



Carrickmines-Shanganagh River Flood Relief Scheme

Riparian Bird Conservation Plan

Final Report

August 2026

www.jbaconsulting.ie

www.egis-group.com



OPW

Oifig na
nOibreacha Poiblí
Office of Public Works

JBA Project Director

Bernadette O'Connell
2nd Floor
Lincoln House
Lincoln Lane
Arran Quay
DUBLIN

Egis Project Manager

Eoin Dunphy
Classon House
Dundrum Business Park
Dundrum Road
Dublin 14

Revision History

Revision Ref/Date	Amendments	Issued to
S3-P02 19/08/2026	Full Draft	DLRCC and OPW
A-C01 20/08/2026	Final Report	DLRCC and OPW

Contract

This report relates to the Carrickmines-Shanganagh River Flood Relief Scheme commissioned by Dún Laoghaire-Rathdown County Council (DLRCC), on behalf of the Office of Public Works (OPW). Matt Hosking of JBA Consulting compiled this report.

Purpose

This document has been prepared as a Final Report for DLRCC and the OPW. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

JBA Consulting has no liability regarding the use of this report except to DLRCC and the OPW.

Copyright

© JBA Consulting Engineers and Scientists Limited 2026. © Egis Engineering Ireland Limited 2026.

Carbon Footprint

A printed copy of the main text in this document will result in a carbon footprint of 165g if 100% post-consumer recycled paper is used and 210g if primary-source paper is used. These figures assume the report is printed in black and white on A4 paper and in duplex.

JBA is aiming to reduce its per capita carbon emissions.

Table of Contents

1	Introduction	1
	1.1 Background	1
	1.2 Legislative Context	1
2	Scheme Description.....	3
	2.1 Project Location	3
	2.2 Project Description	12
3	Methodology	14
	3.1 Desktop Baseline Study.....	14
	3.2 Field Surveys	14
	3.3 Consideration of Cumulative and In-combination Impacts	15
	3.4 Residual Impacts	15
	3.5 NPWS Consultation	15
	3.6 Competent Persons	15
	3.7 Limitations and Constraints	15
4	Conservation Plan Objectives	16
	4.1 Introduction	16
	4.2 Riparian Birds Conservation Objectives	16
5	Existing Environment	18
	5.1 Baseline Conditions	18
	5.2 Core Riparian Bird Habitats	18
	5.3 Existing Territorial Ranges.....	20
	5.4 Existing Commuting Barriers	24
6	Potential Impacts	25
	6.1 Construction Impact	25
	6.2 Operational Impacts	26
7	Mitigation	27
	7.1 Introduction	27
	7.2 Mitigation by Design	27
	7.3 Pre-enabling / Pre-Construction Mitigation	27
	7.4 Construction Mitigation	29
	7.5 Operational Mitigation	30
8	Post-construction / Early Operational Ecological Monitoring	31
9	Residual Impacts.....	32
	9.1 Nesting Potential.....	32
	9.2 Foraging and Commuting	32
	9.3 Habitat Loss and Fragmentation.....	32
	9.4 Overall Residual Impact on Riparian Bird Populations.....	32
10	Conclusion.....	33

List of Figures

Figure 2-1: Overview of Project Location	3
Figure 2-2: Clon Brugh Site Location	4
Figure 2-3: Belarmine Park Site Location	5
Figure 2-4: Kilgobbin Road Site Location	6
Figure 2-5: Glenamuck Road North Site Location	7
Figure 2-6: Cherrywood Road Site Location	8
Figure 2-7: Bray Road Site Location	9
Figure 2-8: Lower Brides Glen Site Location	10
Figure 2-9: Commons Road, River Lane and Brookdene Site Location	11
Figure 2-10: Bayview Site Location	12
Figure 5-1: Old nest chamber found in the riverbank downstream of the Bayviewsite	21
Figure 5-2: Riparian birds and nests recorded during surveys near the Bayview site	22
Figure 5-3: Riparian birds and nests recorded during surveys along Commons Road	22
Figure 5-4: Riparian birds and nests recorded during surveys near the Bray Road site	23
Figure 5-5: Riparian birds and nests recorded during surveys along Cherrywood Road	23
Figure 5-6: Culvert running under the N11 that heads to the Bray Road site and Cherrywood Park	24
Figure 5-7: Culvert running under the N11, far end is stream that goes to Cherrywood Road	24
Figure 7-1: Two types (A left, B right) of Grey Wagtail and Dipper nest boxes (©Vivara Pro)	27
Figure 7-2: Suggested location of artificial nest placement along Commons Road site	28
Figure 7-3: Suggested location for artificial nest location near the Bray Road site	29

List of Tables

Table 5-1: Work sites, their core riparian habitats, and their respective functions that support riparian birds	18
---	----

Abbreviations

BAP	Biodiversity Action Plan
BoCCI	Birds of Conservation Concern Ireland
CIEEM	Chartered Institute of Ecology and Environmental Management
DLRCC	Dún Laoghaire-Rathdown County Council
DoHLGH	Department of Housing, Local Government, and Heritage
ECow	Ecological Clerk of Works
EU	European Union
FI	Further Information
FRS	Flood Relief Scheme
LA	Local Authorities
NBAP	National Biodiversity Action Plan
NBDC	National Biodiversity Centre Ireland
NPWS	National Parks and Wildlife Service
OPW	Office of Public Works
pNHA	Proposed Natural Heritage Area
RFI	Request for Further Information
RPS	Record of Protected Structures
WFD	Water Framework Directive

1 Introduction

1.1 Background

JBA Consulting Engineers and Scientists Ltd. (hereafter JBA) was commissioned by Dún Laoghaire-Rathdown County Council (DLRCC), on behalf of the Office of Public Works (OPW), to produce a Riparian Birds Conservation Plan, as part of a Request for Further Information (RFI) for the proposed Carrickmines-Shanganagh River Flood Relief Scheme at sites in the townlands of Woodside, Kilgobbin, Carrickmines, Brennanstown, Shankill, Loughlinstown, Shanganagh and Hackettsland. See below for the specifics of Item 9a and 9b from An Coimisiún Pleanála's RFI:

9a: *'Undertake breeding bird surveys in the works areas, assess the magnitude of the impacts to local breeding bird populations due to removal of / disturbance to riparian habitats, and devise appropriate mitigation measures to minimise and offset these impacts'*

9b: *'Submit a Riparian Bird Conservation Plan which has regard to surveys undertaken, in particular which has regard to kingfisher, dipper and grey wagtail, the avoidance of the destruction of the nests of such bird species in the course of these works, and alternate temporary nest sites for any birds which have to be excluded from nest sites during the works and installation of nest boxes or ledges suitable for to be used by these bird species during the operational phase of the scheme.'*

1.2 Legislative Context

Policy and legalisation for nature conservation; and protected and priority species relevant to the proposed project is provided below.

1.2.1 Biodiversity Policy and Guidance

Ireland's 4th National Biodiversity Action Plan 2023-2030 (NBAP) (DoHLGH, 2024) sets the national biodiversity agenda for the period 2023-2030 and aims to deliver the transformative changes required to the ways in which we value and protect nature.

The 4th NBAP endeavours for a "whole of government, whole of society" approach to the governance and conservation of biodiversity. The aim is to ensure that every citizen, community, business (including developers), local authority, semi-state and state agency has an awareness of biodiversity and its importance, and of the implications of its loss, while also understanding how they can act to address the biodiversity emergency as part of a renewed national effort to "act for nature".

This NBAP 2023-2030 builds upon the achievements of the previous Plan. It will continue to implement actions within the framework of five strategic objectives, with the first two objectives of particular relevance to the production of this Riparian Bird Conservation Plan:

- Objective 1 - Adopt a Whole of Government, Whole of Society Approach to Biodiversity
- Objective 2 - Meet Urgent Conservation and Restoration Needs
- Objective 3 - Secure Nature's Contribution to People
- Objective 4 - Enhance the Evidence Base for Action on Biodiversity
- Objective 5 – Strengthen Ireland's Contribution to International Biodiversity Initiatives.

The Wildlife (Amendment) Act 2023 introduced a new public sector duty on biodiversity. The legislation provides that every public body, as listed in the Act, is obliged to have regard to the objectives and targets in the National Biodiversity Action Plan.

As part of the Action Plan process Local Authorities (LA) must produce Biodiversity Action Plans (BAP). BAPs highlight local biodiversity issues and set out a series of objectives and action plans for the conservation of priority species and habitats where they occur in each district or county.

1.2.2 Protected and Notable Species

The Birds Directive (Directive 79/409/EEC) was adopted in 1979 and officially codified within Ireland in 2009. The directive seeks to protect all wild birds in the EU, it sets out rules for their protection, management and control. The directive covers bird species, their eggs, nests and associated habitats. The directive puts general protection for all wild birds specifically damaging nests, taking or keeping eggs, deliberate disturbance which puts conservation at risk.

Ireland also has a list of Birds of Conservation Concern in Ireland which outlines the risk of local extinction for bird species found within Ireland. It does not provide any legal protection, however; consideration for impacts on those at higher risk must be given extra consideration due to the vulnerability within an Irish context.

2 Scheme Description

2.1 Project Location

The development will consist of a series of flood defences positioned along the banks of the Carrickmines-Shanganagh river system as it flows from the R117 Enniskerry Road towards the Irish Sea, where it discharges at Killiney Bay (Figure 2-1). The defences comprise new and upgraded flood walls, culvert adjustments, and instream works.

The proposed scheme includes interventions on rivers and streams including: Kilgobbin Stream, Ballyogan Stream, Carrickmines River, Brides Glen River and Shanganagh River. The Carrickmines-Shanganagh River catchment is approximately 36km² and encompasses a wide variety of land uses ranging from rural mountainous areas in the west, to urban residential areas in the east. The proposed development will be situated primarily in the built-up residential parts of the catchment. A description of the work areas follows, from west to east (upstream to downstream).

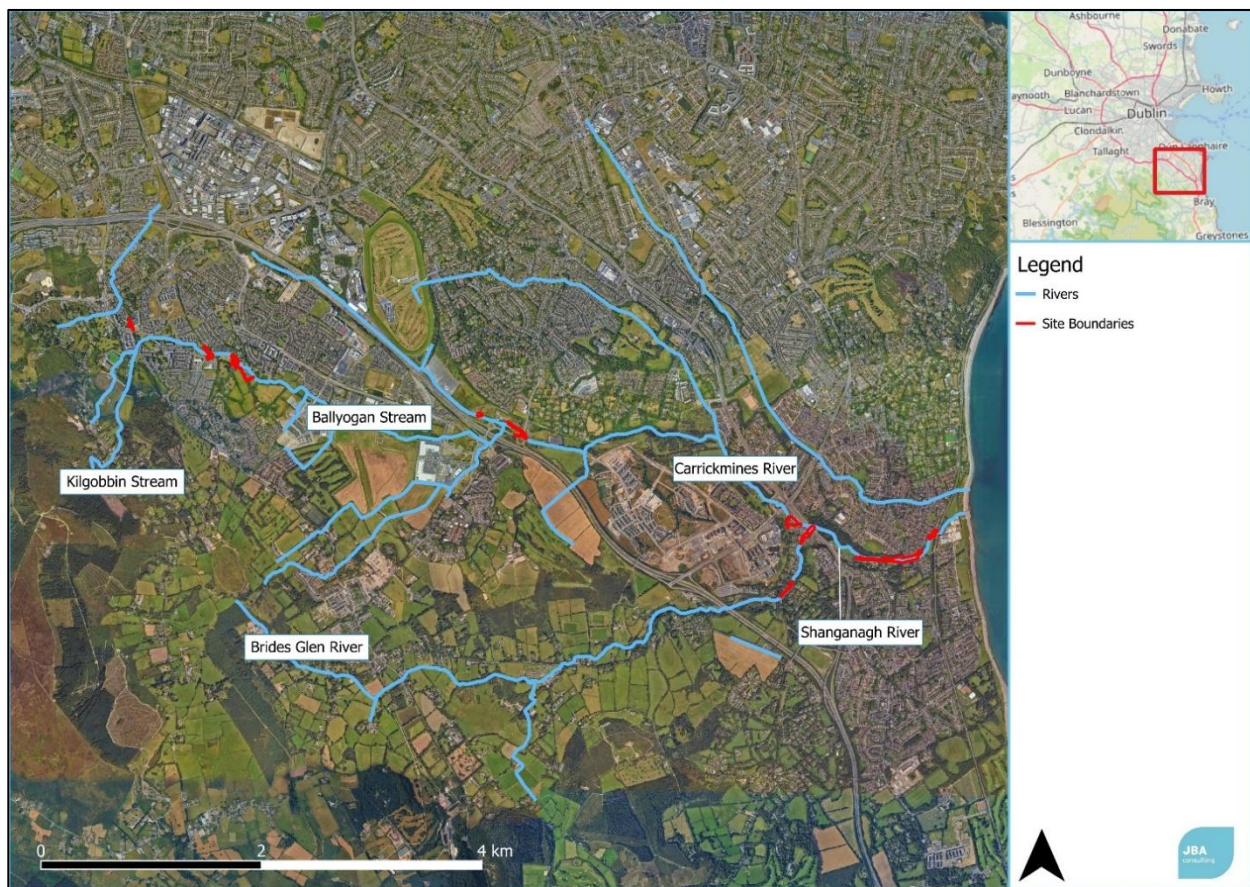


Figure 2-1: Overview of Project Location

Clon Brugh

Clon Brugh (Figure 2-2) is a residential estate situated just east of the R117 Enniskerry Road. It comprises a mix of 3-4 storey apartment blocks and houses, with small green areas, car parking, and footpaths. The proposed works in this area will be located along an area of linear green space and footpath. The area surrounding Clon Brugh is also primarily residential, with green space to the west and south in the Dublin mountains foothills.



Figure 2-2: Clon Brugh Site Location

Belarmine Park

Belarmine Park (Figure 2-3) is a small public park surrounded by residential areas to the north, east, west, and southwest, and a school to the southeast. The Kilgobbin Stream flows through the park from roughly west to east through a wooded area, with grassy areas to the north and south. A small pond or wetland is also within the park. The stream enters a culvert at the eastern end of the park and emerges approx. 80m upstream of Kilgobbin Road. Works will be taking place at the boundary wall between the park and houses to the north in Sandyford Hall Grove and Sandyford Hall Crescent.

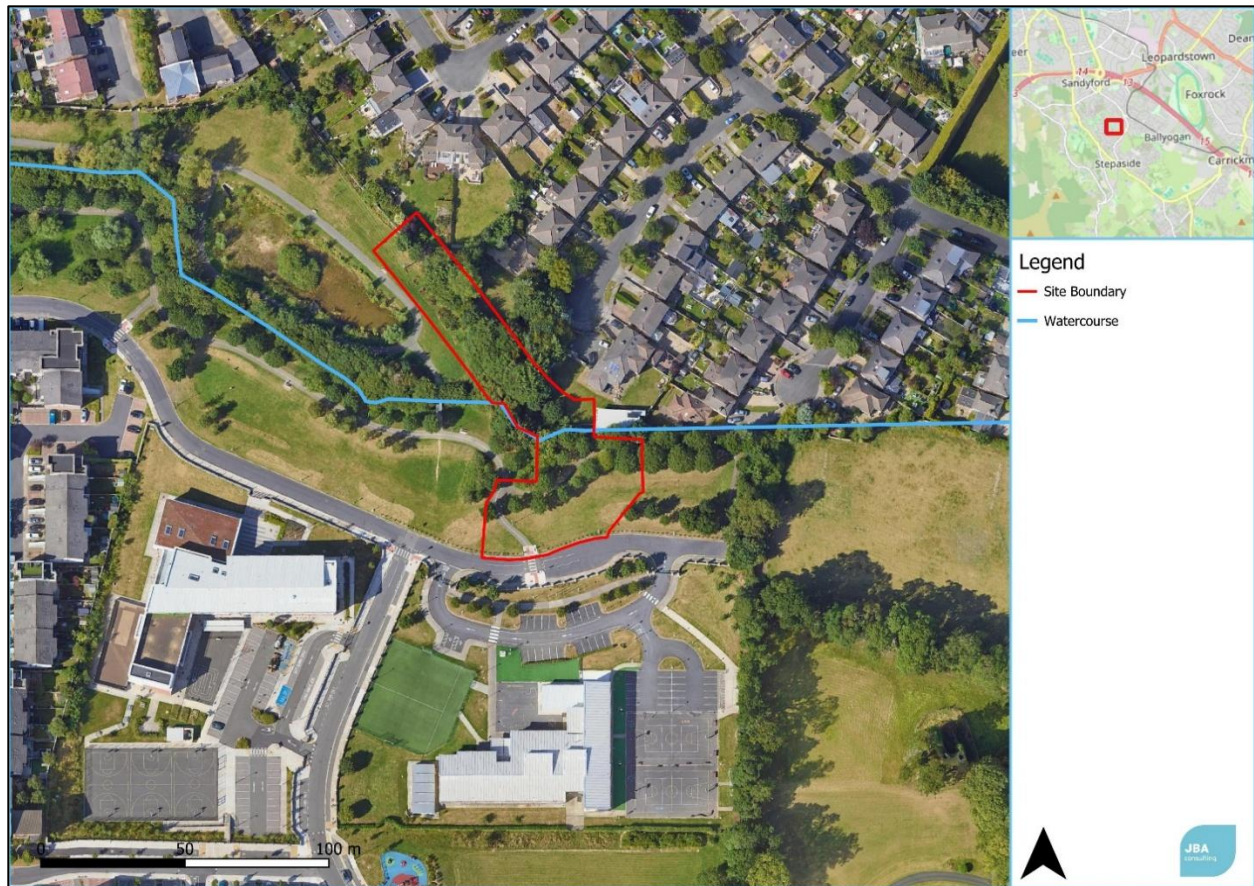


Figure 2-3: Belarmine Park Site Location

Kilgobbin Road

Kilgobbin Road (Figure 2-4) is a small road lined with trees and stone walls, with a narrow footpath on one side for much of its length. The works in this area will take place along the boundaries of two houses on the western side of the road, before running beneath the road and turning east down a narrow laneway, finally running across an area of open space to join back with the river approx. 220m downstream. The houses in this area are all detached, on large plots of land. Kilgobbin House is a protected structure (RPS No.1684) whose stone wall boundary will be removed and reconstructed as a flood wall.



Figure 2-4: Kilgobbin Road Site Location

Glenamuck Road North

The works at the Glenamuck Road North (Figure 2-5) are centred around Glenamuck Road North Roundabout, Ballyogan Grove/Castle View, and Priorsland. Works will be in close proximity to Carrickmines Castle (DU026-005001) and in view of houses along Ballyogan Grove/Castle View and Priorsland. Glenamuck Road North is a busy link road between Carrickmines and the M50 Junction 15, with access also to the Carrickmines Luas Park and Ride, and Leopardstown Racecourse. The proposed works along the northern side of the roundabout are adjacent to an existing footpath and segregated two-way cycle lane, while those along Ballyogan Grove/Castle View are adjacent to the existing road surface, and will replace an existing low stone wall.



Figure 2-5: Glenamuck Road North Site Location

Cherrywood Road

Cherrywood Road (Figure 2-6) is a tree-lined local road with detached houses on either side. It is situated between the M50 to the west and the N11 to the east, with the Cherrywood Strategic Development Zone (SDZ) to the north. Land use in this area is primarily residential, with large green spaces separating individual houses. The proposed works will take place within the property of three houses, adjacent to the river. The river has a riparian corridor here consisting of mature trees and other vegetation. Immediately downstream of this point, the river flows beneath the Cherrywood Viaduct, which is a protected structure (RPS No. 1783).



Figure 2-6: Cherrywood Road Site Location

Bray Road

The works at Bray Road (Figure 2-7) will take place on the Carrickmines River, between a green field to the west and the rear of buildings on Bray Road to the east. Bray Road is a cul-de-sac adjacent to the N11 with a mix of commercial and residential buildings. The buildings back on to the river which flows south before crossing under the N11 in a culvert. A mix of trees line the river, with an open green field on its western side.



Figure 2-7: Bray Road Site Location

Lower Brides Glen

Approximately 100m southeast of the Bray Road works at Lower Brides Glen (Figure 2-8), works will take place within the garden of a private residence called Waterfall Cottage, and to the culvert beneath the N11. The N11 is a busy road corridor and changes to the M11 motorway approx. 500m south of the works area. The downstream end of the N11 culvert overflow works is within Loughlinstown Woods, a densely wooded area which is also designated as a proposed Natural Heritage Area (pNHA).

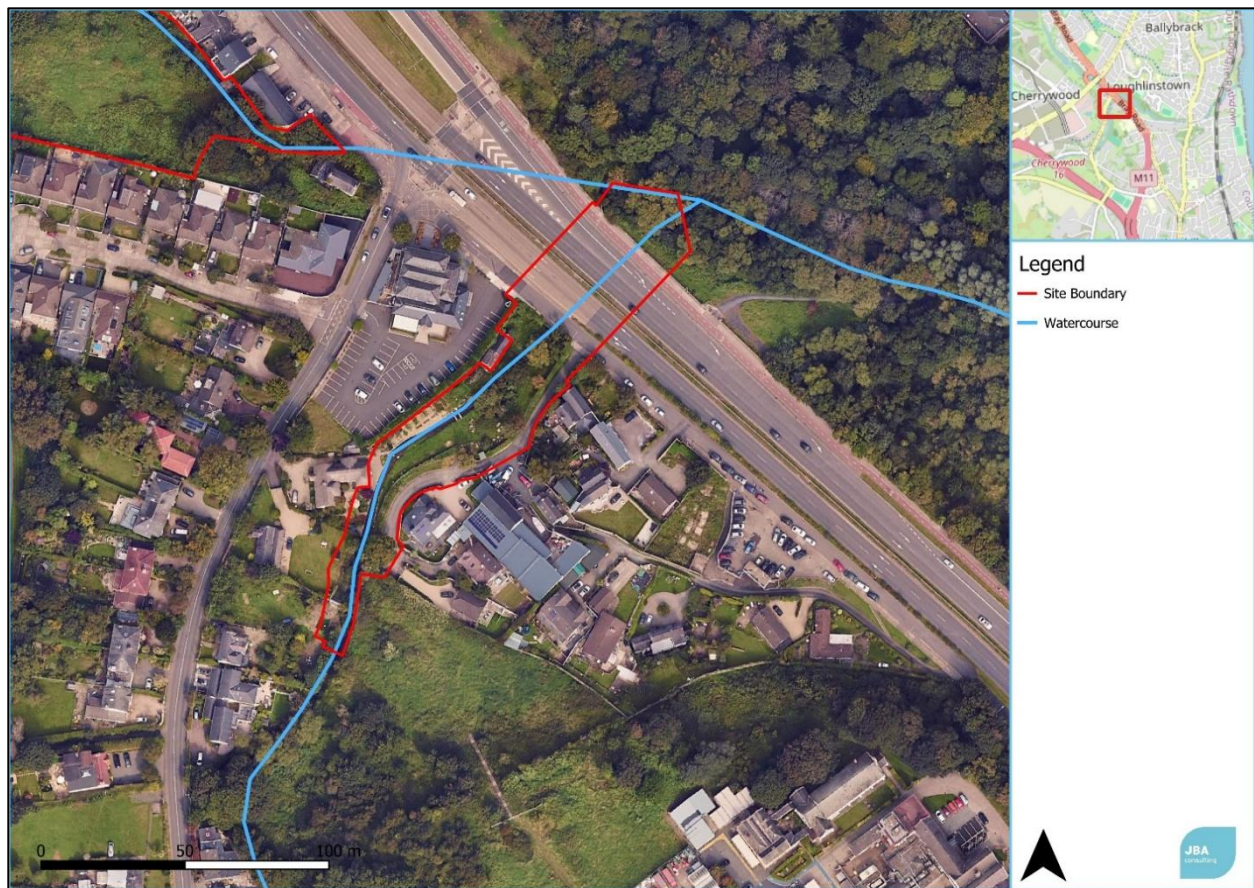


Figure 2-8: Lower Brides Glen Site Location

Commons Road, River Lane and Brookdene

Works at the Commons Road, River Lane and Brookdene Site Location (Figure 2-9) will take place along the Shanganagh River as it flows from west to east along Commons Road, under the Shanganagh Road Bridge, and between Shanganagh Wood and Brookdene. Upstream of the bridge, Commons Road has residential development along its south side, with the river adjacent to the north. The northern side of the river at this point is wooded, with one house and a bridge providing access at roughly the midway point of the works. North of the wooded area is housing. Shanganagh Road Bridge is a protected structure (RPS No. 1772) and is a narrow two-lane stone arch bridge. Downstream of the bridge, Shanganagh Wood and Brookdene are both residential roads, with a footpath adjacent to the river along Shanganagh Wood, and a riparian strip and tree line on the left (north) bank at Brookdene.

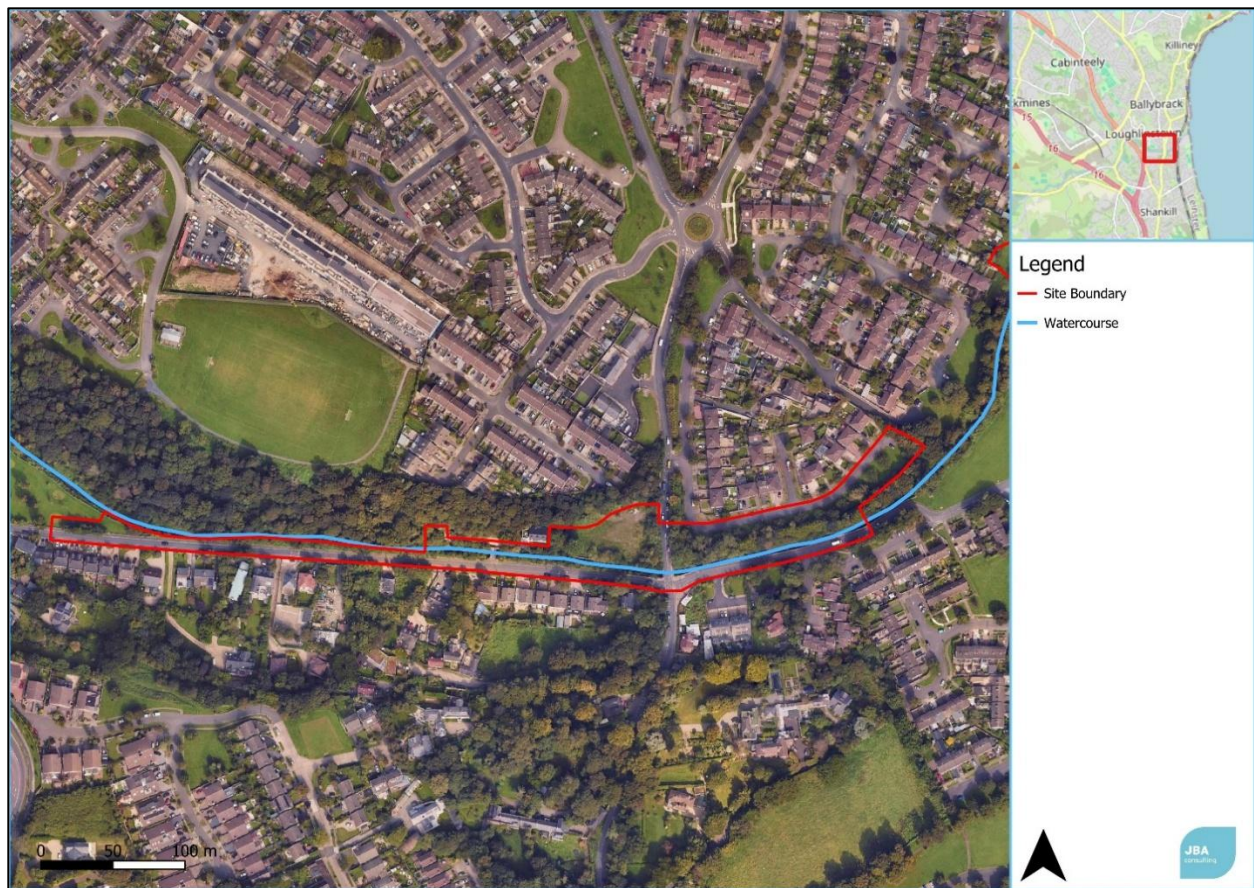


Figure 2-9: Commons Road, River Lane and Brookdene Site Location

Bayview

Bayview (Figure 2-10) is a residential area bound to the east by the railway line and a green area through which the Shanganagh River flows. Bayview comprises semi-detached and detached houses with front and rear gardens. Downstream of this point, the river flows beneath the railway line and past Shanganagh Wastewater Treatment Plant to the south, before discharging into the sea at Killiney Bay.



Figure 2-10: Bayview Site Location

2.2 Project Description

The characteristics of the proposed development are described in detail in this section.

Clon Brugh

- Construction of c. 113m of flood defence walls up to 1.35m high adjacent to the existing overland flow path from the Carysfort Maretimo Stream.
- Demolition of c. 16m of existing masonry walls and realignment works to the existing footpath.

Belarmine Park

- Replacement of c. 100m of the Sandyford Hall boundary wall with a new concrete flood defence wall up to 2.6m high.
- Construction of c. 36m of new flood defence walls in Belarmine Park up to 1.65m high to tie into the existing culvert inlet.
- Minor upgrade works to the existing culvert inlet structure.

Kilgobbin Road

- Replacement of c.69m of existing stone boundary wall to a protected structure Kilgobbin House (RPS Ref: 1684) and construction of c.100m of stone finished flood defence walls up to c.1.7m upstream of Kilgobbin Bridge.
- Installation of c. 298m of culvert from a proposed flow control weir at Kilgobbin Bridge to a discharge point adjoining Meadowbrook downstream.

Glenamuck Road North

- Demolition and removal of c. 128m of existing masonry walls.
- Construction of c. 259m of stone finished flood defence walls up to 1.9m high, including flood gate, along Castle View/Ballyogan Grove and the upstream face of the bridge at Glenamuck Road roundabout.
- Construction of c. 90m of flood defence wall up to 1.5m high adjacent to the river immediately downstream of Glenamuck Road roundabout.
- Installation of a new in-channel debris screen immediately upstream of the existing bridge.

Cherrywood Road

- Construction of c. 178m of concrete flood defence wall ranging from 1.1m to 2.7m high, including demountable barriers and railings, on the bank of the Brides Glen River adjoining the existing properties and upstream of the Cherrywood Viaduct (RPS Ref. 1783).

Bray Road

- Construction of c. 133m of concrete flood defence wall ranging from 1.1m to 3.1m high, including flood gate, on the Carrickmines River to the rear of existing properties on Bray Road.
- Circa 75m of river channel realignment, replacement of the existing access bridge and strengthening works to the existing masonry arch.

Lower Brides Glen

- Construction of c. 129m of flood defence walls ranging from 1.2m to 2m in height. The walls are to be located along the north bank of Brides Glen River, within the curtilage of existing properties including a protected structure Waterfall Cottage (RPS Ref: 1770) and immediately upstream of the N11 culvert. Works include demountable barriers and decorative railings.

N11 Overflow Culvert

- Installation of c. 53m of new 2.4m diameter overflow pipe beneath the N11 dual carriageway including an inlet upstream of the N11 and an outlet structure in Loughlinstown Park.

Commons Road, River Lane and Brookdene

- Construction of c.209m of flood defence walls up to 2.4m high on Commons Road adjoining the river.
- Structural works to upgrade c. 324m of existing flood defence walls upstream of Shanganagh Road Bridge to an overall height of up to c.3.6m.
- Structural remedial works to the existing Protected Structure, Shanganagh Bridge (RPS Ref: 1773) including underpinning, scour protection and reinforcement of the masonry parapet.
- Upgrading of c.113m of existing flood defence wall on River Lane to a height of up to c.1.8m and construction of c.185m of flood defence wall to a height of up to c.1.2m in the Brookdene Estate.

Bayview

- Construction of c. 95m of stone finished flood defence walls up to 1.8m high in the green area adjacent to Bayview Grove/Lawns.
- Replacement of c. 17m of existing boundary wall at 20 Bayview Lawns with a new flood defence wall to match existing wall height and finishes and replacement of remaining c. 10m of wall tying into the culvert under the railway with a concrete flood defence wall.

2.2.1 Duration of Works

The construction phase is anticipated to last approximately 18-24 months. Operations of the site are expected to be permanent.

3 Methodology

This Riparian Birds Conservation Plan assesses the ecological features of value to the local riparian bird populations, in particular Kingfisher *Alcedo atthis*, White-throated Dipper *Cinclus cinclus* and Grey Wagtail *Motacilla cinerea*, that have been previously recorded along the length of the proposed FRS. This allows for identification of the potential impacts of the proposed scheme on the ecological features associated with the local riparian birds. This assessment and resulting conservation plan are based on a desktop study of existing data and site surveys, which provided information on the riparian bird populations and associated habitats present within and adjacent to the proposed scheme's work areas within the catchment.

This Riparian Birds Conservation Plan will outline the findings of the desk-based assessment and the surveys and identify any potential impacts of the proposed scheme on ecological features associated with the local riparian birds; and propose mitigation measures to avoid and/or reduce impacts and provide compensation measures where necessary in order to comply with RFI item 9a and 9b.

3.1 Desktop Baseline Study

A desktop study was conducted of available published and unpublished data, along with a review of data available on the National Parks and Wildlife Service (NPWS), and National Biodiversity Data Centre (NBDC) web-based databases, in order to identify key habitats for the local riparian bird populations, that may be present within ecologically relevant distances from the proposed scheme. The data sources below were consulted for the desktop study:

- NPWS, 2025a. The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report. Edited by: Domhnall Finch, Aoife Delaney, Fionnuala O'Neill and Deirdre Lynn. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland;
- NPWS, 2025b. The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessment. Unpublished NPWS report. Edited by: Domhnall Finch, Aoife Delaney, Fionnuala O'Neill and Deirdre Lynn. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland;
- Aerial photography available from www.osi.ie, Google Maps <http://maps.google.com/>;
- Online data available on Natura 2000 sites as held by the National Parks and Wildlife Service (NPWS) from www.npws.ie;
- NBDC, 2026 – Species Distribution Maps; Available online at www.biodiversityireland.ie;
- All Ireland Red Data lists for vascular flora, mammals, butterflies, non-marine molluscs, dragonflies & damselflies, amphibians and fish; and
- DLRCC Planning Portal.

3.2 Field Surveys

Ecological surveys examining riparian bird activity and habitat change / succession were carried out by JBA ecologists on the 9th February; 25th March; 24th April; 8th May; 21st May; 28th May; 8th June, and the 18th June 2026 to identify the presence of riparian birds, and any potential nesting areas within the work areas of the proposed Carrickmines-Shanganagh FRS, and at least 200m upstream and downstream of these proposed work areas. The 200m is to determine whether any nests lay within the disturbance buffer given to works being carried out for the proposed scheme.

The ecological walkover recorded habitats and signs of riparian bird habitation, following guidance outlined in the documents below:

- Best Practice Guidance for habitat Survey and Mapping. The Heritage Council. (Smith et al., 2011); and

- Ecological Surveying Techniques for Protect Flora and Fauna during the Planning of National Road Schemes (NRA, 2008).

Habitats have been named and classified following A Guide to Habitats in Ireland by Fossitt (2000). Nomenclature for higher plants follows that given in The New Flora of the British Isles 4th Edition (Clive Stace, 2019). Identification of Irish plants generally follows Webb's - An Irish Flora (Parnell and Curtis, 2012).

3.3 Consideration of Cumulative and In-combination Impacts

Potential sources of cumulative and in-combination impacts were identified based on the infrastructural design of other local development sites. Potential sources of cumulative and/or in-combination impacts of potential significance for the local riparian birds were identified within the locality of the Carrickmines-Shanganagh FRS.

3.4 Residual Impacts

The project is assessed including mitigation by design measures. This was done where mitigation by design measures have proven to be effective and implemented effectively with a high certainty of functional operational success. Where notable negative residual impacts are still identified, further mitigation measures are proposed as part of the Riparian Birds Conservation Plan to avoid, reduce or minimise them.

3.5 NPWS Consultation

JBA ecologists held a meeting with NPWS's Terry Doherty on the 23rd of July 2026, to discuss the results of the riparian bird surveys and the mitigations proposed to alleviate potential negative impacts of the local riparian bird populations. Terry Doherty stated that he was 'satisfied' with both the survey effort and resulting data, as well as the proposed mitigation measures to be incorporated into this conservation plan for local riparian birds.

3.6 Competent Persons

The assessment was prepared by Matt Hosking BSc (Hons) Wildlife Biology. Matt is an Ecologist with JBA Consulting with over 3 years' experience in ecological surveying and ecological consultancy.

William Mulville BSc (Hons) Zoology, MSc, MCIEEM. William is a Senior Ecologist with JBA Consulting, with over 9 years' experience in ecological research, endangered species conservation, educational outreach, and ecological consultancy. William is a specialist in riparian ecology.

3.7 Limitations and Constraints

This Riparian Birds Conservation Plan is based on existing data from the above-mentioned sources. The conservation plan necessarily relies on some assumptions and is inevitably subject to some limitations as detailed below:

- The conservation plan cannot account for potential future developments within the locality that are not currently registered within DLRCC's planning systems.
- Data from biological record centres or online databases is historical information, and datasets may be incomplete, inaccurate, or missing. The absence of riparian bird records for an area may be due to the under recording in the area and not necessarily imply a lesser species density. These records are therefore to be treated as minimum information available for the area.
- The precautionary principle is used at all times when determining potential ecological sensitivity of potential nesting sites, and their immediate surrounds.

4 Conservation Plan Objectives

4.1 Introduction

This section sets out the objectives of the Riparian Birds Conservation Plan, that will enable the local riparian bird population within the Shanganagh River catchment to continue to inhabit the river, its tributaries and their respective riparian corridors, with minimal impact on their commuting, foraging and nesting activities in order to comply with RFI item 9b.

4.2 Riparian Birds Conservation Objectives

The overarching objective is to maintain the existing local riparian bird populations. For this to be achieved the following factors will have to be assessed in order to maintain stable population dynamics for local riparian birds within the greater Carrickmines-Shanganagh area:

- Riparian Connectivity and Range Protection;
- Protection of Range and Foraging Resources;
- Protection of Nests from Construction Impacts; and
- Long-term Enhancement of Natural Riparian Zones.

4.2.1 Riparian Connectivity and Range Protection

Riparian connectivity controls the extent to which a landscape facilitates the movements of riparian birds between the resources within their territory. The loss of connectivity for riparian birds can lead to a reduction in overall territorial range, with knock-on effects for foraging and breeding / mate availability, which have the potential to lower the fecundity rates of the local riparian bird species. The protection and enhancement of riparian connectivity is required to offset the impacts of habitat loss and fragmentation from the proposed scheme.

In order to preserve the landscape connectivity for the local riparian bird populations, the following strategies will be carried out:

- Ensure remedial landscaping of riparian corridors for navigation, refuge and future nesting;
- Protection and/or Provision of Nest Sites; and
- Mitigations protecting the health of retained riparian habitats and water quality.

4.2.2 Protection of Foraging Resources

The range of foraging resources available to riparian birds is determined by riparian habitat diversity and structure, river/stream physical parameter and instream / marginal features and water quality. By ensuring that the riparian corridor is optimally maintained during construction and early post-construction phases, this will allow it to provide for suitable foraging resources available to local riparian birds during these periods. The proposed scheme outlines the retention of existing vegetation along most of the scheme, which will aid in maintaining the existing supply invertebrate prey populations for Grey Wagtail, Dipper, Sand Martin, Mallard.

Following guidelines on the protection of water quality will also ensure the availability of clean water, ensuring fish populations in the streams and river are not adversely affected, which in turn protects the foraging supply for local Kingfisher and Grey Heron populations.

4.2.3 Protection and/or Provision of Nest Sites

Wherever practically possible the proposed scheme works will aim to protect existing riparian nests recorded by surveyors, regardless of confirmation of recent nesting given the application of the precautionary principle.

Where it is not possible to retain a nesting or prevent significantly disturbance as a result of the works, the aim will be to ensure the provision of new alternative artificial nesting sites, safeguarding the local riparian bird populations' breeding activity during the construction and early post-construction period.

4.2.4 Long-term Enhancement of Natural Riparian Zones

The landscaping design plans and associated ecological mitigations for the proposed scheme will need to ensure that the long-term condition of the affected natural riparian zones, i.e., natural habitat types as opposed to flood walls etc., have a minimum functional ecological lag period following the commencement of the scheme works. Additionally, the scheme's landscaping will aim to restore and then enhance the overall quality of the riparian zones for local riparian birds, beyond that of their existing respective conditions.

5 Existing Environment

5.1 Baseline Conditions

The proposed scheme is set along multiple stretches of riparian habitat within the south Co. Dublin area; this includes the Shanganagh River and its tributaries, as well as the riparian habitats along their respective banks. While the majority of the riparian habitats are natural, artificial habitats (buildings, walls, roads, railway and pedestrian infrastructure) are present within or immediately adjacent to the riparian zone.

The proposed Clon Brugh works area is excluded from this point forward within this conservation plan as this area does not contain a permanent watercourse.

5.2 Core Riparian Bird Habitats

5.2.1 Proposed Works Sites and Linked Riparian Habitats

This sub-section outlines the core riparian habitats contained within and/or immediately adjacent to the proposed scheme's work areas; as well as the ecological functions they provide to the local riparian bird species.

Table 5-1: Work sites, their core riparian habitats, and their respective functions that support riparian birds

Works Sites	Core Riparian Habitats	Functionality for Riparian Birds
Belarmine Park	Mosaic: Mixed broadleaved woodland / Scrub	Sheltered commuting for all riparian birds Nesting potential for Grey Heron Hunting perches for Kingfisher and Grey Wagtail Moderate value foraging for Sand Martin along river side edge
	Amenity grassland (improved)	Low value grazing for Mallard
	Mosaic: Other artificial lakes and ponds / Reed and large sedge swamps	Nesting potential for Mallard
Kilgobbin Road	Amenity grassland (improved)	Low value grazing for Mallard
	Improved agricultural grassland	Low value foraging for Mallard and Sand Marten Nesting potential for Mallard
	Hedgerows	Partially sheltered commuting for all riparian birds
	Treelines (inner riparian zone)	Partially sheltered commuting for all riparian birds Hunting perches for Kingfisher and Grey Wagtail Nesting potential for Grey Heron and Mallard Moderate value foraging for Sand Martin along river side edge
Glenamuck Road North	Scrub	Moderate value foraging for Sand Martin Nesting potential for Mallard Sheltered commuting for all riparian birds,

Works Sites	Core Riparian Habitats	Functionality for Riparian Birds
		bar Grey Heron
	Treelines	Partially sheltered commuting for all riparian birds Hunting perches for Kingfisher and Grey Wagtail Nesting potential for Grey Heron Moderate value foraging for Sand Martin along river side edge
	Dry meadow and grass verges	Moderate value foraging for Sand Martin Nesting potential for Mallard
Cherrywood Road	Earth bank	Nesting potential for Sand Martin and Kingfisher
	Amenity grassland (improved)	Low value grazing for Mallard
	Stone walls and other stonework	Nesting potential for Grey Wagtail and Dipper
	Mixed broadleaved woodland	Nesting potential for Grey Heron and Mallard Hunting perches for Kingfisher and Grey Wagtail Sheltered commuting for all riparian birds Moderate value foraging for Sand Martin along river side edge
Bray Road	Scrub	Moderate value foraging for Sand Martin Sheltered commuting for all riparian birds, bar Grey Heron
	Dry meadow and grass verges	Moderate value foraging for Sand Martin Nesting potential for Mallard
	Mixed broadleaved woodland	Sheltered commuting for all riparian birds Nesting potential for Grey Heron Hunting perches for Kingfisher and Grey Wagtail Moderate value foraging for Sand Martin along river side edge
Lower Brides Glen	Scrub	Moderate value foraging for Sand Martin Sheltered commuting for riparian birds, bar Grey Heron
	Treelines	Nesting potential for Grey Heron Partially sheltered commuting for all riparian birds Moderate value foraging for Sand Martin
	Dry meadow and grass verges	Nesting potential for Mallard
	Mixed broadleaved woodland / Riparian woodland	Nesting potential for Grey Heron Hunting perches for Kingfisher and Grey Wagtail Sheltered commuting for all riparian birds Moderate value foraging for Sand Martin along river side edge
Commons	Mixed broadleaved woodland	Sheltered commuting for all riparian birds

Works Sites	Core Riparian Habitats	Functionality for Riparian Birds
Road		Nesting potential for Grey Heron Hunting perches for Kingfisher and Grey Wagtail Moderate value foraging for Sand Martin along river side edge
	Stone walls and other stonework	Nesting potential for Grey Wagtail and Dipper
Brookdene / River Lane	Mixed broadleaved woodland	Sheltered commuting for all riparian birds Nesting potential for Grey Heron Hunting perches for Kingfisher and Grey Wagtail Moderate value foraging for Sand Martin along river side edge
	Stone walls and other stonework	Nesting potential for Grey Wagtail and Dipper
	Earth bank	Nesting potential for Sand Martin and Kingfisher
Bayview	Mosaic: Mixed broadleaved woodland / Scrub	Sheltered commuting for all riparian birds Nesting potential for Grey Heron Hunting perches for Kingfisher and Grey Wagtail Moderate value foraging for Sand Martin along river side edge
	Treelines	Nesting potential for Grey Heron Partially sheltered commuting for all riparian birds Moderate value foraging for Sand Martin
	Dry meadow and grass verges	Moderate value foraging for Sand Martin

5.2.2 Riparian Bird Surveys

During the surveying of the proposed work areas for the Carrickmines-Shanganagh FRS, JBA ecologists recorded riparian birds in the Bayview, Commons Road, Bray Road, and Cherrywood Road areas. The other areas did not have riparian birds recorded during the surveys carried out. This may be due to commuting barriers which will be outlined in Section 5.4, or due to river habitat being unsuitable in the other areas of the proposed scheme due to the river size or bank vegetation. The areas that had riparian birds recorded are shown in Figure 5-2, Figure 5-3, Figure 5-4, and Figure 5-5. Active or abandoned nests, and areas suitable for nesting were recorded in all these areas. Some of these nesting areas will be within the areas of the scheme's proposed works.

5.3 Existing Territorial Ranges

Estimations of existing territories for riparian birds are made on prevailing scientific data regarding territory size, as well as observations of the riparian habitat and records by JBA of riparian birds during surveying.

Kingfisher territories vary from 0.05 – 0.33 territories per kilometre (Cummins et al, 2010), this will be impacted by foraging and nesting habitat available to Kingfisher within a stretch of river. Within the context of the proposed project, it is likely that there is only space for one pair of Kingfisher to establish a territory. The small size and canalised nature of the rivers within the project scope, and the unsuitable habitat due to the urbanised landscape in many of the locations, result in limited foraging, commuting and nesting habitat for Kingfisher. There were no confirmed Kingfisher nests, however; one potentially disused nest, located

within and actively eroding bank, was recorded downstream of the Bayview site, may have once supported Kingfisher nesting (Figure 5-1).



Figure 5-1: Old nest chamber found in the riverbank downstream of the Bayview site

Grey Wagtail territories usually occur in the densities of 0.43 – 0.79 territories per kilometre, within the scope of the proposed scheme it is likely that there are enough foraging and nesting resources, as well as watercourse length, for at least two pairs of Grey Wagtail. One territory is likely downstream of the N11 which will act as a natural barrier to territories, suitable habitat for a pair is present upstream of the N11 in the Cherrywood Road site and Bray Road sites. Other work areas may have a Grey Wagtail, however; none were recorded upstream of the Bray Road site.



Figure 5-2: Riparian birds and nests recorded during surveys near the Bayview site



Figure 5-3: Riparian birds and nests recorded during surveys along Commons Road



Figure 5-4: Riparian birds and nests recorded during surveys near the Bray Road site

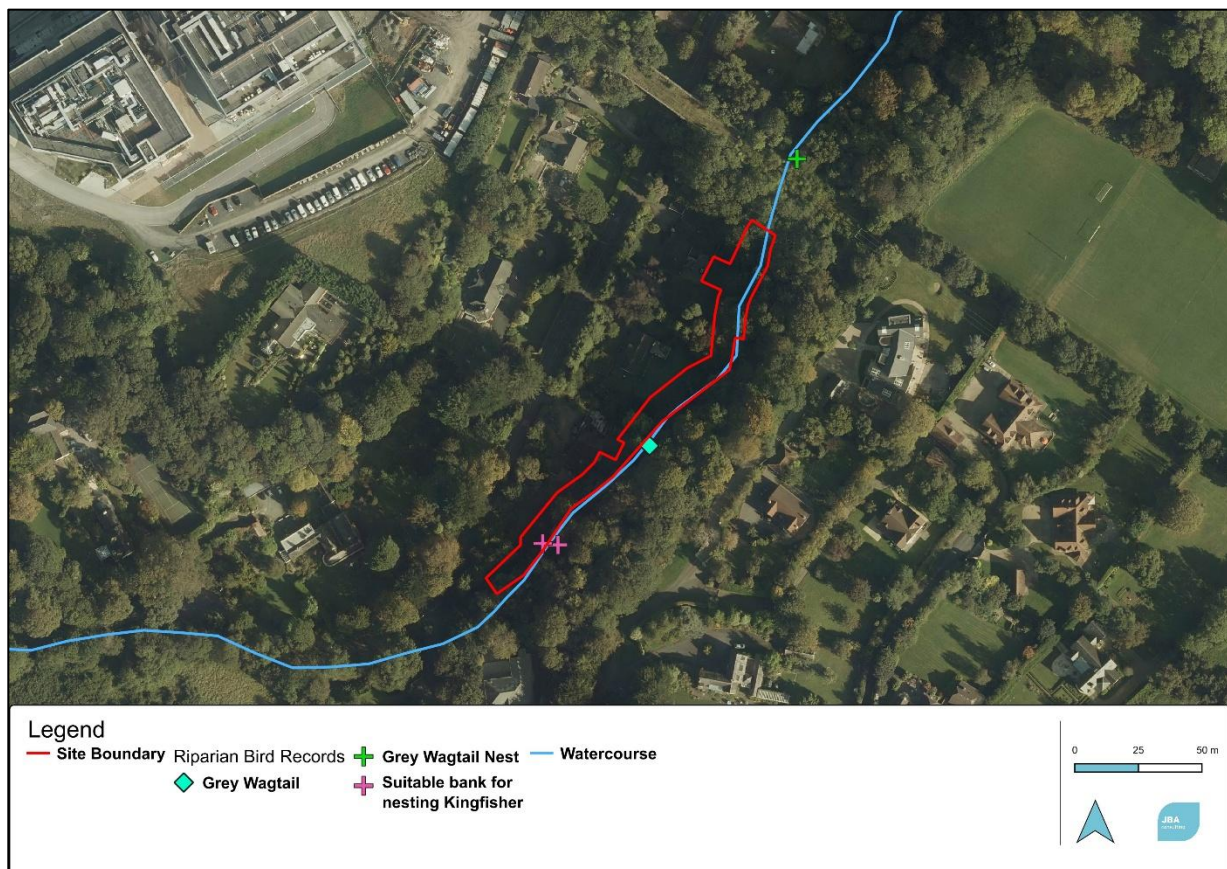


Figure 5-5: Riparian birds and nests recorded during surveys along Cherrywood Road

5.4 Existing Commuting Barriers

Within the proposed project there are typical commuting barriers associated with urban environments, for riparian birds most of these are navigable such as bridges, weirs, and residential areas. However, the N11 poses a significant barrier due to the width and size of the road. The culvert that runs underneath the N11 to the Bray Road is not an attractive commuting route as it is significantly longer contains a bend and as result is notably darker within (Figure 5-6). The culvert to the Cherrywood Road site is straight and shorter, that results in a clear partial illuminated sightline to the upstream section west of the N11, which is a much more attractive commuting route for riparian birds to take under the N11 (Figure 5-7). There are no other likely significant barriers for riparian bird movement throughout the proposed scheme areas.



Figure 5-6: Culvert running under the N11 that heads to the Bray Road site and Cherrywood Park



Figure 5-7: Culvert running under the N11, far end is stream that goes to Cherrywood Road

6 Potential Impacts

6.1 Construction Impact

6.1.1 Nest Disturbance / Loss

During the construction phase of the proposed scheme, there will be disturbance around nests of riparian birds located around the work areas. This will result in loss of nesting potential during the breeding season for local riparian bird populations. There will be disturbance to known nesting sites in the Commons Road (Figure 5-3) and Bray Road (Figure 5-4) sites, and disturbance to what was considered to be an area of good potential nesting for Kingfisher in Cherrywood Road (Figure 5-5). However, no active nests were recorded in this area during the surveys, therefore no disturbance to Kingfisher nests is anticipated during the construction. Works carried out on the bridge within the Commons Road and Bray Road sites, will disturb known nesting sites on those bridges, the length of the scheme's proposed works will cause disturbance to the nesting of riparian birds as works will be carried out during the breeding season.

Therefore, in the absence of mitigation measures, it is predicted that there will be a medium-term adverse impact of moderate significance expected on nesting potential for Grey Wagtail and Dipper during the construction phase.

It is predicted that there will be a medium-term adverse impact of imperceptible significance for local Kingfisher, as no potential Kingfisher nests will be lost or disturbed as a result of the works, though the works themselves will prevent the establishment of any new nests within active work areas, where the banks are suitable for nesting.

6.1.2 Foraging and Commuting Disturbance

The construction works will be taking place in close proximity to the foraging and commuting habitats for the local riparian birds; this will create visual and audible disturbance for local riparian birds within the work areas. The disturbance from the construction phase of the proposed project will cause temporary disruption to riparian birds foraging and commuting habitats within the work areas. Riparian birds such as Kingfisher, Grey Wagtail, and Dipper commute solely along the riparian corridor, the works will result in the riparian birds avoiding the areas which have active works and result in a fragmentation of their usual foraging and commuting habitat.

Kingfisher will lose hunting perches due to the tree removal in areas such as Glenamuck Road North, Bayview, Commons Road, and Cherrywood Road. However, most of these areas do not support suitable foraging habitat for Kingfisher, as they lack pools and glides of appropriate depth to accommodate Kingfisher diving.

During the construction phase there is potential for adverse impacts on the surface water quality due to accidental introduction of pollutants into the surface water, this would have a detrimental impact on the habitat that supports the floral and prey populations consumed by all riparian bird species.

Therefore, in the absence of mitigation, it is anticipated that there will be a short-term adverse impact of moderate significance to foraging and commuting potential for local riparian bird populations during the construction phase.

6.1.3 Habitat Loss and Fragmentation

Tree removal and vegetation clearance for the proposed works will result in some habitat loss and fragmentation of the riparian corridor for local riparian bird species. Due to the nature of riparian bird habitat, the disturbance from the works will also result in habitat fragmentation as riparian birds are unlikely to commute through the works whilst they are active.

During the construction phase, the generation of dust from the works can have a detrimental impact on the vegetation of the riparian corridor. This will have the knock-on effect of reducing the habitat associated with the riparian corridor and a detrimental impact on the insectivorous and omnivorous bird species, which utilise this habitat for foraging.

Therefore, in the absence of mitigation there will be a short-term adverse impact of moderate significance due to habitat fragmentation for local riparian birds during the construction phase.

6.2 Operational Impacts

6.2.1 Nest Disturbance / Loss

The scheme's proposed works may remove nesting potential for local riparian birds within the natural riparian zone and structure; for example, the structural work to be carried on the Shanganagh Bridge may result in the loss of crevices within the stonework that have the potential to be utilised for nesting riparian birds, specifically Grey Wagtail and Dipper. Within the work areas for the proposed scheme there will be no long-term impact on the nesting potential for Kingfisher, the old potential nest recorded downstream of the Bayview site (Figure 5-2) will not have any works carried out in the vicinity. The natural rock and earth banks along the Cherrywood Road, which have nesting potential (Figure 5-5), will not be altered by the proposed flood defences in that area and will be available for potential for all bank-nesting riparian bird species during the operational phase.

Therefore, in the absence of mitigation measures during the operational phase, it is predicted that there will be a short-term adverse impact of moderate significance on the nesting potential for riparian birds during the operational phase.

6.2.2 Foraging and Commuting Disturbance

During the operational phase of the scheme there will be a negligible impact on the foraging and commuting habitats for riparian birds, even the short-term ecological lag within the riparian zone, as result of the tree removals, will not result in disruption to their foraging and commuting potential. Riparian birds will comfortably commute along riparian corridors with minor gaps in vegetation density and the sub-optimal foraging availability. Kingfisher, Grey Wagtail, and Dipper will not be notably impacted by the removal of trees or installation of flood defences along the route.

Therefore, in the absence of mitigation measures during the operational phase, it is predicted that there will be a short-term negative impact of imperceptible significance on the foraging and commuting activities of the local riparian birds.

6.2.3 Habitat Loss and Fragmentation

The riparian corridor will largely remain intact for the local riparian bird populations. Only thin strips of core riparian habitats, including amenity grassland (low value), dry meadow and scrub will be permanently lost as a result of the physical footprints of new floodwalls. Pockets of the newly landscaped habitats will contain young, lower density vegetation initially, but these will ultimately mature and restore the structure of the natural riparian zones. Therefore, the effects of these minor fragmentations will be imperceptible several years after the completion of the works.

Therefore, in absence of mitigation measures during the operational phase, it is predicted that there will be a long-term negative impact of imperceptible significance for local riparian birds during the operational phase.

7 Mitigation

7.1 Introduction

This section covers the mitigation by design, pre-enabling / pre-construction, construction and operational mitigation elements within the proposed scheme. These elements will help to ensure the achievement of the objectives set out in Section 4.

7.2 Mitigation by Design

7.2.1 Remedial Landscaping

The landscaping design plans and incorporated ecological mitigations for the proposed scheme will outline that wherever possible, existing vegetation will be retained, ensuring that the existing riparian zone is as optimally maintained as practically possible, whilst allowing the works to take place. However, where it is necessary to disturb and/or remove tree, scrub or understorey vegetation to accommodate the works, remedial tree planting, meadows and native hedging is to be planted as part of the landscaping. Additionally, invasive species present within the riparian corridor will be removed and replaced with native species. This will ensure the restoration and enhancement of any riparian corridor disturbance for the operational phase.

Planting of mature trees to replace the trees lost are outlined within the landscape design plans, with appropriate species to contribute to the riparian corridor. In certain areas where it was deemed suitable, planting of whips and specimen trees (where appropriate), such as Grey Willow, Goat Willow, Alder, Silver Birch, Downy Birch and Pedunculate Oak will be carried out. The planting of whips will create a shrub layer for the riparian corridor that will mature and join with canopy of the planted specimen trees. This action will ensure the establishment of a fully mature riparian canopy and understorey within a medium to long-term period.

7.3 Pre-enabling / Pre-Construction Mitigation

7.3.1 Installation of Nest Boxes

Nest boxes for species such as Dipper and Grey Wagtail (Figure 7-1) will be installed during the autumn prior to the commencement of any enabling / construction works along the scheme so that the target bird species can become habituated to them. This pre-breeding season installation will ensure optimal nesting uptake, as the likelihood of the target bird species suffering from neophobia (fear of new structures within their environment) will be very low. The installed nest boxes will ensure that there is no loss of nesting resources for Dipper and Grey Wagtail throughout the enabling, construction and early operational phases.



Figure 7-1: Two types (A left, B right) of Grey Wagtail and Dipper nest boxes (©Vivara Pro)

Locations to install these nest boxes are shown in Figure 7-2, these locations are chosen as they are beyond the extent of the works and should remain viable for nesting during the construction phase for the proposed work areas.



Figure 7-2: Suggested location of artificial nest placement along Commons Road site

The artificial nest recommended for the Commons Road area (Figure 7-2) is the nest box labelled as B in Figure 7-1, this is due to the location being on a vertical wall and not underneath a bridge, the installation of the box should be placed at least 0.5m above the high-water line, ideally above a section of deeper water to provide a space for Dippers to dive if necessary. These specifications also suit the nesting preferences of Grey Wagtail.

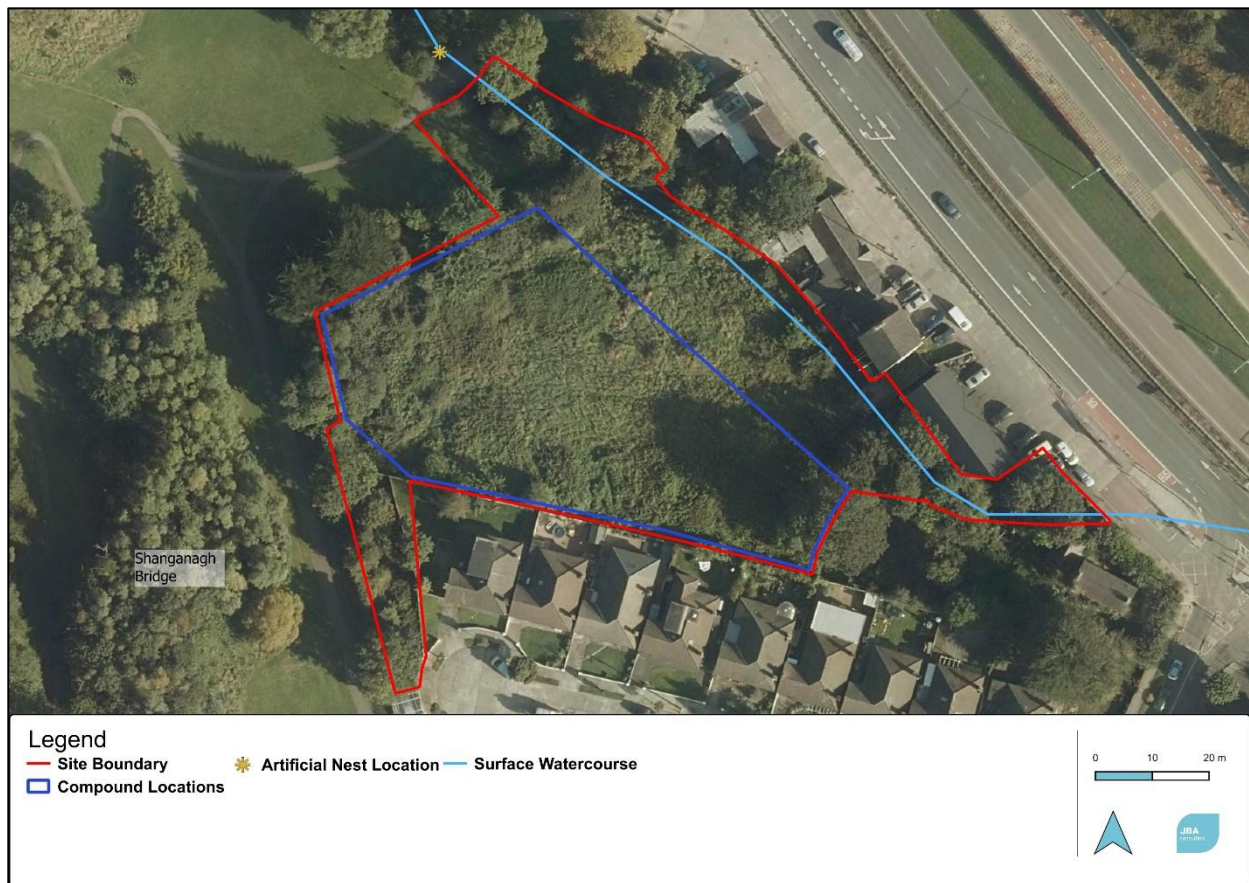


Figure 7-3: Suggested location for artificial nest location near the Bray Road site

Within the Bray Road works area there are limited suitable locations for an artificial nest due to the lack of vertical walls or bridges near deeper water outside the disturbance zone for expected works. It is proposed that an artificial nest is installed on the upstream side of the pedestrian bridge within Cherrywood Park (Figure 7-3) as this is the most suitable. The bridge and adjacent vegetation provide suitable shelter so nesting by Grey Wagtail is likely.

A suitably qualified Ecological Clerk of Works (ECoW) is to be engaged to monitor the nest boxes during the spring following their installation, in order to determine whether they have successfully been taken up by nesting riparian birds.

7.4 Construction Mitigation

7.4.1 Surface Water Control and Management Measures

As part of the proposed scheme there is a dedicated surface water management plan that outlines mitigations to ensure that there is no detrimental impact on the quality of the surface water within the scope of the proposed project. The measures that are outlined in the surface water management plan include:

- Site Establishment (surface water interception)
- Welfare and Sanitary Facilities (correct discharge of wastewater)
- Fuel Storage
- Haul Road Mitigations
- Control of Sediment
- Use of Concrete
- Vehicles and Plants
- Monitoring and Verification of the Control Measures

These measures can be found within Section 3 and Section 4 of the Surface Water Management Plan in greater detail.

7.4.2 Dust Mitigation

As part of the Construction Environmental Management Plan (CEMP), there are mitigation measures that outline the control of dust within the work areas for the proposed scheme. These Dust Management Plan includes:

- Site Management
- Monitoring of Dust Levels
- Preparing and Maintaining the Site
- Operating vehicles/machinery and sustainable travel
- Operations
- Measures Specific to Demolition
- Measures Specific to Earthworks
- Measures Specific to Construction
- Measures Specific to Trackout

These measures can be found in Section 6.4 of the Preliminary CEMP that was submitted with the original planning submission in greater detail.

7.4.3 Artificial Nest Monitoring

The ECoW will be charged with ensuring that the artificial nest boxes remain undisturbed during the proposed scheme's construction works, ensuring that any works carried out within the locality of the nest boxes do not stray into their proximity and potentially disturb any nesting riparian birds.

7.5 Operational Mitigation

7.5.1 Remedial Landscaping

The remedial landscaping design will ensure the long-term restoration of the core riparian habitats; details of the proposed landscaping are outlined perviously in Section 7.2.1.

8 Post-construction / Early Operational Ecological Monitoring

To determine the success of the proposed mitigations for the proposed scheme in regard to local riparian bird populations, it is required that follow-up surveys to monitor the utilisation of mitigation measures are carried out.

8.1.1 Nest Boxes

Monitoring of the nest boxes by the appointed ECoW will continue into the post-construction / early operational phase, to examine whether the nest boxes continue to support nesting Grey Wagtail and/or Dipper.

8.1.2 Landscaping

Monitoring of the new riparian landscape planting will be conducted by the appointed ECoW, who will be responsible for the notifying relevant parties as to whether any additional planting is require due to failing or fallen trees.

9 Residual Impacts

9.1 Nesting Potential

The nesting potential for riparian birds within the scope of the proposed scheme will be increased following the mitigations outlined within this report. Artificial nest boxes are to be installed to mitigate the temporary loss of nesting potential for riparian birds, however; once the works are completed the existing nesting potential will return with the additional benefit of the artificial nests being retained.

Therefore, it is predicted that there will be a long-term positive residual impact of slight significance on the nesting resources for riparian birds following the completion and operation of the proposed scheme.

9.2 Foraging and Commuting

The mitigations outlined within this document will ensure that the natural riparian habitats are returned to a comparable state to what currently exists, with the added benefit of invasive species removal. Additionally, the mitigation measures will ensure no adverse impact on the water quality of the local waterbodies; and in turn will safeguard core riparian habitats, as well as the foraging and commuting resources that they provide the local riparian birds.

Therefore, it is anticipated that there will be a long-term neutral residual impact of imperceptible significance on the foraging and commuting activities of local riparian bird populations, following the completion and operation of the proposed scheme.

9.3 Habitat Loss and Fragmentation

The mitigations outlined within this conservation plan and associated ecological and environmental documents will ensure that core riparian habitat fragmentation will not occur within the work sites of the proposed scheme. Ultimately, as a result of the footprint of new floodwalls, small-scale habitat loss will be permanent; however, the vast majority of the habitats affected are low-value habitats and/or located towards the outer zones of the riparian corridors.

Therefore, it is predicted that there will be a long-term negative residual impact that is not significant for the riparian habitats that support the local riparian bird populations, following the completion of the proposed project.

9.4 Overall Residual Impact on Riparian Bird Populations

Given the details present in the above sub-sections, it is predicted that there will be a long-term positive residual impact that is not significant for the local riparian bird populations, following the completion and operation of the proposed flood relief scheme.

10 Conclusion

The proposed FRS will require works in the vicinity of known nesting sites, as well as removal of trees which will alter the riparian corridor, impacting the nesting, foraging, and commuting of local riparian birds. The installation of artificial nest boxes will mitigate the immediate loss of nesting potential, and enhance the nesting potential once works are completed. The removal of existing trees will be mitigated with remedial tree planting ensuring no net loss of riparian canopy across the scheme in the long-term. This will ensure the retention of commuting and foraging habitat for riparian birds once the works are completed.

In conclusion, with the proposed mitigation measures safeguarding the retained riparian habitats and watercourses; remedial landscape planting; invasive species removal; and installation of new nesting sites for riparian bird species, including those on the BoCCI Breeding Amber-list, there will be a long-term positive impact across the scheme's areas for the local riparian bird populations of south Co. Dublin.

References

DoHLGH (2024) Ireland's 4th National Biodiversity Action Plan Ireland's 4th National Biodiversity Action Plan 2023–2030 2023–2030. Prepared by the National Parks & Wildlife Service.

Fossitt, J.A. (2000) A Guide to Habitats in Ireland, Heritage Council of Ireland series, Heritage Council/Chomhairle Oidhreachta: Kilkenny.

Gilbert et al, 2021. *Birds of Conservation Concern Ireland (BoCCI) lists which Classify Bird Specie into Three Catgories: Red list, Amber List and Green List* , s.l.: s.n.

NBDC (2026) – Species Distribution Maps. Available online at www.biodiversityireland.ie.

NPWS (2025a). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland;

NPWS (2025b). The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessment. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neil. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland;

NRA, 2009. *Ecological Survey Techniques for Flora and Fauna during the Planning of National Road Schemes* , s.l.: National Road Authority.

Smith et al. (2011) Best Practice Guidance for habitat Survey and Mapping. The Heritage Council.



Offices at:

Dublin
Limerick
Cork
Castlebar

JBA Registered Office

24 Grove Island
Corbally, Limerick
Ireland
+353 61 345463
info@jbaconsulting.ie
www.jbaconsulting.ie

Egis Registered Office

Classon House
Dundrum Business Park
Dundrum, Dublin 14
Ireland
+353 1 485 1400
Info.ireland@egis-group.com
www.egis-group.com