4 Ecology and Biodiversity

4.1 Introduction

This chapter of the remedial Environmental Impact Assessment Report (rEIAR) presents a retrospective assessment of the potential effects on ecological receptors resulting from activities carried out at the disused quarry site at Coolsicken-Quinnsborough, Ballykelly, Monasterevin, Co. Kildare (the 'Application Site').

The works seeking substitute consent include the extraction of sand, gravel and rock over an area of 7.87 ha through blasting, mechanical excavation and rock breaking along with aggregate processing and stockpiling between the years 2000-2006. These works are hereafter referred to as the Project. A full Project description is presented in Chapter 2 (Project Description).

A concurrent application under Section 37L of the Planning and Development Act 2000 (as amended) for the development of the Site to agricultural use through importation of clean, uncontaminated soil and stone which intends to reinstate the quarry footprint to land contours similar to previous topographical levels, will be submitted separately and is beyond the scope of this report.

This assessment and report have been prepared by WSP Consultant Ecologist, Lisa O'Dowd ACIEEM and reviewed by WSP Technical Director Ursula Digby CEnv MCIEEM who have 4.5 and 15+ years' experience respectively in ecological consultancy, and specifically with respect to assessing impacts from soil recovery and quarry restoration projects.

4.1.1 Geographical and Temporal Scope

Historical aerial mapping and documentation held by Kildare County Council indicates that extraction of aggregates within the Substitute Consent Application Site (referred to as the 'Application Site') is estimated to have commenced within the year 2000 and that the operation had ceased within the year 2006. Accordingly, the baseline for this rEIAR has been set to 01 January 2000, and the rEIAR process has assessed environmental impacts from that date to 31 December 2006 (see Chapter 2 Project Description for further detail). This period equates to approximately seven years and is hereafter referred to as the 'Assessment Period'. It is identified as having a 'short-term' duration (those lasting one to seven years *sensu* (EPA, 2022)).

The geographical study area for the assessment covers the physical extent of the Application Site boundary as shown in Figure 4-1**Error! Reference source not found.** and the assessment area has been extended as appropriate to identify the relevant Important Ecological Features (IEFs) surrounding the Project. In the context of this rEIAR, the Application Site boundary is located entirely within the EIA Boundary and contains lands

which form the historical extraction area and quarry working areas (i.e. the historical stockpile areas). The Application Site boundary is shown below in Figure 4-1.

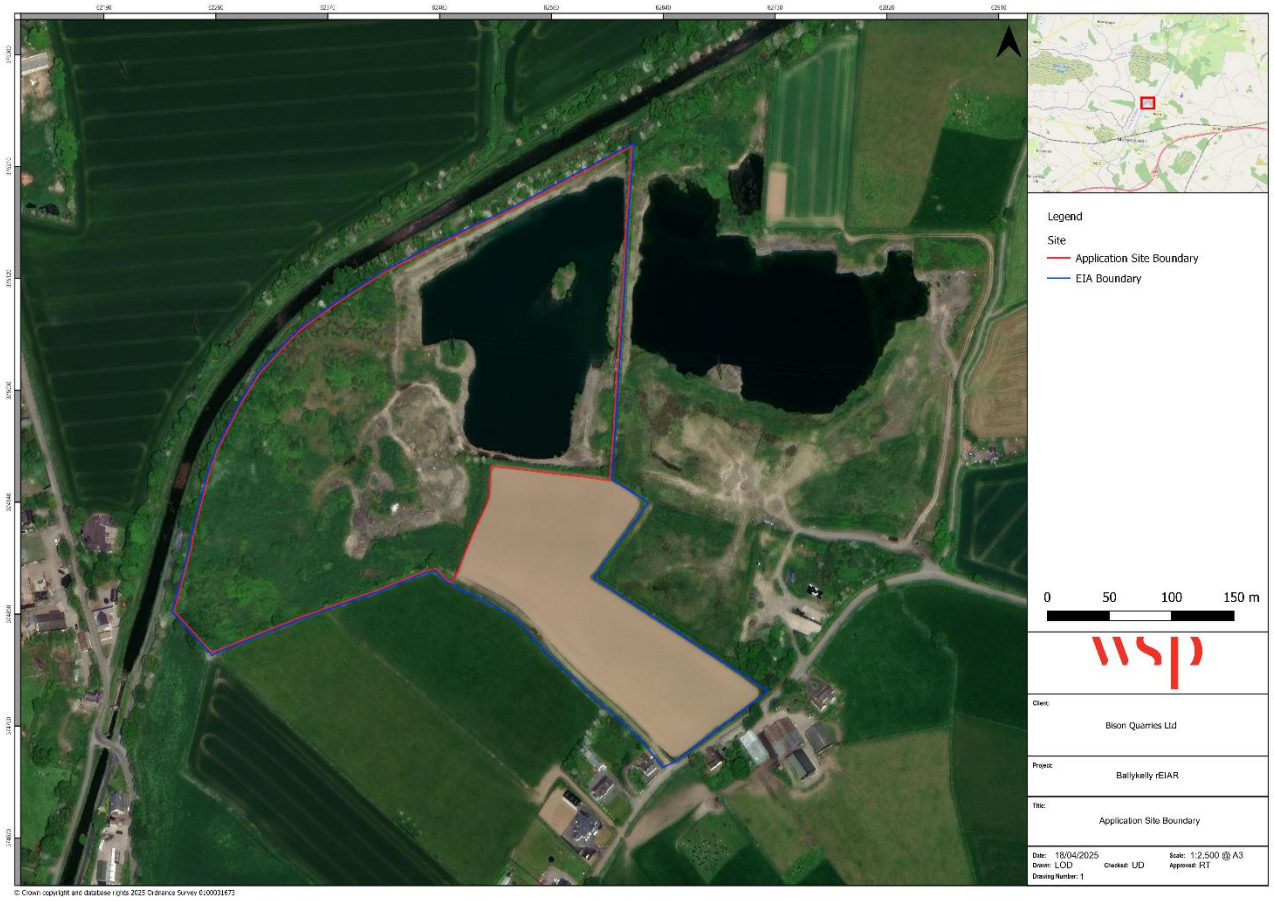

Figure 4-1 – Substitute Consent Application Site Boundary and EIA Boundary

4.1.2 Technical Scope

This report outlines the likely baseline ecological conditions (flora, fauna and habitat composition) of the Application Site prior to the Project, enabling a retrospective assessment of potential impacts and effects to be completed. Historical mapping, historical aerial imagery, anecdotal evidence, Kildare County Council planning records, information obtained from the client, Bison Quarries Ltd, as well as surveys within the Application Site to infer the conditions of the Application Site during the Assessment Period. Due to the inherent uncertainties related to a retrospective assessment, a conservative approach has been adopted to recognise potential impacts.

4.1.3 Overview of Application Site and Surrounding Area

The lands contiguous to the Application Site boundary can be largely characterised as rural in nature, with land use in the area being mixed agricultural and single-house residential. Low density, one-off ribbon type roadside housing and farmyards are situated in the vicinity of the Application Site. The Grand Canal and adjacent towpath are situated to the North and

West of the Application Site with thick hedgerows, treelines and areas of scrub bordering the Application Site. In the wider landscape, land uses have remained consistent during the Assessment Period.

4.1.4 Objectives

The objectives of this chapter are to:

- Describe the ecological baseline (and trends) prior to the Project;
- Describe the criteria used to evaluate IEFs potentially impacted by the Project;
- Describe the criteria used to assess the significance of effects arising from the impacts of the Project;
- Identify IEFs and describe the potential effects, including direct, indirect and cumulative effects on IEFs;
- Describe the mitigation measures proposed to address likely significant effects;
- Assess the residual effects remaining following the implementation of mitigation; and
- Identify opportunity for biodiversity enhancements where suitable.

4.2 Project Description Summary

The Project seeking substitute consent consists of extraction of sand, gravel and rock over an area of 7.87 ha through blasting, mechanical excavation and rock breaking along with aggregate processing and stockpiling. The Project was operational between the years 2000-2006.

A full project description is presented in Chapter 2 (Project Description).

4.3 Policy and Legislation Context

The ecological assessment described in this chapter complies with the following legislation and guidance:

4.3.1 Legislation

- EC Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora; hereafter referred to as the Habitats Directive;
- Wildlife Act, 1976 and Wildlife (Amendment) Act (2000) including all amendments. In this document, the legislation is referred to collectively as the Wildlife Acts (referred to in this report as WAs);
- EU Environmental Impact Assessment (EIA) Directive (2011/92/EU as amended by 2014/52/EU);
- EU Water Framework Directive (WFD) 2000/60/EC;
- Planning and Development Act, 2000 (as amended);

- EC Council Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds; hereafter referred to as the Birds Directive;
- S.I. No. 356/2015 - Flora (Protection) Order, 2022; and
- EC Regulations 2011 (S.I. No. 477/2011) as amended; hereafter referred to as the Birds and Habitats Regulations.

4.3.2 Relevant Policies and Plans

- The Kildare County Development Plan 1999;
- The Kildare County Development Plan 2005-2011 in particular Chapter 17 Heritage;

The key policies and objectives of these plans are listed in the Project Description (Chapter 2).

4.3.3 Relevant Guidance

- Chanin, P. (2003) Monitoring the Otter *Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No. 10, English Nature, Peterborough.
- CIEEM (2024) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.3. Chartered Institute of Ecology and Environmental Management, Winchester.
- Collins, J. (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4thEdition). Bat Conservation Trust, London.
- DAFM (2022). Nitrates Explanatory Handbook. Department of Agriculture, Food and the Marine.
- EPA (2022). Guidelines on the Information to be Contained in environmental Impact Assessment Reports.
- Fossitt, J. (2000) A Guide to Habitats in Ireland. Heritage Council.
- Gurnell, J., Lurz, P., McDonald, R. and Pepper, H. (2009). Practical Techniques for Surveying and Monitoring Squirrels. Forestry Commission.
- Marnell, F., Kelleher, C. & Mullen, E. (2022) Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.
- National Biodiversity Data Centre (n.d.). Irish Vegetation Classification – Division Synopses.
- National Roads Authority (NRA) (2006) Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes.
- NatureScot standing advice for planning consultations: Pine Marten.
- NatureScot standing advice for planning consultations: Red Squirrel.

- Notice Nature (n.d.). Guidelines for the Protection of Biodiversity within the Extractive Industry document 'Wildlife, Habitats & the Extractive Industry.
- NRA (2006) Guidelines for the treatment of badgers prior to the construction of national road schemes.
- NRA (2008) Guidelines for the treatment of otters prior to the construction of national road schemes.
- NRA (2009a) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes.
- NRA (2009b) Guidelines for Assessment of Ecological Impacts of national Road Schemes.
- NPWS (2019a) The Status of EU Protected Habitats and Species in Ireland. Habitat Conservation Assessments (Volume 2). Version 1.0. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- NPWS (2019b) The Status of EU Protected Habitats and Species in Ireland. Species Assessments (Volume 3). Version 1.0. Unpublished NPWS Report. Edited by Deirdre Lynn and Fionnuala O'Neill.
- NPWS (2024) Conservation Objectives and Site Synopsis of Special Areas of Conservation (SACs), Special Protected Areas (SPAs) and National Heritage Areas (NHAs). Available at: https://www.npws.ie/protected-sites
- OPR Practice Note PN01 (2021) Appropriate Assessment Screening for Development Management. Office of the Planning Regulator.
- Smith, G. F., O'Donoghue, P., O'Hara, K and Delaney, E. (2011). Best Practice and Guidance for Habitat Surveying and Mapping. Heritage Council.
- SNH (2016) Assessing Connectivity with SPAs. Version 3 – June 2016.

4.4 Assessment Methodology and Significance Criteria

The approach to this impact assessment comprises analysis of data within the Study Area' (desk study data) and within the 'Survey Area' (ecological field data) as well as environmental emissions monitoring data over the Assessment Period. The Study Area and Survey Area vary for each ecological receptor in accordance with receptor-specific best practice guidance and the Ecological Zone of Impact Influence (EZoI) likely to be associated with the Project. The EZoI can be defined as 'the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities' (CIEEM, 2024a).

Conclusions are drawn as to whether (and to what extent) conditions within the Application Site and relevant surrounding EZoI changed during the Assessment Period as a result of the Project, and whether these changes comprised significant effects on ecological receptors.

4.4.1 Desk Study

A desk study was undertaken in February 2025 to review existing ecological baseline information available in the public domain and to obtain relevant information held by third parties. This desk study supported the characterisation of the ecological condition of the Application Site and the relevant surrounding area during the Assessment Period.

The Study Area comprises the Application Site and the distances outlined in Table 4-1 below.

Table 4-1 – Overview of Desk Study

Data Type	Ecological Receptor	Source	Study Area
International and European Designated Sites	Ramsar Site	Irish Ramsar Wetlands Committee	10km[1]
	Special Area of Conservation (SAC) and candidate SAC (cSAC)	NPWS Designations Viewer	
	Special Protection Area (SPA) and potential SPA (pSPA)	NPWS Designations Viewer	
	Site of Community Importance (SCI)	Various including the EU, The Heritage Council and Local Authorities	
Statutory Designated Sites	Natural Heritage Areas (NHA)	NPWS Designations Viewer	2 km[1]
	proposed Natural Heritage Areas pNHAs	NPWS Designations Viewer	
	Nature Reserves	NPWS Protected Sites	
	Wildfowl Sanctury	NPWS Protected Sites	
Non-Statutory Sites	I-WeBS Sites	BirdWatch Ireland	2 km

[1] The Study Area is extended where hydrological connectivity may be present and/or where Functionally-Linked Habitat is considered present, such as the case for SPAs based on the upper foraging range of greylag geese (SNH, 2016).

Data Type	Ecological Receptor	Source	Study Area
	Margaritifera sensitive areas	NPWS data	
	Non-designated wetland sites	Map of Irish Wetlands	500 m
	Other Sites of Wildlife Interest (OSWI)	Various	500 m
Species	Legally protected and notable[2] species records including: ■ Terrestrial and aquatic fauna. ■ Rare higher plants. ■ Notable Bird Species[3]. ■ Fish.	NBDC Biodiversity map viewer[4], Article 17 2007 Data (Habitats Directive)[5], Article 12 2012 Data (Birds Directive)[6], Consultation with Inlands Fisheries Ireland	5 km
	Protected Bryophytes[7]	FPO Map Viewer – Bryophytes	5 km
	Protected Vascular Plants	FPO Map Viewer – Vascular Plants	5 km

2 Notable species are species considered rare or important/endemic in Ireland. Specifically, if they are categorised as Vulnerable, Endangered or Critically Endangered, Extinct in the Wild, or Extinct as per the International Union for the Conservation of Nature and Natural Resources (IUCN) Red Lists. Available at: https://www.npws.ie/publications/red-lists.

3 Notable bird species include those listed in Annex I of the Birds Directive, and those listed as either Red or Amber as per Birds of Conservation Concern in Ireland (BoCCI) 1 Newton *et al*. (1999) or BoCCI 4 by Gilbert *et al* (2021).

4 A custom polygon was drawn on the NBDC online mapping platform to define a 5km buffer from the site. This represents an estimate.

5 Data illustrates range and distribution on a 10km^2 grid across Ireland. The Application Site lies within the hectad N61. Article 17 data relating to habitats and species is therefore of a low resolution.

6 Data was collected prior to 2012, primarily between 2007 and 2011 by BirdWatch Ireland and other species-specific projects carried out by NPWS and others. Data was originally collected to inform the BirdAtlas 2007 to 2011. Due to the lack of available data within the Assessment Period, this data is acknowledged to be a close representation, and distribution is assumed to have been similar.

7 https://www.npws.ie/maps-and-data/flora-protection-order-map-viewer-bryophytes

Data Type	Ecological Receptor	Source	Study Area
Historic Granted Licences	Granted European Protected Species Licence (EPSL) for protected and notable species	Consultation with NPWS under European Communities (Access to Information on the Environment (AIE) Regulations	5 km
Habitats and Landscape Connectivity	Annex 1 Habitats (Habitats Directive)	Article 17 2007 data	5 km
	Bat Habitats, landscape features and commuting routes	Aerial Imagery, NBDC Biodiversity map viewer[8]	2 km
	Wetland	Map of Irish Wetlands	2 km

Hydrological connectivity between international and European designated sites and the Application Site as well as statutory and non-statutory designated sites and the Application Site is highlighted if an open watercourse exists within 50 m of the Site.

In addition to the sources noted above, the desk study made use of free online resources to assess the context of the land associated with the Project as well as to assess habitat suitability for species within the Study Area (accessed January 2024 – March 2025):

- Bing maps (https://www.bing.com/maps/);
- Google Earth;
- EPA maps (https://gis.epa.ie/EPAMaps/);
- Flood maps (https://floodinfo.ie);
- NBDC Biodiversity Maps (https://maps.biodiversityireland.ie/Map); and
- Review of any other relevant ecological reports and literature – cited as necessary.

[8] the relative importance of the wider landscape for bats was reviewed on NBDC under the Bat Landscape layer. This layer illustrates the outcomes of work by Lundy *et al*. (2011) examining the relative importance of landscape and habitat associations across Ireland for bats. This work was published in 2011 however, considers records between 2000 and 2009 and so, is of relevance to this desk study.

4.4.2 Field Survey

A range of ecological surveys were carried out throughout the Site between 2023 and 2024, as set out in Table 4-2 below. These surveys both informed the current conditions of the site and supported characterisation of the likely baseline condition prior to the start of the Project.

All results of ecological surveys carried out within the Application Site are presented in Section 4.5.

Table 4-2 – Overview of Ecological Field Surveys

Survey Type	Date	Surveyor[9]
Ecological Scoping survey	■ 30 May 2023.	■ Steven Tooher ACIEEM (Principal Ecologist) with 9 years of relevant experience.
Detailed Habitat and Botanical Survey, Invasive Species Survey and Non-Volant Mammal Survey	■ 09 May 2024.	■ Steven Tooher ACIEEM.
Amphibian Survey	■ Visit 1: 23 February 2024. ■ Visit 2: 08 March 2024.	■ Visit 1: Steven Tooher ACIEEM and Lisa O'Dowd ACIEEM (Consultant Ecologist) with 4 years of relevant experience. ■ Visit 2: Lisa O'Dowd ACIEEM and Lisa Cleary (Graduate Environmental Scientist) with 2 years of relevant experience.
Bat Daytime Walkover	■ 9 May 2024.	■ Mark Blacker ACIEEM (Principal Ecologist), with 9 years of relevant experience and Lisa O'Dowd ACIEEM.

[9] Job title and years of relevant experience are included at first mention of the surveyor only.

Survey Type	Date	Surveyor[9]
Bat Static Deployment[10]	■ Visit 1: 11 July 2024. ■ Visit 2: 25 July 2024. ■ Visit 3: 08 August 2024. ■ Visit 4: 22 August 2024. ■ Visit 5: 30 August 2024.	■ Visit I: Lisa O'Dowd ACIEEM. ■ Visit 2: Zak Bursey (Graduate Environmental Scientist), with 2 years of relevant experience. ■ Visit 3: Zak Bursey. ■ Visit 4: Zak Bursey. ■ Visit 5: Zak Bursey.
Breeding Bird Survey	■ Visit 1: 30 May 2023. ■ Visit 2: 27 June 2023. ■ Visit 3: 17 July 2023. ■ Visit 4: 27 July 2023.	■ Visit 1: Steven Tooher ACIEEM. ■ Visit 2: Iain Gilmore (Senior Ecologist), with 5 years of relevant experience. ■ Visit 3: Lisa O'Dowd ACIEEM. ■ Visit 4: Lisa O'Dowd ACIEEM.
Badger Camera Trapping	■ Visit 1: 11 July 2024. ■ Visit 2: 25 July 2024. ■ Visit 3: 26 August 2024. ■ Visit 4: 9 September 2024.	■ Visit 1: Lisa O'Dowd ACIEEM. ■ Visit 2: Zak Bursey. ■ Visit 3: Zak Bursey. ■ Visit 4: Zak Bursey.

For all visits, at least one surveyor present was 'capable'[11], as described within the CIEEM's competency framework (2024b) . Further descriptions of each survey are provided throughout this section. Additionally, all surveys included the entire area within the Application Site and relevant EZoI where specified. This area is hereafter referred to as the Survey Area.

10 The static bat detectors monitored continuously for 50 nights during the survey period. These dates present the dates which batteries were changed for the detectors and their security was reviewed.

11 A capable surveyor is one with the knowledge and experience essential to carry out standard relevant tasks unsupervised consistently well (CIEEM, 2024b).

Ecological Scoping Survey

An initial ecological scoping survey was carried out within the Survey Area on the 30 May 2023 following guidance from NRA (2009a). The purpose of the survey was to gain an appreciation of the Site, identify the requirement for targeted surveys and ascertain ecological opportunities and limitations.

Following the initial ecological scoping survey, several targeted surveys were undertaken. The requirement for these surveys was based on professional judgement and best practice guidance. Methodologies are described below.

Habitats

A habitat survey was carried out on 09 May 2024 to record habitats and flora within the Survey Area. Additionally, the survey classified habitat adjacent to the Application Site along the canal. The survey followed guidance by Smith *et al*. (2011) and Fossitt (2000), with a focus on collecting a detailed flora inventory, determining suitability for and evidence of protected species as well as the presence of any invasive species[12].

Species

Mammals

Bats

Site Suitability:

The Application Site and landscape features contained within the Application Site were assessed for suitability for bats for foraging, roosting and commuting. These surveys categorised the overall suitability of the Application Site for bats following Table 4-1 in the Bat Conservation Trust (BCT) (Collins, 2023) guidelines as summarised within Appendix 4A.

Daytime Bat Walkover:

A dedicated Daytime Bat Walkover (DBW) was undertaken by an experienced bat ecologist (Natural England Bat Level 1 Survey Class Licence and Associate member of CIEEM with nine years of relevant bat survey experience). The survey was undertaken to inspect an area (south quarry wall) identified during the initial walkover surveys as having moderate potential for roosting bats. The survey occurred on the 09 May 2024 in optimal weather conditions.

[12] Unless specified otherwise, the term 'invasive species' in this report refers to species listed in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477/2011) and subsequent amendments as well as those listed as High Impact invasive species by O'Flynn *et al.* (2014).

Static Detector Survey:

Potential roost features could not be closely inspected during the DBW and use of static detectors were considered as a suitable alternative to gather information on bat activity, as it was deemed not possible to safely conduct bat activity surveys within the Site (discussed further in Section 4.4.4). Two static detectors, Song Meter SM4 (Wildlife Acoustics, Maynard, MA, USA), were deployed at the south quarry face 14 m south of the waterbody with the quarry void where potential for roosting bats was identified. The detectors were secured approximately 20 m apart, to give full survey coverage of the rock wall. Both detectors were deployed on the 11 July 2024and surveyed continuously until the 29 August 2024 (50 consecutive survey nights). Locations of the bat detectors are illustrated below in Figure 4-2. Weather data was obtained from a weather station in Oakpark, Co. Carlow, situated 35 km southeast of the Site.

Figure 4-2 – Bat Static Detector Survey

The detectors surveyed continuously from a half hour before sunset to a half hour after sunrise. Site location using GPS coordinates were inputted into both detectors. The detectors automatically adjust sunset and sunrise times using the Solar Calculations Method from the GPS location provided. Details of the survey effort and weather conditions are summarised in Appendix 4A. Each detector was setup with four D-cell batteries and a

64 gigabyte (GB) Secure Digital (SD) memory card. Batteries were replaced, and SD cards changed every two weeks throughout the survey period. Recording settings used are detailed in Table 4-3.

Table 4-3 – Static Detector Settings

Recording Range	**30 minutes before sunset to 30 minutes after sunrise**
Trigger frequency range	16kHz to 250kHz
Minimum event	4 milliseconds
Max file length	15 seconds

Sound Analysis:

Sound files collected during the static detector surveys were analysed using specialist computer software (Wildlife Acoustics Kaleidoscope Pro 5.1.3). Each sound file represented an observation with a bat pass being defined as any call, or series of calls, separated by more than one second from another call or series of calls (Reason, Newson, & Jones, 2016). Bat passes are representative of overall bat activity levels rather than individual bats. The analysis of each of these sound files enables identification/confirmation of species or species group based on call parameters, and the relative activity of different species of bats by counting the minimum number of bats recorded within discrete sound files.

During the auto-identification process, an analysis parameter was applied to filter out files that only contained background noise and did not contain bat calls. The settings used during the filter process are detailed in Table 4-4. All files outside these parameters were labelled as noise during the auto-identification process. Ten percent of these were manually checked to ensure no bat activity was missed.

Table 4-4 – Kaleidoscope Pro 5.1.3 Auto Identification Parameters

Signal of Interest	
Kilohertz	8 - 120kHz
Milliseconds	2 – 500ms
Minimum number of pulses	2

All remaining sound files were classified to species level by the auto-identification system. Files were attributed with a species-specific identification or classified as ‘NoID’ where the call parameters could not be identified by the software.

Following the auto-identification process, all 'NoID' calls were manually checked to assign a species identification. Ten percent of Pipistrelle sp. calls were manually checked to verify the auto-identification, and 100% of species calls excluding Pipistrelle were manually checked and assigned to the closest match. If the percentage checks returned a greater than 10% error rate all sound files in that session were checked manually.

For manual identification, bat calls were identified to species level. However, species of the genus *Myotis* are grouped together because their call characteristics are similar in structure (Russ, 2012). Individuals were therefore collectively referenced by their genus rather than their species name. *Myotis* species encountered within the geographical region of the Survey Area comprise Daubenton's bat *Myotis daubentonii*, whiskered bat *Myotis mystacinus,* Brandt's bat *Myotis brandtii* and Natterer's bat *Myotis nattereri*. Additionally, *Pipistrellus* species often produce similar calls and as such, it was not always possible to identify a call to species level during analysis. These calls were classified to genus level and described as *Pipistrellus* species.

An abbreviation of the genus and species name of each bat was used to create the call Identification References (ID) used during analysis. Details of these call IDs are provided in Table 4-5. Individual species included under each genus are only those which have a known distribution in Ireland. Data was sorted following guidance from Collins (2023).

Table 4-5 – Call Identification References

Genus	Common name	Scientific name	Call ID
Pipistrellus	*Common pipistrelle*	*Pipistrellus pipistrellus*	PIPPIP
	Soprano pipistrelle	*Pipistrellus pygmaeus*	PIPPYG
	Nathusius' pipistrelle	*Pipistrellus nathusii*	PIPNAT
Nyctalus	*Leisler's bat*	*Nyctalus leisleri*	NYCLEI
Plecotus	*Brown long-eared bat*	*Plecotus auritus*	PLEAUR
Myotis	*Daubenton's bat*	*Myotis daubentonii*	MYOTIS
	Brant's bat	*Myotis brandtii*	
	Whiskered bat	*Myotis mystacinus*	
	Natterer's bat	*Myotis nattereri*	
Rhinolophus	*Lesser horseshoe bat*	*Rhinolophus hipposideros*	RHIHIP

Badger and Other Non-Volant Mammals

In addition to the dedicated bat surveys described above, a protected mammal walkover survey was undertaken on the 09 May 2024 within the Survey Area to search for evidence (such as, sett holes, latrines, dung pits, scat, mammal paths, prints and sightings of protected mammals including badger *Meles meles*, red squirrel *Sciurus vulgaris*, otter *Lutra lutra*, pine marten *Martes martes*, hedgehog *Erinaceus europaeus,* Irish hare *Lepus timidus hibernicus* and pygmy shrew *Sorex minutus*. The survey followed relevant guidelines as set out by NRA (2009a) for badgers, Chanin (2003) for otter and Olsen (2013) for all other species. Incidental observations of flora and fauna were also recorded during the survey.

Additional evidence of non-volant mammals were recorded during the amphibian survey, bat survey and breeding bird survey as described within Table 4-2.

Badger Camera Trapping

The mammal walkover survey identified a potential badger sett at Irish Grid Reference N 63448 13016. A trail camera (K&F Concept 48MP UHD) was secured to a wooden post in front of the badger set on the 11 of July 2024 detailed in Table 4-2. The camera was set up by an Ecologist experienced in setting up such cameras and was deployed for an initial two two-week periods, following guidance from Scottish badgers (Scottish Badgers, 2018). The camera was collected at the end of the two-week period to review footage, swap out batteries and replace the memory card. As no badger activity was identified within the footage, the camera was redeployed at the end of August for a further two-week period. The camera was then retrieved in early September as detailed in Table 4-2 with final footage reviewed.

Birds

Breeding Bird Survey

A breeding bird survey was carried out following an adapted version of the Common Birds Census (CBC) methodology by Gilbert *et al.* (1998).

Four survey visits were carried out between May and July 2023, as described in further detail within Appendix 4A in line with recommended guidance by Calladine *et al*. **(2009)**.

The surveys were conducted between at least an hour after dawn and 11 o'clock in the morning. Visits were scheduled to take place during good weather conditions (i.e. avoiding persistent rain or fog, excessive cold or heat and wind exceeding Beaufort force 4).

During each visit, the surveyor walked through the Survey Area recording all bird species observed. Due to the undulating and scrubby nature of the Site, transect lines were selected within the Site and surveyed sequentially. Birds observed visually or aurally up to 150 m either side of the transects were recorded. Each observation was plotted onto a digital field map (ESRI ArcGIS Field Maps application) using the standard British Trust for Ornithology (BTO) coding and symbology to record species and details of their behaviour, particularly where indicative of breeding, such as singing males, alarm calling or nest building birds.

Breeding Bird Territory Analysis

The objective of the breeding bird surveys was to identify the presence and locations of breeding territories held by species of conservation concern. Such species are referred to as 'target species' and were based on the following legislative or conservation lists:

- Listed on Annex I of the Birds Directive (Annex I); and
- Listed as 'Red' or 'Amber' on the Birds of Conservation Concern in Ireland (BoCCI) 4 2020-2026 by Gilbert *et al*. (2021).

Field observations were entered into desktop QGIS Geographical Information System (GIS) software. These were then analysed to identify the minimum number of probable or confirmed breeding territories for all bird species following the CBC methods described by Gilbert *et al*. (1998). This involves the identification of 'clusters' of observations of the same species displaying breeding characteristics (e.g. singing, alarm calling, nest building, mating) or food provisioning in the same general area over successive survey visits (probable breeding). Additionally, the discovery of an active nest (e.g. containing eggs or chicks) during a single visit (confirmed breeding). Given that the surveys comprised four visits over the breeding season, the minimum requirement for a 'cluster', a probable breeding territory, to be defined was at least two observations conforming to the above criteria recorded on separate survey visits conducted at least ten days apart.

Non-target species (i.e. Green-listed by Gilbert *et al*. (2021)) were identified as being 'present' within the Survey Area and territory analysis was not carried out on these species.

Herpetofauna

Amphibians

An amphibian survey was carried out by adapting methodologies presented in Meehan (2013a) and Reid *et al.* (2013b).

A total of two survey visits were carried out in line with timeframes proposed in Meehan **(2013a)** and Reid *et al.* **(2013b)**. Further details of the survey effort are summarised within Appendix 4A**.**

During each visit, two surveyors walked through the Survey Area recording all suitable habitats for breeding common frog *Rana temporaria* and smooth newt *Lissotriton vulgaris* such as small areas of pooled water and ponds as well as the presence of common frog spawn/tadpoles or smooth newt eggs. Suitability for breeding common frogs was based on shallow areas of pooled freshwater whereas suitability for smooth newt was based on the presence of aquatic vegetation in such pooled water bodies as described in Meehan (2013a) and Reid *et al.* (2013b). The total coverage of spawn in any one water feature was recorded as the maximum estimate recorded between the two visits.

Suitable waterbodies were measured using a digital field map (ESRI ArcGIS Field Maps application). The underside of aquatic leaves was inspected for the presence of smooth newt eggs. Incidental observations of adults were also recorded. Each positive observation was plotted onto a digital field map recording location with a description of the receptor.

Reptiles

Suitability was recorded during the ecological walkover and habitat survey. Reptiles were recorded incidentally throughout the programme of ecological surveys. No additional targeted surveys were carried out.

Fish

No targeted survey for fish and other aquatic fauna was carried out.

Terrestrial Invertebrates

Suitability was recorded during the ecological walkover and habitat survey. Notable invertebrates were recorded incidentally throughout the programme of ecological surveys. No targeted survey was carried out.

Flora

Notable flora was recorded during the ecological walkover survey as well as incidentally throughout the programme of ecological surveys. No additional targeted survey was carried out.

4.4.3 Assessment of Significant Effects (Methodology)

Overview

Assessment of the significance of effects on ecological receptors is based on the staged process outlined in the ecological impact assessment guidelines from CIEEM (2024a). The stages in the assessment are as follows:

- Identifying and characterising impacts and their effects;
- Incorporating measures to avoid and mitigate adverse impacts and effects;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects; and
- Identifying opportunities for ecological enhancement.

Baseline Evaluation Criteria of Ecological Features

Evaluation of the ecological features as identified by the baseline studies as IEFs have been guided by the NRA (2009b) and CIEEM (2024a) guidelines. In accordance with these guidelines, the importance of each IEF has been assessed in relation to the conservation status of the feature over a range of geographical scales as listed below in Table 4-6.

Table 4-6 – Approach for Establishing Important Ecological Features (IEFs)

Importance (Sensitivity)	Conservation Value	Criteria
High	International	■ Statutory sites designated under internation conventions such as World Heritage Sites, Biosphere Reserves, Wetlands of International Importance (Ramsar sites) ■ European Site including SACs, SPAs and Site of Community Importance (SCI) ■ Features essential to maintaining the coherence of the European Network[13]. ■ Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. ■ Resident or regularly occurring populations (assessed to be important at the international level)[14] of the following: ■ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or ■ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. ■ Ramsar Site (Convention on Wetland of International Importance Especially Waterfowl Habitat, 1971). ■ World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). ■ Biosphere Reserve (UNESCO Man & The Biosphere Programme).

13 See Article 3 and 10 of the Habitats Directive.

14 It is suggested that, in general, 1% of the international population of such species qualifies as internationally important. However, a smaller population may qualify as internationally important where the population forms a critical part of the wider population, or the species is at a critical phase of its life cycle.

Importance (Sensitivity)	Conservation Value	Criteria
		■ Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). ■ Biogenetic Reserve under the Council of Europe. ■ Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).[15]
High	National	■ Site designated or proposed as a Natural Heritage Area (NHA). ■ Statutory Nature Reserve. ■ Refuge for Fauna and Flora protected under the WAs. ■ National Park. ■ Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA). ■ Resident or regularly occurring populations (assessed to be important at the national level)[16] of the following: ■ Site containing 'viable areas'[17] of the habitat types listed in Annex I of the Habitats Directive.

15 Note that such waters are designated based on these waters' capabilities of supporting salmon, char and whitefish *Coregonus.*

16 It is suggested that, in general, 1% of the national population of such species qualifies as nationally important. However, a smaller population may qualify as internationally important where the population forms a critical part of the wider population or the species is at a critical phase of its life cycle.

17 A 'viable area' is defined as an area of habitat that, given the particular characteristic of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological process and function) would be maintained in the face of stochastic change (e.g. as a result of climate change)

Importance (Sensitivity)	Conservation Value	Criteria
		■ Species protected under the WAs; and/or ■ Species listed on the relevant Red Data list.
Medium	County	■ Area subject to a Tree Preservation Order as defined by the Planning and Development Act 2000. ■ Area of High Amenity[18], or equivalent, designated under the County Development Plan (CDP). ■ Resident or regularly occurring populations (assessed to be important at the County level)[19] of the following: ■ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; ■ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; ■ Species protected under the WAs; and/or ■ Species listed on the relevant Red Data list. ■ Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.

[18] It should be noted that whilst areas such as Areas of High Amenity and areas subject to a Tree Preservation Order are often designated on the basis of their ecological value, they may also be designated for other reasons such as their amenity or recreational value. Therefore, it should not be automatically assessed that such sites are of county importance from an ecological perspective.

[19] It is suggested that, in general, 1% of the County population of such species qualifies as a County important population. However, a smaller population may qualify as County important where the population forms a critical part of the wider population or the species is at a critical phase of its life cycle.

Importance (Sensitivity)	Conservation Value	Criteria
		■ County important populations of species, or viable areas of semi-natural habitats or ecological features identified in the National or Local BAP, if this has been prepared. ■ Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county. ■ Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Low	Local Importance (Higher Value)	■ Locally important populations of priority species or habitats or natural heritage features identified in the Local Biodiversity Action Plan (LBAP) if this has been prepared. ■ Resident or regularly occurring populations (assessed to be important at the Local level)[20] of the following: ■ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; ■ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; ■ Species protected under the WA; and/or ■ Species listed on the relevant Red Data list. ■ Sites containing semi-natural habitat types with the high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality.

[20] It is suggested that, in general, 1% of the Local population of such species qualifies as a locally important population. However, a smaller population may qualify as locally important where the population forms a critical part of the wider population or the species is at a critical phase of its life cycle.

Importance (Sensitivity)	Conservation Value	Criteria
		▪ Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining connectivity between features of higher ecological vale.
Site	Local Importance (Lower Value)	▪ Sites containing small areas of semi-natural habitat that are of local importance for wildlife. ▪ Sites or features containing non-native species that are of importance in maintaining habitat links. ▪ All other species that are widespread and common and which are not present in regionally or nationally important numbers considered to be of limited conservation value.

In accordance with NRA (2009a) guidelines, ecological sites of below 'Local Importance (higher value)' should not be selected as Important Ecological Features (IEFs) for which impact assessment is required during subsequent stages of the process. Impacts on these features would not be considered significant.

The criteria listed above are intended as a guide and are not definitive. Professional judgement is therefore importance when attributing a level of value to a species or individual. In these cases, reference has also been made to respective national and county populations and trends.

The EIA Regulations require consideration of the types of effects in terms of how they arise, whether they are beneficial or adverse and their duration. The nature of these effects is defined later in Table 4-9.

The potential effects are determined through understanding how each IEF is likely to be affected by the Project and include determining:

- The potential type of effect (as described in Table 4-7);
- The scale/magnitude of the predicted effect (as detailed in Table 4-8); and
- Cumulative effects that may affect the long-term integrity of the ecosystems at the site.

Guidelines (CIEEM, 2024a) defines a significant effect as one "that either supports or undermines biodiversity conservation objectives for IEFs or for biodiversity in general". Therefore, the assessment process does not require consideration of effects on ecological features deemed to be below a predefined nature conservation importance threshold. As mentioned earlier in this section, IEFs of below 'Local Importance (higher value)' are excluded from further assessment.

Table 4-7 – Types of Effects

Effect	Description
Direct	Effects which arose immediately as part of the Project
Indirect	Effects which were not caused immediately by the Project but arose because of it (e.g., habitat change which may not directly affect a top-level predator, but which causes a reduction in the presence of their prey species).
Secondary	Additional effects resulting because of one or more direct effects (e.g. the combined effects of habitat loss and displacement).
Temporary	Effects which caused a change to the baseline for a limited period.
Permanent	Effects which caused an irreversible change to the baseline.

Effect	Description
Cumulative	Effects which arose from multiple types of effect on a particular receptor. These may overlap spatially or temporally.
Beneficial	Effects which had a beneficial influence on the environment.
Short term	Effects with a duration of 0-5 years
Medium term	Effects with a duration of 5-15 years
Long term	Effects with a duration of more than 15 years
Adverse	Effects which had adverse influence on the environment.

The level of potential effect on each IEF was determined by considering the type (Table 4-7) and magnitude of effect (Table 4-8) in relation to the conservation importance (sensitivity) of the IEF, as described later within this chapter in Table 4-26. Sensitivity is reported on a scale of high, medium, low, and negligible, and magnitude of change on a scale of large, medium, small, and negligible.

Table 4-8 – Criteria for Describing the Scale of Magnitude

Magnitude	Criteria and resultant effect
Large	The change permanently (or over the long-term) affects the conservation status of a habitat/species, reducing or increasing the ability to sustain the habitat or the population level of the species within a given geographic area. Relative to the wider habitat resource/species population, a large area of habitat or large proportion of the wider species population is affected. For designated sites, integrity is compromised. There may be a change in the level of importance of the ecological feature in the context of the Project.
Medium	The change permanently (or over the long term) affects the conservation status of a habitat/species reducing or increasing the ability to sustain the habitat or the population level of the species within a given geographic area. Relative to the wider habitat resource/species population, a small-medium area of habitat or small-medium proportion of the wider species population is affected. There may be a change in the level of importance of this ecological feature in the context of the Project.

Magnitude	Criteria and resultant effect
Small	The quality or extent of designated sites or habitats or the sizes of species' populations, experience some small-scale reduction or increase. These changes are likely to be within the range of natural variability and they are not expected to result in any permanent change in the conservation status of the species/habitat or integrity of the designated site. The change is unlikely to modify the evaluation of the ecological feature in terms of its importance.
Very Small	Although there may be some effects on individuals or parts of a habitat area or designated site, the quality or extent of sites and habitats, or the size of species populations, means that they would experience little or no change. Any changes are also likely to be within the range of natural variability and there would be no short-term or long-term change to conservation status of habitats/species ecological features or the integrity of designated sites.
Negligible	A change, the level of which is so low, that it is not discernible on designated sites or habitats or the size of species' populations, or changes that balance each other out over the lifespan of a project and result in a neutral position.

Table 4-9 – Assessment Matrix

Magnitude of change	Sensitivity (or value/importance)				
		High	**Medium**	**Low**	**Negligible**
	Large	Major	Moderate - Major	Minor – Moderate	Negligible
	Medium	Moderate - Major	Moderate	Minor	Negligible
	Small	Minor - Moderate	Minor	Negligible - Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Explanations of the level of significance are provided below in Table 4-10.

Table 4-10 – Explanations of the Levels of Significance

Magnitude	Description
Major	Only adverse effects are assigned this level of importance as they represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites and features of international, national or county importance that are likely to suffer a most damaging effect and loss of resource integrity. A major change at a county scale site or feature may also enter this category.
Moderate	These beneficial or adverse effects while important at a local scale are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may influence decision making if they lead to an increase in the overall adverse effects on a particular area or on a particular resource.
Minor	These beneficial or adverse effects may be raised as local factors but are unlikely to be of critical importance in the decision-making process.
Negligible	No effect or an effect which is beneath the level of perception, within normal bounds of variation or within the margin of forecasting error. Such effects are not normally considered by the decision maker.

The level of significance generated from Table 4-9 was then assessed against the likelihood of such predictions occurring, and the confidence level of the effect on a population, based on professional judgement and evidence from the existing literature. A scale of confidence, as recommended by IPCC (2010) can then be used (Table 4-11).

Table 4-11 – Scale of confidence and likelihood

Likelihood	Virtually certain	Very likely	Likely	About as likely as not	Unlikely	Very unlikely	Exceptionally unlikely
Probability (of occurrence)	>99 %	>90 %	>66 %	33-66 %	<33 %	<10 %	<1 %

Where the assessment criteria arrive at an effect of variable levels (e.g. Major or Moderate, see Table 4-9), then the outcome is defined either by taking a precautionary, worst case scenario approach or where possible by applying professional judgement taking into consideration specialist knowledge of the receptor in question and confidence in the prediction.

Based on the EIA Regulations, those effects defined as being of 'Moderate' or greater are considered to have the potential to result in a significant effect, defined against the relevant geographical scale (Table 4-6) and duration. In the case of 'Moderate' effects, further evidence needs to be provided to show that an identified effect is likely to be 'tolerable' if it is, then a significant effect will not result.

The issue of what is a 'tolerable' level of effect has not been specifically defined here, although it is generally accepted that populations or habitats usually have a threshold for absorbing deterioration and a certain capacity for self-regeneration. Therefore, to be tolerable (and thus avoiding a significant effect), it should be demonstrated that the magnitude of any losses is within the regenerative capacity of the reference population or habitat to be absorbed and result in the population or habitat extent remaining viable over the long-term.

Results that are 'Minor' or 'Negligible' are not considered to be significant effects (in terms of the EIA Regulations) arising from the Project.

4.4.4 Assumptions and Limitations

Every effort has been made to provide comprehensive descriptions of the baseline conditions however, the following assumptions and limitations apply:

Extraction Timeline, Process, Plant and Equipment

As described in Chapter 2 (Project Description), there is limited publicly available information on the extraction activities carried out by the Project. Assumptions have been made regarding the operational timeline for extraction and extraction processes as well as the volume and type of mobile plants and vehicles used for extraction, stockpiling and processing activities. A conservative approach has been followed, with estimations on the basis of comparison with other similar projects from the same period.

The following plant are estimated to have been involved:

- 1x Loader;
- 2x Haulers (18T);
- 1x Crusher; and
- 1x Screen.

It has been estimated that there were approximately 60 truck movements and 6 car movements per day over the Assessment Period on the Application Site. Additionally, dry processing onsite has been assumed. Other operations which have been predicted are outline in Chapter 2 (Project Description).

Furthermore, it can be assumed that all equipment was maintained, preventing any spills, leaks or other associated pollution events.

These assumptions have informed our ecological assessment and conclusion of likely impacts and effects.

The rationale for these assumptions is set out in Chapter 2 (Project Description), and where relevant, within this chapter.

Desk Study

NBDC Data

Data held by the NBDC are often collected on a voluntary basis and therefore, the expertise and experience of the recorder, and the validity of records cannot be confirmed. Records are often accumulated in a piecemeal fashion with systematic surveys for specific species generally undertaken infrequently, if at all. The absence of records does not demonstrate the absence of a species; rather it may indicate a gap in recording coverage.

Article 17 and Article 12 Data

Article 17 and Article 12 data derived during the desk study was reported in 2012 and 2007 respectively.

The Article 17 data was published in 2007 and so, is assumed to have been collected during the Assessment Period. Desk data is not exhaustive and is only indicative of ecological receptors.

The majority of the Article 12 data was collected by BirdWatch Ireland and NPWS between 2007 and 2011. Data was originally collected to inform the BirdAtlas 2007 to 2011. Due to the lack of available data within the Assessment Period, this data is acknowledged to be a close representation, and distribution is assumed to have been similar within the Assessment Period.

This minor assumption facilitates a robust ecological assessment.

Field Survey

Bat Survey

Desk Study

The data which informed the habitat suitability assessment by Lundy *et al.* (2011) was collected between 2000 and 2009. However, this suitability ranking corresponds to the desk-based ranking which was given following review of aerial footage. It is therefore acknowledged that despite this study using data collected after the Assessment Period, the rankings are reflective of baseline conditions.

Field Survey

If potential roost features are identified during a DBW and if the feature will be impacted by the Project, it is recommended that roost inspection surveys/ presence/absence surveys or activity surveys are carried out (Collins, 2023). However, health and safety concerns, including unstable rock, prevented these surveys from being carried out. Static detector surveys were therefore carried out to characterise the bat populations which may be using the feature. This approach resulted in a large dataset that was sufficient to describe the

population of bats within the vicinity of the detectors during the main period of significant bat activity i.e. the maternity season.

Due to a perceived risk of vandalism on site, the detectors were secured directly to the base of the wall using pre-drilled anchor points. The optimal placement of the microphone is in the middle of the bat flyway (Wildlife Acoustics, 2019) however, the area in front of the wall was relatively uncluttered, and there were no obstacles to deter sound or force bats away from the detectors. Due to the difficulties in calculating the optimum distance between static detectors (Metcalf, et al., 2022), bat activity levels rather than bat population are estimated to avoid considering data replications. It is considered that the activity recorded is an accurate reflection of the bat activity present within this area of the site.

In addition, there is no observational context for the data collected with bat passes possibly representing multiple bats passing or an individual bat passing multiple times. Furthermore, behavioural data has not been collected or analysed.

Due to technical issues, detector 2 did not record for the final 2 weeks. However, detector 1 functioned adequately for the full duration, such that sufficient survey data was made available for a robust assessment.

Some species such as brown long-eared bat often emit low-amplitude and FM echolocation calls and foraging bats often make no sound, using eyes or ears to hunt by gleaning (Swift & Racey, 2002). Therefore, these individuals can be missed during recording periods. Professional judgement and interpretation of surrounding habitat and suitability for different species groups was used to determine likely species present within the Site.

Breeding Bird Survey

The breeding bird survey represents an adapted version of the CBC methodology with fewer survey visits undertaken. Four survey visits were considered sufficient to provide an estimate of breeding territories to enable an assessment of effects of the Project to be carried out. The number and location of breeding territories is an estimate based on the criteria outlined above.

The surveyors were unable to survey the island within the quarry void for breeding birds. Large stationary birds and the movement of smaller birds on the island were identified using binoculars. However, surveyors were unable to hear any calls/song from the island due to the location within the quarry void space. This may have resulted in breeding territories on the island being overlooked and not recorded.

The series of surveys commenced later than guidelines recommend (in May rather than March). It is nonetheless considered that the survey results are sufficiently robust to provide an accurate representation of breeding bird assemblages at the Site. It is also noted that all surveys occurred within the nesting season for birds defined by the WA (March-August inclusive).

Amphibian Survey

In the absence of clear Irish survey guidelines, methodologies followed by the national smooth newt survey by Meehan (2013a) and the national frog survey by Reid *et al*. (2013b) were adapted. Details of these adaptions are provided below:

- Smooth newt: Following an initial site suitability survey, a habitat assessment and a visual daytime search for individuals and eggs were carried out over two visits. The first visit occurred at the end of February rather than in the recommended period of March or April. The minor difference in timings here is not thought to affect results. Due to health and safety concerns, surveyors were not able to access the site in hours of darkness and so, torching techniques were not applied. As torching presents the most successful method of newt surveying after trapping, the limitations within the methodology followed by the surveyors have been recognised. As such, all water features within the Application Site with suitability for smooth newt, as described in Table 1 by Meehan (2013a), are assumed to hold populations of smooth newt.
- Common Frog: The entire site was surveyed for common frogs, rather than only a sample area, with all water features including permanent and temporary water features being mapped. The national frog survey included three visits within 14 days to water features within their survey area, however, only two visits within the same period were deemed necessary to capture adequate data for the Application Site. This reduced number of visits was decided based on the small scale and spatial proximity of all water features within the Application Site. No statistical analysis was carried out on the results of the common frog survey based on the final purpose of the data. The adaptions outlined above are not considered to negatively impact the robustness of the impact assessment.

Results of these surveys influenced the design of the restoration plan (Chapter 2 / Appendix 2A) for the Application Site.

Validity

The baseline conditions were estimated by interpreting desk and field data. Ecological field data is typically valid for a period of 18 months unless otherwise specified (CIEEM, 2019). However, in the context of this retrospective assessment, the field data presented in this chapter is used to estimate the historic baseline. Therefore, it is considered that the findings of the field data remain valid for the purpose of this assessment.

4.4.5 Mitigation, Compensation and Enhancement Measures

The approach to mitigation is as set out in the mitigation hierarchy (CIEEM, 2024a) and is outlined below in Table 4-12. The principle underlying the mitigation hierarchy is that avoidance is favoured over mitigation, and mitigation is favoured above compensation, which should be viewed as a last resort. Measures for the implementation of Biodiversity Enhancement (BE) should be included regardless of whether avoidance, mitigation or compensation is necessary.

Table 4-12 – Mitigation Hierarchy

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

BE – Relevant Policy

Kildare County Development Plan 1999-2005 and Kildare County Development Plan 2005-2011 are the relevant CDPs covering the assessment period. There is no minimum mention of biodiversity, with no specific objective for BE or biodiversity net gain within these plans. The 2005-2011 CDP includes 17.1.3 where the following principles are included:

- "To avoid unnecessary harm to heritage."
- "To mitigate the effects of harm where it can be avoided."
- "To promote appropriate enhancement as an integral part of any development."

4.5 Baseline Ecological Conditions (2000-2006)

4.5.1 Designated Sites

Designated and Notable Conservation Sites

Two sites of nature conservation interest were identified within the Study Area (Table 4-1).

These sites include the Grand Canal pNHA adjacent to the Application Site and the River Barrow and River Nore SAC 1.6 km southwest. Potential hydrological connectivity exists between the River Barrow and River Nore SAC and the adjacent Grand Canal for the following species listed as SAC Qualifying Interest features (QIs)[21]:

[21] Desmoulin's whorl snail *Vertigo moulinsiana* is also listed as a QI. However, this species disperses vertically by transportation in the water column, travelling vertically on a plant rather than horizontally over terrestrial habitats (Killeen, 2003). Considering their inability to disperse

- White clawed crayfish *Austropotamobius pallipes*;
- Freshwater pearl mussel *Margaritifera margaritifera;*
- Nore freshwater pearl mussel *Margartififera durrovensis*;
- Sea lamprey *Petromyzon marinus;*
- Brook lamprey *Lampetra planeri*;
- River lamprey *Lampetra fluviatilis*;
- Twaite shade *Alosa fallax fallax*;
- Salmon *Salmo salar*; and
- Otter *Lutra lutra.*

Descriptions of both of these sites are presented in Table 4-13 and their locations in relation to the Application Site are shown in Figure 4-3.

It should be noted that pNHAs do not have lists of QIs in the same sense as European sites. Instead, they have been selected for the presence of a variety of habitats and/or species assemblages, which have been determined to be of ecological significance in a regional and/or national context. However, these habitats and/or species are referred to as QIs throughout. Site synopsis for pNHAs is provided by the NPWS, and the main/relevant points from these are reproduced in the table overleaf (Table 4-13).

A remedial Appropriate Assessment Screening Report (rAAS) accompanies this substitute consent application.

horizontally in an independent manner, there is no opportunity for the designated Desmoulin's whorl snail to be functionally connected to the Application Site.

Table 4-13 – Designated and Notable Sites Identified within the Study Area

Designated Site Name and Code	Approximate Distance/Direction from the Project	Qualifying Interests and Conservation Objectives [Habitats/Birds Directive Code] (NHAs/pNHAs) - Site Synopsis Summary
River Barrow and River Nore SAC [002162]	1.6 km southwest (direct) 25.6 km southwest (fluvial)	Designated for: ■ Estuaries [1130]. ■ Mudflats and sandflats not covered by seawater at low tide [1140]. ■ Reefs [1170]. ■ Salicornia and other annuals colonising mud and sand [1310]. ■ Atlantic salt meadows Glauco-Puccinellietalia maritimae [1330]. ■ Mediterranean salt meadows *Juncetalia maritimi* [1410]. ■ Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]. ■ European dry heaths [4030]. ■ Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]. ■ Petrifying springs with tufa formation (*Cratoneurion*) [7220]. ■ Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]. ■ Alluvial forests with *Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)* [91E0]. ■ Desmoulin's Whorl Snail [1016]. ■ Freshwater Pearl Mussel [1029][22]. ■ Nore freshwater pearl mussel [1990]. ■ White-clawed Crayfish [1092]. ■ Sea Lamprey [1095]. ■ Brook Lamprey [1096]. ■ River Lamprey [1099]. ■ Twaite Shad [1103].

[22] The Nore freshwater pearl mussel is included within the COs of the River Barrow and River Nore SAC however, it is omitted within the Site Synopsis. The species has been included to follow a precautionary approach.

Designated Site Name and Code	Approximate Distance/Direction from the Project	Qualifying Interests and Conservation Objectives [Habitats/Birds Directive Code] (NHAs/pNHAs) - Site Synopsis Summary
		■ Salmon[1106]. ■ Otter [1355]. ■ Killarney Fern *Trichomanes speciosum* [1421]. ■ The Conservation Objectives: To restore and maintain the favourable conservation condition of the habitats and species listed above.
Grand Canal pNHA [002103]	Adjacent to the west of the Application Site	■ Diversity of species and habitats including hedgerow, tall herbs, calcareous grassland, reed fringe, open water, scrub and woodland as well as flora including arrowhead *Sagittaria sagittifolia*, watercress *Nasturitum officinale*, hemlock water-droplet *Oenanthe crocata*, opposite-leaved pondweed Groenlandia densa (Flora Protection Order 1987). ■ Otter and smooth newt. ■ 'The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species. It crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods.' (NPWS, 1995). *There are no Conservation Objectives (COs) for pNHAs.*

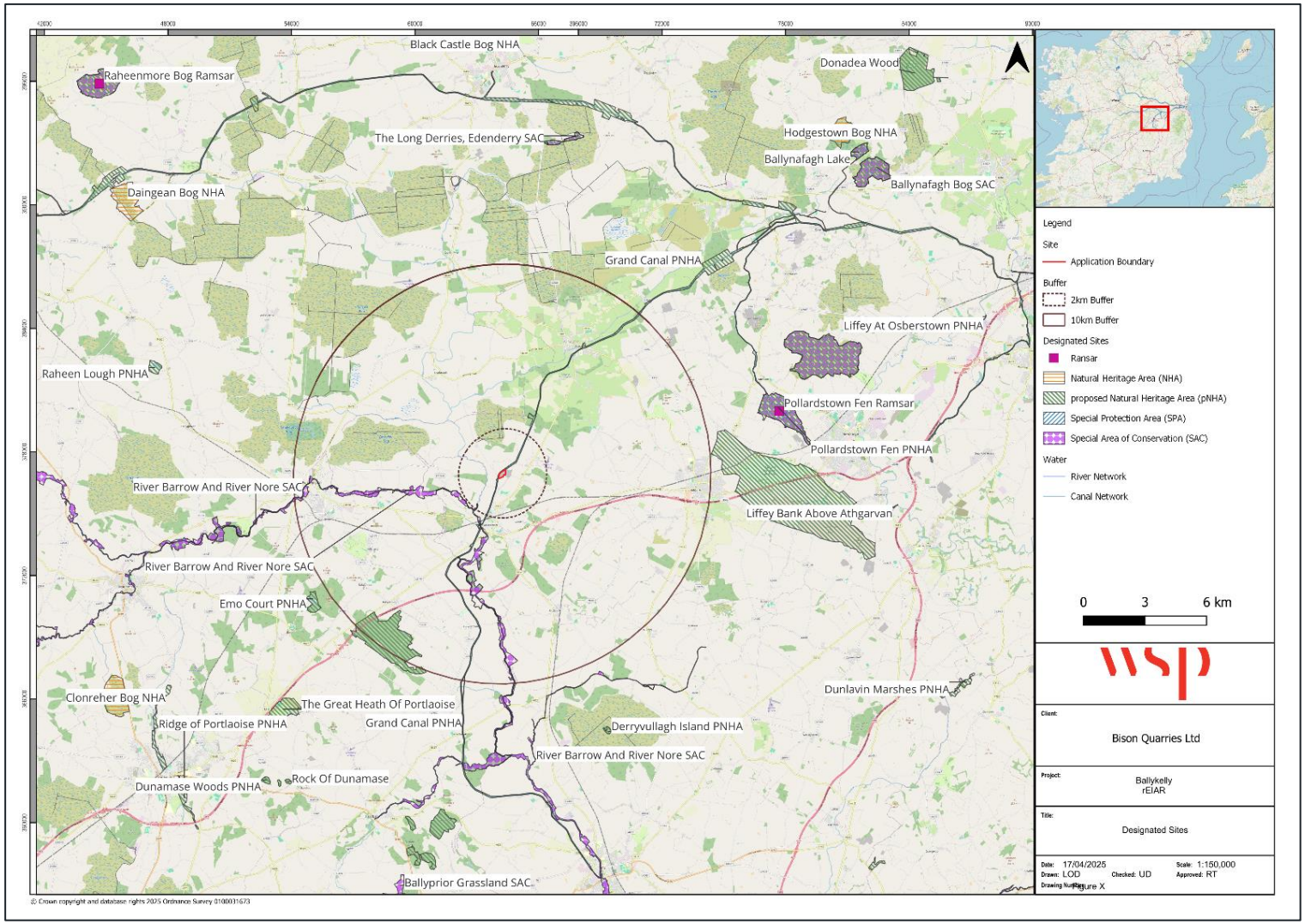

Figure 4-3 – Designated Sites Within the EZoI

4.5.2 Habitats Baseline

Annex I Habitats

Twelve areas of Annex 1 habitat were identified within N61 (NPWS, 2008a). Details of these habitats are provided below in Table 4-14.

Table 4-14 – Annex 1 Habitats Within N61 (as Reported in 2007)

Habitat [Habitats Directive Code]	Current Distribution	Current Range[23]	Favourable Reference Range[24]
Hard Water Lakes [3140]	-	✓	✓
Dystrophic Lakes [3160]	✓	✓	✓
Floating River Vegetation [3260]	✓	✓	✓
Dry Heath [4030]	✓	✓	✓
Orchid-Rich Grassland/Calcareous Grassland [6210]	✓	✓	✓
Molinia Meadows [6410]	✓	✓	✓
Lowland Hay Meadow [6510]	✓	✓	Not reported
Degraded Raised Bogs [7120]	✓	✓	✓
Transition Mires [7140]	-	✓	✓
Rhynchosporion Depressions [7150]	✓	✓	✓
Cladium Fens [7210]	-	✓	✓

[23] 'The map presented (In the Article 17 Reporting) with each habitat or species gives the known or best estimate of distribution, shown as hatched squares. The range is defined by the smallest polygon size containing all of these grid squares. Horizontal or vertical gaps in the habitat distribution of three or more grid squares or oblique gaps of two or more squares were deemed enough as to justify a break in the range. When the ecological conditions for the development of the habitat were deemed unsuitable, gaps of just one grid square may also have been admitted.' (NPWS, 2008a).

[24] 'Favourable Reference Range is the geographic range within which all significant ecological variations of the species are included and which is sufficiently large to allow the long-term survival of the species'. (NPWS, 2008a).

Habitat [Habitats Directive Code]	Current Distribution	Current Range[23]	Favourable Reference Range[24]
Alkaline Fens [7230]	-	✓	✓

Wetland Habitats

Review of the Map of Irish Wetlands (MIP) identified the Application Site to be situated within the Coolsickin or Quinsborough [MIW_KE170] wetland. The main wetland feature is an artificial pond which corresponds to the collected waters present within the quarry void space that formed following cessation of the Project. The wetland description states that no marginal wetland vegetation was recorded and that there is no other wetland feature of interest. The wetland received a D Rating indicating and is of local conservation value (moderate value). No other wetlands were identified within the Study Area.

Habitats within the Application Site Pre- Assessment Period

Aerial imagery between 1996 and 2000 was used to infer baseline habitats within the Application Site prior to the Project. Imagery showed the Application Site dominated by arable land prior to the commencement of the Project. These baseline habitats are further described in Table 4-15 and illustrated in Figure 4-4.

Table 4-15 – Baseline habitats identified by aerial imagery

Fossitt Habitat Classification	Fossitt Habitat Code	Area / Length (approximate)	Description
Arable crops	BC1	7.58 ha	Agricultural land that was cultivated and managed for the production of arable crops dominated lands within the Application Site.
Tilled land	BC3	0.30 ha	A small sliver of tilled land is present to the southeast of the Application Site where aerial imagery indicates the land was prepared for planting, but future use and the type of crop is unclear.
Hedgerows	WL1	1353 m	A mature hedgerow separated the Application from the adjacent Grand Canal to the north and west. A thin, highly managed hedgerow enclosed the Application Site, separating it from neighbouring land. In addition, a highly managed hedgerow extended westwards separating two arable fields.

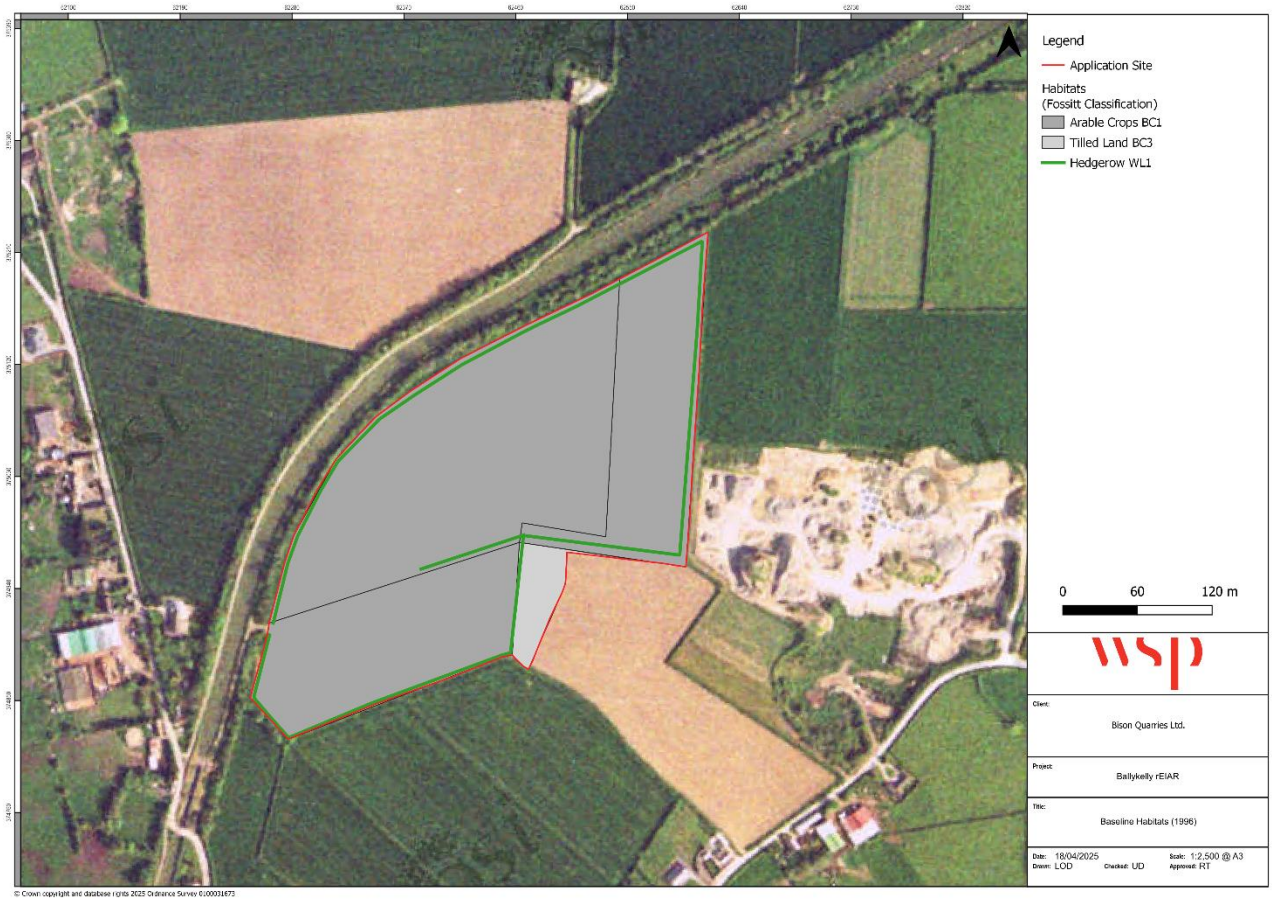

Figure 4-4 – Baseline habitats (1996)

Habitats within the Application Site End of Assessment Period

Aerial imagery was reviewed to estimate the habitats present at the end of the Project. Due to an absence of aerial imagery in 2006, imagery from 2009 was used to infer likely conditions and is described in Table 4-16 below. These estimated habitats are illustrated in Figure 4-5.

Table 4-16 – Habitats at the end of the Assessment Period (2006)

Fossitt Habitat Classification	Fossitt Habitat Code	Area / Distance (approximate)	Description
Active quarries and mines	ED4	6.47 ha	It is very likely that the quarry and its associated works expanded to include the majority of the Application Site. Levels of ground disturbance were likely to be high and as such, colonisation of flora and fauna is likely only following the end of the Assessment period. This

Fossitt Habitat Classification	Fossitt Habitat Code	Area / Distance (approximate)	Description
			habitat includes areas which are estimated to have been used for temporary stockpiling.
Recolonising bare ground	ED3	1.41 ha	This habitat includes areas within the Application Site which likely were used for stockpiling and / or served alternative purposes. Aerial imagery indicates that recolonisation happened relatively quickly in this area and so, it is predicted that disturbance was a minimum. Flora likely included typical ruderal species. This habitat is important for local invertebrate and fauna populations, likely supporting diverse flora.
Hedgerow	WL1	1152 m	A hedgerow enclosed most of the Application Site at the end of the Assessment Period, but the following loss had occurred when compared to the baseline: ■ 19 m to create an access entrance for the Site to the east of the Application Site (Point A, Figure 4-5) ■ 86 m of hedgerow which originally had extended east / west to separate the agricultural fields (Point B, Figure 4-5) ■ 96 m of hedgerow which had originally extended north / south and separated agricultural fields (Point C, Figure 4-5)

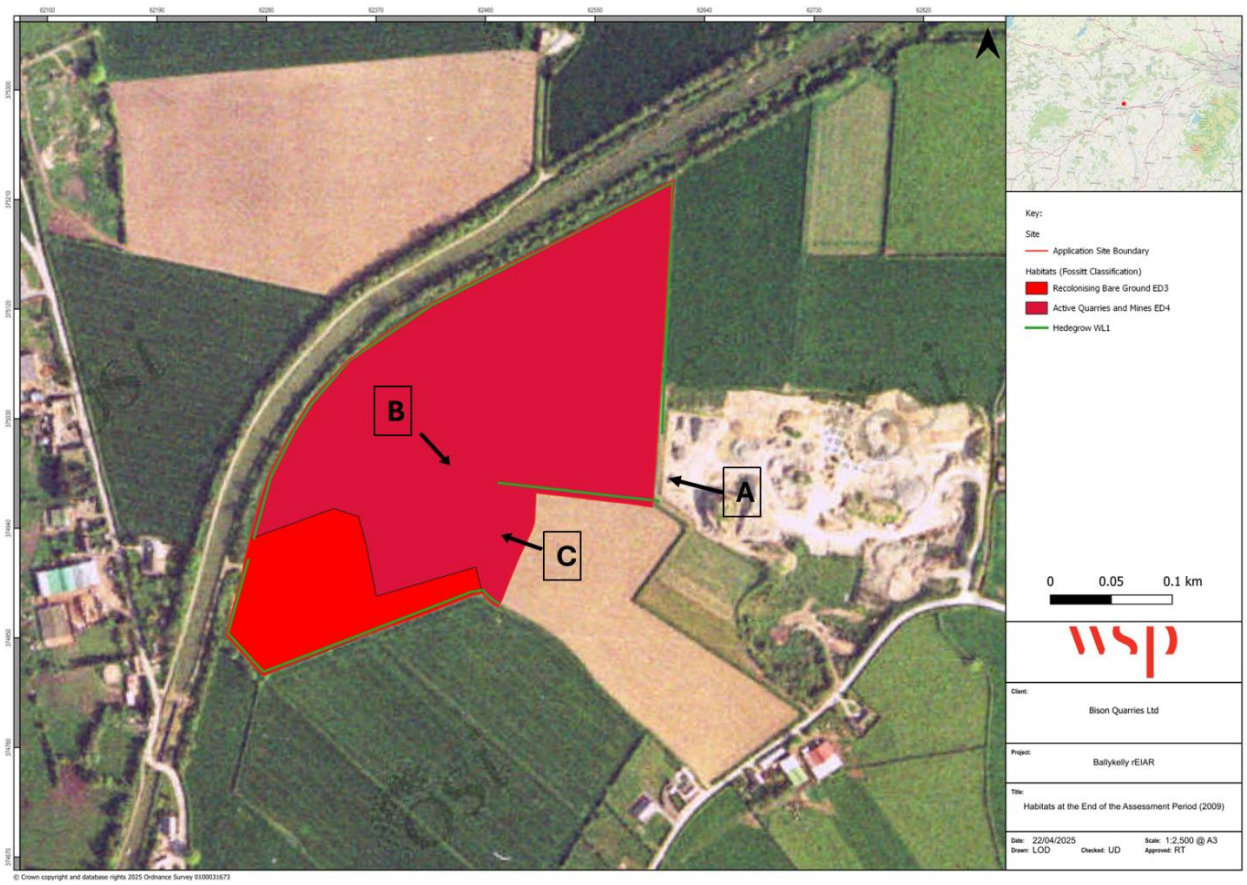

Figure 4-5 – Habitats Post Project (2009)

Current Habitat Baseline (2024)

The conditions onsite circa 2024 are not representative of the existing condition onsite circa 2006, at the time of Project closure. They are presented herein as they inform the proposed rehabilitation plan presented in Chapter 2 (Appendix 2A).

The habitat survey identified a dominant artificial waterbody and a mosaic of several distinct habitats such as dry calcareous neutral grassland, scrub, wet grassland and hedgerows. In addition, large areas of soil and bare ground, recolonising bare ground as well as calcareous scree and loose rock were recorded. A full description of the habitats recorded during the habitat survey are provided in the table below in Table 4-17 and illustrated in Figure 4-6.

Table 4-17 – Habitats recorded within the Application Site (2024)

Fossitt Habitat Code and Name	Description and Species	Photo
BL1 Arable Crops	Located east of an agricultural access track leading to the southwest corner of the Application Site. Per Fossitt (2000), BC1 is “agricultural land that is cultivated and managed for the production of arable crops”. In this case, the field was sown with a monoculture of maize[25].	
BL2 Earth Banks	Located east of the canal towpath, between the canal and the Application Site. A treeline (WL2) sits on top. This habitat was recorded within a habitat mosaic with dry meadows and grassy verges (GS2).	

[25] Identified through Google Streetview (2021).

Fossitt Habitat Code and Name	Description and Species	Photo
ED2 Soil and bare ground	Located along internal vehicle tracks, as well as within patchy mosaics with recolonising bare ground (ED3) and scrub (WS1) throughout the Application Site. This habitat is characterised by the absence of flora, likely as a result of ongoing soil disturbance.	
ED3 Recolonising bare ground Mosaic	ED3 is the first stage in ecological succession after bare ground (ED2) and is characterised by the patchy presence of herbaceous ruderal flora. It is a transitional habitat, whereby the next stage is grassland (in this case GS1 or GS2). 34 species were recorded in ED3, including several grasses and a range of other herbaceous species. The transitional nature of this habitat means that it is inherently inclined to form patchy mosaics with other habitats. It is quite common within the existing quarry footprint, notably along vehicle tracks, along the eastern wall of the main quarry void, and in the central area where works appear to have been most recent. This habitat was recorded alone and within habitat mosaics with scrub (WS1) and soil and bare ground (ED2).	

Fossitt Habitat Code and Name	Description and Species	Photo
ER2 Exposed Calcareous Rock	Per Fossitt (2000), ER2 is applied to “all natural and artificial exposures of calcareous bedrock and loose rock, and any other exposures of basic rock, with the exception of unstable scree and areas of rocky coastline”. Examples included exposed bedrock at the southern and western edges of the quarry void space. A small number of species were recorded in crevices. These comprised *Hart’s-tongue fern Asplenium scolopendrium*, dandelion *Taraxacum* sp. and three species of moss – *Amphidium mougeotii, Brachythecium rutabulum and Trichostomum brachydontium.*	
ER4 Calcareous scree and loose rock	Per Fossitt (2000), ER4 is applied to accumulations of loose or broken calcareous rock that are largely unvegetated because they are unstable and subject to ongoing disturbance. In the context of the Application Site, the lack of vegetation is more attributable to the lack of suitable growing substrate on large areas of solid rock. Located primarily in the central area where works appear to have been most recent.	

Fossitt Habitat Code and Name	Description and Species	Photo
FL4 Mesotrophic lakes	A number of topographical depressions have arisen as a result of extractive works, including redeposition of overburden and soil compaction by the passage of heavy machinery. Many of these have formed small waterbodies and have become vegetated. The term ‘mesotrophic’ refers to a moderate concentration of nutrients, which is considered reasonable given the lack of agricultural activity at the Site. These waterbodies are unlikely to be acidic, given the bedrock type and soil conditions. Thus, these were categorised as FL4 after other options were eliminated. Species recorded included common stonewort *Chara vulgaris*, greater water-moss *Fontinalis antipyretica* and floating sweet grass *Glyceria fluitans.*	
FL8 Other artificial lakes and ponds	Located in the east of the Application Site, this habitat is represented by the collected waters within the quarry void space. The steep sides of this waterbody make it inhospitable for aquatic vegetation that would otherwise take root in shallow water.	

Fossitt Habitat Code and Name	Description and Species	Photo
FW3 Canals	The Grand Canal (Barrow Line) extends along the north-eastern boundary of the Application Site. It is separated from the Application Site by a treeline, an earthen bank, a footpath and a grassy verge.	
GS1 Dry calcareous and neutral grassland	Per Fossitt (2000), “this category is used for unimproved or semi-improved dry grassland that may be either calcareous or neutral, but not acid. It is associated with low intensity agriculture and typically occurs on free-draining mineral soils of various depths.” Considering the works associated with the Project, and that the bedrock is limestone, it can be assumed that the works have led to an increased calcareous composition of the soil. Calcareous indicators included yellow-wort *Blackstonia perforata,* cowslip, wild carrot *Daucus carota*, common bird’s-foot trefoil *Lotus corniculatus* and common spotted orchid *Dactylorrhiza fuchsii*. This habitat was recorded alone and as a mosaic with Scrub (WS1) and Recolonising bare ground (ED3).	

Fossitt Habitat Code and Name	Description and Species	Photo
GS2 Dry Meadows and Grassy Verges	Per Fossitt (2000), 'this type of grassland is now best represented on grassy roadside verges, on the margins of tilled fields, on railway embankments, in churchyards and cemeteries, and in some neglected fields or gardens. These areas are occasionally mown (or treated with herbicides in the case of some railway embankments), and there is little or no grazing or fertiliser application.' In the context of the Application Site, this habitat has been assigned to the grassy verges either side of the canal towpath, both of which are outside the Application Site. It contained several grasses and herbaceous species but lacked the calcareous indicators that were observed within the footprint of the Application Site. This habitat was recorded within a habitat mosaic with earth banks (BL2).	
GS4 Wet grassland	Per Fossitt (2000), this type of grassland "occurs on wet or waterlogged mineral or organic soils that are poorly drained". One area of GS4 was noted near the northern boundary, bound on two sides by scrub (WS1). It was characterised by the abundance of field horsetail *Equisetum arvense* and hard rush *Juncus inflexus.* Other indicator species of wet soils included glaucous sedge *Carex flacca*, cottongrass *Eriophorum angustifolium* and silverweed *Potentilla anserina*.	

Fossitt Habitat Code and Name	Description and Species	Photo
WL1 Hedgerows	Hedgerows were recorded around the boundary of the Application Site, with two examples at height above the main quarry void. They were primarily made up of hawthorn *Crataegus monogyna* and ash *Fraxinus excelsior*. Occasional shrubs included goat willow *Salix caprea*, dog rose *Rosa canina* and bramble *Rubus fruticosus* agg.	
WL2 Treelines	The distinction between hedgerows and treelines is based primarily (per Fossitt (2000)) on the height of the trees. A treeline is 5 m or higher, and anything shorter is a hedgerow. In reality the distinction is somewhat academic, as both habitats often fulfil similar ecological roles. This habitat has been assigned to the tall line of trees lining the canal towpath outside the boundary of the Application Site.	

Fossitt Habitat Code and Name	Description and Species	Photo
WS1 Scrub	Dense patches of scrub have become established throughout the Application Site, which are typically an indication of succession, where an area has been left undisturbed for a prolonged period. Goat willow, bramble, hawthorn and ash dominated the habitat with hedge mustard *Sisymbrium officinale* and dog rose occasionally recorded. This habitat was recorded alone and within a habitat mosaic with dry calcareous and neutral grassland (GS1), recolonising bare ground (ED3) and soil and bare ground (ED2)	

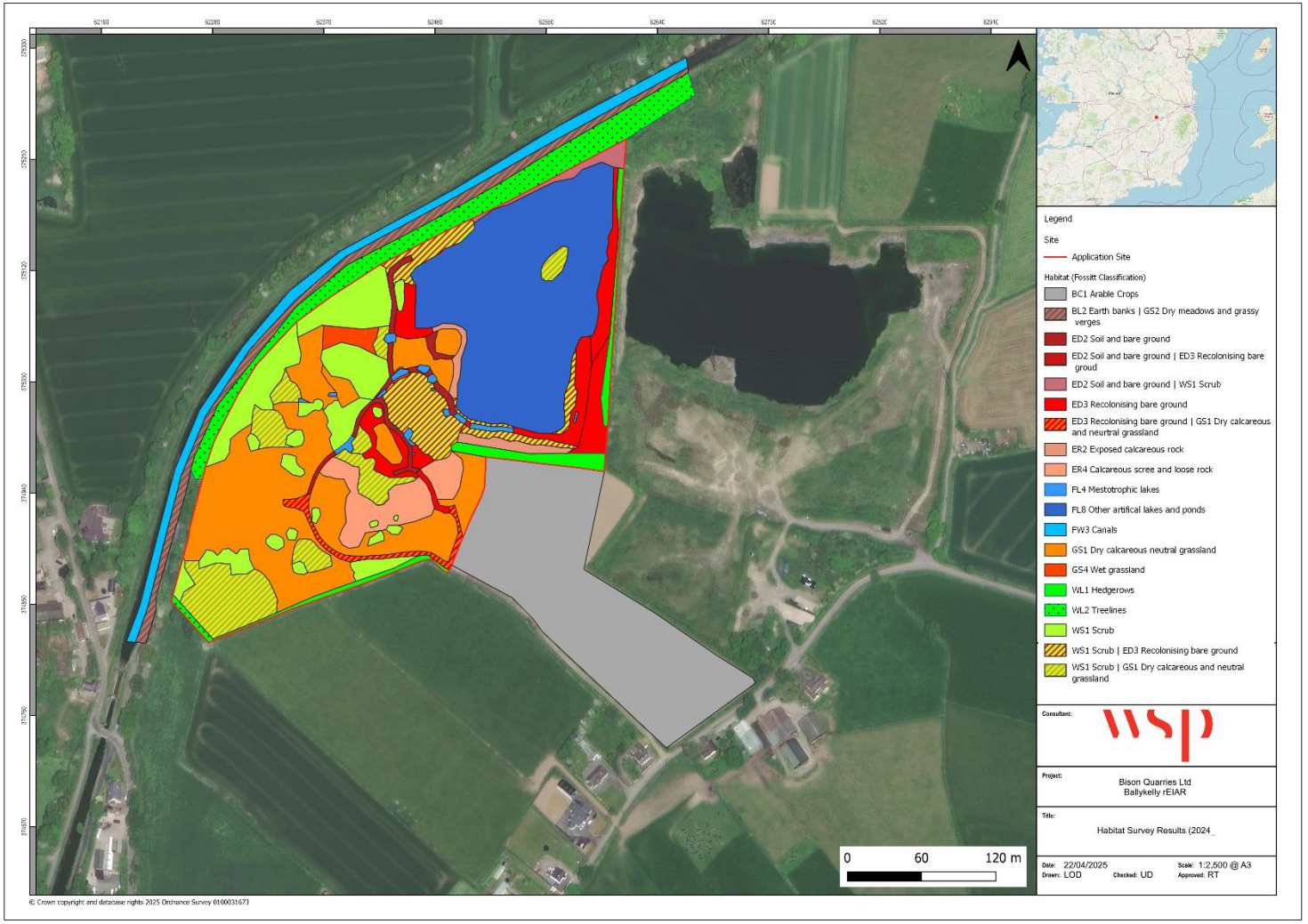

Figure 4-6 – Habitat Survey Results (2024)

4.5.3 Species Baseline

Fauna

Mammals

Desk Study

No records of mammals were returned during from the NBDC during the desk study.

Review of Article 17 2012 distribution data showed the favourable reference range for nine Annex IV bats and three other mammalian species in N61. All species identified (Table 4-18) have a current range and favourable reference range in N61, with the exception of Irish hare, otter, pine marten, common pipistrelle and Leisler's bat which also have a distribution in N61.

Table 4-18 – Desk Study: Mammals

Common Name	Scientific Name	Habitats Directive Species Code
Irish hare	*Lepus timidus subsp. Hibernicus*	[1334]
Otter	*Lutra lutra*	[1355]
Pine marten	*Martes martes*	[1357]
Leisler's bat	*Nyctalus leisleri*	[1331]
Brandt's bat	*Myotis brandtii*	[1320]
Daubenton's bat	*Myotis daubentonii*	[1314]
Whiskered bat	*Myotis mystacinus*	[1339]
Natterer's bat	*Myotis nattereri*	[1322]
Nathusius' pipistrelle	*Pipistrellus nathusii*	[1317]
Common pipistrelle	*Pipistrellus pipistrellus*	[1309]
Soprano pipistrelle	*Pipistrellus pygmaeus*	[5009]
Brown long-eared bat	*Plecotus auritus*	[1326]

Following BCT guidelines (Collins, 2023), the Application Site was precautionarily assessed as having high suitability for bat flight paths and bat foraging habitat due to its connectivity

to the wider landscape with linear features such as high quality hedgerows, treelines and the adjacent Grand Canal. Additionally, the nearby River Figile provides foraging and community habitats for bats.

Additionally, the Application Site was assessed as having moderate suitability for bat roosting habitats (specifically the several large trees identified to the south of the Application Site on aerial imagery which may provide habitat for crevice dwelling bat species). Outside of the Application Site, old sheds, houses, bridges and mature trees may provide further roosting opportunities for bats. Figure 4-7 below illustrates connectivity and roosting opportunities for bats within 2 km of the site.

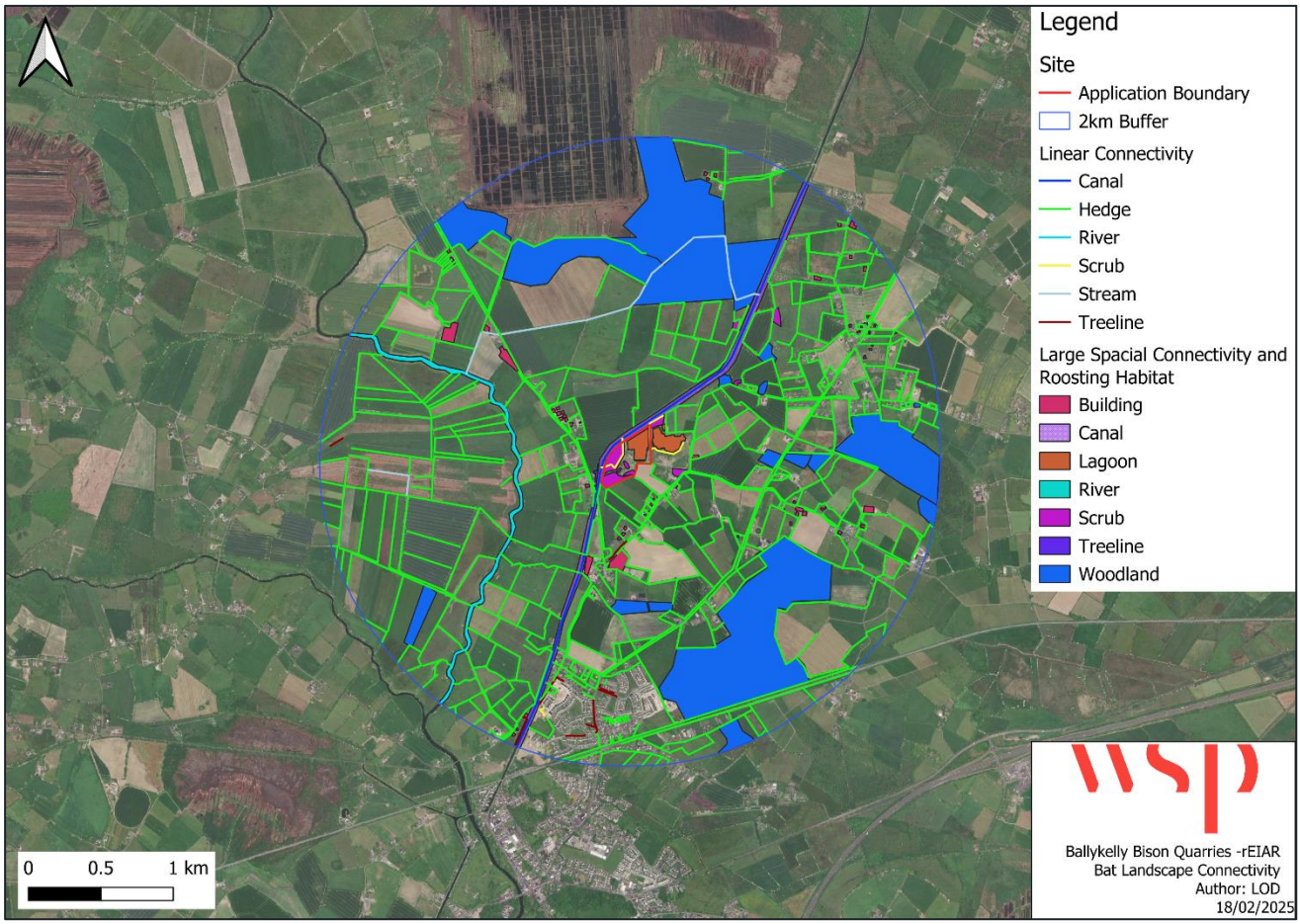

Figure 4-7 – Bat Connectivity to the Wider Landscape

The desk-based review of habitat suitability corresponded to a study by Roche et. al. (2011) that showed the Application Site to be situated within an area with a habitat suitability index of 28.1111 to 36.444401, indicative of medium-high habitat suitability for all Irish bat species.

Field Survey

Site Suitability and Daytime Bat Walkover

The Site was found to contain habitat connected to the wider landscape that may be used for foraging and commuting bat, badger, hedgehog, Irish hare, pine marten, pygmy shrew and red squirrel such as high-quality hedgerows, scrub, grassland and watercourses.

The exposed southern quarry face was noted to have potential suitability for roosting bats however, close inspection of features from ground level was not possible due to health and safety restrictions as described earlier in Section 4.4.4. No further roosting resources were observed on site with no Potential Roost Features (PRFs) noted. Outside of the site boundary, old sheds, houses, bridges and trees may provide further roosting opportunities for bats. Following BCT Guidance (Collins, 2023), the Application Site was assessed as having **high suitability for potential flight paths and foraging habitat** and **moderate suitability for roosting habitats** (specifically features within the exposed bedrock).

A potentially inactive badger sett was identified within a sand mound (Figure 4-8). Additionally, suitable foraging habitat for otter was identified from the collected waters within the quarry void space however, no evidence of the species was recorded.

These potentially suitable roosting and resting locations are illustrated below in Figure 4-8.

Figure 4-8 – Mammal Field Survey Results

Static Detector Survey

Throughout the survey period, at least six species of bat were recorded: soprano pipistrelle, common pipistrelle, Nathusius's pipistrelle, *Myotis* species, Leisler's bat and brown long-eared bat.

Over the whole survey period across both Detectors, a total of 20,190 bat passes were recorded, as detailed in Table 4-19 Soprano pipistrelle accounted for the majority of activity on site with Nathusius's pipistrelle recording the lowest activity levels.

Table 4-19 – Total Bat Passes Per Species

Species	Passes (No.)	Percentage of total (%)
Soprano pipistrelle	12,806	63.43
Common pipistrelle	6,377	31.58
Myotis sp.	417	2.07
Leisler's bat	292	1.45
Pipistrelle sp.	242	1.20
Brown long-eared bat	40	0.20
Nathusius's pipistrelle	16	0.08
Total	**20,190**	**100**

The most widely recorded species was soprano pipistrelle (63.38% of all bat passes), followed by common pipistrelle (31.62% of all bat passes). Nathusius's pipistrelle was the least recorded (0.08% of all bat passes), followed by brown long-eared bat (0.2% of all bat passes). Additionally, 11.3% of the total passes recorded at both Detectors were not considered to be or identified as bats. Due to the relatively low number of calls which needed to be checked (4 in total) these records were excluded from further analysis as were records of noise and those which could not be identified.

Badger Camera Trapping

When camera footage was reviewed after two weeks, no images or videos of badgers were identified. Therefore, the camera trap was deployed for an additional two weeks however, when reviewed, there was no footage of badgers. Moreover, no field evidence of badgers was recorded during site visits to change the batteries or ultimately collect the camera.

No incidental evidence of mammals was recorded during the other ecological surveys as described within Table 4-2.

Birds

Desk Study

No records of birds were returned during the search on NBDC.

Distribution data from the 2012 review of Article 12 returned 54 species of avifauna within the Study Area. One species was listed on Annex 1 of the Birds Directive, two were Red listed and 10 species were Amber listed on the BoCCI 1 published in 1999. A present-day review of the conservation status of the birds returned during the desk study showed eight Red listed and 13 Amber listed on the BoCCI4 published in 2021. Table 4-20 describes the red and amber listed species identified during the desk study whilst Appendix 4C provides details of all species identified and their conservation status. All records were recorded within the breeding season only.

Table 4-20 – Desk Study: Birds

Common Name	Scientific Name	Conservation Status (2000 – 2006)[26]	Conservation Status Present Day[27]
Cuckoo	*Cuculus canorus*	Amber	Green
Goldcrest	*Regulus regulus*	Green	Amber
Grasshopper warbler	*Locustella naevia*	Amber	Green
Greenfinch	*Carduelis chloris*	Green	Amber
Grey wagtail	*Motacilla cinerea*	Green	Red
House martin	*Delichon urbicum*	Green	Amber
House sparrow	*Passer domesticus*	Green	Amber
Kingfisher	*Alcedo atthis*	Annex 1, Amber	Annex 1, Amber
Lapwing	*Vanellus vanellus*	Red	Red
Lesser redpoll	*Carduelis cabaret*	Amber	Green
Linnet	*Carduelis cannabina*	Green	Amber

[26] Status as per BoCCI1 by Newton *et al*. (1999) as well as listing on Annex 1 of the Birds Directive. The BoCCI1 conservation assessment prevents the most up to date conservation status during the Assessment Period. The next national conservation assessment for birds is not published to 2007 and so, is outside the Assessment Period.

[27] Status as per BOCCI4 by Gilbert *et al*. (2021) as well as listing on Annex 1 of Birds Directive.

Common Name	Scientific Name	Conservation Status (2000 – 2006)[26]	Conservation Status Present Day[27]
Mallard	*Anas platyrhynchos platyrhynchos*	Green	Amber
Meadow pipit	*Anthus pratensis*	Green	Red
Mute Swan	*Cygnus olor*	Green	Amber
Sand martin	*Riparia riparia*	Amber	Amber
Skylark	*Alauda arvensis*	Amber	Amber
Snipe	*Gallinago gallinago*	Amber	Red
Starling	*Sturnus vulgaris*	Green	Amber
Stock Dove	*Columba oenas*	Amber	Red
Swallow	*Hirundo rustica*	Amber	Amber
Swift	*Apus apus*	Green	Red
Whinchat	*Saxicola rubetra*	Amber	Red
Willow warbler	*Phylloscopus trochilus*	Green	Amber
Yellowhammer	*Emberiza citrinella*	Red	Red

Two I-WeBS subsites of the River Barrow (Monasterevin - Portarlington 05301) were identified within the relevant Study Area as described in Table 4-1, namely Quinsborough (05310) situated 290 m west and Derrylea North of Monasterevin (05399) situated 790 m southwest of the Application Site. Review of I-WeBS data from the two sites showed no records within the Assessment Period. Recent records from the sites have been included below to increase our understanding of the wider landscape and its ecological function.

Common name	Scientific name	BoCCI1 Conservation Status	Count	Subsite Code	Date
Golden plover	*Pluvialis apricaria*	Amber	6,600	05399	2021
Golden plover	*Pluvialis apricaria*	Amber	4,000	05399	2022

Common name	Scientific name	BoCCI1 Conservation Status	Count	Subsite Code	Date
Greylag goose	*Anser anser*	Amber	4	05301	2019
Lapwing	*Vanellus vanellus*	Red	1,101	05399	2021
Lapwing	*Vanellus vanellus*	Red	327	05399	2022
Whooper swan	*Cygnus cygnus*	Amber	11	05395	2015

Field Survey

Habitat Suitability for Breeding Birds

Habitats within the Survey Area are considered suitable for a variety of breeding bird species; particularly associated with quarries and farmland, including some of those listed as Amber or Red by Newton *et al.* (1999) on the BoCCI 1 and by Gilbert *et al*. (2021) on the BoCCI 4. Scrub, hedgerows and treelines are routinely considered suitable for nesting birds, and it is also acknowledged that areas of grassland and disturbed ground may be used by ground-nesting species.

Breeding Bird Survey

A total of 39 bird species were recorded during the breeding bird surveys. Five of these species were listed on the BoCCI1 Red or Amber list while 14 species were listed on the BoCCI4 as Red or Amber (see Table C2).

Territory analysis was carried out in context of BoCCI4 and reflects the habitats within the Application Site which were identified in in the 2023/24 surveys. Of the 39 species recorded during the surveys, seven species were considered to be holding breeding territories (see Figure 4-9) with 18 separate breeding territories identified. The most abundant species were sand martins where an extensive colony is established within the sandy layer located near the top of the mid-section of the eastern quarry face. Willow warblers were also abundant within the Application Site, holding six territories. Linnet held three territories while yellowhammer held two. Finally, kestrel[28], spotted flycatcher and grey wagtail held a single territory each (see Table 4-21 and Figure 4-9).

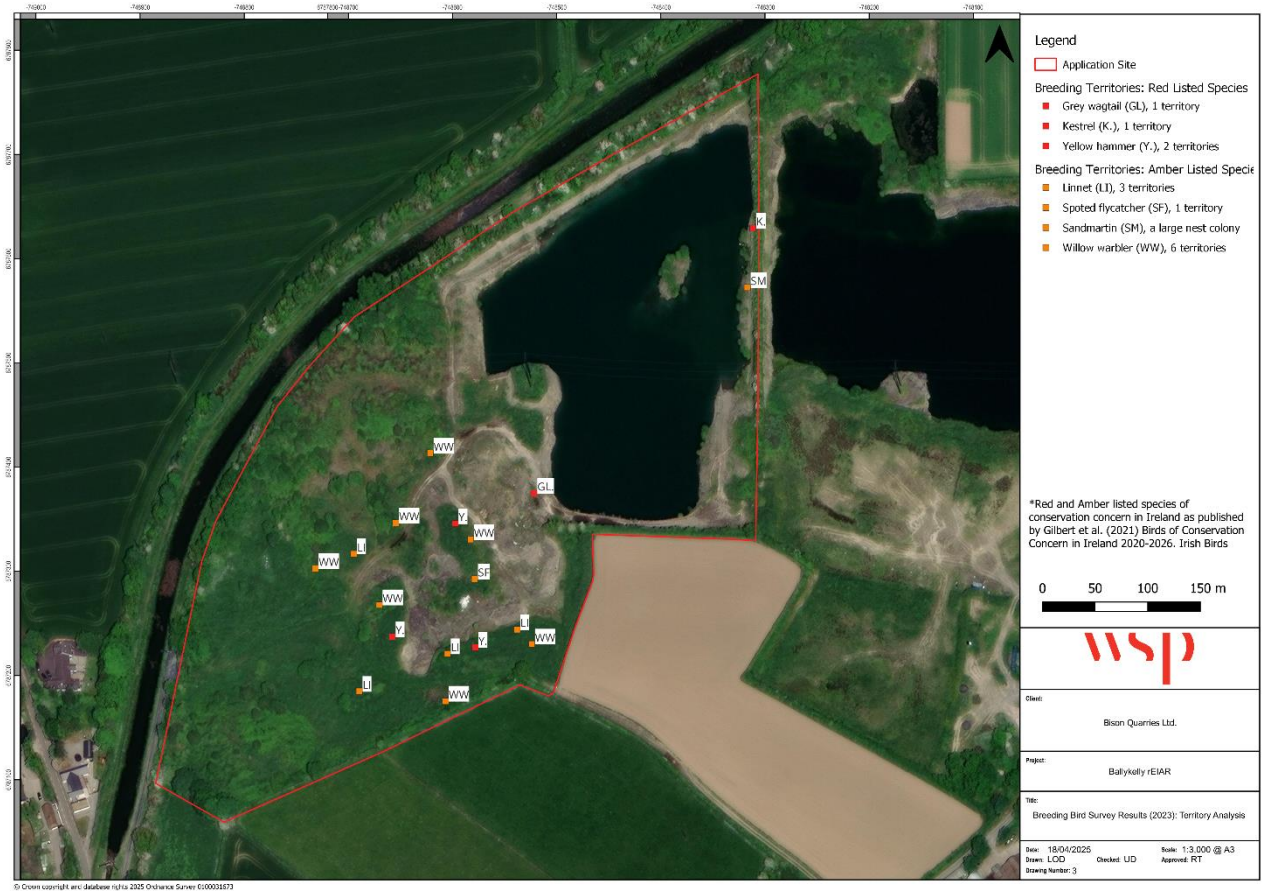

Figure 4-9 – Territory Analysis Results (2023)

28 Health and Safety restrictions reduced the ability of Surveyors to identify breeding behaviour (from the kestrel). However, it was twice recorded perched in the same tree in 2023. The following year on a separate survey, a kestrel was again recorded in the same location. On account of acting precautionary, the Surveyors concluded the likely presence of a breeding territory in the area, likely a nest within a tree at the top of the eastern quarry face.

Table 4-21 – Breeding Bird Survey Results (2023)

Species	Number of Territories[29]	Legal Protection/ Conservation Status[30]
Grey wagtail	1 territory	Red
Kestrel	1 territory	Red
Yellowhammer	3 territories	Red
Goldcrest	Present only	Amber
Greenfinch	Present only	Amber
House martin	Present only	Amber
Linnet	3 territories	Amber
Sand Martin	Large colony with c. 150 nests	Amber
Spotted flycatcher	1 territory	Amber
Starling	Present only	Amber
Swallow	Present only	Amber
Willow warbler	6 territories	Amber

The spatial distribution of breeding territories associated with the Survey Area from 2023 is illustrated in Figure 4-9. The majority of breeding territories were recorded within scrub habitat associated with the west of the Application Site and Site perimeter. The large sand martin colony was recorded on the easters quarry face with the kestrel territory also recorded nearby. No territories were recorded within the waterbody within the quarry void space or within the bare ground habitat or exposed rock piles. A full list of species recorded during the breeding bird surveys and their scientific names are provided in within Appendix 4C.

Herpetofauna

Desk Study

Review of NBDC data returned no records of amphibian or reptile species within the Study Area however, Article 17 2007 distribution data showed N61, to be within the current range,

[29] Number of territories and presence recorded for both BoCCI Red and Amber listed species only.
[30] Listed on Annex 1 of the Birds Directive (A1) and/or listed on the BoCCI as either Red or Amber.

distribution and favourable reference range of common frog *Rana temporaria* [1213] (NPWS, 2008a).

Field Survey

Habitat Suitability - Amphibians and Reptiles

The habitats within the Application Site were noted to be suitable for breeding common frog and smooth newt, especially the large shallow vegetated groundwater pools and other small pooled areas. These small waterbodies are seasonal and are situated near to the waterbody within quarry void space, within areas of scrub and semi-natural grassland as well as on the worn tracks.

Habitats within the Application Site were suitable for common lizard, in particular the hedgerow which provided good opportunities for foraging and overwintering.

Breeding Amphibian Survey

During the first visit, 16 pond/small pooled water habitats suitable for breeding amphibians were recorded across the Application Site. When combined, these areas totalled 798.39 m^2. Full details of these areas are provided in Appendix 4C and illustrated below Figure 4-10.

Figure 4-10 – Amphibian Survey Results

Of the 16 no. small water bodies identified during the survey, all 16 no. were noted to be suitable for breeding common frog whilst nine were noted to be suitable for breeding smooth newt. Of these, three contained positive samples of frog spawn in the first visit with tadpoles noted to be extensive in two of these ponds during the second visit. No sample of newt eggs were observed during the survey. Locations of the positive breeding evidence is illustrated above in Figure 4-10 with full details of these data points in Table C-4.

Fish and Other Aquatic Species

Desk Study

No records of aquatic fauna including molluscs, crustaceans or fish were returned during a review of NBDC data. Four aquatic species were identified during review of Article 17 2007 distribution data within N61 (NPWS, 2008a). The Application Site is located within the current range, distribution and favourable reference range for all species described in Table 4-22.

Table 4-22 – Aquatic Species – Article 17 2007 Data

Species	Scientific Name	Habitats Directive Species Code
White clawed crayfish	*Austropotamobius pallipes*	[1092]
River Lamprey	*Lampetra fluviatillis*	[1099]
Brook lamprey	*Lampetra planeri*	[1096]
Atlantic salmon	*Salmo salar*	[1106]

Field Survey

No targeted field surveys for fish or other aquatic species were carried out.

Terrestrial Invertebrates

Desk Study

Records of two species of terrestrial invertebrate were returned from NBDC including. These records are described below in Table 4-23. Neither are of enhanced conservation status, listed on the WA, Annex II of the Habitats Directive or are listed on the relevant Irish Red List as Near Threatened and above. Furthermore, neither were identified as posing an invasive risk.

Review of Article 17 2007 distribution data showed N61 to be within the current range and favourable reference range for Marsh Fritillary *Euphydryas aurinia* [1065].

Table 4-23 – Invertebrate Species Identified from NBDC as Part of the Desk Study

Common Name	Scientific Name	Record count	Date of last record
Small dark olive mayfly	*Baetis scambus*	2	10/08/2006
Wandering snail	*Radix balthica*	2	10/08/2006

Field Survey

No targeted field surveys for terrestrial invertebrates were carried out.

Flora

Desk Study

A review of NBDC returned 44 no. records of flora including ferns, flowering plants and horsetails within the Study Area (Table 4-1). None of these species were classified as vulnerable or above on the relevant Irish Red List by Jackson *et al.* (2016) and Lockhart *et al.* (2019).

In addition, a review of protected flora amalgamated in the Flora Protection Order 2022 map viewer, returned no records of protected vascular plant species within the Study Area (Table 4-1).

A review of Article 17 2007 distribution data found N61[5] to host the current distribution and favourable reference range of three bryophyte species, White cushion moss *Leucobryum glaucum* [1400][31], Sphagnum genus Sphagnum species [1409] and Cladonia species *Cladonia subgenus Cladina* [5113] (NPWS, 2008a).

No records of invasive flora were identified during the desk study.

Field Survey

No notable or invasive plant species were identified during the 2023/2024 field surveys.

4.5.4 Evaluation of Baseline Conditions and Ecological Features

The majority of ecological features have been evaluated below with reference to results from the desk study rather than the field surveys as the desk data provided information more relevant to baseline conditions. However, desk data was returned for a Study Area greater than the Application Site and so, results are discussed below in the context of the likelihood of their presence within the Application Site. An overall evaluation and assessment of IEFs is made later in this Section.

[31] N61 is located within the current range only for white cushion moss (not within the current distribution). N61 represents the hectad within which the Application Site is located.

Designated Sites

One international designated site, the River Barrow and River Nore SAC, was identified within the EZoI and is brought forward for further consideration in this chapter.

One national designated site, the Grand Canal pNHA, was identified within the EZoI and is brought forward for further consideration in this chapter.

Habitats

Annex 1 Habitats

The desk study returned 12 no. Annex 1 habitats within N61 however, aerial review of baseline conditions indicated the absence of any of these habitats within the Application Site. As such, it is highly unlikely that an Annex 1 habitat was present prior to the Project and are not considered further in this assessment.

Wetland Habitats

The Coolsickin or Quinsborough [MIW_KE170] wetland was identified within the Application Site. However, as the wetland feature is an artificial pond, the wetland does not concern habitats or features present within the Assessment Period. Therefore, the wetland is not considered further in this assessment.

On-site Habitats

Habitats identified as likely to have been present within the Application Site are considered further in this assessment.

Fauna

Mammals

Bats

Desk data showed the Application Site within the range for eight Irish bat species including Common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Brandt's bat, Daubenton's bat, Natterer's bat, whiskered bat, brown long-eared bat and Leisler bat. Aerial review of baseline habitats within the Application Site suggested suitability for all these bat species especially with regards to the hedgerow which may have comprised a commuting route. Furthermore, individual mature trees within the hedgerows may have provided suitable summer and winter roosts for crevice dwelling species which include all of the above bat species except Daubenton's bat Marnell *et al*. (2022).

Field data collected in 2024 recorded the presence of all bat species previously identified in the desk study. Therefore, despite the change in habitats between the baseline in 2000 and the present-day conditions recorded in 2024, the population assemblage is predicted to have included the same species. However, due to the managed nature of the arable fields, the abundance of bats which used the site is estimated to have been lower.

Population Importance

The bat population estimated to have been present within the Application Site and the habitat features identified through aerial review were assessed following best practice guidance including the Bat Mitigation Guidelines for Ireland by Marnell *et al*. (2022) and the UK Bat Mitigation Guidelines (Reason & Wray, 2023). The UK bat Mitigation Guidelines were followed as they reflect updated research, good practice and new approaches with additional guidance on loss of foraging and commuting habitat.

The importance of the bat population within the Application Site was assessed to provide contextual information to inform this impact assessment. The rarity of the species assumed present within the Application Site was assessed by adapting the rarity categories presented by Reason and Wray (2023) following review of the distribution of Irish bats in the 2007 Article 17 report (NPWS, 2008). These categories combined with their distribution score are presented below in Table 4-24.

Table 4-24 – Assessing the Importance of an Irish Bat Assemblage

Rarity category	Comon Name	Distribution Score	Species recorded
Widespread	soprano pipistrelle 394	1	✓
	common pipistrelle 276	1	✓
	Leisler's bat 194	1	✓
	Brown long-eared bat 172	1	✓
Widespread in many geographies	Daubenton's bat 136	2	✓
	Natterer's bat 118	2	✓
Rarer or restricted in distribution	Whiskered bat 100	3	✓
	Brandt's bat 100	3	✓
	Nathusius' pipistrelle 50	3	✓
Annex II species / Very rare	lesser horseshoe bat 124	4	x

Distribution scores were summed to identify the maximum assemblage score available at the site (21). This maximum score was used to calculate the threshold score needed for any assemblage to meet a geographic level of importance. These thresholds as described by Reason and Wray (2023) are detailed below in Table 4-25 with specific scores calculated based on the maximum distribution score of the Application Site.

Table 4-25 – Assemblage Threshold Scores

Thresholds	Score
County Importance (higher value): 45%	9.45
Regional Importance[32] threshold: 55%	11.5
National Importance threshold: 70%	14.7
Maximum	21

Assuming all four *Myotis* bats were present, the site has a total assemblage score of 17 (out of a maximum score of 21). This population of bats is therefore of national importance. This level of importance corresponds to that defined by the NRA (2009b) as the site provides a refuge for fauna protected under the WA.

Therefore, all bat species identified in the field and desk study are considered further in this assessment with the population assemblage recognised as of national importance.

Other Non-Volant Mammals

Desk study identified the distribution of Irish hare, otter and pine marten within N61. Aerial review of the baseline habitat indicates suitable foraging habitat for these species was present and so their presence is assumed.

The camera trapping survey of 2024 indicated the inactivity of the potential badger sett within the Application Site. As the habitat in this area was not suitable for sett creation due to Project activities, it is estimated that this sett was not present. Hedgerows presented suitable habitat for sett construction and so badgers are brought forward for further evaluation.

Furthermore, pygmy shrew and hedgehog are widespread species in Ireland especially within arable land and hedgerows. Aerial review indicated suitable nesting and foraging habitat for both with hibernating habitat present for hedgehog. Therefore, the presence of both of these species is assumed and they are brought forward for further evaluation.

Birds

Due to the dramatic change in the population and distribution of birds in Ireland in the interim between the baseline and the present-day as well as the change in habitats between those identified by aerial review during the desk study and those noted in the field, the population of birds using the Application Site is estimated based on records returned from the desk study.

[32] Regional Importance is not defined by the NRA 2009b, rather it is included within the Bat Mitigation Guidelines by Reason and Wray. It is understood to be a category between National and County Importance and is equivalent to provisional importance in Ireland.

Species listed as Red or Amber on the BoCCI1 included: cuckoo, grasshopper warbler, kingfisher, lapwing, lesser redpoll, sand martin, snipe, stock dove, swallow, whinchat and yellowhammer. Suitable breeding habitat for all of these species, except kingfisher, sand martin and swallow, were likely present within the Application boundary in 2000. Furthermore, wintering birds which were recorded within the neighbouring I-WeBs include: golden plover, greylag goose, lapwing and whooper swam. All of these birds were listed as Red or Amber on BoCCI1 with suitable wintering habitat identified within the Application Site.

Therefore, both the above breeding and wintering birds are considered further in this assessment.

Herpetofauna

Amphibians

Common frog was identified during review of Article 17 distribution data as well as recorded breeding during field surveys in 2024. Review of aerial imagery shows that the Application Site was suitable for foraging frogs in the form of cropland and hedgerows; however, no suitable breeding habitat was identified.

Despite no records of smooth newt from the desk or field survey, the species is designated by the adjacent Grand Canal pNHA. Furthermore, suitable habitat for foraging and overwintering including hedgerows was identified during aerial review of the Application Site. Small pools may have arisen within the Application Site which would have provided suitable breeding habitat for common frog as aquatic vegetation is assumed to have been absent.

Therefore, both species are considered to have been present within the Application Site; however, suitable breeding habitat existed for common frog only. Both species are brought forward for further assessment in the context of foraging, commuting and overwintering with common frog also considered in the context of breeding.

Reptiles

Due to the presence of suitable foraging habitat within the Application Site, common lizard is brought forward for further evaluation.

Fish and Other Aquatic Species

The desk study identified four Annex V fish and other aquatic species (white clawed crayfish, river lamprey, brook lamprey and Atlantic salmon) present within N61, possibly within the Grand Canal located adjacent to the Application Site within the EZoI. Review of historic mapping and aerial imagery shows the absence of any waterway within the Application Site. As such, aquatic species such as fish and aquatic crustaceans are considered further in this assessment as an independent ecological receptor.

Terrestrial Invertebrates

The desk study identified the Application Site to lie within the known distribution for marsh fritillary. Aerial review of the baseline habitat suggests that suitable habitats such as damp, flower-rich grasslands, dunes and wet heath were not present within the Application Site. Therefore, the species is not considered further in this assessment.

Flora

The three Annex V flora species identified within N61, white cushion moss [1400], sphagnum species [1409] and *Cladonia* species [5113] are typical of woodland, bog, heath and dune habitat. Aerial review of baseline habitats suggest unsuitability for these flora species. As such, it is highly unlikely that these species were present within the Application Site.

The field survey noted the absence of invasive flora within the Application Site. As described within Chapter 1 (Project Description), no further works associated with the Project were undertaken at the Application Site following the cessation of extraction activities. Therefore, the absence of invasive species in 2023/24 is indicative of the absence of invasives during the Assessment Period.

No other notable or protected flora species were identified within the Study Area and therefore, rare and invasive flora are not considered further in this assessment.

Summary Evaluation of IEFs

Table 4-26 provides an evaluation of IEFs (Important Ecological Features) identified following a review of ecological baseline information provided above, in line with criteria set out in Table 4-6. Reasons for inclusion or omission of IEFs are also detailed in Table 4-26 below.

As stated above in Section 4.4 and in line with NRA (2009a) guidance, only IEFs deemed to be of Local Importance (Higher Value) or above will been taken to the assessment stage.

Table 4-26 – Summary of IEFs

Ecological Feature	Summary Description / Justification for inclusion or omission	Conservation Value[33]	Important Ecological Feature (IEF)
Designated and Notable Sites			
River Barrow and River Nore SAC [002162]	The River Barrow and River Nore SAC is classified as a European site. There is potential for indirect connectivity as a result of hydrology and the presence of functionally linked land.	International Importance	Yes
Grand Canal pNHA [002103]	Proposed National Heritage Area within the EZoI of the Project. There is potential for direct and indirect connectivity between the Application Site and this pNHA.	National Importance	Yes
Habitats			
Active Quarries and mines (ED4)	This habitat is directly linked to disturbance and has no associated vegetation cover. Further, there is no reference to this habitat in the CDPs or BAPS. Impacts to birds (i.e. sand martins, peregrine falcons and kestrels) are covered separately.	Local Importance (Lower Value)	No

[33] IEFs evaluated in line with NRA (2009) Guidelines for Assessment of Ecological Impacts of national Road Schemes. Available at: https://www.tii.ie/technical-services/environment/planning/Guidelines-for-Assessment-of-Ecological-Impacts-of-National-Road-Schemes.pdf.

Ecological Feature	Summary Description / Justification for inclusion or omission	Conservation Value[33]	Important Ecological Feature (IEF)
Arable Crops BC1	Whilst this habitat is directly associated with food production, it does provide an important habitat for birds and mammals. The habitat is associated with low floral diversity. It is not mentioned in the CDP or in local BAPS. Despite 7.58 ha of arable crop habitat being lost within the Assessment Period, the loss is not thought to have significantly negatively impacted flora and fauna within the Application Site.	Local Importance (Lower Value)	No
Hedgerows WL1	In the absence of extensive woodland across Ireland, hedgerows are an important alternative habitat for woodland species. Review of aerial imagery indicates removal of c. 212 m of hedgerow within the Application Site over the Assessment Period. As discussed in Chapter 2 (Project Description) this includes 19 m to the east of the Application Site to facilitate access, 86 m in the centre of the Application Site to facilitate stock piling and 96 m to the south of the Application Site for extension of agricultural activities. The importance of hedgerows is recognised by the EU Habitats Directive (92/43/EEC), which obliges member states to maintain them to improve the ecological coherence of the Natura 2000 network.	Local Importance (Higher Value)	Yes

Ecological Feature	Summary Description / Justification for inclusion or omission	Conservation Value[33]	Important Ecological Feature (IEF)
	Furthermore, hedgerows are acknowledged in local BAP and CDPs from predevelopment to the present day. Specifically, within the 1999 Kildare CDP Part 2 Section 2.31A and 2005 Kildare CDP Chapter 17 Policy 17.2.1 regarding hedgerow protection and preservation.		
Tilled Land BC3	The bare soil associated with this habitat provides minimum value to the local ecosystem. This habitat is not mentioned in the CDP or in local BAPS. Machinery which is associated with this habitat may have resulted in destruction of nesting birds and other animals. Furthermore, long-term tilling reduces soil health with fewer invertebrates and prey resources.	Local Importance (Lower Value)	No
Species			
Mammals			
Bats: Common pipistrelle, soprano pipistrelle, Nathusius pipistrelle, Daubenton's bat, Natterer's bat, whiskered bat, Brandt's bat, Leisler bats and brown long eared bat.	All bats in Ireland are afforded full protection under the Habitats Directive and the WA. It is estimated that a diverse assemblage of bats used the site and considered of national importance. Habitats within the Application Site, in particular the hedgerow provided an important foraging and commuting habitat for bats. Mature trees present within the	National Importance	Yes

Ecological Feature	Summary Description / Justification for inclusion or omission	Conservation Value[33]	Important Ecological Feature (IEF)
	Application Site boundary may have provided roosting opportunity for crevice dwelling species such as all those identified (expect for Daubenton's bats).		
Badger	Badgers and their setts are protected under the WA. However, they are listed as being of least concern on the Irish Red Data List as described by Marnell *et al*. (2019). The population, range and habitat for the species is stable nationally and the species is assumed to have been present within the Site. Aerial review of the site indicates suitable habitat for sett creation along hedgerows adjacent to the site boundary.	Local Importance (Higher Value)	Yes
Pine marten	Pine marten receive protection under the WA. Habitats identified within the Application Site were suitable for pine marten, in particular mature trees and hedgerows. No record of the species was returned during the desk study nor during the 2024 field surveys however, their presence can be assumed.	Local Importance (Higher Value)	Yes
Invasive Fauna	The desk study did not return any records of invasive fauna within the Study Area. Furthermore, no invasive fauna was noted during the 2024 field surveys. However, suitable habitat for invasive fauna including grey squirrel and sika deer were present within the Application Site	Local Importance (Higher Value)	Yes

Ecological Feature	Summary Description / Justification for inclusion or omission	Conservation Value[33]	Important Ecological Feature (IEF)
	including arable fields and hedgerows. Both species are listed as Invasive on the Regulations S.I 477.		
Other Mammals	In addition to the mammals described above, the desk study returned records of Irish hare and otter, both of which are protected under the WA. The habitats identified on Site are suitable for foraging hare (within arable fields) and holting otter (within the base of mature trees). Furthermore, hedgerow habitats offer suitability for foraging and breeding pygmy shrew and hedgehog. The presence of all of these species is assumed within the Application Site.	Local Importance (Higher Value)	Yes
Birds			
Birds: Breeding Red and Amber listed species	All nesting birds are protected under the WA, which makes it an offence to intentionally kill, injure or take any wild bird or take, damage, or destroy its nest whilst in use or being built, or take or destroy its eggs. Eight Red or Amber listed BoCCI1 species are estimated to have been breeding within the Application Site, particularly within hedgerows. These species include cuckoo, grasshopper warbler, lapwing, lesser redpoll, snipe, stock dove, swallow, whinchat and yellowhammer.	County Importance	Yes

Ecological Feature	Summary Description / Justification for inclusion or omission	Conservation Value[33]	Important Ecological Feature (IEF)
	Due to their listing on the BoCCI all Red and Amber listed species holding breeding territories are valued at County Importance. Furthermore, yellowhammer is included in Objective BI021 of the most recent Kildare CDP 2023 – 2029 where it is recognised that County Kildare supports a national stronghold of the species.		
Birds: All Other breeding birds	All nesting birds are protected under the WA, which makes it an offence to intentionally kill, injure or take any wild bird or take, damage, or destroy its nest whilst in use or being built, or take or destroy its eggs. Hedgerows and arable land are suitable for breeding birds. It can be assumed with confidence that numerous Green listed (BoCCI1) species use the above-described habitats for breeding.	Local Importance (Higher Value)	Yes
Birds: All Other Non-Breeding Birds (summer and winter)	The mosaic of habitats on Site are suitable for feeding and loafing birds throughout the seasons including winter and summer. During the Project, agricultural grassland habitat is lost and is replaced by recolonising bare ground. Arable fields which were present within the Application Site provides opportunities for winter foraging especially for lapwing, golden plover, greylag geese and whooper swan who were recorded at two nearby I-WeBS site. Hedgerow	Local Importance (Higher Value)	Yes

Ecological Feature	Summary Description / Justification for inclusion or omission	Conservation Value[33]	Important Ecological Feature (IEF)
	habitat provided an important foraging resource for wintering birds as well as attracting prey, indirectly providing a summer foraging resource.		
Herpetofauna			
Amphibians: common frog and smooth newt	Common frog and smooth newt are protected under the WA. Suitable habitat for foraging common frog and smooth newt is assumed to have been present within the hedgerow as well as breeding habitat for common frog within small pools .	Local Importance (Higher Value)	Yes
Reptiles	Common lizard is the only species of reptile found in Ireland and is protected under the WA. No records of the species were returned from the desk study nor identified in the 2024 field surveys however, due to their widespread nature in Ireland (Irish Wildlife Trust, 2017), their presence is assumed. Habitats within the Application Site were suitable for common lizard, in particular the hedgerow which provided good opportunities for foraging and overwintering.	Local Importance (Higher value)	Yes

Ecological Feature	Summary Description / Justification for inclusion or omission	Conservation Value[33]	Important Ecological Feature (IEF)
Fish and Other Aquatic Species			
Fish and Other Aquatic Species	The desk study returned records of several fish species including river lamprey, brook lamprey and Atlantic salmon as well as a single aquatic invertebrate, white-clawed crayfish within the Study area. These species are all listed on Annex II of the Habitats Directive and are likely from the River Barrow and River Nore SAC. The adjacent grand canal may provide suitable habitat for these species directly west of the Application Site.	County Importance	Yes
Terrestrial Invertebrates			
Terrestrial Invertebrates	Two records of terrestrial invertebrates were identified from the NBDC desk study; however, neither are of enhanced conservation status, listed on the WA, Annex II of the Habitats Directive or are listed on the relevant Irish Red List as Near Threatened or above. Furthermore, neither pose an invasive risk. It is assumed the site did not support any terrestrial invertebrate species of enhanced conservation importance. Furthermore, the nature of the habitats on site during the Assessment Period are unlikely to have supported large terrestrial invertebrate populations. As such, marsh fritillary is not considered for further assessment..	Local Importance (Higher value)	No

Ecological Feature	Summary Description / Justification for inclusion or omission	Conservation Value[33]	Important Ecological Feature (IEF)
Invasive Fauna	The desk study did not return any records of invasive fauna within the Study Area. Furthermore, no invasive fauna was noted during the 2024 field surveys. However, suitable habitat for invasive fauna including grey squirrel and sika deer were present within the Application Site including arable fields and hedgerows. Both species are listed as Invasive on the Regulations S.I 477.	Local Importance (Higher Value)	Yes

4.6 Impact Assessment

This section seeks to quantify the impacts on IEFs of the works undertaken at the Application Site during the Assessment Period.

4.6.1 Identification of Impact – Effect Pathways: Rationale

Following a review of information within Chapter 2 (Project Description), Chapter 6 (Water), Chapter 7 (Air Quality) and Chapter 8 (Noise and Vibrations) of this rEIAR, potential impact-effect pathways were considered in line with the rationale described below:

Direct Impact – Effect Pathways

Habitat Loss/ Gain

A review of aerial imagery and comparison between the baseline habitats and those estimated at the end of the Assessment Period identified habitat changes within the Application Site, as detailed in Table 4-27.

It is important to note that due to the dewatering procedure described within Chapter 2 (Project Description), there was no waterbody present within the Application Site during the Assessment Period and as such, it is not included in the calculations.

Table 4-27 – Habitat Change over the Assessment Period

Fossitt Habitat [Code]	Area/Length Lost	Area/Length Gained
Recolonising bare ground [ED3]	0	1.41 ha
Active Quarries and mines [ED4]	0	6.47 ha
Arable crops [BC1]	7.58 ha	0
Tilled Land [BC3]	0.30 ha	0
Hedgerow [WL1]	105 m	0
Total Area (approximate) / Length	**7.8 ha / 105 m**	**7.8 ha**

Degradation of Habitats

Dewatering

As detailed within Chapter 2 (Project Description), it is understood that dewatering of the quarry void within the Application Site was carried out when extraction occurred below the groundwater table. Chapter 2 (Project Description) also estimates that any pumped water would have been discharged to ground within the Application Site at a suitable location constrained by topographical levels and the location of working areas/ internal haul routes. As described in Chapter 6 (Water), there is no data to confirm where this would have

occurred within the Application Site. Therefore, it is understood that the water was discharged to ground within the Application Site to a topographical low which would have acted similarly to a soakaway. In the absence of aerial and monitoring data, the location of this discharge point cannot be estimated.

Additionally, changes due to dewatering and potential discharge and collection may have resulted in a slight significant[34] effect on the availability of groundwater. This is an important effect to consider in the context of ecological receptors which are sensitive to changes in groundwater levels. Monitoring data from a neighbouring third-party quarry indicated some impact on user wells installed into sands and gravel, although cessation of pumping allowed levels to recover.

Therefore, a drop in the groundwater table is a temporary short-term impact which is considered within this assessment. Such changes were of imperceptible significance to the Grand Canal pNHA. However, the River Nore and River Barrow SAC, located approximately 1.6 km southwest is designated for fauna and habitats which are sensitive to changes in groundwater.

Pollution

As discussed within Chapter 6 (Water), potential hydrocarbon leaks were of imperceptible significance to surface and ground water quality and availability[35]. Furthermore, hydrocarbon leaks impacting water quality and availability at the Grand Canal pNHA and River Barrow and River Nore SAC also had an imperceptible significance. There were no recorded spills over the Assessment Period and any leaks will have likely been very minor. There was no indication of lasting contamination to surface water or ground water quality within the Application Site. As such, pollution due to hydrocarbon leaks is considered in the context of the Application Site only and not in the context of ground water or surface run-off.

Changes in the availability and quality of surface and ground water due to changes in the topography of the Application Site would have also had an imperceptible effect.

Functionally Linked Land

Functionally Linked Land (FLL) refers to the role or 'function' that land (which may be beyond the boundary of a European site) may fulfil in terms of ecologically supporting the populations for which the site was designated or classified. Such land is therefore 'connected' to the European site in question because it provides an important role in maintaining or restoring the population of qualifying species at favourable conservation status.

[34] Slight significance is a category of significance to describe where an effect which causes noticeable changes to the character of the environment without affecting its sensitivities.

[35] Imperceptible significance is a category of significant where an effect is capable of measurement but without significant consequences.

The Grand Canal and its adjacent habitat provide suitable habitat for breeding, foraging and migrating/commuting QI of the River Barrow and River Nore SAC and so, is potentially FLL. Table 4-28 summarises habitat preference, and the likelihood that the Grand Canal comprises FLL for each relevant mobile aquatic and semi-aquatic QI as detailed within the 2008 Article 17 Report (NPWS) and supporting reports (NPWS, 2008b).

As discussed in Chapter 7 (Dust), the Grand Canal pNHA was identified as the sole sensitive ecological receptor in the assessment. It is acknowledged that a slight short-term effect (Table 4-7) on the Grand Canal pNHA may have occurred. This is given a medium maximum residual source emission, a moderately effective effectiveness pathway and a high receptor sensitivity as it potentially comprises FLL for QI of the River Narrow and River Nore SAC. Increased noise, vibration, light and movement levels (plant, vehicles and people) caused by enabling and operation of the Project may also have impacted QIs using the Grand Canal (see ‘disturbance’ section below for further details on these impacts).

Table 4-28 – Breeding Habitat Preference for mobile QI species of the River Barrow and River Nore SAC

QI species	Habitat Description	Habitat estimated to have been present within the Grand Canal adjacent to the Application Site?
Freshwater pearl mussel [1029]	Nutrient-poor, acid to neutral waters of rivers flowing over granite or sandstone rock. Gravel substrate.	No – The Grand Canal lies on top of a clay substrate (Murray, 2018) rather than granite or sandstone. As the canal was lined with clay there is unlikely to have been a gravel substrate. Therefore, unsuitable for breeding freshwater pearl mussel.
Nore freshwater pearl mussel [1990]	Lime-rich waters of the River Nore	No – The Grand Canal lies outside of the River Nore and so was unsuitable for breeding Nore pearl mussel.
White-clawed crayfish [1092]	Shallow, slow-moving freshwater with: ■ Bank suitable for burrowing. ■ Tree roots. ■ Cobble and stones. ■ Aquatic vegetation, particularly Fontinalis antipyretica, Rorippa nasturtium aquaticum and Apium nodiflorum in streams, and charophytes in lakes. Water quality of Q3 and above, pH generally 7.0 and above, adequate lime, and cool temperature (below 20^{o}C). Refuge habitat can include canals (O'Connor, Hayes, O'Keefe, & Lynn, 2009) where the substrate is a mixture of cobbles and rubble as well as larger structures such as boulders, slates, logs and submerged vegetation. This is	**Yes** – Although the Grand Canal may not have provided all desirable habitat features for breeding white-clawed crayfish, the species is recognised as being tolerable of a range of habitat conditions in Ireland. The location of the Grand Canal adjacent to the Application Site has been identified within the range for the species. As adults don't migrate far from breeding grounds, it was plausible that the species was breeding within the Grand Canal.

QI species	Habitat Description	Habitat estimated to have been present within the Grand Canal adjacent to the Application Site?
	particularly important for juveniles as they are prone to predation. (Holdich, 2003)	
Sea lamprey [1095], Brook lamprey [1096] & River lamprey [1099]	Gravel substrate available for redd construction. In addition, areas of fine silt material for juveniles. Restricted in distribution by weirs.	No – As the Grand Canal is lined with clay (Murray, 2018) it was unlikely to have provided the gravel substrate required for redd construction. Therefore, it is unsuitable for breeding sea lamprey, brook lamprey and river lamprey.
Twaite shad [1103]	The tidal limits within estuaries. Deep pool areas and backwaters for adults to rest and gravelled areas for laying eggs.	No – the Grand Canal is approximately 90 km (fluvial distance) from the tidal limits of the River Barrow and was unlikely to have provided the gravel substrate required by the species to lay eggs.
Atlantic salmon [1106]	Upstream waters with gravel substrate for redd construction. Review of online available datasets from Inland Fisheries Ireland (IFI) found no plausible location for spawning from the Grand Canal adjacent to the Application Site.	No – As the Grand Canal is lined with clay (Murray, 2018) it was unlikely to have provided the gravel substrate required for redd construction. Therefore, it is unsuitable for breeding Atlantic salmon. However, this is not to rule out migrating salmon which may have passed through the waters which is discussed further in Table 4-29 below.
Otter [1355]	As described by Liles (2003): ■ Extensive reed beds; ■ Lakes and ponds; ■ Deciduous woodland;	No – the Grand Canal was unlikely to have provided the secluded security and habitat preference of a natal otter den.

QI species	Habitat Description	Habitat estimated to have been present within the Grand Canal adjacent to the Application Site?
	■ Young conifer plantations; ■ Extensive areas of scrub; ■ Features such as large areas of blockstone or boulders; and ■ Buildings/structures immediately adjacent to watercourses.	

Table 4-29 – Foraging/Commuting/Migrating Habitat Preference for mobile QI species of the River Barrow and River Nore SAC

QI Species	Habitat Description	Habitat estimated to have been present within the Grand Canal adjacent to the Application Site?
Freshwater pearl mussel [1029]	Waters with migratory salmonid fish (salmon and/or sea trout) present, gravel substrate,	No – Due to the estimated absence of gravel substrate within the Grand Canal, the most likely way that freshwater pearl mussel was present within the waters of the Grand Canal was during the glochidia (larval) stage when salmonid fish acted as host species. However, review of online datasets from IFI show that the Grand Canal (barrow line) does not lead to any suitable salmonid spawning grounds. As such, it is highly unlikely that Atlantic salmon or sea trout migrated through the Grand Canal, it is considered due to this very low likelihood that the additional presence of larval stage mussel is not a likely probability.

QI Species	Habitat Description	Habitat estimated to have been present within the Grand Canal adjacent to the Application Site?
Nore freshwater pearl mussel [1990]	Nore freshwater pearl mussel were confined to the River Nore.	No – The Grand Canal is outside the distribution of this species.
White-clawed crayfish [1092]	Shallow, slow-moving freshwater with: ■ Bank suitable for burrowing ■ Tree roots ■ Cobble and stones ■ Aquatic vegetation, particularly common water-moss Fontinalis antipyretica, Rorippa nasturtium aquaticum and fool's watercress Apium nodiflorum in streams, and charophytes in lakes. ■ Water quality of Q3 and above, pH generally 7.0 and above, adequate lime, and cool temperature (below 20oC) (Holdich, 2003) ■ White-clawed crayfish are likely to use habitats where the substrate is covered in mud or silt for foraging only (O'Connor, Hayes, O'Keefe, & Lynn, 2009).	**Yes** – Although the Grand Canal may not have provided all desirable habitat features for breeding white-clawed crayfish, the species is recognised as being tolerable of a range of habitat conditions in Ireland. The location of the Grand Canal adjacent to the Application Site has been identified within the range for the species. As adults don't migrate from breeding grounds, it was likely that the species was breeding within the Grand Canal here.
Sea lamprey [1095]	Using Article 17 data from the assessment period, the downstream distance of the distribution and range of sea lamprey was estimated as 53 km downstream via the River Figile and 53.3 km downstream via the canal.	No – Considering the distribution and range of this species and downstream distance to functionally connected habitats for this species, there was no connectivity between SAC sea lamprey populations and the Site during the assessment period.

QI Species	Habitat Description	Habitat estimated to have been present within the Grand Canal adjacent to the Application Site?
	The Conservation Objectives for the SAC highlight that artificial barriers cause the distribution of lamprey to be restricted to the lower stretches of the SAC. According to King (2006), this species is typically restricted to tidal reaches (St. Mullins being the northernmost tidal area in the River Barrow), although they have been recorded up to 43 km upstream of St. Mullins at the River Fushoge. This is approximately 65.9 km downstream of the canal adjacent to the Site and 66.6 km via the River Figile.	
River lamprey [1099] Brook lamprey [1096]	This species spends all its life in freshwater and so, does not migrate to sea. Following the larvae stage they transform to adults and migrate back upstream to spawn in redds. Spawning sites vary with the species observed spawning in small streams and drains.	**Yes** – On a precautionary basis there is potential that river and brook lamprey ascended to upstream spawning sites via the Grand Canal.
Twaite shad [1103]	Adult life is spent at sea or in the lower reaches of estuaries and ascending to fresh water to spawn. Eggs which are deposited to gravel beds hatch after several days and drift downstream. The larvae stage and young fish are found in estuarine waters before going to sea to mature.	No - The Grand Canal is situated 90 km (fluvial distance) from the estuary of the River Barrow. It is highly unlikely that twaite shad would travel this distance to their spawning grounds as they prefer locations closer to the tidal limit.
Atlantic salmon [1106]	Adults spend the majority of their life at sea, returning to upstream freshwater spawning grounds in the summer. After larvae hatch, they develop into juvenile salmon and usually stay in a river for two to three years eventually	**Yes** – Fluvial connection exists between a known location of migratory salmon and the Grand Canal 25 km downstream. Although the Grand Canal does not lead to any documented spawning ground. it is difficult to entirely

QI Species	Habitat Description	Habitat estimated to have been present within the Grand Canal adjacent to the Application Site?
	making their way back to sea. As a result, salmon inhabitant a wide range of conditions from upstream redds to cold water feeding grounds thousands of kilometres away. They return to spawning grounds where they were born after a year or more winters at sea. Review of several online datasets from IFI identified no spawning ground upstream of the Grand Canal adjacent to the Application Site.	rule out the presence of migrating salmon. It is highly unlikely salmon use the canal as a migratory route however, the possibility cannot be entirely ruled out.
Otter [1355]	Widespread throughout all Irish fresh-water and coastal waters. As opportunistic predators, prey can include stickleback, salmonids, frogs, ells, crayfish, molluscs as well as on rare occasions birds and small terrestrial mammals. Otter habitat includes riparian buffers (10 m) and they have been observed to forage only within 80 m of banks. Female otters have a home range in Ireland of 9 km whilst males have a home range of 18.5 km (Reid, et al., 2013b). As otters are known to exit waterways to travel over land, SAC otters could have travelled from the River Barrow into the canal at Monasterevin, which is ~2.5 km from the Application Site and within their home range. or up the River Figile and out of the SAC	**Yes** – due to the estimated presence of prey species in the Grand Canal as well the opportunistic nature of otters, otters from the SAC were likely to have been present within the Grand Canal to forage.

Disturbance / Mortality

Increased noise, vibration, light and movement levels (plant, vehicles and people) and vegetation clearance caused by enabling and operation of the Project may have directly displaced mobile IEFs from resting places and/or foraging areas within the Application Site over the Assessment Period, thus potentially impacting breeding success or survival. The sheltering places of most mobile IEFs are protected by law, and it is necessary to take measures to ensure compliance with the relevant legislation.

Light

The hours of operation have been described within Chapter 2 (Project Description). These hours are considered to have been daylight hours. As such, artificial light is not assessed as an impact pathway.

Noise and Vibration

As described within Chapter 9 (Noise and Vibration), there was no monitoring noise or vibration data available from the Assessment Period. Baseline noise conditions were estimated to be below the EPA recommended noise limit value. There were no calculations on vibrations resulting from blasting however, no complaints were made during the Assessment Period from blasting.

Therefore, noise is not considered an impact pathway, but vibration is. It may have resulted in disturbance and mortality affecting aquatic and terrestrial species.

Visual

A review of aerial imagery identified several natural visual screens:

- The dense mature hedgerow that bordered the Application Site to the north and west and separating it from the Grand Canal;
- The hedgerow to the southwest of the Application Site;
- The hedgerow separating the Application Site from the neighbouring quarry to the east; and
- The hedgerow to the direct south of the quarry void.

As such there was only opportunity for visual disturbance within the Application Site and the arable field directly to the southwest. This rationale is followed when assessing ecological receptors and visual disturbance is only included as an effect when the receptor may have been present either within the Application Site or within the arable field to the southeast.

4.6.2 Assessment of Potential Effects

Potential effects on IEFs (in the absence of mitigation) as a result of the above impacts are described below and summarised in Table 4-32. Significance was assessed following methodology outlined in Section 4.4 where effects defined as 'Moderate' or greater are considered to have the potential to result in a significant effect. However, in the case of a

‘Moderate’ effect, a significant effect won’t have occurred if the effect can be identified as being tolerable.

Designated Sites

River Barrow and River Nore SAC

Habitat Degradation: Dewatering

A stable hydrological regime, specifically the availability of groundwater and the height of the water table, is important for QI. As described in Chapter 6 (Water), the bedrock aquifer below the site was highly productive over the Assessment Period and the results of Bagenalstown Upper and Cushina groundwater monitoring show a good overall status. It can be deduced that the effect of dewatering had a negligible magnitude and was very unlikely (<10% probability of occurrence) to have occurred.

Following the assessment matrix as detailed within Table 4-9, the high sensitivity of this site combined with the negligible magnitude of the effect of dewatering results in the effect having had negligible significance. The effect is not considered further.

Habitat Degradation: Dust Deposition

The effect relates to deposition of dust to the Grand Canal adjacent to the Application Site, which potentially comprises FLL for a number of QI (as indicated in Table 4-28 and Table 4-29).

Waterways Ireland, the Central Fisheries Board and the South & East River Basin District used monitoring data from 2006 – 2007 to assess the ecological potential of the Grand Canal (barrow line) and concluded the canal to have Good Ecological Potential (2008). This indicates that any degradation to the canal from dust emissions during the Assessment Period would have been short-term in nature. As such, it can be determined that the effect of dust deposition was of a small magnitude. Following the assessment matrix as detailed within Table 4-9, the high sensitivity of this site combined with the small magnitude results in the effect being of minor-moderate significance. To determine whether this effect is significant, tolerance was assessed (Table 4-30).

An aerial review of habitat suitability suggested that the Grand Canal may have provided breeding habitat for a single QI: white clawed crayfish [1092]. This species is considered a keystone or heritage species and is tolerant of low-quality waters[36], significant fluctuations in temperature, dissolved oxygen and lime. As detailed within Chapter 6 (Water), the canal was estimated to have had a Q value of 3-4 at the end of the Assessment Period. As such, it is considered that the species would have been tolerant of minor dust deposition and the survival of their population was unlikely to have been impacted. Therefore, the effect on breeding QI was of minor significance.

[36] Water quality is measured in Q values with low quality water being below a Q value of 3.

Aerial review of habitat suitability suggested that the Grand Canal and / or habitats adjacent to the canal or within the Application Site may have also provided migrating/foraging/commuting habitat for several QI. Tolerance of these species to dust deposition in the context of migrating/commuting/foraging is summarised within Table 4-30 below.

Table 4-30 – Tolerance of Aquatic QI from the River Barrow and River Nore SAC to Dust Deposition within the Grand Canal

Species	Tolerance Description	Tolerance Yes/No
White-clawed crayfish [1092]	Tolerant of low water quality to Q3 (moderate quality, noticeable pollution). Chapter 6 (Water) estimates that the water quality was likely Q3-4 at the end of the Assessment Period. Therefore, it is estimated that white-clawed crayfish were tolerant of the slight, short-term dust deposition during the Assessment Period.	Yes
brook lamprey [1096]	Sea, brook and river lamprey have been observed in a wide range of water quality types, as low as Q-2 and no correlation between their success and the Q-value has been identified. As such, it is estimated that sea, brook and river lamprey were tolerable of the slight, short-term dust deposition during the Assessment Period.	Yes
river lamprey [1099]	Sea, brook and river lamprey have been observed in a wide range of water quality types, as low as Q-2 and no correlation between their success and the Q-value has been identified. As such, it is estimated that sea, brook and river lamprey were tolerable of slight, short-term dust deposition during the Assessment Period.	Yes
Salmon [1106]	As described within S.I. No. 293/1988 European Communities (Quality of Salmonid Waters) Regulations, 1988, standards of water temperature, oxygen levels, ph balance, turbidity, pollutants and nutrient levels must be maintained for habitat suitability for salmon. Dust deposition may have resulted in changes to water turbidity and substrate composition. However, due to the fluvial connectivity 25 km downstream to the River Barrow, there is a very low likelihood that these species were present in a brief and transient nature within the canal.	No

Species	Tolerance Description	Tolerance Yes/No
	Chapter 7 (Air Quality), concluded that the risk of an adverse effect due to dust emissions was low during the assessment period. It can be estimated that salmon were unlikely to have been present within the canal and were not tolerant of the low risk of dust deposition.	
Otter [1355]	Due to their opportunistic nature, any unlikely decrease in prey availability due to dust deposition would not have affected persistence of the population. Water quality has been estimated to have been Q-3, indicating slight pollution within the waterway. However, the National Otter Survey of Ireland 2004/2005 (Bailey & Rochford, 2006) found no significant difference between polluted and unpolluted sites indicating reasonable tolerance. Therefore, it is estimated that otter were tolerable of the slight, short term dust deposition during the Assessment Period.	Yes

Due to the tolerance outlined in the table above, dust deposition resulted in a minor significant effect on migrating/commuting/foraging white-clawed crayfish, sea lamprey, brook lamprey, river lamprey and otter and is not considered further.

Salmon were identified as sensitive species and not tolerant of dust deposition. As such, dust deposition may have resulted in a minor to moderate significant effect on migrating/foraging salmon. However, considering the assessment (Chapter 7) as well as the likelihood of the presence of the above fish species within the canal, the likelihood of habitat degradation (dust deposition) affecting QI of the SAC was determined to be a very unlikely probability of occurrence.

The effect of dust deposition on migrating white-clawed crayfish, sea lamprey, brook lamprey, river lamprey and otter is concluded to have been minor, given the contextual information regarding the likelihood of presence along with the localised effect of dust deposition, the effect on salmon is also assessed as minor. The effect can be characterised as indirect, negative, short-term and very unlikely in nature.

Disturbance/Mortality

The effect of disturbance/mortality on QI of the SAC including white-clawed crayfish, river and brook lamprey, salmon and otter were considered.

White-clawed crayfish lack swim bladders or gas filled spaces within their body and so, are resilient to noise and vibration disturbances (Popper, Salmon, & Korch, 2001). Similarly,

lamprey don't have swim bladder or gas filled spaces (Borowiec, et al., 2021) Therefore the effect of disturbance/mortality is not considered further.

Salmon have swim bladders and are therefore susceptible to barotrauma due to particle motion rather than sound pressure (Popper, et al., 2014). However, as salmon are unlikely to be present within the Grand Canal due to the ill-suited habitat as described in Table 4-30, the magnitude of the effect on salmon was very small-negligible.

Otter was likely present along the Grand Canal however, as described in Table 4-28, suitable natal habitat was likely absent. As such, any disturbance /mortality effect is likely to impact lone foraging/commuting otters. Therefore, the magnitude of the effect on otter is also very small-negligible.

The effect is unlikely to have occurred (<33% probability, Table 4-11). The high sensitivity of the site combined with the negligible magnitude resulted in a negligible effect.

In conclusion, the effect of disturbance/mortality on salmon and otter from the SAC was direct, negative, unlikely and short term.

Grand Canal pNHA

Habitat Degradation: Dust Deposition

Due to its national value, this designated site is determined to be of high importance or sensitivity.

Dust deposition may have resulted in temporarily poorer water quality. As detailed in Chapter 6 (Water), the Q value of the Grand Canal was estimated to be 3 or 4. It is estimated that the Q value in 2006 was the same as that at the start of the Assessment Period in 2000, indicating no medium-long-term change to water quality. In addition, Waterways Ireland, the Central Fisheries Board and the South & East River Basin District used monitoring data from 2006 – 2007 to assess the ecological potential of the Grand Canal (barrow line) and concluded the canal to have Good Ecological Potential (2008). As such, the effect of dust deposition is evaluated in the short-term and at small magnitude.

Following the assessment matrix as detailed within Table 4-9, the high sensitivity of this site combined with the small magnitude results in the effect being of minor-moderate significance. To determine whether the effect was minor or moderate significance, tolerance was assessed.

Arrowhead, watercress, hemlock water droplet, opposite-leaved pondweed and smooth newt were scoped out on the tolerance assessment based on their known distribution/locations. As outlined in Table 4-31 hedgerows, tall herbs and calcareous grassland were found within the EZoI and are not considered tolerable of the effect. Otter was tolerant of the effect.

Therefore, the direct, negative, short-term and likely probability of occurrence, the effect of dust deposition was of moderate significance to hedgerows, tall herbs and calcareous grassland within the pNHA and considered to of minor significance to otter.

Table 4-31 – Tolerance of QI from the Grand Canal pNHA located within the EZoI to Dust Deposition

Feature	Location	Relevant	Tolerance Description	Tolerance Yes/No
Hedgerow (dominated by hawthorn)	Adjacent to the Application Site	Yes	Plants are sensitive to dust deposition with it resulting in a short-term change to photosynthesis and transpiration. Although the effect was short-term in nature, it may have temporarily affected hedgerow species.	No
Tall Herbs	Estimated adjacent to the Application Site	Yes	Plants are sensitive to dust deposition with it resulting in a short-term change to photosynthesis and transpiration. Although the effect was short-term in nature, it may have temporarily affected hedgerow species.	No
Calcareous Grassland	Estimated adjacent to the Application Site	Yes	Plants are sensitive to dust deposition with it resulting in a short-term change to photosynthesis and transpiration. Although the effect was short-term in nature, it may have temporarily affected hedgerow species.	No
Otter	Estimated adjacent to the Application Site	Yes	Due to their opportunistic nature, any decrease in prey availability due to dust deposition would not have affected persistence of the population. Water quality has been estimated to have been Q-3, indicating slight pollution within the waterway. However, the National Otter Survey of Ireland 2004/2005 (Bailey & Rochford, 2006) found no significant difference between polluted and unpolluted sites indicating reasonable tolerance.	Yes

Disturbance/Mortality

The Grand Canal pNHA is of national value and so, is of high importance or sensitivity. The effect of disturbance/mortality was assessed on QI from the pNHA including otter.

Otter was likely present along the Grand Canal however, as described in Table 4-28, suitable natal habitat and holt sites were likely absent. As such, any disturbance /mortality effect is likely to impact lone foraging/commuting otters. Therefore, the magnitude of the effect on otter is very small-negligible.

Following the assessment matrix, as detailed within Table 4-9, the high sensitivity of this site combined with the very small-negligible magnitude results in the effect being of negligible-minor significance. The effect was unlikely to have occurred (<33% probability, Table 4-11).

In conclusion, the effect of disturbance/mortality on otter from the pNHA was direct, negative, unlikely and short term.

Habitats

Hedgerow WL1

Habitat Loss

It is estimate that approximately 105 m was removed to facilitate access, extraction and stockpiling relating directly to the Project. This loss equates to approximately 7.75% (105 m/1354 m) of overall hedgerow at the Application Site. As such, the magnitude of change for the effect is considered small.

As outlined in Table 4-26, this receptor is of local importance (higher value) and as such has a sensitivity of low when assessed within Table 4-6. Therefore, by following the Assessment matrix (Table 4-9), the effect was negligible-minor and is not considered further.

Mammals

Bats

Habitat Loss

Loss of hedgerow resulted in the loss of foraging habitat and linear flight path features for foraging bats. As the population of bats estimated to have been using these features is of national importance (Table 4-26) the sensitivity of this ecological feature is high (Table 4-6). The magnitude of change for the habitat loss is small. Therefore, by following the Assessment matrix (Table 4-9), the effect was minor– moderate and requires further consideration.

The Application Site is situated in a rural landscape criss-crossed with many mature hedgerows. The loss of hedgerow within the Application Site represents a small fraction of the available hedgerow for foraging bats within the local area. In addition to hedgerows, the Grand Canal, River Figile and Ummeras Beg are waterways in proximity that represent foraging resource and flight path features. There was no direct loss of potential roosting habitat. The effect of habitat loss was therefore tolerable by bats and is considered of minor significance. The effect was direct, negative, with a certain probability of occurrence, permanent and long-term in nature.

Disturbance / Mortality

Disturbance to foraging and roosting bats may have been caused by artificial light. As detailed by Andrews and Pearsons (2022), many bat species emerge within 30 minutes of sunset. Sunset was during hours of operation between late October and the start of February, therefore for just over three months of the seven operational years, activities relating to the operation of the Project could have been impacting foraging bats.

Furthermore, only one mature tree to the south of the Application Site was identified as having potential to support a bat roost throughout the year. Activity relating to the project such as localised vibration and noise, could have disturbed this potential roost. However, the field surveys in 2024 did not identify any suitable roost features in the tree so it is likely that any roost, if present, was of a small scale such as a day roost, night roost or feeding roost.

The sensitivity of this receptor was high (Table 4-6, Table 4-26) whilst the magnitude of change for the effect of disturbance is very small. The effect is direct, negative, unlikely and temporary in nature. Therefore, by following the Assessment matrix (Table 4-9), the effect was negligible-minor and is not considered further.

Badgers

Habitat Loss

The loss of 7.8 ha of arable habitat as well as the loss of 105 m of hedgerow over the Assessment Period represents a loss of foraging habitat for badger. Furthermore, hedgerows often present suitable habitat for sett creation and so, it is estimated that the hedgerow loss also represents a loss in available habitat for sett creation and expansion.

The sensitivity of this receptor was low (Table 4-6, Table 4-26) whilst the magnitude of the effect of habitat loss is medium. The effect is direct, negative, certain and permanent in nature. Therefore, by following the Assessment matrix (Table 4-9), the effect was minor and is not considered further.

Disturbance / Mortality

Activity including movement of vehicles and plants, operation of plant, blasting resulting in noise and vibration may have disturbed resting badgers within the Application Site or adjacent. Badgers and their sets are protected under the WA and intentional harm to a badger or damage to a sett by the Project would have been illegal and no evidence of harm or damage is available. A potential inactive sett was identified in 2024 however, it is located within an area which would have been active during the Assessment Period and unsuitable for sett construction. Any potential setts during the Assessment Period are estimated to have been present along hedgerows only and relatively protected from anticipated levels of disturbance.

Site activities may have resulted in disturbance and on a precautionary basis, mortality cannot be excluded. However, there is no evidence that this occurred.

The sensitivity of this receptor was low (Table 4-6, Table 4-26) whilst the magnitude of the effect of disturbance and mortality was localised and medium. The effect was direct, negative, medium-term and unlikely in nature. By following the Assessment matrix (Table 4-9), the effect is considered to have been minor and is not considered further.

Pine marten

Habitat Loss

Approximately 105 m of hedgerow habitat suitable for foraging pine marten was lost during the Assessment Period. Pine martens are unlikely to have chosen to den in hedgerows within the Application Site, rather they would have chosen to den in the one of the many woodland or treeline habitats within the wider landscape. As such, hedgerow loss is only considered in the context of loss of foraging resource.

The sensitivity of this receptor was low (Table 4-6, Table 4-26) whilst the magnitude of change was small. The effect was direct, negative, long-term and certain in nature. Following the assessment Matrix, the effect was assessed to be negligible-minor and is not considered further.

Disturbance / Mortality

As it was unlikely that pine marten would be denning within the Application Site, disturbance is related to foraging activity only. As mostly nocturnal species, it is unlikely that a pine marten would have been disturbed during operational hours.

Sunset was during hours of operation between late October and the start of February, therefore for just over three months of the year (21 months in total over the Assessment Period), activities relating to the operation of the Project including light, noise and vibration could have resulted in minor and localised disturbance to foraging pine marten.

The sensitivity of this receptor was low (Table 4-6, Table 4-26) whilst the magnitude of change was small. The effect was direct, negative, unlikely and temporary in nature. Therefore, by following the Assessment Matrix (Table 4-9), the effect is negligible-minor and is not considered further in this assessment.

Invasive Fauna

Spread of Invasive Species

Suitable habitat for invasive fauna including grey squirrel and sika deer were present within the Application Site. Works during the Assessment Period were very unlikely to have contributed to the introduction or proliferation of invasive fauna.

The sensitivity of this receptor was low (Table 4-6, Table 4-26) whilst the magnitude of the effect was small. The effect was direct, negative, long-term and very unlikely in nature. Following the Assessment Matrix (Table 4-9), the effect was negligible-minor and is not considered further.

Other Non-Volant Mammals

Habitat Loss

Approximately 7.8 ha and 105 m of suitable foraging and resting habitat for small mammals such as pygmy shrew, hedgehog and Irish hare was lost during the Assessment Period. The wider landscape presents ample opportunity for such species and the loss is not thought to have greatly impacted local populations.

The sensitivity of this receptor was low (Table 4-6, Table 4-26) whilst the magnitude of change for the effect was very small. The effect was direct, negative, certain and medium-term. Following the Assessment Matrix (Table 4-9), the effect was negligible and is not considered further in this assessment.

Disturbance/Mortality

Activities including vehicle movement and blasting would have resulted in disturbance to small non-volant mammals. It would be expected that such mammals would flee the Application Site due to the level of disturbance from the works and no direct mortality from works would occur.

The sensitivity of this receptor was low (Table 4-6, Table 4-26) whilst the magnitude of change for the effect was very small. The likelihood of the effect was about-as-likely-as-not. This effect was direct, negative, about-as-likely-as-not and short-term. Following the Assessment Matrix (Table 4-9), the effect was negligible and is not considered further in this assessment.

Birds

Breeding Birds

Habitat Loss

Important habitats for farmland birds including hedgerow (105 m) and arable land (7.8 ha) were lost due to the Project. These habitats are estimated to have supported local populations of breeding birds including those listed as Amber or Red on the BoCCI1. Aerial review of the surrounding landscape showed a mosaic of rural arable and tillage land. Therefore, loss of habitat for breeding birds within the Application Site is of a small magnitude.

As evaluated within Table 4-26, breeding birds were of county importance. Following the methodology presented in Table 4-6, the sensitivity of this receptor was medium. The effect was direct, negative, long-term and certain in nature. Utilising the Assessment Matrix (Table 4-9), the effect was minor and not considered further in this assessment.

Habitat Degradation

Dust deposition may have resulted in habitat degradation impacting breeding birds.

Dust deposition within the Application Site may have temporarily degraded vegetation, reducing plant health and food availability such as insects and seeds. Furthermore, dust deposition may have reduced foliage quality affecting shelter and nesting materials. However, these changes were unlikely to have resulted in permanent impacts to the population. Habitat degradation is therefore considered as an effect of very small magnitude.

As evaluated within Table 4-26, breeding birds were of county importance. Following the methodology presented in Table 4-6, the sensitivity of this receptor was medium. The effect was direct, negative, short-term and unlikely in nature. Utilising the Assessment Matrix (Table 4-9), the effect was negligible and not considered further in this assessment.

Disturbance / Mortality

Noise and vibration may have resulted in the abandonment of nests and the subsequent failure of breeding pairs impacting local populations. As a precaution it is estimated that vegetation clearance (including hedgerow removal) occurred within the breeding season potentially resulting in disturbance of nesting birds as well as mortality. The widespread availability of arable land and hedgerows during the Assessment Period promotes re-population of the species in new areas. The effect of noise and vibration may have caused short-term changes to populations of breeding birds but are not expected to have resulted in permanent changes to the conservation status of the birds. Therefore, the magnitude of change was considered small.

As evaluated within Table 4-26, breeding birds were of county importance. Following the methodology presented in Table 4-6, the sensitivity of this receptor was medium. The effect was direct, negative, short-term and unlikely in nature. Utilizing the Assessment Matrix (Table 4-9), the effect was minor and not considered further in this assessment.

Birds: Non-breeding and wintering birds

Habitat Loss

Important habitats for farmland birds including hedgerow (105m) and arable land (7.8 ha) were lost due to the Project. These habitats are estimated to have supported populations of non-breeding and wintering birds including those listed as Amber or Red on the BoCCI1. The desk study identified important local populations of wintering golden plover, lapwing, greylag geese and whooper swan. Arable and ploughed fields provide an important foraging resource. In the absence of data on the crops sown in these fields, the precautionary principle is followed, and it is estimated that fields were sparsely vegetated with spring-sown cereals suitable for foraging wintering birds. Aerial review of the surrounding landscape showed a mosaic of rural arable and tillage land potentially suitable for wintering birds. Therefore, loss of habitat for non-breeding and wintering birds is of a medium magnitude.

As evaluated within Table 4-26, non-breeding and wintering birds were of local importance (higher value). Following the methodology presented in Table 4-6, the sensitivity of this receptor was low. The effect was direct, negative, long-term and certain in nature. Utilising the Assessment Matrix (Table 4-9), the effect was minor and not considered further in this assessment.

Disturbance / Mortality

Noise and vibration may have disturbed non-breeding and wintering birds which were roosting or foraging within the Application Site. Birds may have fled the Application Site and found refuge in adjacent lands where suitable habitat was present. In addition, activities associated with the Project may have resulted in direct mortality if nesting birds were present. It is noted that site activities may have resulted in disturbance and on a precautionary basis, mortality cannot be excluded. However, there is no evidence that this occurred.

The effect of noise and vibration may have caused short-term changes to populations of non-breeding and wintering birds but are not expected to have resulted in permanent changes to the conservation status of the species. The magnitude of change was therefore considered small.

As evaluated within Table 4-26, non-breeding and wintering birds were of local importance (higher value). Following the methodology presented in Table 4-6, the sensitivity of this receptor was low. The effect was direct, negative, long-term and about as unlikely as not in nature. Utilising the Assessment Matrix (Table 4-9), the effect was negligible-minor and not considered further in this assessment.

Herpetofauna

Amphibians

Habitat Loss

Loss of hedgerow (105 m) resulted in loss of overwintering and foraging habitat for common frog and smooth newt. Aerial review showed hedgerow widespread within the local area. Amphibians would likely colonise these alternative areas following habitat loss within the Application Site. The effect of habitat loss may have caused short-term changes to populations of amphibians but are not expected to have resulted in permanent changes to the conservation status of the species. The magnitude of change was therefore considered small.

As evaluated within Table 4-26, amphibians were of local importance (higher value). Following the methodology presented in Table 4-6, the sensitivity of this receptor was low. The effect was direct, negative, long-term and certain in nature. Utilising the Assessment Matrix (Table 4-9), the effect was negligible-minor and not considered further in this assessment.

Habitat Degradation

Whilst unlikely, hydrocarbon spills during the Project may have resulted in temporary localised degradation of habitats, specifically hedgerow habitats. The sensitivity of this receptor is low whilst the magnitude of the effect is negligible. The effect was indirect, negative, very unlikely and temporary. Therefore, by following the Assessment matrix (Table 4-9), the effect was negligible and is not considered further.

Disturbance / Mortality

Noise and vibration may have disturbed overwintering and foraging amphibians. They may have fled the Application Site and found refuge in adjacent lands where suitable habitat was present. In addition, activities associated with the Project, such as movement of plant, may have resulted in direct mortality to local common frog and smooth newt within the Application Site.

Disturbance / mortality may have caused short-term changes to populations of amphibians but are not expected to have resulted in permanent changes to the conservation status of the species. The magnitude of change was therefore considered small.

Site activities may have resulted in disturbance and on a precautionary basis, mortality cannot be excluded. However, there is no evidence that this occurred.As evaluated within Table 4-26, amphibians were of local importance (higher value). Following the methodology presented in Table 4-6, the sensitivity of this receptor was low. The effect was direct, negative, short-term and unlikely in nature. Utilizing the Assessment Matrix (Table 4-9), the effect was negligible-minor and not considered further in this assessment.

Reptiles

Habitat Loss

Loss of hedgerow (201 m) resulted in loss of habitat for shelter/refuge for common lizard. Aerial review showed hedgerow widespread within the local area. Reptiles would likely colonise these alternative areas following habitat loss within the Application Site. The effect of habitat loss may have caused short-term changes to populations of reptiles but is not expected to have resulted in permanent changes to the conservation status of the species. The magnitude of change was therefore considered small.

As evaluated within Table 4-26, reptiles were of local importance (higher value). Following the methodology presented in Table 4-6, the sensitivity of this receptor was low. The effect was direct, negative, long-term and certain in nature. Utilizing the Assessment Matrix (Table 4-9), the effect was negligible-minor and not considered further in this assessment.

Disturbance / Mortality

Noise and vibration may have disturbed sheltering reptiles. They may have fled the Application Site and found refuge in adjacent lands where suitable habitat was present. In addition, activities associated with the Project, such as movement of plant, may have resulted in direct mortality to local common lizard within the Application Site.

Site activities may have resulted in disturbance and on a precautionary basis, mortality cannot be excluded. However, there is no evidence that this occurred.

Disturbance resulting from noise and vibration may have caused short-term changes to populations of reptiles but are not expected to have resulted in permanent changes to the conservation status of the species. The magnitude of change was therefore considered small.

As evaluated within Table 4-26, reptiles were of local importance (higher value). Following the methodology presented in Table 4-6, the sensitivity of this receptor was low. The effect was direct, negative, short-term and unlikely in nature. Utilising the Assessment Matrix (Table 4-9), the effect was negligible-minor and not considered further in this assessment.

Fish and Aquatic Invertebrates

Habitat Degradation: Dust Deposition

Dust deposition may have temporarily changed the water quality within the canal affecting fish species. Fish and aquatic invertebrates identified in the desk study include river lamprey, brook lamprey, salmon and white clayed crayfish. Habitat preferences for each of these species (as detailed within Table 4-28 and Table 4-29) indicate suitability of the canal within some life stage (except for breeding). As such, dust deposition is not estimated to have resulted in permanent change to the conservation status of fish species and the magnitude of change is considered small.

As evaluated within Table 4-26, fish were of county importance (higher value). Following the methodology presented in Table 4-6, the sensitivity of this receptor was medium. The effect was direct, negative, short-term and unlikely in nature. Utilizing the Assessment Matrix (Table 4-9), the effect was minor and not considered further in this assessment.

Disturbance/Mortality

The effect of disturbance/mortality on fish and aquatic invertebrates including white-clawed crayfish, river and brook lamprey, salmon and otter were considered.

White-clawed crayfish lack swim bladders or gas filled spaces within their body and so, are resilient to noise and vibration disturbances (Popper, Salmon, & Korch, 2001). Similarly, lamprey don’t have swim bladder or gas filled spaces (Borowiec, et al., 2021) Therefore the effect of disturbance/mortality is not considered further.

Salmon have swim bladders and are therefore susceptible to barotrauma due to particle motion rather than sound pressure (Popper, et al., 2014). However, as salmon are unlikely

to be present within the Grand Canal due to the ill-suited habitat as described in Table 4-30, the magnitude of the effect on salmon was very small-negligible.

The sensitivity of this receptor was medium whilst the magnitude of the effect was also very small. The effect was direct, negative, long-term and very unlikely in nature. Following the Assessment Matrix, the effect was assessed to be minor.

Summary

A summary of the effects identified, and their significance are provided within Table 4-32.

Table 4-32 – Summary of Potential Effects on IEFs Prior to Mitigation

Ecological Receptor	Evaluation	Type of Effect	Scale of Effect	Significant
Designated Sites				
River Barrow and River Nore SAC	International	Habitat Degradation: ■ Dewatering	Negligible	No Significance
		Habitat Degradation: ■ Dust Deposition	Minor	No Significance
		Disturbance / Mortality	Negligible	No Significance
Grand Canal pNHA	National	Habitat degradation ■ Dust emissions resulting in dust deposition on vegetation	Moderate	Significance
		Disturbance/Mortality	Negligible-Minor	No Significance
Habitats				
Hedgerow WL1	Local Importance (Higher Value)	Habitat Loss	Negligible-Minor	No Significance
Mammals				

Ecological Receptor	Evaluation	Type of Effect	Scale of Effect	Significant
Bats	Local Importance (Higher Value)	Habitat Loss:	Minor	No Significance
		Disturbance	Negligible-Minor	No Significance
Badgers	Local Importance (Higher Value)	Habitat Loss	Minor	No Significance
		Disturbance / Mortality	Minor	No Significance
Pine marten	Local Importance (Higher Value)	Habitat Loss	Negligible-Minor	No Significance
		Disturbance / Mortality	Negligible-Minor	No Significance
Invasive Fauna	Local Importance (Higher Value)	Spread of invasive species	Negligible-Minor	No Significance
Other non-volant mammals	Local Importance (Higher Value)	Habitat Loss	Negligible	No Significance
		Disturbance / Mortality	Negligible	No Significance
Birds				
Breeding Birds	Local Importance (Higher Value)	Habitat Loss	Minor	No Significance
		Habitat Degradation	Negligible	No Significance
		Disturbance / Mortality	Minor	No Significance
		Habitat Loss	Minor	No Significance

Ecological Receptor	Evaluation	Type of Effect	Scale of Effect	Significant
Non-breeding and wintering birds	Local Importance (Higher Value)	Disturbance / Mortality	Negligible-Minor	No Significance
Herpetofauna				
Amphibians	Local Importance (Higher Value)	Habitat Loss	Negligible-Minor	No Significance
		Habitat degradation	Negligible	No Significance
		Disturbance / Mortality	Negligible-Minor	No Significance
Reptiles	Local Importance (Higher Value)	Habitat Loss	Negligible-Minor	No Significance
		Disturbance / Mortality	Negligible-Minor	No Significance
Fish and Aquatic Invertebrates				
Fish and aquatic invertebrates	County Importance	Habitat Degradation	Minor	No Significance
		Disturbance / Mortality	Minor	No Significance

4.7 Remedial Mitigation, Compensation and Enhancement Measures

The objective of this section is to explore potential mitigation options in a retrospective context, with respect to any significant effects[37] deemed to have occurred during the Assessment Period. In accordance with the impact assessment presented in Table 4-32, the only effect deemed significant was dust deposition on the sensitive habitat receptors within the Grand Canal pNHA.

With reference to the mitigation hierarchy (see Table 4-12), and acknowledging that these events have already occurred, it is impossible to avoid or mitigate impacts. The only recourse is therefore to compensate and enhance.

4.7.1 Section 37L Application

Subject to the success of this substitute consent application, Bison Quarries Ltd also intent to apply for permission to infill the Application Site and restore the land to agricultural use. This application will be submitted separately, under Section 37L of the Planning and development Act, as amended. That being the intention, any proposals for biodiversity enhancement need to be incorporated into future plans, and therefore included in the Section 37L application, which will be provided as a separate document.

Compensation and Enhancement

The following sections detail recommended compensation and enhancement for the significant impacts addressed above. A detailed Restoration Plan will be included with this substitute consent application, which will include mitigation, compensation and enhancement measures for effects of minor and moderate significance for the past and future.

Habitat replacement – Hedgerow

It is recommended that that the area of hedgerow lost should be compensated for by replacing it with at least an additional 105 m of hedgerow in an appropriate location within the Application Site.

Methodology should be adapted from that set out by the NBDC (2009). These guidelines recommend a diverse range of native species including those already present within the existing hedgerows. Trees and shrubs should be planted as soon as possible with ground flora also planted. Timing of planting will be subject to seasonal constraints.

4.8 Residual Effects

Following the implementation of compensation and enhancement measures, the residual impacts on IEFS are listed below in Table 4-33.

[37] In addition to the loss of any hedgerow habitat.

Table 4-33 – Residual Impacts

IEF	Potential Effect	Scale of Effect	Compensation and Enhancement	Residual Impact
Grand Canal pNHA	Habitat Degradation ■ Dust Deposition affecting: • Hedgerows • Tall herbs • Calcareous grassland	Moderate	None	Moderate

4.9 Cumulative Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Ecological features may be already exposed to background levels of threat or pressure and may be close to critical thresholds where further impact could result in irreversible decline. Cumulative effects can also make habitats and species more vulnerable or sensitive to change (CIEEM, 2024a).

Other permitted / constructed third party developments have been considered in light of the projects listed within Chapter 2 (Project Description). The neighbouring quarry to the northeast of the Application Site was identified as having the potential to cumulative effect air quality, water quality and availability as well as noise/vibration which could result in habitat degradation as well as disturbance. Review of Chapter 6 (Water), Chapter 7 (Air Quality) and Chapter 9 (Noise and Vibration) did not show a cumulative increase to these impact pathways.

Habitat Loss is the only effect which could have provided an impact pathway which would be considered cumulatively. Whilst insignificant in isolation, it may contribute to large-scale habitat loss in the wider environment. A brief assessment of habitat loss from the neighbouring quarry showed approximately 4 ha of arable fields and 260 m of hedgerow lost during the Assessment Period. When considered in light of the wider landscape, this loss is of a low magnitude and effects are minor. Similarly, when considered in combination with habitat loss from the Project, effects are minor.

Cumulative effects are assessed to have been **Not Significant.**

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Appendix 4A

Additional Information: Assessment Methodology

Table A-1 – Assessing suitability of sites for bats, based on the presence of habitat features within a landscape (Collins 2023)

Suitability	Habitat Suitability Criteria
None	No habitat features on site likely to be used by roosting, commuting or foraging bats at any time of year.
Negligible	No obvious habitat features on site likely to be used by roosting, commuting or foraging bats however, some uncertainty is present.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically at any time of year, however, are not of sufficient size to be used regularly or for maternity/hibernation. Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by another habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat type but is unlikely to support a roost of high conservation status, such as maternity or hibernation. Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure with one or more potential roost sites that are obviously suitable for a larger number of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat. These structures have the potential to support high conservation status roosts e.g. maternity or classic cool/stable hibernation site. Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

Table A-2 – Survey Effort: Static Bat Detector Surveys

Survey Night	Date	Start Time	End[38] Time	Duration	Weather Conditions[39]
1	11/07/2024	22:23:44	05:43:48	08:20:04	Temperature: 11.8°C; Rainfall: 0.4mm; Wind speed: 7.3kts; Wind direction: NNW
2	12/07/2024	21:22:47	05:45:00	08:22:13	Temperature: 11.8°C; Rainfall: 0mm; Wind speed: 5.6kts; Wind direction: NNW
3	13/07/2024	21:21:47	05:46:14	08:24:26	Temperature: 13.6°C; Rainfall: 0mm; Wind speed: 4kts; Wind direction: NW
4	14/07/2024	21:20:44	05:47:30	08:26:46	Temperature: 13.2°C; Rainfall 0.7mm; Wind speed: 3.1kts, Wind direction: SE
5	15/07/2024	21:19:38	05:50:07	08:30:29	Temperature: 12.3°C; Rainfall: 0mm; Wind speed: 3.2kts, Wind direction: SE
6	16/07/2024	21:18:30	05:51:28	08:32:58	Temperature: 13.6°C; Rainfall: 1.3mm; Wind speed: 3.1kts, Wind direction: W
7	17/07/2024	21:17:18	05:52:51	08:35:33	Temperature: 12.5°C; Rainfall: 0mm; Wind speed: 3.5kts, Wind direction: SSW
8	18/07/2024	21:16:04	05:54:16	08:38:12	Temperature: 15.1°C; Rainfall: 2mm; Wind speed: 7.7kts; Wind direction: SSE
9	19/07/2024	21:14:48	05:55:42	08:40:54	Temperature: 16.7°C; Rainfall: 0.2mm; Wind speed: 7.1kts; Wind direction: S

38 The survey end time occurred +1 (day) from the start date.

39 Weather conditions describe nighttime conditions for each survey night, starting at 19:00 on the date indicated and continuing to 07:00 the following day. Temperature, windspeed and wind direction are an average over the nighttime period with rainfall being a sum of the hourly amounts recorded. All values have been rounded to one decimal place.

Survey Night	Date	Start Time	End[38] Time	Duration	Weather Conditions[39]
10	20/07/2024	21:13:28	05:57:09	08:43:41	Temperature: 15.3°C; Rainfall: 2.4mm; Wind speed: 5.8kts; Wind direction: SSE
11	21/07/2024	21:12:06	05:58:38	08:46:32	Temperature: 12°C; Rainfall: 0mm; Wind speed: 4.2kts; Wind direction: NW
12	22/07/2024	21:10:42	06:00:07	08:49:25	Temperature: 15.4°C; Rainfall: 0.8mm; Wind speed: 6.4kts; Wind direction: SW
13	23/07/2024	21:09:15	06:01:38	08:52:23	Temperature: 14.5°C; Rainfall: 1.3mm; Wind speed: 7.2kts; Wind direction: WNW
14	24/07/2024	21:07:46	06:03:11	08:55:25	Temperature: 15.1°C; Rainfall: 0mm; Wind speed: 6kts; Wind direction SSE
15	25/07/2024	21:06:15	06:04:44	08:58:29	Temperature: 16.3°C; Rainfall: 0mm; Wind speed: 4.5kts; Wind direction SSW
16	26/07/2024	21:04:41	06:06:18	09:01:37	Temperature: 12.6°C; Rainfall: 0mm; Wind speed: 6.3kts; Wind direction: SW
17	27/27/2024	21:03:06	06:07:53	09:04:47	Temperature: 13.3°C; Rainfall: 2.1mm; Wind speed: 3.4kts; Wind direction: S
18	28/07/2024	21:01:28	06:09:29	09:08:01	Temperature: 13°C; Rainfall: 0mm; Wind speed: 3kts; Wind direction: S
19	29/07/2024	20:59:48	06:11:06	09:11:18	Temperature: 13.1°C; Rainfall: 0mm; Wind speed: 5.5kts; Wind direction: SSE
20	30/07/2024	20:58:06	06:12:43	09:14:37	Temperature: 15.9°C; Rainfall: 0mm; Wind speed: 3.7kts; Wind direction: S

Survey Night	Date	Start Time	End[38] Time	Duration	Weather Conditions[39]
21	31/07/2024	20:56:22	06:14:21	09:17:59	Temperature: 12.5°C; Rainfall: 0mm; Wind speed: 2kts; Wind direction: SE
22	01/08/2024	20:54:36	06:16:00	09:21:24	Temperature: 16.2°C; Rainfall: 0mm; Wind speed: 2.9kts; Wind direction: SSW
23	02/08/2024	20:52:49	06:17:39	09:24:50	Temperature: 17.1°C; Rainfall: 0mm; Wind speed: 7kts; Wind direction: S
24	03/08/2024	20:50:59	06:19:19	09:28:20	Temperature: 11.3°C; Rainfall: 0.2mm; Wind speed: 4.1kts; Wind direction: SW
25	04/08/2024	20:49:08	06:21:00	09:31:52	Temperature: 14.1°C; Rainfall: 0.1mm; Wind speed: 4.9kts; Wind direction: SSW
26	05/08/2024	20:47:15	06:22:22	09:35:07	Temperature: 18.1°C; Rainfall: 0.1mm; Wind speed: 15.1kts; Wind direction: S
27	06/08/2024	20:45:21	06:24:22	09:39:01	Mean temperature: 12°C; Rainfall: 0mm; Windspeed: 4.1kts; Wind direction: SSW
28	07/08/2024	20:43:25	06:26:03	09:42:38	Mean temperature: 14.1°C; Rainfall: 0mm; Windspeed: 8.5kts; Wind direction: SW
29	08/08/2024	20:41:27	06:27:45	09:46:18	Temperature: 14.8°C; Rainfall: 0.2mm; Wind speed: 6kts; Wind direction: SSE
30	09/08/2024	20:39:28	06:29:27	09:49:59	Temperature: 15.6°C; Rainfall: 0.1mm; Wind speed: 9.4kts; Wind direction: WSW
31	10/08/2024	20:37:27	06:31:09	09:53:42	Temperature: 16.5°C; Rainfall: 0mm; Wind speed: 6.5kts; Wind direction SSW

Survey Night	Date	Start Time	End[38] Time	Duration	Weather Conditions[39]
32	11/08/2024	20:35:25	06:32:52	09:57:27	Temperature: 13.1°C; Rainfall: 0mm; Wind speed: 2.2kts; Wind direction: SW
33	12/08/2024	20:33:22	06:34:35	10:01:13	Temperature: 18.4°C; Rainfall: 0.1mm; Wind speed: 9.1kts; Wind direction: SSE
34	13/08/2024	20:31:18	06:36:18	10:05:00	Temperature: 16.4°C; Rainfall: 0.7mm; Wind speed: 11.3kts; Wind direction: S
35	14/08/2024	20:29:15	06:38:01	10:08:46	Temperature: 11.2°C; Rainfall: 0mm; Wind speed: 2.9kts; Wind direction: WSW
36	15/08/2024	20:27:05	06:39:44	10:12:39	Temperature: 16.7°C; Rainfall: 2.1mm; Wind speed: 10.7kts; Wind direction: S
37	16/08/2024	20:24:57	06:41:27	10:16:30	Temperature: 11.6°C; Rainfall:0mm; Wind speed: 5kts; Wind direction: SSE
38	17/08/2024	20:22:48	06:43:11	10:20:23	Temperature: 13.8°C; Rainfall: 0mm; Wind speed: 5.6kts; Wind direction: SW
39	18/08/2024	20:20:37	06:44:54	10:24:17	Temperature: 12.9°C; Rainfall:0mm; Wind speed: 6.2kts; Wind direction: SSW
40	19/08/2024	20:18:26	06:46:37	10:28:11	Temperature: 12.5°C; Rainfall: 0mm; Wind speed: 3.4kts; Wind direction: S
41	20/08/2024	20:16:14	06:48:21	10:32:07	Temperature: 13.3°C; Rainfall: 1.3mm; Wind speed: 7.1kts; Wind direction: S
42	21/08/2024	20:14:00	06:50:04	10:36:04	Temperature: 11.5°C; Rainfall: 0.1mm; Wind speed: 8.4kts; Wind direction: SW

Survey Night	Date	Start Time	End[38] Time	Duration	Weather Conditions[39]
43	22/08/2024	20:11:46	06:51:48	10:40:02	Temperature: 15.8°C; Rainfall: 0.8mm; Windspeed: 13.8kts; Wind direction: SSW
44	23/08/2024	20:09:31	06:53:31	10:44:00	Temperature: 12.5°C; Rainfall: 11.2mm; Wind speed: 10.3kts; Wind direction: SSW
45	24/08/2024	20:07:15	06:55:15	10:48:00	Temperature: 11.4°C; Rainfall: 2.5mm; Winds peed: 5.8kts; Wind direction: S
46	25/08/2024	20:04:58	06:56:58	10:52:00	Temperature: 10.4°C; Rainfall: 0.1mm; Wind speed: 6.5kts; Wind direction: SSW
47	26/08/2024	20:02:41	06:58:41	10:56:00	Temperature: 13.8°C; Rainfall: 0mm; Wind speed: 8kts; Wind direction: SSW
48	27/08/2024	20:00:23	07:00:25	11:00:02	Temperature: 16.5°C; Rainfall: 6.8mm; Wind speed: 14.8kts; Wind direction: S
49	28/08/2024	19:58:04	07:02:08	11:04:04	Temperature: 14.8°C; Rainfall: 0.1mm; Wind speed: 8.3kts; Wind direction: S
50	29/08/2024	19:55:44	07:03:51	11:08:07	Temperature: 12.4°C; Rainfall: 0mm; Wind speed: 7.3kts; Wind direction: SW

Table A-3 – Summary of breeding bird survey effort

Date	Start Time	End Time	Duration (hours)	Weather Conditions
30/05/2023	08:15	10:02	01:47	Temp: 11-15°C; Cloud cover: 0 oktas; Rainfall: light drizzle; Wind: Beaufort 1, West; Visibility: Excellent
27/06/2023	07:15	08:45	01:50	Temp: 11-15°C; Cloud cover: 6 oktas; Rainfall: dry; Wind: Beaufort 1, West; Visibility: Excellent

Date	Start Time	End Time	Duration (hours)	Weather Conditions
17/07/2023	07:35	09:30	01:55	Temp: 11-15°C; Cloud cover: 0 oktas; Rainfall: dry; Wind: Beaufort 1, West; Visibility: Excellent
27/07/2023	07:15	09:45	02:30	Temp: 11-15°C; Cloud cover: 8 oktas; Rainfall: light drizzle; Wind: Beaufort 2, West-Northwest; Visibility: Good

Table A-4 – Metadata: Amphibian Survey

Date	Start Time	End Time	Weather Summary
23 February 2024	08:48	12:35	6 degrees, dry, overcast, No wind (F0 Beaufort scale)
8 March 2024	08:42	12:30	6 degrees, dry, sunny, fresh winds (F4 Beaufort scale)

Appendix 4B

Further Information Request: Waterways Ireland

From: Gerard Bayly
Sent on: 26 March 2025 14:07:49
To: O'Dowd, Lisa
Subject: RE: Hydrological Connectivity: Old Grange stream/ the Grand Canal

Lisa

Information as follows:

1. Clogheen Stream (14C23) between the townlands of Clogheen and Killinure:
   https://maps.app.goo.gl/3NYQxCvXXHPLpZdo7
   This is culverted under the canal at the county boundary

2. Sallyford Stream (14508) between the townlands of Fishertown and Courtwood:
   https://maps.app.goo.gl/j3SKSoFRA9Z9P1ec8
   I am not familiar with this culvert, however I can confirm there is no supplys entering the canal at or near this location so I assume it is culverted under the canal here or some location in close proximity. Sorry I can be clearer on this one.

Kind Regards
Gerard Bayly
Senior Engineer

For and on behalf of

Waterways Ireland
Uiscebhealaí Éireann Watterweys Airlann

T: 01 8823305
E: gerard.bayly@waterwaysireland.org
W: www.waterwaysireland.org
A: Floor 2, Block C, Ashtowngate, Navan Rd, Dublin 15

"Waterways Ireland, managing and promoting the inland waterways for the benefit of all..."

From: O'Dowd, Lisa <Lisa.O'Dowd@wsp.com>
Sent: 26 March 2025 14:01
To: Gerard Bayly <Gerard.Bayly@waterwaysireland.org>
Subject: RE: Hydrological Connectivity: Old Grange stream/ the Grand Canal

Hi Gerard,

Would you also be able to confirm whether the following are culverted beneath the Grand Canal, there is limited evidence online:

1. Clogheen Stream (14C23) between the townlands of Clogheen and Killinure:
   https://maps.app.goo.gl/3NYQxCvXXHPLpZdo7
2. Sallyford Stream (14508) between the townlands of Fishertown and Courtwood:
   https://maps.app.goo.gl/j3SKSoFRA9Z9P1ec8

Thank you for your help,
Lisa

From: O'Dowd, Lisa
Sent: Wednesday 26 March 2025 12:50

To: Gerard Bayly <Gerard.Bayly@waterwaysireland.org>
Subject: RE: Hydrological Connectivity: Old Grange stream/ the Grand Canal

Hi Gerard,

Thank you for your timely response, that is really helpful information.

Thanks,
Lisa

From: Gerard Bayly <Gerard.Bayly@waterwaysireland.org>
Sent: Wednesday 26 March 2025 12:43
To: O'Dowd, Lisa <Lisa.O'Dowd@wsp.com>
Subject: RE: Hydrological Connectivity: Old Grange stream/ the Grand Canal

Lisa

The stream here is culverted under the canal. It does not enter the canal or the backdrains.

I assume it flows direct to the River Figile from this point, however I cannot be certain of its route after it flows through the culvert under the canal.

Kind Regards
Gerard Bayly
Senior Engineer

For and on behalf of

Waterways Ireland
Uiscebhealaí Éireann Watterweys Airlann

T: 01 8823305
E: gerard.bayly@waterwaysireland.org
W: www.waterwaysireland.org
A: Floor 2, Block C, Ashtowngate, Navan Rd, Dublin 15

From: O'Dowd, Lisa <Lisa.O'Dowd@wsp.com>
Sent: 26 March 2025 12:31
To: Gerard Bayly <Gerard.Bayly@waterwaysireland.org>
Subject: RE: Hydrological Connectivity: Old Grange stream/ the Grand Canal

Hi Gerald,

Thank you so much for getting back to me. I really appreciate your help on this.

Find a pin from google maps here: https://maps.app.goo.gl/BduAGfnqH7F3dt4h8 and a link to the location on grid reference finder here: https://irish.gridreferencefinder.com?gr=N6308812311|N_s_63088_s_12311|1&t=N%2063088%2012311&v=r

Any other queries please let me know.

Looking forward to hearing from you.

Thanks,
Lisa

Appendix 4C

Additional Information: Species Baseline

Table C-1 – Desk Study (Article 12 Data) Results

Common Name	Scientific Name	Conservation Status (2000 – 2006)[40]	Conservation Status Present Day[41]
Blackbird	*Turdus merula*	Green	Green
Blue tit	*Parus caeruleus*	Green	Green
Bullfinch	*Pyrrhula pyrrhula*	Green	Green
Buzzard	*Buteo buteo*	Green	Green
Blackcap	*Sylvia atricapilla*	Green	Green
Chaffinch	*Fringilla coelebs*	Green	Green
Chiffchaff	*Phylloscopus collybita*	Green	Green
Collared Dove	*Streptopelia decaocto*	Green	Green
Cuckoo	*Cuculus canorus*	Amber	Green
Dunnock	*Prunella modularis*	Green	Green
Coal tit	*Parus ater*	Green	Green
Goldcrest	*Regulus regulus*	Green	Amber
Goldfinch	*Carduelis carduelis*	Green	Green
Grasshopper warbler	*Locustella naevia*	Amber	Green
Great tit	*Parus major*	Green	Green
Greenfinch	*Carduelis chloris*	Green	Amber

[40] Status as per BoCCI1 by Newton *et al*. (1999) as well as listing on Annex 1 of the Birds Directive. The BoCCI1 conservation assessment prevents the most up to date conservation status during the Assessment Period. The next national conservation assessment for birds is not published to 2007 and so, is outside the Assessment Period.

[41] Status as per BOCCI4 by Gilbert *et al*. (2021) as well as listing on Annex 1 of Birds Directive.

Common Name	Scientific Name	Conservation Status (2000 – 2006)[40]	Conservation Status Present Day[41]
Grey wagtail	*Motacilla cinerea*	Green	Red
Hooded Crow	*Corvus corone cornix*	Green	Green
House martin	*Delichon urbicum*	Green	Amber
House sparrow	*Passer domesticus*	Green	Amber
Jackdaw	*Corvus monedula*	Green	Green
Kingfisher	*Alcedo atthis*	Annex 1, Amber	Annex 1, Amber
Lapwing	*Vanellus vanellus*	Red	Red
Lesser redpoll	*Carduelis cabaret*	Amber	Green
Linnet	*Carduelis cannabina*	Green	Amber
Long-eared owl	*Asio otus*	Green	Green
Long-tailed tit	*Aegithalos caudatus*	Green	Green
Magpie	*Pica pica*	Green	Green
Mallard	*Anas platyrhynchos platyrhynchos*	Green	Amber
Meadow pipit	*Anthus pratensis*	Green	Red
Mistle thrush	*Turdus viscivorus*	Green	Green
Moorhen	*Gallinula chloropus chloropus*	Green	Green
Mute Swan	*Cygnus olor*	Green	Amber
Pheasant[42]	*Phasianus colchicus*	-	-
Pied wagtail	*Motacilla alba*	Green	Green

[42] Pheasant has been excluded from conservation assessments due to it's nonnative status and it's management as a game bird.

Common Name	Scientific Name	Conservation Status (2000 – 2006)[40]	Conservation Status Present Day[41]
Reed bunting	*Emberiza schoeniculus*	Green	Green
Robin	*Erithacus rubecula*	Green	Green
Rock Dove	*Columba livia*	Green	Green
Rook	*Corvus frugilegus*	Green	Green
Sand martin	*Riparia riparia*	Amber	Amber
Sedge warbler	*Acrocephalus*	Green	Green
Skylark	*Alauda arvensis*	Amber	Amber
Snipe	*Gallinago gallinago*	Amber	Red
Song thrush	*Turdus philomelos*	Green	Green
Starling	*Sturnus vulgaris*	Green	Amber
Stock Dove	*Columba oenas*	Amber	Red
Swallow	*Hirundo rustica*	Amber	Amber
Swift	*Apus apus*	Green	Red
Whitethroat	*Sylvia communis*	Green	Green
Whinchat	*Saxicola rubetra*	Amber	Red
Willow warbler	*Phylloscopus trochilus*	Green	Amber
Woodpigeon	*Columba palumbus palumbus*	Green	Green
Wren	*Troglodytes troglodytes*	Green	Green
Yellowhammer	*Emberiza citrinella*	Red	Red

Table C-2 – Complete Species List from the 2023 Breeding Bird Survey at Ballykelly

Species common name	Scientific name	Conservation Status (BoCCI1)	Conservation Status (BoCCI4)
Blackbird	*Turdus merula*	Green	Green
Blackcap	*Sylvia atricapilla*	Green	Green
Blue tit	*Cyanistes caeruleus*	Green	Green
Chaffinch	*Fringilla coelebs*	Green	Green
Chiffchaff	*Phylloscopus collybita*	Green	Green
Collared dove	*Streptopelia decaocto*	Green	Green
Dunnock	*Prunella modularis*	Green	Green
Goldcrest	*Regulus regulus*	Green	Green
Grey wagtail	*Motacilla cinerea*	Green	Red
Goldfinch	*Carduelis carduelis*	Green	Green
Greenfinch	*Chloris chloris*	Green	Amber
Great tit	*Parus major*	Green	Green
Grey heron	*Arda cinerea*	Green	Green
House martin	*Delichon urbicum*	Green	Green
Jackdaw	*Corvus monedula*	Green	Green
Kestrel	*Falco tinnunculus*	Green	Annex 1, Red
Linnet	*Linaria cannabina*	Green	Amber
Magpie	*Pica pica*	Green	Green
Moorhen	*Gallinula chloropus*	Green	Green
Meadow pipit	*Anthus pratensis*	Green	Red
Robin	*Erithacus rubecula*	Green	Green

Species common name	Scientific name	Conservation Status (BoCCI1)	Conservation Status (BoCCI4)
Reed bunting	*Emberiza schoeniclus*	Green	Green
Raven	*Corvus corax*	Green	Green
Rook	*Corvus frugilegus*	Green	Green
Spotted flycatcher	*Muscicapa striata*	Amber	Amber
Starling	*Sturnus vulgaris*	Green	Amber
Swift	*Apus apus*	Green	Red
Swallow	*Hirundo rustica*	Amber	Amber
Sand martin	*Riparia riparia*	Amber	Amber
Whinchat	*Saxicola rubetra*	Amber	Red
Whitethroat	*Curruca communis*	Green	Green
Woodpigeon	*Columba palumbus*	Green	Green
Wren	*Troglodytes aedon*	Green	Green
Willow warbler	*Phylloscopus trochilus*	Green	Amber
Yellowhammer	*Emberiza citrinella*	Red	Red

Table C-3 – Amphibian Survey Results – Habitat Suitability

Date	ID	Habitat Description	Area (ha)
23/02/24	1	Large area of pooled water on track. Some old and unfertilised frogspawn present.	0.00957004
23/02/24	2	Shaded by some small willows, sloping banks, no positive ID, however, suitable for breeding common frog.	0.00189652
23/02/24	3	Shaded by willow, sloped banks, no positive ID, however, suitable for breeding common frog.	0.00197301
23/02/24	4	Small pool on track with lots of aquatic veg, some broad leaves, checked for eggs on these however, no positive	0.00236172

Date	ID	Habitat Description	Area (ha)
		ID. Suitable for breeding smooth newts and common frogs.	
23/02/24	5	Large area on track with aquatic vegetation. Suitable for breeding smooth newts and common frogs.	0.00697368
23/02/24	6	Located partially on track. Suitable for breeding common frogs.	0.00500949
23/02/24	7	Small pool approximately 3.5m wide. Compacted gravel substrate with floating aquatic algae/moss and suitability for breeding smooth newts and common frogs.	0.00407858
23/02/24	8	Small pool on gravel track with emergent grasses and rushes. Depth 0.3m. Suitability for breeding smooth newts and common frogs.	0.00274944
23/02/24	9	Compacted gravel substrate, submerging and emergent grasses, herbs and moss. Approx 20cm deep. Suitable for breeding smooth newts and common frogs.	0.00434162
23/02/24	10	Two small ponds/pools located within an area of grassland off track. Suitable for breeding common frog.	0.0005524
23/02/24	11	Small pool area approximately 0.5 m deep with frog spawn present and gravel substrate. Vegetation including green algae and emergent rushes and grasses present. Suitable for breeding smooth newt and common frog.	0.02539799
23/02/24	12	Small pool area approximately 3 m long and 1.5 m wide, 10cm deep with a gravel substrate. Suitable for breeding common frog.	0.00139374
23/02/24	13	Located on track with aquatic vegetation present and gravel substrate. Suitable for breeding smooth newt and common frog.	0.00628337
23/02/24	14	Small pooled area on track with a gravel substrate. Approximately 1 x 1.5m with emergent grasses and herbs. No evidence of amphibians, however, suitability for breeding smooth newt and common frog	0.00039741
23/02/24	15	Pond located off track with aquatic vegetation including grasses and sedges such as curly dock *Rumex crispus*. Suitability for breeding smooth newt and common frog.	0.00650204

Date	ID	Habitat Description	Area (ha)
23/02/24	16	Small pool approximately 1 x 1 m on track with a gravel substrate. Shallow 3in deep with no vegetation or evidence of amphibians. Suitability for breeding common frog.	0.00035817

Table C-4 – Amphibian Survey Results – Breeding Point Data

Date	Visit	Species	Life Stage	Description	Habitat Type	X	Y
23/02/24	1	Common Frog	Spawn	clump of approximately 150 viable frog spawn	Small pool	663365.5002	713155.5545
23/02/24	1	Common Frog	Spawn	clump of approximately 300 viable frog spawn	Small pool	663428.0078	713107.6008
08/03/24	2	Common Frog	Spawn	unfertilised frog spawn	Small pool	663323.0089	713095.519
08/03/24	2	Common Frog	Spawn	tadpoles forming in older spawn	Small pool	663363.1893	713153.2982
08/03/24	2	Common Frog	Tadpole	tadpoles observed within frog eggs. Same location as visit one	Small pool	663425.9508	713106.7485

Appendix 4D

Further Details: Impact Assessment

Table D-1 – Tolerance of QI from the Grand Canal pNHA to Dust Deposition

Feature	Location	Relevant	Tolerance Description	Tolerance Yes/No
Hedgerow (dominated by hawthorn)	Adjacent to the Application Site	Yes	Plants are sensitive to dust deposition with it resulting in a short-term change to photosynthesis and transpiration. Although the effect was short-term in nature, it may have temporarily harmed hedgerow species.	No
Tall Herbs	Estimated adjacent to the Application Site	Yes	Plants are sensitive to dust deposition with it resulting in a short-term change to photosynthesis and transpiration. Although the effect was short-term in nature, it may have temporarily harmed hedgerow species.	No
Calcareous Grassland	Estimated adjacent to the Application Site	Yes	Plants are sensitive to dust deposition with it resulting in a short-term change to photosynthesis and transpiration. Although the effect was short-term in nature, it may have temporarily harmed hedgerow species.	No
Arrowhead	Eastern section of the main line between Summit level at Lowtown and Inchicore	No	n/a	n/a
Watercress	Eastern section of the main line between Summit level at Lowtown and Inchicore	No	n/a	n/a

Feature	Location	Relevant	Tolerance Description	Tolerance Yes/No
Hemplock water-droplet	Eastern section of the main line between Summit level at Lowtown and Inchicore	No	n/a	n/a
Opposite-leaved pondweed	Present in the eastern section of the main line between Lowtown and Ringsend Basin, Dublin	No	n/a	n/a
Otter	Estimated adjacent to the Application Site	Yes	Due to their opportunistic nature, any decrease in prey availability due to dust deposition would not have affected persistence of the population. Water quality has been estimated to have been Q-3, indicating slight pollution within the waterway. However, the National Otter Survey of Ireland 2004/2005 (Bailey & Rochford, 2006) found no significant difference between polluted and unpolluted sites indicating reasonable tolerance.	Yes
Smooth newt	As the species was not identified during the desk study, the Grand Canal adjacent to the Application Site is estimated to be outside the range for smooth newt.	No	n/a	n/a