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NATURA IMPACT STATEMENT IN SUPPORT OF **APPROPRIATE ASSESSMENT** OF PROPOSED TRDEX1 EXPLORATION DRIFT EXTENSION BY BOLIDEN TARA MINES DAC

in accordance with the requirements of Article 6(3) of the Habitats Directive (Council Directive 92/43/EEC)

DECEMBER 2025 UPDATED MARCH 2026

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Prepared
December 2025 Updated March 2026 by:

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RECEIVED: 12/03/2026

Table of Contents

Meath County Council - Viewing Purposes Only!

RECEIVED: 12/03/2026
Meath County Council - Viewing Purposes Only!

RECEIVED: 12/03/2026
Meath County Council - Viewing Purposes Only!

EXECUTIVE SUMMARY

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Boliden Tara Mines DAC (BTM), located near Navan in Co. Meath, is one of Europe's largest zinc and lead mining operations and represents a major source of employment within the county. In 2012, a satellite deposit known as 'Tara Deep' was discovered approximately 2 km southeast of the existing mine following a preliminary drilling campaign guided by seismic survey targets. If proven economically viable, this mineral resource has the potential to extend the current life of mine plan. This mineral resource is located at a depth exceeding 1km below the surface, requiring an extensive underground exploration drilling programme in order to evaluate its economic viability. To enable this, a 2.4 km exploration tunnel, referred to as 'TRDEX1' was initiated in late 2018 from the existing Southwest Extension (SWEX) mine workings, advancing towards the Tara Deep deposit. Planning permission was sought, and granted, in 2020 for the development of ventilation shaft infrastructure to enable the extension of the TRDEX1 exploration tunnel to enable access to the Tara Deep resource. This planning application related to the 'proposed TRDEX1 Extension' involves the continuation of the exploration drift at a depth exceeding 1 km, with a total length of 3 km.

The proposed development will entail extension to an existing underground exploration tunnel to access the Tara Deep discovery for the purposes of exploration and resource definition. This extension will continue works previously undertaken under exempt development (Planning Ref. NA/S51749) and within Prospecting Licence PL 4502 issued by the Geoscience Regulation Office (GSRO) under the Department of Climate, Energy and the Environment.

The underground tunnel will consist of three distinct phases, to be carried out as follows:

- Phase 1: advancement of existing exploration tunnel for a further 450 m;
- Phase 2: construction of a tunnel to the East and perpendicular to existing tunnel with a spiral decline approximately 1,900 m; and
- Phase 3: construction of a parallel tunnel to the west of approximately 600 m.

The tunnels will include the development of ancillary bays and cubbies as smaller support tunnels to facilitate necessary infrastructure to support exploration drilling. Access will be from the existing underground mine.

The proposed development will take place proximate to the River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA. As such, in accordance with the Precautionary Principle, the operation requires Appropriate Assessment in order to comply with article 6(3) of the Habitats Directive.

Following the identification of a potential impact(s) upon one or more Natura 2000 sites through an Appropriate Assessment Screening exercise, a Stage 2 Appropriate Assessment of the proposed

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development has been undertaken. The Natura Impact Statement, presented here, concludes that assuming all recommendations and mitigation/preventative measures are implemented, there will be no risk of adverse effects on Qualifying Interest habitats or species, nor on the attainment of specific conservation objectives, either alone or in-combination with other plans or projects, for the relevant Natura 2000 sites.

An Environmental Impact Assessment screening report has been prepared for the proposed development and concludes that

> *"…With the implementation of the listed environmental control and mitigation measures, it is submitted that the proposed TRDEX1 Extension will not have any significant adverse impact on surrounding development, residential amenity, traffic, biodiversity and natural heritage, groundwater, landscape amenity or cultural heritage. The design has been developed to ensure maximum protection to the underlying groundwater environment..."*

This document should be read in conjunction with the EIA screening report.

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1 Introduction

1.1 FERS Ltd. Company background

Forest, Environmental Research and Services have been conducting ecological surveys and research since the company's formation in 2005 by Dr Patrick Moran and Dr Kevin Black. Dr Moran, the principal ecologist with FERS, holds a 1st class honours degree in Environmental Biology (UCD), a Ph.D. in Ecology (UCD), a Diploma in EIA and SEA management (UCD) a Diploma in Environmental and Planning Law (King's Inn), a M.Sc. in Geographical Information Systems (University of Ulster, Coleraine) and a M.Sc. in Environmental and Climate Change Law (UCD). Patrick has in excess of 25 years of experience in carrying out ecological surveys on both an academic and a professional basis. Dr Emma Reeves, senior ecologist with FERS holds a 1st class honours degree in Botany, and a Ph.D. in Botany. Emma has in excess of 15 years of experience in undertaking ecological surveys on an academic and professional basis. Ciarán Byrne, a senior ecologist with FERS holds a 1st class honours degree in Environmental Management (DIT) and a M.Sc. in Applied Science/Ecological Assessment (UCC). Ciarán has in excess of 10 years in undertaking ecological surveys on both an academic and a professional basis. Senan Clynch, a junior ecologist with FERS holds a 1st class honour in Environmental Science from Trinity College Dublin. Senan has several years of academic and professional experience undertaking ecological surveys.

FERS client list includes National Parks and Wildlife Service, An Bord Pleanála, various County Councils, the Heritage Council, Teagasc, University College Dublin, the Environmental Protection Agency, Inland Waterways Association of Ireland, the Department of Agriculture, the Office of Public Works and Coillte in addition to numerous private individuals and companies. FERS Ltd. has prepared in excess of 1000 Appropriate Assessment Screenings/Natura Impact Statements for a wide range of plans and projects. Please note that following a Request for Further Information (RFI) from Meath Co, Council (Chief Executive Order 284/26, Ref No. 25/61391), the update of this Appropriate Assessment screening report and Natura Impact Statement was undertaken by Dr Patrick Moran.

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1.2 The aim of this report

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This report has been prepared in compliance with Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (DoEHLG 2009, February 2010) and the European Communities (Birds and Natural Habitats) Regulations 2011 (DoEHLG 2011) in support of the Appropriate Assessment of proposed development by Boliden Tara Mines DAC within the townlands of Hanlonstown, Gainstown and Curraghtown – Navan Co. Meath.

This report provides the information required in order to establish whether or not the proposed development is likely to have a significant ecological impact on any Natura 2000 sites, in the context of their conservation objectives and specifically on the habitats and species for which the sites have been designated.

Please note that following a Request for Further Information (RFI) from Meath Co, Council (Chief Executive Order 284/26, Ref No. 25/61391), the Appropriate Assessment Screening and Natura Impact Statement have been updated to take account of the findings of the reports and surveys to be compiled as part of the Items 1(a) and (b) of the RFI.

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1.3 Methodology for Appropriate Assessment

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1.3.1 Guidance

A number of guidance documents on the appropriate assessment process have been consulted during the preparation of this NIS. These are:

- DoEHLG (2010a) *Appropriate Assessment of Plans and Projects in Ireland. Revision February 2010.* Department of Environment, Heritage and Local Government, Dublin.
- DoEHLG (2010b) *Circular NPW 1-10 & PSSP 2-10*. Department of Environment, Heritage and Local Government, Dublin.
- European Commission (2002) *Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC: Novembre 2001*. Publications Office, Luxembourg.
- European Commission (2007) *Guidance Document on Article 6(4) of the 'Habitats Directive' 92/43/EEC. Clarification of the Concepts of: Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission.* Publications Office, Luxembourg.
- European Communities (Birds and Natural Habitats) Regulations 2011 (as amended), S.I. No. 477 of 2011. Stationery Office, Dublin.
- European Commission (2019) *Managing Natura 2000 Sites: The Provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*. Publications Office, Luxembourg.
- OPR (2021) *OPR Practice Note PN01 Appropriate Assessment Screening for Development Management*. Office of the Planning Regulator, Dublin.

The assessment requirements of Article 6 are generally dealt with in a stage-by-stage approach. The stages as outlined in DoEHLG (2010a) are:

Stage (1) Screening – Appropriate Assessment (Habitats Directive) Screening report

This initial process identifies the likely impacts of a proposed project or plan upon a Natura 2000 site, either alone, or in combination with other projects or plans and considers whether these impacts are likely to be significant. Please note that judgement in the ECJ (C323/17) found that:

"…Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora must be interpreted as meaning that, in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site…"

The deliverable of the screening process is a screening report.

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Stage (2) Appropriate Assessment – preparation of Natura Impact Statement (NIS)

The consideration of the impact of the project or plan on the integrity of the Natura 2000 Site, either alone or in combination with other projects or plans to the sites structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts. The deliverable of this stage in the Appropriate Assessment process is a Natura Impact Statement.

Stage (3) Assessment of Alternative Solutions

The process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site.

Stage (4) Assessment where Adverse Impacts Remain

An assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed that the project or plan should proceed.

At each stage, there is a determination as to whether a further stage in the Appropriate Assessment process is required. If, for example, the conclusions of the Screening stage indicate that there will be no significant impacts on the Natura 2000 site, there is no requirement to proceed further. Appropriate Assessment stages 1 and 2 deal with the main requirements for assessment under Article 6.3. Stage 3 may be part of Article 6(3) or a necessary precursor for Stage 4.

This report has been undertaken in accordance with the European Commission's Guidance on Appropriate Assessment (European Commission, 2002) which comprises the following:

1. Description of the Plan.
2. Identification of Natura 2000 sites likely affected by the Plan.
3. Identification and description of individual and cumulative impacts likely to result from the Plan.
4. Assessment of the significance of the impacts identified on the conservation objectives of the site(s).
5. Exclusion of sites where it can be objectively concluded that there will be no likely impacts on conservation objectives.

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1.3.2 Desktop study

A desk study to collate relevant environmental information pertaining to the proposed development was undertaken to inform this appropriate assessment. The following sources were consulted:

- NPWS boundary data shapefiles for SACs (SAC_ITM_2024_10), SPAs (SPA_ITM_2023_05), NHAs (NHA_ITM_2019_06) and pNHAs (pNHA_ITM_2015_11).
- NPWS habitat/species datasets including National Survey of Native Woodlands (2003-2008), Ancient and Long-established Woodland), *Margaritifera* sensitive areas, Irish Semi-natural Grassland Survey.
- National Biodiversity Data Centre mapping of species of conservation concern, available from https://maps.biodiversityireland.ie/
- Site documents for relevant Natura 2000 sites including Site Synopses, Conservation Objectives and Natura 2000 Standard Data forms.
- Information outlined in NPWS (2019a) and NPWS (2019b) Article 17 reporting on the conservation status of habitats (Annex I) and species (Annex II, IV and V).
- EPA online mapping data including surface and groundwater quality, water features, river catchment boundaries, groundwater bodies, wastewater/IPPC/waste emission points, pressures on rivers/lakes/groundwater, rivers/groundwater in SAC habitats, rivers/surface waters in SPA habitats, drinking water – rivers/lakes/groundwater, etc.
- OSI Geohive online mapping data including historic 6-inch mapping (1837-1842), satellite imagery (1995, 2000, 2005, 2005-2012, Aerial Premium), contours, soils, geology etc.

1.3.2.1 Consultations

Following correspondence with local NPWS staff, information regarding the proposed development was submitted to the Developments Application Unit (DAU) of NPWS on the 4th of November 2025 for comment (reference G Pre00343/2025). As of 15/12/25 there has been no comment.

1.3.2.2 NPWS database consultation

Information pertaining to Natura 2000 sites within the Republic of Ireland is typically held by NPWS and is publicly accessible through their on-line database at www.npws.ie. Consultations carried out involved searching through the NPWS database for information pertaining to the potential impact of the development on Natura 2000 sites within 15 km of the development. The role of the NPWS is:

- To secure the conservation of a representative range of ecosystems and maintain and enhance populations of flora and fauna in Ireland.

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Meath County Council - Viewing Purposes Only!

- To implement the EU Habitats and Birds Directives.
- To designate and advise on the protection of Natural Heritage Areas (NHA) having particular regard to the need to consult with interested parties.
- To make the necessary arrangements for the implementation of National and EU legislation and policies and for the ratification and implementation of the range of international Conventions and Agreements relating to the natural heritage.
- To manage, maintain and develop State-owned National Parks and Nature Reserves.

1.3.2.3 NBDC Database

The National Biodiversity Database Centre database was queried for records of species of conservation concern present within the immediate vicinity of the plan area.

1.3.2.4 Other relevant data sources

Other relevant data-sources were queried, as necessary.

RECEIVED: 12/03/2026
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2 Appropriate Assessment Screening

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Following the guidelines set out by DoEHLG (2010a), Appropriate Assessment Screening (Phase I Appropriate Assessment) is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3) of the EU Habitats Directive. According to the guidelines, Appropriate Assessment Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3):

(1) Is the plan or project directly connected to or necessary for the management of the site?

(2) Is the plan or project, alone or in combination with other such plans or projects likely to have significant negative effects on a Natura 2000 site(s) in view of the conservation objectives of that site(s)?

The proposed development cannot be screened out via the first screening test (i.e. the proposed development is not directly connected to, or necessary for the management of any Natura 2000 site). The screening exercise will therefore inform the Appropriate Assessment process in determining whether the proposed development, alone or in combination with other plans and projects, has any potential to have significant effects on the Natura 2000 sites within the study area. If the effects are deemed to be significant, potentially significant, or uncertain, or it the screening process becomes overly complicated, then applying the Precautionary Principle and in accordance with Article 6(3) of the Habitats Directive, a Stage 2 Appropriate Assessment is required stage, i.e., "*The consideration of the impact of the project or plan on the integrity of the Natura 2000 Site, either alone or in combination with other projects or plans to the sites structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts.*"

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2.1 Description of proposed development

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The proposed development will consist of the following:

Extension to an existing underground exploration tunnel to access the Tara Deep discovery for the purposes of exploration and resource definition. This extension will continue works previously undertaken under exempt development (Planning Ref. NA/S51749) and within Prospecting Licence PL 4502 issued by the Geoscience Regulation Office (GSRO) under the Department of Climate, Energy and the Environment.

The underground tunnel will consist of three distinct phases, to be carried as follows:

- Phase 1: advancement of existing exploration tunnel for a further 450 m;
- Phase 2: construction of a tunnel to the East and perpendicular to existing tunnel with a spiral decline approximately 1,900 m; and
- Phase 3: construction of a parallel tunnel to the west of approximately 600 m.

The tunnels will include the development of ancillary bays and cubbies as smaller support tunnels to facilitate necessary infrastructure to support exploration drilling.

Access will be from the existing underground mine. The proposed development will take place within the townlands of Hanlonstown, Gainstown and Curraghtown, Navan, Co. Meath. The location of the proposed development is indicated in Figure 1, Figure 2 and Figure 3.

The proposed development, by its underground nature, will result in a change to the hydrogeological regime in the areas which are worked. Groundwater ingress to the underground tunnel will be managed and pumped out to the existing discharge point (Emission Reference SW1) as part of current mine water management system. The proposed development will not consume water and will not require intense water usage for operational activities. There is an overall site water management system covering the entire mine complex. A comprehensive description of the water management systems inclusive of source, treatment and final discharges arising from the project, including dewatering systems and process water system management is included within the EIA screening report and is outlined below

> *"…The groundwater diverted from the proposed TRDEX1 Extension will be treated as part of the overall mine complex water management system, which is overseen by the EPA and operated in compliance with the conditions of the EPA IE Licence P0516 and the future abstraction licence (application currently applied for). Average total groundwater dewatering rates comprising the Main mine SWEX mine areas and TRDEX1 exploration tunnel are*

Meath County Council - Viewing Purposes Only!

RECEIVED: 12/03/2026

approximately 14,000 to 17,000 m^3/d (representing 75% of total groundwater inflow). Average discharge flows of treated process and reclaim water to the River Boyne (SW1) are approximately 13,531 m^3/d. These discharge flows are continuously monitored for suspended solids, pH, dissolved oxygen, temperature, and flow. The system will shut down preventing discharge if there are any deviations outside of setpoints. (while groundwater abstraction from the Nevinstown mine area represents c. 25% m of the total groundwater flow).

Numerical hydrogeological modelling estimates will be updated and will be considered in final engineering level design and construction of required drainage and pumping system for the proposed TRDEX1 Extension.

Generally, groundwater will be managed as follows:

1) ***Drainage System -** The tunnel invert will be designed to have open drainage channels along the outer edges, where all groundwater seepages and inflows from cover and probe holes will be conveyed to and stored temporarily in collection sumps and integrated pumping stations.*

2) ***Pumping Stations -** Collected water will be pumped from the exploration tunnel in stages between each pumping station using submersible pumps. These stations will be strategically placed, and corresponding sumps and submersible pumps will be sized to handle varying groundwater inflow volumes.*

3) ***Cover Grouting -** Where feasible, cover grouting campaigns will be designed and implemented in advance of tunnel excavation to seal off water bearing structures (fissures and faults) identified and characterised during cover and probe hole drilling.*

4) ***Water Monitoring -** A surface and underground water monitoring plan is currently in place for the existing TRDEX1 exploration drift. This plan will continue and be extended as required to provide appropriate coverage of the footprint area of the proposed TRDEX1 Extension.*

5) ***Treatment and Discharge -** As is currently the case, all groundwater inflows collected in the proposed TRDEX1 Extension will be pumped to surface before discharge to the River Boyne under conditions of IE Licence P0516, overseen by the EPA.*

Currently groundwater inflows to the TRDEX1 tunnel are conveyed via drainage channels along the outer edges of the tunnel invert to pump sump stations. This groundwater is then pumped in stages, between each pump sump, out of the tunnel to the pump station of the main mine dewatering system. This groundwater is then pumped to ground surface and into a series of

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settlement ponds and integrated lamella water treatment plant where suspended solids and antimony are removed. The treated water is discharged to the River Boyne under conditions of IE Licence P0516.

A similar system of gravity drainage and staged pump stations, with appropriately sized submersible pumps, will be constructed within the proposed tunnel extension. This too will be fully integrated with the main mine dewatering system.

BTM are continually in compliance with their required emission limits, and in general the recorded, analysed parametric values in the discharge are well below these licence emission limits…"

With regard to ventilation shafts (RAR6 and RAR7) permitted under NA 2011/53 (which will facilitate ventilation of the TRDEX1). RAR7 will not now be undertaken. The remaining work on RAR6 (and explanation for same), which is not completed, is described below to consider the project in its entirety:

The Board of Boliden made a decision to temporarily suspend operations at Boliden Tara Mines (BTM) and enter a 'care and maintenance' period from July 15th, 2023.This decision was made to safeguard the long-term future of the operation at Navan, in response to significant and unsustainable losses that the business was experiencing. The losses been brought about by a combination of factors including operational challenges, a decline in the price of zinc, high energy prices, and general cost inflation. This decision was made following a comprehensive review of operational and economic factors. During this period, mining and processing activities were temporarily suspended. However, essential environmental monitoring, site maintenance, and safety management activities continued to ensure compliance with regulatory requirements and to maintain the site in a state of readiness for potential future restart. During the care and maintenance period all projects were suspended including the completion of development of ventilation shaft, under planning reference NA/201153.

The reopening of the operation commenced in July 2024 with employees returning to work on a phased basis with production starting in November 2024. Following this prolonged shutdown all electrical systems, communications infrastructure, fixed plant, equipment, and machinery had to undergo thorough inspection, servicing, and recommissioning to ensure safe and reliable functionality. This was critical to restoring operational integrity and preparing the site for a controlled and sustainable restart. BTM are in a position now to resume projects, including the completion of development of ventilation shaft, under planning reference NA/201153.

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Meath County Council - Viewing Purposes Only!

Outstanding works required for Project Completion and the approximate timescale are indicated as follows:

Stage 1 Complete Grout Curtain (c. 3–5 months) this involves drilling (660m) and grouting the remaining 2 holes (pumping a cement-like mixture into the drilled holes) to complete the grout curtain (curtain prevents water entering the working area). A subsequent test hole will be drilled (but not grouted) in the working area inside the grout curtain and used to verify the integrity of the curtain. In the event the integrity of the grout curtain cannot be established, a set of secondary holes will be drilled, grouted, and tested prior to advancing the project onto stage 2.

Stage 2: Pilot Borehole Drilling (c. 4–6 weeks). This involves drilling a 15-inch-wide pilot hole inside the grout curtain (working area). Once the grout curtain has been confirmed to function, stage 3 can proceed.

Stage 3: Raise Bore Drilling (c. 4–6 weeks**)** The pilot hole will be enlarged (ream drilled from underground) out to a final diameter of 4.5 meters using a drilling method called raise boring.

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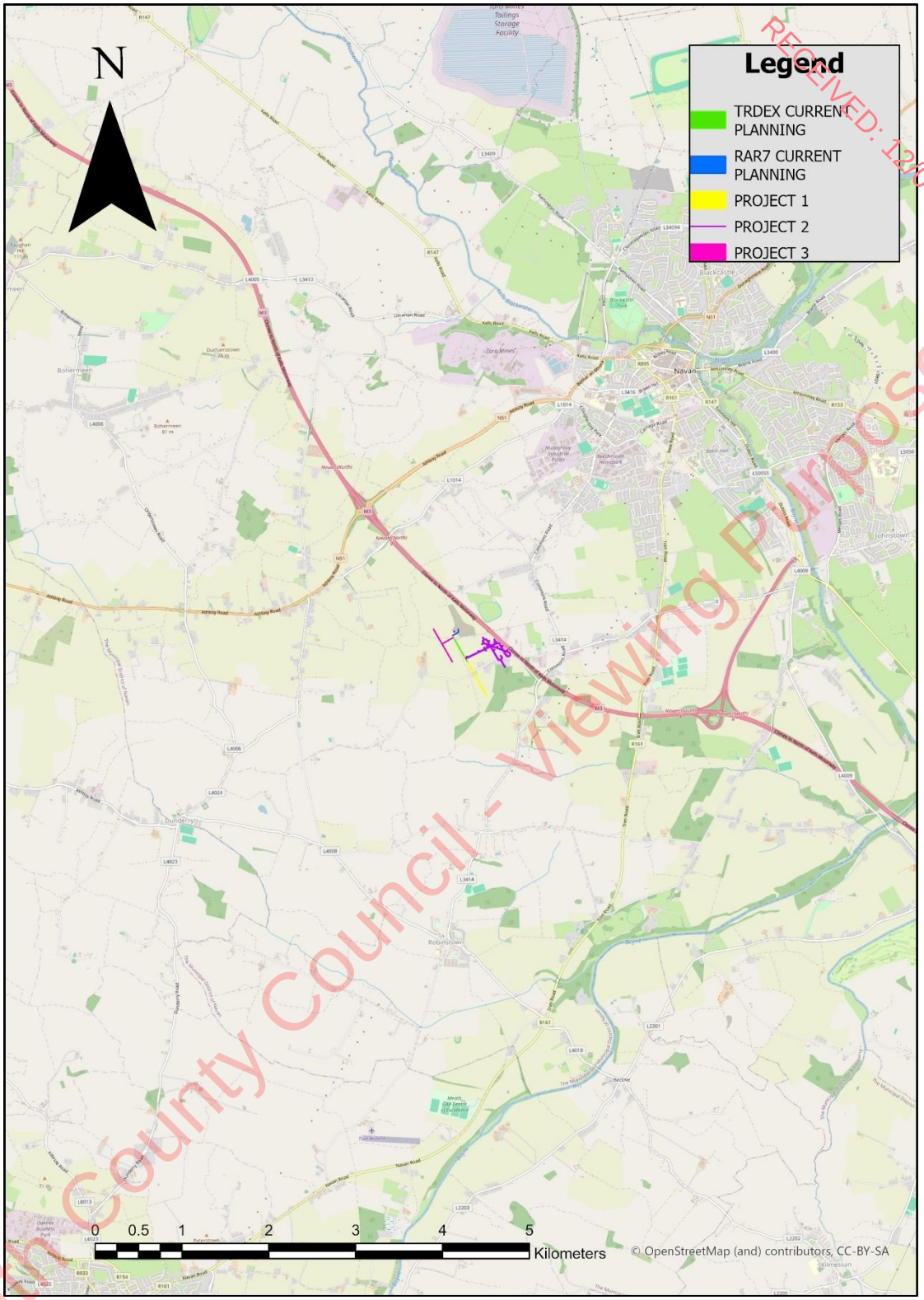

Figure 1: Location of proposed development (1:50,000)

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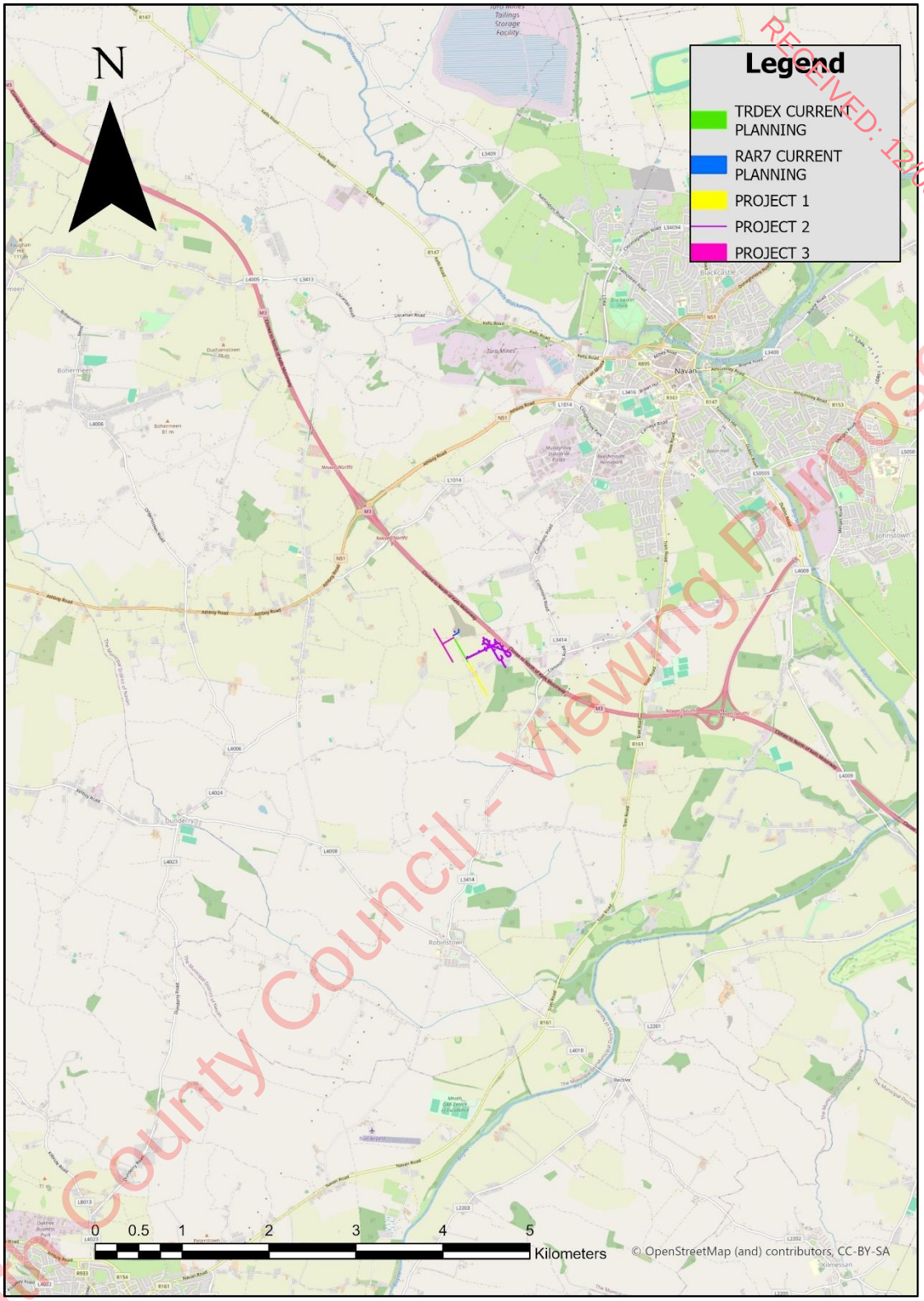

Figure 2: Location of proposed development (1:25,000)

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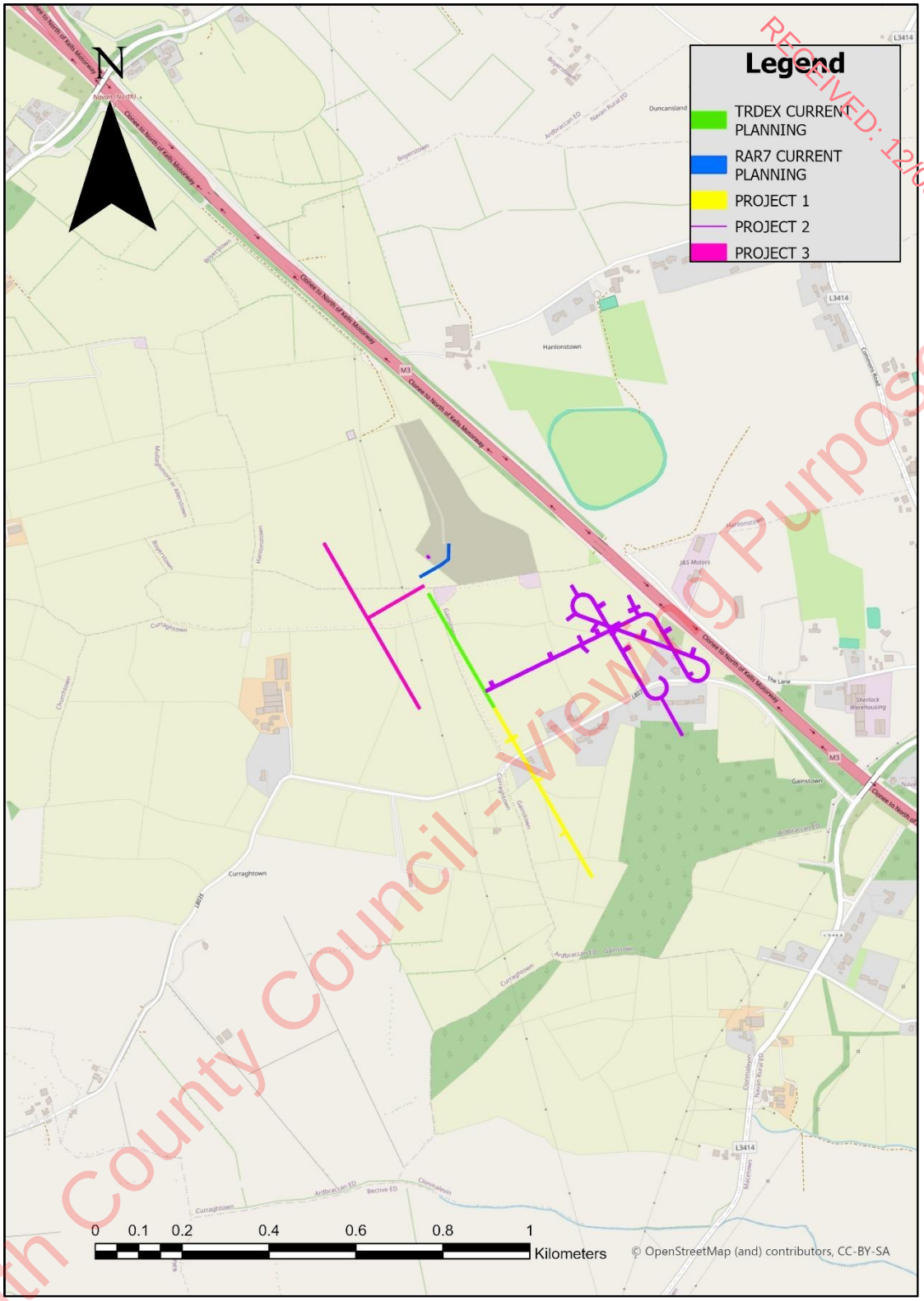

Figure 3: Location of proposed development (1:10,000)

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2.2 Description of existing conditions on site

The surface habitats comprise largely agricultural farmland and rural housing (see Figure 4). There will be no additional surface infrastructure or activities associated with the proposed development and, therefore, no impact on existing surface conditions. Any changes will occur largely in excess of 1 km below the surface.

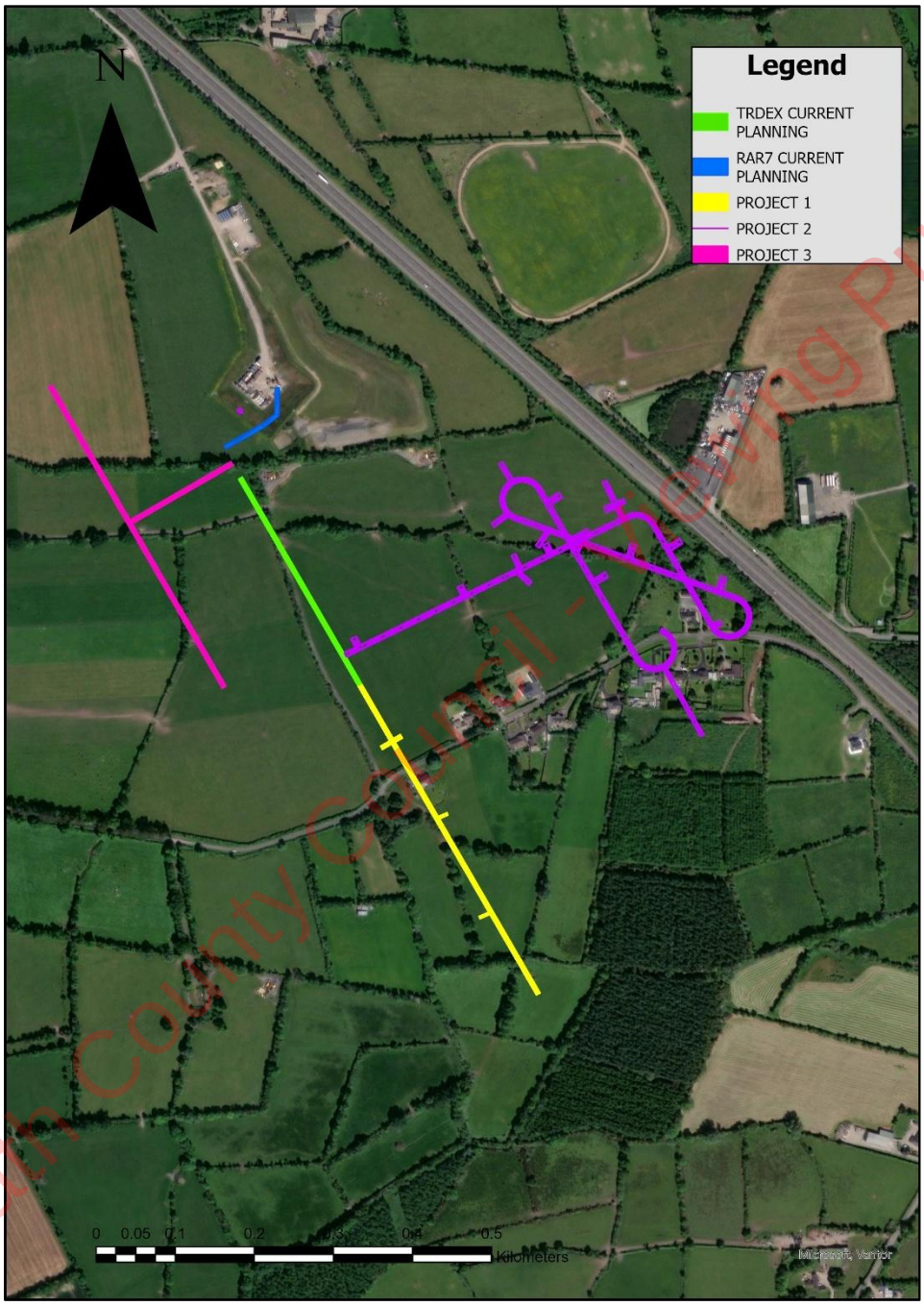

Figure 4: Location of proposed development (1:5,500) relative to *environs*

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2.3 Description of scope

The initial geographical scope of the assessment is to determine if the proposed development has the potential to have any significant negative impact on proximate Natura 2000 sites. Having utilised a 15km scoping buffer to identify Natura 2000 sites proximate, a zone of influence is refined based on the Source-Pathway-Receptor linkage model.

2.4 Existing ecological records of note – NBDC database records

The NBDC database was accessed on 10/12/25 to query records occurring within the vicinity of the proposed development (10 km square N86, see Figure 5). The species of conservation concern as recorded within polygon are illustrated in Table 1. The number of records indicates a well recorded area as would be expected, given that it includes the Rivers Boyne and Blackwater. The map presented in Figure 6 indicates that as regards the "Habitat Suitability Index" for all bats, the proposed development is located in the middle and second highest category.

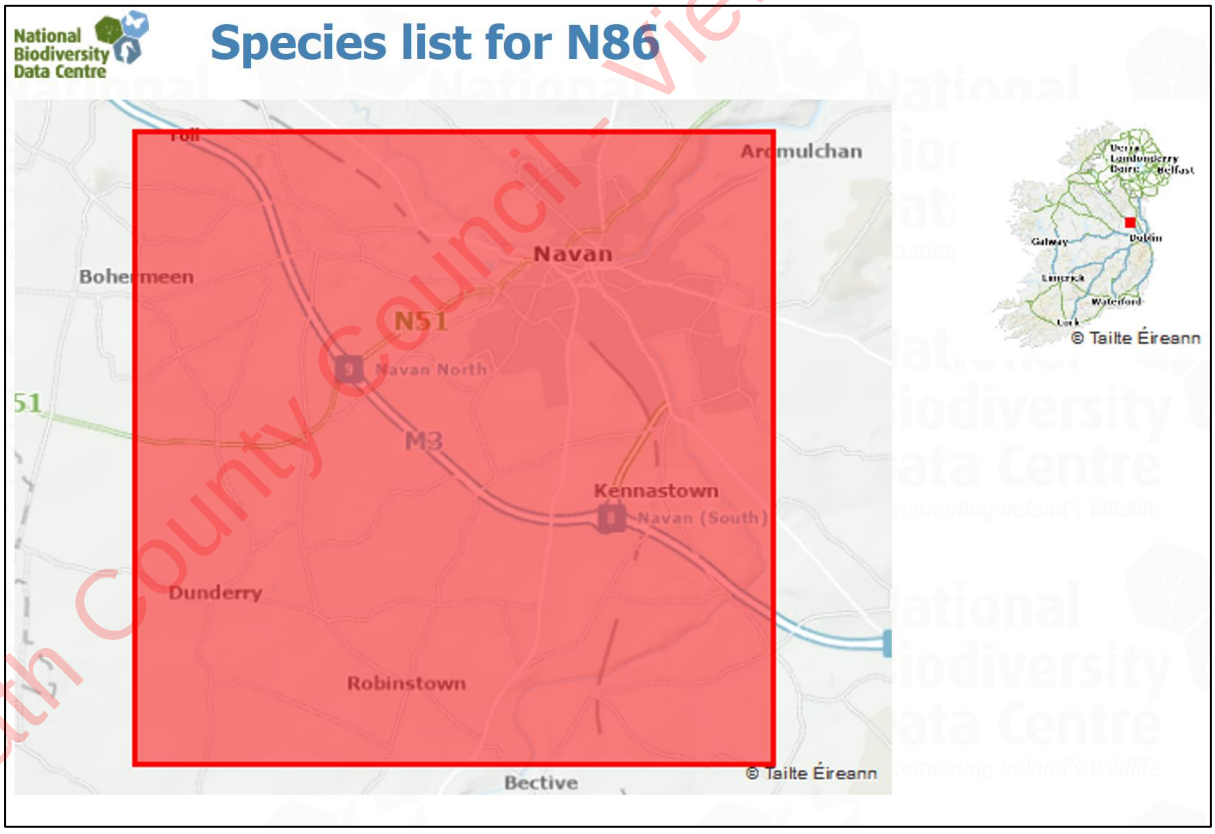

Figure 5. Location of polygon queried (National Biodiversity Data Centre)

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Table 1: Species of conservation concern recorded in the vicinity of the proposed development site (* indicates invasive species of concern)

Scientific Name	**Common Name**	**Date last recorded**
Rana temporaria	Common Frog	28/03/2020
Lissotriton vulgaris	Smooth Newt	25/05/2013
Tyto alba	Barn Owl	02/11/2020
Chroicocephalus ridibundus	Black-headed Gull	03/01/2023
Fringilla montifringilla	Brambling	10/01/2021
Larus canus	Common Gull	31/12/2011
Actitis hypoleucos	Common Sandpiper	24/04/2010
Fulica atra	Coot	31/12/2011
Phalacrocorax carbo	Cormorant	03/01/2025
Crex crex	Corncrake	31/07/1972
Numenius arquata	Curlew	29/02/1984
Regulus regulus	Goldcrest	26/10/2024
Pluvialis apricaria	Golden Plover	29/02/1984
Dendrocopos major	Great Spotted Woodpecker	17/02/2024
Chloris chloris	Greenfinch	03/05/2025
Perdix perdix	Grey Partridge	31/07/1972
Motacilla cinerea	Grey Wagtail	24/05/2024
Circus cyaneus	Hen Harrier	31/12/2011
Delichon urbicum	House Martin	18/05/2025
Lymnocryptes minimus	Jack Snipe	09/01/2021
Falco tinnunculus	Kestrel	10/05/2021
Alcedo atthis	Kingfisher	18/11/2024
Vanellus vanellus	Lapwing	31/12/2011
Linaria cannabina	Linnet	12/04/2024
Egretta garzetta	Little Egret	16/01/2025
Tachybaptus ruficollis	Little Grebe	03/01/2025
Anas platyrhynchos	Mallard	02/05/2025
Anthus pratensis	Meadow Pipit	17/05/2025
Turdus viscivorus	Mistle Thrush	02/05/2025
Cygnus olor	Mute Swan	25/09/2024
Phasianus colchicus	Pheasant	01/04/2024
Milvus milvus	Red Kite	05/06/2018
Turdus iliacus	Redwing	15/12/2022
Erithacus rubecula	Robin	01/01/2025

RECEIVED: 12/03/2026
Meath County Council - Viewing Purposes Only!

Scientific Name	Common Name	Date last recorded
Columba livia	Rock Dove	03/01/2025
Riparia riparia	Sand Martin	16/04/2024
Alauda arvensis	Skylark	31/12/2011
Gallinago gallinago	Snipe	21/04/2021
Accipiter nisus	Sparrowhawk	17/12/2022
Muscicapa striata	Spotted Flycatcher	31/12/2011
Columba oenas	Stock Dove	31/12/2011
Saxicola rubicola	Stonechat	19/04/2010
Hirundo rustica	Swallow	13/05/2024
Apus apus	Swift	27/06/2025
Passer montanus	Tree Sparrow	12/08/2022
Phylloscopus trochilus	Willow Warbler	09/06/2024
Scolopax rusticola	Woodcock	21/04/2021
Emberiza citrinella	Yellowhammer	18/11/2024
Austropotamobius pallipes	White-clawed Crayfish	09/08/2018
*Arthurdendyus triangulatus**	New Zealand Flatworm*	31/12/0006
*Gunnera tinctoria**	Giant-rhubarb*	31/12/1999
*Impatiens glandulifera**	Himalayan Balsam*	08/07/2024
*Fallopia japonica**	Japanese Knotweed*	16/04/2024
*Allium triquetrum**	Three-cornered Garlic*	04/04/2025
Sphagnum capillifolium s.l.	Acute-leaved Bog-moss	24/09/1970
Sphagnum papillosum	Papillose Bog-moss	24/09/1970
*Neovison vison**	American Mink*	30/09/2010
Meles meles	Badger	10/04/2023
Plecotus auritus	Brown Long-eared Bat	01/07/2022
Pipistrellus pipistrellus sensu stricto	Common Pipistrelle	16/08/2022
Myotis daubentonii	Daubenton's Bat	20/09/2021
Erinaceus europaeus	Hedgehog	21/12/2023
Nyctalus leisleri	Leisler's Bat	31/08/2022
Pipistrellus nathusii	Nathusius's Pipistrelle	03/08/2015
Myotis nattereri	Natterer's Bat	31/08/2022
Lutra lutra	Otter	14/06/2015
Martes martes	Pine Marten	01/06/2021
Pipistrellus pipistrellus sensu lato	Pipistrelle	01/07/2022
Sorex minutus	Pygmy Shrew	30/11/2014

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Scientific Name	**Common Name**	**Date last recorded**
Sciurus vulgaris	Red Squirrel	29/11/2015
Pipistrellus pygmaeus	Soprano Pipistrelle	31/08/2022
Myotis mystacinus	Whiskered Bat	31/08/2008

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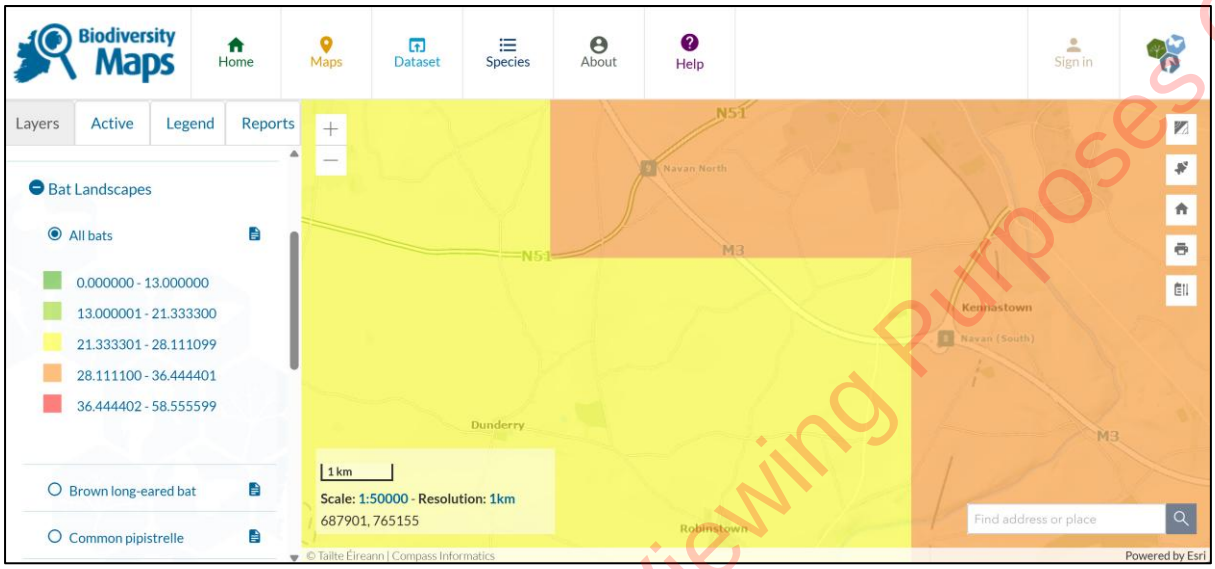

Figure 6. Excerpt from NBDC database online resource indicating Habitat Suitability index of general area

Given the underground nature of the proposed development (approximately 1 km below surface), there will be no direct impacts on above-ground habitats or species of concern.

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2.5 Identification of Natura 2000 sites potentially impacted upon by the development

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When screening a plan or project for compliance with the Habitats Directive, a scoping buffer of 15 km is utilised to identify Natura 2000 sites proximate to the proposed development. The functional area of the plan/project itself is utilised to identify an appropriate "Zone of Influence" identified from any Source-Pathway-Receptor linkages. This approach ensures that potentially affected Natura 2000 sites are included in the screening process. The maintenance of habitats and species within individual Natura 2000 sites at favourable conservation condition contributes to the overall maintenance of favourable conservation status of those habitats and species at a national level. It is therefore necessary to identify any potential impacts of the proposed development on the conservation status of Natura 2000 sites. The National Parks and Wildlife Service deem that the favourable conservation status of a habitat is achieved when:

- Its natural range, and area it covers within that range, is stable or increasing.
- The ecological factors that are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future.
- The conservation status of its typical species is favourable.

The National Parks and Wildlife Service deem that the favourable conservation status of a species is achieved when:

- Population data on the species concerned indicate that it is maintaining itself.
- The natural range of the species is neither being reduced, or likely to be reduced in the foreseeable future.
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

There are two areas designated as a special area of conservation (SAC) within 15 km of the proposed development site and one area designated as special protection areas (SPA) (see Table 2, Figure 7 and Figure 8). The proposed development is approximately 1 km below the surface but is located within an ecologically sensitive area.

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Table 2: Natura 2000 sites within 15km of the proposed development

SITE CODE	DESIGNATION	SITE NAME	Distance to site (km)
002203	SAC	GIRLEY (DREWSTOWN) BOG	14.24
002299	SAC	RIVER BOYNE AND RIVER BLACKWATER	3.03
004232	SPA	RIVER BOYNE AND RIVER BLACKWATER	3.3

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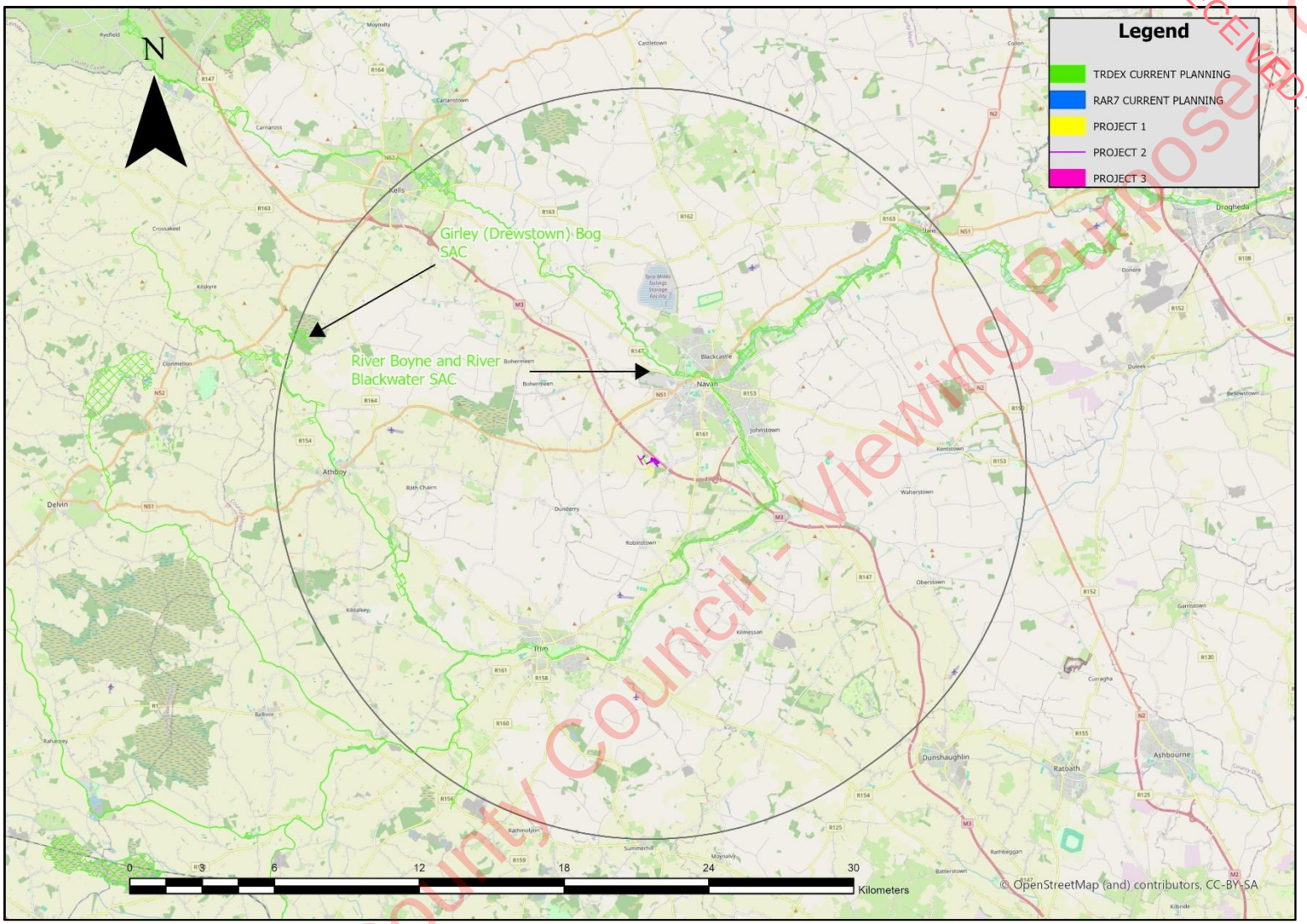

Figure 7: Location of SACs within 15 km of proposed development site

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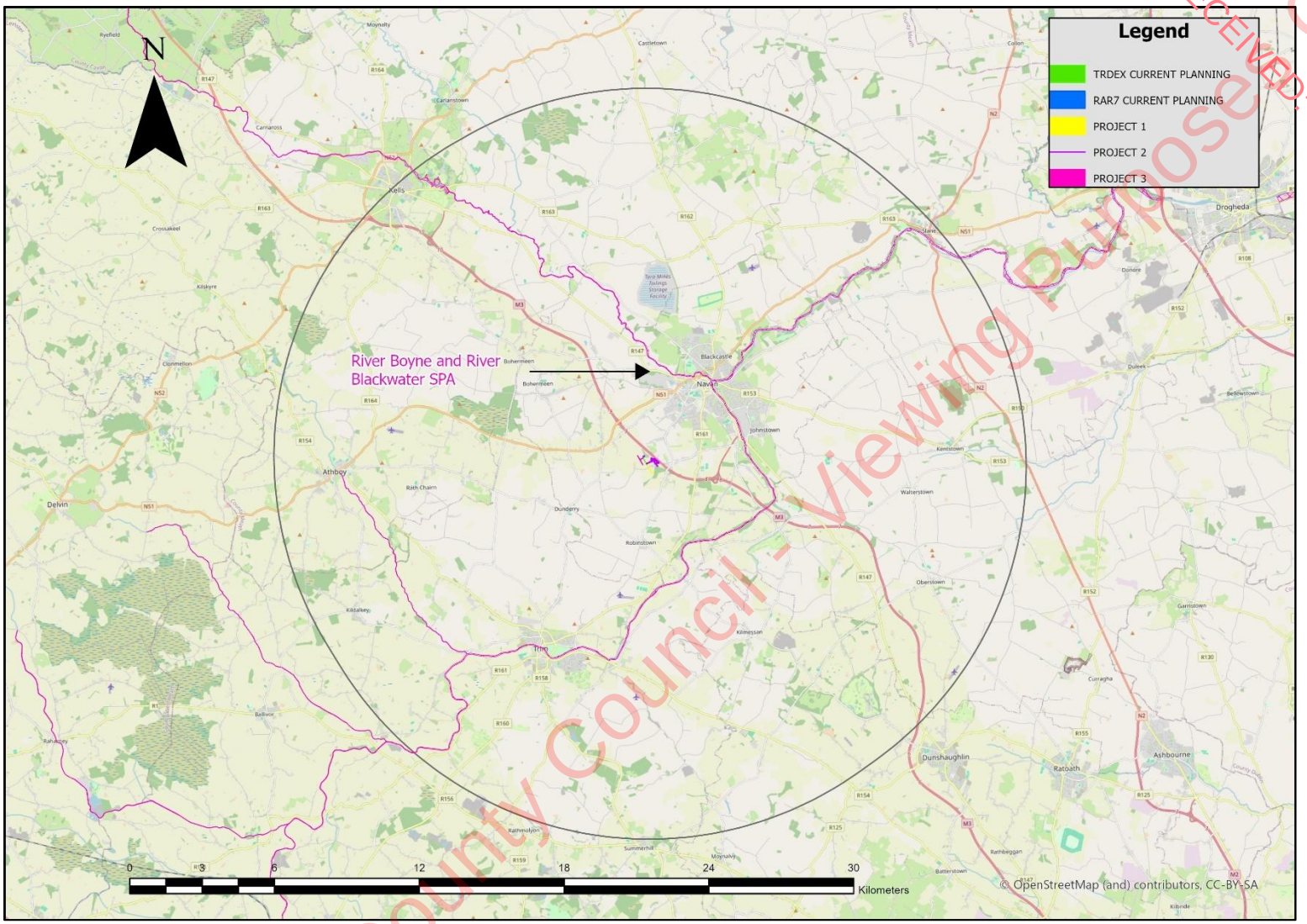

Figure 8: Location of SPAs within 15 km of proposed development

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2.6 Condition of potentially impacted sites

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It is the goal of NPWS to draw up conservation plans for all areas designated for nature conservation, and that these plans will, among other things, set clear objectives for the conservation of the features of interest within a site. Where a detailed Conservation Objectives Document is not available, NPWS have provided a site synopsis, generic Conservation Objectives and a Natura 2000 data form from which information is sourced.

Natura 2000 sites potentially impacted upon by the proposed development are described according to:

1) General description of the site;
2) Qualifying Interests (QI) of the site;
3) Threats, pressures and activities with negative impacts on the site;
4) Conservation Objectives of the site; and
5) Conservation status of the site.

The codes utilized within the Natura 2000 forms are available from http://bd.eionet.europa.eu/activities/Natura_2000/reference_portal

The information regarding condition of sites is presented as Appendix (a)

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2.7 Identification and evaluation of likely significant effect - Description of source-pathway-receptor linkages and identification of "Zone of Influence"

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The basis for identifying potential impacts/significance thereof and defining the zone of influence is the "Source-Pathway-Receptor" (S-P-R) model. This model underpins all groundwater protection schemes in Ireland, as well as the EU Water Framework Directive on which both surface water and groundwater regulations are based. When examining S-P-R relationships in regard to impacts on Natura 2000 sites, the main questions to be considered are:

1) Source characterisation – Identification of potential source(s) of the impact(s);
2) Pathways analysis – Identification of means through which potential impacts could take place, for example is there a hydrogeological or hydrological link that can deliver a pollutant source to a nearby receptor; and
3) Receptor identification – identification of Natura 2000 sites/qualifying interests potentially affected.

The proposed development is within 15 km of Girley Bog SAC, The River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA. Although the proposed development is taking place approximately 1 km below the surface, any impact of the proposed development on air or water quality/hydrology could potentially impact on the Conservation Objectives of the Qualifying Interests of these sites.

Therefore, the key questions to be considered are:

1) Is there any source(s) of impact(s) within the scope of operations, and in particular any source of impacts on air quality, water quality or hydrology?
2) Is there a pathway present between the source of impact and the Natura 2000 sites identified?
3) What are the Natura 2000 sites/qualifying interests potentially impacted upon?

2.7.1 Sources of potential impacts

2.7.1.1 Water quality/hydrology

In any below ground tunnelling operations, there are complex interactions between surface water and groundwater, and the underground nature of the proposed tunnelling activities indicates that in the absence of any mitigation measures, there is potential for impacts on water quality/hydrology. Indeed, in 2021, an incident arose from construction works for the ventilation shafts permitted through P. Ref. NA/201153, which are required to be complete in order to enable safe working of the proposed

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TRDEX1 Extension. During these works, on 20th November 2021 pilot hole drilling works broke through into the existing TRDEX1 exploration drift, causing flooding and temporary evacuation of parts of the mine. Short-term impacts to residential wells were reported by some in the Shambo/Robinstown area (some 2-3 km south of the incident site). Water ingress was stopped on 2nd December 2021 following deployment of a packer in the pilot hole and subsequent sealing of the hole, above the packer and to ground surface with cement grout.

The Stage 1 Groundwater and Surface Water Risk Assessment by Dr Robert Meehan in 2024 (Appendix E), assessed the risks of the TRDEX1 project. It indicated that

> *"…The main potential risks of continued workings on the TRDEX hydrogeologically are a lowering of groundwater levels (and related volumes) in near-surface wells within the cone of depression of the dewatering, and any potential issues in terms of groundwater quality associated with same. As monitoring data have proven that there is not a lowering of groundwater levels (and related volumes) in near-surface wells within the cone of depression of the dewatering associated with the mine, the hydrogeological risks are considered to be negligible. Continual monitoring of near surface wells around the BTM subsurface workings has shown that there are not any potential issues in terms of groundwater quality either…".*

2.7.1.2 Air emissions

The permitted ventilation system for the TRDEX1 tunnel may potentially result in a source of emissions to air.

2.7.2 Pathways

The proposed development is within the same catchment (Boyne) as the three identified Natura 2000 sites, all of which could be impacted upon by alterations in water quality/hydrology. There is, therefore, a potential pathway between the proposed development and these sites. In addition, any impact on air quality could potentially impact these sites.

2.7.3 Receptors

The primary receptors of concern are the Rivers Boyne and Blackwater and any tributaries thereof. These water-courses comprise the River Boyne and River Blackwater Special Area of Conservation (site code 002299) and the River Boyne and River Blackwater Special Area of Conservation (site code 004232). All of the qualifying interests of these two sites are directly or indirectly dependent on water quality. Any alterations in hydrology or negative impacts on water quality could impact on the on the

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conservation objectives and ecological integrity of these sites. Given the potential for N in air emissions, there is potential for Girley (Drewstown) Bog SAC to be impacted upon through N-deposition.

Given the nature of the proposed development, the S-P-R linkages present and considering the Precautionary Principle, the "Zone of Influence" of the proposed development should be extended to these three sites.

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2.8 Sources of potential Direct, Indirect or Secondary Impacts

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The sources of potential direct, indirect or secondary impacts do not include catastrophic events, such as a terrorist attack, earthquake, tsunami, etc. Such catastrophic events have the potential to cause direct, indirect and/or secondary impacts, but are deemed highly unlikely to occur.

2.8.1 Potential Direct Impacts

Given the distance of the proposed development from the Natura 2000 sites in question (in excess of 3 km), no direct impacts are likely to occur through land-take, habitat fragmentation, etc. Currently groundwater inflows to the TRDEX1 tunnel are conveyed via drainage channels along the outer edges of the tunnel invert to pump sump stations. This groundwater is then pumped in stages, between each pump sump, out of the tunnel to the pump station of the main mine dewatering system. This groundwater is then pumped to ground surface and into a series of settlement ponds and integrated lamella water treatment plant where suspended solids and antimony are removed. The treated water is discharged to the River Boyne under conditions of IE Licence P0516. There is a potential for contamination of the River Boyne in the absence of mitigation measures.

2.8.2 Potential Indirect Impacts

2.8.2.1 Contamination of Mine Water

The efficient operation of the mine is critically dependent on a variety of mobile equipment designed specifically for the underground mining. The mobile fleet is powered by diesel engines. To assist the efficient running of the operation many service backup vehicles are used for shotcreting, loading explosives, pipe handling, bulkhead building, materials handling and other tasks. Mobile equipment includes 4x4 wheel drive vehicles plus large plant.

Water enters the mine in three ways:

- As natural ground water;
- As service water for the mining operations; and
- As transport for the backfill.

There are numerous potential sources for contamination of mine water, for example:

- Nitrogen-based explosives are utilised during blasting;
- Underground vehicles/equipment are a source of numerous contaminants, including fuels, oils, etc. In the event of leaks/accidents, this is a source of contamination;

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- Chemicals used and stored underground – there is a potential for contamination through leaks/accidents;
- Fuel is stored underground in fuel bays. In the event of leaks/accidents, this is a source of contamination; and
- In the event of an underground fire, water used for fire-fighting purposes has very high potential for becoming contaminated.

2.8.3 Contamination of groundwater

Re-watering during the decommissioning of the mine will occur. There is potential for contamination associated with re-watering. As recharge occurs, water could be impacted by various contaminants left over from operations, such as fuel, chemicals, etc. There is, therefore, a potential for contamination of ground water during decommissioning.

2.8.4 Impact on hydrology – water levels

The proposed development will likely entail dewatering during operations, and re-watering of the mine during decommissioning. There is potential for these activities to impact on ground water levels, and if there is a dependence of surface water courses on ground water, there is a potential for impacts of operations on water levels within the Rivers Blackwater and Boyne and their tributaries.

2.8.5 Emissions to air

The use of underground diesel equipment requires large volumes of fresh air to be passed through the mine access routes to ensure breathable atmosphere for workers and extract particulates associated with tunnelling. Ventilation is by a 'pull' system whereby the fans are on the exhaust end of the system creating a negative flow. There is potential for emissions to impact on ambient air quality, in particular with regard to N.

2.8.6 Potential Secondary/Residual Impacts

Any direct or indirect impacts have the potential to result in secondary/residual impacts such as bioaccumulation, changes in sedimentation, etc.

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2.8.7 Summary of potential Direct, Indirect and Secondary Impacts

A summary of the potential for impacts upon Natura 2000 sites within the zone of influence of the proposed development is summarised in Table 3. The potential for impacts upon the Natura 2000 sites identified in the event of negative impacts is summarised in Table 4. The potential impacts on the qualifying interests of identified Natura 2000 sites are summarised in Table 5.

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Table 3: Summary of the potential for impacts upon Natura 2000 sites

Site Name	Direct Impacts	Indirect/ Secondary Impacts	Resource requirements (water abstraction etc.)	Emissions (to land, water or air)	Excavation requirements	Duration of construction, operation and decommissioning
Girley (Drewstown) Bog SAC	None foreseen	None foreseen	None foreseen	Potential	None foreseen	Potential
River Boyne and River Blackwater SAC	Potential	Potential	Potential	Potential	Potential	Potential
River Boyne and River Blackwater SPA	Potential	Potential	Potential	Potential	Potential	Potential

Table 4: Summary of the potential for changes to Natura 2000 sites

Site Name	Reduction of habitat area	Disturbance to key species	Habitat/species fragmentation	Reduction in species density	Changes in Key Indicators of Conservation Value	Climate change
Girley (Drewstown) Bog SAC	Potential	Potential	Potential	Potential	Potential	Potential (exacerbated impacts of N-deposition)
River Boyne and River Blackwater SAC	Potential	Potential	Potential	Potential	Potential	Potential (changes in water-levels)
River Boyne and River Blackwater SPA	Potential	Potential	Potential	Potential	Potential	Potential (changes in water-levels)

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Table 5: Summary of potential impacts on Qualifying Interests of Natura 2000 sites identified as at risk of impact

Site name	Qualifying Interest	Potential Impact
Girley (Drewstown) Bog SAC	[7120] Degraded raised bogs still capable of natural regeneration	Potential impacts associated with increased N-deposition associated with mining activities, in particular with regard to aerial emissions
River Boyne and River Blackwater SAC	[7230] Alkaline fens	None foreseen (habitat located upstream at distance from proposed development site)
	[91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (priority)	Potential indirect impacts associated with hydrogeological alterations; Potential indirect impacts associated with changes in water quality
	[1099] River Lamprey	Potential indirect impacts associated with hydrogeological alterations; Potential indirect impacts associated with changes in water quality
	[1106] Atlantic Salmon	Potential indirect impacts associated with hydrogeological alterations; Potential indirect impacts associated with changes in water quality
	[1355] Otter	Potential indirect impacts associated with hydrogeological alterations; Potential indirect impacts associated with changes in water quality
River Boyne and River Blackwater SPA	A229 Kingfisher *Alcedo atthis*	Potential indirect impacts associated with hydrogeological alterations; Potential indirect impacts associated with changes in water quality

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2.8.8 Potential cumulative impacts in association with other plans

Article 6(3) of the Habitats Directive requires an assessment of a plan/project to consider other plans/projects that might, in combination with the proposed plan/project, have the potential to adversely impact upon Natura 2000 sites. The nature of the proposed works is entirely exploratory to ensure the viability of future extraction. In the event of sufficiently high-grade mineral deposits being discovered during the exploratory works that are deemed to be viable, a Mandatory EIA, the preparation and submission of an EIAR and preparation of a NIS informed by this EIAR will be prepared. Within the EIA screening, an assessment of the proposed TRDEX1 Extension considers the interactions with the broader mine activities as appropriate. The groundwater diverted from the proposed TRDEX1 Extension will be treated as part of the overall mine complex water management system, which is overseen by the EPA and operated in compliance with the conditions of the EPA IE Licence P0516 and the future abstraction licence (application currently applied for).

A query was undertaken (09/12/25) of recent planning applications made to Meath Co. Council in the vicinity of the proposed development[1], in addition to queries of the EIA Portal[2] and An Coimisiún Pleanála planning portal[3]. None of these projects are of a nature/scale to be considered to represent a potential source of cumulative effects given the depth of the proposed development c. 1 km below ground surface and given the physical distance and separation of the larger scale developments on the other side of the M3 motorway.

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[1] https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=9cf2a09799d74d8e9316a3d3a4d3a8de
[2] https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1
[3] https://www.pleanala.ie/en-ie/Map-Search

2.8.9 "Do nothing" scenario

In the "Do nothing" scenario, any potential negative impacts will be avoided.

2.8.10 Gauging of Impacts on Natura 2000 sites – Integrity of site checklist

The potential impacts of the proposed development on Natura 2000 sites are gauged using a checklist, which aids in determining whether the development has the potential to have a significant negative impact on any Natura 2000 site. This checklist consists of a number of pertinent questions as set out in Table 6.

Table 6: Potential of the proposed development to impact on Natura 2000 sites in the absence of suitable mitigation/preventative measures

Does the Plan have the potential to:	Yes/No
Cause delays in progress towards achieving the conservation objectives of the Natura 2000 site?	YES
Interrupt progress toward achieving the conservation objectives of the Natura 2000 site?	YES
Disrupt those factors helping to maintain the favourable conditions at the Natura 2000 site?	YES
Interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the Natura 2000 site?	YES
Cause changes to the vital defining aspects (e.g., nutrient balance) that determine how the Natura 2000 site functions as a habitat or ecosystem?	YES
Change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the Natura 2000 site?	YES
Interfere with predicted or expected natural changes to the Natura 2000 site (such as water dynamics or chemical composition)?	YES
Reduce the area of key habitats within the Natura 2000 site?	YES
Reduce the population of key species of the Natura 2000 site?	YES
Alter the balance between key species of the Natura 2000 site?	YES
Reduce the biodiversity of the Natura 2000 site?	YES
Result in disturbance that could affect population size or density or the balance between key species within the Natura 2000 site?	YES
Result in fragmentation?	YES
Result in the loss or reduction of key features of Natura 2000 sites?	YES

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2.9 Conclusions of screening

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According to the guidance published by the NPWS (DoEHLG, 2009), Screening for Appropriate Assessment can either identify that a Natura Impact Statement (NIS) is not required where:

(1) A project/proposal is directly related to the management of the site.

(2) There is no potential for significant effects affecting the Natura 2000 network

Where the screening process identifies that significant effects are certain, likely or uncertain the project must either proceed to Stage II Appropriate Assessment or be rejected.

The likely impacts that will arise from the proposed development have been examined in the context of a number of factors that could potentially impact upon the integrity of the Natura 2000 network. On the basis of the findings of this Screening for Appropriate Assessment, it is concluded that the development:

(1) Is not directly connected with or necessary to the management of a Natura 2000 site and

(2) May have significant impacts on one or more Natura 2000 sites.

Following an examination, analysis and evaluation of the relevant information and the potential for significant effects on the conservation objectives of Natura 2000 sites, and applying the Precautionary Principle, it is not possible to exclude (on the basis of objective information and in the absence of specific prescribed precautionary/mitigation measures) that the proposed development, individually or in combination with other plans or projects, has the potential to have significant negative impacts on the following Natura 2000 site:

- Girley (Drewstown) Bog SAC;
- River Boyne and River Blackwater SAC; and
- River Boyne and River Blackwater SPA.

Screening having identified potential impacts of the proposed development upon these Natura 2000 sites, and applying the Precautionary Principle and in accordance with Article 6(3) of the Habitats Directive, a Stage 2 Appropriate Assessment is required, i.e., "*The consideration of the impact of the project or plan on the integrity of the Natura 2000 Site, either alone or in combination with other projects or plans to the sites structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts.*"

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3 Appropriate Assessment

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The potential for significant negative impacts of operations by BTM at their site (and associated) located at Knockumber, Navan, Co. Meath on the ecological integrity of the Boyne Coast and Estuary SAC, the River Boyne and River Blackwater SAC, the Boyne Estuary SPA and the River Boyne and River Blackwater SPA, in light of the conservation objectives of these sites, is examined in this section.

3.1 Stage 2 Appropriate Assessment background

Screening having identified potential impacts, Stage 2 Appropriate Assessment is carried out to determine if the plan/project will have any significant negative impacts on the integrity of the Natura 2000 site(s) identified as being at risk. For the purposes of Appropriate Assessment, a significant effect is any effect that may affect the Conservation Objectives of the Qualifying Interest for which a site was designated but excluding inconsequential effects. If the effect is not relevant to the conservation objective, then it cannot be a significant effect for the purposes of Appropriate Assessment. A likely significant effect, for the purpose of Appropriate Assessment must be:

(a) Significant;

(b) Relevant to the conservation objective for that site; and

(c) The possibility of effects cannot be reasonably excluded.

This stage of the Appropriate Assessment process includes:

1) Impact Prediction - the potential impact of the operations at BTM are identified and their likelihood to impact on the ecological integrity of Natura 2000 sites in terms of the conservation objectives of those sites is assessed; and
2) Mitigation Measures – mitigation/preventative measures are identified (either in place or to be implemented) in relation to any significant negative impacts associated with the operations at BTM on the Natura 2000 sites as described herein.

This stage of the Appropriate Assessment process involves the identification of potentially affected sites, the identification of the qualifying interests of those sites, and an assessment of the significance of impacts on the conservation objectives of those sites. Any negative impacts on the integrity of structure, function or conservation objectives of these sites will require the implementation of avoidance or mitigation measures to avoid progression to Stages 3 and 4 of the Appropriate Assessment process.

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3.2 Summary of Natura 2000 sites relevant to the Stage Two Appropriate Assessment

3.2.1 Girley Bog (Drewstown Bog) SAC 002203 (Site synopsis version date 11/09/17, Natura 2000 form update, Conservation Objectives Version 1)

This site is described in the Natura 2000 data form as "*…Girley (Drewstown) Bog (002203) consists of 32.26 ha of raised bog (15.05 ha of high bog and 17.21 ha of cutover bog) which occupies the south-western part of Girley Bog NHA (001580). Girley Bog is a Midland type raised bog developed in a basin. The SAC is bounded by open high bog on its northern and eastern sides, by agricultural land on its western side and by cutover bog with forestry on its southern side. Most of the SAC, and all of the high bog included in the SAC, was completely covered by coniferous forestry, which has been recently clear-felled as part of the restoration program for the site. Most of the conifers in the SAC were removed and the associated intensive drainage system was blocked by 2013 as part of an EU LIFE funded Coillte project (Demonstrating Best Practice in Raised Bog Restoration in Ireland) so as to raise the water table and restore Active Raised Bog (ARB) on the site. With the clear-felling of conifers and blocking of drains, water-levels have risen and remain high throughout most of the year. As a consequence, raised bog vegetation, including typical sphagnum species, has returned to the wetter areas of the high bog. Overall, the high bog appears to be re-wetting with limited areas of wet flats and hummock/hollows. However, the majority of the restored areas have not yet developed vegetation characteristic of the wettest conditions and there is a considerable amount of conifer and birch regeneration occurring in these areas. Two areas in the north-east of the site covering 2.28 ha have been identified by hydrological modelling as Degraded Raised Bog (7120) (DRB) habitat. They now have standing surface water in the hollows and pools for most of the year with considerable areas of rapidly regenerating bog mosses. These wet areas with regenerating Sphagnum moss are expected to develop into Active Raised Bog habitat within 20 years. However, to ensure that these areas reach their full potential it will be necessary to block the boundary drains in consultation with other stakeholders. The cutover bog to the south of the site is generally drier and is developing into wet and dry woodland dominated currently by Downy Birch scrub with occasional conifers from the former plantation. Cherry Laurel, Rhododendron and conifers are regenerating strongly in this area and are subject to ongoing control programs…*"

NPWS has drawn up a detailed Conservation Objectives document for this site, which is available for download from:

https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002203.pdf

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3.2.2 River Boyne and River Blackwater SAC (Site synopsis version date 06/01/2014, Natura 2000 form update 09/14, Conservation Objectives (generic) version 4.0)

This site is described in the Natura 2000 data form as "*…This site comprises most of the freshwater element of the River Boyne from upriver of the Boyne Aqueduct at Drogheda, the Blackwater River as far as Lough Ramor and the principal Boyne tributaries, notably the Deel, Stoneyford and Tremblestown Rivers. This system drains a considerable area of Cos. Meath and Westmeath and smaller areas of Cavan and Louth. The underlying geology is Carboniferous Limestone for the most part with areas of Upper, Lower and Middle well represented. In the vicinity of Kells Silurian Quartzite is present while close to Trim are Carboniferous Shales and Sandstones. The rivers flow through a landscape dominated by intensive agriculture, mostly of improved grassland but also cereals. Much of the river channels were subject to arterial drainage schemes in the past. Natural flood-plains now exist along only limited stretches of river, though often there is a fringe of reed swamp, freshwater marsh, wet grassland or deciduous wet woodland. Along some parts, notably between Drogheda and Slane, are stands of tall, mature mixed woodland. Substantial areas of improved grassland and arable land are included in site for water quality reasons. There are many medium to large sized towns adjacent to but not within the site. The main channel of the Boyne contains a good example of alluvial woodland of the Salicetum albo-fragilis type which has developed on three alluvium islands. Alkaline fen vegetation is well represented at Lough Shesk, where there is a very fine example of habitat succession from open water to raised bog. The Boyne and its tributaries is one of Ireland's premier game fisheries and offers a wide range of angling, from fishing for spring salmon and grilse to sea trout fishing and extensive brown trout fishing. The site is one of the most important in eastern Ireland for Salmo salar and has very extensive spawning grounds. The site also has an important population of Lampetra fluviatilis, though the distribution or abundance of this species is not well known. Lutra lutra is widespread throughout the site. Some of the grassland areas along the Boyne and Blackwater are used by a nationally important winter flock of Cygnus cygnus. Several Red Data Book plants occur within the site, with Pyrola rotundifolia, Poa palustris and Juncus compressus. Also occurring are a number of Red Data Book animals, notably Meles meles, Martes martes and Rana temporaria. The River Boyne is a designated Salmonid Water under the EU Freshwater Fish Directive…*"

NPWS has drawn up a detailed Conservation Objectives document for this site, which is available for download from:

https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002299.pdf

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3.2.3 The River Boyne and River Blackwater SPA (Site synopsis version date 25/11/10, Natura 2000 form update 09/2014, Conservation Objectives Version 1)

This site is described in the Natura 2000 data form as "*…The River Boyne and River Blackwater SPA is a long linear site that comprises stretches of the River Boyne and several of its tributaries: most of the site is in Co Meath but it extends also into Counties Cavan, Louth and Westmeath. It includes the following river sections: The River Boyne from the M1 motorway bridge, west of Drogheda, to the junction with the Royal Canal, west of Longwood, Co Meath; the River Blackwater from its junction with the River Boyne in Navan to the junction with Lough Ramor in Co Cavan; the Tremblestown River (and Athboy River) from the junction with the River Boyne at Kilnagross Bridge to the bridge in Athboy, Co Meath; the Stoneyford River from its junction with the River Boyne to Stonestone Bridge in Co. Westmeath; the River Deel from its junction with the River Boyne to Cummer Bridge, Co.Westmeath. The site includes the river channel and marginal vegetation. The River Boyne and River Blackwater SPA supports nationally important numbers of Alcedo atthis. Other species which occur within the site include Cygnus olor, Anas crecca, Anas platyrhynchos, Phalacrocorax carbo, Ardea cinerea, Gallinula chloropus, Gallinago gallinago and Riparia riparia.*

NPWS has drawn up a detailed Conservation Objectives document for this site, which is available for downloaded from:

https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004232.pdf

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3.3 Summary of qualifying interests of Natura 2000 sites potentially exposed to significant negative impacts

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Three Natura 2000 sites have been identified as being potentially exposed to significant negative impacts.

3.3.1 Girley (Drewstown) Bog SAC

Girley Bog SAC is linked to the site of the proposed development through emissions to the air of N. The ecology of the Qualifying Interest of this SAC is very sensitive to excess N, and one of the conservation objectives of this site is to limit N-deposition in the vicinity of the site. Significant changes in N-deposition from air emissions could disrupt the ecological functioning of this site if these changes were of sufficient magnitude/duration to affect the N-cycle within the habitat occurring.

A description of the conservation status (taken from The Status of EU Protected Habitats and Species in Ireland) of Qualifying Interest (Annex I habitat(s) and/or the Annex II species for which the SAC has been selected) is given as follows.

[7120] Degraded Raised Bogs

Raised bogs are accumulations of deep acid peat (3-12m) that originated in shallow lake basins or topographic depressions. As raised bogs grow upwards from the surface, they typically develop an elevated dome, which is primarily rainwater fed (ombrotrophic) and isolated from groundwater. This gives rise to a nutrient deficient, acidic habitat, which supports a distinctive suite of specialised vegetation assemblages. Raised bogs are more abundant in the lowlands of central and mid-west Ireland. They are confined to areas with an annual rainfall below 1,250 mm, occurring principally on land below 130m. Degraded raised bog is characterised by the complete absence (or patchy thin cover) of an acrotelm, which is the living, actively peat-forming upper layer. Previously, all the vegetated areas of high bog that were not delineated as active raised bog were defined as degraded raised bog, on the assumption that most of it could be restored to active peat-forming conditions after implementation of comprehensive restoration works. However, recent modelling techniques based on earlier research has allowed degraded raised bog to be delineated based on the premise that only areas with the right combination of physical conditions are ultimately capable of supporting active raised bog after restoration measures are implemented. To qualify as degraded raised bog, there must be a reasonable expectation that these areas are capable of natural regeneration to active bog within 30 years if their hydrology is repaired. The remainder of the high bog that is neither active nor degraded raised bog is now referred to as 'supporting raised bog habitat'. The main pressures on Degraded raised bog come from peat extraction, drainage, afforestation and burning. Climate change

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is recognised as an additional threat in the future. As a result, the Overall Status is assessed as Bad and deteriorating, unchanged since the last assessment.

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3.3.2 River Boyne and River Blackwater SAC

All of the qualifying interests of this Natura 2000 site are directly or indirectly dependent on the water quality/hydrology of the Rivers Boyne and Blackwater. Any habitats or species dependent on water quality/hydrological regime within this Natura 2000 site would potentially be at risk from changes in hydrology associated with operations, and/or changes in water quality associated with contaminated water discharge or accidental pollution incidents (both during mining operations, and any construction works associated with operations, including decommissioning) if these changes were of significant magnitude/duration to affect the hydrological regime/water quality of the Rivers Boyne or Blackwater. A description of the conservation status (taken from The Status of EU Protected Habitats and Species in Ireland) of Qualifying Interest (Annex I habitat(s) and/or the Annex II species for which the SAC has been selected) is given as follows.

[7230] Alkaline Fens

Alkaline fens are typically calcareous basin or flush fen systems with extensive areas of species-rich small sedge communities. These fen systems are often a complex mosaic of habitats, with co-occurring tall sedge beds, reedbeds, wet grasslands, springs and open water. The habitat is characterised by a broad range of small to medium Carex spp., carpets of brown mosses and high species diversity including black bog-rush (*Schoenus nigricans*), blunt-flowered rush (*Juncus subnodulous*), devil's bit scabious (*Succisa pratensis*), hemp agrimony (*Eupatorium cannabinum*) and purple moor-grass (*Molinia caerulea*). This habitat requires a high-water table, a calcareous, low nutrient water supply and minimal water level fluctuation. Low intensity mowing and/or grazing are also very important for maintaining species richness. In Ireland, the most extensive areas of alkaline fens are thought to occur in lowland basins underlain by limestone groundwater bodies with a karstic or poorly productive flow regime. Alkaline fens within upland and lowland flushes, along the fringes of calcareous lakes (e.g. Lough Corrib) and within turloughs, dune slacks and machair are thought to be more limited in local extent but more widespread. The current distribution and range maps provide a more refined estimate of the national habitat extent since 2007, but further survey is needed. Some losses of fen habitat are considered to have occurred since the Directive came into force, though the magnitude of the loss is unknown. The main pressures were identified as peat extraction, wetland reclamation and infilling. Wetland habitats are afforded additional protection under recent Agriculture Environmental

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Impact Assessment Regulations; however the Overall Status is considered to be Bad due to the pressures outlined; the overall trend is Unknown due to the absence of a national survey for this habitat.

[91EO] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) – PRIORITY HABITAT

Riparian forests of ash (*Fraxinus excelsior*) and alder (*Alnus glutinosa*) occur on heavy soils which are periodically inundated by the annual rise of river levels, but which are otherwise well drained and aerated during low water. The herbaceous layer includes many tall species such as remote sedge (*Carex remota*), gypsywort (*Lycopus europaeus*), common nettle (*Urtica dioica*) and water avens (*Geum rivale*). In addition, there are gallery forests of tall willows alongside river channels and occasionally on river islands, where the tree roots are almost continuously submerged. They are dominated by white willow (*Salix alba*), common osier (*S. viminalis*) and almond willow (*S. triandra*), sometimes with grey willow (*S. cinerea*) but alder is relatively rare. This habitat has suffered considerable historic losses and is highly fragmented. Non-native and invasive species especially sycamore (*Acer pseudoplatanus*) and beech (*Fagus sylvatica*), and problematic native species such as bramble (*Rubus fruticosus*) and common nettle (*Urtica dioica*) (a consequence of under grazing) are regarded as the main pressures impacting this habitat. The Overall Status is assessed as Bad due to these ongoing pressures and highly fragmented nature of this habitat. There have been national efforts to remove non-native and invasive plant species reinstate correct hydrological regimes and generally to improve the conservation status of alluvial woodlands. Some substantial areas have been rehabilitated, and this is the main reason for the improving trend reported since the 2007 assessment.

[1099] *Lampetra fluviatilis*

The river lamprey (*Lampetra fluviatilis*) breeds in freshwater rivers and streams. Adults spawn in spring, excavating shallow nests in gravels and stones. After hatching, the larvae called ammocoetes drift or swim downstream to areas of riverbed with a fine silt composition. They burrow into this bed material and live as filter feeders over a period of years before transforming into young adult fish. As adults they are parasitic, attaching to and feeding on larger fish in coastal waters. They can grow to 30cm at maturity at which stage they re-enter freshwater to spawn. The adult fish die after spawning. River and brook lamprey are indistinguishable as larvae, living as filter feeders in sediment. The mature adult forms are clearly distinguishable on the basis of body size. The two types of lamprey are considered by many in the same context as the brown trout / sea trout pairing, with a similar absence of genetic discriminators. Lamprey surveys in Ireland have necessarily focussed on juvenile lamprey.

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Consequently, the vast majority of available data relates to "Lampetra sp." and cannot be assigned to one species or the other. For the above reasons the brook lamprey and the river lamprey are assessed jointly. There are extensive areas of suitable habitat and no significant pressures impacting these species. The Overall Status is therefore assessed as Favourable.

[1106] *Salmo salar*

The range of the Atlantic salmon (*Salmo salar*) extends in an arc from northern Portugal in the east, to New England, United States in the west. Salmon use rivers to reproduce and as nursery areas. Eggs are deposited during the winter in a depression, called a redd, excavated in river gravels. The eggs develop protected within the substrate and during spring hatch into alevins, which in turn develop into fry. The fry feed for the summer and over the autumn, gradually becoming parr. Fry and parr feed primarily upon invertebrates. The Irish population generally comprises fish that spend two winters (small numbers spend one or three winters) in freshwater before going to sea, in spring, as smolts at around 10-25cm in length. Adults spend one to three years at sea where growth rates are much greater. They feed upon crustaceans and fish (e.g. capelin and sandeels) as they migrate to feeding grounds in the North Atlantic. The majority of Irish fish spend one winter at sea before returning to their natal rivers, mainly during the summer, as grilse. Smaller numbers spend two or even three winters at sea, returning mainly in spring, hence "spring" salmon. There has been a recent stabilisation of the numbers of salmon spawning in Ireland and an increasing number of salmon rivers meeting their conservation limits, however low rates of marine survival are of concern. Different units were used to measure population size in 2007; there is no genuine change in the overall population estimate. There are numerous threats to the freshwater habitat and vigilance is required to ensure the maintenance of good quality habitat which salmon require to thrive. The salmon population is still low in comparison to previous decades and so, in the absence of a recovery, the Overall Status is assessed as Inadequate.

[1355] *Lutra lutra*

Dramatic declines, leading in some cases to extinctions, occurred in many European otter (*Lutra lutra*) populations during the latter half of the 20th Century, however, Ireland has remained a stronghold for the species. Otters have two basic requirements: aquatic prey and safe refuges where they can rest. In Ireland, otter populations are found along rivers, lakes and coasts, where fish and other prey are abundant, and where the bank-side habitat offers plenty of cover. The otter is an opportunistic predator with a broad and varied diet. In coastal areas fish, crabs and molluscs are known to be eaten. In freshwater areas a variety of fish from sticklebacks to salmon and eels will be taken, while crayfish

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and frogs can be important locally or seasonally. The main threats to the otter include habitat destruction (including river drainage and the clearance of bank-side vegetation); pollution, particularly organic pollution resulting in fish kills; and accidental deaths (road traffic and fishing gear). The otter is currently widespread throughout Ireland and present in a wide variety of habitat types. Previous concerns about population decline have been allayed and the latest estimate puts the population at approximately 15-20,000 animals. Therefore, the Overall Status is assessed as Favourable.

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3.3.3 River Boyne and River Blackwater SPA

Breeding Kingfisher, the Qualifying Interest of this site is dependent on the maintenance of the water quality (for prey items) and hydrological regime (changes could potentially impact on nesting sites of the River Boyne and Blackwater). This species would potentially be at risk from changes in hydrology associated with operations, and/or changes in water quality associated with contaminated water discharge or accidental pollution incidents (both during mining operations, and any construction works associated with operations, including decommissioning) if these changes were of significant magnitude/duration to affect the hydrological regime/water quality of the Rivers Boyne or Blackwater.

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3.4 Summary of Conservation Objectives of Natura 2000 sites potentially exposed to significant negative impacts

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The focus of the Appropriate Assessment process at the second stage must be on the integrity of European sites "in light of their conservation objectives." A detailed analysis of Natura 2000 sites is given in Section 2.5 as regards:

- General Description;
- Qualifying Interests;
- Threats, Pressures and Activities with negative impacts;
- Conservation Objectives; and
- Conservation Status

A summary of the current conservation status of the qualifying interests (Nationally as indicated in the NPWS document "Status of EU Protected Habitats and Species in Ireland (2025)", and site specific as recorded in the individual Natura 2000 form) and conditions underpinning site integrity is presented in Table 7. A summary of the Conservation Objectives of each site is presented in Table 8**.**

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Table 7: Summary of Conservation Status of Qualifying Interests and conditions underpinning site integrity

SITE NAME/CODE	QUALIFYING INTERESTS HABITAT/SPECIES CODE	NATIONAL CONSERVATION STATUS (2025)		SITE ASSESSMENT OF CONSERVATION STATUS (NATURA 2000 DATA FORM)		CONDITIONS UNDERPINNING SITE INTEGRITY
Girley (Drewstown) Bog SAC						
	[7120]	RANGE	BAD (=)	REPRESENTATIVITY	B	• HYDROLOGICAL INTEGRITY • APPROPRIATE LEVELS OF DISTURBANCE • NUTRIENT CYCLING • AIR QUALITY
		AREA	BAD (↑)	RELATIVE SURFACE	C	
		STRUCTURES AND FUNCTIONS	BAD (↑)	CONSERVATION	C	
		FUTURE PROSPECTS	UNFAVOURABLE/BAD	GLOBAL	B	
		OVERALL STATUS	BAD			
		OVERALL TREND	IMPROVING			
River Boyne and river Blackwater SAC						
	[7230]	RANGE	FAVOURABLE	REPRESENTATIVITY	B	• WATER QUALITY • APPROPRIATE AGRICULTURAL PRACTICES • SURFACE AND GROUND WATER QUALITY • APPROPRIATE LEVELS OF DISTURBANCE • WATER LEVELS • AIR QUALITY • TIDAL CURRENTS (LOWER REACHES)
		AREA	BAD (↓)	RELATIVE SURFACE	C	
		STRUCTURES AND FUNCTIONS	BAD (unknown)	CONSERVATION	B	
		FUTURE PROSPECTS	UNFAVOURABLE/BAD	GLOBAL	B	
		OVERALL STATUS	UNFAVOURABLE/BAD			
		OVERALL TREND	DETERIORATING			
	91E0 (PRIORITY HABITAT)	RANGE	FAVOURABLE (=)	REPRESENTATIVITY	B	
		AREA	BAD (↓)	RELATIVE SURFACE	B	
		STRUCTURES AND FUNCTIONS	BAD(=)	CONSERVATION	B	
		FUTURE PROSPECTS	BAD/UNFAVOURABLE	GLOBAL	B	
		OVERALL STATUS	BAD			
		OVERALL TREND	DETERIORATING			
	[1099]	RANGE	UNKNOWN	REPRESENTATIVITY	C	
		POPULATION	UNKNOWN	RELATIVE SURFACE	B	
		HABITAT	FAVOURABLE (=)	CONSERVATION	C	
		FUTURE PROSPECTS	UNKNOWN	GLOBAL	B	
		OVERALL STATUS	UNFAVOURABLE/INADEQUATE			
		OVERALL TREND	UNKNOWN			

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SITE NAME/CODE	QUALIFYING INTERESTS HABITAT/SPECIES CODE	NATIONAL CONSERVATION STATUS (2025)		SITE ASSESSMENT OF CONSERVATION STATUS (NATURA 2000 DATA FORM)		CONDITIONS UNDERPINNING SITE INTEGRITY
	[1106]	RANGE	BAD (↓)	REPRESENTATIVITY	C	
		POPULATION	BAD (↓)	RELATIVE SURFACE	B	
		HABITAT	UNFAVOURABLE/INADEQUATE (=)	CONSERVATION	C	
		FUTURE PROSPECTS	UNFAVOURABLE/INADEQUATE	GLOBAL	B	
		OVERALL STATUS	BAD			
		OVERALL TREND	DETERIORATING			
	[1355]	RANGE	FAVOURABLE (=)	REPRESENTATIVITY	C	
		POPULATION	FAVOURABLE (=)	RELATIVE SURFACE	A	
		HABITAT	FAVOURABLE (UNCERTAIN)	CONSERVATION	C	
		FUTURE PROSPECTS	FAVOURABLE	GLOBAL	A	
		OVERALL STATUS	FAVOURABLE			
		OVERALL TREND	STABLE			
River Boyne and River Blackwater SPA	A299	N/A	N/A	POPULATION	C	• WATER QUALITY • APPROPRIATE AGRICULTURAL PRACTICES • SURFACE AND GROUND WATER QUALITY • APPROPRIATE LEVELS OF DISTURBANCE • WATER LEVELS • AIR QUALITY
		N/A	N/A	CONSERVATION	B	
		N/A	N/A	ISOLATION	C	
		N/A	N/A	GLOBAL	B	

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Table 8: Summary of Conservation Objectives

SITE NAME/CODE	QUALIFYING INTERESTS	CONSERVATION OBJECTIVE
GIRLEY (DREWSTOWN) BOG SAC		
	DEGRADED RAISED BOGS STILL CAPABLE OF REGENERATION [7120]	To restore the favourable conservation condition of Degraded raised bogs still capable of natural regeneration in Girley (Drewstown) Bog SAC
RIVER BOYNE AND RIVER BLACKWATER SAC		
	ALKALINE FENS [7230]	To maintain or restore favourable conservation condition
	ALLUVIAL FORESTS WITH ALNUS GLUTINOSA AND FRAXINUS EXCELSIOR 91E0 (PRIORITY HABITAT)	To maintain or restore favourable conservation condition
	RIVER LAMPREY[1099]	To maintain or restore favourable conservation condition
	ATLANTIC SALMON [1106]	To maintain or restore favourable conservation condition
	OTTER [1355]	To maintain or restore favourable conservation condition
RIVER BOYNE AND RIVER BLACKWATER SPA		
	KINGFISHER [A229]	To maintain or restore favourable conservation condition

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3.5 Summary of pressures, threats and activities with potential for negative impacts on qualifying interests of sites

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Using the standard Natura 2000 form for each of the Natura 2000 sites potentially at risk of impact from the proposed development, a summary of the threats, activities and pressures with negative impacts on qualifying interests of the sites in question is presented in Table 9. Those relevant to proposed development are highlighted in Amber.

Table 9: Summary of threats, pressures and activities on Natura 2000 site relevant to proposed development

SITE NAME/CODE	PRESSURE/THREAT/ACTIVITY	INSIDE/OUTSIDE /BOTH	RANK
GIRLEY BOG SAC	HUMAN INDUCED CHANGES IN HYDROLOGY	BOTH	HIGH
	INVASIVE SPECIES	BOTH	MEDIUM
	BURNING	BOTH	MEDIUM
RIVER BOYNE AND RIVER BLACKWATER SAC			
	GRAZING	BOTH	HIGH
	CULTIVATION	BOTH	HIGH
	FERTILISATION	BOTH	HIGH
	SYLVICULTURE/AGRICULTURE	**OUTSIDE**	**MEDIUM**
	FISHING	INSIDE	HIGH
	NAUTICAL SPORTS	INSIDE	MEDIUM
	WALKING, HORSERIDING AND NON-MOTORISED VEHICLES	INSIDE	MEDIUM
	HUMAN INDUCED CHANGES IN HYDRAULIC CONDITIONS	**INSIDE**	**MEDIUM**
	SYLVICULTURE/AGRICULTURE	INSIDE	HIGH
	ROADS, MOTORWAYS	**BOTH**	**HIGH**
	DISPERSED HABITATION	OUTSIDE	HIGH
	URBANISED AREAS, HUMAN HABITATION	**OUTSIDE**	**HIGH**
	DISCHARGES	**INSIDE**	**MEDIUM**
RIVER BOYNE AND RIVER BLACKWATER SPA			
	ROADS, MOTORWAYS	**BOTH**	**HIGH**
	HUMAN INDUCED CHANGES IN HYDRAULIC CONDITIONS	**INSIDE**	**MEDIUM**
	URBANISED AREAS, HUMAN HABITATION	**OUTSIDE**	**HIGH**
	DISPERSED HABITATION	**OUTSIDE**	**HIGH**

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3.6 Impact Prediction

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3.6.1 Identified Pathways

As identified in Section 2.6, the proposed operations are connected to two designated sites (the River Boyne and River Blackwater SAC/SPA) via several source-pathway-receptor linkages. There is further connectivity to the Girley Bog SAC. There is potential for the proposed development to have impacts on one or more of these sites in the absence of mitigation measures.

3.6.2 Potential Impacts on Qualifying Interests of sites

The Qualifying Interests (habitat/species), Primary Location of Qualifying Interests, Sensitivities of Qualifying Interests and Potential Impacts affecting Qualifying Interests is indicated in Table 10. The location of the Primary Locations of two Qualifying Interest habitats (both within the River Boyne and River Blackwater SAC – [7230] and [91E0]) are indicated in Figure 9 and Figure 10

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Table 10: Summary of potential impacts on Qualifying Interests of relevant Natura 2000 sites

SITE NAME/CODE	QUALIFYING INTERESTS	PRIMARY LOCATION	SENSITIVITIES RELATIVE TO PROPOSED DEVELOPMENT	POTENTIAL IMPACTS
GIRLEY BOG SAC				
	DEGRADED RAISED BOGS [7120]	THROUGHOUT	• EMISSIONS TO AIR	• INCREASED N-DEPOSITION
RIVER BOYNE AND RIVER BLACKWATER SAC				
	ALKALINE FENS [7230]	LOUGH SHESK, FREEHAN LOUGH AND NEWTOWN LOUGH - APPROXIMATELY 30 KM (UPSTREAM) FROM OPERATIONS (SEE MAP A)	• DISRUPTION TO AND/OR ACIDIFICATION OF WATER FEEDING FEN	• HABITATS ARE LOCATED UPSTREAM, POTENTIAL IMPACTS HIGHLY UNLIKELY
	ALLUVIAL FORESTS WITH ALNUS GLUTINOSA AND FRAXINUS EXCELSIOR [91E0] (PRIORITY HABITAT)	BOYNE ISLANDS, 2.5 KM WEST OF DROGHEDA, APPROIXIMATELY 22 KM (DOWNSTREAM) FROM OPERATIONS (SEE MAP B)	• CHANGES IN HYDROLOGICAL REGIME	• CHANGES IN HYDROLOGICAL REGIME COULD IMPACT ON FLOODING FREQUENCY OF HABITAT
	RIVER LAMPREY [1099]	THROUGHOUT	• CHANGES IN HYDROLOGICAL REGIME • CHANGES IN WATER QUALITY	• CHANGE IN CHEMICAL AND/OR NUTRIENT STATUS OF WATER AND/OR SILT • CHANGES IN DEPOSITION OF SILT IN HABITAT • IMPACTS ON FEEDING AMMOCOETES THROUGH SILTATION AND/OR BIOACCUMULATION
	ATLANTIC SALMON [1106]	THROUGHOUT	• CHANGES IN HYDROLOGICAL REGIME • CHANGES IN WATER QUALITY	• CHANGE IN CHEMICAL AND/OR NUTRIENT STATUS OF WATER • AGGRESSIVE COLONISATION BY ALIEN INVASIVE PLANT SPECIES • CHANGE IN HYDROLOGICAL REGIME MAY IMPACT SPAWNING • BIOACCUMULATION OF CONTAMINANTS
	OTTER [1355]	THROUGHOUT	• CHANGES IN HYDROLOGICAL REGIME • CHANGES IN WATER QUALITY	• CHANGE IN HYDROLOGICAL REGIME COULD IMPACT ON HOLTS • CHANGE IN CHEMICAL/NUTRIENT STATUS COULD IMPACT ON PREY SPECIES • BIOACCUMULATION OF CONTAMINANTS

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SITE NAME/CODE	QUALIFYING INTERESTS	PRIMARY LOCATION	SENSITIVITIES RELATIVE TO PROPOSED DEVELOPMENT	POTENTIAL IMPACTS
RIVER BOYNE AND RIVER BLACKWATER SPA	KINGFISHER [A229]	THROUGHOUT	• CHANGES IN HYDROLOGICAL REGIME • CHANGES IN WATER QUALITY • ALIEN INVASIVE PLANT SPECIES • DISTURBANCE	• CHANGE IN HYDROLOGICAL REGIME COULD IMPACT ON NESTING SITES • CHANGE IN CHEMICAL/NUTRIENT STATUS COULD IMPACT ON PREY SPECIES • BIOACCUMULATION OF CONTAMINANTS • INCREASED DISTURBANCE COULD IMPACT USE OF HABITAT

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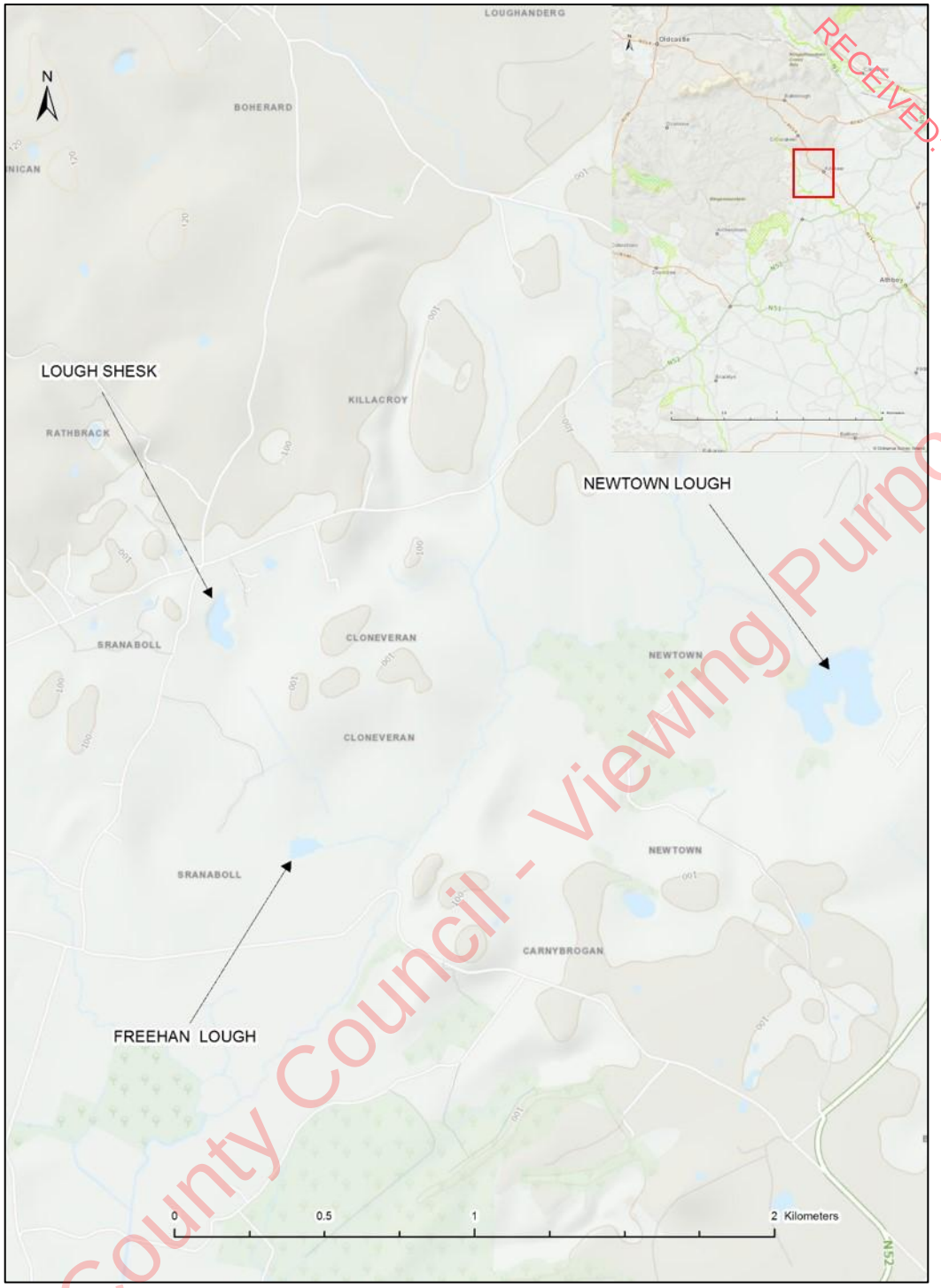

Figure 9 Map illustrating location of three loughs within the River Boyne and River Blackwater where [7230] occurs approximately 10km distant from proposed development southeast of Oldcastle

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Figure 10: Map illustrating location of Boyne Islands, on which [91E0], a priority habitat, outside of the 15 km buffer occurs

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3.6.3 Sources of Potential Impacts associated with proposed development

The sources of potential impacts in relation to the proposed development are identified in Section 2.6.2. The sources of impacts are associated with:

- Impacts on water quality/hydrology
- Impacts on air quality

A summary of potential impacts on Qualifying Interests of relevant Natura 2000 sites and the sources of potential impacts are provided in Table 11.

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Table 11: Summary of potential impacts on Qualifying Interests of relevant Natura 2000 sites and the sources of potential impacts

SITE NAME/CODE	QUALIFYING INTERESTS	POTENTIAL IMPACTS	SOURCE(S) OF IMPACT(S)
GIRLEY BOG SAC			
	DEGRADED RAISED BOGS [7120]	• CHANGES IN N-DEPOSITION	• EMISSIONS OF N TO AIR
RIVER BOYNE AND RIVER BLACKWATER SAC			
	ALKALINE FENS [7230]	• HABITATS ARE LOCATED UPSTREAM, POTENTIAL IMPACTS HIGHLY UNLIKELY	• NONE FORESEEN
	ALLUVIAL FORESTS WITH ALNUS GLUTINOSA AND FRAXINUS EXCELSIOR 91E0 (PRIORITY HABITAT)	• CHANGES IN HYDROLOGICAL REGIME COULD IMPACT ON FLOODING FREQUENCY OF HABITAT • AGGRESSIVE COLONISATION BY ALIEN INVASIVE PLANT SPECIES	• POTENTIAL CHANGES IN HYDROLOGICAL REGIME ASSOCIATED WITH DEWATERING AND/OR REWATERING OF MINE COULD ALTER THE FREQUENCY OF INUNDATION OF THE BOYNE ISLANDS
	RIVER LAMPREY [1099]	• CHANGE IN CHEMICAL AND/OR NUTRIENT STATUS OF WATER AND/OR SILT • CHANGES IN DEPOSITION OF SILT IN HABITAT • AGGRESSIVE COLONISATION BY ALIEN INVASIVE SPECIES • IMPACTS ON FEEDING AMMOCOETES THROUGH SILTATION AND/OR BIOACCUMULATION	• CONTAMINATION OF SURFACE WATER DURING OPERATIONS AND/OR DECOMMISSIONING (INCLUDING ANY ASSOCIATED CONSTRUCTION WORKS) • CONTAMINATION OF GROUND WATER DURING OPERATIONS AND/OR DECOMMISSIONING (INCLUDING ANY ASSOCIATED CONSTRUCTION WORKS)
	ATLANTIC SALMON [1106]	• CHANGE IN CHEMICAL AND/OR NUTRIENT STATUS OF WATER • AGGRESSIVE COLONISATION BY ALIEN INVASIVE SPECIES • CHANGE IN HYDROLOGICAL REGIME MAY IMPACT SPAWNING • BIOACCUMULATION OF CONTAMINANTS	• CONTAMINATION OF SURFACE WATER DURING OPERATIONS AND/OR DECOMMISSIONING (INCLUDING ANY ASSOCIATED CONSTRUCTION WORKS) • CONTAMINATION OF GROUND WATER DURING OPERATIONS AND/OR DECOMMISSIONING (INCLUDING ANY ASSOCIATED CONSTRUCTION WORKS) • POTENTIAL CHANGES IN HYDROLOGICAL REGIME ASSOCIATED WITH DEWATERING AND/OR REWATERING OF MINE COULD ALTER WATER LEVELS, IMPACTING ON THE ABILITY OF FISH TO REACH SPAWNING GROUNDS, AND ON VIABILITY OF SPAWING GROUNDS THEMSELVES

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SITE NAME/CODE	QUALIFYING INTERESTS	POTENTIAL IMPACTS	SOURCE(S) OF IMPACT(S)
	OTTER [1355]	• CHANGE IN HYDROLOGICAL REGIME COULD IMPACT ON HOLTS • CHANGE IN CHEMICAL/NUTRIENT STATUS COULD IMPACT ON PREY SPECIES • BIOACCUMULATION OF CONTAMINANTS • INCREASED DISTURBANCE IMPACTING HABITAT USAGE	• POTENTIAL CHANGES IN HYDROLOGICAL REGIME ASSOCIATED WITH DEWATERING AND/OR REWATERING OF MINE COULD EXPOSE HOLT ENTRANCES • CONTAMINATION OF SURFACE WATER DURING OPERATIONS AND/OR DECOMMISSIONING (INCLUDING ANY ASSOCIATED CONSTRUCTION WORKS) • CONTAMINATION OF GROUND WATER DURING OPERATIONS AND/OR DECOMMISSIONING (INCLUDING ANY ASSOCIATED CONSTRUCTION WORKS) • DISTURBANCE IN VICINITY OF BLACKWATER/BOYNE/TRIBUTARIES ASSOCIATED WITH OPERATIONS
RIVER BOYNE AND RIVER BLACKWATER SPA			
	KINGFISHER [A229]	• CHANGE IN HYDROLOGICAL REGIME COULD IMPACT ON NESTING SITES • CHANGE IN CHEMICAL/NUTRIENT STATUS COULD IMPACT ON PREY SPECIES • BIOACCUMULATION OF CONTAMINANTS	• POTENTIAL CHANGES IN HYDROLOGICAL REGIME ASSOCIATED WITH DEWATERING AND/OR REWATERING OF MINE COULD EXPOSE/INUNDATE BREEDING BURROWS • CONTAMINATION OF SURFACE WATER DURING OPERATIONS AND/OR DECOMMISSIONING (INCLUDING ANY ASSOCIATED CONSTRUCTION WORKS) • CONTAMINATION OF GROUND WATER DURING OPERATIONS AND/OR DECOMMISSIONING (INCLUDING ANY ASSOCIATED CONSTRUCTION WORKS)

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3.7 Mitigation Measures (including existing mitigation measures) – avoiding potential impacts

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Following the inrush event, a series of independent assessments were undertaken to evaluate the cause, impact, and associated risks. In collaboration with the relevant State Authorities (GSRO, EPA and MCC), the key findings of these assessments informed the development of a comprehensive Remedial Action Plan (RAP) designed to address identified deficiencies and prevent recurrence. The RAP incorporates detailed engineering and operational measures, supported by associated Trigger Action Response Plans (TARPs), which establish clear thresholds and predefined actions to mitigate any potential risks.

The lessons learned from the 2021 inrush event and mitigation measures put in place will avoid a reoccurrence.

3.7.1 Water quality/hydrology

The proposed TRDEX1 Extension has the potential to impact on groundwater levels if there is an inflow of groundwater to the exploration tunnel. A comprehensive Remedial Action Plan (RAP) was developed in response to extensive investigations into the inrush event in November 2021, which includes a number of recommendations with regard to future management and monitoring of operations during the proposed development of TRDEX1 Extension. This RAP is presented in Appendix D and includes

> *"…proposed preventative measures which BTM intends to take to ensure that an inrush incident, such as the one which occurred in November 2021, does not occur in the future…."*

The following mitigation measures as set out in the RAP will be implemented with regard to the proposed development:

- BTM commits to the procurement and provision of a durable and secure water supply to the local community. In this regard BTM have funded a mains water installation project and connection to 15 properties in the Shambo area, completed in April 2025, and signed off by Uisce Éireann in late April 2025. In addition, BTM commissioned the drilling and construction of 3 wells and associated pumping systems (June 2023) at 3 properties in the greater Robinstown area.
- BTM has established a significant groundwater and surface water monitoring programme in the areas surrounding the TRDEX1 exploration tunnel, including the communities of Shambo and Robinstown, where monitoring programme suggested a possible short-term drawdown

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of groundwater levels in response to the inrush event in up to four domestic wells. This is notwithstanding the fact that the reported low water levels were more likely related to the shallow nature of the wells and an extended period of dry weather that had preceded the inflow event.

- There will be increased emphasis on 'joined up' thinking and co-ordinated management with the consultant hydrogeologist reporting to the BTM Hydrogeologist and Project Manager / Coordinator for day-to-day liaison in addition to working closely with the BTM Environmental Department on relevant topics, such as district monitoring and monitoring of community wells.
- BTM will implement a cover grouting project to reduce associated groundwater inflows at wet zones 1 and 2 of the existing TRDEX1 tunnel prior to commencing development of the TRDEX1 Extension.
- It is planned to drill cover and probe holes in advance of TRDEX1 Extension tunnel excavation, to identify and characterise water bearing zones and structures and put in measures to control associated groundwater inflows through precover grouting of zones of significant inflows and piped and pumped conveyance of lower inflows via the sump and staged pump system within the TRDEX1 Extension. The pre cover grouting of inflows to the tunnel will help to minimise any dewatering related impact of the tunnel development on groundwater levels in the UDL groundwater system and any identified receptors including domestic private groundwater supply wells and groundwater baseflow to surface water courses.
- A series of Trigger Action Response Plans (TARPs) have been developed specifically for the TRDEX1 tunnel operations and cover:
    - Underground Exploration Drilling;
    - Surface Exploration Drilling;
    - Surface Monitoring Wells and VWP;
    - Grouting Approach;
    - Underground Cover and Probe hole Drilling; and
    - Surface Monitoring and Domestic Wells.

The detail of these TARPs is included as Appendix D, and as is standard for these kinds of plans, triggers and corresponding actions will be reviewed routinely as the project progresses

An updated hydrology/hydrogeological assessment, in relation to groundwater and surface water risk assessment, of the proposed development has been prepared (Puteau, 2025). A summary of this assessment is presented below

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"…Hydrogeology

The proposed TRDEX1 Extension will continue to be driven entirely within the Upper Dark Limestone (UDL) geological formation. Groundwater percolation within the UDL occurs only though discrete flow channels formed by the interaction of isolated but inter-connected fracture systems, small cavities and joints. Some of these features may intersect the trajectory of historic exploration drill holes. However, the standard practice in recent years has been to grout all primary exploration drill holes which may reduce the potential to encounter water bearing features along the alignment of the proposed extension.

Most of the groundwater storage above Tara Deep area occurs at shallow levels within the upper weathered zone of the UDL. The weathered UDL exhibits higher drainable porosity, allowing it to retain more groundwater in storage compared to the underlying non-weathered UDL sequence.

Locally, the more competent, non-weathered UDL rocks are generally tight (impermeable), although occasional fracture and water bearing zones occur within certain stratigraphic horizons. These fracture zones tend to be isolated by geological layering and are discrete in nature. The mechanism for downward percolation of water through the layered UDL strata to the mining horizon is understood to involve a combination of flow through discrete vertical structures and, in some cases, potentially exploration drill holes. During drilling operations, these holes can provide pathways for water to migrate laterally along layers in the formation and into isolated fracture zones that could potentially connect with the TRDEX1 tunnel.

Inflow to the tunnel to date

Prior to development of the existing section of the TRDEX1 exploration tunnel, a series of cover holes was drilled, and a groundwater inflow model developed. The model predicted a maximum overall inflow rate of 216 m^3/hr. In practice, actual inflows have originated from general water makes (seepage) through the joints and fractures in the tunnel walls, as well as from two discrete fractured zones (Fracture 1 and Fracture 2). The peak inflow rate increased to just over 200 m^3/hr.

In November 2021, the pilot hole for raise bore ventilation shaft broke through into TDREX1, resulting in groundwater ingress from higher levels within the UDL and causing the tunnel to flood. There has been no further excavation of the tunnel since this inflow event. The tunnel was fully dewatered back to the current face by September 2022 Since then, inflows have gradually stabilised and declined to approximately 172 m^3/hr. The water entering the tunnel is clean and indicative of a recharge source above the level of the tunnel.

Groundwater level monitoring results

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Groundwater levels above TRDEX1 are monitored through a series of 7 multi-level vibrating wire piezometer installations in exploration drill holes and up to 21 shallow groundwater monitoring wells. The monitoring data indicates that the development of TRDEX1 has had no measurable impact on the surface groundwater levels in wells, except for short-term responses at four discrete locations during and immediately following the inrush event.

Beyond this temporary effect in the four wells to the inrush event, there is no evidence of a hydraulic connection between pumping from TRDEX1 and the groundwater levels in the surrounding areas of Shambo or Robinstown.

Hydrographs from the surface wells show no correlation with either the dewatering of TRDEX1 following the inflow event or with the on-going pumping operations in TRDEX1. Instead, the monitoring well hydrographs indicate that the main factor influencing groundwater levels is rainfall and groundwater recharge. Furthermore, surface water courses above Tara Deep area have not been affected by TRDEX1 development

Groundwater model

An updated numerical groundwater flow model has been developed for Tara Deep, incorporating all available data and the current conceptual understanding of the site conditions. Given the exact flow pathways through the UDL are not known with certainty, the primary objectives of the model are to: (i) achieve a reasonable calibration against water level responses during and following the inflow event, and (ii) run a predictive sensitivity analysis to assess how potential future mine inflows may create drawdown in the upper weathered zone of the UDL for a varying possible degrees of vertical hydraulic connection through the UDL sequence.

The calibrated model water balance shows a total groundwater flux in the model domain of over 900 m^3/hr. Most of this water (over 85%) flows laterally within the upper weathered zone of the UDL and discharges into local drainage ditches and streams. Domestic and landowner wells are simulated to exploit only about 1% of the total water balance. Inflow to TRDEX1 represents between 10 and 20% of the total water balance.

The model suggests that potential groundwater recharge to the domain could be higher than currently simulated if areas of drawdown expand such that there is a reduction of the surface flux of evapotranspiration. The effective recharge would therefore increase if near-surface drawdown were to occur.

Predicted future impacts

For the proposed tunnel extension, the most recent structural geology interpretation and monitoring results from N02658 do not indicate the presence of any additional vertically

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interconnected zones along the proposed TRDEX1 alignment or within areas targeted for exploration drilling from TRDEX1. However, the exact geology conditions remain uncertain, and the possibility of encountering other large inflows cannot be ruled out. To address this, the groundwater model has been designed to provide guidance on managing such zones should they occur.

The model output indicates that, provided total inflows to TRDEX1 are maintained below 250-275 m^3/hr, the near surface drawdown within the upper zone of the UDL will be minimal. Discrete inflow zones that may allow downward percolation rates above this threshold could have the potential to result in localised near-surface drawdown. Importantly, none of the future model predictions show any impact on the surface watercourses above Tara Deep.

Water management control measures

The primary objective of the future TRDEX1 water control program will be to limit total inflows to TRDEX1 to about 250 - 275 m^3/hr. To achieve this, a series of operational controls will be implemented for the proposed TRDEX1 extension.

Cover drill holes will be installed along the proposed tunnel alignment to assess ground conditions several hundred meters in front of the advancing face. In addition, probe holes will be drilled to depths of 10-20 m immediately in front of the advancing face to characterize the exact conditions. Where necessary, engineering holes will be drilled to target specific identified zones that may require grouting and/or depressurisation.

Similar to current practices in the SWEX orebody, a grouting program will be established to help seal any discrete fracture zones that could contribute to groundwater inflow. If inflow zones are encountered, an operational decision will be made either to: (i) grout the inflow zone to exclude the water, or (ii) allow the inflow zone to depressurize and dewater. These decisions will be guided by monitoring data collected from the planned cover holes and pilot holes as the tunnel is being advanced. Additionally, grouting will target the existing inflow locations (Fracture 1 and Fracture2 in existing TRDEX1) with the goal of reducing the current inflow rate.

Monitoring plan

The current monitoring system will remain in place throughout the proposed extension of TRDEX1. The monitoring plan is designed to:

I. *Characterise zones and design grouting programs that may be necessary to maintain inflows below 250-275 m^3/hr*
II. *confirm depressurisation of the formations immediately above the level of the workings is adequate to allow safe mining*

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III. *verify that near surface water levels continue to exhibit the normal seasonal fluctuation cycle, without unexpected drawdown*

IV. *verify that there continues to be no adverse effects on surface stream flow*

V. *confirm there are no adverse changes in near-surface groundwater quality as a result of the tunnel extension.*

Monitoring data collected during the drilling of the cover holes, probe holes and engineering holes will be used to inform operational decisions, including determining when grouting of discrete inflow zones is required…"

Following a Request for Further Information (RFI) from Meath Co, Council (Chief Executive Order 284/26, Ref No. 25/61391), Piteau Associates prepared an extensive document in response , which states as regards 1(a):

"…Piteau Associates has developed the Tara Deep groundwater model as described in the Hydrogeology Report submitted in support of this planning application. The model is based on extensive and long-term groundwater monitoring data, which confirms that a strong inward groundwater flow gradient towards the tunnel exists throughout the current length of TRDEX1 and along the proposed future alignment of the TRDEX1 extension. Groundwater in the area surrounding the proposed tunnel alignment would flow inward to the tunnel and be captured by the TRDEX1 dewatering system. Groundwater pressure monitoring instrumentation that surrounds the TRDEX1 tunnel show elevated groundwater heads in the surrounding strata, so there is no potential for water to flow outward from the tunnel. The only potential source-pathway for migration of any grout components would be via the TRDEX1 dewatering and pumping system. Grouting would only be undertaken if fractured ground conditions or significant water

inflows are encountered ahead of the advancing TRDEX1 tunnel face. In such cases, engineering holes would be drilled to further assess and characterise prevailing ground and hydrogeological conditions and determine whether depressurisation or grouting of the water bearing zone is the more appropriate mitigation method.

Field observations and geotechnical data will be collected from cover holes and probe holes drilled in advance of the tunnel. This information will inform the requirement for targeted grouting at specific locations. The goal of any grouting programme would be to enhance ground stability and minimise or prevent groundwater ingress by reducing fracture permeability within discrete inflow zones through the sealing of faults, joints and other water bearing discontinuities.

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Systematic monitoring of conditions in cover and probe holes will support early identification and mitigation of any risks. If any grouting is necessary, real-time monitoring and controlled application of injection pressures during grouting will prevent any potential for fracture dilation caused by injection pressures. Grouting will be carried out using a cement-based grout. If necessary, faster-setting polyurethane and/or polyurea silicate resins may be employed if the unlikely event of locally higher groundwater velocities. Cementitious grouting is a well-established and widely used technique within the mining industry and has been successfully implemented at Tara Mines for more than 15 years. Piteau Associates has extensive expertise in grouting methodologies at Tara and also at Lisheen, and throughout the global mining industry. The overall process is well understood and is recognised as a safe, effective, and industry-standard method for ground stabilisation and reduction of fracture permeability.

It is important to emphasise that the over-arching intent of the cement-based grouting strategy is to minimise the potential chemical load within the mine environment. Information on the management of chemical products during the grouting process, as well as the rapid curing and hardening characteristics of selected grout materials, is provided in the response to Question 1b below..".

In response Piteau Associates prepared an extensive document, which states as regards 1(b):

Proposed Grout Types and Technical Specifications

If grouting is required for the TRDEX1 tunnel extension, it would use a similar approach and similar range of grout products to the grouting program that has been successfully carried out for the past 15 years within the existing mine (SWEX). As described in response to Question 1a above, there is no hydraulic source-pathway mechanism through which grout components could migrate outwards from the TRDEX1 tunnel and into the surrounding groundwater system or result in a breach of the European Community Environmental Objectives (Groundwater) Regulations.

Cement-based Grouts

Any grouting ahead of the TRDEX1 tunnel face would predominantly use a cement-based grout, typically of mix ratio 2.5:1:0.35 water:cement:bentonite by weight. Cements are primarily composed of a mixture of lime (calcium oxide 65-70%), silica (5- 10%) alumina and iron oxide. Water influenced by cement grouting may exhibit elevated pH and occasionally minor dissolved aluminium. The bentonite component is a naturally occurring montmorillonite clay that is an inert, non-toxic and chemically stable inorganic material. Upon curing, the

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resulting set grout forms calcium silicate and calcium hydroxide bonds, resulting in a high-strength, low-permeability, alkaline mass that effectively seals joints and fractures and restricts water movement. The time for a cement-bentonite grout to gel and restrict groundwater inflow depends on the exact application but is typically less than an hour. All grout materials would be handled using a standard grout pump and mixing bowl unit. Cement would be supplied in standard 20 kg bags with all grout products stored in the designated storage area. A single continuous injection is assumed. If multiple fracture zones are encountered, staged grouting may be employed. These practices align with the general principles of underground grouting outlined in global tunnelling and mining technical references.

In situations where groundwater inflows have the potential to cause washout of noncured grout, an accelerator such as calcium chloride (CaCl2) may be added into the grout mix to create a rapid increase in viscosity and reduce the gelling and hardening times. The use of an accelerator can reduce grout gelling time to less than 30 minutes which limits the potential for uncured material to enter the walls of the tunnel.

Polyurethane and Polyurea Silicate Resins

Should high-water inflows be encountered ahead of the face, it may be necessary to use an expansive and fast setting polyurethane resin as a secondary mitigation measure. This approach has been used successfully in several locations within the SWEX mining area. For TRDEX1 Extension works, the most likely resins would be Polyurethane (MasterRoc MP 355 Series) and Polyurea Silicate (MasterRoc RBA 380). Corresponding technical data sheets (TDS) and safety data sheets (SDS) for these products are presented in Appendices A and B. When mixed and cured, they form an inert, stable resin with no secondary reaction when in contact with water. Gelling and setting times are usually less than 20 minutes. The water acts as a catalyst which enhances their capacity to fill voids and seal water-bearing discontinuities more rapidly and effectively. Independent ecotoxicological testing has concluded there is 'no long term ecotoxicological potential for groundwater'. The products have been certified as suitable for use in applications involving direct contact with drinking water.

Chemical Stability and Groundwater Protection Measures

Under the existing Trigger Action Response Plan (TARP) for TRDEX1 development, control measures and procedures are already in place and implemented within the operational

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TRDEX1 development to protect groundwater and manage any water that may contain residual grout. These measures include:

- *Use of absorbent materials and dedicated sumps within drill cubbies to contain potential spillages and retain water that may have residual grout.*
- *Provision for the removal and transport of water containing residual grout to the surface for treatment, if required (although such occurrences are considered unlikely).*
- *Ongoing water quality monitoring within the TRDEX1 dewatering system to ensure early detection of any changes in groundwater chemistry.*

Routine monitoring from the existing 2.4 km TRDEX1 tunnel development demonstrates stable groundwater quality.

Ongoing Monitoring and Compliance with Regulatory Requirements

The potential for any changes in water quality is assessed through in-situ field measurements at the existing TRDEX1 pumping stations. These pumping stations will remain operational and may be supplemented by additional monitoring points as the proposed development progresses.

Any residual grout, if present, would be detectable through elevated pH or increased electrical conductivity (EC). If any anomalous monitoring results are observed, further investigative sampling and laboratory testing will be undertaken to confirm the source and extent of any deviation.

All groundwater extracted and pumped to the surface undergoes treatment and controlled discharge in accordance with the conditions of the site's Industrial Emissions Licence issued by the Environmental Protection Agency (EPA). This includes compliance with emission limit values as required under the Industrial Emissions licensing regime and EPA discharge authorisation guidance.

These measures enable continued compliance with European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010), as amended, which implement Directive 2000/60/EC (Water Framework Directive) and Directive 2006/118/EC (Groundwater Directive).

The combination of local hydrogeological conditions, the engineered controls in place, the rapid curing properties of cement-based and chemical grouts, and the established environmental monitoring and compliance framework provides robust assurance that the proposed grouting programme presents no **(beyond reasonable scientific risk)** *credible risk to*

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groundwater quality and will remain compliant with all applicable regulatory requirements, including S.I. No. 9 of 2010 and subsequent amendments.

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3.7.2 Emissions to air – mitigation measures

- All emissions to atmosphere are controlled, operated, and maintained. Emissions take place as set out in the Company's current IE Licence. Mass emissions to atmosphere are reported to the Agency in Annual Environmental Report (AER) and through PRTR reporting.
- The company uses an INAB accredited contractor to carry out compliance monitoring at air Emission Points which meets with ISO 17025:2005 requirements and the EPA Air Emissions Monitoring guidance (AG2).
- The Technical letter, included Appendix H, as prepared by Dr Brian Sheridan, Odour Monitoring Ireland, in relation to air quality considerations for the proposed extension to TRDEX1 concludes

  "…In summary, a number of existing air quality impact assessments and continuous monitoring techniques have demonstrated that current and proposed practices in the Boliden will not result in Air Quality impact and that the EPA licensed facility has implemented robust monitoring techniques to identify any proposed risks to Ambient Air quality in the vicinity of the facility…"

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3.8 Significance of any potential Direct, Indirect or Secondary Impacts following implementation of mitigation measures

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For the purposes of Appropriate Assessment, a significant effect is any effect that may affect the Conservation Objectives for which a site was designated but excluding inconsequential effects. If the effect is not relevant to the conservation objective, then it cannot be a significant effect for the purposes of Appropriate Assessment. A likely significant effect, for the purpose of Appropriate Assessment must be:

(a) Significant;

(b) Relevant to the conservation objective for that site; and

(c) The possibility of effects cannot be reasonably excluded (through the provision of suitable preventative and mitigation measures).

Of importance, the inrush event in November 2021 likely represents a worse-case scenario and what was learned from this event has been used to inform future practice to avoid a repeat of this incident. That being said, a statement provided by Boliden Tara Mines DAC indicates that

> *"…Hydrological and water quality monitoring undertaken throughout and following the inrush event within the River Boyne or River Blackwater catchments confirmed no measurable changes with no exceedance of Emission Limit Value (ELVs) in IE License P0516.*
>
> *Accordingly, the inrush event did not result in any significant effects on the hydrology or water quality of these watercourses…"*

It is therefore concluded that the inrush event had no adverse impact on the integrity on the Natura 2000 sites.

The mitigation measures currently in place are sufficient to avoid any negative impact on the Conservation Objectives of the Qualifying Interests of Girley (Drewstown) Bog SAC by means of emissions to air.

A summary of the significance of foreseen impacts is outlined in Table 12.

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Table 12: Summary of significance of foreseen impacts of the operations at BTM on the Natura 2000 network

SITE NAME/CODE	QUALIFYING INTERESTS	POTENTIAL IMPACTS	SIGNIFICANCE OF IMPACTS ON QI FOLLOWING IMPLEMENTATION OF MITIGATION MEASURES
GIRLEY BOG SAC	DEGRADED RAISED BOGS [7120]	• CHANGES IN N DEPOSITION	NOT SIGNIFICANT
RIVER BOYNE AND RIVER BLACKWATER SAC	ALKALINE FENS [7230]	• HABITATS ARE LOCATED UPSTREAM, POTENTIAL IMPACTS HIGHLY UNLIKELY	NOT SIGNIFICANT
	ALLUVIAL FORESTS WITH ALNUS GLUTINOSA AND FRAXINUS EXCELSIOR [91E0] (PRIORITY HABITAT)	• CHANGES IN HYDROLOGICAL REGIME COULD IMPACT ON FLOODING FREQUENCY OF HABITAT • AGGRESSIVE COLONISATION BY ALIEN INVASIVE PLANT SPECIES	NOT SIGNIFICANT
	RIVER LAMPREY [1099]	• CHANGE IN CHEMICAL AND/OR NUTRIENT STATUS OF WATER AND/OR SILT • CHANGES IN DEPOSITION OF SILT IN HABITAT • AGGRESSIVE COLONISATION BY ALIEN INVASIVE SPECIES • IMPACTS ON FEEDING AMMOCOETES THROUGH SILTATION AND/OR BIOACCUMULATION	NOT SIGNIFICANT
	ATLANTIC SALMON [1106]	• CHANGE IN CHEMICAL AND/OR NUTRIENT STATUS OF WATER • AGGRESSIVE COLONISATION BY ALIEN INVASIVE PLANT SPECIES • CHANGE IN HYDROLOGICAL REGIME MAY IMPACT SPAWNING • BIOACCUMULATION OF CONTAMINANTS	NOT SIGNIFICANT

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SITE NAME/CODE	QUALIFYING INTERESTS	POTENTIAL IMPACTS	SIGNIFICANCE OF IMPACTS ON QI FOLLOWING IMPLEMENTATION OF MITIGATION MEASURES
	OTTER [1355]	• CHANGE IN HYDROLOGICAL REGIME COULD IMPACT ON HOLTS • CHANGE IN CHEMICAL/NUTRIENT STATUS COULD IMPACT ON PREY SPECIES • BIOACCUMULATION OF CONTAMINANTS • INCREASED DISTURBANCE COULD IMPACT USE OF HABITAT	NOT SIGNIFICANT
RIVER BOYNE AND RIVER BLACKWATER SPA	KINGFISHER [A229]	• CHANGE IN HYDROLOGICAL REGIME COULD IMPACT ON NESTING SITES • CHANGE IN CHEMICAL/NUTRIENT STATUS COULD IMPACT ON PREY SPECIES • BIOACCUMULATION OF CONTAMINANTS • INCREASED DISTURBANCE COULD IMPACT USE OF HABITAT	NOT SIGNIFICANT

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4 Conclusions

Based on an examination, analysis, and evaluation of the best scientific information (and applying the precautionary principle), of the proposed extension to exploitation tunnel TRDEX1, and assuming the implementation in full of all mitigation measures as outlined in the EIA screening report and this NIS, it is the professional opinion of the author of this report that there is not likely to be an adverse impact on the integrity of any relevant Natura 2000 sites in view of their conservation objectives as outlined herein either alone or in combination with other plans or projects. Consequently, there will be no risk of adverse effects on Qualifying Interest habitats or species, nor on the attainment of specific conservation objectives, either alone or in-combination with other plans or projects, for the relevant Natura 2000 sites. This NIS concludes (beyond reasonable scientific doubt) that the ecological integrity of the Natura 2000 sites concerned (connected with qualifying interests for which the sites have been designated) will not be adversely impacted.

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5 References and Bibliography

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PITEAU (2025) Boliden Tara Mines, Tara Deep – Hydrogeology of the TDREX1 Extension, December, 2025

www.meath.ie – official website of Meath Co Council.

www.npws.ie – website of the National Parks and Wildlife Service, source of information for data regarding Natura 2000 sites and Article 17 Conservation Assessments.

www.europa.eu – official website of the European Union, source of information on EU Directives.

www.epa.ie – official website of the Environmental Protection Agency.

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6 Appendix (a) Condition information regarding Natura 2000 sites

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6.1 Girley Bog (Drewstown Bog) SAC 002203 (Site synopsis version date 02/2023, Natura 2000 form update, Conservation Objectives Version 1)

6.1.1 General Description

Girley (Drewstown) Bog SAC occurs within the larger raised bog system that is designated as Girley Bog NHA (001580). It is situated 5.5 km north of Athboy in the townland of Drewstown, Co. Meath. The site is part of a raised bog that includes both areas of high bog and cutover bog. It is bordered by open high bog on its northern and eastern margins, by agricultural land on its western margin and by a conifer plantation on cutover bog on its southern side. The underlying geology is carboniferous limestone.

Degraded Raised Bog corresponds to those areas of high bog where the hydrology has been adversely affected by peat cutting, drainage and other land use activities, but which are capable of regeneration to Active Raised Bog (7110) within 30 years. Girley (Drewstown) Bog consists of 32.26 ha of raised bog (15.05 ha of high bog and 17.21 ha of cutover bog) which occupies the south-western part of Girley Bog NHA (Site Code 001580). Girley Bog is a Midland type raised bog developed in a basin. It originally covered approximately 190 ha in the early 1800s but by 2010 had been reduced to 72.5 ha (38.4% of the original area) by turf cutting. Most of the SAC and all of the high bog included in the SAC was completely covered by coniferous forestry, which was planted in the 1970s, and was recently clear-felled as part of the restoration program for the site. The areas of high bog that were planted supported a dense plantation of Lodgepole Pine (*Pinus contorta*) and Sitka Spruce (*Picea stichensis*). Most of the conifers in the SAC were removed and the intensive drainage system associated with it was blocked by 2013 as part of an EU LIFE-funded Coillte project Demonstrating Best Practice in Raised Bog Restoration in Ireland so as to raise the water table and restore Active Raised Bog on the site. With the clear-felling of conifers and blocking of drains, water-levels on the high bog have risen and remain high throughout the year. As a consequence, raised bog vegetation has returned to the wetter areas of the high bog. Hare's-tail Cottongrass (Eriophorum vaginatum) dominates these wet hollows with Bilberry (*Vaccinium myrtillus*), Heather (*Calluna vulgaris*) and Cross-leaved Heath (*Erica tetralix*) along with Bog Rosemary (*Andromeda polifolia*) and Cranberry (*Vaccinium oxycoccos*). Bog mosses that are regenerating include *Sphagnum subnitens*, *Sphagnum capillifolium* and *Sphagnum palustre* forming low hummocks with *Sphagnum recurvum* in drains. Overall, the high bog appears to be re-wetting and limited areas of wet flats and hummock/hollows have developed. However, the majority

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of the restored areas have not yet developed vegetation characteristic of the wettest conditions and there is a considerable amount of conifer and birch regeneration occurring in these areas. Two areas in the northeast of the site covering 2.28 ha have been identified by hydrological modelling as Degraded Raised Bog habitat. They now have standing surface water in the hollows and pools for most of the year with considerable areas of rapidly regenerating Sphagnum species. These wet areas with regenerating Sphagnum moss are expected to develop into Active Raised Bog habitat within 20 years. The cutover bog to the south of the site is generally drier and is developing into wet and dry woodland dominated currently by Downy Birch (*Betula pubescens*) scrub with occasional conifers from the former plantation. Cherry Laurel *(Prunus laurocerasus*), Rhododendron (*Rhododendron ponticum*) and conifers are regenerating in this area and are subject to ongoing control programs. Current land use on the site consists of conservation management with the removal of conifer plantations and the blocking of the drainage associated with these plantations, both on the high bog and on the cutover. However, active drains are still present on the northern and eastern boundaries of the SAC which are adversely impacting on its restoration and need to be blocked in consultation with other stakeholders. In addition, there have been fires on the adjacent bog and within the SAC causing some damage to the recovering vegetation. These are all activities that have resulted in loss of habitat and damage to the hydrological status of the site and pose a continuing threat to its viability. There is also some dumping around the site. Girley Bog SAC is a site of considerable conservation significance comprising as it does a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. The site is being actively managed for conservation as part of the Coillte EU LIFE Project. This site supports regenerating raised bog microhabitats, including hollows and wet flats, which add to the diversity and scientific value of the site. This site is one of the few remaining raised bogs in County Meath and represents the eastern extreme of the range of raised bogs in the country. Ireland has a high proportion of the total E.U. resource of the Atlantic raised bog habitat type (over 50%) and so has a special responsibility for its conservation at an international level.

6.1.2 Qualifying Interests

The qualifying interests of 002203 Girley (Drewstown) Bog SAC are:

- 7120 Degraded raised bogs still capable of natural regeneration

6.1.3 Threats, pressures and activities with negative impacts on Girley Bog SAC

The threats, pressures and activities associated with impacts on this site are outlined in Table 13

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Table 13:Threats pressures and activities with negative impacts on Girley Bog SAC

Negative Impacts			
Rank	**Threats and pressures [code]**	**Pollution (optional) [code]**	**inside/outside [i|o|b]**
M	I01		b
M	I02		b
H	J02.15		b
M	J01.01		b

Positive Impacts			
Rank	**Activities, management [code]**	**Pollution (optional) [code]**	**inside/outside [i|o|b]**
H	B02.02		i
M	I02		b
M	I01		b
H	J02.01		i
M	J02.15		b

Rank: H = high, M = medium, L = low
Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification, T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions
i = inside, o = outside, b = both

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6.1.4 Conservation Objectives

A detailed Conservation Objectives document for this site has been prepared and is available at:

https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002203.pdf

Excerpts from this document are presented in Table 14.

Table 14: Conservation Objectives for Girley Bog SAC-7120 degraded raised bog still capable of natural regeneration

Conservation Objectives for : Girley (Drewstown) Bog SAC [002203]

7120 Degraded raised bogs still capable of natural regeneration

To restore the favourable conservation condition of Degraded raised bogs still capable of natural regeneration in Girley (Drewstown) Bog SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Restore area of active raised bog to 3.3ha, subject to natural processes	Active Raised Bog (ARB) habitat has not been recently recorded within the boundary of Girley (Drewstown) Bog SAC. The area of Degraded Raised Bog (DRB) on the high bog has been estimated as being 2.3ha. Eco-hydrological assessments of the cutover estimate that an additional 1ha of bog forming habitats could be restored. The long term target for ARB is therefore 3.3ha. See raised bog supporting document for further details on this and following attributes
Habitat distribution	Occurrence	Restore the distribution and variability of active raised bog across the SAC. See map 2 for distribution of potential ARB	DRB corresponds to those areas of high bog where the hydrology has been adversely affected by peat cutting, drainage, afforestation and other land use activities, but which are capable of regeneration to ARB within 30 years (see area target above)
High bog area	Hectares	No decline in extent of high bog, subject to the conservation requirements of the SAC necessary to support the development and maintenance of active raised bog. See map 2	The area of high bog within Girley (Drewstown) Bog SAC in 2014 (latest figure available) was 21.9ha (NPWS, 2017)
Hydrological regime: water levels	Centimetres	Restore appropriate water levels throughout the site	For DRB to be restored to ARB, mean water level needs to be near or above the surface of the bog lawns for most of the year. Seasonal fluctuations should not exceed 20cm, and should only be 10cm below the surface, for very short periods of time. Open water is often characteristic of soak systems
Hydrological regime: flow patterns	Flow direction; slope	Restore, where possible, appropriate high bog topography, flow directions and slopes. See map 3 for current situation	The restoration of DRB to ARB depends on mean water levels being near or above the surface of bog lawns for most of the year. Long and gentle slopes are the most favourable to achieve these conditions. Changes to flow directions due to subsidence of bogs can radically change water regimes and cause drying out of higher quality DRB areas and soak systems
Transitional areas between high bog and adjacent mineral soils (including cutover areas)	Hectares; distribution	Restore adequate transitional areas to support / protect the active raised bog ecosystem and the services it provides	The cutover bog to the south of the site is generally drier and is developing into wet and dry woodland dominated currently by downy birch (*Betula pubescens*) scrub with occasional conifers from the former plantation. Cherry laurel *Prunus laurocerasus*, rhododendron (*Rhododendron ponticum*) and conifers are regenerating strongly in this area and are subject to ongoing control programs
Vegetation quality: central ecotope, active flush, soaks, bog woodland	Hectares	Restore 1.6ha of central ecotope/active flush/soaks/bog woodland as appropriate as appropriate	At least 50% of ARB habitat should comprise high quality ARB habitat such as central ecotope, active flush, soaks and bog woodland. Target area of ARB for the site has been set at 3.3ha (see area target above)
Vegetation quality: microtopographical features	Hectares	Restore adequate cover of high quality microtopographical features	As a result of restoration efforts, the high bog appears to be re-wetting with limited areas of wet flats and hummock/hollows
Vegetation quality: bog moss (*Sphagnum*) species	Percentage cover	Restore adequate cover of bog moss (*Sphagnum*) species to ensure peat-forming capacity	*Sphagnum* cover varies naturally across Ireland with relatively high cover in the east to lower cover in the west. Hummock forming species such as *Sphagnum austinii* are particularly good peat formers. *Sphagnum* cover and distribution also varies naturally across a site

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Typical species: flora	Occurrence	Restore, where appropriate, typical active raised bog flora	Typical flora species include widespread species, as well as those with more restricted distributions but typical of the habitat's subtypes or geographical range
Typical species: fauna	Occurrence	Restore, where appropriate, typical active raised bog fauna	Typical fauna species include widespread species, as well as those with more restricted distributions but typical of the habitat's subtypes or geographical range
Elements of local distinctiveness	Occurrence	Maintain features of local distinctiveness, subject to natural processes	Despite the relatively small area of DRB present the restoration actions have resulted in active redevelopment of the habitat towards ARB which add significantly to the diversity and scientific value of the site
Negative physical indicators	Percentage cover	Negative physical features absent or insignificant	Negative physical indicators include: bare peat, algae dominated pools and hollows, marginal cracks, tear patterns, subsidence features such as dry mineral mounds/ridges emerging or expanding, and burning evidence. Bare peat has been recorded along some of the bog margins (Derwin & MacGowan 2000; Denyer 2014)
Vegetation composition: native negative indicator species	Percentage cover	Native negative indicator species at insignificant levels	The majority of the restored areas have not yet developed vegetation characteristic of the wettest conditions and there is considerable amount of conifer and birch regeneration occurring in these areas. The cutover bog to the south of the site is generally drier and is developing into wet and dry woodland dominated currently by downy birch (*Betula pubescens*) scrub with occasional conifers from the former plantation
Vegetation composition: non-native invasive species	Percentage cover	Non-native invasive species at insignificant levels and not more than 1% cover	The most common non-native invasive species of raised bogs include lodgepole pine (*Pinus contorta*), rhododendron (*Rhododendron ponticum*), and pitcherplant (*Sarracenia purpurea*) (Cross, 1990). At this site Cherry laurel (*Prunus laurocerasus*), rhododendron and conifers are regenerating on the cutover and are subject to ongoing control programs
Air quality: nitrogen deposition	kg N/ha/year	Air quality surrounding bog close to natural reference conditions. The total N deposition should not exceed 5kg N/ha/yr	Change in air quality can result from fertiliser drift; adjacent quarry activities; or other atmospheric inputs. The critical load range for ombrotrophic bogs has been set as between 5 and 10kg N/ha/yr (Bobbink and Hettelingh, 2011). The latest N deposition figures for the area around Girley (Drewstown) Bog suggests that the current level is approximately 15.4kg N/ha/yr (Henry and Aherne, 2014)
Water quality	Hydrochemical measures	Water quality on the high bog and in transitional areas close to natural reference conditions	Water chemistry within raised bogs is influenced by atmospheric inputs (e.g. rainwater). However, within soak systems, water chemistry is influenced by other inputs such as focused flow or interaction with underlying substrates. Water chemistry in areas surrounding the high bog varies due to influences of different water types (bog water, regional groundwater, and runoff from surrounding mineral lands)

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6.1.5 Baseline Conservation Status

A synopsis of the conservation status of this site is provided in Table 15.

Table 15: Habitats present on site and assessment for them

Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A|B|C|D	A|B|C		
						Representativity	Relative Surface	Conservation	Global
7120			2.28	0	G	B	C	C	B

PF: for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
NP: in case that a habitat type no longer exists in the site enter: x (optional)
Cover: decimal values can be entered
Caves: for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
Data quality: G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

6.2 River Boyne and River Blackwater SAC 002299 (Site synopsis version date 06/01/2014, Natura 2000 form update 09/19, Conservation Objectives Version 1)

6.2.1 General Description

This site comprises most of the freshwater element of the River Boyne from upriver of the Boyne Aqueduct at Drogheda, the Blackwater River as far as Lough Ramor and the principal Boyne tributaries, notably the Deel, Stoneyford and Tremblestown Rivers. This system drains a considerable area of Cos. Meath and Westmeath and smaller areas of Cavan and Louth. The underlying geology is Carboniferous Limestone for the most part with areas of Upper, Lower and Middle well represented. In the vicinity of Kells, Silurian Quartzite is present while close to Trim are Carboniferous Shales and Sandstones. The rivers flow through a landscape dominated by intensive agriculture, mostly of improved grassland but also cereals. Much of the river channels were subject to arterial drainage schemes in the past. Natural floodplains now exist along only limited stretches of river, though often there is a fringe of reed swamp, freshwater marsh, wet grassland or deciduous wet woodland. Along some parts, notably between Drogheda and Slane, are stands of tall, mature mixed woodland. Substantial areas of improved grassland and arable land are included in site for water quality reasons. There are many media to large sized towns adjacent to but not within the site.

The main channel of the Boyne contains a good example of alluvial woodland of the *Salicetum albo-fragilis* type which has developed on three alluvium islands. Alkaline fen vegetation is well represented at Lough Shesk, where there is a very fine example of habitat succession from open water to raised

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bog. The Boyne and its tributaries are one of Ireland's premier game fisheries and offers a wide range of angling, from fishing for spring salmon and grilse to sea trout fishing and extensive brown trout fishing. The site is one of the most important in eastern Ireland for *Salmo salar* and has very extensive spawning grounds. The site also has an important population of *Lampetra fluviatilis*, though the distribution or abundance of this species is not well known. *Lutra lutra* is widespread throughout the site. Some of the grassland areas along the Boyne and Blackwater are used by a nationally important winter flock of *Cygnus cygnus*. Several Red Data Book plants occur within the site, with *Pyrola rotundifolia*, *Poa palustris* and *Juncus compressus*. Also occurring are a number of Red Data Book animals, notably *Meles meles*, *Martes martes* and *Rana temporaria*. The River Boyne is a designated Salmonid Water under the EU Freshwater Fish Directive.

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6.2.2 Qualifying Interests

The qualifying interests for the River Boyne and River Blackwater SAC (site code :002299) have been identified as; (*indicate a priority habitat under the Habitats Directive)

1099 River Lamprey *Lampetra fluviatilis*

1106 Salmon *Salmo salar*

1355 Otter *Lutra lutra*

7230 Alkaline fens

91E0 Alluvial Forests with *Alnus glutinosa* and *Fraxinus excelsior* Alno-Padion (Alnion incanae, Salicon albae)*

6.2.3 Threats, pressures and activities with negative impacts on the site

Details as to the threats, pressures and activities with negative impacts on the site are identified from the Natura 2000 data form for the sites and are illustrated in Table 16.

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Table 16: Threats, pressures and activities with negative impacts on the site

Negative Impacts

Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i|o|b]
M	J02.11		i
M	E03.02		i
L	D01.05		i
M	A07		i
H	J02.15		i
M	G02.10		i
M	J02.10		i
M	A01		i
L	G05		i
L	G01		i
M	E01.04		i
H	H01		i
M	A10.01		i
M	A05.02		o
M	D01.02		i
L	G05.06		i
M	E05		i
H	E02		i
M	A08		i
H	I01		i
M	C01.01		i
M	J02		i
M	B01.02		i
H	E03.04		i
M	A10.01		i

Rank: H = high, M = medium, L = low
Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification, T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

Positive Impacts

Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i|o|b]
H	J02.05.02		i
M	A03		i

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6.2.4 Conservation Objectives of the site

A detailed Conservation Objectives document for this site has been prepared and is available at:

https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002299.pdf

Excerpts from this document are presented in Table 17, Table 18, Table 19, Table 20 and Table 21.

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Table 17

Conservation Objectives for : River Boyne and River Blackwater SAC [002299]

7230 Alkaline fens

To maintain the favourable conservation condition of Alkaline fens in River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Alkaline fen has not been mapped in detail for River Boyne and River Blackwater SAC and thus the exact total current area of the qualifying habitat in the SAC is currently unknown. The main areas of alkaline fen in the SAC are documented to occur in the vicinity of Lough Shesk, Freekan Lough, Newtown Lough in the upper reaches of the Stonyford River. At Lough Shesk, the habitat is particularly well-represented and there is a good example of succession from open water to fen-type habitat (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat in NPWS (2013). See also Bobbink and Hettelingh (2011). Increased nutrients can lead to changes in plant and invertebrate species through competition and subsequent structural changes to micro-habitat. These nutrients favour growth of grasses rather than forbs and mosses and leads to a higher and denser sward
Ecosystem function: peat formation	Percentage cover of peat-forming vegetation and water table levels	Maintain active peat formation, where appropriate	In order for peat to form, water levels need to be slightly below or above the soil surface for c.90% of the time
Ecosystem function: hydrology - groundwater levels	Water levels (centimetres); duration of levels; hydraulic gradients; water supply	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat	Fen habitats require high groundwater levels (i.e. water levels at or above the ground surface) for a large proportion of the calendar year (i.e. duration of mean groundwater level). Fen groundwater levels are controlled by regional groundwater levels in the contributing catchment area (which sustain the hydraulic gradients of the fen groundwater table). Regional abstraction of groundwater may affect fen groundwater levels
Ecosystem function: hydrology - surface water flow	Drain density and form	Maintain, or where necessary restore, as close as possible to natural or semi-natural, drainage conditions	Drainage, either within or surrounding the fen habitat, can result in the drawdown of the groundwater table. The depth, geometry and density of drainage (hydromorphology) will indicate the scale and impact on fen hydrology. Drainage can result in loss of characteristic species and transition to drier habitats
Ecosystem function: water quality	Various	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	Fens receive natural levels of nutrients (e.g. iron, magnesium and calcium) from water sources. However, they are generally poor in nitrogen and phosphorus, with the latter tending to be the limiting nutrient under natural conditions. Water supply should be also relatively calcium-rich
Vegetation composition: community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of alkaline fen vegetation communities present in the SAC is currently unknown. Information on the vegetation communities associated with alkaline fens is provided by O'Neill et al. (in prep.). See also the Irish Vegetation Classification (Perrin, 2018; www.biodiversityireland.ie/projects/ivc-classification-explorer)

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Vegetation composition: typical brown mosses	Percentage cover at a representative number of monitoring stops	Maintain adequate cover of typical brown moss species	For lists of typical bryophyte species, including high quality indicator species, see O'Neill et al. (in prep.). Species recorded at Lough Shesk and Newtown Lough include: *Calliergon giganteum, Scorpidium scorpioides, Campylium stellatum, Bryum pseudotriquetrum, Fissidens adianthoides, Scorpidium scorpioides, Calliergonella cuspidata* and *Ctenidium molluscum* (NPWS internal files)
Vegetation composition: typical vascular plants	Percentage cover at a representative number of monitoring stops	Maintain adequate cover of typical vascular plant species	For lists of typical vascular plant species for the different vegetation communities, including high quality indicators, see O'Neill et al. (in prep.). Typical species recorded in the habitat in the SAC include black bog-rush (*Schoenus nigricans*), dioecious sedge (*C. dioica*) and common butterwort (*Pinguicula vulgaris*) (NPWS internal files)
Vegetation composition: native negative indicator species	Percentage cover at a representative number of monitoring stops	Cover of native negative indicator species at insignificant levels	Negative indicators include species not characteristic of the habitat and species indicative of undesirable activities such as overgrazing, undergrazing, nutrient enrichment, agricultural improvement or impacts on hydrology. Native negative indicators may include *Anthoxanthum odoratum, Epilobium hirsutum, Holcus lanatus, Juncus effusus, Phragmites australis* and *Ranunculus repens*. See O'Neill et al. (in prep.)
Vegetation composition: non-native species	Percentage cover at a representative number of monitoring stops	Cover of non-native species less than 1%	Attribute and target based on O'Neill et al. (in prep.). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Attribute and target based on O'Neill et al. (in prep.). Scrub and trees will tend to invade if fen conditions become drier
Vegetation composition: algal cover	Percentage cover at, and in local vicinity of, a representative number of monitoring stops	Cover of algae less than 2%	Attribute and target based on O'Neill et al. (in prep.). Algal cover is indicative of nutrient enrichment from multiple sources (McBride et al., 2011)
Vegetation structure: vegetation height	Percentage cover at a representative number of monitoring stops	At least 50% of the live leaves/flowering shoots are more than either 5cm or 15cm above ground surface depending on community type	Attribute and target based on O'Neill et al. (in prep.). While grazing may be appropriate in this habitat, excessive grazing can reduce the ability of plant species to regenerate reproductively and maintain species diversity, especially if flowering shoots are cropped during the growing season
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of monitoring stops	Cover of disturbed bare ground not more than 10%	Attribute and target based on O'Neill et al. (in prep.). While grazing may be appropriate in this habitat, excessive areas of disturbed bare ground may develop due to unsuitable grazing regimes. Disturbance can include hoof marks, wallows, human footprints, vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for peatlands
Physical structure: tufa formations	Percentage cover in local vicinity of a representative number of monitoring stops	Disturbed proportion of vegetation cover where tufa is present is less than 1%	Attribute and target based on O'Neill et al. (in prep.)
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.). The Near Threatened species (Wyse Jackson et al., 2016) round-leaved wintergreen (*Pyrola rotundifolia*) has been recorded in the habitat around Newtown Lough in the SAC (NPWS internal files)
Transitional areas between fen and adjacent habitats	Hectares; distribution	Maintain adequate transitional areas to support/protect the alkaline fen ecosystem and the services it provides	In many cases, fens transition to other wetland habitats. It is important that the transitional areas between fens and other habitats are maintained in as natural condition as possible in order to protect the functioning of the fen

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Table 18

Conservation Objectives for : River Boyne and River Blackwater SAC [002299]

91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*

To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)* in River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes. See map 3 for surveyed woodland areas	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)* is present within River Boyne and River Blackwater SAC. As part of the National Survey of Native Woodlands (NSNW), the sub-sites Grove Island (NSNW site code 688) and Yellow Island (752) were surveyed by Perrin et al. (2008). Yellow Island (code 752) was also included in national monitoring surveys (O'Neill and Barron, 2013; Daly et al., in prep.). Map 3 shows the minimum area of alluvial forests within the SAC, which is estimated to be 16.7ha (Perrin et al., 2008; Daly et al., in prep.). It is important to note that further unsurveyed areas may be present within the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes. The surveyed woodland locations are shown on map 3	Distribution based on Perrin et al. (2008) and Daly et al. (in prep.). It is important to note that further unsurveyed areas may be present within the SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage; metres; centimetres	Total canopy cover at least 30%; median canopy height at least 7m; native shrub layer cover 10-75%; native herb/dwarf shrub layer cover at least 20% and height at least 20cm; bryophyte cover at least 4%	The target aims for a diverse structure with a canopy containing mature trees, shrub layer with semi-mature trees and shrubs, and well-developed field layer (herbs, graminoids and dwarf shrubs) and ground layer (bryophytes). Assessment criteria are described in Daly et al. (in prep.) and O'Neill and Barron (2013)
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	The Boyne River Islands are an example of gallery forests of willows (Salicion albae), which occur alongside river channels and on river islands, where tree roots are almost continuously submerged (Daly et al., in prep.). Grove Island (NSNW site code 688) and Yellow Island (752) were assigned by Perrin et al. (2008) to the *Salix triandra – Urtica dioica* vegetation type (2h) of the *Fraxinus excelsior – Hedera helix* group. This corresponds to the *Salix fragilis – Calystegia sepium* sub-community (WL3Di) of the Irish Vegetation Classification (Perrin, 2016; www.biodiversityireland.ie/projects/ivc-classification-explorer)
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes of target species for 91E0* woodlands and other native tree species occur in adequate proportions to ensure survival of woodland canopy	The target species for 91E0* are alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*) and willows (*Salix* spp.). Assessment criteria are described in Daly et al. (in prep.) and O'Neill and Barron (2013)

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Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river and lake floodplains, but not for woodland around springs/seepage areas. Much of the river channel within the SAC was subject to arterial drainage schemes. Natural flood-plains now exist along only limited stretches of river (NPWS internal files)
Woodland structure: dead wood	Number per hectare	At least 19 stems/ha of dead wood of at least 20cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence; population size	No decline in distribution and, in the case of red listed and other rare or localised species, population size	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red listed and other rare or localised species
Woodland structure: indicators of overgrazing	Occurrence	All five indicators of overgrazing absent	There are five indicators of overgrazing within 91E0*: topiary effect on shrubs and young trees, browse line on mature trees, abundant dung, severe recent bark stripping, and trampling (Daly et al., in prep.)
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover at least 90% of canopy; target species cover at least 50% of canopy	The target species for 91E0* are alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*) and willows (*Salix* spp.) (Daly et al., in prep.; O'Neill and Barron, 2013)
Vegetation composition: typical species	Occurrence	At least 1 target species for 91E0* woodlands present; at least 6 positive indicator species for 91E0* woodlands present	A variety of typical native species should be present, depending on woodland type. The target species for 91E0* are alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*) and willows (*Salix* spp.). Positive indicator species for 91E0* are listed in Daly et al. (in prep.) and O'Neill and Barron (2013)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species cover not greater than 10%; regeneration of negative indicator species absent	Negative indicator species (i.e. any non-native species, including herbaceous species) should be absent or under control. The canopy at Grove Island (NSNW site code 688) and Yellow Island (752) is dominated by a range of *Salix* spp. (*S. cinerea, S. triandra, S. fragilis, S. viminalis*) (Perrin et al., 2008). Although the latter two are not native to Ireland, an exception is made for these species where they occur within gallery woodland (Daly et al., in prep.). Perrin et al. (2008) recorded some sycamore (*Acer pseudoplatanus*) in the canopy at Grove Island (NSNW site code 688). Daly et al. (in prep.) found that the recent arrival of the invasive non-native herb Himalayan balsam (*Impatiens glandulifera*) at Yellow Island (752) has caused significant negative impacts to the alluvial forest habitat
Vegetation composition: problematic native species	Percentage	Cover of common nettle (*Urtica dioica*) less than 75%	Common nettle (*Urtica dioica*) is a positive indicator species for 91E0* but, in some cases, it may become excessively dominant. Increased light and nutrient enrichment are factors which favour proliferation of common nettle (Daly et al., in prep.)

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Table 19

Conservation Objectives for : River Boyne and River Blackwater SAC [002299]

1099 River Lamprey *Lampetra fluviatilis*

To restore the favourable conservation condition of River Lamprey (*Lampetra fluviatilis*) in River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage of river accessible	Restore access to all water courses down to first order streams	Artificial barriers can block or impede the passage of upstream migrating lamprey, thereby restricting access to spawning areas (Gargan et al., 2011; Rooney et al., 2015). There are a number of weirs along the lower sections of the Boyne main channel, the most substantial of these are located at Slane and downstream of Navan at Blackcastle. Efforts to trap adult river lamprey were undertaken at four locations throughout the catchment during November 2014 to April 2015. This was augmented in April 2015 by an extensive fyke-netting survey (n=26 sites). No adult river lamprey were encountered, with the only record to date being a dead individual from the River Boyne at Slane in late March 2015 (Gallagher et al., 2016). On the Boyne main channel, there is ideal spawning habitat both upstream and downstream of the weir at Blackcastle but spawning has not been observed at these locations to date
Distribution of larvae	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	Not less than 50% of sample sites with suitable habitat positive for larval brook/river lamprey	It is not possible to distinguish between larval brook and river lamprey in the field and they are therefore considered together in assessing conservation status. A survey of the Boyne catchment in 2015 recorded n=583 *Lampetra* spp. larvae from n=102 sites (Gallagher et al., 2016). As stated, the weirs in the lower main stem are a significant impediment to river lamprey passage and, for this reason, these larvae are considered to be mainly, if not all, brook lamprey. To achieve favourable condition *Lampetra* spp. should, as a minimum, be present in not less than 50% of all sampling sites surveyed with suitable habitat present within the natural range (JNCC, 2015). *Lampetra* spp. larvae were recorded from 72% of sites indicating a pass for this target. Distribution remained similar to a 2005 survey (O'Connor, 2006) although larvae continued to be absent from the Boycetown and Skane Rivers, as well as the upper reaches of the Kells Blackwater system
Population structure of larvae	Number of age/size classes	At least three age/size classes of larval brook/river lamprey present	The target of at least three age/size classes is based on guidance from JNCC (2015). Larvae typically range from 10-150mm in length and this corresponds to up to six age classes. A broad range of size classes (12-153mm), including young-of-year larvae, was recorded from the 2015 Boyne catchment-wide survey indicating a pass for this target. However, given the issue of artificial barriers on the River Boyne, it is likely that this value pertains to brook lamprey, as previously stated
Larval lamprey density in fine sediment	Larval lamprey/m²	Mean density of brook/river larval lamprey in sites with suitable habitat more than 5/m²	A target mean density of more than 5/m² larvae in sites with suitable habitat is required to achieve favourable condition (JNCC, 2015). In the Boyne survey a mean density of 6/m² *Lampetra* spp. larvae (n=583) was obtained. A number of tributaries did not achieve a pass for this target, including the Athboy/Tremblestown, Boycetown, Deel, Skane and Stonyford Rivers. Again, the overall mean density value is most likely indicative of the status of brook lamprey in the Boyne catchment
Extent and distribution of spawning nursery habitat	m² and occurrence	No decline in extent and distribution of spawning and nursery beds	This target is based on spawning and nursery bed mapping during targeted larval lamprey monitoring surveys. River lamprey spawn in clean gravels in flowing water where they excavate shallow nests. While coarse substrate is required for spawning, the close proximity of nursery areas comprising mainly sand/silt are necessary for the development of larvae. The 2015 Boyne survey recorded adequate spawning and nursery habitat availability within the catchment (Gallagher et al., 2016). However, the sequence of weirs in the lower main channel of the Boyne represents a significant impediment to upstream passage. In addition, this lower section of river is in a degraded hydromorphological state with impounding and, therefore, poor habitat availability for spawning

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Table 20

Conservation Objectives for : River Boyne and River Blackwater SAC [002299]

1106 Salmon *Salmo salar*

To restore the favourable conservation condition of Atlantic Salmon (*Salmo salar*) in River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	Percentage of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmons' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. There are multiple barriers to fish migration in the Boyne system
Adult spawning fish	Number	Conservation limit (CL) for each system consistently exceeded	A conservation limit (CL) is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Technical Expert Group on Salmon's (TEGOS) annual model output of CL attainment levels. See Gargan et al. (2021) for further details. Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The Boyne is significantly below its CL
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	Target is threshold value for rivers currently exceeding their conservation limit (CL)
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice (*Lepeophtheirus salmonis*)
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. There is restricted habitat for salmon in the Boyne and habitat rehabilitation programmes have been undertaken in sections of the catchment
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)

Table 21

Conservation Objectives for : River Boyne and River Blackwater SAC [002299]

1355 Otter *Lutra lutra*

To maintain the favourable conservation condition of Otter (*Lutra lutra*) in River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. Favourable Conservation Status (FCS) target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid et al., 2013)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 447.6ha along river banks/ lake shoreline/around ponds	No field survey. Areas mapped to include 10m terrestrial buffer, identified as critical for otters (NPWS, 2007), along rivers and around water bodies
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 263.3km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake) habitat	Hectares	No significant decline. Area mapped and calculated as 31.6ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk and Moorhouse, 1991; Kruuk, 2006)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006; Reid et al., 2013)
Barriers to connectivity	Number	No significant increase	Otters will regularly commute across stretches of open water up to 500m, e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed

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6.2.5 Baseline Conservation Status of the site

A synopsis of the conservation status of this site is provided in Table 22 and Table 23.

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Table 22: Habitat types present on site and assessment for them

Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A|B|C|D	A|B|C		
						Representativity	Relative Surface	Conservation	Global
7230			23.21	0	M	B	C	B	B
91E0			23.21	0	M	B	B	B	B

PF: for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
NP: in case that a habitat type no longer exists in the site enter: x (optional)
Cover: decimal values can be entered
Caves: for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
Data quality: G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

Table 23: Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species					Population in the site						Site assessment			
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A|B|C|D	A|B|C		
						Min	Max				Pop.	Con.	Iso.	Glo.
B	A038	Cygnus cygnus			w	50	200	i		G	C	B	C	B
F	1099	Lampetra fluviatilis			r	0	0		P	DD	C	B	C	B
M	1355	Lutra lutra			p	0	0		P	DD	C	A	C	A
F	1106	Salmo salar			r	0	0		C	DD	C	B	C	B

Group: A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
S: in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
NP: in case that a species is no longer present in the site enter: x (optional)
Type: p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
Unit: i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see reference portal)
Abundance categories (Cat.): C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
Data quality: G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

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6.3 The River Boyne and River Blackwater SPA (site code 004232) (Site synopsis version date 25/11/10, Natura 2000 form update 10/2020, Conservation Objectives Version 1)

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6.3.1 General Description

The River Boyne and River Blackwater SPA is a long linear site that comprises stretches of the River Boyne and several of its tributaries: most of the site is in Co Meath but it extends also into Counties Cavan, Louth and Westmeath. It includes the following river sections: The River Boyne from the M1 motorway bridge, west of Drogheda, to the junction with the Royal Canal, west of Longwood, Co Meath; the River Blackwater from its junction with the River Boyne in Navan to the junction with Lough Ramor in Co Cavan; the Tremblestown River (and Athboy River) from the junction with the River Boyne at Kilnagross Bridge to the bridge in Athboy, Co Meath; the Stoneyford River from its junction with the River Boyne to Stonestone Bridge in Co. Westmeath; the River Deel from its junction with the River Boyne to Cummer Bridge, Co.Westmeath. The site includes the river channel and marginal vegetation. The River Boyne and River Blackwater SPA supports nationally important numbers of *Alcedo atthis*. Other species which occur within the site include *Cygnus olor*, *Anas crecca*, *Anas platyrhynchos*, *Phalacrocorax carbo*, *Ardea cinerea*, *Gallinula chloropus*, *Gallinago gallinago* and *Riparia riparia*.

6.3.2 Qualifying Interests

The Qualifying Interest (QI) of the River Boyne and River Blackwater SPA (site code:004232) is

- Kingfisher, *Alcedo atthis.*

The River Boyne and River Blackwater SPA supports nationally important numbers of *Alcedo atthis*. Other species which occur within the site include *Cygnus olor, Anas crecca, Anas platyrhynchos, Phalacrocorax carbo, Ardea cinerea, Gallinula chloropus, Gallinago gallinago* and *Riparia riparia.*

6.3.3 Threats, pressures and activities with negative impacts on the site

Details as to the threats, pressures and activities with negative impacts on the site are identified from the Natura 2000 data form for the sites and are illustrated in Table 24.

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Table 24: Threats, pressures and activities with impacts on the site

Negative Impacts			
Rank	**Threats and pressures [code]**	**Pollution (optional) [code]**	**inside/outside [i|o|b]**
H	E01.03		o
H	D01.02		o
M	J02		i
H	E01		o
H	D01.02		i

Positive Impacts			
Rank	**Activities, management [code]**	**Pollution (optional) [code]**	**inside/outside [i|o|b]**
L	X		i

Rank: H = high, M = medium, L = low
Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification, T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions
i = inside, o = outside, b = both

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6.3.4 Conservation Objectives

The primary conservation objective (generic) of this site is to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- Kingfisher (*Alcedo atthis*)

A detailed Conservation Objectives document for this site has been prepared and is available at: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004232.pdf

Excerpts from this document are illustrated in Table 25.

Table 25

Conservation Objectives for : River Boyne and River Blackwater SPA [004232]

A229 Kingfisher *Alcedo atthis*

To maintain the Favourable conservation condition of Kingfisher in River Boyne and River Blackwater SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population size	Number of breeding territories/pairs	No significant decline in the long term	Kingfisher is a small plunge-diving bird, largely resident and monogamous in the breeding season, found typically along shallow freshwater systems, with some local movement to coastal areas in winter (Snow and Perrins, 1997; Crowe et al., 2010). Almost two-thirds of recoveries in Britain refer to movements of less than 9km (Morgan and Glue, 1977). Widespread in Ireland (NPWS, 2019), it requires slow-moving water that contains thriving prey populations of small fish, and look-out perches from which it can hunt (Snow and Perrins, 1997). The all-Ireland population is estimated at 1,300-2,100 pairs (NPWS, 2013). A survey of six SAC river catchments in 2010 identified this SPA as supporting 15-19 breeding territories/pairs, or up to 1.4% of the all-Ireland population. The measure 'breeding territories' is as per Cummins et al. (2010) and these were estimated based on registrations of birds, birds' activities, and nest holes seen, primarily on the first two survey visits (out of three)
Productivity rate	Number of fledged young per confirmed breeding pair	Sufficient productivity to maintain the population trend as stable or increasing	Generally, the setting of a minimum level of productivity to ensure a stable and/or increasing population at a given site ought to be informed by robust estimates of: post-fledging survival; adult survival; and immigration and emigration rates. A lack of comprehensive Irish data precludes the identification of a minimum productivity rate for this species at this site and at the national level. An analysis of available British nest records by Morgan and Glue (1977) estimated that 76 young must survive to breed for every 100 Kingfisher alive at the start of the year, in order to maintain population stability and offset high adult mortality. Typically one to two broods are reared (Snow and Perrins, 1997), though in Central Europe, up to five breeding attempts have been recorded in a single season in Slovakia (Rubáčová and Melišková, 2020)
Spatial distribution of territories	Numbers and distribution of occupied territories across site	No significant loss of distribution in the long term, other than that occurring due to natural patterns of variation	Distribution encapsulates the number of locations and areas of potentially suitable habitat for Kingfisher and its availability for use. The suitability and availability of habitats are likely to vary through the season, for example, due to water level changes (due to rainfall, natural variation and other factors). These will affect the spatio-temporal patterns of use of the SPA by the breeding population. Optimal resilience depends on Kingfisher utilising the suitable extent of habitat in the SPA to the maximum extent possible. In 2010, densities of 0.09-0.12 territories/km length of channel were recorded for this site (Cummins et al., 2010), and these were among the highest territory abundance recorded in surveys, with the lowest densities (0.04-0.08 territories/km) found on the Barrow and the Munster Blackwater systems (0.05 territories/km). A study of 16 GPS-tagged adult Kingfisher in France (Musseau et al., 2023), estimated mean home range size at 2.5ha (0.25km2)

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Extent and quality of nesting banks and other suitable nesting features	Hectares; condition assessment	Sufficient area of high quality nesting habitat to support the population target	Nesting from March to July in Britain, Boag (1982) detailed Kingfisher breeding habitat as being limited by the amount of prey, and the availability of suitable nest sites. Slow-flowing, shallow watercourses with cover along the banks are preferred. In Ireland, they nest in relatively short stretches of suitable banks of less than 10m high (Crowe et al., 2010), but are reliant on suitable fishing conditions (water depth, clarity, and speed of flow). Suitable sand/loam/mud banks (vertical/overhanging) for nesting are necessary to support breeding pairs (Snow and Perrins, 1997; Crowe et al., 2010). Holes in walls, rotten tree stumps, concrete tunnels in canal banks, or burrows of Sand Martin (*Riparia riparia*) are also used. Suitable nest sites located away from the river channel are likely less frequently encountered, but records located over 250m from foraging waters occur (Crowe et al., 2010) and often in a stream or tributary of the main watercourse (Morgan and Glue, 1977)
Forage spatial distribution, extent, abundance and availability	Location, hectares, and forage biomass	Sufficient number of locations, area of suitable forage habitat and available forage biomass to support the population target	Kingfisher occur in many wetland habitats, including smaller types (e.g. ditches, ponds, streams), that provide necessary trophic resources and are ecologically connected (Musseau et al., 2021). Kingfisher diet consists predominantly of small fish/aquatic invertebrates which are captured by plunge-diving, typically over shallow freshwater or estuarine waters (Snow and Perrins, 1997). Pelagic and benthic fish species can be taken (Cramp, 1985) e.g. Three-spined Stickleback (*Gasterosteus aculeatus*), Minnow (*Phoxinus phoxinus*), Bullhead (*Cottus gobio*) and Brown Trout (*Salmo trutta*). Kingfisher prey mostly on small-sized fish, typically 40-70mm in length (Reynolds and Hinge, 1996; Čech and Čech, 2011; Vilches et al., 2012). Availability of suitable fishing perches, along shallow stretches of water from which Kingfisher can hunt (Vilches et al., 2012), is also a key requirement
Water quality	Water quality indicators	Both biotic (i.e. Q-value) and abiotic indices reflect overall good-high quality status	Given that Kingfisher occupy wetlands ecologically connected to the wider landscape, habitat destruction, degradation via pollution (e.g. agricultural run-off; pesticides; increased turbidity) and/or poor management of watercourses (EEA, 2019; Crowe et al., 2010) are a concern. Data are limited for Kingfisher, but Dipper (*Cinclus cinclus*), an exclusively riparian bird, is less abundant where stream acidity and aluminium concentrations increase; its territories are longer at low pH, and clutch and brood sizes are significantly lower (Ormerod and Tyler, 1993). Thus, minimum water quality standards for the site should be met, as set out by the "River Quality Surveys" (Environmental Protection Agency, 2024). Q-values of ≥4 represent satisfactory water quality for Kingfisher. Values are based primarily on the relative proportions of 'pollution sensitive to tolerant macroinvertebrates'. These macroinvertebrates are eaten by both Kingfisher and their prey species (e.g. Brown Trout)
Barriers to connectivity	Number, location, shape and hectares	No significant increase	An adult male Kingfisher is territorial and usually defends its territory from the previous summer (Snow and Perrins, 1997), including necessary access to forage in freshwater habitats ecologically connected to their territory. Along the River Boyne system in 2008, Kingfisher were observed flying out of grass on banks (often short grass) and into fields for 150-200m, where they would disappear out of view (Crowe et al., 2008). Barriers limiting access to this SPA or ecologically important sites outside the SPA will ultimately affect the achievement of targets for population size and/or spatial distribution. Factors such as the number, location, shape and area of potential barriers must be taken into account to determine their potential impact

Disturbance to breeding sites	Intensity, frequency, timing and duration	Disturbance occurs at levels that do not significantly impact upon breeding Kingfisher	The impact of any significant disturbance on the SPA's breeding population will ultimately be manifested in the targets, which relate to population demographics (i.e. population size, productivity rate) and the distribution of territories along the linear river catchments. Canalisation of streams and clearance of emergent vegetation to improve drainage result in loss of nesting and feeding habitat and declines in fish numbers (Tucker and Heath, 1994). In Britain, Kingfisher have been known to be at risk locally from human persecution to protect fish stocks (Woodall, 2001), but no evidence of this threat has been reported in Ireland. Likely disturbance distances in relation to human activities are set out in Goodship and Furness (MacArthur Green) (2022). Factors such as intensity, frequency, timing and duration of a (direct or indirect) disturbance source must be taken into account to determine the potential impact upon the targets for population demographics

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6.3.5 Baseline Conservation Status

A synopsis of the conservation status of this site is provided in Table 26.

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Table 26: Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species					Population in the site						Site assessment			
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A|B|C|D	A|B|C		
						Min	Max				Pop.	Con.	Iso.	Glo.
B	A229	Alcedo atthis			r	19	19	p		G	C	B	C	B
B	A052	Anas crecca			w	166	166	i		G	C	B	C	C
B	A053	Anas platyrhynchos			w	219	219	i		G	C	B	C	C
B	A028	Ardea cinerea			w	44	44	i		G	C	B	C	C
B	A017	Phalacrocorax carbo			w	36	36	i		G	C	B	C	C

Group: A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
S: in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
NP: in case that a species is no longer present in the site enter: x (optional)
Type: p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
Unit: i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see reference portal)
Abundance categories (Cat.): C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
Data quality: G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

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