP, Ringaskiddy Village WWTP's, Cobh & North Cobh WWTP's, Passage-Monkstown WWTP.	Discharges from municipal WWTPs are required to meet water quality standards. Irish Water Capital Investment Plan proposes to upgrade water treatment services countrywide (see above). The long-term cumulative impact is predicted to be negligible.
Other developments – developments under construction in vicinity of proposed development site	The following developments are currently under construction in the vicinity of the proposed development site. Cork City Council Ref: 17/37565 Construction of 66 no. residential units and all associated ancillary development works including vehicular access, parking, footpaths, landscaping, drainage and amenity areas. Granted by way of Material Contravention of City Development Plan on 24/04/2018. Crawford Gate Development. Last phase under construction.	If the construction of these projects were to run concurrently with the Phase 1 'The Meadows' there is potential for in-combination disturbance effects, as the sites are located in proximity to each other. Should this situation arise, construction activities will be planned and phased,

Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Impact
	Cork City Council Ref: 18/37820 The demolition and removal of the existing warehouse/distribution building and associated structures and the construction of 135 no. residential units comprising 24 no. dwelling houses, 64 no. duplex apartments and a three storey apartment block (comprising 20 no. apartments) and a four storey apartment block (comprising 27 no. apartments) and 1 no. creche Granted by way of Material Contravention of City Development Plan on 28/02/2019. Cork City Council Ref: 21/40481 Permission for the construction of a new single storey detached classroom to be associated with the existing Bessborough Creche including all associated site works. Conditionally granted on the 13/12/2021. Cork City Council Ref: 2140503 Permission for the change of use of an existing building from office use to classrooms and associated educational use. The building area subject to the change of use is the ground floor of the existing two storey Coach Building, the existing single storey Anvil Building with attached toilet block, and the existing two storey Gallery Building, all part of an enclosed courtyard structure. Conditionally granted on the 22/12/2021. Cork City Council Ref: 2140453 Permission to alter and extend the previously granted Creche building granted under planning reference No. 18/37820 and An Bord Pleanala ABP-302784-18 to incorporate a larger ground floor Creche/Community facility and bin store. The application is also to include for the permission of 10. no. first and second floors apartments to consist of the following: 5 no. first floor apartments: 2 no. 1 bed and 3 no. 2 bed with communal storage and 5 no. second floor apartments: 2 no. 1 bed and 3 no. 2 bed with communal storage and all associated site works. Conditionally granted on the 22/12/2021. Decision pending	in consultation with the construction management teams. No in-combination impacts were identified during the operational phase of the proposed development. The proposed development will not result in any significant impacts on water quality or aquatic ecology. Therefore, no cumulative impacts on water quality have been identified. No cumulative impacts are predicted to occur within the Cork Harbour SPA as a result of these proposed and permitted projects.
Other developments under consideration/recently refused	The assessment also has regard to the development opportunity that remains in the nearby site where the following planning application was refused in 2021: Cork City Council Ref: 2039705/ABP-309560-1 Permission for the construction of 67 apartments in an 8-storey apartment. A Natura impact statement (NIS) will be submitted to the planning authority with the application. Bessborough, Ballinure, Blackrock, Co Cork. The ABP Inspector considered that, in principle, should the lands immediately to the north be developed the	If the construction of these projects were to run concurrently with the Phase 1 'The Meadows' there is potential for in-combination disturbance effects, as the sites are located in proximity to each other. Should this situation arise, construction activities will be planned and phased, in consultation with the

Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Impact
	subject site would be suitable for residential development whereby a material contravention of the zoning provisions of the development plan could be countenanced. These lands therefore are included in this assessment as they retain development potential.	construction management teams. No in-combination impacts were identified during the operational phase of the proposed development. The proposed development will not result in any significant impacts on water quality or aquatic ecology. Therefore, no cumulative impacts on water quality have been identified. No cumulative impacts are predicted to occur within the Cork Harbour SPA as a result of these proposed and permitted projects.
Future development in landholding	Phase 2 'The Farm' The proposed development provides for the demolition of 10 no.existing agricultural buildings /sheds and log cabin structure and the construction of 140apartments over 2 no. retained and repurposed farmyard buildings and 3no. new blocks of 3-5storeys in height. The development will consist of 1no. 3-bedroom apartments, 69no. 2-bedroom apartments, and 70no. 1-bedroom apartments, and the refurbishment, amalgamation and change of use of 3 no. agricultural buildings to provide communal facilities. Provision is made for a creche at ground floor level in Building D,and shared communal facilities including a resident's gym, workspace, lounge, function room, library, lobby and concierge facilities across buildingsA,B, D and E. Building management facilities including plant and storage areas are provided across all apartment buildings. The proposed development includes a new pedestrian/cycle bridge over the adjoining Passage West Greenway to the west, connecting into the existing down ramp from Mahon providing direct access to the greenway and wider areas. The development includes new pedestrian/cycle path infrastructure to the north of Bessborough Estate with new archway access pointin the estate wall with pedestrian crossing tying into the local footpath network. Thedevelopment includesa publicly accessible parkland, including restoration of its historic pathways. Ancillary site works to include provision of a substation, playgroundand outdoor amenity	If the construction of these projects were to run concurrently with the Phase 1 'The Meadows' there is potential for in-combination disturbance effects, as the sites are located in proximity to each other. Should this situation arise, construction activities will be planned and phased, in consultation with the construction management teams. No in-combination impacts were identified during the operational phase of the proposed development. The proposed development will not result in any significant impacts on water quality or aquatic ecology. Therefore, no cumulative impacts on water quality have been identified.

Plans and Projects	Key Policies/Issues/Objectives Directly Related to the Conservation of the Natura 2000 Network	Impact
	spaces, landscaping, 58no. car parking spaces, 5 no. motorbike spaces, 330no. bicycle parking spaces, bin stores and public lighting. Vehicular access to the proposed development will also be provided viaexisting access road off the Bessborough Road. As set out in the submitted site masterplan, the applicant has intentions for a third follow-on phase of development to the west and south of Bessborough House, subject to zoning which is under consideration as part of the preparation of the Cork City Development Plan 2022-2028. The prepared masterplan provides for 200 no. apartments across 5 blocks ranging in height from 2-4 storeys as part of a landscaped parkland setting. The development will consist of 5 no. 3-bedroom apartments, 100 no. 2-bedroom apartments, 92 no. 1-bedroom apartments, and 3 no. studio apartments. The proposal includes a National Memorial and Archive Centre building and remembrance park to the south. Provision is made for a creche and shared communal facilities across the buildings comprising gym, lounges and home work areas. The development includes new pedestrian/cycle path infrastructure, including connections to the Passage West Greenway. Vehicular access to the proposed development will also be provided via the existing estate access road off the Bessborough Road, with the entrance subject to modification and upgrade works. Phase 3 will be subject to a separate planning consenting process, with the designed particulars of the proposal assessed as part of that application. Notwithstanding this, the EIAR considers the full combined development for the purposes of completing a robust assessment of the entire project and having regard to the outline level of design detail that presently exists for the North Fields.	No cumulative impacts are predicted to occur within the Cork Harbour SPA as a result of these proposed and permitted projects.

The area surrounding the proposed development includes a mixture of retail and residential developments as well as a large road network. Wastewater is also discharged from other settlements (e.g. Blarney, Douglas, Ringaskiddy) and local industry. However, in the absence of any significant impact associated with this project no cumulative impacts on water quality have been identified. Similarly, no significant cumulative impacts in relation to noise and disturbance have been identified.

6. Mitigation

6.1 General Mitigation Measures

The mitigation measures have been drawn up in line with current best practice and include an avoidance of sensitive habitats at the design stage and mitigation measures will function

effectively in preventing significant ecological impacts. The following mitigation measures will be implemented:

A Construction Environmental Management Plan (CEMP) has been submitted with this application. The CEMP contains the construction mitigation measures, which are set out in this report. An ISMP has also been prepared which included mitigation measures relating to the control of invasive species during construction (**Appendix 4**).

Mitigation measures (of relevance in respect of any potential ecological effects) will be implemented throughout the project, including the preparation and implementation of detailed method statements. The works will incorporate the relevant elements of the guidelines outlined below:

- *The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads.* National Roads Authority, Dublin (2010).
- *Control of water pollution from construction sites. Guidance for consultants and contractors (*C532). CIRIA. H. Masters-Williams et al (2001)
- *Control of water pollution from linear construction projects. Technical guidance (C648).* CIRIA. E. Murnane, A. Heap and A. Swain. (2006)

All personnel involved with the proposed development will receive an on-site induction relating to construction and operations, and the environmentally sensitive nature of the Cork Harbour SPA (Douglas Estuary) and to re-emphasise the precautions that are required as well as the control measures to be implemented. Site managers, foremen and workforce, including all subcontractors, will be suitably trained in risks and preventative measures.

All staff and subcontractors have the responsibility to:

- Work to agreed plans, methods and procedures to eliminate and minimise environmental impacts,
- Understand the importance of avoiding on-site impacts, including noise and dust, and how to respond in the event of an incident to avoid or limit environmental impact;
- Respond in the event of an incident to avoid or limit environmental impact;
- Report all incidents immediately to the site manager;
- Monitor the workplace for potential environmental risks and alert the site manager if any are observed; and
- Co-operate as required, with site inspections.

6.2 Water Quality

The employment of good construction management practices will minimise the risk of impacts to soil, stormwater run-off, estuarine waters or groundwater. A summary of the measures relevant to hydrology are provided as follows and are in accordance with Construction Industry Research and Information Association (CIRIA) guidance – *Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors* (Masters-Williams *et al.* 2001).

Further detail is provided in the CEMP which has been submitted as part of the planning application.

All works carried out as part of these works will comply with all Statutory Legislation including the Local Government (Water Pollution) Act, 1977 and 1990 (as amended) and the contractor will cooperate in-full with Irish Water and the Environmental Department of Cork City Council. There is no immediate watercourse in the vicinity of the site. The Douglas Estuary is located south of the site on the southern side of the N40.

The following description outlines the proposed water/wastewater works to be carried out during Phase 1:

- Surface Water - The proposed surface water network will include a drainage pipe network, attenuation storage and SuDS features. The restricted discharge from the site will be conveyed in a new surface water pipe laid from the western boundary of the Meadows in a westerly direction across the Bessborough site to connect to an existing 750mm diameter surface water sewer upstream of its connection to the 1350mm diameter surface water pipe which discharges to the Douglas Estuary south of the N40. A legal wayleave is in place across the Bessborough lands immediately to the south-west of The Meadows development to facilitate this connection.

Surface water runoff during site clearance and construction stage can be potentially contaminated. The most likely forms of contamination are ‘siltation’ and spillage. Siltation occurs when soil and particulate matter are washed away in rainfall events by rainwater. Siltation will be mitigated on the project using stilling tanks and strainers within the site to prevent silt being lost to the drainage network.

6.2.1 Excavation, Erosion and Sediment Control

- Measures will be implemented to capture and treat sediment laden water run off (e.g. silt traps; siltbuster)
- The area of exposed ground will be minimised and as much vegetation as possible will be retained for as long as is practical
- Delay clearing and topsoil stripping of each area until work is ready to proceed.
- Close and backfill trenches as soon as practically possible
- Any earthworks temporary stockpile areas will require silt fencing to be installed.
- Any on-site settlement areas are to include geotextile liners and riprapped inlets and outlets to prevent scour and erosion
- Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement areas, at the lower, south west end of the site, where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.
- Surface water discharge points during the construction phase are to be agreed Cork City Council’s Environment Section prior to commencing works on site.

As fuels and oils are required during construction stage, it is necessary to mitigate the possibility of there being an accidental leakage of these liquids. All fuels stored on site will be bunded and all chemicals will be stored in an appropriate tank. Should any spillage occur on site during construction, it is likely that there will be a localised moderate impact in the short term on the environment.

6.2.2 Accidental Spills and Leaks

- All oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand (impervious) area
- Refuelling and servicing of construction machinery will take place in a designated hard stand area which is also remote from any surface water inlets.
- A response procedure will be put in place to deal with any accidental pollution events and spillage kits will be available and construction staff will be familiar with the emergency procedures and use of equipment.
- Concrete batching will take place on-site and offsite. Wash down and wash out of concrete trucks will take place off site and any excess concrete will not be disposed of on site
- Pumped concrete will be monitored to ensure there is no accidental discharge
- Mixer washings are not to be discharged into surface water drains and will be directed to settlement areas.
- Discharge from any vehicle wheel wash areas is to be directed to onsite settlement areas, debris and sediment captured by vehicle wheel washes are to be disposed off-site at a licensed facility.

Through consultation with the Site Manager (SM) /Site Environmental Manager (SEM), a schedule for surface water quality monitoring will be drawn up. This will be finalised prior to the start of construction. Where monitoring parameters are found to exceed the standards laid down, the SM/SEM will initiate and report corrective actions. This may necessitate the alteration of the environmental control measures and in turn the relevant construction method statement.

It is proposed to implement a programme for monitoring water quality at the outfall tie-in as part of the construction of this development, in agreement with the Planning Authority. This programme and sampling requirements will be agreed with Cork City Council.

6.3 Invasive species

In addition to the possible advance treatment works and a pre-construction survey, when the works areas become available to the contractor for fencing and commencement of site clearance, areas identified as requiring specific invasive species treatment will be demarcated and the designated control measures implemented at the earliest possible stage to reduce the risk of spread along the proposed development or beyond the land take.

There are a number of management options that may be implemented to control and prevent the spread of invasive species. Those involved in the application of herbicides/pesticides will be competent to do so and will have sufficient experience and knowledge in the area of herbicides/pesticides application.

All staff involved in the application of herbicides/pesticides will have received appropriate training, which may include achieving competency certification in the safe use of herbicides/pesticides through a National Proficiency Tests Council registered assessment centre or achieving an appropriate FETAC award in this area.

As noted in **Section 4.4.3** of this report, there is no statutory obligation to remove Buddleia, Wild Clematis or Winter Heliotrope. However, all invasive species will be removed via mechanical movement and herbicide treatment prior to the commencement of construction. An Outline Invasive Species Management Plan (ISMP) has been included in **Appendix 4** of this report.

7. Screening conclusion and statement

The AA screening concluded, on the basis of objective information and in view of best scientific knowledge, the possibility of significant effects from the proposed project on European sites could not be ruled out and therefore an Appropriate Assessment was required. The AA screening concluded that there was potential for the proposed development to significantly impact the Cork Harbour SPA, via surface water runoff and the spread of invasive species during construction as well as potential in-combination impacts.

The NIS has been prepared to inform and assist An Bord Pleanála to assess, in view of best scientific knowledge, if the proposed development, individually or in combination with another plan or project is likely to have a significant effect on the European site, Cork Harbour SPA.

This NIS has examined and analysed, in light of the best scientific knowledge, with respect to Cork Harbour SPA within the potential zone of influence of the proposed development, the potential effect pathways, how these could impact on SCI species and habitats and whether the predicted effects would adversely affect the integrity of Cork Harbour SPA.

Mitigation measures are set out in **Section 6** of the NIS and they ensure that any effects on the conservation objectives of Cork Harbour SPA will be avoided during the proposed development such that there will be no risk of adverse effects on the integrity of these European sites.

It has been objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted effects from the proposed development and with the implementation of the mitigation measures proposed, that the construction and operation of the proposed development will not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in combination with other plans or projects. There is no reasonable scientific doubt in relation to this conclusion. The competent authority will make the final determination in this regard.

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Appendices

Appendix 1 Site synopses

Cork Harbour Special Protection Area (Site Code 004030)

Cork Harbour is a large, sheltered bay system, with several river estuaries - principally those of the Rivers Lee, Douglas, Owenboy and Owennacurra. The SPA site comprises most of the main intertidal areas of Cork Harbour, including all of the North Channel, the Douglas River Estuary, inner Lough Mahon, Monkstown Creek, Lough Beg, the Owenboy River Estuary, Whitegate Bay and the Rostellan and Poulnabibe inlets.

Owing to the sheltered conditions, the intertidal flats are often muddy in character. These muds support a range of macro-invertebrates, notably Macoma balthica, Scrobicularia plana, Hydrobia ulvae, Nepthys hombergi, Nereis diversicolor and Corophium volutator. Green algae species occur on the flats, especially Ulva lactua and Enteromorpha spp. Cordgrass (Spartina spp.) has colonised the intertidal flats in places, especially where good shelter exists, such as at Rossleague and Belvelly in the North Channel. Salt marshes are scattered through the site and these provide high tide roosts for the birds. Salt marsh species present include Sea Purslane (Halimione portulacoides), Sea Aster (Aster tripolium), Thrift (Armeria maritima), Common Saltmarsh-grass (Puccinellia maritima), Sea Plantain (Plantago maritima), Laxflowered Sea-lavender (Limonium humile) and Sea Arrowgrass (Triglochin maritima). Some shallow bay water is included in the site. Cork Harbour is adjacent to a major urban centre and a major industrial centre. Rostellan Lake is a small brackish lake that is used by swans throughout the winter. The site also includes some marginal wet grassland areas used by feeding and roosting birds.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Little Grebe, Great Crested Grebe, Cormorant, Grey Heron, Shelduck, Wigeon, Teal, Pintail, Shoveler, Red-breasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Dunlin, Blacktailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Black-headed Gull, Common Gull, Lesser Black-backed Gull and Common Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Cork Harbour is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl, for which it is amongst the top five sites in the country. The two-year mean of summed annual peaks for the entire harbour complex was 55,401 for the period 1995/96 and 1996/97. Of particular note is that the site supports internationally important populations of Black-tailed Godwit (905) and Redshank (1,782) - all figures given are average winter means for the two winters 1995/96 and 1996/97. At least 18 other species have populations of national importance, as follows: Little Grebe (51), Great Crested Grebe (204), Cormorant (705), Grey Heron (63), Shelduck (2,093), Wigeon (1,852), Teal (922), Pintail (66), Shoveler (57), Red-breasted Merganser (88), Oystercatcher (1,404), Golden Plover (3,653), Grey Plover (84), Lapwing (7,688), Dunlin (10,373), Bartailed Godwit (417), Curlew (1,325) and Greenshank (26). The Shelduck population is the largest in the country (over 10% of national total). The site has regionally or locally important populations of a range of other species, including Whooper Swan (10), Pochard (145) and Turnstone (79). Other species using the site include Gadwall (13), Mallard (456), Tufted Duck (113), Goldeneye (31), Coot (53), Mute Swan (38), Ringed Plover (34) and Knot (38). Cork Harbour is a nationally important site for gulls in winter and autumn, especially Black-headed Gull (4,704), Common Gull (3,180) and Lesser Black-backed Gull (1,440).

A range of passage waders occurs regularly in autumn, including such species as Ruff (5-10), Spotted Redshank (1-5) and Green Sandpiper (1-5). Numbers vary between years and usually a few of each of these species over-winter.

The wintering birds in Cork Harbour have been monitored since the 1970s and are counted annually as part of the I-WeBS scheme.

Cork Harbour has a nationally important breeding colony of Common Tern (3-year mean of 69 pairs for the period 1998-2000, with a maximum of 102 pairs in 1995). The birds have nested in Cork Harbour since about 1970, and since 1983 on various artificial structures, notably derelict steel barges and the roof of a Martello Tower. The birds are monitored annually and the chicks are ringed.

Extensive areas of estuarine habitat have been reclaimed since about the 1950s for industrial, port-related and road projects, and further reclamation remains a threat. As Cork Harbour is adjacent to a major urban centre and a major industrial centre, water quality is variable, with the estuary of the River Lee and parts of the Inner Harbour being somewhat eutrophic. However, the polluted conditions may not be having significant impacts on the bird populations. Oil pollution from shipping in Cork Harbour is a general threat. Recreational activities are high in some areas of the harbour, including jet skiing which causes disturbance to roosting birds.

Cork Harbour is of major ornithological significance, being of international importance both for the total numbers of wintering birds (i.e. > 20,000) and also for its populations of Black-tailed Godwit and Redshank. In addition, there are at least 18 wintering species that have populations of national importance, as well as a nationally important breeding colony of Common Tern. Several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover, Bar-tailed Godwit, Ruff and Common Tern. The site provides both feeding and roosting sites for the various bird species that use it.

Great Island Channel SAC Site Code: 001058

The Great Island Channel stretches from Little Island to Midleton, with its southern boundary being formed by Great Island. It is an integral part of Cork Harbour which contains several other sites of conservation interest. Geologically, Cork Harbour consists of two large areas of open water in a limestone basin, separated from each other and the open sea by ridges of Old Red Sandstone. Within this system, Great Island Channel forms the eastern stretch of the river basin and, compared to the rest of Cork Harbour, is relatively undisturbed. Within the site is the estuary of the Owennacurra and Dungourney Rivers. These rivers, which flow through Midleton, provide the main source of freshwater to the North Channel.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1140] Tidal Mudflats and Sandflats [1330] Atlantic Salt Meadows

The main habitats of conservation interest in Great Island Channel SAC are the sheltered tidal sand and mudflats and the Atlantic salt meadows. Owing to the sheltered conditions, the intertidal flats are composed mainly of soft muds. These muds support a range of macro-invertebrates, notably Macoma balthica, Scrobicularia plana, Hydrobia ulvae, Nepthys hombergi, Nereis diversicolor and Corophium volutator. Green algal species occur on the flats, especially Ulva lactua and Enteromorpha spp. Cordgrass (Spartina spp.) has colonised the intertidal flats in places, especially at Rossleague and Belvelly.

The saltmarshes are scattered through the site and are all of the estuarine type on mud substrate. Species present include Sea Purslane (Halimione portulacoides), Sea Aster (Aster tripolium), Thrift (Armeria maritima), Common Saltmarsh-grass (Puccinellia maritima), Sea Plantain (Plantago maritima), Greater Sea-spurrey (Spergularia media), Lax-flowered Sea-lavender (Limonium humile), Sea Arrowgrass (Triglochin maritimum), Sea Mayweed (Matricaria maritima) and Red Fescue (Festuca rubra).

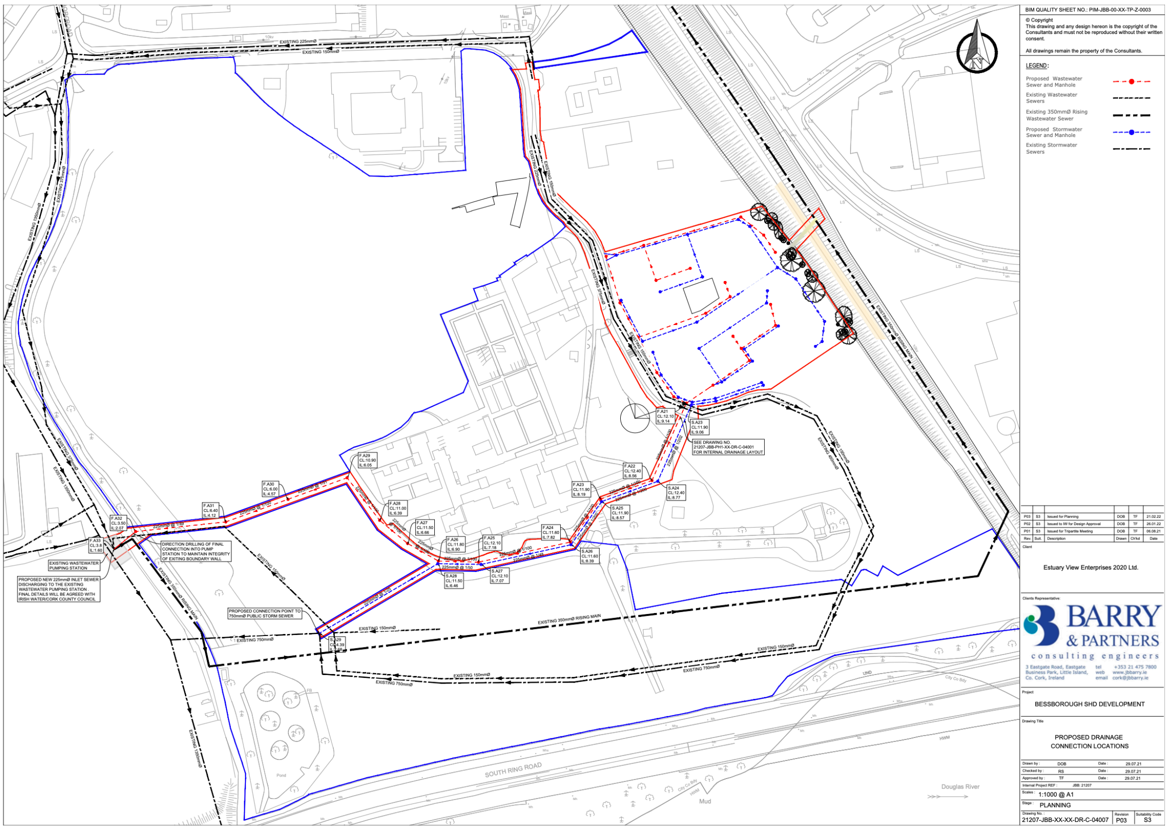
The site is extremely important for wintering waterfowl and is considered to contain three of the top five areas within Cork Harbour, namely North Channel, Harper's Island and Belvelly-Marino Point. Shelduck is the most frequent duck species with 800-1,000 birds centred on the Fota/Marino Point area. There are also large flocks of Teal and Wigeon, especially at the eastern end. Waders occur in the greatest density north of Rosslare, with Dunlin, Godwit, Curlew and Golden Plover the commonest species. A population of about 80 Grey Plover is a notable feature of the area. All the mudflats support feeding birds; the main roost sites are at Weir Island and Brown Island, and to the north of Fota at Killacloyne and Harper’s Island. Ahanesk supports a roost also but is subject to disturbance. The numbers of Grey Plover and Shelduck, as given above, are of national importance.

The site is an integral part of Cork Harbour which is a wetland of international importance for the birds it supports. Overall, Cork Harbour regularly holds over 20,000 waterfowl and contains internationally important numbers of Black-tailed Godwit (1,181) and Redshank (1,896), along with nationally important numbers of nineteen other species. Furthermore, it contains large Dunlin (12,019) and Lapwing (12,528) flocks. All counts are average peaks, 1994/95 – 1996/97. Much of the site falls within Cork Harbour Special Protection Area, an important bird area designated under the E.U. Birds Directive.

While the main land use within the site is aquaculture (oyster farming), the greatest threats to its conservation significance come from road works, infilling, sewage outflows and possible marina developments.

The site is of major importance for the two habitats listed on Annex I of the E.U. Habitats Directive, as well as for its important numbers of wintering waders and wildfowl. It also supports a good invertebrate fauna.

Appendix 2. Site Drawings


BIM QUALITY SHEET NO.: PIM-JBB-00-XX-TP-Z-0003
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All drawings remain the property of the Consultants.
LEGEND:
Proposed Wastewater Sewer and Manhole
Existing Wastewater Sewers
Existing 350mmØ Rising Wastewater Sewer
Proposed Stormwater Sewer and Manhole
Existing Stormwater Sewers
P03 S3 Issued for Planning DOB TF 21.02.22
P02 S3 Issued to IW for Design Approval DOB TF 26.01.22
P01 S3 Issued for Tripartite Meeting DOB TF 06.08.21
Rev. Suit. Description Drawn Ch'kd Date
Client
Estuary View Enterprises 2020 Ltd.
Clients Representative:
BARRY & PARTNERS
consulting engineers
3 Eastgate Road, Eastgate Business Park, Little Island, Co. Cork, Ireland
tel +353 21 475 7800
web www.jbbarry.ie
email cork@jbbarry.ie
Project
BESSBOROUGH SHD DEVELOPMENT
Drawing Title
PROPOSED DRAINAGE CONNECTION LOCATIONS
Drawn by : DOB Date : 29.07.21
Checked by : RS Date : 29.07.21
Approved by : TF Date : 29.07.21
Internal Project REF : JBB: 21207
Scales : 1:1000 @ A1
Stage : PLANNING
Drawing No. : 21207-JBB-XX-XX-DR-C-04007
Revision P03
Suitability Code S3
SOUTH RING ROAD
Douglas River
Mud

Appendix 3. Letter from Irish Water

UISCE ÉIREANN : IRISH WATER

Tim Finn

JB Barry & Partners
3 Eastgate, Eastgate Business Park
Little Island
Co. Cork
T45KH74

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

9 February 2022

Re: CDS21001326 pre-connection enquiry - Subject to contract | Contract denied

Connection for Multi/Mixed Use Development of 280 unit(s) and creche at Bessboro, Blackrock, Co. Cork

Dear Sir/Madam,

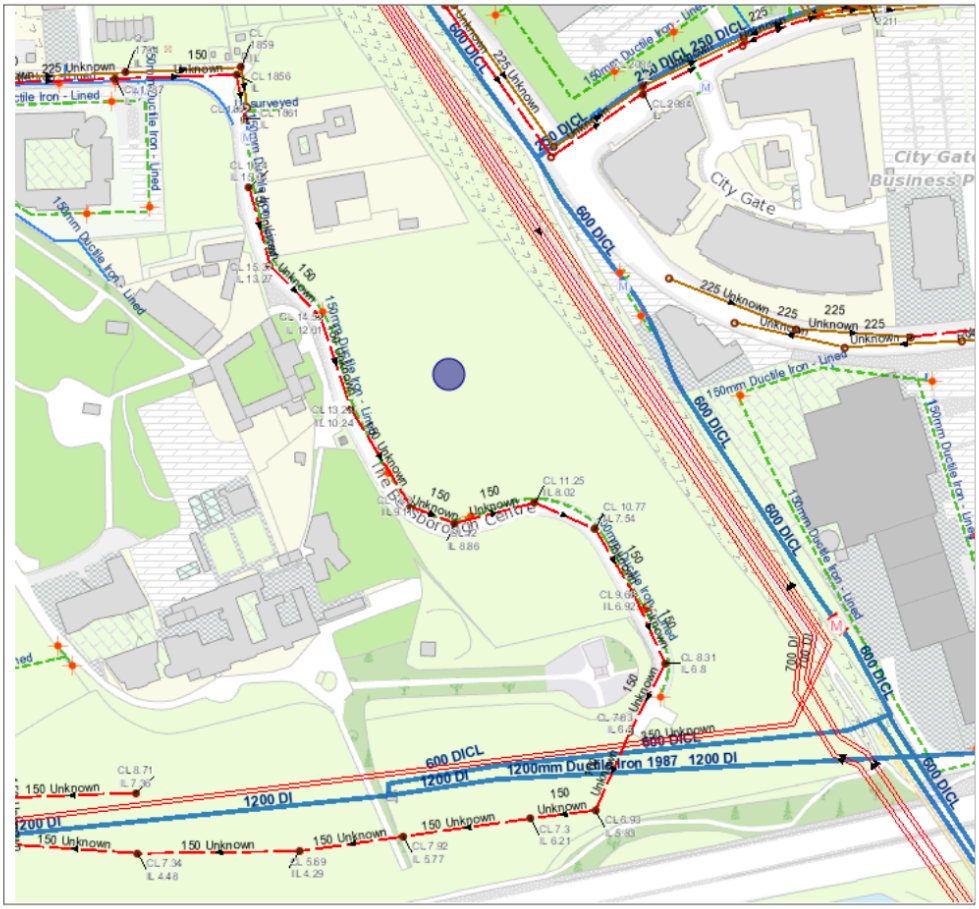
Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at Bessboro, Blackrock, Co. Cork (the **Premises**). Based upon the details you have provided with your pre-connection enquiry and on our desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, we wish to advise you that your proposed connection to the Irish Water network(s) can be facilitated at this moment in time.

SERVICE	OUTCOME OF PRE-CONNECTION ENQUIRY THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible Subject to upgrades
SITE SPECIFIC COMMENTS	
Water Connection	Connection to be made to the existing 150mm DI adjacent to site. No works to interfere with existing 1200mm trunkmain. No diversions of this main shall be permitted.
Wastewater Connection	Bessborough WWPS is almost at design loading capacity. Irish Water has a project underway to replace the existing pumps which will increase the pump rate and provide sufficient capacity to accommodate this development. This upgrade project is scheduled to be completed by Q4 2022 (this may be subject to change) and the proposed connection could be completed as soon as possibly practicable after this date.
Strategic Housing Development	Irish Water notes that the scale of this development dictates that it is subject to the Strategic Housing Development planning process. In advance of submitting your full application to An Bord Pleanala for assessment, you must have reviewed this development with Irish Water and received a

	Statement of Design Acceptance in relation to the layout of water and wastewater services.

The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.

The map included below outlines the current Irish Water infrastructure adjacent to your site:



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Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the

information provided and does not accept any liability whatsoever arising from any errors or omissions. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

General Notes:

1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**
2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.
3) The feedback provided is subject to a Connection Agreement/contract being signed at a later date.
4) A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at https://www.water.ie/connections/get-connected/
5) A Connection Agreement cannot be issued until all statutory approvals are successfully in place.
6) Irish Water Connection Policy/ Charges can be found at https://www.water.ie/connections/information/connection-charges/
7) Please note the Confirmation of Feasibility does not extend to your fire flow requirements.
8) Irish Water is not responsible for the management or disposal of storm water or ground waters. You are advised to contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges
9) To access Irish Water Maps email datarequests@water.ie
10) All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact Marko Komso from the design team on 022 54611 or email mkomso@water.ie For further information, visit **www.water.ie/connections.**

Yours sincerely,

Yvonne Harris

Head of Customer Operations

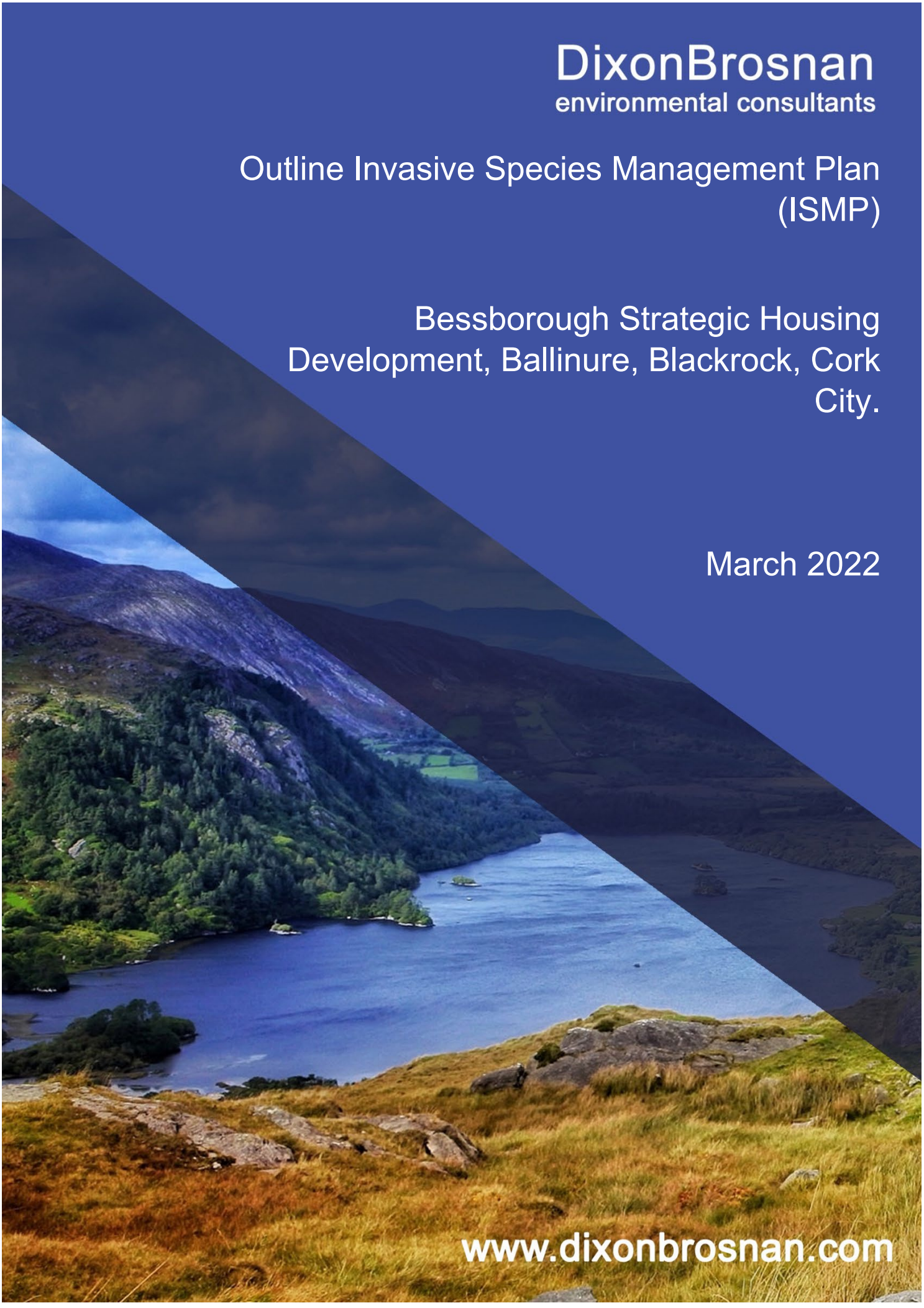
Appendix 4. ISMP

DixonBrosnan
environmental consultants

Outline Invasive Species Management Plan (ISMP)

Bessborough Strategic Housing Development, Ballinure, Blackrock, Cork City.

March 2022



www.dixonbrosnan.com

DixonBrosnan

environmental consultants

Project	Outline Invasive Species Management Plan (ISMP) Bessborough Strategic Housing Development, Ballinure, Blackrock, Cork City.	
Client	Estuary View Enterprises Ltd	
Project Ref.	2217	
Report No.	2217	
Client Ref.	-	
Date	**Revision**	**Prepared By**
07/02/22	First Draft	Carl Dixon BSc MSc
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1. Introduction

DixonBrosnan were commissioned to survey for invasive species at the Bessborough Strategic Housing Development, Ballinure, Blackrock, Cork City. The study area includes the Phase 1 'The Meadows', Phase 2 'The Farm' and Phase 3 'North Fields' development sites.

This report was prepared by Carl Dixon MSc (Ecological Monitoring) and Cian Gill MSc (Ecological Monitoring).

Carl Dixon MSc (Ecology) is a senior ecologist who has over 20 years' experience in ecological and water quality assessments. Carl Dixon holds an Honours Degree (BSc) in Ecology and a Masters (MSc) in Ecological Monitoring from UCC. He is a senior ecologist who has over 25 years' experience in ecological assessment. Prior to setting up DixonBrosnan Environmental Consultants in 2000, Carl set up and ran Core Environmental Services which included Rural Environmental Protection Scheme (REPS) planning for landowners and ecological assessments. Carl has particular experience in freshwater ecology including electrofishing fish stock assessments and water quality assessments. He also has considerable experience in habitat mapping and mammal ecology including survey work and reporting in relation to badgers and bats. Other competencies include surveys for invasive species and bird surveys. Carl has extensive experience with regards to EIAR and NIS mitigation and impact assessment. He has particular experience in large-scale industrial developments with extensive experience in complex assessments as part of multi-disciplinary teams. Such projects include gas pipelines, incinerators, electrical cable routes, oil refineries and quarries.

Cian Gill MSc (Ecology) is a qualified ecologist with ten years' experience working with wildlife and ecology-based NGOs and public bodies in Ireland, the UK and the US. Past projects include invasive species planning for the city of Rosemount, Minnesota, and the Under The Sea project for Essex Wildlife Trust. Recent projects include ecological reports for Cork-based housing and private developments.

2. Invasive species – desktop review

Non-native plants are defined as those plants which have been introduced outside of their native range by humans and their activities, either purposefully or accidentally. Invasive non-native species are so-called as they typically display one or more of the following characteristics or features: (1) prolific reproduction through seed dispersal and/or re-growth from plant fragments; (2) rapid growth patterns; and, (3) resistance to standard weed control methods.

Where a non-native species displays invasive qualities and is not managed it can potentially: (1) out compete native vegetation, affecting plant community structure and habitat for wildlife; (2) cause damage to infrastructure including road carriageways, footpaths, walls and foundations; and, (3) have an adverse effect on landscape quality. The NBDC lists a number of both aquatic and terrestrial high impact invasive species which have been recorded within grid square W77 (**Table 1**).

Table 1. High impact invasive species recorded in W77

Common Name	Latin Name
Canada Goose	*Branta canadensis*
Ruddy Duck	*Oxyura jamaicensis*
Cherry Laurel	*Prunus laurocerasus*
Common Cord-grass	*Spartina anglica*
Knotweed	*Fallopia japonica x sachalinensis = F. x bohemica*
Giant Hogweed	*Heracleum mantegazzianum*
Giant Knotweed	*Fallopia sachalinensis*
Giant-rhubarb	*Gunnera tinctoria*
Indian Balsam	*Impatiens glandulifera*
Japanese Knotweed	*Fallopia japonica*
Parrot's-feather	*Myriophyllum aquaticum*
Rhododendron	*Rhododendron ponticum*
Harlequin Ladybird	*Harmonia axyridis*
American Mink	*Mustela vison*
Brown Rat	*Rattus norvegicus*
Fallow Deer	*Dama dama*
Feral Ferret	*Mustela furo*
House Mouse	*Mus musculus*
Sika Deer	*Cervus nippon*

Source NBDC database 28/01/22

The control of invasive species in Ireland comes under the Wildlife (Amendment) Act 2000, where it states that

'Any person who— [...] plants or otherwise causes to grow in a wild state in any place in the State any species of flora, or the flowers, roots, seeds or spores of flora, ['refers only to exotic species thereof']][...] otherwise than under and in accordance with a licence granted in that behalf by the Minister shall be guilty of an offence.'

The Birds and Natural Habitats Regulations 2011 (SI 477 of 2011), Section 49(2) prohibits the introduction and dispersal of species listed in the Third Schedule, which includes Rhododendron *Rhododendron ponticum* and Japanese Knotweed *Fallopia japonica*, as follows: *"any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow [….] shall be guilty of an offence."*

The Third Schedule species, Japanese Knotweed and Himalayan Knotweed *Persicaria wallichii* were recorded at several locations within the study area. The location of this species within the Phase 1 'The Meadows', Phase 2 'The Farm' and are shown in **Figure 1 and Figure 2.** The non-native third schedule species Rhododendron *Rhododendron ponticum* was recorded within the woodland in the Phase 3 'North Fields' site, including the small islands within the artificial pond, as shown in **Figure 3**. The third schedule invasive species Himalayan Balsam *Impatiens glandulifera* was recorded immediately south of the Phase 1 'The Meadows' site boundary. Although not within the proposed development area, it is recommended that this plant be eradicated.

Japanese Knotweed is a member of the Polygonaceae (docks and rhubarb family), native to Japan and northern China. It has however, become widely distributed throughout Europe, North America, Canada, New Zealand and Australia. Himalayan Knotweed which is a closely related species rarely exceeds 1.5m in height while Japanese Knotweed can reach 3m in height. Dispersal typically occurs through rhizome fragments being transported in soil by humans or to a lesser extent, through passive mechanical means such as in floodwaters. Dispersal is also achieved through vegetative reproduction from plant fragments. The plant typically occurs along roadsides, riverbanks and waste ground in Ireland where it forms dense, monotypic stands. Japanese and Himalayan Knotweed cause a range of problems due to prolific and dense growth habit including blocking sight- lines on roads, damage to paving and structures, erosion of riverbanks and flood defence structures, damage to archaeological sites, loss and displacement of native habitats and species.

Rhododendron is an evergreen, acid loving shrub introduced to Ireland in the 18th Century. It can withstand considerable shade and thrives as an understorey species in woodland, though it also tolerates open conditions in suitable acid soils. Its dense tangle of stems can block pathways, smother watercourses and encroach on roadways thereby impinging on sight-lines and reducing the capacity of the road to drying out. The foliage of Rhododendron contains various compounds that appear to have an allelopathic action on other species (inhibiting their growth) which may further inhibit plants from growing within close proximity.

Himalayan balsam (*Impatiens glandulifera*) is an invasive terrestrial plant species that was first introduced in the UK in 1839 as an ornamental garden plant. Since it was introduced, it has spread to most parts of Ireland. Due to the nutrient poor soil and cold temperatures in its home range, the Himalayas, it has adapted to develop thousands of seeds, which are dispersed widely as the ripe seedpods shoot their seeds up to 7m (22ft) away. Due to our warmer climate and nutrient rich soils it has thrived here and became highly invasive. Once established in the catchment of a river the seeds, which can remain viable for two years, are transported further afield by water.

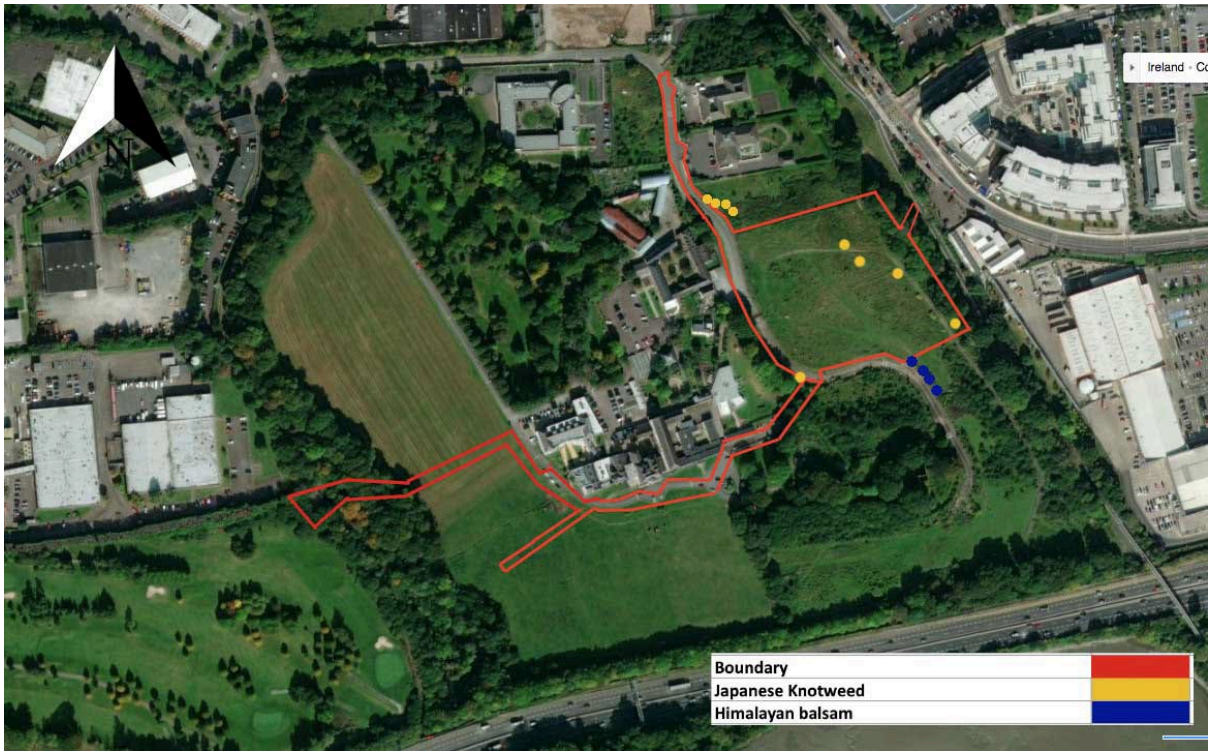

Figure 1. Third schedule invasive species recorded in Phase 1 'The Meadows' site boundary | Not to scale

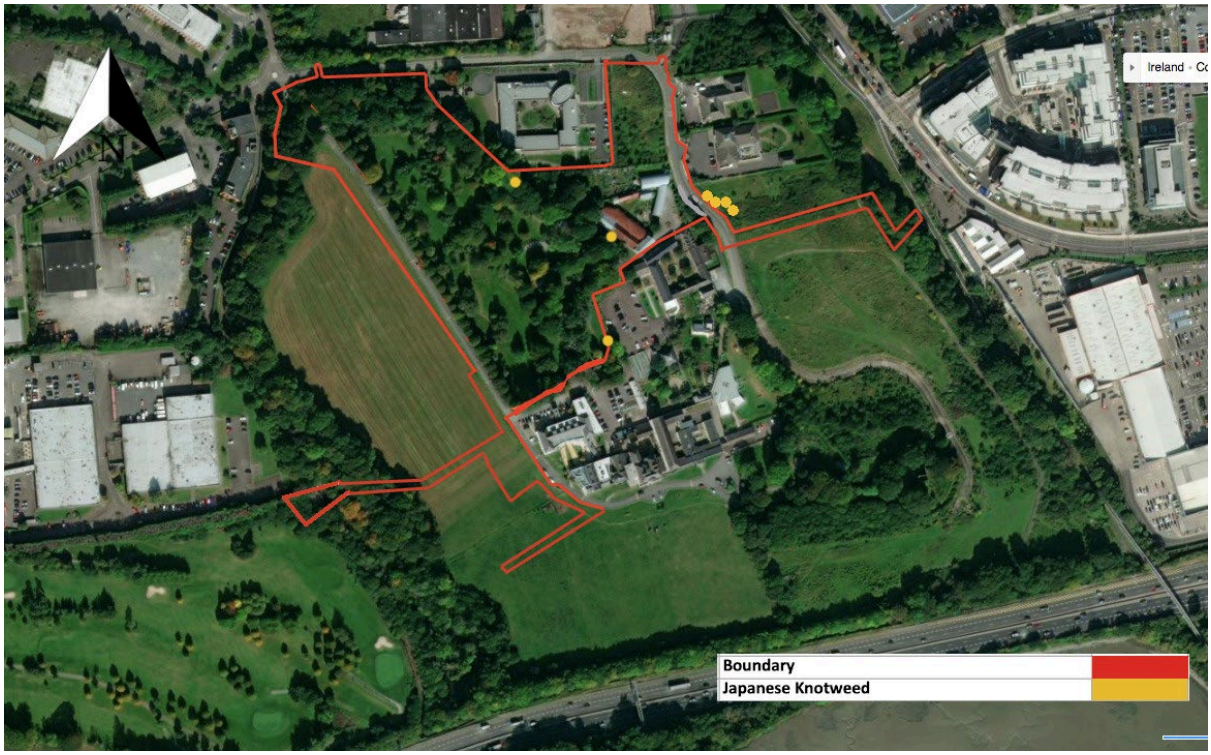

Figure 2. Third schedule species recorded within the Phase 2 'The Farm' site boundary | Not to scale

Figure 3. Third schedule invasive species recorded within the Phase 3 'North Fields' site boundary | Not to scale

Four other invasive species Cherry Laurel *Prunus laurocerasus* Buddleia *Buddleja davidii*, Wild Clematis *Clematis vitalba* and Winter Heliotrope *Arctostaphylos luciana* were recorded with a scattered distribution throughout the site. These species are not included in the Third Schedule of the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011). Therefore, their presence at the site does not have the potential to lead to an offence under the Birds and Natural Habitats Regulations 2011 (S.I. 477 of 2011).

Cherry Laurel (*Prunus laurocerasus*) is listed by the National Biodiversity Data Centre as a high risk invasive species. Cherry laurel grows extensively in the area of woodland along the western boundary of Phase 3 'North Fields' and also occurs within the walled garden in Phase 2 'The Farm'. Cherry laurel is a dense thicket forming invasive ever-green shrub of gardens, parks and woodlands from South West Asia. The leaves are thick and laurel-like and are poisonous with cyanide. Its rapid growth and the way it casts an all–year–round dense shade means that it shades out plants from the woodland floor, and generally out–competes less vigorous shrubs and young trees. Like *Rhododendron ponticum* with which it often grows, if unmanaged, it will form almost impenetrable shrubberies or understories in woodland and effectively kill off all other vegetation except the mature trees.

Buddleia and Wild Clematis are listed as a medium impact listed species by the NBDC. These species are not included in the Third Schedule of the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011). Therefore, their presence at the site does not have the potential to lead to an offence under the Birds and Natural Habitats Regulations 2011 (S.I. 477 of 2011). However, the NBDC notes that under the right ecological conditions these species may have an impact on the conservation goals of a European site or impact on a water body achieving good/high ecological status under the Water Framework Directive (Directive 2000/60/EC). Buddleia and Wild Clematis is also included in the NRA *Guidelines*

on the Management of Noxious Weeds and Non-native Species on National Roads (NRA 2010) as these species have been shown to have an adverse impact on landscape quality, native biodiversity or infrastructure; and is likely to be encountered during road schemes.

Winter Heliotrope is classified as a low risk invasive species by the NBDC. This species is not included in the Third Schedule of the Birds and Natural Habitats Regulations 2011 (SI 477 of 2011). Therefore, its presence at the site does not have the potential to lead to an offence under the Birds and Natural Habitats Regulations 2011 (S.I. 477 of 2011). Winter Heliotrope is included in the NRA *Guidelines on the Management of Noxious Weeds and Non-native Species on National Roads* (NRA, 2010) as these species have been shown to have an adverse impact on landscape quality, native biodiversity or infrastructure; and are likely to be encountered during road schemes.

3. Japanese and Himalayan Knotweed Management During Construction Phase

This purpose of this plan is to:

- Identify the extent of the infestation on the site
- Ensure further growth and spread of the plant on the site does not occur
- Ensure the plant is not spread to other sites either adjacent to the infested site or through transportation of contaminated soil to another site
- Identify the best method for managing and controlling Japanese Knotweed, Himalayan Knotweed and other invasive species on the site with regard to the proposed site works and construction methods
- Communicate the plan to all site operatives to ensure success of the plan
- Document and record the treatment and management methods carried out on site for future reference, for future site owners and site users and to avoid litigation.

The contractor will employ a suitably qualified ecologist to update the plan prior to the commencement of construction. The updated plan will contain the following:

- Site background including proposed works
- Extent of the Japanese Knotweed and Himalayan Knotweed infestation
- Specific control plan to be put in place
- Site hygiene protocols
- Responsible individuals
- Follow up requirements
- Any other relevant information

3.1 Management Options for Knotweed Species

There are a number of suitable management options to control and prevent the spread of Japanese Knotweed and Himalayan Knotweed. The methodology outlined in this document will be updated, if required, based on an up to date survey of the contaminated area. The proposed management plan will be agreed with Cork City Council prior to the works being carried out. It should be noted that:

- Where any infested material (soil containing Japanese Knotweed or Himalayan Knotweed) is to be taken off site, a licence to transport the material will be required from National Parks and Wildlife Service (NPWS).
- A landfill, which is licensed to accept such material, will be identified to dispose of the excavated material. The landfill site operator will be informed of what the material contains.
- Where herbicide treatment will be used, consideration will be given to the proximity of the herbicide treatment to other vegetation/habitats.

For all management plans, site hygiene protocols will be implemented. These protocols will apply to sites which are infested with Knotweed and those where Knotweed is not growing to prevent contaminated material being brought to site. Site hygiene protocols are outlined in **Section 3.3** below.

3.2 Pre-Construction Survey

Since invasive species spread quickly, prior to the commencement of treatment, a pre-construction survey will be undertaken to identify the extent of invasive species at that time. The survey will be undertaken by a suitably qualified ecologist. This information will be utilised to update the ISMP.

3.3 Site Hygiene at Contaminated Area

Construction equipment, vehicles and footwear may provide a vector for the spread of invasive species. Maintaining site hygiene at all times in an area affected by invasive species is essential to prevent further spread.

The following site hygiene measures will be implemented for the contaminated area:

- Understand the potential extent of the rhizome (root) system underground – up to seven metres horizontally and three metres vertically.
- Where possible, the contaminated area will be avoided and fenced off, or the extent of the rhizomes clearly marked.
- If possible, the use of machinery with tracks will be avoid contaminated areas. Movement of machinery between contaminated and non-contaminated areas must be controlled and adequate power washing measures implemented.
- Areas where contaminated soil is to be stockpiled on site will be clearly identified and marked out.
- Designated entry and exit points will be identified for personnel on foot and for small mobile equipment. A delineated access track, to be maintained free of Japanese

Knotweed and Himalayan Knotweed, will be established through the site to minimise the spread of Knotweed species by permitted vehicles accessing the site.

- Vehicles, including footwear and tools, leaving the site will be inspected for any plant material and washed down (using a pressure washer) in a dedicated vehicular wheel wash down facility, which will drain into a contained area within the site. Particular care is required with tracked machines.
- Vehicles used in the transport of contaminated material will be visually checked and washed down into a contained area before being used for any other work, either in the same area or on a different site.
- Only vehicles required for essential works including site investigation works will be brought on site and the number of visits minimised as much as practicable.
- Material gathered in the dedicated wash down contained areas will be appropriately disposed of off-site.
- For any subsoil or topsoil entering the site, the supplier will be required to provide an assurance that it is free of Japanese Knotweed and Himalayan Knotweed.
- All site personnel will be made aware of measures to be taken and will be informed of the requirements of the ISMP.
- Site hygiene signage, in relation to the management of invasive species, will be erected.

3.4 Management Options

In addition to the possible advance treatment works and pre-construction survey, when the works areas become available to the contractor for enabling works, areas identified as requiring specific invasive species treatment will be demarcated and the designated control measures implemented at the earliest possible stage to reduce the risk of spread along the proposed scheme or beyond the land take.

There are a number of management options that may be implemented to control and prevent the spread of invasive species. These are presented in the sections below.

Those involved in the application of herbicides/pesticides will be competent to do so and, consequently, will have sufficient training, experience and knowledge in the area of herbicides/pesticides application.

All staff involved in the application of herbicides/pesticides will have received appropriate training, which may include achieving competency certification in the safe use of herbicides/pesticides through a National Proficiency Tests Council registered assessment centre or achieving an appropriate FETAC award in this area.

It is likely that chemical treatment, as described in **Section 3.5** will be the most suitable method for the identified invasive species.

3.5 Chemical Treatment

The control of Japanese Knotweed and Himalayan Knotweed will require the use of herbicides, which can pose a risk to human health, to non-target plants or to wildlife. In order to ensure the safety of herbicide applicators and of other public users of the site, it is essential that a competent and qualified person carries out the herbicide treatment. A qualified and experienced contractor will be employed to carry out all treatment work.

The contractor will follow the detailed recommendations of the following documents for the control of invasive species and noxious weeds:

Chapter 7 and Appendix 3 of the TII Publication: The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010)

Best Practice Management Guidelines for Japanese Knotweed (Invasive Species Ireland, 2015)

Circular Letter NPWS 2/08 Use of Herbicide Spray on Vegetated Road Verges (National Parks and Wildlife Service 2008)

These documents include measures to aid the identification of relevant species, with details for the timing, chemicals and methodology for chemical control, and for measures to avoid environmental damage during the use of herbicides.

Chemical treatment involves the application of an herbicide to invasive species plant such as Japanese Knotweed stands without any excavation or removal of the plant material. The preferred types of herbicides to be used in the treatment of Knotweed are Glyphosate and 2,4-D Amine.

If herbicide is applied as the treatment option, it may need to be reapplied for up to five years after the first application to ensure the plant control measures have been effective.

Glyphosate is non-persistent and can be used near water but it is not selective (i.e. it is a broad spectrum chemical and will impact all plant species) whereas 2,4-D Amine can be persistent for up to one month, and can also be used near water but is more selective on certain plants. The selection of chemical by the contractor and supervising ecologist will depend on seasonal factors, site conditions, proximity to water, surrounding habitats etc.

The most effective time to apply Glyphosate is from July to September (or before cold weather causes leaves to discolour and fall). The majority of herbicides are not effective during the winter dormant stage because they require living foliage to take up the active ingredient.

Reapplication rates will depend on site specific considerations including the extent of the infestation, its location, and the time of year treatment commences. Details of the proposed chemical treatment plan will be included in the updated ISMP based the proposed work programme.

Foliar treatment (spraying) is usually applied with a sprayer such as a knapsack sprayer or a larger spray system. It is important to use a treatment dye to identify clearly all areas treated. Foliar treatment is an efficient way to treat large monocultures of invasive plants, or to spot-treat individual plants that are difficult to remove mechanically such as Japanese Knotweed.

In the case of Knotweed, depending on weather and temperatures in the days following the initial treatment, and to ensure optimal uptake of herbicide into the rhizome system, a second similar treatment will be required usually within ten days, before the internal vascular system is no longer capable of translocating the herbicide to the root system.

While the upper surface of the leaves will be easier to treat, it is also important to treat the leaf under surface as Knotweed possesses many stomata openings on the leaf under surface. Dead stems can be cut, removed and burned on/off site in accordance with the relevant legislation.

The stem injection method is sometimes used for Japanese Knotweed control. This treatment requires a higher concentration of the active ingredient than is used in foliar applications. It involves the use of a specialist herbicide injection tool whereby the injection tool injects the herbicide directly into each of the canes approximately 20-30cms from the base of each cane (between the 1st and 2nd nodule).

Subsequently approximately 10 mL of herbicide mix is injected into each cane at a ratio of 5:1 through the use of a specialist stem injection tool. The application of glyphosate-based products by injection is most effective when applied in the early Autumn (mid to late Sept). Regrowth will occur in subsequent years, albeit much less vigorously, which will require follow up treatment at the appropriate time of year. Spot treatment will be required each year until no regrowth is observed.

In order to ensure that the use of herbicides does not contravene legislation, the contractor must comply with Circular Letter NPWS 2/08 *Use of Herbicide Spray on Vegetated Road Verges* from the National Parks and Wildlife Service dealing with the application on to non-target areas.

3.6 Excavation and Chemical Treatment On-Site

This option employs both physical and chemical methods of treatment. This method is employed in situations where treatment of invasive species, in particular Knotweed, is required to be completed in a relatively short timeframe. Generally, digging up the rhizomes and re-cultivating it stimulates plant growth and will result in more successful herbicide application and management.

In summary, this management method requires cutting and killing of the surface plant. The cut material must be left on top of plastic sheeting until dried out and subsequently monitored for any sign of regrowth. Storage of cut material should not take place within flood risk zone of a river. The cut material should not be placed in a green waste recycling bin. Once dried out, the material should be burned on site in accordance with the relevant legislation. The surface of the affected area should be raked with tines to remove crowns and surface material, and in order to break up the rhizomes, bringing them to the surface, which will stimulate leaf production. This will make the plant more vulnerable to herbicide treatment. The more rhizomes that are brought to the surface, the more growth will occur, allowing for a more successful treatment. An excavator can be used to scrape the surface crowns and rhizomes into a pile and then to cultivate the ground to stimulate rhizomes to produce a higher density of stems for treatment. Reapplication of herbicide may be required for up to five years after initially application, subject to the site-specific management plan.

3.7 Excavation and burial

Excavated material containing Knotweed can also be buried on site. This will require burying the material at a depth of at least five metres. The contaminated material must be covered with a root barrier membrane before being backfilled with topsoil, or other, suitable fill material. The manufacturer's guarantee is required that the membrane will stay intact for at least 50 years. An accurate map and record of the location of the burial site, to prevent any future accidental disturbance, is required, and future owners must be informed of its position. If soil containing Japanese Knotweed is stockpiled, the material must be stored in a manner that will not harm health or the environment. The stockpile should be on an area of the site that will remain undisturbed. The area should be clearly fenced and marked with warning signs, and the stockpile should be regularly treated with herbicide to prevent any regrowth or re-infestation.

As a precaution, the stockpiled material should be laid on a root barrier membrane and covered to avoid contaminating the site further. The contractor must also comply with all waste legislation.

3.8 Excavation and root barrier cell method

Excavated material containing Knotweed can also be buried on site within a root barrier membrane cell. The procedure is similar to that described in **Section 3.7** above.

This method will require burying the material at a depth of at least two metres. The contaminated material must be placed in a contained cell formed by a root barrier membrane before being backfilled with topsoil, or other, suitable fill material. The manufacturer's guarantee is required that the membrane will stay intact for at least 50 years. The method for stockpiling prior to burial would be as described as above. The contractor must also comply with all waste legislation.

3.9 Excavation and bund method

Where there is not sufficient depth on a site excavated material can be placed in a structured bund. The bund will comprise a raised area above ground level or a shallow excavation, no more than 0.5m deep, and lined with a root barrier membrane. The manufacturer's guarantee is required that the membrane will stay intact for at least 50 years. This method of treatment can also be used where Knotweed material needs to be moved from a location and there is another area of the site available to contain it.

The aim of this method is to concentrate the rhizome material into the upper surface of the bund, where it will grow and be controlled by herbicide. If the rhizome is buried deep, it will become dormant when inside the bund and regrow when the apparently clean soil is used for landscaping on the site. The bund location needs to be clearly marked by warning signs and protected from potential accidental damage. Reapplication of herbicide may be required for up to five years after the initial application, subject to the site-specific management plan.

The appointed contractor must comply with waste legislation if this method is to be considered.

3.10 Excavation and removal from site

Where the above treatment options are not possible because the site is too small to contain excavated material, or too shallow for burial, or where there is a lack of space or where the infestation simply cannot be avoided by the construction works, removal of excavated material may be the only option. If any invasive species plant material is collected (e.g. by hand-pulling or mowing), it is important that its disposal will not lead to a risk of further spread. Where there are small amounts of Knotweed material to be removed it is possible to double bag the material and send to a licenced waste facility for disposal. Where the amount of material is larger in volume, it will be necessary to haul it from site to a suitably licenced waste facility.

Invasive species material, particularly roots, flower heads or seeds, must be disposed of at licensed waste facilities appropriately buried, or incinerated in compliance with the relevant legislation. Disposal must be carried out in accordance with the relevant waste management legislation. Invasive species plant material or soil containing residual herbicides may be classified as either ‘hazardous waste’ or ‘non-hazardous waste’ under the terms of the Waste Management Acts, and both categories may require special disposal procedures or permissions. If the material has been treated with a persistent herbicide, the excavated material must be classified as hazardous waste and must be disposed of to a hazardous waste facility. Advice would need to be sought from a suitably qualified waste expert regarding the classification of the waste and the suitability of different disposal measures.

The movement of invasive plant material requires a licence from the NPWS under Section 49 of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended).

3.11 Outline methodology

It is proposed that treatment commences immediately and that the following site hygiene protocols will be put in place to prevent inadvertent spread of plant fragments.

1. Prior to the commencement treatment the development area will be resurveyed to accurately assess any changes in distribution in the intervening period.

2. All stands of Japanese Knotweed will be clearly delineated with hazard tape in a manner visible to machine operators prior to the commencement of works. This zone will extend 7m from the parent plant as roots can extend to this distance.

3. Appropriate signage will be put in place to deter any entrance by people or machinery into the areas within which the Japanese Knotweed JKW is growing.

4. Prior notification will be given to all employees that the fenced zone within 7m of the parent plant is off limits to vehicles and no ground excavation will take place. No aggregates can be removed from this area and no reinstatement will take place until the treatment programme is complete.

6. If vehicles enter this zone a specialised wash down area will be created for machinery and footwear. All machinery and equipment (including footwear) will be power washed prior to leaving the contaminated works area within this wash down area. They should also be visually checked for clods of soil, bits of vegetation etc. and particular care is required with tracked machinery.

7. The treatment programme will be carried out by a suitably qualified person who has experience of treating invasive species and will be carried out in line with the herbicide manufacturer's instructions. A five-year monitoring programme will be put in place to ensure that the herbicide has been successful.

4. Buddleia Management During Construction Phase

As noted in **Section 2** of this report, there is no statutory obligation to remove Buddleia. However, should it be concluded that Buddleia at the proposed development site should be removed, the following treatment methods are recommended.

Buddleia is straightforward to control using a mixture of mechanical removal and herbicide treatment.

Buddleia is a plant that favours disturbed sites, physical grubbing of plants can provide ideal conditions for the germination of seeds. Therefore, care needs to be taken to ensure re-vegetation of controlled areas is undertaken swiftly. The branches of Buddleia are capable of rooting as cuttings, so care should also be taken to ensure material is disposed of in a manner to avoid this risk. Site hygiene measures outlined is **Section 3.3** should be implemented where relevant.

As mature plants occur within the proposed works area, the preferred method of treatment is cutting back to a basal stump or grubbing out followed by chemical treatment.z Herbicide applications will take into account sensitive receptors such as watercourses and locally important habitats such as woodland and must only be applied in line with manufacturers recommendations.

Recommended practice for the application of herbicides requires cutting back of plants to a basal stump during active growth (late spring to early summer) which is then treated (brushed on) immediately with a systemic weed killer mix (Starr *et al*, 2003). Foliar application of triclopyr or glyphosate may be adequate for limited infestations of younger plants but should be followed up at 6 monthly interval until the supervising ecologist can certify that the plant is no longer extant within the works area.

5. Wild Clematis

As noted in **Section 2** of this report, there is no statutory obligation to remove Wild Clematis. However, should it be concluded that Wild Clematis at the proposed development site should be removed, the following treatment methods are recommended.

Wild Clematis is straightforward to control using a mixture of mechanical removal and herbicide treatment. Alternative methods of control are discussed below.

This species can be controlled by both mechanical control and herbicides, though typically its control relies on a combination of both i.e., cut-stump application.

Small seedlings can be readily pulled by hand. Larger stems have to be cut, the roots grubbed out and the material placed off the ground so it cannot take root again.

A number of chemicals have been used effectively against Wild Clematis in New Zealand, including glyphosate, though control invariably takes more than one year (New Zealand Department of Conservation 2005). Control should be undertaken during active growth. For mature plants, the vines should be cut back to ground level or waist height in winter or spring and the subsequent re- growth can be then foliar sprayed. This method will avoid impacting on the host plant the vine may be covering.

For larger specimens, the plant can be cut at the base with a straight horizontal cut. Herbicide is then applied immediately to the wound with a paint brush, eye dropper or small squeeze bottle. On larger stems it is only necessary to wipe herbicide around the outer rim of the cut. The plants should be left in situ until they are dead. Where plants are not killed in a single application, wait until re growth before re spraying.

Triclopyr can also be used as a foliar spray or as a spot treatment. This should be applied in summer during active growth before senescence, when it is not very hot or during drought. Following control, regular monitoring will be required with appropriate follow-up to deal with re- growth or new seedling germination over a period of 2–3 years.

6. Winter Heliotrope

As noted in **Section 2** of this report, there is no statutory obligation to remove Winter Heliotrope. Winter heliotrope *(Petasites fragrans)*, a member of the Asteraceae family, is a low-growing herbaceous plant originating in North Africa. It is established widely in Ireland being frequent along roadsides, hedgerows, woodland edges and waste ground. As apparently only the male plant that is present in Ireland, its spread is confined to vegetative means.

6.1 Physical Control

Due to the extensive rhizome network, physical removal of winter heliotrope is really only practical on a limited scale. Where mechanical means can be employed, it should be possible to deal with larger infestations but due to the potential for regeneration from fragments of roots, it may be best to tackle its control using a combination of excavation with follow-up treatment by herbicides. As with other plants with the potential to spread from small root fragments, disposal of material should be undertaken with due caution to prevent accidental spread of the plant. Other means of disposal include burial of material at a depth of at least 2m, incineration or disposal to licensed landfill. There is no evidence that the material would withstand composting though this approach would probably only be suitable for limited infestations.

6.2 Chemical Control

An application of a glyphosate-based herbicide after flowering in February to March is recommended by Cornwall Nature Reserves (2008), though the Royal Horticultural Society (2008b) recommends spraying in mid- summer or later but before the foliage begins to die back.

7. Cherry Laurel

For all sites, the following six steps can be implemented.

1. Resurvey to ensure there is up to date survey data.

2. Note the age, condition and previous treatments at the site.

3. Areas should be prioritised. It may be easier to clear less heavily infested areas to begin with or sites where seed production has not yet occurred. Also, ideally work with prevailing

wind direction, rather than against it, to help minimise seed dispersal into recently cleared areas.

4. Create suitable conditions for the recovery of native ground flora. This will reduce open areas for recolonisation.

5. Develop a Management Plan including timeframes for planned clearance and repeated treatments.

6. Follow-up work will be necessary to ensure that any small plants and seedlings have not been missed.

Treatment programmes can be divided into 3 main stages: initial removal, control of stems and roots, and follow up. The following treatment options have been widely tested and measured for effectiveness across Ireland. In almost all cases, failures can be accredited to poor application of a particular technique and/or logistical difficulties, rather than the control method itself. Care should be taken when embarking on a control programme and resources should be identified and allocated for repeated treatments.

Cut and remove stems by hand or chainsaw, cutting as close to the ground as possible to remove above ground growth. Chip or remove the cut material from the area to allow for effective follow-up work and prevent regrowth. Chipped material can provide good weed barrier around ornamental garden areas. Flailing has also been effectively used in Ireland to treat young or immature growth. Although not suitable on all sites and locations, especially steeply sloping or wet sites, it is very effective as it breaks up woody stems upon contact.

The removal of above ground growth will not prevent regrowth as Cherry Laurel will regrow from cut stems and stumps. There are four recommended methods to achieve successful management after the initial cut and removal:

1. Digging the stumps out. The effectiveness of this technique is increased by removing all viable roots. This can be done manually or with a tractor and plough. To avoid regrowth, stumps should be turned upside down and soil should be brushed off roots.

2. Direct stump treatment by painting or spot spraying freshly cut low stumps with a herbicide immediately after been cut. Glyphosate (20% solution), tryclopyr (8% solution) or ammonium sulphate (40% solution) are known to be effective during suitable weather conditions i.e. dry weather. The herbicide concentrations used and timings of applications vary according to which chemical is used. Use of a vegetable dye is recommended to mark treated stumps and all stumps should be targeted. A handheld applicator will help avoid spray drift onto surrounding non-target species. Always read the label and follow the manufacturers guidelines when using herbicides. Remember that using

3. A variation on the stump treatment method is stem injection, using a ‘drill and drop’ methodology, whereby, if the main stem is cut and is large enough for a hole to be drilled into it, the hole can be used to facilitate the targeted application of glyphosate (25% solution).

4. Stump regrowth and seedlings can be effectively killed by spraying regrowth with a suitable herbicide, usually glyphosate. Best practice spraying protocols should be carefully followed. General broadcast spraying is not as effective as stump spot treatment and has the potential to impact on surrounding non-target species. Cherry Laurel leaves are thick and waxy. For

herbicide treatment to be effective each individual leaf needs be thoroughly wetted with herbicide to kill the plant.

8. Rhododendron

Under the right ecological condition, Rhododendron can become highly invasive and once rhododendron has invaded an area, few native plants survive. This species causes severe ecological issues. Rhododendron can regenerate via seeds, suckers or rootlets. It forms extensive dense thickets which cast a very deep shade, leading in woodland to loss of ground flora, epiphytic bryophytes and lichens, modifying the fauna and preventing regeneration of trees. In addition to the effect of shade, it may produce biochemicals which can affect other plants, inhibiting the germination or seedling establishment of other species. There is also evidence for the prevention of mycorrhizal development in the roots of seedlings of competing plant species. R. ponticum is identified as a serious threat to upland oakwood. It is also identified as a threat for several lower plants and fungi including *Acrobolbus wilsonii, Arthothelium macounii* and *Lejeunea mandonii.*

To prevent Rhododendron or other invasive species being spread around the site or being inadvertently being brought into the site, the contractor will be required to inspect vehicles before using them on site. Herbicides will only be used in line with manufacturers recommendations and shall take into account the need to avoid impacts on aquatic receptors or adjoining habitats. It is noted that this species has colonised small islands within the artificial pond and this creates particular issues in relation to access and use of herbicides

A survey for invasive species will be carried out prior to the commencement of works. This is to confirm the extent of infestations as identified by invasive species surveys to date, and to determine whether any new infestations have established in the intervening period.

Prior notification will be given to all contractors that parts of the site are contaminated with Rhododendron and that they must adhere to this protocol to avoid the spread of the plant within and more importantly, outside of the works area. This includes any site investigation works in advance of commencement of excavation works.

All stands of Rhododendron will be clearly delineated with hazard tape in a manner visible to machine operators prior to the commencement of works.

Appropriate signage will be put in place to deter any entrance by people or machinery into the areas within which the Rhododendron is growing.

Only vehicles required for the works within the contaminated works area should be brought on site and the number of visits minimised as much as practicable. Vehicle movements within this area should be kept a minimum. A specialised wash down area will be created for machinery and footwear. All machinery and equipment (including footwear) should be power washed prior to leaving the contaminated works area within this wash down area. They should also be visually checked for clods of soil, bits of vegetation etc. and particular care is required with tracked machinery. This wash down area will be located in close proximity to existing stands and the wash down area will be included in the post-works treatment programme for Rhododendron.

If and where contaminated soil or heaps of high-risk invasive species (i.e. Rhododendron)

are to be stockpiled, the area will be clearly marked out on site. These areas will not be within 20m of any watercourse or flood zone.

8.1 Management of Rhododendron

The eradication of rhododendron from an infested habitat can only be carried out effectively by understanding the ecology of the species and by strategically planning the clearance work. In order to rid a habitat of rhododendron, a number of steps should be followed, including cutting all standing rhododendron and killing the stumps by uprooting or herbicide treatment. All habitats cleared of rhododendron must be regularly and systematically re-visited to remove any seedlings that have germinated and become established. Appropriate guidelines are provided in *The Control of Rhododendron in Native Woodlands (Native Woodland Scheme Information Note No. 3)* and Higgins, G.T. (2008) *Rhododendron ponticum: A guide to management on nature conservation sites. Irish Wildlife Manuals, No. 33.*

8.2 Cutting and removal

The first operation in clearing rhododendron is the cutting of individual stems with hand or chainsaws. Stems will be cut as close to the ground as possible. The cut material will be removed from the area to allow for effective follow-up work. Burning under the supervision of personnel with fire experience is another option. Rhododendron material can be burnt green immediately after being cut. Fires should be carefully located so as not to damage any trees or other vegetation close by, and old tyres or diesel should not be used. If burning is not an immediate option, the cut material can be piled neatly outside the treated area, allowing them to be dismantled easily to facilitate burning at a later stage (ideally 1-2 years later).

Where burning is envisaged, contact will be made with the Local Authority to obtain permission. Flailing is another method of rhododendron clearance. This involves the flailing of the thickets down to ground level, using a mechanical flail head mounted on a tracked machine. Although not suitable on all sites, especially those that are steeply sloping or very wet, it is a very effective as it mulches the material upon contact.

8.3 Killing Rhododendron

Some method of killing must be used as rhododendron invariably grows back vigorously when cut. The following approaches can be considered:

8.3.1 Digging out

Digging the stumps out of the ground is an effective way of killing rhododendron. Its effectiveness is maximized by removing all viable roots. Digging out can be carried out manually or, if the terrain allows, by machine (e.g. a tractor and chain). To prevent regrowth, as much soil as possible should be knocked off the root system, and the stumps should be turned upside down to expose the roots to the air and to allow the rain to wash off any remaining soil. Stumps that are dug out should be burnt along with the cut material.

This method avoids any use of herbicides. However, the impact to tree root systems and the potential for soil compaction and disturbance caused by the use of machinery in certain habitats means that this option will only be implemented under ecological supervision to minimise inadvertent disturbance of habitats.

8.3.2 Direct stump treatment

Rhododendron kill can be achieved by direct stump treatment, whereby freshly cut stumps are painted or spot sprayed with a herbicide solution. Ideally this should be carried out when rain is not imminent, to avoid the solution from being washed off. Stems are cut as close to the ground as possible, and the fresh stump surfaces treated with herbicide immediately, i.e. within minutes. A vegetable dye is used to clearly identify which stumps have been treated. Painting of stumps with glyphosate solutions (25-100%) was found to be 100% effective when carried out between May and March at an experimental site in Scotland (Tabbush and Williamson, 1987). This method is regarded as being most effective outside the time of spring sap flow. The following are herbicides (including application rates, methods and timing) used in the control of rhododendron by stump treatment (after Willoughby and Dewar (1995)).

- Glyphosate: Apply 'Roundup' in a 20% solution in water to all freshly cut stump surfaces using one of the following: a knapsack sprayer at low pressure; a forestry spot gun fitted with a solid stream nozzle; a cleaning saw fitted with a suitable spray attachment; or a paint brush. Best results can be obtained during the period October to February.

- Tryclopyr: Apply 'Garlon 4' in an 8% solution in water using one of the following: a knapsack sprayer at low pressure; a forestry spot gun fitted with a solid stream nozzle; a cleaning saw fitted with a suitable spray attachment; or a paint brush. Apply at any time between cutting and the appearance of new growth.

- Ammonium sulphamate: Apply as a 40% solution between April and September. Optimum control resulting from treatments applied between June and September. Surfactant additives are not appropriate for stump application. It is important to ensure that all cut surfaces are treated. In Ireland, trials in Killarney using stump treatment resulted in extremely successful kill rates among a range of plant sizes throughout all months of the year. Chemical concentrations from 10% to 20% have been used effectively and further trials are ongoing.

A major advantage of stump treatment is that all initial clearance work can be carried out in a single sweep. Also, as the application of the herbicide is carried out with a handheld applicator, spray drift is avoided and the impact to the surrounding non-target area is minimal. In addition, small volumes of herbicide are used. Although stump treatments can result in total kill, regrowth from the cut stumps can occur. This regrowth is usually slow and stunted. Carefully timed foliar application of herbicide to the regrowth will subsequently achieve full kill.

8.3.3 Spraying of regrowth and large seedlings

Stumps and large seedlings (less than 1.5 m in height) can be effectively killed by spraying the regrowth with a suitable herbicide. Success is dependent on the plants being dry at the time of herbicide application and remaining dry for a sufficient time thereafter to allow the herbicide to be absorbed into the plant (at least 6 hours, preferably longer). The addition of a surfactant (e.g. Mixture B) can increase the rate of herbicide absorption and reduce the amount of 'dry-time' required after foliar herbicide application. Surfactants are often more environmentally damaging than the herbicides themselves and must be used with great

care, especially adjacent to aquatic habitats. Spraying should be carried out in near windless conditions, to maximise herbicide contact and absorbance of the chemical into the plant. Conversely, spraying in windy conditions should be avoided at all costs, as this will lead to herbicide drift, resulting in 'collateral damage' which will kill nearby native flora, including herbaceous species and young regenerating trees. This delays the establishment of a ground cover and facilitates further rhododendron establishment.

It is important to ensure at all times that chemical solutions do not enter watercourses, as this can have a severe impact on the aquatic habitat and on aquatic life. At all times, adhere to best practice regarding safety and environmental protection, as set out in the manufacturer's guidelines, Ward (1998), and the Forest Service Forestry and Water Quality Guidelines and Forest Protection Guidelines. As spraying is not 100% effective, some plants may require two or more applications before they are killed. Since cut stumps generally produce multiple shoots of regrowth, delaying the spraying for more than three years after the initial stump cutting can actually result in the infestation becoming even more severe. At this stage, the regrowth is likely to be too tall to be sprayed effectively, forming dense impenetrable thickets. Regrowth is also likely to flower more vigorously than naturally regenerated rhododendron.

8.3.4 Stem injection

Stem injection, using the 'drill and drop' method (Edwards, 2006), can be used for the control of established rhododendron bushes, where access to the main stem is possible and where the stem is large enough for a hole to be drilled into it. One of the main advantages of this technique is that it facilitates the controlled application of herbicide to target plants, thereby reducing damage to other flora adjacent to treated bushes. It is a particularly useful method on difficult, sloping terrain, where other methods may be impractical.

A handheld cordless drill with several re-chargeable batteries and a spot gun are the only tools required. A 25% solution of glyphosate (i.e. 1:3 mix with water) is recommended. No additives are required. Applications during March, April and October have been successful in giving complete control of target bushes. Treated bushes can be left standing on site to rot. However, bear in mind that standing, dead rhododendron may persist for 10 to 15 years, is unsightly and can inhibit access to the woodland for management operations. Therefore, it may be better to cut and remove the treated bushes at a later date.

The effectiveness of control should be assessed initially every 12 months following the treatment. The main steps involved in stem injection are as follows.

1. Stems to be treated should be greater than 3 cm in diameter. In order to maximise the potential of killing the entire plant, choose a position on the stem as close to the main root system as possible, and at least below the lowest fork.

2. Drill as vertically as possible into the stem to create a hole that will hold the herbicide solution. The drill bit used should be 11-16 mm in diameter, depending on the stem diameter. There is no upper limit to the size of stem that can be treated.

3. Apply the herbicide to the hole immediately after drilling. The recommended amount is 2ml of herbicide solution per stem. Do not allow the herbicide to overflow from the hole. The use of a forestry spot gun with a calibrated 10ml chamber is recommended, as this allows for the accurate application of a calibrated 2ml of

herbicide per hole.

4. It is recommended that each plant be marked immediately after treatment, to track progress. Treated plants can be marked with a spray of coloured paint or by attaching coloured biodegradable tape.

5. Applications can be made in light rain, provided that rainwater is not running down the stem into the application hole and washing the herbicide solution out into the surrounding area.

6. Bush death should occur between 9 and 31 months, depending on application date and bush size.

8.3.5 Outline methodology Rhododendron

1. The exact treatment details will be outlined in a detailed management plant prepared by the treatment contractor and supervising ecologist will be finalized prior to the commencement of treatment. The following principles/guidelines will be implemented.

2. The entire site and adjacent area will be surveyed and the level of infestation assessed and mapped prior to the commencement of treatment works.

3. The age, condition and any previous treatments of all stands will be noted and mapped.

4. Areas to be treated will be prioritized. However, the objective is complete removal within the applicant's landholding.

5. A Rhododendron Management Plan will be prepared by the contractor with input from the supervising ecologist. The plan will encompass the entire site and include projections over a suitable timeframe. All work to be carried out in the area should be mapped and clearly dated and detailed in an accompanying schedule, along with a timeframe for follow-up work.

6. Treatment options will follow the following guideline methods:

- Young plants - single stemmed, typically < 10 years old & up to 1m tall
- These plants will be cut off as close to the ground as possible (with secateurs or pruning saw) and the stem treated with herbicide.
- Plants may be pulled by hand, if necessary, loosening the adjacent soil with a mattock or pick axe.
- Foliage will be treated with herbicide.

Isolated plants, typically >10 years old

- The plant may be cut down to the stump, as low to the ground as possible and the stump treated with herbicide.
- If access to the base of the main stems is possible, stem application of herbicide may be used.

- If low growing enough (usually less than 1.5m) foliage may be sprayed with herbicide.
- The plant may be cut to the ground/low stump and regrowth later treated with herbicide.
- The plants may be cut to c. 40cm above ground, each stem broken off from the root and the root treated with herbicide (New method under trial, see p. 28).
- If chemical treatments are not an option, the only alternative method of killing to rootstock is stump extraction. This may be done manually (using a mattock) or mechanically.

Mature stands of dense rhododendron

- The plant may be cut down to the stump, as low to the ground as possible and the stump may be treated with herbicide.
- If access to the base of the main stems is possible, stem application of herbicide may be used.
- The plant may be cut to the ground/low stump and regrowth later (after c. 18 months) treated with herbicide.
- The plant may be cut to the ground/low stump and regrowth later knocked off and the stump collar treated with herbicide.
- If chemical treatments are not an option, the only alternative method of killing the rootstock is stump extraction. This may be done manually (using a mattock) or mechanically, but the use of heavy machinery on nature conservation sites is often inadvisable.

7. In all sites, follow-up work will be necessary to ensure that any small plants or seedlings which were either missed on the previous visit or have entered the site subsequently from adjacent seed sources, are removed before they reach the flowering age (10-12 years). Ideally remove them when they are c. 0.5 m tall. At this stage, they are more easily seen, and any young seedlings likely to die naturally through desiccation will have done so. The systematic checking for reinfestation is necessary if the area is to be maintained free of seed-producing rhododendron. Also, reinfestation brought about by poor follow-up will negate the considerable time and cost invested in the initial clearance.

8. The use of track mounted machinery can offer a relatively fast approach to rhododendron clearance by this method, however there are particular issues in relation to access to the islands. A fork or bucket can extract either entire standing plants or stumps. This method is not suitable where vehicular access to a site is very difficult, where very steep slopes require clearance and where terrain (e.g. boulders) hinders the movement of machinery around the clearance site. In addition, the disturbance caused by heavy machinery to soil and to tree roots requires consideration and there is also potential for damage to standing trees, although a

good operator can often avoid this. Extraction of the rootstock by this method gives good kill, although some regrowth from root fragments may require further treatment. Given that the applicant has access to suitable machinery this is preferred option on areas within the proposed extension area. How usage of this method on areas within the landholding outside the proposed extension area need to be carefully evaluated based on up to date survey results to ensure inadvertent damage of adjacent habitats is minimized.

9. The treatment programme will be carried out by a suitably qualified person who has experience of treating invasive species and will be carried out in line with the herbicide manufacturer's instructions. Site hygiene protocols to prevent spread of this species will be specified by the management plan and will be strictly enforced.

9. Himalayan Balsam

Any Himalayan Balsam within the works will be hand-pulled and bagged prior to the commencement or site works. It will be then placed in a designated area of the site to decay. The seeds are not particularly robust but may survive for 18 months so a two-year programme of control, which will extend beyond the construction period, will be required. All machinery leaving the site will be washed down in a designated wash down area in proximity to the site exit to prevent seeds from being spread outside the site boundary.

If and where contaminated soil or heaps of high-risk invasive species (i.e. Himalayan Balsam) are to be stockpiled, the area will be clearly marked out on site. These areas will preferably not be within 20m of any watercourse or flood zone.

10. Conclusions

Two high risk invasive species were recorded within for the Phase 1 'The Meadows', Phase 2 'The Farm' i.e., Japanese and Himalayan Knotweed. No impediment to the removal of these species within the study area, as part of a detailed invasive species management plan, have been identified. Himalayan Balsam, a third schedule species, was recorded just outside the Phase 1 'The Meadows' site boundary.

The non-native third schedule species Rhododendron was recorded within the woodland, including the small islands within the artificial pond, within the Phase 3 'North Fields' site boundary. The location of this species on islands within a water feature creates particular difficulties in terms of access and use of herbicides and this issue will be taken into account when finalising the treatment programme which will be drawn up by the project ecologist in consultation with the nominated contractor.

This outline ISMP will be updated by the supervising ecologist based on up-to-date survey data, prior to the commencement of proposed development.