



Glashaboy River

(Glanmire/Sallybrook) Drainage Scheme



Volume

3

Natura Impact Statement

May 2018



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**Natura Impact Statement
May 2018**

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Contract

This report describes work commissioned by Arup. Anne Murray, Niamh Sweeney and Tanya Slattery of JBA Consulting carried out this work.

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Purpose

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Abbreviations

AA.....	Appropriate Assessment
DEHLG	Department of Environment, Heritage and Local Government
EC	European Communities
EDM.....	Environmental Drainage Maintenance
EREP	Environmental River Enhancement Programme
IFI	Inland Fisheries Ireland
IROPI.....	Imperative Reason of Overriding Public Interest
MAC.....	Maintenance Access Corridor
NIS.....	Natura Impact Statement
NPWS.....	National Parks and Wildlife Service
OPW	Office of Public Works

SAC Special Area of Conservation
SOP Standard Operating Procedure
SPA Special Protection Area

1 Introduction

1.1 Background

JBA Consulting has been appointed by Arup, on behalf of the Office of Public Works and Cork County Council, to undertake Environmental Consultancy services in relation to the Glashaboy River (Glanmire/Sallybrook) Drainage Scheme in County Cork. This includes providing information for the competent authority to assist them to undertake an Appropriate Assessment due to the presence of Cork Harbour Special Protection Area (SPA) directly south of Glanmire town and the Great Island Channel Special Area of Conservation (SAC) to the south east of Glanmire.

This Natura Impact Statement (NIS) provides the results of the appraisal conducted for the Glashaboy River (Glanmire/Sallybrook) Drainage Scheme in accordance with Article 6(3) of the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora).

1.2 Legislative Context

The Habitats Directive (Directive 92/43/EEC) aims to maintain or restore the favourable conservation status of habitats and species of community interest across Europe.

The requirements of Articles 6(3) and 6(4) of the Habitats Directive have been transposed into Irish legislation by means of the Habitats Regulations, 1997 (S.I. No. 94 of 1997) and the European Communities (Birds and Natural Habitats) Regulations 2011 (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 Special Areas of Conservation (SACs) and Special Protection Areas (SPAs), and also candidate sites, which together form the *Natura 2000* network.

Article 6(3) of the Habitats Directive requires that, in relation to European designated sites (i.e. SACs and SPAs that form the *Natura 2000* network), *"any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to **appropriate assessment** of its implications for the site in view of the site's conservation objectives"*.

A competent authority (e.g. 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.

Under article 6(4) of the Directive, if adverse impacts are likely, and in the absence of alternative options, a plan or project must nevertheless proceed for imperative reasons of overriding public interest (IROPI), including social or economic reasons, a Member State is required to take all compensatory measures necessary to ensure the overall integrity of the *Natura 2000* site network. The European Commission have to be informed of any compensatory measures adopted, unless a priority habitat type or species is present, in which case an opinion from the European Commission is required beforehand (unless the project has to proceed for imperative human health or public safety reasons, or to benefit to the environment).

1.3 Appropriate Assessment Process

Guidance on the Appropriate Assessment (AA) process was produced by the European Commission in 2002, which was subsequently developed into guidance specifically for Ireland by the Department of Environment, Heritage and Local Government (DEHLG) (2009). These guidance documents identify a staged approach to conducting an AA, as shown Figure 1-1: The Appropriate Assessment Process (from: Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities, DEHLG, 2009)

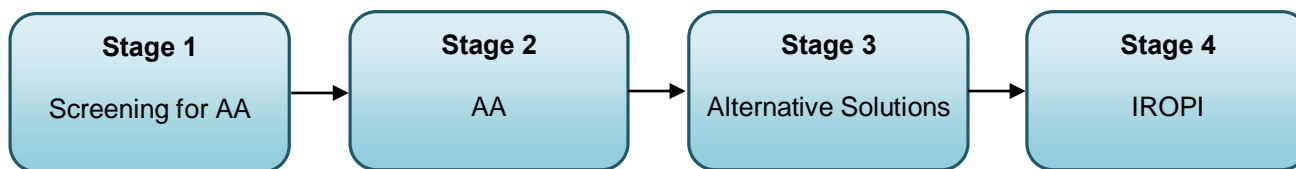


Figure 1-1: The Appropriate Assessment Process (from: Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities, DEHLG, 2009)

1.3.1 Stage 1 - Screening for AA

The initial, screening stage of the Appropriate Assessment is to determine:

- a. whether the proposed plan or project is directly connected with, or necessary for, the management of the European designated site for nature conservation
- b. if it is likely to have a significant adverse effect on the European designated site, either individually or in combination with other plans or projects

For those sites where potential adverse impacts are identified, either alone or in combination with other plans or projects, further assessment is necessary to determine if the proposals will have an adverse impact on the integrity of a European designated site, taking into account the sites conservation objectives (i.e. the process proceeds to Stage 2).

1.3.2 Stage 2 - AA

This stage requires a more in-depth evaluation of the plan or project, and the potential direct and indirect impacts arising from it on the integrity and the interest features of the European designated site(s), alone and in-combination with other plans and projects, taking into account the site's structure, function and conservation objectives. Where required, mitigation or avoidance measures will be suggested.

The competent authority can only agree to the plan or project after having ascertained that it will not adversely affect the integrity of the site(s) concerned. If this cannot be determined, and where mitigation cannot be achieved, then alternative solutions will need to be considered (i.e. the process proceeds to Stage 3).

1.3.3 Stage 3 - Alternative Solutions

Where adverse impacts on the integrity of *Natura 2000* sites are identified, and mitigation cannot be satisfactorily implemented, alternative ways of achieving the objectives of the plan or project that avoid adverse impacts need to be considered. If none can be found, the process proceeds to Stage 4.

1.3.4 Stage 4 - IROPI

Where adverse impacts of a plan or project on the integrity of *Natura 2000* sites are identified and no alternative solutions exist, the plan will only be allowed to progress if imperative reasons of overriding public interest (IROPI) can be demonstrated. In this case compensatory measures will be required.

The process only proceeds through each of the four stages for certain plans or projects. For example, for a plan or project, not connected with management of a site, but where no likely significant impacts are identified, the process stops at stage 1. Throughout the process, the precautionary principle must be applied, so that any uncertainties do not result in adverse impacts on a site.

1.4 Methodology

This Natura Impact Statement has been prepared with regard to the following documents:

- DoEHLG (2009 rev 2010) Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government.
- European Communities (EC) (2000) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission.
- EC (2002) Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission.
- EC (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. European Commission.
- EC (2007) Interpretation Manual of European Union Habitats. Version EUR 27. European Commission.
- Fossitt, J., (2000). A Guide to Habitats in Ireland. The Heritage Council, Kilkenny.
- National Parks and Wildlife Service (NPWS) (2008). The Status of EU Protected Habitats and Species in Ireland. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
- NPWS (2014). The Status of EU Protected Habitats and Species in Ireland. Habitats Assessment Volume 2. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
- NPWS (2014). The Status of EU Protected Habitats and Species in Ireland. Species Assessment Volume 3. Habitats Assessment Volume 2. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

1.4.1 Consultation

As part of the consultation process, observations were received from Inland Fisheries Ireland (IFI) and the Development Applications Unit (DAU) of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs on the drainage scheme before the submission deadline of 31st January 2017. Specifically, further information was requested in relation to the NIS regarding piling activities within the scheme. This observation is included and addressed in this report.

There has also been consultation with NPWS staff on a number of occasions regarding otter and bats. Derogation licences for the Scheme have been obtained from NPWS with respect to otter and bats. A further consultation meeting was also held with IFI on November 29th 2017. This report has been produced on currently available information, with the most up-to-date versions used. Where new, or updated, information becomes available, the client will consider and review the findings of this appraisal, if necessary, as the AA process is iterative in nature.

2 Drainage Scheme Description

2.1 Background

Glanmire Town, in County Cork, has a long history of serious flooding, primarily due to high flows in the River Glashaboy exceeding channel capacity. Surface water flooding associated with heavy rainfall and exceedance of the drainage system is also a problem. Glanmire and Sallybrook are prone to both fluvial and tidal flooding. Tidal flooding results from tides and storm surges propagating up the Glashaboy River estuary and extends upstream of Glanmire Village in extreme tide events, and would be experienced as far upstream as the weir at the council water intake. River levels can be exacerbated by high tides in the River Lee estuary. The highest flooding event recorded occurred in June 2012. Flooding has also occurred in the town in November 2009, October 2004, November 2000 and during 2015.

Following recommendations contained within the Lee Catchment and Flood Risk Management (CFRAM) Study, and in particular the Flood Risk Management Plan (FRMP) and following the 2012 flood event, Arup and JBA Consulting were commissioned by Cork County Council (CCoC) to assess the flood risk within the Glanmire Area and develop a flood relief scheme and other measures to manage this risk. Part of this project includes the preparation of a Natura Impact Statement in order to assess potential impacts posed to designated *Natura 2000* sites and habitats present within the zone of influence of the works.

2.2 Proposed flood relief measures

The proposed scheme will be principally confined to the urban areas of Glanmire and Sallybrook. The measures will involve a range of the following items, of which the full details and locations of the works are shown in Appendix A;

- Replacement of a number of existing culverts with either new culverts or bridges, new culverts and culvert extensions;
- Replacement of Hazelwood Shopping Centre bridge;
- New flood relief channel and culvert at Hazelwood Avenue;
- Replacement of existing flood defence walls and construction of new flood defence walls;
- Construction of a new earthen flood defence embankment at Sallybrook;
- New surface water pumping stations and one foul pumping station;
- Localised in-channel conveyance improvements at culvert/bridge structures;
- Local channel widening, deepening, realignment and regrading of river channel;
- Provision of civil works such as road/footpath re-grading at a number of locations;
- Protecting drainage outlets along the line of flood defence works with non-return flap valves;
- Retaining walls
- Flow control structure on a millrace
- Removal of vegetation and trees to facilitate construction works.
- Reinstatement of boundary walls and fences and landscaping and replanting of trees on completion in agreement with landowners; and
- Once construction is completed, ongoing maintenance of the river channel.

All drainage outfalls will be fitted with non-return valves and non-return valves will also be fitted on all drainage lines and ducts.

No construction works are proposed south of Glanmire Bridge (road L2999).

Direct Defences

Direct defences comprise the construction of embankments and walls along the river through built up areas to provide protection from flood waters. The height of these would vary throughout, with some up to 2m in height and average height of embankments 1.5m. Where there is insufficient room for an embankment, walls would be constructed, with construction of their foundations likely to require in-river working.

Localised temporary piling works will be required during the construction phase of the scheme. These temporary works will be conducted at Sallybrook, Hazelwood Shopping Centre, Meadowbrook, on the Glenmore Stream at Brooklodge Grove and upstream of Glanmire Bridge.

Flood relief measures are not proposed south of Glanmire Bridge and thus, all localised temporary piling activities are situated upstream of Glanmire Bridge.

Conveyance measures

Hazelwood Shopping Centre Bridge is to be removed and reconstructed. It is also proposed to construct a flood relief channel & culvert parallel to Hazelwood Avenue bridge and to clear a bridge eye at Riverstown Bridge, which currently provide a constriction to flows. A number of new culverts and culvert upgrades are also proposed which will require in-river works.

The removal of selected trees will take place as part of the scheme, which are predominantly in the Sallybrook, Meadowbrook and Brooklodge Grove areas of the proposed scheme. Tree removal is not anticipated in the vicinity of the tidal section of the Glashaboy River and there shall be no tree removal from Glanmire Woods. No dredging works shall take place as part of the scheme.

Channel Maintenance

Under the 1945 Arterial Drainage Act the OPW have a statutory requirement to undertake channel and embankment maintenance operations within a scheme and this will apply to the maintenance of the Glashaboy River (Glanmire/Sallybrook) Drainage Scheme. Channel and embankment maintenance operations can encompass a variety of activities, including silt and vegetation management, aquatic vegetation cutting, bank protection, bush cutting/branch trimming, tree cutting, mulching, mowing and structure maintenance (Ryan Hanley, 2014).

As outlined in Chapter 4 of the EIAR, a channel maintenance programme will be required throughout the reach of watercourses within the Scheme during its operation. The purpose of channel maintenance will be to ensure that Scheme elements are kept in '*proper repair and effective condition*'. Channel maintenance will include the removal of silt gravel build-ups and vegetation to maintain the as-designed channel cross section but this will not require removal of material below the existing bed and therefore is not considered dredging. All maintenance work is undertaken in accordance with Environmental Management Protocols and Standard Operating Procedures (SOPs) (OPW, 2011) along with additional measures where the SOPs show deficiencies, to ensure adverse impacts on the environment are considered and minimised.

Maintenance activities will only be conducted within the extent of the Scheme. The downstream extent of the Scheme is the confluence of the Mill Race with the main channel of the Glashaboy River and thus, maintenance activities will be carried out from this point upstream.

Recommendations of Inland Fisheries Ireland (IFI), as outlined in Chapter 4, will be incorporated into the channel maintenance method statement for the Scheme;

- a. This work is carried out as much as possible from the river bank without in stream tracking,
- b. Any unavoidable in stream work is carried out between May and September,
- c. Tree removal is limited to fallen trees or overhanging branches,
- d. Tree roots are not pulled from the river bank.

The proposed pumping stations will require regular maintenance and it will be necessary to jet the surface water sewers to maintain the hydraulic capacity to drain flood waters. Other measures will include regular inspections of flood walls and embankments, regular scheduled maintenance of the river channel and pruning of trees (including removal of trees where necessary), planning and control measures. The inspection regime will ensure that there is no deterioration in the structural integrity of the defences which may occur as a result of a vehicular collision for example. It is expected that the flood defences will otherwise be relatively maintenance free. In general, maintenance will typically consist of the following activities:

- The channels will be monitored by means of a walkover survey from the banks on a regular basis (likely quarterly, and also following a flood event). The walkover surveys would aim to identify issues with implications for flood risk (e.g. fallen trees, excessive vegetation build-up, overgrown trees, illegal dumping, accumulation of granular deposits, etc.). In-channel debris will typically be removed by a long reach excavator working from the banks. Excessive overhanging vegetation will typically be pruned back or removed by hand using a cherry picker, depending on access.
- The structures will be monitored by means of a walkover survey from the banks on a bi-annual basis. The walkover surveys would aim to identify issues with implications for flood risk (e.g. damage to structures, settlement of embankments, etc.).

- Culverts will be inspected on an annual basis, or following a significant flood event. Any debris present in the culvert will be cleared by hand. A full CCTV survey and clearing of silt/sediment from the culvert is expected to take place approximately every five years. Removal of debris will be carried out as required.

Consultation will be required with the relevant stakeholders as necessary during the planning of these maintenance works including landowners, IFI, the National Monuments Service (NMS), Cork County Council (CCC) and National Parks and Wildlife Service (NPWS) to ensure that the works are carried out with minimal environmental impact.

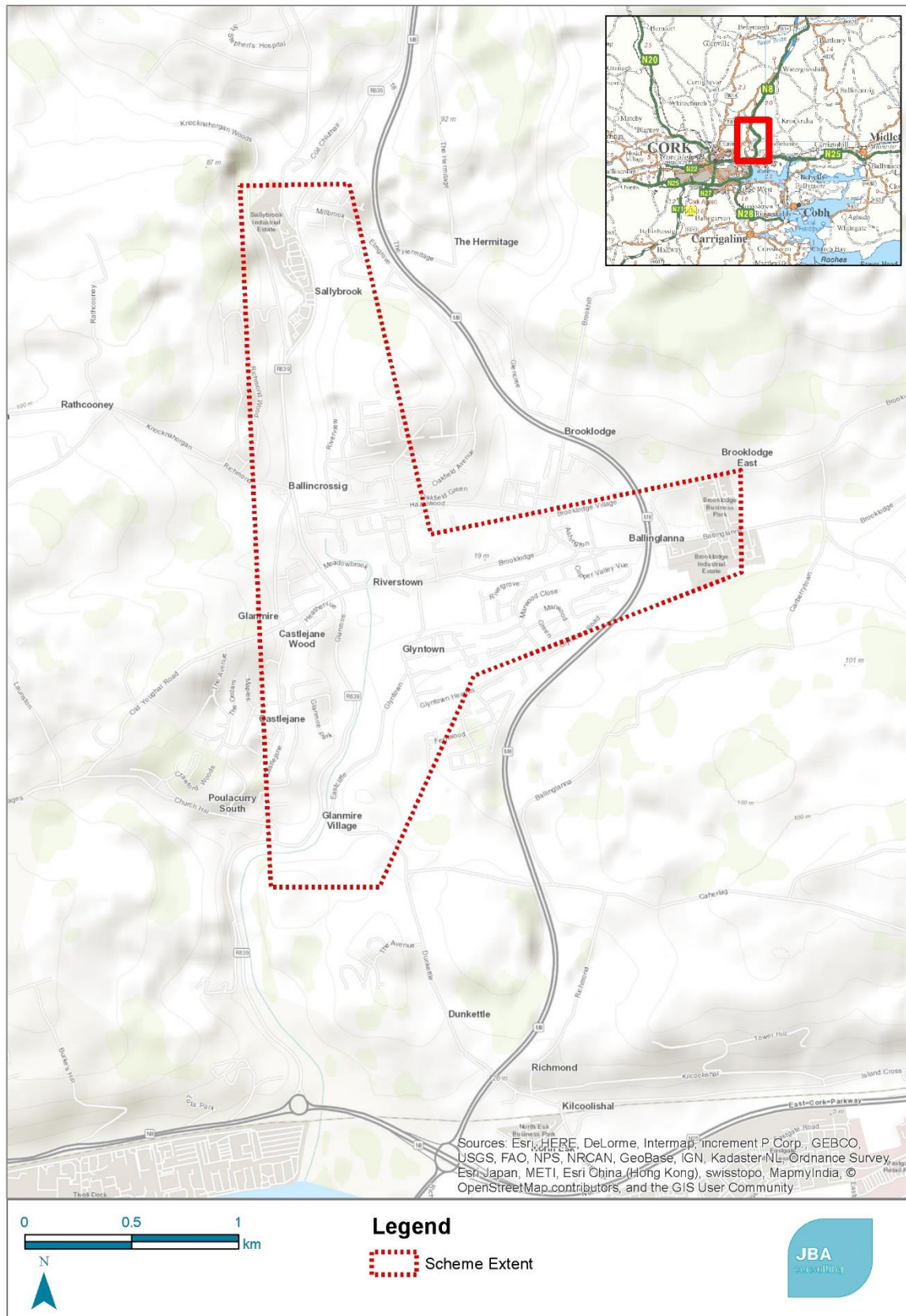


Figure 2-1: Extent of proposed project marked by red line boundary

3 Ecology Baseline

3.1 Desktop based assessment and site surveys

The data sources below were consulted for the desktop assessment to collate information regarding protected species and habitats, and statutory designated natures conservation sites, in or within close proximity to the extent of the proposed scheme;

- NPWS website (www.npws.ie);
- EPA website (www.envision.ie);
- National Biodiversity Data Centre (<http://www.biodiversityireland.ie/>)
- Water Framework Directive Ireland (www.wfdireland.ie)
- Botanical Society of Britain and Ireland (<http://bsbidb.org.uk/maps/>)
- 2010/2011 Waterbird Survey Programme as undertaken by The National Parks & Wildlife Service (Cummins and Crowe, 2011)
- Irish Wetland Bird Survey (I-WeBS) data
- Birdwatch Ireland and British Trust for Ornithology Bird Atlas 2007-2011 online database. Available online at; <http://app.bto.org/mapstore/StoreServlet?id=46> . Accessed 2016
- Gittings, T. (2006). Waterbird monitoring in Cork Harbour: 1994/95-2002/03. In C. Cronin, C. Barton, H. Hussey, & M. Carmody (Eds.), (pp. 319–339). Cork: Cork Bird Report Editorial Team

3.2 Methodology

3.2.1 Introduction

Detailed ecological surveys and species-specific surveys were carried out during 2016, as part of the larger environmental assessment of the proposed scheme, by a number of ecologists and other technical specialists as outlined in the table below. Additional surveys, in particular for otter and bats, were carried out in 2017.

Table 3-1: Technical specialists who conducted ecological and species-specific surveys

Name	Company	Role	Ecological Receptor
Francis Tobin and Anne Murray	JBA Consulting	Ecologists and Bird Specialists	Breeding Birds and Wintering birds
Niamh Sweeney	JBA Consulting	Ecologist and Aquatic Specialist	Aquatic macroinvertebrates, Reptiles, Amphibians and Large Mammals
Matthew Hemsworth	JBA Consulting	Geomorphologist	Geomorphology interactions with Ecology
Jonathan Whitmore	JBA Consulting	Fisheries Specialist	Fisheries interactions with Geomorphology and Hydrology
Dr. Kieran Connolly	Kieran Connolly	Botanist	Habitats and Flora
Ross Macklin	Triturus Environmental Services	Fisheries Scientist	Fisheries
Dr. Tina Aughney	Bat Eco Services	Bat Specialist	Bats
Anne Murray	JBA Consulting	Senior Ecologist	EclA Overview and Technical Reviewer

3.2.2 Ecological Walkover Survey

The ecological walkover survey consisted of:

- Mapping and recording all habitats along the channels/embankments in accordance with the Best Practice Guidance for Habitat Survey and Mapping (Smith *et al.*, 2011).
- Noting, as part of the habitat mapping, the location and extent of all Annex I habitats.
- Recording any other habitat features that contribute to habitat diversity, but that were not sufficient to warrant a separate classification as part of the habitat mapping exercise, these might include spoil heaps, small wetland areas or linear features with high species-richness.
- Recording the location of any areas of floating river vegetation.
- Recording the presence of any non-native invasive species.
- Recording the presence and location of all Annexed species, species protected under the Wildlife Acts and Flora Protection Order, and any other notable floral or faunal species. Specifically, this included:
 - Recording of evidence of Otter *Lutra lutra* (e.g. spraints, holts, couches, feeding remains, footprints)
 - Recording of evidence of Badger *Meles meles* activity (e.g. setts, latrines, footprints, runs, feeding signs or hairs)
 - Recording all bird activity observed during the survey, including species listed in Annex I of the Birds Directive (79/409/EEC) and Birds of Conservation Concern in Ireland (BoCCI).
 - Noting and mapping the locations of Kingfisher *Alcedo atthis* nests, Sand Martin *Riparia riparia* nesting cliffs, or eroded sections of vertical bank providing suitable nest sites.
 - Recording habitats where rare or protected animal or plant species are present, or where the habitats are suitable to support these species.

The results of all of the above surveys have been compiled into an ArcGIS geodatabase, which includes three layers:

- Habitats classified according to Fossitt (2000) system.
- Areas of Annex I habitats and other notable habitat areas not sufficient to warrant classification under the Fossitt system.
- The location of any species information (i.e. evidence of protected species, stands of non-native invasive species).

A geo-referenced photographic record has also been compiled during the ecological survey, which consists of:

- Habitats present along the surveyed watercourses and embankments (where habitat type is continuous along a channel, a minimum of one photograph for each kilometre stretch of channel corridor was taken).
- Notable areas, such as ecologically valuable habitats and other ecological sensitivities.
- Bridges encountered during the survey work.

3.2.3 Flora and Habitats survey

The habitats and flora survey was carried out in general accordance with those methods outlined in the following documents;

- Best Practice Guidance for Habitat Survey and Mapping (Smith *et al.*, 2011).
- Phase 1 Habitat Survey methodology (Joint Nature Conservation Committee (JNCC), 1990, revised 2003).
- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA, 2009).

A habitat survey was carried out on the 1st and 2nd of June 2016. Habitats and flora are stable and remained unchanged within the receiving environment and therefore remain relevant to the proposed Scheme. The survey area followed the course of the Glashaboy River and its tributaries, from its confluence with the River Lee in Cork harbour at the south end of the site, to Sallybrook, approximately 5km to the north. Habitats were surveyed following standard methodology (Smith *et al.*, 2011; JNCC, 2003), and were classified under the national habitat classification system of Fossitt (2000). Plant names follow Stace (2010). The survey was undertaken during the optimum season for surveying flowering plants (typically May-September inclusive).

3.3 Ecology of the Proposed Site

3.3.1 Habitats and Flora

The habitats listed in Table 3-2 are those recorded within and adjacent to the proposed area of the scheme and are shown in Figure 3-1. More detailed habitat maps are available in Appendix C.

Table 3-2: Habitats recorded in the adjacent area of the proposed scheme.

Habitat	Fossitt Habitat code
Treelines	WL2
Riparian woodland	WN5
Hedgerow	WL1
Mixed broadleaved woodland	WD1
Amenity grassland (improved)	GA2
Buildings and artificial surfaces	BL3
Stone walls and other stonework	BL1
Scrub	WS1
Improved agricultural grassland	GA1
Tidal rivers	CW2
Recolonising bare ground	ED3
Mud shores	LS4
Ornamental/non-native shrub	WS3
Dry meadows and grassy verges	GS2

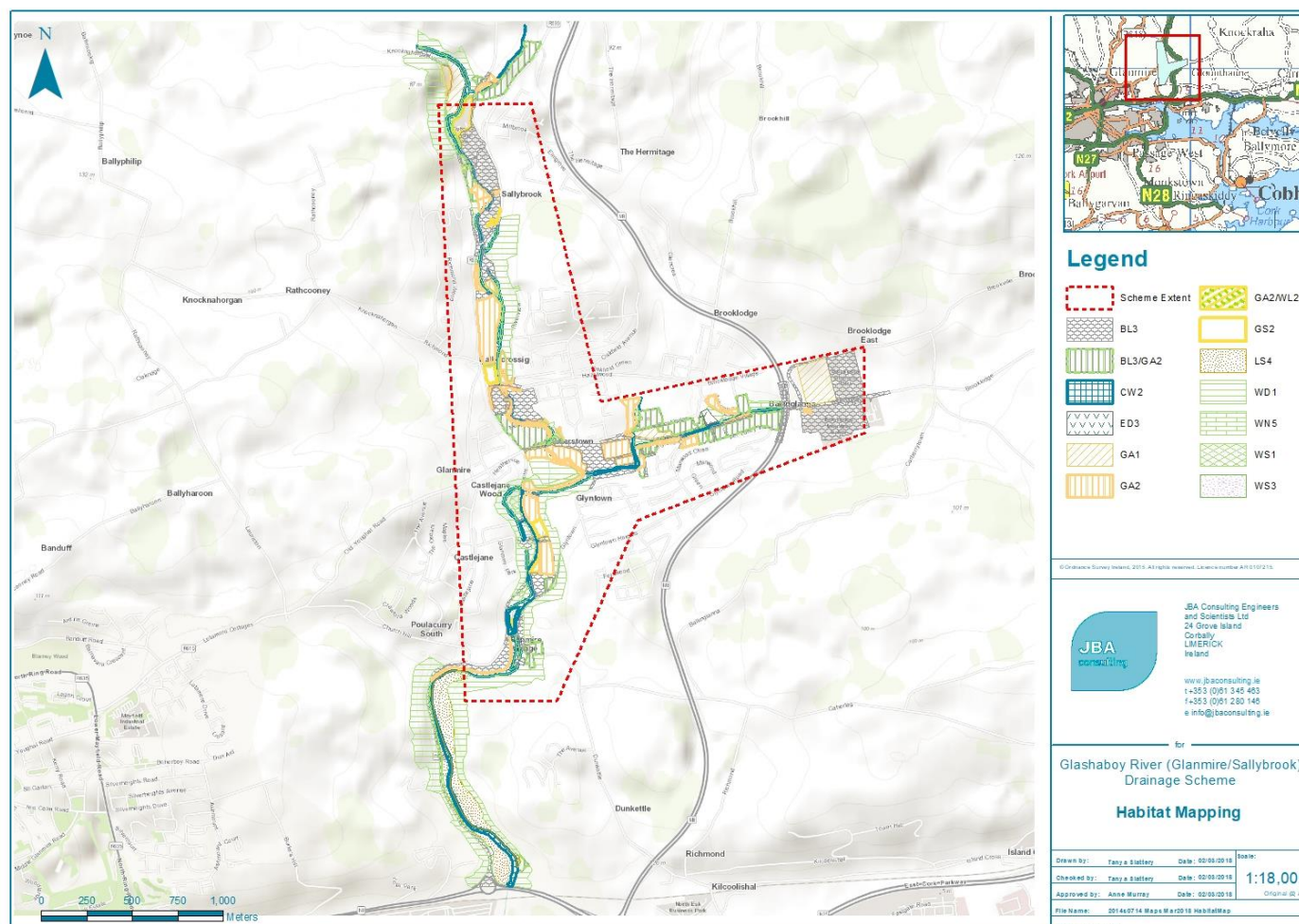
The survey area is mostly within an urban/suburban environment, with many buildings, roads and car parks throughout (Buildings and artificial surfaces, BL3). Amenity grassland (GA2), encompassing lawns, playing fields and parks, is also much in evidence throughout the site.

Natural habitats adjacent to the river channel are frequently reduced to narrow treelines (WL2), along riverbanks, some of which are on low earth embankments. Treelines are taken to include narrow rows or single lines of trees that are greater than 5m in height, and no greater than approximately 4m wide at the base.

There are a number of wet woodland areas along the river margins in the site that are categorised as Riparian woodland, WN5. This category of woodland includes those that are generally subject to periodic or frequent flooding, and are dominated by Willows (*Salix spp.*), with Alder (*Alnus glutinosa*) also occasional. This woodland type has some clear affinities with the priority EU Annex I habitat 'Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-padion*, *Alnion incanae*, *Salicion albae*)' (91E0). However, in a recent woodland survey encompassing alluvial forests in Ireland (O'Neill and Barron 2013), sites were rejected for consideration under the Annex I type (91E0) when they did not sufficiently conform to the habitat type, either through a lack of target species in the canopy or a lack of typical species in the field layer, or a combination of both. This is true of all of the riparian woodland mapped here, therefore, the Annex I habitat is, not deemed to be present within the survey area.

(Mixed) broadleaved woodland (WD1) comprises woodland with 75-100% cover of broadleaved trees and 0-25% conifers that cannot be satisfactorily classified into a more specific category of semi-natural woodland. Non-native tree species are often present.

Other occasional habitats mapped included scrub (WS1), improved agricultural grassland (GA1) and dry meadows and grassy verges (GS2).



Code	Habitat Type
WL1	Hedgerow
WL2	Treeline
BL3	Buildings and artificial surfaces
CW2	Tidal river
ED3	Recolonising bare ground
GA1	Improved agricultural grassland
GA2	Amenity grassland
GS2	Dry meadows and grassy verges
LS4	Mud shores
WD1	Mixed broadleaved woodland
WN5	Riparian woodland
WS1	Scrub
WS3	Ornamental/non-native shrub

Figure 3-1: Overall Habitat Map of Proposed Scheme

Treelines and Hedgerows (WL2 and WL1)

Treelines mainly consist of Alder (*Alnus glutinosa*), Willow (*Salix sp.*), Ash (*Fraxinus excelsior*), Hawthorn (*Crataegus monogyna*), Oak (*Quercus sp.*), Sycamore (*Acer pseudoplatanus*) and Beech (*Fagus sylvatica*). Many of these trees are mature trees that line the existing channel. Ground flora contains species such as Winter heliotrope (*Petasites fragrans*) and Bramble (*Rubus fruticosus agg.*).

Riparian woodland (WN5)

The majority of the canopy layer of riparian woodland recorded within the survey area is dominated by Alder and Willows (mostly *Salix cinerea*). Riparian woodland generally has affinities with the priority Annex I type 'Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-padion*, *Alnion incanae*, *Salicion albae*)' (91E0), however a lack of target species in the canopy or lack of typical species in the field layer, or a combination of both is taken as precluding the habitat from classification as the Annex I type. Field layers of this habitat type comprise species such as Wild Angelica (*Angelica sylvestris*), opposite-leaved Golden Saxifrage (*Chrysosplenium oppositifolium*), Water horsetail (*Equisetum fluviatile*), Meadow-sweet (*Filipendula ulmaria*), Water figwort (*Scrophularia auriculata*) and Common nettle (*Urtica dioica*). Hemlock water-dropwort (*Oenanthe crocata*) and Wood anemone (*Anemone nemorosa*) were recorded occasionally in the field layer.

Buildings and artificial surfaces (BL3)

The Glashaboy River and its tributaries in the vicinity of the proposed scheme flow through an urban/suburban environment with many buildings, roads and car parks. Sallybrook industrial estate is located at the northern end of the proposed scheme area and Hazelwood Shopping Centre is located adjacent to the Glashaboy River in Glanmire. Sections of the Glashaboy River channel are also edged with rock gabions, boulders and low built walls.

Scrub (WS1)

The vegetation along the narrow stream channel, Cois na Gleann stream that is a tributary of the Glashaboy River, consists of a fringe of scrub species including Hawthorn, Blackthorn (*Prunus spinosa*), Bramble and Elder (*Sambucus nigra*). The ground flora is mostly composed of rough grasses and common herbaceous species.

Amenity Grassland (GA2)

Amenity grassland is located amongst much of the housing estate areas and Hazelwood Shopping Centre. Large amenity grassland areas include the playing pitches north of Hazelwood Shopping Centre and at John O'Callaghan Park.

Mud Shores (LS4)

Downstream of Glanmire Bridge, aerial photographs and NPWS habitat maps of Cork Harbour SPA (NPWS, 2014a) indicate that the receding tide exposes substantial mudflats. However, the tide was high during the survey.

Tidal River (CW2)

The Glashaboy River is a transitional waterbody downstream of Glanmire Bridge in Glanmire village, and therefore a tidal river. It is named the Glashaboy estuary (IE_SW_060_0800) and is classified as having *Moderate* status (WaterMaps, 2016).

Non-native Invasive Species

There is extensive cover of invasive Japanese Knotweed *Fallopia japonica* species in this area, which has significantly compromised the habitat quality. This area will require treatment of this species prior to entering this area.

A number of invasive plant species were recorded, most notably the knotweed species Japanese Knotweed, Giant Knotweed (*Fallopia sachalinensis*) and a hybrid knotweed *R. x bohemica*, that is a hybrid between *F. japonica* and *F. sachalinensis*.

Knotweed is common over much of the survey area, particularly in the more northern parts (Figure 3-2), and it's typically invasive and spreading habit has negatively affected significant areas of habitat. Himalayan Knotweed (*Persicaria wallichii*) was also recorded, in the most southerly part of the survey site, but appears to be quite limited in its occurrence at present.

Other invasive species, all of which were uncommon or generally restricted in their occurrence throughout the survey area, included the Butterfly-bush (*Buddleja davidii*), Traveller's-joy *Clematis vitalba*, Himalayan honeysuckle (*Leycesteria formosa*), Cherry-laurel (*Prunus laurocerasus*) and Snowberry *Symphoricarpos albus*.

Advance treatment of Japanese knotweed has commenced on site and to date a minimum of two years of two-stage treatment have been carried out. It is expected that a further round of treatment shall take place if deemed necessary and feasible, prior to commencement of the Scheme. In addition to the advance treatment works, a pre-construction survey of invasive species shall take place. Treatment of Japanese knotweed will continue throughout the construction phase of the proposed Scheme.



Figure 3-2: Extensive stands of Knotweed along the River Glashaboy, upstream of Hazelwood Avenue Bridge.

3.3.2 Breeding Birds

The breeding bird surveys were carried out on the 1st and 2nd of July 2016 and the 16th and 20th of July 2016. The survey area encompassed the entire riparian area from the northern part of the proposed scheme to Dunkettle and also included areas where construction access routes and compounds may be located.

Table 3-3 details the breeding birds that were recorded during the surveys, including terrestrial and riparian habitats.

Table 3-3: Breeding bird surveys for Glashaboy, including terrestrial and riparian habitats

Common Name	Latin name	Conservation Status		Riparian Action Plan Species	Breeding status	Comments	Habitat
		EU Birds Directive ¹	BoCCI ²				
Kingfisher	<i>Alcedo atthis</i>	Annex I	Amber	✓	Probable	Kingfisher nesting embankment - 4-5 nest holes (longer term nesting site)	Nests in river bank between areas of walled river and also an historical nesting site now collapsed.
Little Egret	<i>Egretta garzetta</i>	Annex I	Green	✓	Probable	Observed in suitable habitat	Estuary habitat adjacent to woodland. Known to breed in Pfizer Woodland
Grey Wagtail	<i>Motacilla cinerea</i>	-	Red	✓	Confirmed	Observed nesting at bridges and cobble wall along river	Bridge structures and walls
Dipper	<i>Cinclus cinclus</i>	-	Green	✓	Confirmed	Observed 2 nests in bridge structure	Bridges
Kestrel	<i>Falco tinnunculus</i>	-	Amber		Possible	Observed in suitable habitat	Woodland
Mute Swan	<i>Cygnus olor</i>	-	Amber	✓	Confirmed	Cygnets present	River
Cormorant	<i>Phalacrocorax carbo</i>	-	Amber	✓	Possible	Observed in suitable habitat; feeding	Estuary
Swallow	<i>Hirundo rustica</i>	-	Amber		Possible	Observed in suitable habitat	Nearby buildings
Lesser Black-	<i>Larus fuscus</i>	-	Amber		Not Breeding	Observed foraging in	Colonial breeders Buildings

¹ Annex I of the Birds Directive lists 193 species and sub-species which are: in danger of extinction; vulnerable to specific changes in their habitat; considered rare because of small populations or restricted local distribution; requiring particular attention for reasons of the specific nature of habitat.

² BoCCI = Birds of Conservation Concern Ireland: Red-listed species are those of highest conservation priority, Amber listed species those which are of lesser priority and Green-listed species those of least conservation priority.

Conservation Status							
Common Name	Latin name	EU Birds Directive ¹	BoCCI ²	Riparian Action Plan Species	Breeding status	Comments	Habitat
backed Gull						estuary	or may nest on coast/ islands
Swift	<i>Apus apus</i>		Amber		Not Breeding	Flyover only	
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	-	Red		Not Breeding	Flyover only	
Blackbird	<i>Turdus merula</i>	-	Green		Probable	Pair observed in suitable habitat; agitated behaviour indicating presence of nest site nearby	Riparian woodland
Blackcap	<i>Sylvia atricapilla</i>	-	Green		Possible	Observed in suitable habitat; males singing	Riparian woodland and scrub
Blue Tit	<i>Cyanistes caeruleus</i>	-	Green		Possible	Observed in suitable habitat; males singing	Riparian woodland and scrub
Bullfinch	<i>Pyrrhula pyrrhula</i>	-	Green		Possible	Observed in suitable habitat	Scrub
Carrion Crow	<i>Corvus corone</i>	-	Green		Possible	Observed in suitable habitat	Woodland
Chaffinch	<i>Fringilla coelebs</i>	-	Green		Probable	Female and males observed alarm calling in the survey areas.	Woodland and scrub habitat
Chiffchaff	<i>Phylloscopus collybita</i>	-	Green		Possible	Observed in suitable habitat; males singing	Scrub and riparian woodland
Coal Tit	<i>Parus ater</i>	-	Green		Confirmed	family observed	Riparian woodland
Dunnock	<i>Prunella modularis</i>	-	Green		Possible	Observed in suitable habitat; males singing	Hedgerow and riparian scrub
Goldfinch	<i>Carduelis carduelis</i>	-	Green		Probable	Pair observed in suitable habitat	Hedgerow along a ditch
Great Tit	<i>Parus major</i>	-	Green		Possible	Observed in suitable habitat; males singing	Woodland and riparian scrub
Grey Heron	<i>Ardea cinerea</i>	-	Green		Possible	Observed in suitable habitat; hunting	Estuary and river Colony at Dunkettle Shoreline pNHA

Conservation Status							
Common Name	Latin name	EU Birds Directive ¹	BoCCI ²	Riparian Action Plan Species	Breeding status	Comments	Habitat
							Woodland edge at Pfizer.
Hooded Crow	<i>Corvus cornix</i>	-	Green		Possible	Observed in suitable habitat	Woodland
Jackdaw	<i>Corvus monedula</i>	-	Green		Confirmed	Nest site present in woodland	Woodland
Jay	<i>Garrulus glandarius</i>	-	Green		Possible	Observed in suitable habitat	Woodland and scrub
Mallard	<i>Anas platyrhynchos</i>	-	Green		Possible	Observed in suitable habitat	River
Magpie	<i>Pica pica</i>	-	Green		Confirmed	Observed carrying food material for young.	Riparian woodland
Pied Wagtail	<i>Motacilla alba</i>	-	Green		Confirmed	Observed carrying food material for young; Pied Wagtail families observed within the survey area	Improved grassland, riparian woodland
Robin	<i>Erithacus rubecula</i>	-	Green		Confirmed	Observed carrying food for young	Riparian scrub
Rook	<i>Corvus frugilegus</i>	-	Green		Possible	Observed in suitable habitat	Woodland
Song Thrush	<i>Turdus philomelos</i>	-	Green		Possible	Observed in suitable habitat	Amenity grassland; riparian woodland and hedges nearby
Woodpigeon	<i>Columba palumbus</i>	-	Green		Possible	Observed in suitable habitat; males singing	Woodland and scrub
Wren	<i>Troglodytes troglodytes</i>	-	Green		Confirmed	Adult entering and leaving an area which is indicative of nesting behaviour	Scrub

3.3.3 Wintering Birds

Wintering birds were not surveyed as part of the project as surveys were commissioned outside of the wintering period. However, given the nature of the proposed works that are located outside Cork Harbour SPA and the information obtained from the desktop study including *Supporting Documents of Cork Harbour SPA* (NPWS, 2014a) and IWeBs data, these are considered sufficient to complete the assessment of potential impacts. Additionally, the precautionary approach is taken and it is assumed that wintering bird species, including those designated as features of the SPA, will use the area of mudflat that occurs approximately 500m downstream of Glanmire Bridge, and other areas downstream of the proposed works.

Waterbirds were counted within a series of 73 count subsites in Cork Harbour SPA, many of these extending beyond the SPA boundary. Although, these datasets are not absolute, the data provides an indication of the distribution of birds across the SPA and surrounding areas. This information along with habitat surveys and an understanding of each bird species' ecology is used to inform this NIS of the Glashaboy River (Glanmire/Sallybrook) Drainage Scheme. The most relevant subsites are Glashaboy OL538, approximately 500m downstream of Glanmire Bridge, and Rathcoursey OL483, which is South of the N8 road (Figure 3-3 and Table 3-4).

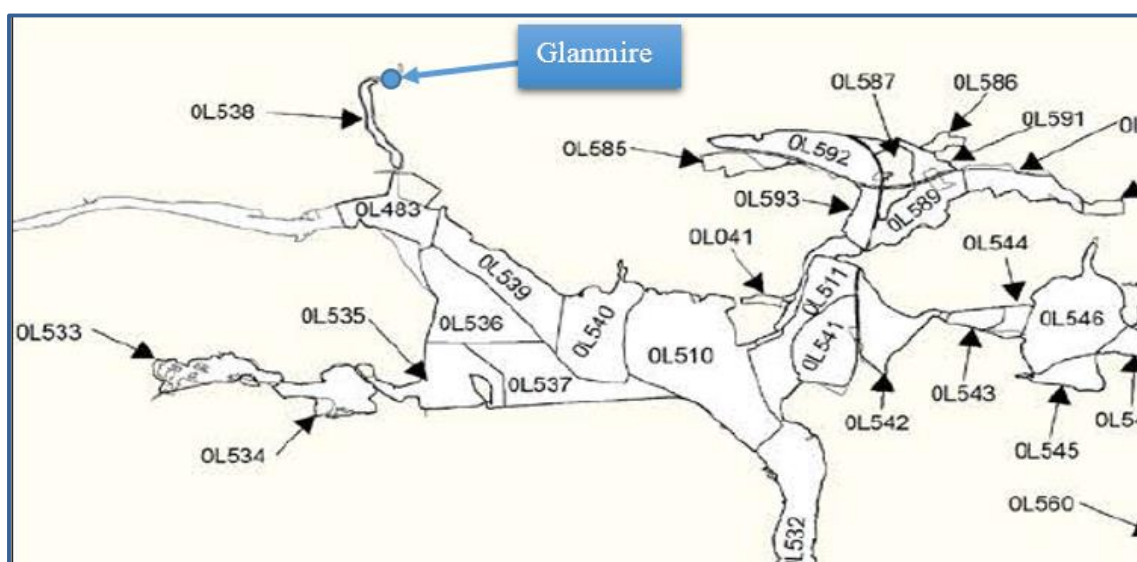


Figure 3-3: Wintering bird surveys subsites Glashaboy OL538 and Rathcoursey OL483 (NPWS, 2014a)

Table 3-4: Wintering bird surveys for Glashaboy for the subsites Glashaboy OL538 and Rathcoursey OL483 (NPWS, 2014a)

Survey	Glashaboy OL538	Rathcoursey OL483	Designated Features of Cork Harbour SPA
Low Tide	Common Gull	Common Gull	✓
	Black-headed Gull	Black-headed Gull	✓
	Curlew	Curlew	✓
	Black-tailed Godwit	Black-tailed Godwit	✓
	Cormorant	Cormorant	✓
	Oystercatcher	Oystercatcher	✓
		Lesser Black-backed Gull	✓
		Bar-tailed Godwit	✓
		Lapwing	✓
		Dunlin	✓
		Heron	✓
		Shelduck	✓
		Wigeon	✓

Survey	Glashaboy 0L538	Rathcoursey 0L483	Designated Features of Cork Harbour SPA
		Teal	✓
High Tide	None Recorded	Blackheaded Gull	✓
		Curlew	✓
		Great Black-backed Gull	✓
		Black-tailed Godwit	✓
		Greenshank	✓
		Redshank	✓
		Heron	✓
		Mallard	
		Shelduck	✓
		Teal	✓
		Wigeon	✓
Night time		Cormorant (Glanmire Woods)	✓

3.3.4 Otter

A number of otter activity signs were recorded along the Glashaboy River during the June and July 2016. Activity signs were in the form of footprints, spraints, slides, couches and holts. Both active and inactive otter holts were recorded during the survey. The presence of otter was mainly recorded along the Glashaboy River main channel in the vicinity of John O' Callaghan's Park, Meadowbrook, upstream of Hazelwood Centre road, and Sallybrook Industrial estate. Otter activity was also recorded along the Glenmore stream. Subsequent surveys and monitoring were conducted during 2016 and 2017. Monitoring was carried out under licences obtained from NPWS and a derogation licence was obtained for the proposed Scheme with respect to otter in December 2017.

3.3.5 Bats

These surveys were completed during the daytime assessment on the 12th, 13th and 25th July 2016. The 2016 surveys were supplemented by additional surveys on 21st July and 14th August 2017 to incorporate design changes to the proposed scheme. A derogation licence was obtained for the proposed Scheme with respect to bats in December 2017.

Six species of bats were recorded feeding and commuting within the survey area along the Glashaboy River. This is indicative of the importance of this area for bats. While three of the bat species recorded are common Irish bat species (common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus* and Leisler's bat *Nyctalus leisleri*), two typical woodland species were recorded (brown long-eared bats *Plecotus auritus* and Natterer's bats *Myotis nattereri*), and one bat species that relies on both woodland and waterways (Daubenton's bat *Myotis daubentonii*). This is a rich bat fauna for one survey area and shows that the Glashaboy River and its tributaries are principal commuting routes especially along dark treelines and woodland areas. The Leisler's bat was the only species flying across the open fields/parklands. This emphasises the importance of these habitats for the suite of bat species recorded on-site.

There are a number of large mature trees located in woodlands (Hazelwood, John O'Callaghan Park and north of Sallybrook) that are considered highly suitable for roosting bats. Only areas where there were proposed flood relief plans were surveyed for Potential Bat Roosts (PBRs) and twelve PBRs were identified in these areas.

3.3.6 Fisheries

Fisheries surveys were conducted during July 2016. Survey areas were located at flood relief working zones where significant instream works are proposed. These included a first station, commencing slightly upstream but overlapping the instream works zone and at a second station downstream of this location to provide improved knowledge of the fisheries value of the wider site. Electro-fishing was conducted at ten locations where instream works are expected, under licence from Inland Fisheries Ireland.

Four sites within the survey area had the best quality salmonid habitat, in terms of spawning, nursery and holding (pool) habitat. Sites 1 (Bleach Hill Stream) and 9 (Glenmore Stream) had moderate to good quality habitat because of poorer nursery or spawning habitat respectively. Heavily modified streams with very poor river profiles because of historical modification and associated higher levels of sedimentation and or of a shallow nature scored poorly. These included Sallybrook stream (Site 2), the Cois na Gleann Stream (Site 4) and the Springmount Stream (site 7). Barry's Terrace was not evaluated given it is in the upper parts of the Glashaboy estuary and outside the scope of the scoring system.

3.3.7 Freshwater macroinvertebrates

Three sampling sites were selected for the sampling of freshwater macroinvertebrates; two on the Glashaboy River and one on the Butlerstown River. The three sites were assigned a rating of Q4, which represents Good ecological conditions. The Glashaboy and Bulterstown Rivers are classed as being of 'Good' status under the WFD classification system (EPA, 2016). Macroinvertebrate assemblages are one biological quality element considered when calculating the status of a river, with the 'one out all out rule' whereby overall classification is defined by the lowest observed individual quality element. Rivers of Q4 rating also represent waters that provide good fishery potential, as outlined in the Water Quality for Phosphorus Regulations 1998 (S.I. 258/1998). Curtis *et al.* (2009) also describe the ecological requirements of Salmon *Salmo salar* as requiring very high water quality and waters less than Q4 put Salmon populations at risk.

3.3.8 Geomorphology

The geomorphological audit has shown that the Glashaboy is presently not actively transporting much gravel sized material. The river in its upper reaches has good floodplain connectivity, but in its lower reaches, as the urban influences encroach into the channel and floodplain and confine the river corridor, instabilities in the channel occur and erosional processes increase.

Sediment deposition is generally at a low level. The main supply of sediment into the system is from bank erosion, steep tributaries and glacial sediment re-working (in the very upper reaches). Run off from agricultural areas also inputs fine sediment in to the system with limited buffer strips due to a poor quality riparian zone in many locations. Where sediment accumulation issues exist within the system these tend to be as a result of modifications to the channel which has acted to disrupt the natural river system processes. This includes impoundment disrupting the downstream transport of sediment, over widening which reduces channel velocity (increasing sedimentation), channel narrowing increasing velocities (decreasing sedimentation and increasing bank erosion) and poor placement of in channel features and structures. The full audit report is detailed in Appendix D, which involved assessments in 2014 and 2016.

4 Screening for Appropriate Assessment

4.1 Natura 2000 sites

The DEHLG (2009) guidance identifies that the Appropriate Assessment screening stage of a plan or project should consider the following *Natura 2000* sites:

- Any *Natura 2000* sites within or adjacent to the plan or project area.
- Any *Natura 2000* sites within the likely zone of impact of the plan or project. This is dependent on the nature and scale of the plan, with 15km generally recommended for plans, but potentially much less for projects.
- Any *Natura 2000* sites that are more than 15km from the plan or project area, but may potentially be impacted upon, for example, through a hydrological connection.

For the Glashaboy River (Glanmire/Sallybrook) Drainage Scheme, previously described in Section 2.2, the study area is considered to be the primary focus of this assessment. A 5km buffer encompasses the areas where options are currently proposed. Being on the coast, it is not considered necessary to widen the zone of impact as upstream sites will not be affected. There are no protected Groundwater Dependent Terrestrial Ecosystems in the surrounds of the Glashaboy River and tributaries that will be impacted by the proposed measures, therefore a 5km buffer is considered sufficient in the context of these measures.

The *Natura 2000* sites within the zone of potential impact are:

- Cork Harbour SPA; and
- Great Island Channel SAC.

These sites occur within a 5km radius of the proposed scheme. In particular, the upper section of Cork Harbour SPA is located immediately downstream of Glanmire Bridge. The Great Channel Island SAC occurs to the east of the proposed scheme approximately 5km downstream (Figure 4-1).

The potential impacts on these designations is largely through impacts on water quality, alterations to surface water flows, changes to riparian and instream habitats affecting fisheries and aquatic invertebrates, all of which may have an indirect impact on the foraging opportunities of designated bird species of the SPA and may also impact the mudflats and wetlands that form an integral part of the SPA and SAC downstream of the scheme. Given the presence of the invasive non-native species Japanese Knotweed in the catchment, there is potential for this to spread and cause further negative impacts on the *Natura 2000* sites.

The proposed project is not directly connected with or necessary to the management of any *Natura 2000* site. It is, accordingly, necessary for the competent authority to assess whether the proposed development, either individually or in combination with other plans or projects, would be likely to have significant effects on any *Natura 2000* site.

Given the presence of surface water and land and air pathways and the potential impacts posed by the proposed scheme on the Cork Harbour SPA and Great Island Channel SAC, it is concluded by the authors of this report that it is not possible to rule out (screen out) likely significant impacts on these *Natura 2000* sites. Therefore, it is recommended by the authors of this report that the proposed drainage scheme should be brought forward to the second stage of the Appropriate Assessment process.

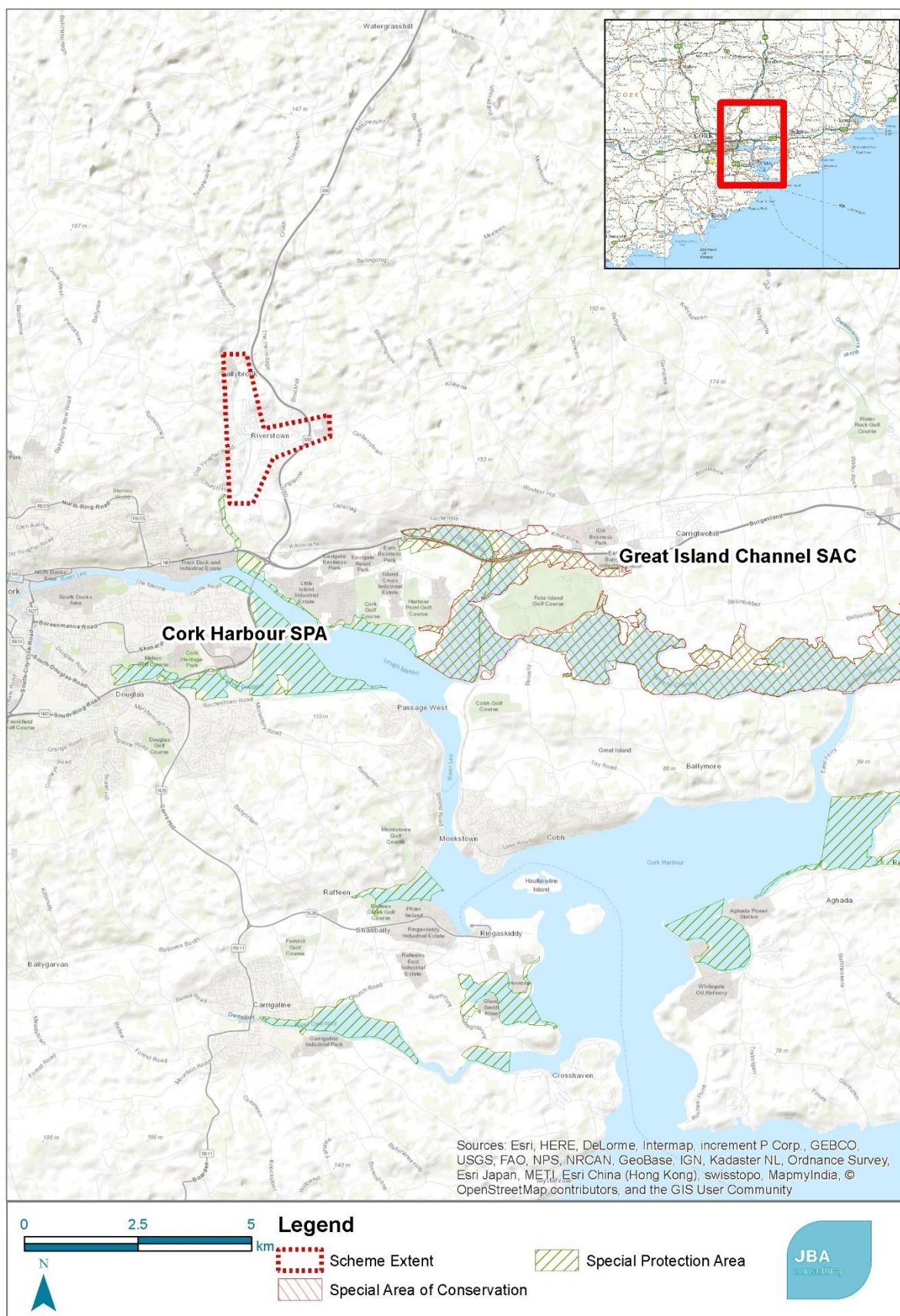


Figure 4-1: *Natura 2000* sites in relation to the Glashaboy River (Glanmire/Sallybrook) Drainage Scheme

5 Natura 2000 sites within the Zone of Influence of the scheme

5.1 Introduction

This chapter provides baseline information on the *Natura 2000* sites within the Zone of Influence of the scheme, as screened in in Section 4. There are two *Natura 2000* sites (Figure 4-1) that occur within the zone of potential impact, namely:

- Cork Harbour SPA
- Great Island Channel SAC

5.2 Cork Harbour SPA [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, Ringabella Creek and the Rostellan and Poul nabibe 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*, *Nephtys hombergi*, *Nereis diversicolor* and *Corophium volutator*. Green algae species occur on the flats, especially *Ulva* 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. 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), Bar-tailed 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 (NPWS, 2015).

5.2.1 Qualifying Interests

Table 5-1: Qualifying Interests of Cork Harbour SPA

Species		Comment
Little Grebe	<i>Tachybaptus ruficollis</i>	Wintering
Great Crested Grebe	<i>Podiceps cristatus</i>	Wintering
Cormorant	<i>Phalacrocorax carbo</i>	Wintering
Grey Heron	<i>Ardea cinerea</i>	Wintering
Shelduck	<i>Tadorna tadorna</i>	Wintering
Wigeon	<i>Anas penelope</i>	Wintering
Teal	<i>Anas crecca</i>	Wintering
Pintail	<i>Anas acuta</i>	Wintering
Shoveler	<i>Anas clypeata</i>	Wintering
Red-breasted Merganser	<i>Mergus serrator</i>	Wintering
Oystercatcher	<i>Haematopus ostralegus</i>	Wintering
Golden Plover	<i>Pluvialis apricaria</i>	Wintering
Grey Plover	<i>Pluvialis squatarola</i>	Wintering
Lapwing	<i>Vanellus vanellus</i>	Wintering
Dunlin	<i>Calidris alpina</i>	Wintering
Black-tailed Godwit	<i>Limosa limosa</i>	Wintering
Bar-tailed Godwit	<i>Limosa lapponica</i>	Wintering
Curlew	<i>Numenius arquata</i>	Wintering
Redshank	<i>Tringa totanus</i>	Wintering
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	Wintering
Common Gull	<i>Larus canus</i>	Wintering
Lesser Black-backed Gull	<i>Larus fuscus</i>	Wintering
Common Tern	<i>Sterna hirundo</i>	Breeding
Wetlands & Waterbirds		

5.2.2 Conservation Objectives

The Conservation Objectives for Cork Harbour SPA are to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (Table 5-1) (NPWS, 2014a).

The favourable conservation status of a species is achieved when:

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

The conservation objective for non-breeding birds Special Conservation Interests of Cork Harbour SPA are as follows (NPWS, 2014a) and are summarised in Table 5-2.

Table 5-2: Conservation Objectives of Cork Harbour SPA

Objective 1: To maintain the favourable conservation condition of the waterbird Special Conservation Interest species listed for Cork Harbour SPA, which is defined by the following list of attributes and targets:			
Parameter	Attribute	Measure	Target
Population	Population Trend	Percentage change as per population trend assessment using waterbird count data collected through the Irish Wetland Bird Survey and other surveys	The long term population trend should be stable or increasing
Range	Distribution	Range, timing or intensity of use of areas used by waterbirds, as determined by regular low tide and other waterbird surveys	There should be no significant decrease in the range, timing or intensity of use of areas by the waterbird species of Special Conservation Interest other than that occurring from natural patterns of variation
Objective 2: 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, which is defined by the following list of attributes and targets:			
Parameter	Attribute	Measure	Target
Area	Wetland habitat	Area (Ha)	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 2,587 Ha, other than that occurring from natural patterns of variation.

5.2.3 Site Vulnerabilities

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. (NPWS, 2008).

5.3 Great Island Channel SAC [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 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*, *Nephtys hombergi*, *Nereis diversicolor* and *Corophium volutator*. Green algal species occur on the flats, especially *Ulva lactuca* 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 an integral part of Cork Harbour which is a wetland of international importance for the birds it supports and this SAC overlaps with Cork Harbour SPA (NPWS, 2013).

Table 5-3: Conservation interests of Great Channel Island SAC

Code	Habitat Name
1140	Mudflats and sandflats not covered by seawater at low tide
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>)

5.3.1 Conservation Objectives

The conservation objectives for the Great Channel Island SAC (001058) are detailed in Table 5-4 and are taken from NPWS (2014b).

Table 5-4: Conservation Objectives of the Great Channel Island SAC

Qualifying Interest	Mudflats and sandflats not covered by seawater at low tide (1140)	
National Overall Conservation Status	Inadequate	
Conservation Objective	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Great Island Channel SAC, which is defined by the following list of attributes and targets:	
Attribute	Measure	Target
Habitat Area	Hectares	The Permanent habitat area is stable or increasing, subject to natural processes. Habitat area is estimated at 723ha.
Community distribution	Hectares	Conserve the following community type in a natural condition: Mixed sediment to sandy mud with polychaetes and oligochaetes community complex.
Qualifying Interest	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) (1330)	
National Overall Conservation Status	Inadequate	
Conservation Objective	To restore the favourable conservation condition of Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) in Great Island Channel SAC, which is defined by the following list of attributes and targets:	
Attribute	Measure	Target
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Bawnard - 0.29ha; Carrigtwohill - 1.01ha
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime
Vegetation structure: zonation	Occurrence	Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% area outside creeks vegetated
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of subcommunities with typical species listed in the Saltmarsh Monitoring Project (McCorry and Ryle, 2009)

Vegetation structure: negative indicator species - <i>Spartina anglica</i>	Hectares	No significant expansion of common cordgrass (<i>Spartina anglica</i>), with an annual spread of less than 1% where it is known to occur
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5.3.2 Site Vulnerability

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 (NPWS, 2013).

6 Appropriate Assessment - Stage 2

6.1 Introduction

This chapter assesses the *Natura 2000* sites, Cork Harbour SPA and the Great Island Channel SAC, in more detail and examines where potentially adverse impacts may arise from the sources of impact identified above. Where potentially significant adverse impacts are identified, avoidance and mitigation measures are proposed to offset these impacts. These are discussed in the following sections.

6.2 Identification of Potential Sources of Impact

This section further examines the potential sources of impact that could possibly result in adverse effects arising on the *Natura 2000* sites. These potential sources of impact could arise during both the construction and operational phases, but require complete source > pathway > receptor changes for adverse impacts to arise. These are summarised in Table 6-1.

The potential impacts posed by the Glashaboy River (Glanmire/Sallybrook) Drainage Scheme on Cork Harbour SPA and the Great Island Channel SAC are largely through impacts on water quality, as alterations to surface water flows, changes to riparian and instream habitats affecting fisheries and aquatic invertebrates, could have an indirect impact on the foraging opportunities of designated bird species of the SPA and may also impact the mudflats and wetlands that form an integral part of the SPA and SAC downstream of the scheme. The works also have the potential to cause disturbance that could possibly adversely impact bird species of the SPA via land and air pathways. The proposed scheme will require construction works to be undertaken upstream of Cork Harbour SPA (upstream of Glanmire Bridge). However, no aspects of the works will encroach on the designated areas during construction or operation of the scheme.

Indirect impacts on the designated sites could occur as a result of construction activities also upstream of the *Natura 2000* sites. During the construction phase there is the potential that silt and nutrients within the watercourses could be mobilised or that pollution incidents could occur. The Glashaboy River could then act as a surface water pathway for this contaminated material to reach Cork Harbour SPA and the Great Island Channel SAC further downstream, adversely impacting upon the habitats and species present. Contaminated water or silt may locally adversely affect the habitats, flora and macro-invertebrate fauna they support at the head of the estuary, including the mudflats of the SPA and sandflats and saltmarsh of the SAC. This could then impact upon the food source of the waterbird populations in this area, causing them to have to find alternative feeding areas. However, given the large size of the estuary, the resulting dilution effects, and the relatively localised nature of the works, a large proportion of which are upstream of the site, this is unlikely to have a widespread impact across the bay. Furthermore, during the construction phase, minor increases in flow velocities would be expected and this would remain within the depositional range; an impact of low magnitude is therefore anticipated.

The works have the potential to cause disturbance to the designated bird species of the SPA. The wintering birds may be impacted by the proposed works mainly as a result of impacts during construction and therefore water quality controls during the construction phase are imperative to ensure that no adverse impacts are caused to the designated bird species. The main habitats they rely upon in this area are the transitional waters and the mudflats and estuarine habitats. The area is used by a number of designated features of the Cork Harbour SPA for foraging and roosting. Also, disturbance due to the physical presence of machinery and humans working upstream of the SPA may interfere with the feeding and roosting times for the birds, as bird species may travel upstream when foraging and fishing, and cause energy expenditure in avoiding the source of disturbance.

Given the presence of the invasive non-native species Japanese knotweed in the catchment (among others), there is potential for this to spread and cause further negative impacts on the *Natura 2000* sites. It is noted that Japanese knotweed is currently being treated, however it will not be eradicated from the proposed working areas prior to commencement of works. Thus, the spread of invasive species remains a potential impact of the proposed Scheme and biosecurity measures will be required to mitigate this potential impact.

Table 6-1: Potential impacts arising from the Glashaboy River (Glanmire/Sallybrook) Drainage Scheme

Potential Hazard	Description
Physical damage	<p>This includes degradation to, and modification of, habitats upstream/within the designated boundaries of a <i>Natura 2000</i> site. This could arise in working areas and along access routes where construction works are undertaken within the site boundary. However, no temporary or permanent flood relief works are proposed downstream of Glanmire bridge and therefore, there will be no habitat loss from the Cork Harbour SPA and the Great Island Channel SAC.</p> <p>Indirect physical damage to habitats could occur, for example, through the alterations of flows and changes to riparian habitats. This may affect species such as fish and aquatic invertebrates that rely on instream and riparian habitats, thus indirectly affecting bird species of the SPA that fish the river or forage on the mudflats at Glanmire.</p>
Changes in physical regime	<p>These are changes to physical processes that can alter the present characteristics of the <i>Natura 2000</i> site (e.g. estuarine, fluvial and geomorphological processes, salinity levels, tidal regimes, erosion, deposition, sediment transport and accumulation). This could then result in degradation or loss of habitats and indirectly this could also affect sensitive species.</p>
Changes to hydrological regime	<p>Certain activities may result in changes to the current hydrological regime. For example, a reduction or increase in the frequency, extent, duration and/or depth of flooding may affect estuarine, riverine and floodplain habitats.</p> <p>The hydrological change in the catchment will affect extreme flood events only. Works in the proposed scheme are designed to reduce flooding to heavily urbanised area in the floodplain. The only expected increase to floodplain depths are on the right floodplain of the Glashaboy upstream of Hazelwood Avenue. These locations would not be deemed to be reducing any floodplain habitats.</p>
Disturbance (noise, visual)	<p>A number of activities can result in disturbance, including visual and noise. This is more frequently associated with construction activities, but could also be associated with some aspects of the operational phase (e.g. structure maintenance). 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.</p> <p>Disturbance of bird species of the SPA may occur in the upper section of Glanmire estuary, which is located downstream of the proposed works.</p>
Competition from non-native species	<p>Certain activities, such as construction or recreation, may cause the introduction or spread of non-native animals and plants (e.g. Japanese Knotweed) which could result in changes to community composition and even to the complete loss of native species or communities.</p>
Changes in water quality	<p>A number of activities can impact upon water quality, in particular nutrient status and turbidity levels. For example, loss of riparian habitat that filters runoff from land, inundation of contaminated/nutrient enriched land and sediment mobilisation can all impact on water quality. This can adversely impact on habitats and also species, for example by impacting upon macroinvertebrate and fish communities.</p>
Pollution	<p>Certain activities, in particular construction works, may lead to the release of pollutants, into water, air or the ground. This can impact upon habitats directly and also the species they support.</p>

6.3 In-combination Effects

Appropriate Assessment requires consideration of the impacts of a scheme, in-combination with other plans or projects. Potential sources of in-combination effects identified as part of this assessment include:

- As outlined in Section 2.2, the OPW is statutorily obliged to maintain all rivers, embankments and urban flood defences on which it has executed works since the 1945 Act, in '*proper repair and effective condition*'. Therefore, future channel maintenance will apply to the Glashaboy River (Glanmire/Sallybrook) Drainage Scheme. The scope of maintenance works for the proposed Scheme is also detailed in Section 2.2. All maintenance work is to be undertaken in accordance with Environmental Management Protocols and Standard Operating Procedures (OPW, 2011) along with additional measures where the SOPs show deficiencies, to ensure adverse impacts on the environment are considered and minimised. If drainage maintenance activities are required that fall outside the scope of maintenance activities described in Section 2.2, those maintenance activities will also be subject to a separate Appropriate Assessment process to ensure no adverse impacts arise. Consequently, adverse in-combination effects on Cork Harbour SPA and Great Island Channel SAC, through the delivery of this scheme and its ongoing maintenance, are not anticipated.

- Cork County Development Plan (2014 - 2020) aims to ensure sustainable development within the county, while being accountable for its environment. The Plan is accompanied by a Strategic Environmental Assessment (SEA) and Appropriate Assessment (AA). The SEA evaluates the likely significant environmental effects of implementing the Plan and the AA assesses the likely significant effect on *Natura 2000* sites. The AA identifies Cork Harbour and the Great Island Channel SAC as a sensitive waterbody. The primary pressures identified on the habitats within the SAC are associated with pollution to surface waters, while impacts arising from fishing and the harvesting of aquatic resources are also an issue for the area of Cork harbour. Other sources of nutrient input to the SAC are from Wastewater Treatment Plants (WWTPs), leaks in the sewage network, and from rivers flowing into the SAC. The implementation of WWTP upgrades, the Cork Great Island Pollution Reduction Programme and the Water Services (Amendment) Act 2012 and the Nitrates Directive will allow the functioning of the habitats to recover.

Therefore, in terms of the cumulative impact of this Plan in combination with the proposed scheme, the Plan aims to achieve the requirements of the SEA and AA and therefore in combination, would not significantly adversely impact the Great Island Channel SAC or the Cork Harbour SPA.

- The Cobh Municipal District Local Area Plan contains details of the Glanmire development area. This Plan contains objectives that proposed to facilitate residential development in the area, as follows;

Objective GM-GO-01: It is an objective of this plan to secure the development of a minimum of 1200 new dwellings in Glanmire up to 2012 in order to facilitate the sustainable growth of the town's population from 8,924 to 10,585 people over the same period.'

The Glanmire/ Sallybrook drainage scheme is detailed in Objective GM-GO-04, which details the support of the implementation of the scheme within the town of Glanmire and that this scheme shall be subject to Appropriate Assessment processes.

Subsequent objectives state that in order to secure and implement this population growth objective in a sustainable manner, appropriate and sustainable water and waste water infrastructure that will secure the objectives of the relevant River Basin Management Plan and the Cork Harbour Special Protection Area must be provided and operational in advance of developments. It also states that the development of Glanmire town will only be permitted where it is can be shown that it is compatible with the requirements of the Habitats Directive and the protection of the SPA.

The Glanmire/ Sallybrook drainage scheme is detailed in Objective GM-GO-04, which details the support of the implementation of the scheme within the town of Glanmire and that this scheme shall be subject to Appropriate Assessment processes.

Consequently, adverse in-combination effects on the sensitive ecological receptors of the Glashaboy (including the nature conservation site Cork Harbour SPA) from the delivery of

this drainage scheme and its ongoing maintenance are not anticipated on the basis that project specific ecological assessments, including as a minimum Screening for Appropriate Assessment, are carried out at the more detailed design stage of the proposed residential developments as part of the Objective GM-GO-01.

- Cork County Biodiversity Action Plan (2009-2014) aims to '*conserve and to enhance biodiversity, and to ensure that every person in the county has the opportunity to appreciate and understand its importance in our lives*'. The action plan aims to protect biodiversity and *Natura 2000* sites within the county. Therefore, no in-combination adverse effects are anticipated as a result of the role of the action plan in promoting and enhancing biodiversity.
- The Glashaboy Water Management Unit (WMU) falls under the South West River Basin District. The WMU identifies a number of risks and pressures on the river and these include diffuse nutrient sources (mainly from agriculture) and wastewater treatment systems and also point sources of nutrients from septic tanks. The aim of the plan is to achieve compliance with the Water Framework Directive and to achieve 'Good' status. The overall aim is to improve the status of the Glashaboy and therefore no in-combination adverse effects are anticipated.
- A search of Cork County Council's online planning enquiry database was undertaken to identify other projects in and around Glanmire, which are proposed or have been constructed over the last two years, to determine if there was any potential for in-combination effects. The vast majority of these developments are small-scale, associated with residential dwellings and involve alteration or extension to existing structures. From these small-scale localised developments, no in-combination effects are anticipated. The Dunkettle Interchange upgrade is proposed for 2018/2019, however the timing of these works has not been confirmed. This project will be subject to an Environmental Impact Assessment and Appropriate Assessment to ensure no adverse impacts on *Natura 2000* sites and their designated habitats and species.

A strategic housing development is proposed at Ballinglanna, Glanmire by O'Flynn Construction Co. Unlimited Company (OFC). OFC are applying for a 10-year planning permission for the development which will include a mix of residential, retail, school site, community facilities and amenities. Permission was granted by An Bord Pleanála in April 2018. An Environmental Impact Assessment Report was prepared for the development. The development was also subject to the Appropriate Assessment process to ensure no adverse impact on *Natura 2000* sites and their designated habitats and species, in particular key elements such as water quality. Therefore, no in-combination effects are anticipated.

Cork County Council are proposing to carry out a number of road improvements and sustainable transport works in the Glanmire, Sallybrook and Riverstown areas by means of a Part VIII application process. The application will be subject to EIA Screening and AA Screening. The proposed works comprise a total of 16 no. infrastructural works. These works are arising from Cork County Council having secured €5.9 million from the Local Infrastructural Housing Activation Fund (LIHAF) for the Glanmire area. LIHAF is a Government initiative to address significant public infrastructure deficits, where the lack of infrastructure is considered to have hindered the development of housing. An Appropriate Assessment has been carried out to ensure no adverse impact on *Natura 2000* sites and their designated habitats and species will occur. Although the above scheme does not yet have planning permission, is it expected that construction would commence in 2019 if planning is achieved. There will no significant cumulative effects if the development proceeds.

7 Impact Assessment

7.1 Do Nothing Impact

If the 'do nothing' approach is adopted and the development of the Glashaboy River (Glanmire/Sallybrook) Drainage Scheme does not take place, flooding events will keep occurring within the urban area of Glanmire and Sallybrook, which would place great socio-economic pressures on the local community. This may result in the requirement for emergency works or ad hoc remedial actions which may negatively affect the downstream Natura 2000 sites if they proceed without a coherent approach of a drainage scheme.

7.2 Impact Evaluation

7.2.1 Cork Harbour SPA

The main impacts to Cork Harbour SPA and its designated bird species are via surface water and land and air pathways. These pathways will result in the potential for changes in water quality, pollution, noise and visual disturbance. The bird species for which the SPA is designated are reliant upon mudflat and sand flat habitats for roosting and feeding in the Glashaboy estuary, downstream of Glanmire Bridge. Changes in water quality could indirectly impact upon the food supply of the designated bird species of the SPA.

The geomorphological assessment and hydraulic modelling have shown that there will be no significant change to the physical and hydrological regimes of the river. Hydraulic model analysis has been conducted and the changes in model velocities as a result of the scheme are minimal and remain within the depositional range across the flow regime or are of negligible impact in relation to scour. In addition, the defences of the scheme will only influence hydraulics during extreme flows, which are infrequent. Consequently, the impact on the functionality of the mudflat habitats within the head of Cork Harbour SPA as a whole will be negligible.

Construction works, including localised temporary piling activities, upstream of the boundary of the SPA could generate disturbance as a result of machinery operation and workforce movement. Given the distance from the working area upstream of the SPA and the fact that the upper estuary and the proposed working area will be visually screened by the natural bend in the Glashaboy River, it is anticipated that physical disturbance due to increased human activity and machinery operation will be negligible. However, as bird species of the SPA may travel upstream to fish such as cormorant, the precautionary principle is applied and mitigation measures are detailed in Section 7.3 for the localised temporary piling activity proposed upstream of Glanmire bridge.

7.2.2 Great Island Channel SAC

Given that the Great Island Channel SAC is located to the east of the project and approximately 5km downstream, the potential impact posed by the works is the deterioration of water quality and release of polluting materials via surface water pathways. The geomorphological assessment and hydraulic modelling have shown that there will be no significant change to the present physical and hydrological regimes.

During the construction phase there is potential for the release of silt and nutrients within the River Glashaboy and its tributaries that could be mobilised, or that pollution incidents could occur. The Glashaboy River and estuary could then act as a surface water pathway for this contaminated material to reach the designated area of the Great Island Channel SAC, potentially adversely impacting upon the habitats and species present. Contaminated water or silt may locally adversely affect the water dependant habitats of Atlantic salt meadows, mudflats and sandflats, and the associated community complex of mixed sediment to sandy mud with polychaetes and oligochaetes. However, given the size of the estuary, distance from the proposed works, the resulting dilution effects, and the relatively localised nature of the works, it is unlikely to impact upon the area of Belvelly Channel and Slatty Water. However, as a precautionary measure, the works shall follow the mitigation measures outlined in Section 7.3 to ensure that no adverse impact will occur on the SAC and its designated habitats and associated communities.

7.2.3 Maintenance activities

During the operation of the Scheme, maintenance activities have the potential to impact on surface water quality of the River Glashaboy. Maintenance activities, as detailed in Section 2.2, will be carried out according to the OPW SOPs and specifications of IFI;

- *This work is carried out as much as possible from the river bank without in stream tracking, Any unavoidable in stream work is carried out between May and September,*
- *Tree removal is limited to fallen trees or overhanging branches,*
- *Tree roots are not pulled from the river bank.*

However, if maintenance activities are required that are significant in their nature and extent, i.e. they are outside the scope of maintenance activities described in Section 2.2, then those activities will be required to undergo the Appropriate Assessment process and a Screening for AA be carried out as a minimum requirement. This requirement is included in the mitigation measures of Section 7.3 below.

Disturbance to bird species of Cork Harbour SPA is not anticipated as maintenance activities will only be conducted within the extent of the Scheme as outlined in Section 2.2. The downstream extent of the Scheme is the confluence of the Mill Race with the main channel of the Glashaboy River and thus, maintenance activities will only be carried out from this point upstream.

7.3 Avoidance and Mitigation Measures

This section describes the avoidance and mitigation measures required to prevent or reduce impacts on Cork Harbour SPA and Great Island Channel SAC that will be incorporated into the proposed Glashaboy River (Glanmire/Sallybook) Drainage Scheme.

All of the works and mitigation measures will be monitored by a suitably qualified ecologist during the construction period, with findings reported to the competent authority.

7.3.1 Construction and Environment Management Plan

A detailed and site-specific Construction and Environmental Management Plan (CEMP) for the construction phase of the works has been prepared and it will be provided to the competent authority by the contractor prior to works commencing. This has been completed in consultation with a suitably qualified ecologist. The CEMP incorporates the main constraints outlined in Chapter 4 (Construction) of the EIAR (Refer to Appendix B) and the mitigation measures listed below in Section 7.3.3. The CEMP will be included in the tender documents for the construction of the proposed scheme.

All works will be monitored by a suitably qualified ecologist who will report to the Heritage Officer of Cork County Council. The reporting format and programme will be agreed with Cork County Council prior to commencement of works and at least 4 weeks prior to site clearance.

7.3.2 Measures to mitigate disturbance from temporary piling

- Piling activities shall not take place during the hours of darkness.
- Vibratory piling methods shall be used as a low noise alternative to impact piling.
- Piling methods shall use a 'soft-start' approach to piling.

7.3.3 Measures to avoid/mitigate pollution and water quality issues

Appropriate mitigation measures will be implemented prior to the construction phase to ensure that the water quality of the Glashaboy River and estuary is not adversely affected through pollution incidents and silt and nutrient mobilisation. This mitigation will specify that:

- Works will be carried out in accordance with the following, but not limited to, best practice and guidelines where possible and where appropriate;
 - C532 Control of water pollution from construction sites: guidance for consultants and contractors;
 - C648 Control of water pollution from linear construction projects;
 - SP156 Control of water pollution from construction sites – guide to good practice;

- C515 Groundwater control – design and practice;
- Inland Fisheries Ireland 2016 'Guidance on Protection of Fisheries During Construction Works In and Adjacent to Waters'.
- Appropriate sediment control measures will be employed.
- Any chemical, fuel and oil stores will be located on an impervious base within a secured bund with a storage capacity 110% of the stored volume.
- Biodegradable oils and fuels will be used where possible.
- Drip trays will be placed underneath any standing machinery to prevent pollution by oil/fuel leaks. Where practicable, refuelling of vehicles and machinery will be carried out on an impermeable surface in one designated area well away from any watercourse or drainage (at least 10m).
- Emergency spill kits will be available on site and staff will be trained in their use.
- Operators will check their vehicles on a daily basis before starting work to confirm the absence of leakages. Any leakages should be reported immediately.
- Daily checks will be carried out and records kept on a weekly basis and any items that have been repaired/replaced/rejected noted and recorded. Any items of plant machinery found to be defective will be removed from site immediately or positioned in a place of safety until such time that it can be removed. All items of plant will be checked prior to use before each shift for signs of wear/damage.
- All washing out of grout pumps will be carried out in designated areas well away from the river, such as in the lined compound area. At no point will grout pumps be washed out at the worksite.
- All structures must be designed by a competent person, be constructed of appropriate materials and take account of site conditions (i.e. depth of water, available space, bed substrate, flow velocities, flow patterns, duration of works, accessibility and potential ingress of water).

7.3.4 Measures to prevent the spread of non-native invasive species

In order to mitigate the possible spread of non-native invasive species, the following mitigation measures will be incorporated in to a site specific Invasive Species Management Strategy, as outlined in Appendix 4 of the EIAR (Refer to Appendix B):

- All works shall be conducted according to the NRA Guidelines 'The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads'.
- Avoid working in areas where Japanese Knotweed is present; all areas within 7m of visible above-ground growth will be avoided, where possible and clearly demarcated.
- If work is required in areas infested with Japanese Knotweed (including any area within 7m of visible above-ground growth) an appropriate Japanese Knotweed Mitigation Strategy will need to be devised and implemented to prevent spread.
- Prior to commencement, all works areas, site compounds and access routes will be re-surveyed to ensure that stands of non-native invasive species have not become established. If found, appropriate mitigation strategies will need to be devised and implemented.
- An overall site specific Invasive Species Management Strategy has been developed to address any areas that may affect the proposed scheme prior to the commencement of works (Refer to Appendix B). Advance treatment works have commenced in order to address both the treatment and/or removal of Japanese Knotweed in particular.
- All contractors and staff shall adhere to Biosecurity Protocols for invasive species as outlined in the Invasive Species Management Strategy;
 - In relation to knotweed plant species - understand the possible extent of the rhizome (root) system underground – up to 7m horizontally and 3 meters vertically.
 - Fence off the infested areas prior to and during construction works where possible in order to avoid spreading seeds or plant fragments around or off the construction site. In relation to knotweed plant species, allow for a 10m buffer around the area.

- Clearly identify and mark out infested areas. Erect signs to inform Contractors of the risk.
- Avoid if possible using machinery with tracks in infested areas.
- Clearly identify and mark out areas where contaminated soil is to be stockpiled on site and cannot be within 50m of any watercourse or within a flood zone.
- Create designated entry and exit points for operators on foot and for small mobile equipment. A delineated access track to be maintained free of non-native invasive species to be established through the site to avoid the spread of Japanese knotweed by permitted vehicles accessing the site.
- Installation of a dedicated footwear and vehicular wheel wash down facility into a contained area within the site.
- Vehicles leaving the site to be inspected for any plant material and washed down into a contained area.
- Vehicles used in the transport of contaminated material will need to be visually checked and washed down into a contained area before being used for any other work, either on the same site or at a different site.
- Material gathered in dedicated wash down contained areas will need to be appropriately treated along with other contaminated soil on site.
- If soil is imported to the site for landscaping, infilling or embankments, the contractor shall gain documentation from suppliers that it is free from invasive species.
- Ensure all site users are aware of measures to be taken and alert them to the presence of the Invasive Species Management Plan.
- Erection of adequate site hygiene signage in relation to the management of nonnative invasive material.

7.3.5 Maintenance Activities

- If maintenance activities are required during the operation of the Scheme that fall outside the scope of maintenance activities described in Section 2.2, those maintenance activities will be subject to the Appropriate Assessment process to ensure no adverse impacts to *Natura 2000* sites arise. The description of maintenance activities outlined in Section 2.2 are as follows;

The proposed pumping stations will require regular maintenance and it will be necessary to jet the surface water sewers to maintain the hydraulic capacity to drain flood waters. Other measures will include regular inspections of flood walls and embankments, regular scheduled maintenance of the river channel and pruning of trees (including removal of tress where necessary), planning and control measures. The inspection regime will ensure that there is no deterioration in the structural integrity of the defences which may occur as a result of a vehicular collision for example. It is expected that the flood defences will otherwise be relatively maintenance free. In general, maintenance will typically consist of the following activities:

- *The channels will be monitored by means of a walkover survey from the banks on a regular basis (likely quarterly, and also following a flood event). The walkover surveys would aim to identify issues with implications for flood risk (e.g. fallen trees, excessive vegetation build-up, overgrown trees, illegal dumping, accumulation of granular deposits, etc.). In-channel debris will typically be removed by a long reach excavator working from the banks. Excessive overhanging vegetation will typically be pruned back or removed by hand using a cherry picker, depending on access.*
- *The structures will be monitored by means of a walkover survey from the banks on a bi-annual basis. The walkover surveys would aim to identify issues with implications for flood risk (e.g. damage to structures, settlement of embankments, etc.).*
- *Culverts will be inspected on an annual basis, or following a significant flood event. Any debris present in the culvert will be cleared by hand. A full CCTV survey and*

clearing of silt/sediment from the culvert is expected to take place approximately every five years. Removal of debris will be carried out as required.

8 Conclusions

This Natura Impact Statement provides information for the competent authority to undertake the Stage 2 Appropriate Assessment of the proposed Glashaboy River (Glanmire/Sallybrook) Drainage Scheme and in particular to examine the potential direct and indirect impacts on the following *Natura 2000* sites:

- Cork Harbour SPA
- Great Island Channel SAC

The above sites were identified by a screening exercise that assessed likely significant effects of the proposed scheme. The scheme principally involves the construction of flood relief channels, replacement of existing culverts and installation of new culverts, construction of flood defence embankments and reinforced concrete flood defence walls, replacement of an existing bridge and construction of surface and foul water pumping stations.

The Natura Impact Statement has investigated the potential direct and indirect impacts of the proposed works on the integrity and interest features of the above *Natura 2000* sites, alone and in-combination with other plans and projects, taking into account the site's structure, function and conservation objectives.

Where potentially significant adverse impacts were identified, a range of mitigation and avoidance measures have been suggested to help offset them.

Following a comprehensive evaluation of the potential direct, indirect and cumulative impacts on the qualifying interests and conservation objectives for the Cork Harbour SPA and Great Island Channel SAC and ensuring that avoidance and mitigation measures are implemented as proposed, it has been concluded by the authors of this report that the proposed Glashaboy River (Glanmire/Sallybrook) Drainage Scheme will not have an adverse effect on the integrity of the above *Natura 2000* sites.

To confirm this conclusion, the following checklist, taken from DEHLG (2009) has been completed.

Table 8-1: Integrity of Site Checklist (from DEHLG, 2009)

Conservation objectives: does the project or plan have the potential to:	Y/N
Cause delays in progress towards achieving the conservation objectives of the sites?	N - Following mitigation, no significant adverse residual impacts have been identified that will prevent achievement of the conservation objectives of Cork Harbour SPA and Great Island Channel SAC.
Interrupt progress towards achieving the conservation objectives of the sites?	N - Following mitigation, no significant adverse residual impacts have been identified that will prevent achievement of the conservation objectives of Cork Harbour SPA and Great Island Channel SAC..
Disrupt those factors that help to maintain the favourable conditions of the site?	N - Potential adverse impacts identified during the screening process, including potential changes to physical/hydrological regimes, water quality issues and pollution, can be avoided or mitigated against.
Interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	N - Potential adverse impacts on the bird populations for which Cork Harbour SPA is designated can be avoided by implementing a range of measures to maintain water quality and thus protect estuarine and intertidal habitats supporting the bird populations.

Other objectives: does the project or plan have the potential to:	Y/N
Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem?	N - Potential adverse impacts from physical damage of habitats, sediment mobilisation and pollution, which could impact upon ecosystem functioning, can be effectively mitigated.
Change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	N - Potential adverse impacts relating to changes in the physical and hydrological regime have been identified which could impact on the functioning and dynamics of the site; however, these are not considered to be significant or will not impact upon the functioning of the SAC and SPA.
Interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	N - Potential adverse impacts from changes to the physical and hydrological regime, have been identified which could impact on the functioning and dynamics of the site; however, these are not considered to be significant or will not impact upon the functioning of the SAC and SPA.
Reduce the area of key habitats?	N - There will be no loss of habitat as works will be conducted outside the <i>Natura 2000</i> site boundaries and there will be no changes to the physical and hydrological regime that could cause habitat loss in the future.
Reduce the population of key species?	N - Potential disturbance impacts to SPA bird populations are not considered to be significant due to the distance between the proposed working area and SPA boundary. Mitigation measures will ensure that the works will not cause a deterioration in water quality, thus protecting supporting habitats to the SPA bird populations to ensure populations are not reduced.
Change the balance between key species?	N - Potential disturbance impacts to SPA bird populations are not considered to be significant and therefore, population dynamics will not be adversely affected.
Reduce diversity of the site?	N - The identified mitigation measures to protect designated habitats and species will ensure that the current diversity of the sites is maintained.
Result in disturbance that could affect population size or density or the balance between key species?	N - Potential disturbance impacts to SPA bird populations are not considered significant and therefore, population size and density will not be reduced.
Result in fragmentation	N - The proposed works will not result in the fragmentation of habitats within the SAC and SPA or surrounding habitat.
Result in loss or reduction of key features (e.g. tree cover, tidal exposure, annual flooding etc.)?	N - Potential adverse impacts on SAC habitats can be effectively mitigated to ensure no loss of or reduction of key features.

References

- Beale, C.M. and Monaghan, P. (2004) 'Behavioural responses to human disturbance: a matter of choice?' *Animal Behaviour*. **68**: pp.1065–1069.
- Boere, G.C., Galbraith, C.A. and Stroud, D.A. (eds). (2006). *Waterbirds around the world*. The Stationery Office, Edinburgh, UK.
- Bregnballe T., Aaen K. and Fox A. D. (2009) 'Escape distances from human pedestrians by staging waterbirds in a Danish wetland.' *Wildfowl 2000 Special Issue 2*: pp. 115–130. Wildfowl & Wetlands Trust.
- Burger, J. (1981). 'The effect of human activity on birds at a coastal bay'. *Biological Conservation*. **21**: pp. 231–241.
- Crowe, O., Austin, G. E., Colhoun, K., Cranswick, P., Kershaw, M. and Musgrove, A. J. (2008) 'Estimates and trends of waterbird numbers wintering in Ireland, 1994/95-2003/04.' *Bird Study* **55**, pp. 66-77.
- Cummins, S. and Crowe, O. (2012) *Collection of baseline waterbird data for Irish coastal Special Protection Areas 2011/2012*. Report to National Parks & Wildlife Service. June 2012.
- Department of Environment, Heritage and Local Government (2009) *Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities*.
- Fitzpatrick, S. & Bouchez, B. (1998). 'Effects of recreational disturbance on the foraging behaviour of waders on a rocky beach'. *Bird Study* **45**: pp. 157–171.
- Fossitt, J.A. (2000) *A Guide to Habitats in Ireland*. The Heritage Council, Dublin.
- JNCC (2014) *Annex I Habitat Accounts*. [online] http://jncc.defra.gov.uk/ProtectedSites/SACselection/SAC_habitats.asp [date accessed 19th October 2015]
- Kennedy, G.J.A. (1984) 'Evaluation of techniques for classifying habitats for juvenile salmon (*Salmo salar* L.)' *Proceedings of the Atlantic Salmon trust workshop on stock enhancement*. **23**.
- Lafferty, K.D. (2001a). 'Birds at a southern California beach: seasonality, habitat use and disturbance by human activity.' *Biodiversity And Conservation*. **10**: pp.1949–1962.
- Lafferty, K.D. (2001b). 'Disturbance to wintering Western Snowy Plovers.' *Biological Conservation*. **101**: pp. 315–325.
- Mathers, R.G., Watson, S., Stone, R. and Montgomery, W.I. (2000). 'A study of the impact of human disturbance on Wigeon *Anas penelope* and Brent Geese *Branta bernicla* hrota on an Irish Sea Loch' *Wildfowl* **51**: pp. 67–81.
- McGowan, A., Cresswell, W. and Ruxton, G.D. (2002). 'The effects of daily weather variation on foraging and responsiveness to disturbance in overwintering Red Knot *Calidris canutus*.' *Ardea* **90**: pp. 229–237.
- NPWS (2013) *Site Synopsis: Great Island Channel SAC (001058)*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2014a) *Cork Harbour Special Protection Area (Site Code 4030) Conservation Objectives Supporting Document Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2014b) *Conservation Objectives: Great Island Channel SAC 001058. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2015) *Site Synopsis: Cork Harbour SPA (0004030)*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NRA (2009) *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*. National Roads Authority, Dublin, Ireland.
- Smit, C.J. and Visser, G.J.M. (1993). 'Effects of disturbance on shorebirds: a summary of existing knowledge from the Dutch Wadden Sea and Delta area.' *Wader Study Group Bulletin*. **68**: pp. 6–19.

Smith, G.F., O'Donoghue, P., O'Hara, K. and Delaney E. (2011) Best Practice Guidance for Habitat Survey and Mapping. Heritage Council, Kilkenny, Ireland.

Stace, C. (2010) New Flora of the British Isles. 2nd Ed. Cambridge University Press, Cambridge.

Stillman, R.A. and Goss-Custard, J.D. (2002) 'Seasonal changes in the response of Oystercatchers *Haematopus ostralegus* to human disturbance.' *Journal of Avian Biology*. **33**: pp. 358–365.

Thomas, K., Kvitek, R.G. and Bretz, C. (2003). Effects of human activity on the foraging behavior of Sanderlings *Calidris alba*. *Biol. Conserv.* 109: 67–71.

Triplet, P., Bacquet, S., Morand, M.-E. & Lahilaire, L. 1998. La distance d'envol, un indicateur de dérangements: l'exemple de quelques espèces d'oiseaux en milieu estuarien. *Alauda* 66: 199–206.

WaterMaps (2016) *WaterMaps 'Our Plan'* [ONLINE] Available at: http://watermaps.wfdireland.ie/NsShare_Web/Viewer.aspx?Site=NsShare&ReloadKey=True. Accessed on September 7th 2016.

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NIS Appendices

Appendix A Drainage Scheme Drawings

Appendix B Construction Activities and Management

Appendix C Habitat maps

Appendix D Geomorphic audit

Appendix A (NIS)

Drainage Scheme Confirmation Drawings

Office of Public Works & Cork County Council

Arterial Drainage Acts, 1945 and 1995

Glashaboy River (Glanmire/Sallybrook) Drainage Scheme

Confirmation Drawings

24/05/2018

J.CURTIN

DIRECTOR OF FLOOD RISK MANAGEMENT

CONFIRMATION COPY

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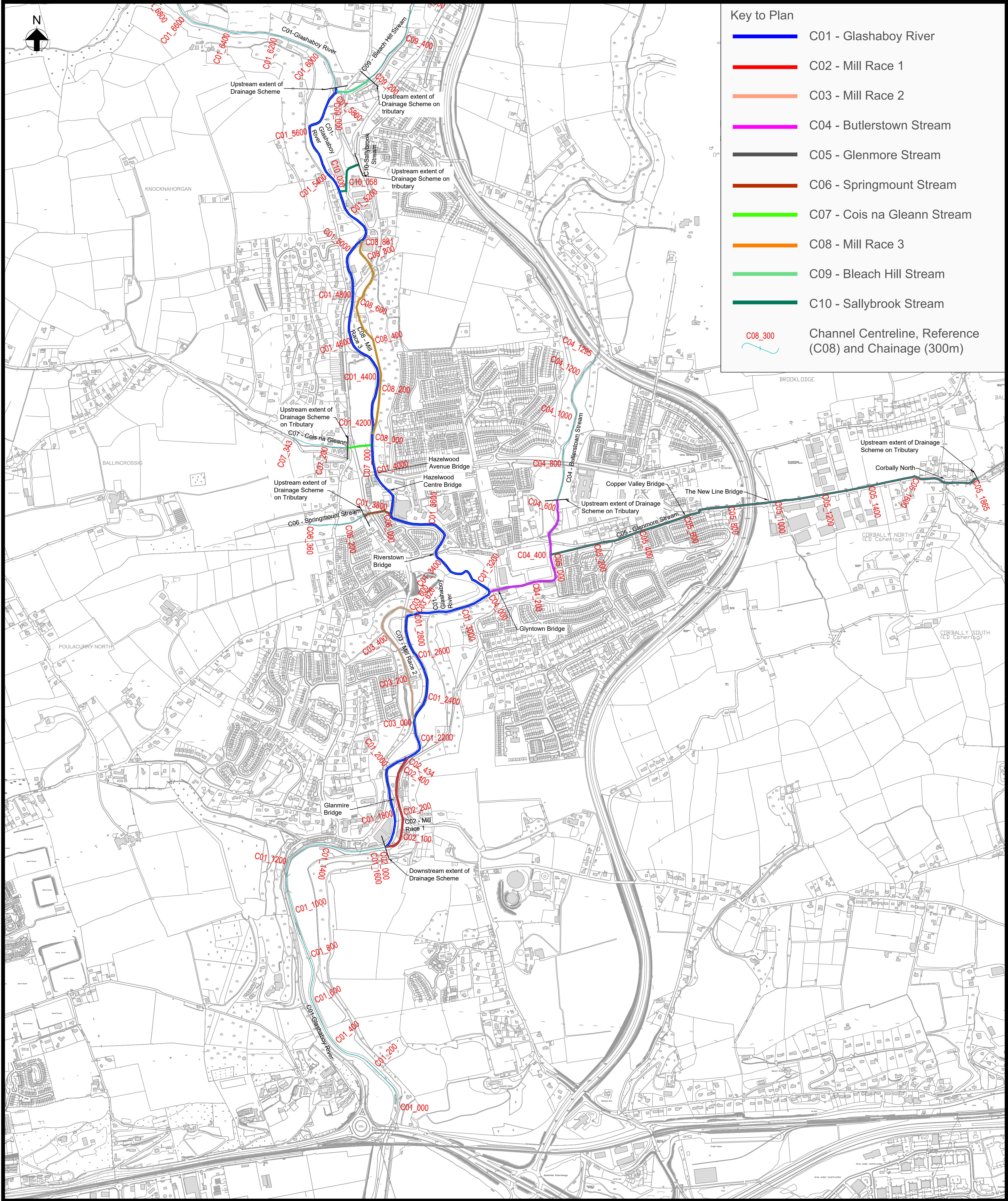
Arterial Drainage Acts, 1945 and 1995

Glashaboy River (Glanmire/Sallybrook) Drainage Scheme

Confirmation Drawings

Drawing Number	Drawing Name
Series 1	
GR_101	Cover Sheet
GR_102	Index Sheet
GR_103	Channel Codes Drawing
GR_104	Existing Flood Extents and Proposed Flood Benefit Area (Sheet 1 of 3)
GR_105	Existing Flood Extents and Proposed Flood Benefit Area (Sheet 2 of 3)
GR_106	Existing Flood Extents and Proposed Flood Benefit Area (Sheet 3 of 3)
GR_107	Proposed Flood Defences - Restrictions
GR_108	Overview of Drawings
Series 2	
GR_201	Proposed Flood Defences - Plan Layout (Sheet 1 of 17)
GR_202	Proposed Flood Defences - Plan Layout (Sheet 2 of 17)
GR_203	Proposed Flood Defences - Plan Layout (Sheet 3 of 17)
GR_204	Proposed Flood Defences - Plan Layout (Sheet 4 of 17)
GR_205	Proposed Flood Defences - Plan Layout (Sheet 5 of 17)
GR_206	Proposed Flood Defences - Plan Layout (Sheet 6 of 17)
GR_207	Proposed Flood Defences - Plan Layout (Sheet 7 of 17)
GR_208	Proposed Flood Defences - Plan Layout (Sheet 8 of 17)
GR_209	Proposed Flood Defences - Plan Layout (Sheet 9 of 17)
GR_210	Proposed Flood Defences - Plan Layout (Sheet 10 of 17)
GR_211	Proposed Flood Defences - Plan Layout (Sheet 11 of 17)
GR_212	Proposed Flood Defences - Plan Layout (Sheet 12 of 17)
GR_213	Proposed Flood Defences - Plan Layout (Sheet 13 of 17)
GR_214	Proposed Flood Defences - Plan Layout (Sheet 14 of 17)
GR_215	Proposed Flood Defences - Plan Layout (Sheet 15 of 17)
GR_216	Proposed Flood Defences - Plan Layout (Sheet 16 of 17)
GR_217	Proposed Flood Defences - Plan Layout (Sheet 17 of 17)

Drawing Number	Drawing Name
Series 3	
GR_301	Proposed Flood Defences - Proposed Sections (Sheet 1 of 8)
GR_302	Proposed Flood Defences - Proposed Sections (Sheet 2 of 8)
GR_303	Proposed Flood Defences - Proposed Sections (Sheet 3 of 8)
GR_304	Proposed Flood Defences - Proposed Sections (Sheet 4 of 8)
GR_305	Proposed Flood Defences - Proposed Sections (Sheet 5 of 8)
GR_306	Proposed Flood Defences - Proposed Sections (Sheet 6 of 8)
GR_307	Proposed Flood Defences - Proposed Sections (Sheet 7 of 8)
GR_308	Proposed Flood Defences - Proposed Sections (Sheet 8 of 8)
Series 4	
GR_401	Proposed Flood Defence Works Finishes (Sheet 1 of 3)
GR_402	Proposed Flood Defence Works Finishes (Sheet 2 of 3)
GR_403	Proposed Flood Defence Works Finishes (Sheet 3 of 3)
Series 5	
GR_501	Proposed Access Routes and Works Area (Sheet 1 of 3)
GR_502	Proposed Access Routes and Works Area (Sheet 2 of 3)
GR_503	Proposed Access Routes and Works Area (Sheet 3 of 3)



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Location Plan

- Notes:
1. Do not scale from drawing.
 2. The channels on this drawing have been assigned colours and codes for the purpose of assigning identification labels and interference references.
 3. This drawing should be read in conjunction with all other Glashaboy River (Glanmire/Sallybrook) Drainage Scheme Confirmation Drawings and Schedules.

Drg. No. GR_103 Channel Codes

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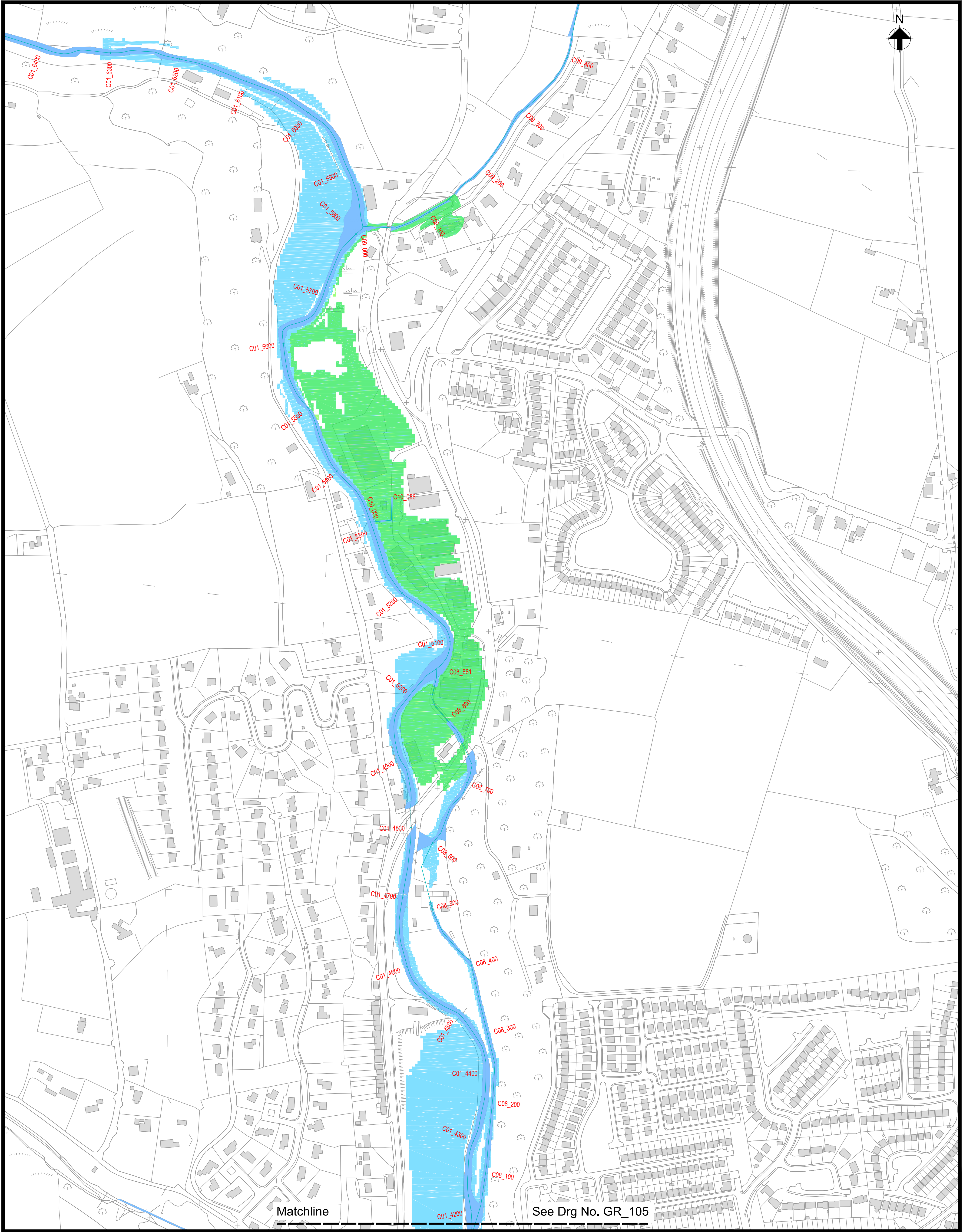
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0 50 100 200 Metres





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Scale 1:15,000 at A3



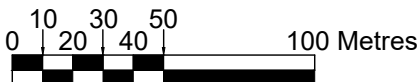
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Location Plan

Key to Plan

-  Benefiting Lands
-  Channel Centreline, Reference (C06) and Chainage (300m)
-  1 in 100yr Fluvial / 1 in 200yr Tidal Flood Extents
-  Watercourse

Notes:
1. Do not scale from drawing.
2. This drawing should be read in conjunction with all other Glashaboy River (Glanmire/Sallybrook) Drainage Scheme Confirmation Drawings and Schedules.



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Scale 1:5,000 at A3

Drg. No. GR_104 Existing Flood Extents and Proposed Flood Benefit Area (Sheet 1 of 3)

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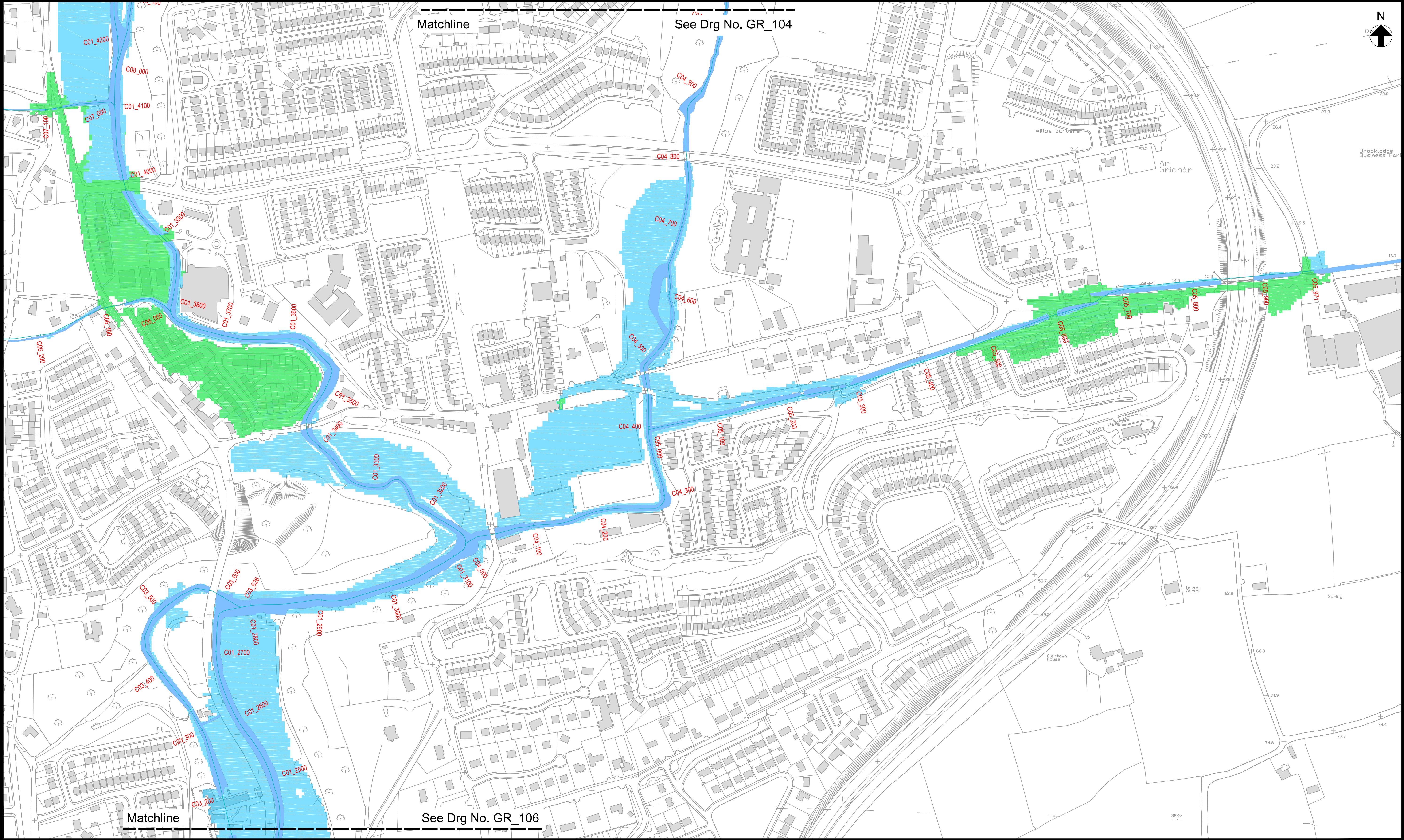
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Location Plan

Scale 1:2,500 at A1
Scale 1:5,000 at A3

Key to Plan

Benefiting Lands

1 in 100yr Fluvial / 1 in 200yr Tidal Flood Extents

Watercourse

C06_300

Channel Centreline, Reference (C06) and Chainage (300m)

Notes:

1. Do not scale from drawing.

2. This drawing should be read in conjunction with all other Glashaboy River (Glanmire/Sallybrook) Drainage Scheme Confirmation Drawings and Schedules.

Drg. No. GR_105 Existing Flood Extents and Proposed Flood Benefit Area (Sheet 2 of 3)

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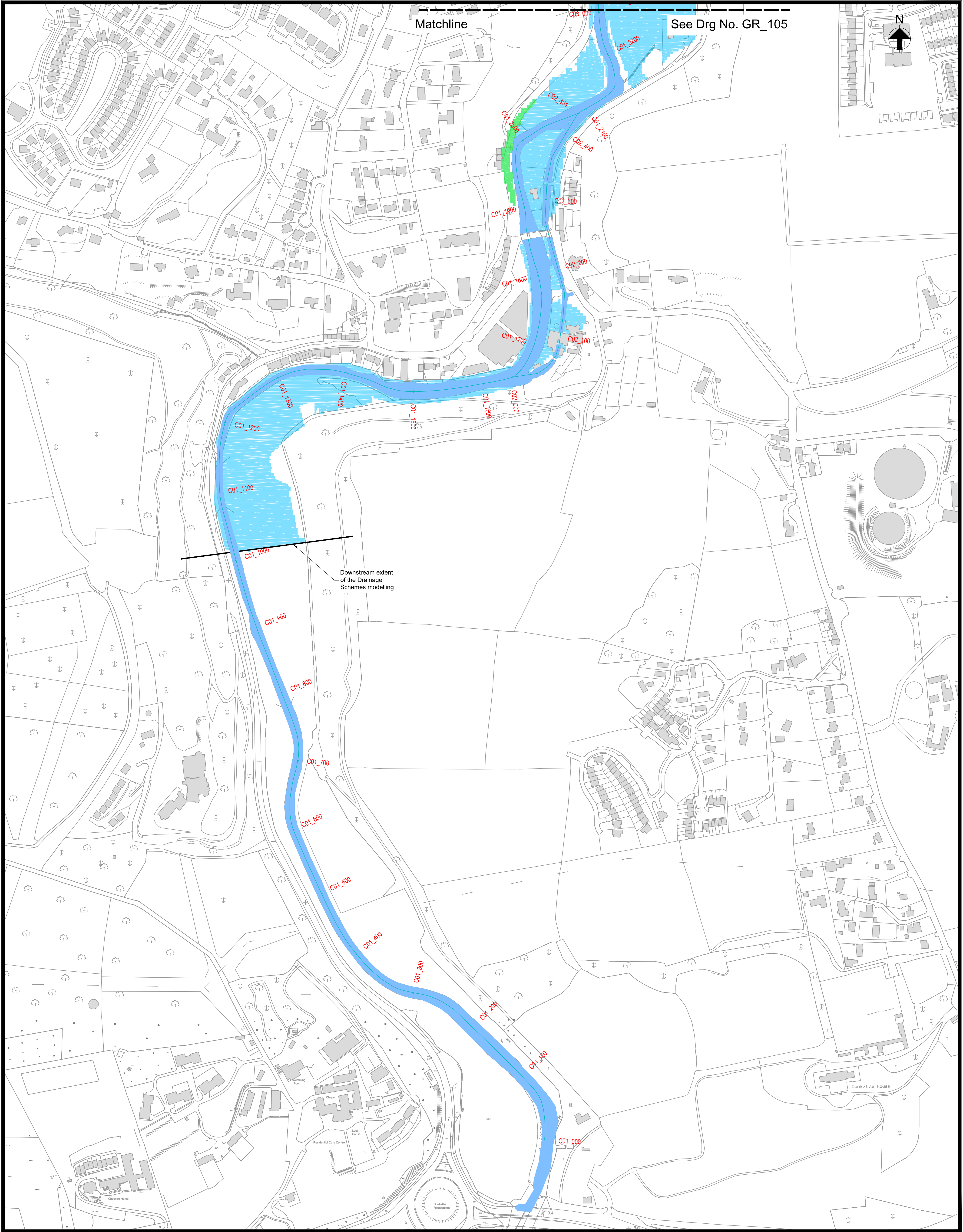
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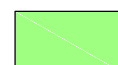



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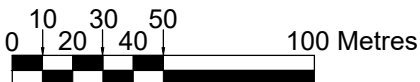
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Location Plan

Key to Plan

-  Benefiting Lands
-  1 in 100yr Fluvial / 1 in 200yr Tidal Flood Extents
-  Watercourse
-  C06_300 Channel Centreline, Reference (C06) and Chainage (300m)

Notes:
1. Do not scale from drawing.
2. This drawing should be read in conjunction with all other Glashaboy River (Glanmire/Sallybrook) Drainage Scheme Confirmation Drawings and Schedules.



Scale 1:2,500 at A1
Scale 1:5,000 at A3

Drg. No. GR_106 Existing Flood Extents and
Proposed Flood Benefit Area (Sheet 3 of 3)

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Proposed Flood Defences - Restrictions

Proposed Flood Defence	Restrictions
Flood Defence Embankments	Flood defence embankments shall not be tilled or planted with any vegetation other than grass. Permanent access to be provided for maintenance and inspection of the flood defence embankments - refer to proposed access and work area drawings GR_501, GR_502 and GR_503. Flood defence embankments to be regularly maintained through frequent grass cutting (approximately four times per year). Non-authorised vehicular or pedestrian access on flood defence embankments shall not be permitted. Flood defence embankments shall not be grazed by livestock other than sheep due to the potential risk of rutting or causing damage to the embankments. No works shall be permitted in close proximity to flood defence embankments without approval from the Office of Public Works (OPW).
Flood Defence Walls	Permanent access to be provided for maintenance and inspection of flood defence walls - refer to proposed access and work area drawings GR_501, GR_502 and GR_503. No works shall be carried out to flood defence walls or in close proximity to flood defence walls without approval from the Office of Public Works (OPW). No excavation of material close to flood defence walls shall be permitted without the approval of the Office of Public Works (OPW).
Pumping Stations	Permanent access to be provided for maintenance and inspection of pumping stations - refer to proposed access and work area drawings GR_501, GR_502 and GR_503. No works shall be carried out near pumping stations or in close proximity to the pumping stations without approval from the Office of Public Works (OPW) No local connections or drains shall be connected to a pumping station without approval from the Office of Public Works (OPW). No vegetation, material or detritus shall be disposed of within the channel, as this may increase the risk of blockage at pumping stations.
Bridges	Permanent access to be provided for maintenance and inspection of bridges - refer to proposed access and work area drawings GR_501, GR_502 and GR_503. No works shall be carried out to bridges or in close proximity to bridges without approval from the Office of Public Works (OPW). No vegetation, material or detritus shall be disposed of within the channel, as this may increase the risk of blockage at bridges.
Culverts	No local connections or drains shall be connected to culverts without approval from the Office of Public Works (OPW). No works shall be carried out to culverts or in close proximity to culverts without approval from the Office of Public Works (OPW). No vegetation, material or detritus shall be disposed of within the channel, as this may increase the risk of blockage within culverts.
Sluice	Permanent access to be provided for maintenance and inspection of the penstock - refer to proposed access and work area drawings GR_501. No works shall be carried out to the penstock or in close proximity to the penstock without approval from the Office of Public Works (OPW).
Regraded Ground	No works shall be carried out to regraded ground, such as road resurfacing, without approval of the Office of Public Works (OPW).
Channels	Permanent access to be provided for maintenance and inspection of channels - refer to proposed access and work area drawings GR_501, GR_502 and GR_503.