MKO Planning and Environmental Consultants

Natura Impact Statement

Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development

DOCUMENT DETAILS

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1. INTRODUCTION

1.1 Background

MKO has been appointed to provide the information necessary to allow the competent authority to conduct an Article 6(3) Appropriate Assessment of works associated with the permitted Knocknamork Renewable Energy Development (Permitted Development), located near Ballyvourney, Co. Cork. The proposed works will consist of a 110kV Electricity Substation, underground electrical cabling, road and junction upgrades, new access roads, borrow pit and associated works (Proposed Development). An Appropriate Assessment Screening Report has been prepared and is provided in Appendix 1. The Article 6(3) Appropriate Assessment Screening Report has identified the European Sites upon which the Proposed Development has the potential to result in significant effects and the pathways by which those effects may occur.

This Natura Impact Statement (NIS) has been prepared in accordance with the European Commission's Assessment of Plans and Projects Significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC (EC, 2021) and Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (EC, 2018) as well as the Department of the Environment's Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DoEHLG, 2010) and the Appropriate Assessment Screening for Development Management. Office of the Planning Regulator, Dublin 7, Ireland OPR (2021).

In addition to the guidelines referenced above, the following relevant guidance was considered in preparation of this report:

1. *European Communities (2000) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission,*
2. *Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission,*
3. *EC (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. European Commission.*
4. *EC (2020) Guidance document on wind energy developments and nature legislation.*

1.2 Appropriate Assessment

Screening is the process of determining whether an Appropriate Assessment is required for a plan or project. Under Part XAB of the Planning and Development Act, 2000, as amended, screening must be carried out by the Competent Authority. As per Section 177U of the Planning and Development Act, 2000, as amended 'A screening for appropriate assessment shall be carried out by the competent authority to assess, in view of best scientific knowledge, if that land use plan or proposed development, individually or in combination with another plan or project is likely to have a significant effect on the European site'. The Competent Authority's determination as to whether an Appropriate Assessment is required must be made on the basis of objective information and should be recorded. The Competent Authority may request information to be supplied to enable it to carry out screening.

Consultants or project proponents may provide for the competent authority, the information necessary for them to determine whether an Appropriate Assessment is required and provide advice to assist them in the Article 6(3) Appropriate Assessment Screening decision.

Where it cannot be excluded beyond reasonable scientific doubt at the Screening stage, that a proposed plan or project, individually or in combination with other plans and projects, would have a significant effect on the conservation objectives of a European site, an Appropriate Assessment is required.

Where an Appropriate Assessment is required, the Competent Authority may require the applicant to prepare a Natura Impact Statement.

The term Natura Impact Statement (NIS) is defined in legislation[1]. An NIS, where required, should present the data, information and analysis necessary to reach a definitive determination as to 1) the implications of the plan or project, alone or in combination with other plans and projects, for a European site in view of its conservation objectives, and 2) whether there will be adverse effects on the integrity of a European site. The NIS should be underpinned by best scientific knowledge, objective information and by the precautionary principle.

This report has been prepared in compliance with the provision of section 177U of the Planning & Development Act 2010 as amended.

Statement of Authority

Baseline ecological surveys were undertaken on the 28th of September 2021, the 29th of September 2021, the 13th of January 2022, the 9th of February 2022, the 9th of May 2022 and the 10th of May 2022 by Kevin McElduff (B.Sc. (Env.)) and Padraig Desmond (B.Sc. (Eco.)) of MKO. All surveyors had the necessary qualifications and experience to undertake the surveys that they were required to undertake. This report has been prepared by Kevin McElduff who has the necessary qualifications and experience to undertake this assessment. This report has been reviewed by Pat Roberts (B.Sc., MCIEEM) who has over 15 years' experience in ecological assessment.

[1] As defined in Section 177T of the Planning and Development Act, 2000 as amended, an NIS means a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a Proposed Development, on its own and in combination with other plans and projects, for a European site in view of its conservation objectives. It is required to include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for the European site in view of its conservation objectives

2. CONCLUSIONS OF ARTICLE 6(3) APPROPRIATE ASSESSMENT SCREENING REPORT

The Article 6(3) Appropriate Assessment Screening report identified the potential for the Proposed Development to result in significant effects on the following European Sites:

- Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC [000365]
- Mullaghanish to Musheramore Mountains SPA [004162]

These sites are discussed individually below in terms of the Qualifying Interests (QIs) and Special Conservation Interests (SCIs) with the potential to be affected and the pathways by which any such effects may occur.

2.1 Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC [000365]

The only identified pathway for effect on this European Site was via water pollution and taking the terrestrial nature of the following habitats and species into account, and the nature and scale of the proposed works, no pathway for effect was identified and there is no potential for adverse effect on the following QIs:

- [1421] Killarney Fern (*Trichomanes speciosum)*
- [4010] Northern Atlantic wet heaths with *Erica tetralix*
- [4030] European dry heaths
- [4060] Alpine and Boreal heaths
- [5130] *Juniperus communis* formations on heaths or calcareous grasslands
- [6130] Calaminarian grasslands of the *Violetalia calaminariae*
- [6410] *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils *(Molinion caeruleae)*
- [7130] Blanket bogs (* if active bog)
- [7150] Depressions on peat substrates of the *Rhynchosporion*
- [91A0] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- [91J0] *Taxus baccata* woods of the British Isles*

Taking the intervening distance between the Proposed Development and species into account, and the nature and scale of the works, there is no potential for adverse effect on the following QIs:

- [1024] Kerry Slug (*Geomalacus maculosus)* (Map 7 of the SSCOs (NPWS 2017)).
- [1065] Marsh Fritillary (*Euphydryas aurinia)* (Map 9 of the SSCOs (NPWS 2017)).
- [1303] Lesser Horseshoe Bat (*Rhinolophus hipposideros)* (As per Map 10 of the SSCOs (NPWS 2017) the EIAR Study Area is located outside the core foraging range (2.5km) of Lesser Horseshoe Bat (NPWS, 2013)).
- [1029] Freshwater Pearl Mussel (*Margaritifera margaritifera)* (As per Map 8 of the SSCOs (NPWS 2017), the Conservation Objective population is located in a separate catchment (Caragh River catchment) and no source-pathway-receptor chain was identified).

2.1.1 Water Pollution

A potential pathway for effect via surface water connectivity with this European Site has been identified via tributaries of the Clydagh River and there is potential for deterioration of water quality to result in impact on the following QIs:

- [1095] Sea Lamprey (*Petromyzon marinus)*
- [1096] Brook Lamprey (*Lampetra planeri)*
- [1099] River Lamprey (*Lampetra fluviatilis)*
- [1106] Salmon (*Salmo salar)*
- [1355] Otter (*Lutra lutra)*
- [1833] Slender Naiad (*Najas flexilis)*
- [3110] Oligotrophic waters containing very few minerals of sandy plains *(Littorelletalia uniflorae)*
- [3130] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*
- [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
- [5046] Killarney Shad *Alosa fallax killarnensis*
- [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)**

The potential effects require further assessment and will be considered below under the conservation objectives for the above listed QIs.

2.2 Mullaghanish to Musheramore Mountains SPA [004162]

Following an extremely precautionary principle, habitat connectivity with the SPA has been identified and there is potential for disturbance as a result of the Proposed Development on the following SCI species:

- [A082] Hen Harrier (*Circus cyaneus)*

The potential effects require further assessment and will be considered below under the conservation objectives for the above listed SCI.

3. DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 Site Location

The site of the Proposed Development which straddles the county boundary between Co. Kerry and Co. Cork is located approximately 11 kilometres southwest of the town of Millstreet and 3 kilometres northwest of the village of Ballyvourney. The Grid Reference co-ordinates of the approximate start and end points for the Proposed Development site are E514036, N581567 and E525824, N584341 respectively.

3.2 Characteristics of the Proposed Development

3.2.1 Description of the project

The Proposed Development comprises the provision of the following:

i. *110 kV electrical substation with 2 no. control buildings with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, waste water holding tank and all ancillary works;*
ii. *Underground electrical cabling (110kV);*
iii. *Underground electrical cabling (33kV);*
iv. *Access Roads (new and upgrade of existing)*
v. *Temporary access road;*
vi. *Upgrade of access junctions;*
vii. *Amendments to the Permitted Development (Ref. No. 19/4972), including extension to the borrow pit and the omission of the 38kV Electrical Substation, 38KV underground cabling and Battery Storage compound;*
viii. *Borrow pit;*
ix. *Site Drainage;*
x. *Forestry Felling; and*
xi. *All associated site development works and apparatus.*

An Bord Pleanála – Planning Notice Project Description

i. *110 kV electrical substation with 2 no. control buildings with welfare facilities, all associated electrical plant and apparatus, security fencing, underground cabling, waste water holding tank and all ancillary works;*
ii. *Underground electrical cabling (110kV);*
iii. *New access roads;*
iv. *Borrow pit;*
v. *Site Drainage;*
vi. *Forestry Felling; and*
vii. *All associated site development works and apparatus.*

Cork County Council – Planning Notice Project Description

i. *Underground electrical cabling (33kV);*
ii. *Access roads (new and upgrade of existing);*

iii. *Amendments to the Permitted Development (Ref. No. 19/4972), including extension to the borrow pit and the omission of the 38kV Electrical Substation, 38KV underground cabling and Battery Storage compound;*
iv. *Site Drainage; and*
v. *All associated site development ancillary works and apparatus.*

Kerry County Council – Planning Notice Project Description

i. *Underground electrical cabling (33kV);*
ii. *Upgrade of access junctions;*
iii. *Access roads (new and upgrade of existing);*
iv. *Temporary access road;*
v. *Borrow pit;*
vi. *Site Drainage;*
vii. *Forestry Felling; and*
viii. *All associated site development works and apparatus.*

All elements of the Proposed Development have been assessed as part of this NIS. A full description of the Proposed Development is provided in Appendix 2, which comprises chapter 4 of the EIAR, Description. The appendices to that chapter are available for review as part of the EIAR.

4. CHARACTERISTICS OF THE RECEIVING ENVIRONMENT

The ecological surveys that were undertaken to inform this NIS are fully described in this section. A general description of the ecology of the site of the Proposed Development is provided in the AA Screening Report in Appendix 1. The specific surveys that were undertaken to assess the potential effects on the identified European Sites are described below. A full description of the ecology of the site of the Proposed Development is provided below in Section 4.4.

4.1 Ecological Survey Methodologies

4.1.1 Desk Study methodology

The desk study undertaken for this assessment included a thorough review of available ecological data including the following:

- Review of NPWS Site Synopses, Conservation Objectives for the European Sites
- Review of 2019, 2013 and 2007 EU Habitats Directive (Article 17) Reports.
- Review of online web-mappers: National Parks and Wildlife Service (NPWS), EPA (Envision), Water Framework Directive (WFD), Geological Survey of Ireland (GSI) & Inland Fisheries Ireland (IFI).
- Review of the publicly available National Biodiversity Data Centre (NBDC) web-mapper.
- Data on potential occurrence of protected bryophytes – as per NPWS online map viewer; Flora Protection Order Map Viewer – Bryophytes[2].
- Review of specially requested records from the NPWS Rare and Protected Species Database for the hectad in which the Proposed Development is located.
- Review of NPWS Article 17 Metadata and GIS Database Files

4.1.2 Scoping and Consultation

MKO undertook a scoping exercise during preparation of this NIS and associated planning application documentation. Relevant consultees to whom the scoping document were sent and the responses received to date are summarised in Tables 4-1 and 4-2 below.

Table 4- 1 Scoping Responses

No.	Consultee	Summary Response
1	Bat Conservation Ireland	No Response
2	BirdWatch Ireland	No Response
3	Department of the Environment, Climate and Communications	Response received 22nd/26th April
4	Department of Housing, Local Government and Heritage	Response received 16th March 2022
5	Inland Fisheries Ireland	Response received 17th January 2022

[2] *NPWS, 2020, Online map viewer; Flora Protection Order Map Viewer – Bryophytes. Online, Available at: http://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=71f8df33693f48edbb70369d7fb26b7e, Accessed: 24/03/2020.*

No.	Consultee	Summary Response
6	Irish Wildlife Trust	No Response
7	Irish Peatland Conservation Council	No Response
8	Cork County Council – Environment Department	No Response
9	Kerry County Council – Environment Department	Response received 7th January 2022
10	Irish Water	No Response

Table 4- 2 Review of Scoping Responses

No.	Consultee	Key Scoping Response Points
1	Department of the Environment, Climate and Communications	Response on behalf of Geological Survey Ireland (a division of the Department of Environment, Climate and Communications) *"With reference to your email dated 11 April 2022, regarding the proposed Knocknamork Turbine Delivery Route and Grid Connection Route Scoping, please note that Geological Survey Ireland has no specific comment or observations to make on this matter since our last response 21/476."* Response from Rory Coleman on behalf of Environmental Protection Division (a division of the Department of Environment, Climate and Communications) *"In respect of waste in the within documentation, we would be obliged if the Local Authority would consult directly with their respective Regional Waste Management Planning Office regarding development of the final plans."*
2	Department of Housing, Local Government and Heritage	› Not in a position to make specific comment on this particular referral at this time. › No inference should be drawn from this that the Department is satisfied or otherwise with the proposed activity. › The Department may submit observations/recommendations at a later stage in the process.
3	Inland Fisheries Ireland	The site of the Proposed Development encompasses the upper Clydagh and Foherish Rivers and their tributaries, significant salmonid fisheries. In this context IFI would ask that the following requirements should be taken into consideration. › There should be no drainage, crossing, bridging, culverting or other physical interference with the bed or bank of any watercourse without prior consultation with IFI. › Suspended solids and or hydrocarbon contaminated site run-off waters must be controlled adequately so that no pollution of surface waters can occur. More specifically IFI feels the following issues should be addressed. i. Identifying and zoning the project for environmental impact should a peat slip ii. Setting out contingency plan should a peat movement occur. iii. Setting out a plan for the control of silt in such a scenario, including measures to be put in place at the initial stages of construction. In the event of any watercourse crossings being bridged or culverted the following general criteria should apply; 1. The free passage of fish must not be obstructed. 2. Span watercourse crossings are the preferred option 3. Design details on any proposed crossing should be forwarded to IFI for consideration and incorporated at planning stage 4. Instream works should be carried out only in the July-September period.

No.	Consultee	Key Scoping Response Points
4	Kerry County Council – Environment Department	› The response noted that the lower water body, the Flesk (KERRY) _020 is described as at risk as per WFD Risk 3rd cycle. › The response expresses concern for the potential impact on surface water quality downstream of the Proposed Development. › The response suggests that attention is placed on any potential downstream impacts particularly as the Clydagh River is a tributary of the River Flesk, which in turn constitutes the main water body flowing into Lough Leane.

In addition, a data request was sent to the NPWS Scientific Data Unit, and a response was received on the 31st of December 2021. The results of this data request informed the surveys that were undertaken for this NIS.

4.2 Ecological Survey Methodologies

4.2.1 Ecological Multidisciplinary Walkover Surveys

Comprehensive surveys of the biodiversity of the entire site were undertaken on the 28th of September 2021, the 29th of September 2021, the 13th of January 2022, the 9th of February 2022, the 9th of May 2022 and the 10th of May 2022. Surveys were conducted throughout a range of seasons including optimum periods for vegetation surveys and habitat mapping, i.e. April to September (Smith et al., 2011).

The walkover surveys were also designed to detect the presence, or likely presence, of a range of protected species. The surveys included a search for signs of otter and areas of suitable habitat, potential features likely to be of significance to bats and additional habitat features for other protected species that are likely to occur in the vicinity of the Proposed Development. Findings of the multidisciplinary walkover surveys are provided below in Section 4.4 below.

The multi-disciplinary walkover surveys comprehensively covered the entire EIAR Study Area for features and locations of ecological significance. The 2021 and 2022 surveys were carried out in accordance with NRA *Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna* on National Road Schemes (NRA, 2009).

During the multidisciplinary surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted.

4.2.2 Otter Survey

Otter surveys were conducted as per NRA (2009) guidelines '*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes'*. This involved a search for all otter signs e.g. spraints, scat, prints, slides, trails, couches and holts. In addition to the width of the rivers/watercourses, a 10m riparian buffer (both banks) was considered to comprise part of the otter habitat (NPWS 2009). The dedicated otter surveys also followed the guidance as set out in NRA (2008) *'Guidelines for the Treatment of Otters Prior to the Construction of National Roads Schemes'* and following CIEEM best practice competencies for species surveys (CIEEM, 2013).

There are seven EPA mapped watercourse crossings associated with the Proposed Development works, with six crossings associated with the proposed underground electrical cabling route and the remaining crossing associated with the proposed works for the turbine delivery route.

Table 4-2 in Chapter 4 of the EIAR, Description (Appendix 2 of this NIS) has numbered the six watercourse crossings associated with the proposed underground electrical cabling route (33kV and 110kV) from 1 to 6, with watercourse crossing no. 1 being the most westerly crossing and watercourse crossing no. 6 being the most easterly crossing.

All seven watercourse crossings were surveyed for signs of otter. Otter surveys at these water crossings involved visual inspection of the watercourse and associated verge habitat for a length of 150m upstream and downstream of the footprint of the Proposed Development as per guidance set out in NRA Guidelines for the Treatment of otters prior to the Construction of National Road Schemes. All other watercourses and waterbodies within 150m of the footprint of the Proposed Development were also surveyed for signs of otter for a length of approximately 150m upstream and downstream of the closest point of the watercourse to the footprint of the Proposed Development. No Signs of otter were recorded during the dedicated otter surveys of the watercourses that drain the EIAR Study Area boundary. These watercourses are shown on Figures 4-1A – 4-1H.

4.2.3 Bird Surveys

Dedicated walked surveys for birds were undertaken as part of the Ecological Multi-disciplinary walkover surveys that were completed on the 28th of September 2021, the 29th of September 2021, the 13th of January 2022, the 9th of February 2022, the 9th of May 2022 and the 10th of May 2022. Particular attention was paid to the potential for hen harrier to be present.

Given the nature, scale and location of the proposed works, no further or additional surveys were required.

4.3 Desk Study Results

4.3.1 Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC [000365]

4.3.1.1 Review of Conservation Objectives

The relevant QIs and the associated conservation objectives of the site are presented in Table 4-3. The Targets and Attributes for the relevant habitats and species, as described in the SSCOs (NPWS 2017) were reviewed and considered in this assessment.

Table 4- 3 Qualifying Interests and Conservation Objective (Version 1, 2017)

Qualifying Interest	Conservation Objective
[3110] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae)*	To restore the favourable conservation condition of this habitat in the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC
[3130] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*	
[91E0] *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*	
[3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	To maintain the favourable conservation condition of this habitat in the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC
[1095] Sea Lamprey (*Petromyzon marinus)*	To maintain the favourable conservation condition of this species in the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC
[1096] Brook Lamprey (*Lampetra planeri)*	
[1099] River Lamprey (*Lampetra fluviatilis)*	
[1106] Salmon (*Salmo salar)*	
[1355] Otter (*Lutra lutra)*	
1833] Slender Naiad (Najas flexilis)	
[5046] Killarney Shad *Alosa fallax killarnensis*	To restore the favourable conservation condition of this species in the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC

4.3.1.2 Site Specific Pressures and Threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to effect on the SAC were reviewed and considered in relation to the Proposed Development. These are provided in Table 4-4.

Table 4- 4 Site-specific threats, pressures and activities with potential to effect on the SAC

Negative Impacts			
Rank	**Threats and pressures [code]**		**Inside/outside/both**
M	A04	Grazing	o
M	G02.06	Attraction park	i
L	G01.02	Walking, horse-riding and non-motorised vehicles	i
M	B	Sylviculture, forestry	i
L	B	Sylviculture, forestry	i
M	J01	Fire and fire suppression	i
L	G02.01	Golf course	o
M	F03.01	Hunting	i
L	F02.03	Leisure fishing	i
M	E01.03	Dispersed habitation	i
M	K01.01	Erosion	i
M	E01	Urbanised areas, human habitation	o
M	A08	Fertilisation	o
M	B	Sylviculture, forestry	o
H	A04	Grazing	i
H	I01	Invasive non-native species	i
L	A08	Fertilisation	i
L	E01.03	Dispersed habitation	o
M	C01.03	Peat extraction	i

Rank: H = high, M = medium, L = low; i = inside, o = outside, b = both

4.3.1.3 Annex I habitats of Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC [000365]

The Qualifying Interests with the potential to be affected via the identified pathway include:

- [3110] Oligotrophic waters containing very few minerals of sandy plains *(Littorelletalia uniflorae)*
- [3130] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*
- [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

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

4.3.1.3.1 [3110] Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)

Habitat area was estimated as 3176 ha using OSi data and the Transitional Water Body area as defined under the Water Framework Directive (see Map 3 of the SSCOs).

From 'The Status of EU Protected Habitats and Species in Ireland (NPWS 2019):

Ireland is a European stronghold for this soft-water, nutrient-poor lake habitat. It is quite species-poor and dominated by plants with an isoetid growth form, such as quillwort (Isoetes lacustris), or water lobelia (Lobelia dortmanna). Other species such as bulbous rush (Juncus bulbosus) and bog pondweed (Potamogeton polygonifolius) also commonly occur. This habitat is frequent in catchments where peatland overlies acid bedrock (notably granite and old red sandstone). It is best developed on more gentle slopes along sheltered shorelines. The oligotrophic isoetid lake habitat is also found in upland lakes, such as corries, and earlier references to it as a "lowland lake" type were incorrect. It can also co-occur with the more speciespoor Acid oligotrophic lake habitat (3160) and the more species-rich Mixed Najas flexilis lake habitat (3130). The oligotrophic isoetid lake habitat has a widespread distribution in Ireland, occurring in a large number of lakes. It requires oligotrophic or Water Framework Directive High status, but is under significant pressure from eutrophication, and from drainage and other damage to peatland. Damage to peatland can result in hydrological changes in lakes, increased organic matter, water colour and turbidity, changes in sediment characteristics, acidification and enrichment. It is recognised that ensuring the long-term future of this lake habitat requires action to address peatland damage at a catchment scale, as well as to reduce nutrient and other pollution. The Overall Status is assessed as Bad with a stable trend. The change in trend from deteriorating to stable is because of the use of a different method.

4.3.1.3.2 [3130] Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea

Habitat area was estimated as 2999 ha using OSi data, and the Transitional Water Body area as defined under the Water Framework Directive (see Map 3 of the SSCOs).

From 'The Status of EU Protected Habitats and Species in Ireland (NPWS 2019):

The habitat 'Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea' has been interpreted as a mixed Najas flexilis lake habitat in Ireland. The habitat co-occurs with Oligotrophic isoetid lake habitat (3110) in some lakes, and may also co-occur with Hard-water lake habitat (3140) and Rich pondweed lake habitat (3150). Mixed Najas flexilis lake habitat occurs in lakes with very clear, circum-neutral, low-nutrient waters in catchments of mixed geology. Base-rich influences come from basalt, limestone, marble, sedimentary deposits or calcareous coastal sand, and peatland is often widespread in the catchments. The Annex II macrophyte Najas flexilis is a character species. The co-occurrence of Potamogeton perfoliatus and Isoetes lacustris is also characteristic. Macrophytes grow from shallow to deep water (8 m or more) and, hence, vegetation can cover a large proportion of the lake bed. Owing to its rare species and relatively high species richness, mixed Najas flexilis lake habitat is of high conservation value. Ireland is a European stronghold for the habitat and for Najas flexilis. The habitat is widespread particularly along the western fringe. It is under significant pressure from drainage, agriculture, peat extraction, forestry and wastewaters. The Overall Status is assessed as Inadequate, unchanged since the 2013 assessment. Based on improved knowledge through dedicated survey during the reporting cycle, the trend is assessed as deteriorating.

4.3.1.3.3 [91E0] *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)

Habitat area was estimated as 765 ha using OSi data, and the Transitional Water Body area as defined under the Water Framework Directive (see Map 5 of the SSCOs).

From 'The Status of EU Protected Habitats and Species in Ireland (NPWS 2019):

A number of variants of Alluvial woodland habitat exist, of which riparian forests of ash (Fraxinus excelsior) and alder (Alnus glutinosa) (Alno-Padion) of temperate and Boreal Europe lowland and hill watercourses are the most common in Ireland. All types occur on heavy soils which are periodically inundated by the annual rise of river levels but otherwise well-drained and aerated during low water. The herbaceous layer includes many large species such as meadowsweet (Filipendula ulmaria), wild angelica (Angelica sylvestris), wood dock (Rumex sanguineus) and sedges (Carex spp.), vernal species such as lesser celandine (Ficaria verna) and wood anemone (Anemone nemorosa), and other indicative 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 (Salicion albae) alongside river channels and occasionally on river islands, where the tree roots are almost continuously submerged. These are dominated by white willow (Salix alba), osier (S. viminalis) and almond willow (S. triandra), sometimes with grey willow (S. cinerea), but alder should be rare. There is a luxuriant herb layer of species such as reed canary-grass (Phalaris arundinacea), common nettle and meadowsweet. A number of pressures affect this habitat in Ireland, the most serious being invasive species, particularly sycamore (Acer pseudoplatanus), beech (Fagus sylvatica), Indian balsam (Impatiens glandulifera) and currant species (Ribes nigrum and R. rubrum). Some native species such as brambles (Rubus fruticosus agg.) and common nettle can also become over-vigorous. Small area losses due to clearfelling have also occurred. As a result the Overall Status is Bad and the trend is declining. This poorer trend since the previous assessment is mainly due to the availability of more accurate data, and the decline is considered to have been ongoing since before the last assessment.

4.3.1.3.4 [3260] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation

Habitat area was estimated as 765 ha using OSi data, and the Transitional Water Body area as defined under the Water Framework Directive.

From 'The Status of EU Protected Habitats and Species in Ireland (NPWS 2019):

'Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation' has a broad definition, covering upland, flashy, oligotrophic, bryophyte- and algal-dominated rivers, to tidal reaches dominated by higher plants. In Ireland, the riverine areas of highest conservation interest are associated with lowland depositing and tidal rivers and unmodified, fast-flowing, lownutrient rivers. A number of rare submerged and marginal species are found in the former including opposite-leaved pondweed (Groenlandia densa), water-starworts (e.g. Callitriche truncata), triangular club-rush (Schoenoplectus triqueter), needle spike-rush (Eleocharis acicularis) and mud-dwelling mosses (e.g. Ephemerum spp.). The low-nutrient, high-velocity river types are associated with high bryophyte diversity, cascades, riffles and riparian woodland. Important communities also occur in groundwater-fed, base-rich oligotrophic rivers. Many Irish rivers have been heavily modified, particularly through arterial drainage and channelisation. These activities have changed channel hydrology and morphology, resulting in the accumulation of larger amounts of fine sediment. Such fines provide a rooting medium for plants and, as a result, stream watercrowfoot (Ranunculus penicillatus) has increased in abundance. Consequently, the habitat erroneously became synonymous with water-crowfoot in Ireland. Crowfootdominated reaches frequently have low diversity and are of low conservation value, and an abundance of the species generally indicates poor condition and damage. The main problems for river habitats in Ireland are damage through hydrological and morphological change, eutrophication and other water pollution. The EPA continues to highlight the

decline in high quality rivers. While not all variants of the river habitat require low nutrient conditions, this trend is a significant concern. Agriculture and municipal and industrial discharges are the most significant sources of nutrient and organic pollution. The Overall Status of the habitat is Inadequate and deteriorating, unchanged since the 2013 assessment.

4.3.1.4 Annex II Species of Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC [000365]

The Qualifying Interests with the potential to be affected via the identified pathway include:

- [1095] Sea Lamprey (*Petromyzon marinus)*
- [1096] Brook Lamprey (*Lampetra planeri)*
- [1099] River Lamprey (*Lampetra fluviatilis)*
- [1106] Salmon (*Salmo salar)*
- [1355] Otter (*Lutra lutra)*
- [1833] Slender Naiad (*Najas flexilis)*
- [5046] Killarney Shad (*Alosa fallax killarnensis*)

4.3.1.4.1 *[1095] Sea Lamprey (Petromyzon marinus)*

From 'The Status of EU Protected Habitats and Species in Ireland (NPWS 2019):

The life cycle of the sea lamprey *(Petromyzon marinus)* contains both a marine phase and a freshwater phase. Adult sea lamprey living as external parasites on host fish or marine mammals at sea grow in length from 60 to 100cm before migrating in spring into freshwater to excavate redds or spawning nests in gravelled areas of large rivers. Upriver migration occurs at a time of falling water levels and substantial spawning activity has been recorded in gravelled areas downstream of large weirs in the major Irish rivers. Sea lamprey spawning has been recorded in the upper reaches of the River Laune, where there are no barriers to upstream migration. Substantial areas of gravel suitable for spawning have been recorded in SAC main stem rivers but low utilisation of these areas by spawning sea lamprey has been recorded, both up- and downstream of barriers to migration. Egg laying follows nest excavation and the resulting larvae, called ammocoetes, hatch out within days. These swim or drift downstream to areas of fine sediment into which they can burrow. The ammocoete retains its burrowing habit in fine-grained sediment over a period of years. Transformation to the young adult stage occurs in late summer and the juvenile sea lamprey can be found migrating downriver to estuarine waters and the open sea in late autumn-winter. The sea lamprey is listed in the most recent Irish Red Data Book as Near Threatened. Barriers to upstream migration (e.g. weirs) are considered the major impediment to good conservation status for sea lamprey as these limit access to spawning beds and juvenile habitat. The Overall Status of this species is assessed as Bad with a stable trend, unchanged since the last 2013 assessment.

4.3.1.4.2 *[1096] Brook Lamprey (Lampetra planeri)*

From 'The Status of EU Protected Habitats and Species in Ireland (NPWS 2019):

The brook lamprey (*Lampetra planeri*) is the smallest of the three lampreys recorded in Ireland, typically reaching no more than 15-18cm in length. Unlike the sea lamprey (*Petromyzon marinus*) and the river lamprey (*Lampetra fluviatilis*), the brook lamprey is non-parasitic and non-migratory as an adult, living its entire life in freshwater. Adults spawn in spring, excavating shallow nests in relatively small-sized gravels in areas of reduced flow. After hatching, the larvae ('ammocoetes') drift or swim downstream to areas of river bed or margins with fine silt deposits. They burrow into this substrate and live as filter feeders over a period of years before transforming into young adult fish. The young adults overwinter before migrating short distances upstream to gravelled areas where they spawn. The adult fish die after spawning. River and brook lamprey are indistinguishable as larvae, living as filter feeders in sediment. Mature adult forms are, however, clearly distinguishable based on body size. Brook

lamprey and river 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 focused on ammocoete abundances and to a lesser extent upon observations of adult spawning events. Distribution records can only be definitively assigned to one species or the other where adult records exist. For brook lamprey in Ireland there are extensive areas of suitable habitat and no significant pressures impacting this species. The Overall Status is therefore assessed as Favourable.

4.3.1.4.3 *[1099] River Lamprey (Lampetra fluviatilis)*

From 'The Status of EU Protected Habitats and Species in Ireland (NPWS 2019):

The river lamprey (*Lampetra fluviatilis*) breeds in freshwater rivers and streams. Adults spawn in spring, excavating shallow nests in riverine sections comprising fine gravels and small stones. After hatching, the larvae or 'ammocoetes' drift or swim downstream to areas of river bed or margins with fine silt deposits. They burrow into this bed material where they live as filter feeders over a period of years before transforming into young adult fish and migrating downriver to estuarine and marine habitats. As adults they are parasitic, attaching to and feeding on larger fish in coastal waters. They can grow up to 25-30cm at maturity, at which stage they return to freshwater habitats to spawn. The adult fish die after spawning. River and brook lamprey are indistinguishable as larvae. The mature adult forms are, however, clearly distinguishable based on 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. The inability to distinguish between river lamprey and brook lamprey larvae, and the challenges associated with sampling for adult river lamprey, means that an evaluation of their actual range and population size cannot be undertaken. The Overall Status for river lamprey is therefore assessed as Unknown. The previous reporting period used primarily juvenile Lampetra sp. distribution data for this species.

4.3.1.4.4 *[1106] Salmon (Salmo salar)*

From 'The Status of EU Protected Habitats and Species in Ireland (NPWS 2019):

The Atlantic salmon (*Salmo salar*) is indigenous to the North Atlantic, extending in an arc from northern Portugal in the east to the north-eastern United States in the west. The Irish population generally comprises fish that spend usually two years as sub-adults in freshwater before going to sea as smolts. The majority of fish spend one winter at sea before returning to their natal rivers, mainly during the summer, as grilse. Smaller numbers spend two winters at sea, returning mainly in spring, hence "spring" salmon. A small proportion of the adult population returns to the sea postspawning and can return to spawn again. The survival of salmon during the marine phase of its lifecycle has been identified as the key determinant of trends in population size in natal rivers. Known pressures include exploitation at sea in commercial fisheries, interceptory fisheries in coastal waters, aquaculture and predation. In addition, the negative influence of climate change on food prey structure and abundance has increasingly been attributed to the declines observed in stocks at sea. Within river systems, variation in individual stock abundance can be influenced by a variety of factors, notably alterations in physical habitat, water quality, environmental factors, predation, and angling and commercial fisheries exploitation pressure. There is considered to be sufficient habitat in Ireland to support a viable salmon population. Freshwater quality in Ireland continues to remain a concern but ongoing pressures linked with habitat quality are not considered to be compromising the viability of the species. The Overall Status is assessed as Inadequate, the same as the last assessment. Although a short-term negative trend is reported for this species, the trend has reversed in the last 5 years. Therefore an overall stable trend is reported.

4.3.1.4.5 *[1355] Otter (Lutra lutra)*

The distribution of otter commuting habitat is shown on Map 11 of the SSCOs.

From 'The Status of EU Protected Habitats and Species in Ireland (NPWS 2019):

Ireland continues to remain a stronghold for the European otter (*Lutra lutra*). Four national surveys have been conducted to date. The first in 1980/81 found signs of otters throughout the country, at 88% of sites surveyed. There was some suggestion of declines in the survey results of 1990/91 and 2004/05 but the most recent survey (2010) indicated recovery to 1980 levels. The most recent distribution data show that the otter continues to be widespread throughout Ireland in a wide variety of habitat types. 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 and frogs can be important locally or seasonally. A total of 44 SACs have been designated for the otter comprising extensive stretches of river channels and coastline (including off-shore islands) as well as lakes and blanket bog systems. The main threats to the otter include pollution, particularly organic pollution resulting in fish kills; and accidental deaths (road traffic and fishing gear). Although recent studies on territory overlaps and animal movements suggest that refinements to the population estimation formula are needed, the otter population (estimated at between 7,000 and 10,000 breeding females) is considered to be increasing and none of the threats or pressures identified is considered likely to impact significantly on the species. The Overall Status of otter is therefore considered to be Favourable, unchanged since the previous reporting period.

4.3.1.4.6 [1833] Slender Naiad (Najas flexilis)

The distribution of slender naiad is shown on Map 12 of the SSCOs.

From 'The Status of EU Protected Habitats and Species in Ireland (NPWS 2019):

The slender naiad (*Najas flexilis*) is a fragile, annual plant that grows in clear-water, lowland lakes. It has an unusual global distribution, being widespread in North America but more restricted in Europe and Asia, and is rare and declining in many countries. The core of the species' European range is Ireland and Scotland. The species is considered to occur in 52 lakes in counties Clare, Donegal, Galway, Kerry and Mayo, with most sites found near the coast. It is a glacial relict species that is not colonising new sites, rather it has occupied the same lakes continuously for almost 10,000 years. It is considered to have gone extinct in six lakes. The slender naiad has exacting environmental requirements, most notably high water clarity/transparency and deep euphotic zones. It occurs in lakes with some base-rich influences in otherwise peatland-dominated catchments. In Ireland, the lakes typically overlie calcareous sand (often in machair), marble or sometimes limestone. The plant grows permanently submerged, commonly in deep water, and can easily be overlooked. It reproduces only from seed with seedlings appearing around June. The plant dies in September/October, once it has set seed. Population size can vary over time, owing to fluctuations in seed production and germination. The species is threatened by enrichment (eutrophication), acidification and peatland damage. The Overall Status is assessed as Inadequate and the trend as deteriorating, because of population extinctions, population decreases and decreasing habitat quality in the current reporting period. The trend differs from the previous assessment because of the availability of improved data to inform the assessments

4.3.1.4.7 [5046] Killarney Shad (Alosa fallax killarnensis)

From 'The Status of EU Protected Habitats and Species in Ireland (NPWS 2019):

The Killarney shad (*Alosa killarnensis*) is unique to Ireland and is only recorded in Lough Leane in Killarney. For this reason it is listed in the Irish Red Data Book as Vulnerable. Anecdotal reports and observations indicate that the species spawns within Lough Leane along shallow gravelled shores and on gravel shoals adjoining the various islands. The adult fish live in shoals in the lake, feeding on zooplankton. Thus the full life cycle is undertaken within the lake. The species is considered to derive from ancestral post-glacial populations that became isolated in the lake. Lough Leane has unimpeded connectivity to the transitional waters of Castlemaine Harbour via the River Laune but the species has never been found outside Lough Leane. The continual presence of adult fish in successive fish surveys

indicates an ongoing successful spawning effort. The continued absence of pike and introduced species from L. Leane is crucial to the continued success of Killarney shad: any disruption of the ecology of the lake could be detrimental to the species. L. Leane has been subject to considerable pressure, primarily due to nutrient enrichment: the seasonal increase in human population at Killarney that occurs each summer puts pressure on water supply and leads to increased waste production for the local waste water treatment works. The Killarney shad population appears to have survived impacts of eutrophication in the 1970s and early 1980s. However, the potential for adverse impact on L. Leane from anthropogenic eutrophication, particularly in combination with reduced summer water levels, remains. The entire range of the Killarney shad is protected within Killarney National Park. The Overall Status is assessed as Favourable, as it has been in the last two assessments.

4.3.2 Mullaghanish to Musheramore Mountains SPA [004162]

The relevant SCIs and the associated conservation objectives of the site are presented in Table 4-5. The Targets and Attributes for the relevant habitats and species, as described in the SSCOs (NPWS 2022) were reviewed and considered in this assessment.

Table 4- 5 Special Conservation Interest and Conservation Objective (Version 1, 2022)

Qualifying Interest	Conservation Objective
[A082] Hen Harrier *(Circus cyaneus)*	To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA

4.3.2.1 Site Specific Pressures and Threats

As per the Natura 2000 Data Form, the site-specific threats, pressures and activities with potential to effect on the SAC were reviewed and considered in relation to the Proposed Development. These are provided in Table 4-6.

Table 4- 6 Site-specific threats, pressures and activities with potential to effect on the SPA

Negative Impacts			
Rank	**Threats and pressures [code]**		**Inside/outside/both**
L	D01.02	Roads, motorways	i
L	E01.03	Dispersed habitation	i
M	A04	Grazing	o
M	A04	Grazing	i
L	D01.01	Paths, tracks, cycling tracks	i
H	B	Sylviculture, forestry	o
H	B	Sylviculture, forestry	i
M	C01.03	Peat extraction	i

Rank: H = high, M = medium, L = low; i = inside, o = outside, b = both

4.3.2.2 Annex I species of Mullaghanish to Musheramore Mountains SPA [004162]

The Special Conservations Interests with the potential to be affected via the identified pathway include:

- [A082] Hen Harrier *(Circus cyaneus)*

4.4 Ecological Survey Results

4.4.1 Description of Habitats

The habitat classifications and codes correspond to those described in '*A Guide to Habitats in Ireland*' (Fossitt 2000). A total of 17 habitats were recorded within the EIAR Study Area (Table xx). Peatland and grassland habitats have also been categorised to plant communities from the National Survey of Upland Habitats (Perrin et al. 2014) and the Irish Vegetation Classification.

Habitat maps are also provided with the Proposed Development footprint overlain in Figure 4-1A, 4-1B, 4-1C, 4-1D, 4-1E, 4-1F, 4-1G and 4-1H.

4.4.1 Description of Habitats

The habitat classifications and codes correspond to those described in '*A Guide to Habitats in Ireland*' (Fossitt 2000). A total of 17 habitats were recorded within the EIAR Study Area (Table xx). Peatland and grassland habitats have also been categorised to plant communities from the National Survey of Upland Habitats (Perrin et al. 2014) and the Irish Vegetation Classification.

Habitat maps are also provided with the Proposed Development footprint overlain in Figure 4-1A, 4-1B, 4-1C, 4-1D, 4-1E, 4-1F, 4-1G and 4-1H.

Table 4- 7 Habitats recorded in the EIAR Site Boundary

Habitat Name	Fossitt Code
Buildings and artificial surfaces	BL3
Upland/ eroding rivers	FW1
Wet grassland	GS4
Drainage ditches	FW4
Treelines	WL2
Improved agricultural grassland	GA1
Wet heath/ Upland Blanket Bog mosaic	HH3/ PB2
Recolonising bare ground	ED3
Conifer plantation/ Dry meadows and grassy verges	WD4/ GS2
Recently-felled conifer woodland	WS5
Conifer Woodland	WD4
Recently-felled Conifer woodland/ Wet grassland/ Scrub mosaic	WS5/ GS4/ WS1
Cutover bog	PB4

Habitat Name	Fossitt Code
Upland blanket bog / Wet heath	PB2/ HH3
Dystrophic Lakes	FL1
Immature woodland	WS2
Treelines/ Hedgerows mosaic	WL2/ WL1

Habitats within each section of the Proposed Development are described below.

4.4.1.1 Habitats within and adjacent to Proposed 110kV Underground Electrical Cabling Route

Habitats within and adjacent to the footprint of the proposed 110kV underground electrical cabling route are Buildings and artificial surfaces (BL3), Upland/ eroding rivers (FW1), Wet grassland (GS4), Drainage ditches (FW4), Treelines (WL2), Improved agricultural grassland (GA1), Wet heath (HH3)/ Upland Blanket Bog (PB2), Recolonising bare ground (ED3) and Conifer plantation (WD4)/ Dry meadows and grassy verges (GS2).

Description of proposed 110kV cabling route footprint

Starting at the existing 220kV Ballyvouskill substation, the proposed 110kV underground electrical cabling route proceeds to the northwest through fields of Improved Agricultural Grassland (GA1) and Wet Grassland (GS4) with access tracks (Recolonising Bare Ground (ED3)) small Drainage Ditches (FW4). These habitats are shown in Plates 2-1 and 2-2.

Plate 2- 1 View of Wet grassland (GS4) located to the west of existing Ballyvouskill 220kV substation.

Plate 2- 2 View of improved agricultural habitats through which the proposed 110kV cabling passes as it proceeds northwest from the existing Ballyvouskill 220kV substation.

The 110kV cabling route then proceeds out of the agricultural grasslands and into an unfenced area that is dominated by a mosaic of Upland Blanket Bog (PB2) and Wet Heath (HH3). This area was degraded through drainage and turbary and evidence of sheep and deer grazing was recorded. Species present in Wet heath (HH3)/ Upland blanket bog (PB2) mosaic habitat included Ling heather (*Calluna vulgaris*), Purple Moor-grass (*Molinia caerulea*), Hare's-tail cotton grass (*Eriophorum vaginatum*), Common cotton grass (*Eriophorum angustifolium*), Round-leaved sundew (*Drosera rotundifolia*), Cross-leaved heather (*Erica tetralix*), Tormentil (*Potentilla erecta*), Cuckoo flower (*Cardamine pratensis*), Common sorrel (*Rumex acetosa*), Soft rush (*Juncus effusus*), Lousewort (*Pedicularis sylvatica*), Bird's-foot trefoil (*Lotus corniculatus*), Milkwort (*Polygala vulgaris*), *Sphagnum palustre*, *Sphagnum rubellum*, *Sphagnum auriculatum*, *Polytrichum* spp., Red-stemmed feather moss (*Pleurozium schreberi*) and Reindeer lichen (*Cladonia rangiferina*).

The area where the 110kV cabling is proposed is located immediately adjacent to an area where an existing 110kV underground cable is located. This area is heavily degraded and is dominated by Soft rush (*J. effusus*). This is shown in Plate 2-3 below.

Plate 2- 3 View of degraded Wet heath (HH3)/ Upland Blanket Bog (PB2) habitat mosaic within which an existing underground 110kV cable was previously laid. Proposed 110kV cabling is to be located in degraded peatland habitat directly to the left of the rush-dominated strip shown in the plate above.

The proposed 110kV underground electrical cabling route heads northwest adjacent to the existing 110kV cable for a distance of 160m and then veers southwest and follows immediately adjacent to an existing track for a distance of 440m. The existing 110kV cable is located underneath the track and the proposed 110kV underground electrical cabling route will be located immediately adjacent to it within peatland habitat that is highly degraded and disturbed as shown in Plates 2-4 and 2-5. The 110kV underground electrical cabling route crosses the existing track prior to joining the forestry road approximately 80m to the east of the hairpin bend.

Plate 2- 4 View of degraded Wet heath (HH3)/ Upland Blanket Bog (PB2) mosaic habitat within which the proposed 110kV cabling is to be installed. Proposed 110kV cabling is to be installed to the right of the roadway shown in the plate above.

Plate 2- 5 View of degraded Wet heath (HH3)/ Upland Blanket Bog (PB2) mosaic habitat to the south of existing trackway, classified as (ED3). Proposed 110kV cabling is to be installed in the degraded peatland habitat shown to the left of the fence in the plate above before crossing the existing track and joining the existing forestry road.

The route then proceeds in a south westerly direction in the margin of an existing forestry road (BL3) that is bounded by commercial Conifer Plantation (WD4) for a distance of approximately 1.9km. The proposed 110kV underground electrical cabling route and associated access road will be located in Dry Meadows and Grassy Verge (GS2) habitat at the edge of the road as shown in Plate 2-6 below.

Plate 2- 6 View of forestry roadway classified as Buildings and artificial surfaces (BL3) and surrounding Dry Meadows and Grassy Verge (GS2) habitat into which the 110kV cabling will be laid.

The proposed 110kV underground electrical cabling route then veers to the west through an existing conifer plantation, some of which has been recently clear-felled, before terminating at the site of the proposed 110kV electrical substation. This area is shown in Plate 2-7 below.

Plate 2- 7 View of immature Conifer woodland (WD4) located within the footprint of the proposed 110kV cabling route. Proposed 110kV cabling runs west through the habitat shown in the plate above and continues through the mature Conifer plantation seen in the background before concluding at the footprint of the proposed 110kV substation.

4.4.1.1.1 EPA mapped watercourse crossing associated with 110kV Electrical Underground Cabling Route

There is one EPA mapped watercourse crossing associated with the footprint of the proposed 110kV underground cabling route. This watercourse is referred to as watercourse crossing no. 6 in Table 4-2 in Chapter 4 of this EIAR, Description. Crossing methodology for this watercourse is also described in Chapter 4 of this EIAR, Description. Although dry at the time of surveying and supporting grassy vegetation, this watercourse has been classified as Upland/ eroding rivers (FW1) as evidence suggests it is a small mountain stream that dries out periodically with a persisting and obvious channel evident. This watercourse was culverted under a forestry roadway through a 600mm pipe. There is evidence of intermittent waterflow through this channel in a southerly direction during periods of wet weather. This was evidenced by the presence of flattened vegetation at the southerly end of the existing culvert. The location of this watercourse in relation to the footprint of the Proposed Development can be seen in Figure 4-1B, below.

Plate 2- 8 View of dry temporary watercourse at watercourse crossing no. 6, classified as Upland/ eroding rivers (FW1).

4.4.1.1 Habitats within and adjacent to Proposed 110kV Electrical Substation and Borrow Pit

Habitats recorded within and adjacent to the footprint of the proposed 110kV substation and borrow pit comprise solely of Conifer Plantation (WD4) of varying ages. These habitats are shown in Plates 2-9 and 6-10.

Conifer plantation (WD4) varied between mature stands and young recruiting saplings. Conifer plantation (WD4) was species poor, with Sitka spruce (*P. sitchensis*) dominating. Mature conifer

plantation understory was species poor with accumulated pine needles a characteristic feature. Vegetation assemblages were dominated by bryophytes. Species present in immature Conifer plantation (WD4) included Sitka spruce (*P. sitchensis*), Soft rush (*J. effusus*), Purple-moor grass (*M. caerulea*), Foxglove (*D. purpurea*), Gorse (*U. europeaus*) and Bracken (*P. aquilinum*).

Plate 2-9 View of immature Conifer plantation (WD4) within the footprint of the proposed 110kV substation.

Plate 2- 10 View of Conifer plantation (WD4) within which the proposed borrow pit will be located.

4.4.1.2 Habitats within and Adjacent to Proposed 33kV Underground Electrical Cabling Route

Habitats recorded within and adjacent to the footprint of the proposed 33kV underground electrical cabling route include Conifer plantation (WD4), Drainage ditches (FW4), Upland/ eroding rivers (FW1), Wet heath (HH3)/ Upland blanket bog (PB2), Recolonising bare ground (ED3), Cutover bog (PB4), Wet grassland (GS4) and Dystrophic Lakes (FL1).

The proposed 33kV underground electrical cabling route originates from the proposed 110kV substation discussed above. This is located within immature Conifer woodland (WD4). From here the proposed 33kV underground electrical cabling heads in a westerly direction, crossing and running alongside a forestry roadway that is classified as Buildings and artificial surfaces (BL3). It then enters a mature Conifer plantation (WD4) and continues west through a mosaic of Conifer plantation (WD4) of varying ages. It crosses a stream that is classified as Upland/ eroding rivers (FW1). Once passed this stream, the footprint of the proposed 33kV underground electrical cabling re-enters into mature Conifer plantation (WD4). Examples of the conifer plantation habitats through which the cabling passes are shown in Plates 2-11 – 2-13.

Plate 2- 11 View of immature Conifer plantation (WD4) within the footprint of the proposed 33kV cabling route. Proposed 33kV cabling runs south through immature Conifer plantation (WD4) shown above, crosses a forestry roadway and enters into mature Conifer plantation (WD4) in background.

Plate 2- 12 View of mature Conifer plantation within which the proposed 33kV cabling will be located.

Plate 2- 13 View of species poor mature Conifer plantation (WD4) understorey.

The proposed 33kV underground electrical cabling route footprint then proceeds along the edge of a forestry plantation that is bounded to the south by a mosaic of Upland Blanket Bog (PB2) and Wet Heath (HH3). The habitat in this area was relatively dry, well drained and highly disturbed. Sitka spruce (*P. sitchensis*) and deadwood were characteristic features of this habitat. Species present in this habitat included Sitka spruce (*P. sitchensis*), Purple-moor grass (*M. caerulea*), Soft rush (*J. Effusus*), Bracken (*P. aquilinum*), Bilberry (*Vaccinium myrtillus*), Gorse (*U. Europeaus*), Ling heather (*C. vulgaris*) and Briar (Rubus fruticosus agg.).

Plate 2- 14 View of the edge of the conifer plantation along which the 33kV cabling route is proposed. The proposed 33kV cabling route is located to the right of the fence shown in the plate above.

Upland blanket bog (PB2)/ Wet heath (HH3) mosaic habitat was identified to the south of the proposed 33kV underground electrical cabling. The footprint of the proposed 33kV underground electrical cabling route is located outside of this habitat. Ground in this habitat was waterlogged. Species present in this mosaic habitat include Ling heather (*Calluna vulgaris*), Purple Moor-grass (*Molinia caerulea*), Hare's-tail cotton grass (*Eriophorum vaginatum*), Common cotton grass (*Eriophorum angustifolium*), White-beak sedge (*Rhynchospora alba*), Round-leaved sundew (*Drosera rotundifolia*), Cross-leaved heather (*Erica tetralix*), Tormentil (*Potentilla erecta*), Bog asphodel (*Narthecium ossifragum*), Soft rush (*Juncus effusus*), *Sphagnum palustre*, *Sphagnum rubellum*, *Sphagnum auriculatum*, *Polytrichum* spp., Red-stemmed feather moss (*Pleurozium schreberi*) and Reindeer lichen (*Cladonia rangiferina*). This habitat is shown in Plate 2-15.

Plate 2- 15 View of Upland blanket bog (PB2)/ Wet heath (HH3) mosaic habitat located directly to the south of the footprint of the proposed 33kV cabling route.

As it proceeds in a westerly direction, the proposed 33kV underground electrical cabling enters into a forestry firebreak, classified as Recolonising bare ground (ED3). The proposed 33kV underground electrical cabling route follows the path of this firebreak in a westerly direction. This is shown in Plate 2-16

Plate 2- 16 View of firebreak classified as Recolonising bare ground (ED3) within which the proposed 33kV cabling will be located.

After following the path of this firebreak for approximately 2.2km the footprint of the proposed 33kV underground electrical cabling turns in a southerly direction and runs along an existing roadway, classified as Recolonising bare ground (ED3), for approximately 530m where it meets the Permitted Development infrastructure. This roadway is located between two dystrophic lakes but there is no complete surface water connection between the roadway and the lakes. Lough Carrignamork (19_71) and Lough Gal (22_147), classified as Dystrophic lakes (FL1), are located approximately 25m and 128m respectively from the footprint of the proposed 33kV underground electrical cabling route. These dystrophic lakes are located within peatland habitat and have steep peat-based banks. Dystrophic lakes

correspond to the EU Habitats Directive Annex I habitat, Natural dystrophic lakes and ponds (Natura 2000 Code 3160). Lough Carrignamork is shown below in Plate 2-17.

Plate 2- 17 View of Lough Carrignamork, classified as Dystrophic Lake (FL1), located approximately 25m to the west of the proposed 33kV cabling route footprint.

At this point 33kV underground cabling will connect to the locations of wind farm elements within the permitted development site. This stretch of 33kV underground electrical cabling runs through a mosaic of highly degraded Cutover bog (PB4), Wet grassland (GS4) and Recolonising bare ground (ED3). These habitats are shown in Plates 2-18 – 2-20.

Plate 2- 18 View of Recolonising bare ground (ED3) located in an area where historical peat removal has stripped soil down to the underlying bedrock where the 33kV cabling will be located.

Plate 2- 19 View of Cutover bog (PB4) and Wet Grassland (GS4) located adjacent to existing roadway, classified as Recolonising bare ground (ED3) within which the additional proposed 33kV cabling will be located.

Plate 2- 20 View of Wet grassland (GS4) located within the footprint of the proposed 33kV cabling route.

4.4.1.2.1 EPA mapped watercourse crossings associated with 33kV Electrical Underground Cabling Route

There are five EPA mapped watercourse crossings associated with the footprint of the proposed 33kV underground electrical cabling route. These watercourses have been classified as Upland/ eroding rivers (FW1). These watercourse crossings are numbered 1 to 5 in accordance with Table 4-2 of Chapter 4 of this EIAR, Description. Watercourse crossings 1, 2, 3, 4 and 5 are within the footprint of the proposed 33kV underground electrical cabling routes and are addressed individually below.

The EPA mapped watercourse at watercourse crossing no. 5 flows north out of the EIAR Study Area and into the Flesk River catchment. Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC has downstream surface water connectivity to the EIAR Study Area via the Clydagh River. Water flow within this watercourse was slow at the time of the site visit. The substrate of this watercourse comprised pebble and fine sediment. The depth of this watercourse varied from ~10cm to ~30cm. The width of this watercourse varied from ~0.5m to ~1m. No in-stream vegetation was recorded within this watercourse with the exception of aquatic bryophytes. Mosses, such as *Tortula muralis,* were recorded growing on rocks in the watercourse. Species recorded within associated bankside habitat included Sitka spruce (*P. sitchensis*), Purple-moor grass (*M. caerulea*), Soft rush (*J. Effusus*), Bracken (*P. aquilinum*), Foxglove (*D. purpurea*), Great woodrush (*L. sylvatica*) and Ling heather (*C. vulgaris*).

Whilst the watercourse was small, typical of an upland stream and did not provide high quality fishery habitat, it provides connection to known sensitive watercourses downstream.

Plate 2- 21 View of watercourse at watercourse crossing no. 5, classified as Upland/ eroding rivers (FW1).

The EPA mapped watercourse at watercourse crossing no. 4 flows north out of the EIAR Study Area and into the Flesk River catchment. Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC has downstream surface water connectivity to the EIAR Study Area via the Clydagh River. Water flow within this watercourse was moderate at the time of the site visit. The substrate of this watercourse comprised pebble and boulder. The depth of this watercourse varied from ~10cm to ~40cm. The width of this watercourse varied from ~1m to ~2m. No in-stream vegetation was recorded within this watercourse with the exception of aquatic bryophytes. Mosses, such as *Tortula muralis,* were recorded growing on rocks in the watercourse. Species recorded within associated bankside habitat included Sitka spruce (*P. sitchensis*), Purple-moor grass (*M. caerulea*), Soft rush (*J. Effusus*), Bracken (*P. aquilinum*), Bilberry (*V. myrtillus*), Foxglove (*D. purpurea*), Great woodrush (*L. sylvatica*), Gorse (*U. Europeaus*), Ling heather (*C. vulgaris*) and Briar (*Rubus fruticosus agg.*).

Whilst the watercourse was small, typical of an upland stream and did not provide high quality fishery habitat, it provides connection to known sensitive watercourses downstream.

Plate 2- 22 View of watercourse at watercourse crossing no. 4, classified as Upland/ eroding rivers (FW1).

The EPA mapped watercourse at crossing no. 3 flows north out of the EIAR Study Area and into the Clydagh River. Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC has downstream surface water connectivity to the EIAR Study Area via the Clydagh River (Flesk catchment). Water flow within this watercourse was moderate t the time of the visit. The substrate of this watercourse comprised pebble and boulder. The depth of this watercourse varied from ~20cm to ~40cm. The width of this watercourse was ~1m. No in-stream vegetation was recorded within this watercourse with the exception of aquatic mosses. Mosses, such as *Tortula muralis,* were recorded growing on rocks within the watercourse. Species recorded within associated bankside habitat included Sitka spruce (*P. sitchensis*), Soft rush (*J. Effusus*), Purple-moor grass (*M. caerulea*), Bracken (*P. aquilinum*), Foxglove (*D. purpurea*), Great woodrush (*L. sylvatica*), Gorse (*U. Europeaus*), Nettle (*U. dioica*) and Briar (*Rubus fruticosus agg.*). Whilst the watercourse was small, typical of an upland stream and did not provide high quality fishery habitat, it provides connection to known sensitive watercourses downstream.

Plate 2- 23 View of watercourse at watercourse crossing no. 3, classified as Upland/ eroding rivers (FW1).

The EPA mapped watercourse at crossing no. 2 flows north out of the EIAR Study Area and into the Clydagh River. Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC has downstream surface water connectivity to the EIAR Study Area via the Clydagh River (Flesk catchment). Water flow within this watercourse was slow. The substrate of this watercourse comprised gravel, sand and silt. The depth of this watercourse varied was ~20cm at the time of the site visit. The width of this watercourse varied from ~0.3m to ~1m. No in-stream vegetation was recorded within this watercourse with the exception of aquatic mosses. Species richness of the bankside habitat associated with this watercourse varied as this watercourse was located partially in Conifer plantation (WD4) and partially in Wet heath (HH3)/ Upland blanket bog (PB2) mosaic habitat. Species recorded along the boundary of this watercourse through Conifer plantation (WD4) included Sitka spruce (*P. sitchensis*), Purple-moor grass (*M. caerulea*), Bracken (*P. aquilinum*) and Foxglove (*D. purpurea*). Species recorded on the banks of this watercourse in Wet heath (HH3)/ Upland blanket bog (PB2) mosaic habitat included Purple-moor grass (*M. caerulea*), Ling heather (*C. vulgaris*), Hare's-tail cotton grass (*Eriophorum vaginatum*), Common cotton grass (*Eriophorum angustifolium*), Soft rush (*Juncus effusus*) and Cross-leaved heather (*Erica tetralix*). Whilst the watercourse was small, typical of an upland stream and did not provide high quality fishery habitat, it provides connection to known sensitive watercourses downstream.

Plate 2- 24 View of watercourse at watercourse crossing no. 2, classified as Upland/ eroding rivers (FW1).

The EPA mapped watercourse at watercourse crossing no. 1 flows north out of the EIAR Study Area and into the Clydagh River. Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC has downstream surface water connectivity to the EIAR Study Area via the Clydagh River (Flesk catchment). Water flow within this watercourse was slow during the site visit. The substrate of this watercourse comprised silt with scattered pebbles and is typical of a peatland stream. The depth of this watercourse varied was ~20cm. The width of this watercourse varied from ~0.3m to ~0.5m. No in-stream vegetation was recorded within this watercourse. Species richness of the bankside habitat associated with this watercourse varied as this watercourse was located partially in Conifer plantation (WD4) and partially in Wet heath (HH3)/ Upland blanket bog (PB2) mosaic habitat. Species recorded along the banks of this watercourse through Conifer plantation (WD4) included Sitka spruce (*P. sitchensis*), Purple-moor grass (*M. caerulea*), Soft rush (*J. effusus*) and Tormentil (*P. erecta*). Species recorded along the boundary of this watercourse in Wet heath (HH3)/ Upland blanket bog (PB2) mosaic habitat included Purple-moor grass (*M. caerulea*), Ling heather (*C. vulgaris*), Hare's-tail cotton grass (*E. vaginatum*), Soft rush (*J. effusus*), Tormentil (*P. erecta*) and Cross-leaved heather (*E. tetralix*). Whilst the watercourse was small, typical of an upland stream and did not provide high quality fishery habitat, it provides connection to known sensitive watercourses downstream.

Plate 2- 25 View of watercourse at watercourse crossing no. 1, classified as Upland/ eroding rivers (FW1).

4.4.1.3 Habitats within and Adjacent to Proposed Extension of Permitted Borrow Pit

Habitats within and adjacent to proposed extension works at the borrow pit as permitted under Planning Permission Ref. No. 19/4972 include Recolonising bare ground (ED3) and Cutover bog (PB4) (Plate 2-25).

Recolonising bare ground (ED3) located within the footprint of the proposed extension to the permitted borrow pit is characterised by bare ground with sparse vegetation cover. A narrow strip of Cutover bog (PB4) exists on the northern edge of the footprint of the proposed extension works.

Plate 2- 26 View of recolonising bare ground and cutover bog within the footprint of the proposed extension works at permitted borrow pit.

4.4.1.4 Habitats within and Adjacent to Proposed TDR

Habitats within and adjacent to proposed TDR works include Buildings and artificial surfaces (BL3), Conifer plantation (WD4), Upland/ eroding rivers (FW1), Dystrophic lakes (FL1), Upland blanket bog (PB2)/ Wet heath (HH3), Recolonising bare ground (ED3), Improved agricultural grassland (GA1), Wet grassland (GS4), Immature woodland (WS2), Treelines (WL2), Hedgerows (WL1) and Drainage ditches (FW4).

Throughout the western section of the proposed TDR works associated with the turbine delivery route, the proposed works follow existing forestry roads that are located within the existing forestry plantation, with occasional deviations requiring felling of Conifer Plantation (WD4) to exclude sharp bends from the TDR. Existing roadways to be widened are located within Conifer Plantation (WD4). Sitka spruce (*P. sitchensis*) was the dominant species. Also present were stands of Lodgepole pine (*P. contorta*). Conifer plantation understory was generally dominated by needles and bryophytes with some fungi.

Plate 2- 27 Typical view of forest roadway classified as Buildings and artificial surfaces (BL3) located within the footprint of the proposed TDR works.

Plate 2- 28 Typical view of Conifer plantation (WD4) adjacent to and within the footprint of the proposed TDR works.

The eastern end of the footprint of the proposed TDR works is located within a forestry firebreak at the interface between a conifer plantation and degraded and drained upland blanket bog habitats. This section of new access road follows the firebreak which is classified as Recolonising bare ground (ED3). Bare peat is characteristic of this habitat. Species present included Sitka spruce (*P. sitchensis*), Purple Moor-grass (*Molinia caerulea*), Bilberry (*V. myrtillus*), Common cotton grass (*E. angustifolium*), Round-leaved sundew (*D. rotundifolia*), Ling heather (*C. vulgaris*), Bog asphodel (*N. ossifragum*), *Sphagnum palustre* and *Sphagnum capillifolium*. This firebreak is shown in Plate 2-28 below. The TDR works terminate within an area of Recolonising Bare Ground (ED3) on an existing track within degraded peatland habitats.

Plate 2- 29 View of firebreak, classified as Recolonising bare ground (ED3), located within the footprint of the proposed road upgrade works.

4.4.1.4.1 Watercourse crossings associated with TDR

One unnamed EPA mapped watercourse (IE_SW_22F020040), classified as Upland/ eroding rivers (FW1) is culverted beneath the forestry roadway proposed for TDR works. This watercourse flows in a northerly direction through conifer plantation into the Clydagh River. Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC has a surface water connection to the site via the Clydagh River (Flesk catchment). There was little to no in-stream vegetation, with species poor vegetative communities along the banks of this watercourse due to the location of this watercourse in an area of conifer plantation. This stream was ~20cm deep and ~1m wide. No instream works will take place within this watercourse.

Plate 2- 30 View of stream, classified as Upland/ eroding rivers (FW1) located within Conifer plantation (WD4). The watercourse shown in the plate above is culverted beneath the forest roadway proposed for TDR works.

Two Dystrophic lakes (FL1), Lough Carrignafurark (19_67) and an unnamed lake (22_71), are located approximately 70m and 75m to the south of the proposed TDR works footprint. These dystrophic lakes are located within a mosaic of Wet heath (HH3)/ Upland blanket bog (PB2) habitat and have steep peat-based banks. There is no surface water connection between the proposed works and these lakes. Associated peatland habitats are located outside of the footprint of the proposed TDR works. Dystrophic lakes correspond to the EU Habitats Directive Annex I habitat, Natural dystrophic lakes and ponds (Natura 2000 Code 3160).

Plate 2- 31 View of unnamed Dystrophic Lake (FL1) located approximately 75m to the south of the footprint of the proposed TDR works. Fringe habitats associated with this waterbody comprise Wet heath (HH4)/ Upland blanket bog (PB2) mosaic habitat and Conifer plantation (WD4).

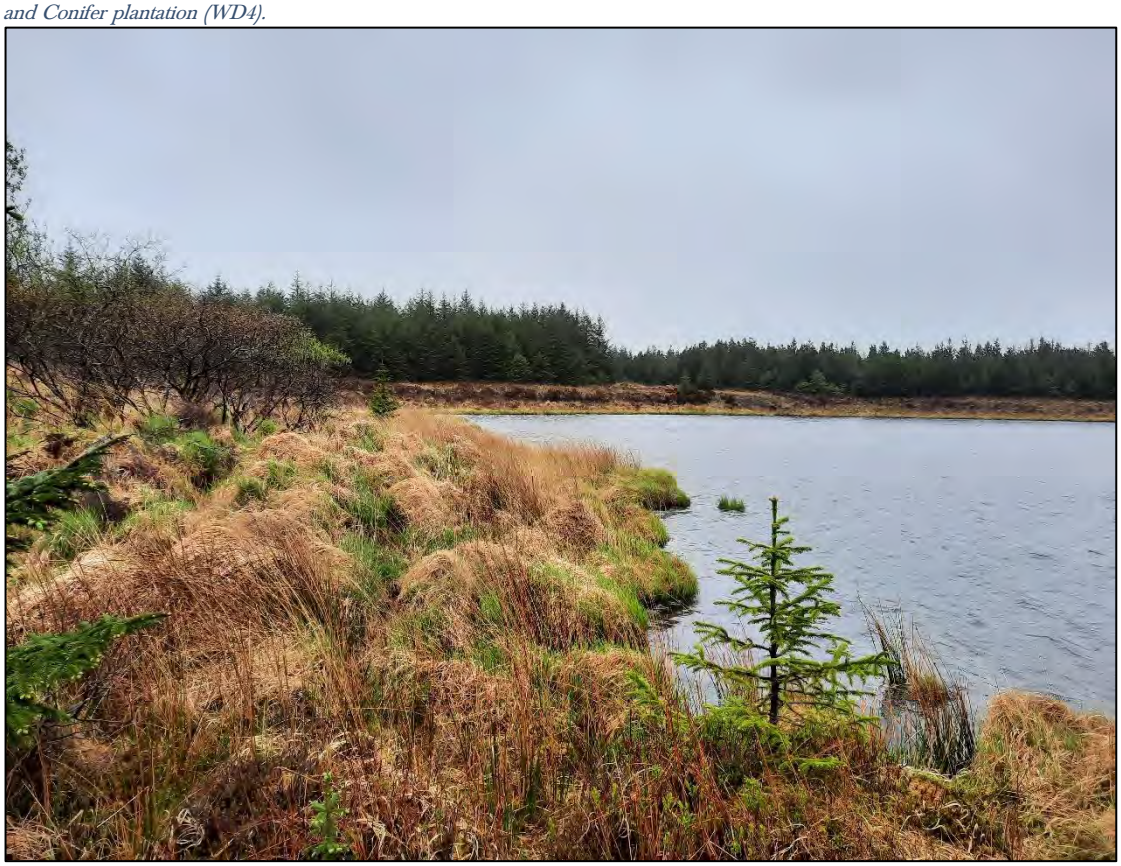


Plate 2- 32 View of Lough Carrignafurark, classified as Dystrophic Lake (FL1), located approximately 70m to the south of the footprint of the proposed TDR works.

Several areas of Upland blanket bog (PB2)/ Wet heath (HH3) mosaic habitat were recorded less than five metres from the edge of the footprint of the proposed TDR works. Waterlogging was prevalent in these areas with substantial *Sphagnum* coverage. Species present include Ling heather (*Calluna vulgaris*), Purple Moor-grass (*Molinia caerulea*), Hare's-tail cotton grass (*Eriophorum vaginatum*), Common cotton grass (*Eriophorum angustifolium*), Cross-leaved heather (*Erica tetralix*), Tormentil (*Potentilla erecta*), Soft rush (*Juncus effusus*), Bird's-foot trefoil (*Lotus corniculatus*), *Sphagnum palustre*, *Sphagnum rubellum*, *Polytrichum* spp., Red-stemmed feather moss (*Pleurozium schreberi*) and Reindeer lichen (*Cladonia rangiferina*). These areas will be entirely avoided by the proposed works, which will be confined to existing forestry roads, conifer plantation and fire breaks. The proposed works will not involve significant excavations or road drainage.

Plate 2- 33 View of Upland blanket bog (PB2)/ Wet heath (HH3) mosaic habitat located directly to the north of the footprint of the proposed TDR works.

Immature planted woodland (WS2) was present in the west of the EIAR Study Area, within the footprint of proposed junction widening works associated with the TDR. This habitat was dominated by Ash (*Fraxinus excelsior*). Species present in the woodland understory include Soft rush (*J. effusus*), Perennial rye grass (*Lolium perenne*), Creeping bent (*Agrostis stolonifera*), Sweet vernal grass (*Anthoxanthum odoratum*), Yorkshire fog (*Holcus lanatus*), Foxglove (*Digitalis purpurea*), Thistle (*Cirsium* spp.), Briar (*Rubus fruticosus* agg.), Dandelion (*Taraxacum* spp.) and Nettle (*Urtica dioica*).

Plate 2- 34 View of Immature woodland (WS2) located within the footprint of the proposed junction widening associated with the TDR.

Improved agricultural grassland (GA1) was recorded in the west of the EIAR Study Area within the footprint of the proposed temporary access road off the N22 associated with the TDR (Plate 2-34 & 2-35). This habitat was grazed by sheep at the time of surveying and was dominated by Perennial ryegrass (*L. perenne*).

Plate 2- 35 View of Improved agricultural grassland (GA1) within the footprint of the proposed temporary access road associated with the TDR in the west of the EIAR Study Area.

Plate 2- 36 View of Improved agricultural grassland (GA1) within the footprint of the proposed temporary access road associated with the TDR in the west of the EIAR Study Area. Treelines (WL2) in the background of the above plate are located outside of the footprint of the Proposed Development.

Treeline (WL2)/ Hedgerow (WL1) mosaic habitat was recorded in the west of the EIAR Study Area. Approximately 15m of Treeline (WL2)/ Hedgerow (WL1) mosaic habitat is located within the footprint of the proposed temporary access road associated with the TDR. Ash (*F. excelsior*) and Willow (*Salix* spp.) dominated these habitats.

Plate 2- 37 View of Hedgerow (WL1) located in the west of the EIAR Study Area.

Plate 2- 38 View of Treeline (WL1) located in the west of the EIAR Study Area.

Drainage ditches (FW4) are located in the southwest of the EIAR Study Area. Water levels varied between habitat areas, with variation between waterlogged and dry habitats. Water levels within waterlogged ditches was shallow, approximately 15cm deep. These waterlogged Drainage ditches (FW4) were located in agricultural land outside the footprint of the Proposed Development. Width varied among drainage ditches, ranging from 0.3m to 1m in places. Flow rates also varied among drainage ditches (FW4), with variation between stagnant and flowing areas. Drainage ditch substrate varied from light sediment to gravel and pebbles. Drainage ditches present within the footprint of elements associated with the proposed TDR were dry at the time of surveying and did not support wetland vegetation. Plant species present within dry Drainage ditches (FW4) include Perennial rye grass (*Lolium perenne*), Gorse (Ulex europaeus), Soft Rush (*Juncus effusus*), Foxglove (*Digitalis purpurea*), Ribwort plantain (*Plantago lanceolata*), Daisy (*Bellis perennis*), Colt's-foot (*Tussilago farfara*), Thistle (*Cirsium* spp.), Meadow buttercup (*Ranunculus acris*), Ribwort plantain (*P. lanceolatum*), Dandelion (*Taraxacum* spp.), Briar (*Rubus fruticosus* agg). As no water was present in dry Drainage ditches within the footprint of elements associated with the proposed TDR, no instream works will take place within these drainage ditches as per Chapter 4 of this EIAR, Description.

Plate 2- 39 View of dry Drainage ditch (FW4) located within the footprint of the proposed temporary access road off the N22 associated with the TDR.

4.4.2 Fauna in the Existing Environment

4.4.2.1 Otter

No otter signs were recorded along the watercourses within the site or in close proximity to any of the main Proposed Development components. The main watercourses were assessed as providing suitable commuting and foraging habitat for the species and otter may occur within the EIAR Study Area boundary, at least on occasion.

4.4.2.2 Birds

A total of eleven bird species were recorded within the EIAR Study Area. Species recorded included Rook (*Corvus frugilegus*), Jackdaw (*Corvus monedula*), Grey crow (*Corvus cornix),* Woodpigeon (*Columba palumbus*), Blackbird (*Turdus merula*), Robin (*Erithacus rubecula*), Stonechat (*Saxicola rubicola*), Tree sparrow (*Passer montanus*), Wren (*Troglodytes troglodytes*), Magpie (*Pica pica*) and Pheasant (*Phasianus colchicus*). These bird species are typical of the conifer plantations and upland habitats that are present on the site. Given the nature and scale of the works, consisting of short term works associated with construction of access roads, 110kV electrical substation, cable laying and forestry road widening along with construction works in a conifer plantation, there was no requirement for further, dedicated bird surveys.

Hen harrier, which is a Special Conservation Interest of the nearby Mullaghanish to Musheramore Mountains SPA, were not recorded during the surveys undertaken to inform this EIAR and no additional surveys for this species were required.

4.4.2.3 Bats

With regard to commuting and foraging bats, features along the Proposed Development area were assessed as having *Low-Moderate* suitability i.e. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water (Collins, 2016).

With regard to roosting bats, habitat features along the Proposed Development area, including roads and tracks, were assessed as having *Negligible* to *Low* roosting potential i.e. Negligible habitat features likely to be used by roosting bats/trees of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential (Collins, 2016).

The Proposed Development areas will be largely confined to existing roadways, tracks and conifer plantation. Any loss of bat habitat will be minimal and there is no potential for the Proposed Development works to result in significant effect on bat species.

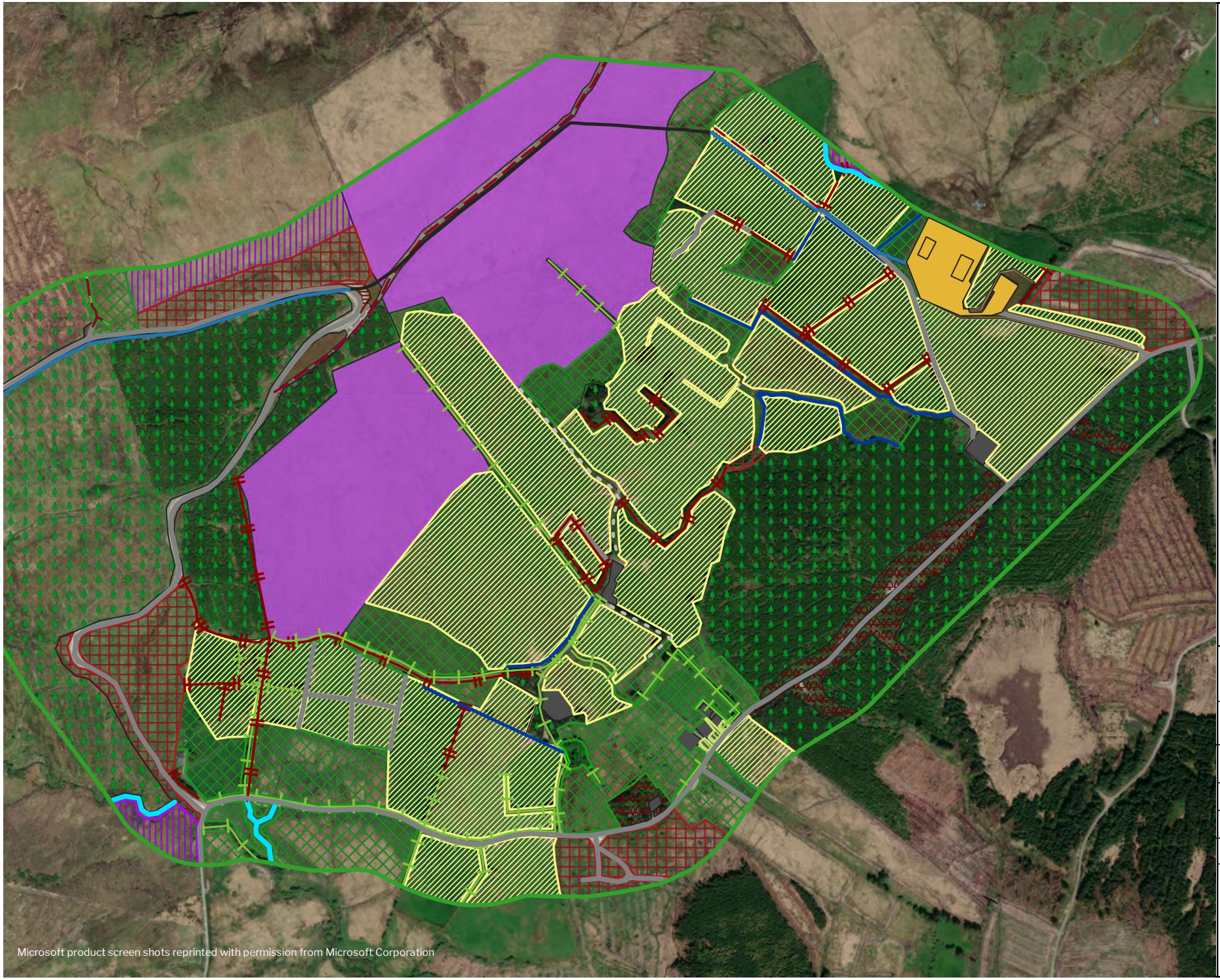
4.4.3 Other Findings

4.4.3.1 Protected Flora

No botanical species listed under the Flora (protection) Order (1999, as amended 2015), listed in the EU Habitats Directive (92/43/EEC), or listed in the Irish Red Data Books were recorded on the Proposed Development site. All species recorded are common in the Irish landscape.

4.4.3.2 Invasive species

During field surveys, a search for Invasive Alien Species (IAS) listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015) was conducted. *Rhododendron ponticum* was recorded within the EIAR Study Area boundary. Invasive species encountered within the EIAR Study Area are shown below in Figures 4-1G and 4-1H. No works are proposed in the vicinity of these invasive species.


Map Legend
EIAR Study Boundary
110kV Underground Cabling
110kV Underground Cabling and Access Road
Ballyvouskill 220kV Substation
Buildings and Artificial Surfaces
Spoil and Bare Ground
Recolonising Bare Ground
Eroding/Upland Rivers
Drainage Ditches
Hedgerows
Treelines
Buildings and artificial surfaces
Spoil and bare ground
Recolonising bare ground
Improved agricultural grassland
Dry meadows and grassy verges
Wet grassland
Wet heath/ Upland blanket bog
Upland blanket bog
Mixed broadleaved/conifer woodland
Conifer plantation
Scrub
N
Drawing Title
Habitat Map
Project Title
Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development
Drawn By
KME
Checked By
PR
Project No.
210732
Drawing No.
Fig. 4-1A
Scale
1:10000
Date
15.07.2022
MKO
Planning and Environmental Consultants
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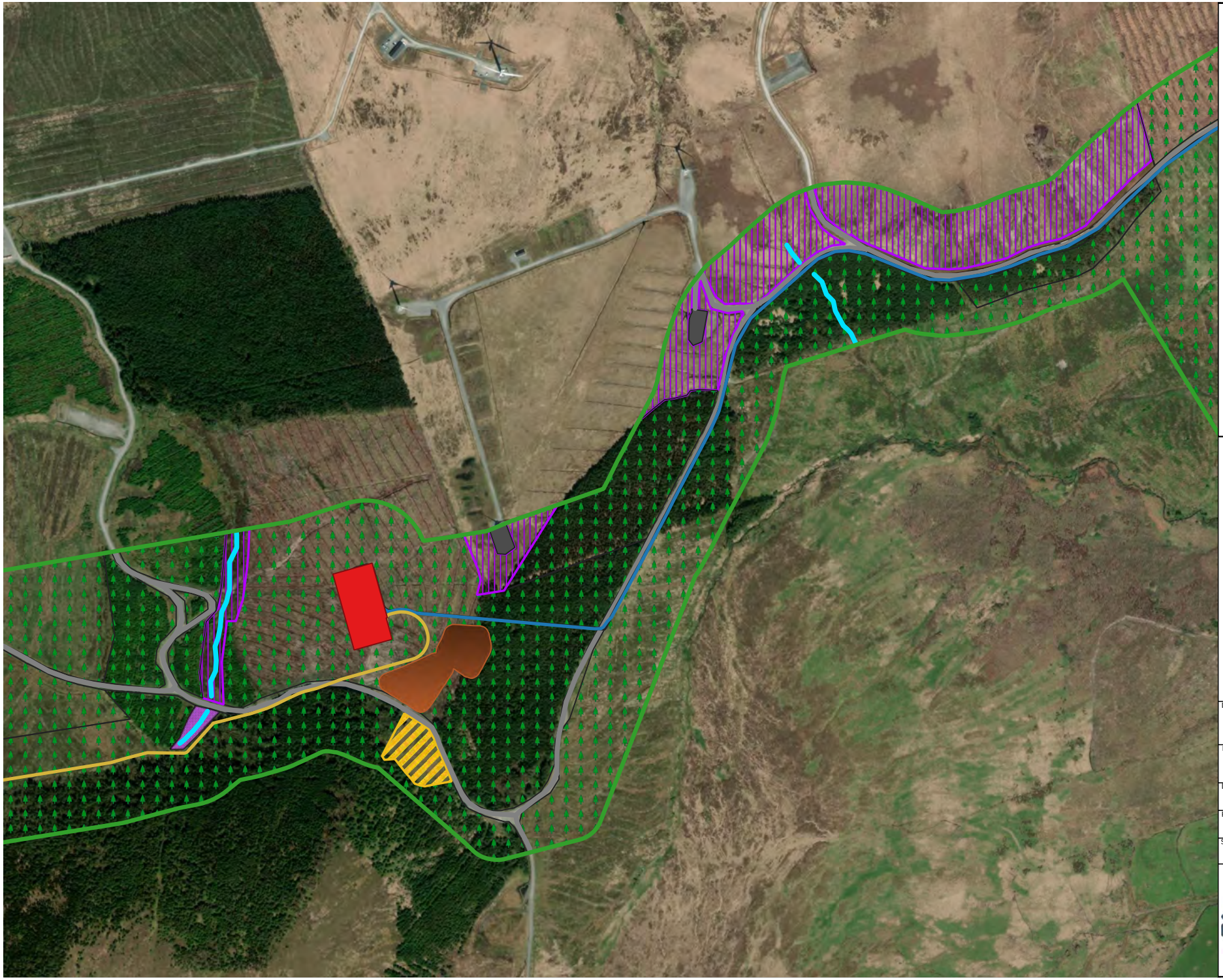

Map Legend

- EIAR Study Boundary
- 33kV Underground Cabling and Access Roads
- 110kV Underground Cabling
- 110kV Underground Cabling and Ac
- Proposed 110kV Substation Locatio
- Proposed Borrow Pit
- Buildings and Artificial Surfaces
- Eroding/Upland Rivers
- Buildings and artificial surfaces
- Dry meadows and grassy verges
- Wet grassland/Scrub
- Wet heath
- Upland blanket bog
- Conifer plantation

N

Drawing Title

Habitat Map

Project Title

Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development

Drawn By	Checked By
KME	PR
Project No.	Drawing No.
210732	Fig. 4-1B
Scale	Date
1:10000	15.07.2022

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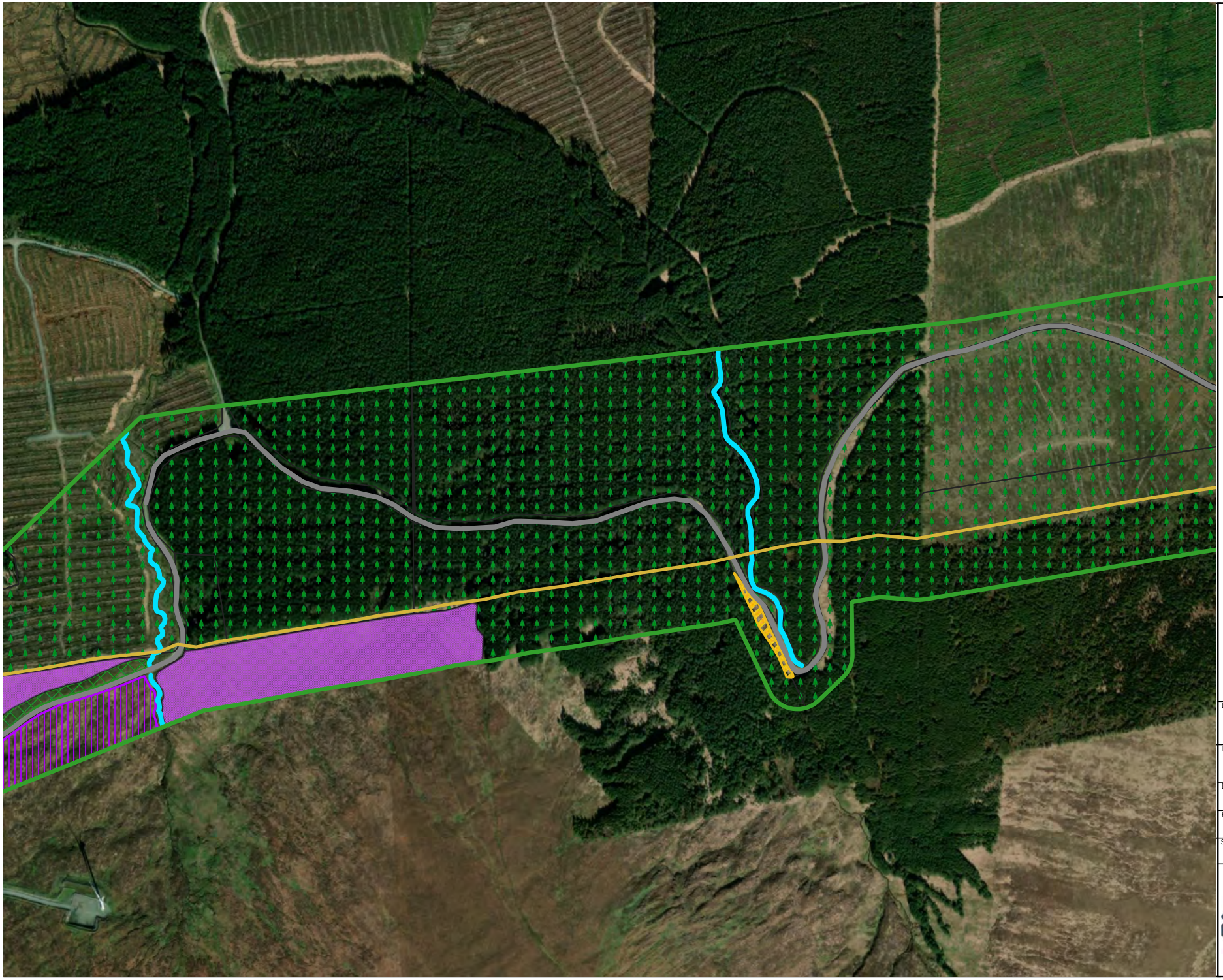

Map Legend

- EIAR Study Boundary
- 33kV Underground Cabling and Access Roads
- Buildings and Artificial Surfaces
- Eroding/Upland Rivers
- Wet grassland
- Wet grassland/Scrub
- Wet heath/ Upland blanket bog
- Upland blanket bog
- Conifer plantation

N

Drawing Title

Habitat Map

Project Title

Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development

Drawn By	Checked By
KME	PR
Project No.	Drawing No.
210732	Fig. 4-1C
Scale	Date
1:10000	15.07.2022

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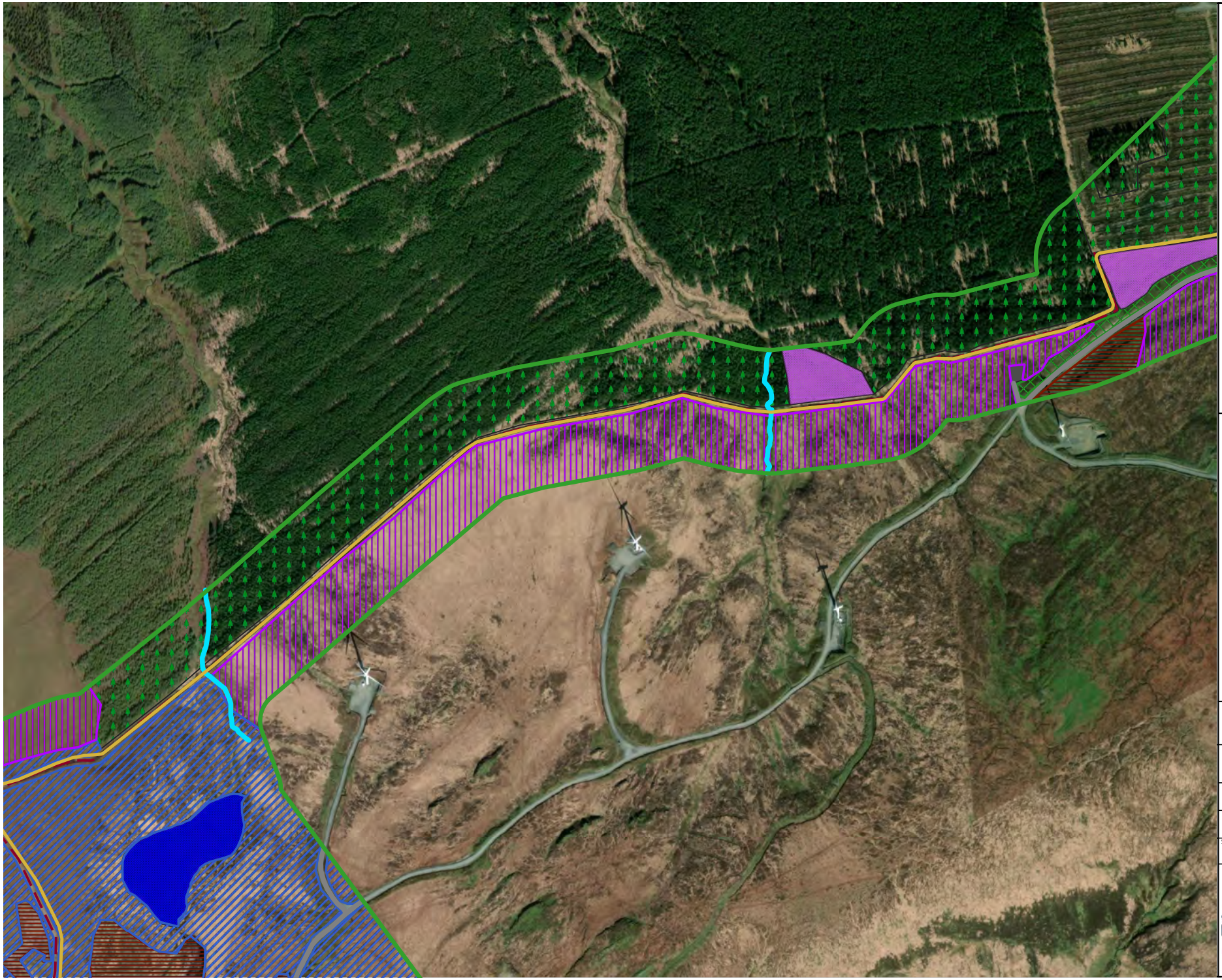

Map Legend

- EIAR Study Boundary
- 33kV Underground Cabling and Access Roads
- Buildings and Artificial Surfaces
- Recolonising Bare Ground
- Eroding/Upland Rivers
- Buildings and artificial surfaces
- Recolonising bare ground
- Dystrophic lakes
- Wet grassland
- Wet heath/ Upland blanket bog
- Upland blanket bog
- Cutover bog
- Conifer plantation

N

Drawing Title

Habitat Map

Project Title

Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development

Drawn By	Checked By
KME	PR
Project No.	Drawing No.
210732	Fig. 4-1D
Scale	Date
1:10000	15.07.2022

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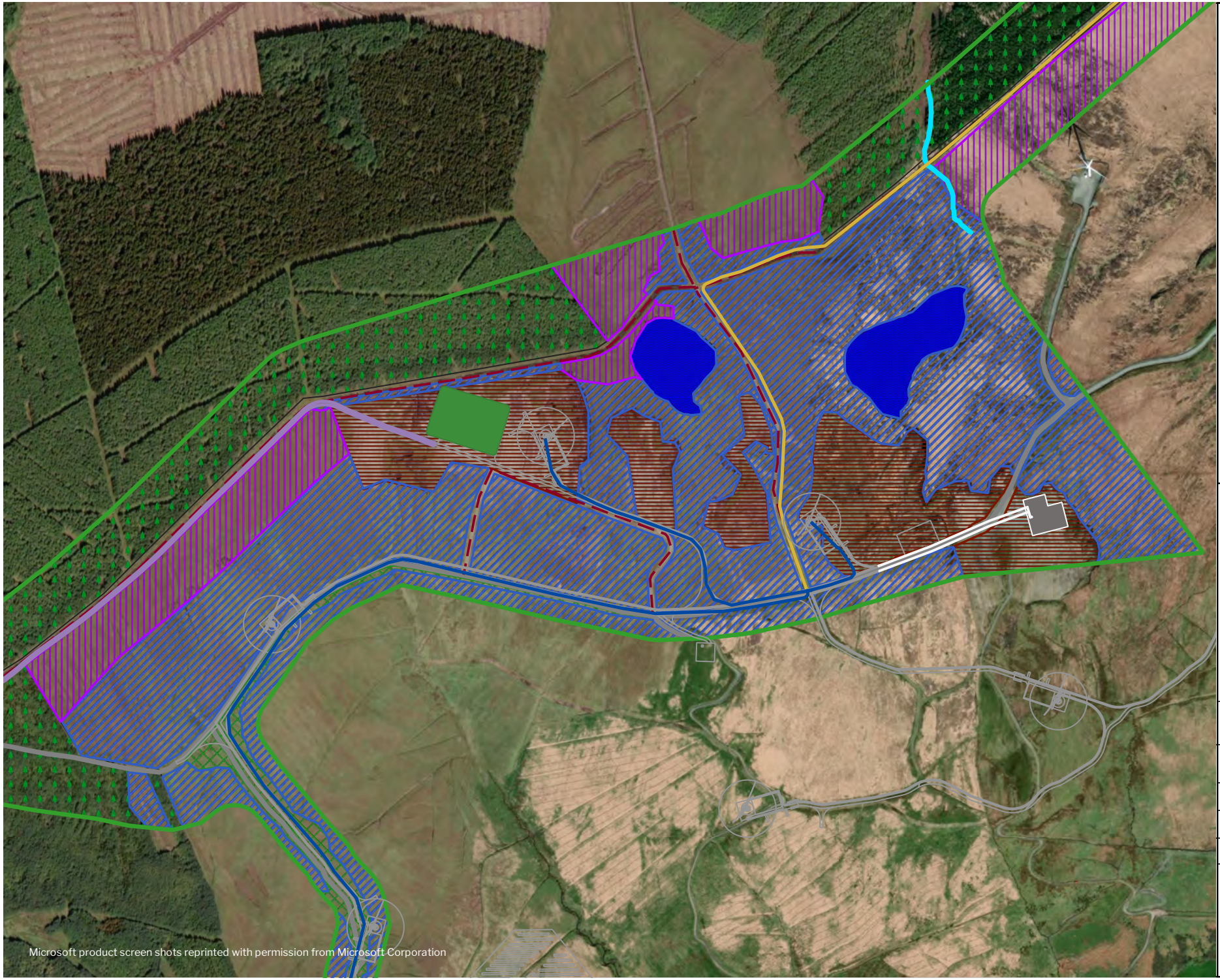
Map Legend
EIAR Study Boundary
Access Road (Upgrade & New)
33kV Underground Cabling and Acc
33kv Underground Cabling within th
Permitted Borrow Pit Extension
Omitted 38kV Electrical Substation a
Knocknamork Permitted Developme
Buildings and Artificial Surfaces
Recolonising Bare Ground
Eroding/Upland Rivers
Recolonising bare ground
Dystrophic lakes
Wet grassland
Upland blanket bog
Cutover bog
Conifer plantation
N
Drawing Title
Habitat Map
Project Title
Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development
Drawn By
KME
Checked By
PR
Project No.
210732
Drawing No.
Fig. 4-1E
Scale
1:10000
Date
15.07.2022
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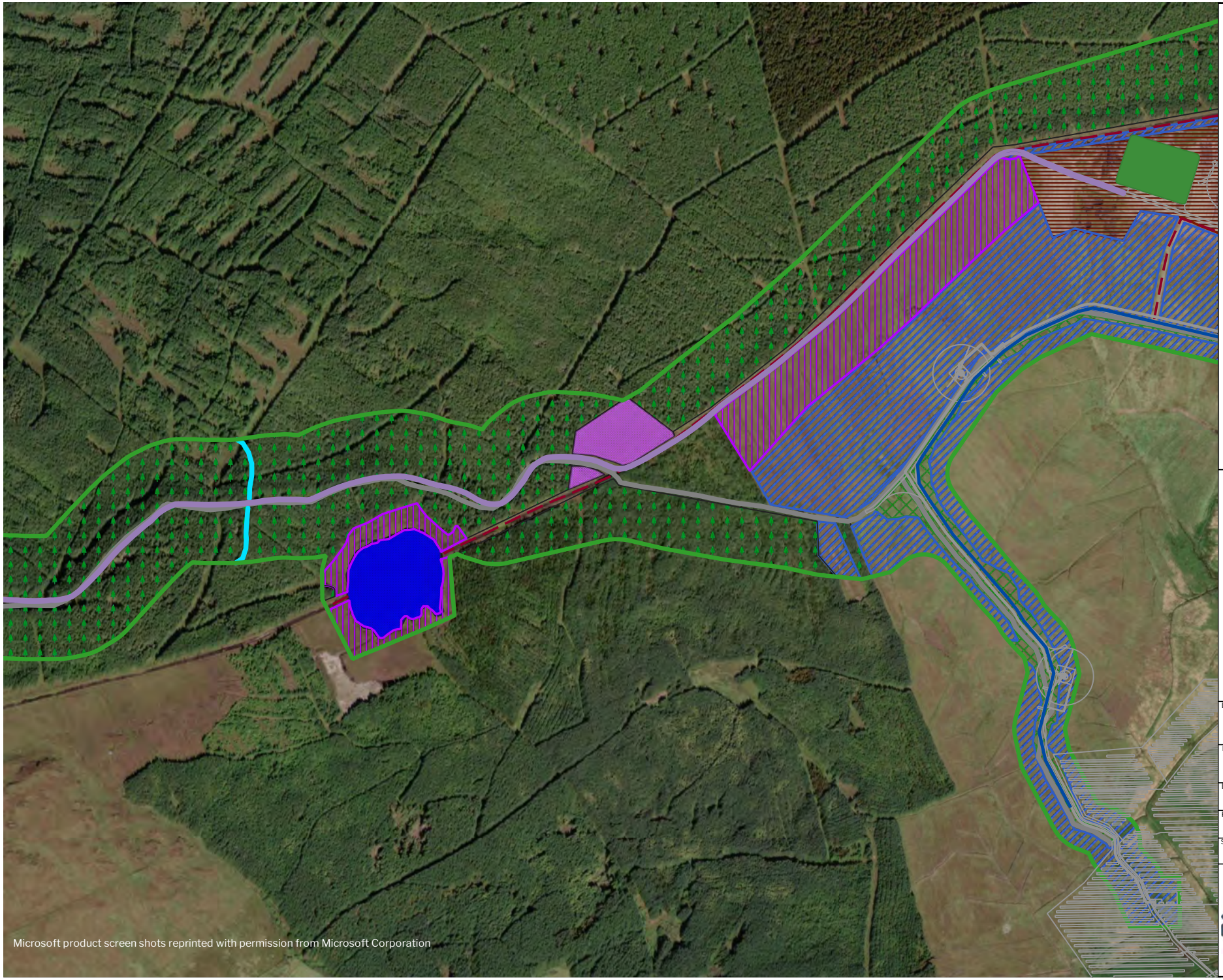
Map Legend
EIAR Study Boundary
Access Road (Upgrade & New)
33kv Underground Cabling within the Permitted Development
Permitted Borrow Pit Extension
Knocknamork Permitted Development
Buildings and Artificial Surfaces
Recolonising Bare Ground
Eroding/Upland Rivers
Recolonising bare ground
Dystrophic lakes
Wet grassland
Upland blanket bog/ Wet heath
Upland blanket bog
Cutover bog
Conifer plantation
N
Drawing Title
Habitat Map
Project Title
Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development
Drawn By
KME
Checked By
PR
Project No.
210732
Drawing No.
Fig. 4-1F
Scale
1:10000
Date
15.07.2022
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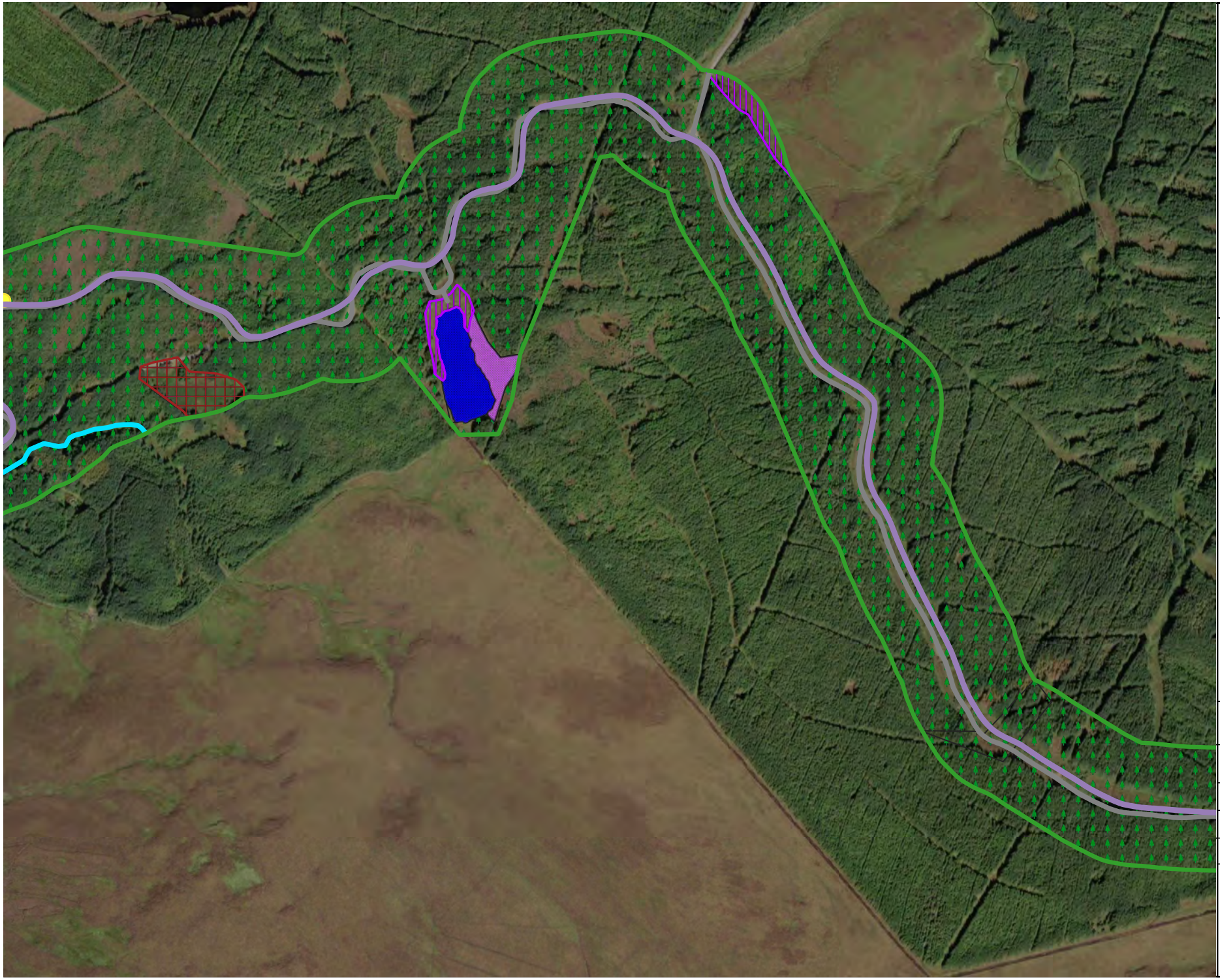

Map Legend

- EIAR Study Boundary
- Access Road (Upgrade & New)
- Rhododendron
- Buildings and Artificial Surfaces
- Eroding/Upland Rivers
- Dystrophic lakes
- Wet heath
- Upland blanket bog
- Conifer plantation
- Scrub

N

Drawing Title

Habitat Map

Project Title

Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development

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210732	Fig. 4-1G
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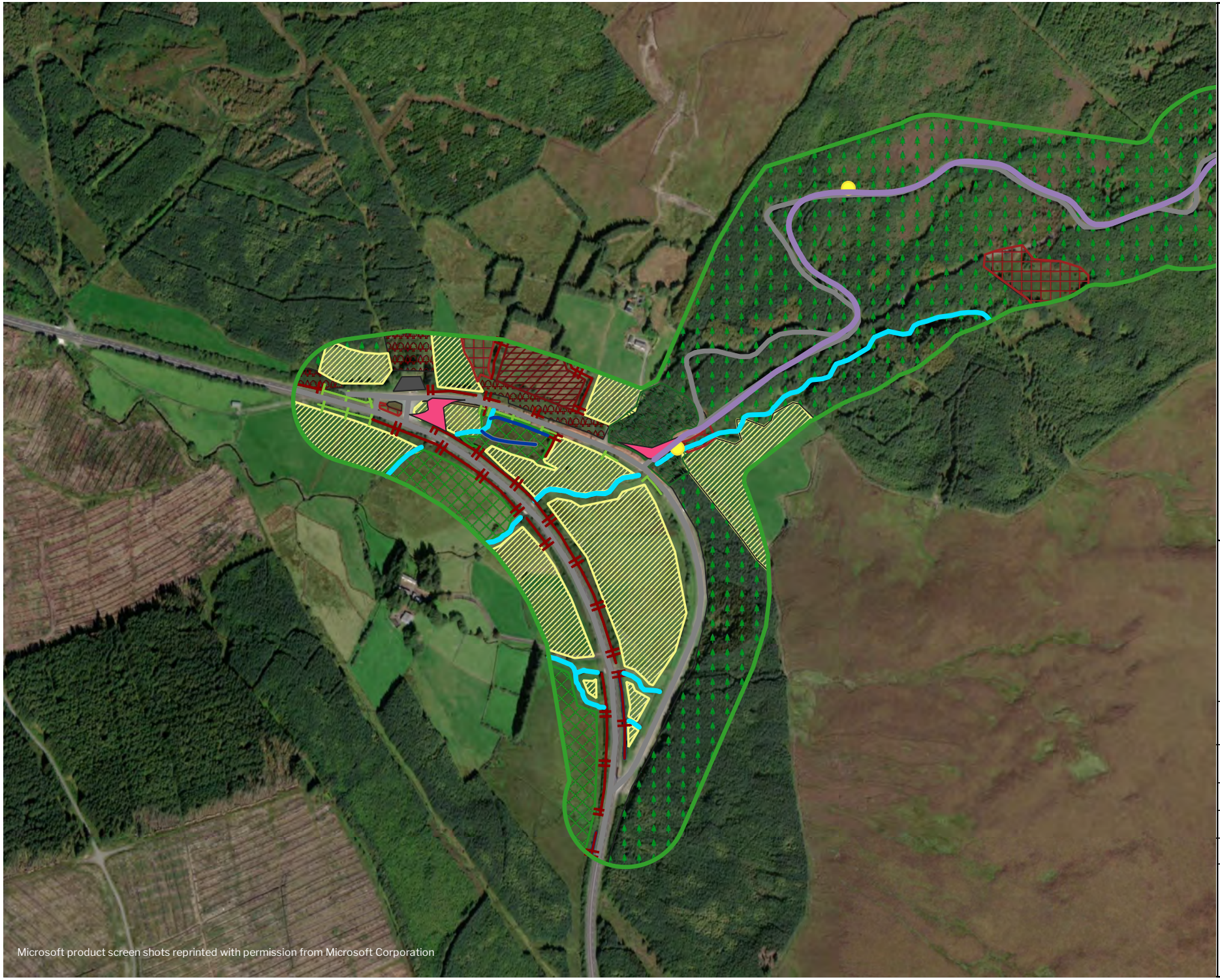
Map Legend
EIAR Study Boundary
Access Road (Upgrade & New)
Temp. Road
Rhododendron
Buildings and Artificial Surfaces
Eroding/Upland Rivers
Drainage Ditches
Hedgerows
Treelines
Buildings and artificial surfaces
Improved agricultural grassland
Dry meadows and grassy verges
Wet grassland
Mixed broadleaved/conifer woodland
Conifer plantation
Scrub
Immature woodland
Recently-felled woodland
N
Drawing Title
Habitat Map
Project Title
Proposed Substation, Underground Cabling & Access Roads to Knocknamork Renewable Energy Development
Drawn By
KME
Checked By
PR
Project No.
210732
Drawing No.
Fig. 4-1H
Scale
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5. ASSESSMENT OF POTENTIAL EFFECTS & ASSOCIATED MITIGATION

5.1 Potential for Direct Effects on the European Sites

The footprint of the Proposed Development is located entirely outside the boundary of any European Site and as such there is no potential for direct effects on the Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC or the Mullaghanish to Musheramore Mountains SPA.

5.2 Potential for Indirect Effects on European Sites

5.2.1 Deterioration of Water Quality

Sections of the site of the Proposed Development site are located within the Flesk (Kerry)_SC_010 sub-catchment within which the Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC [000365] is located. Downstream surface connectivity (between ~1 and ~2.5km surface water distance) with the SAC has been identified via the Clydagh River and its tributaries. Sections of the site that drain into the SAC include the 33kV underground cabling route and access road, 110kV substation, proposed borrow pit and TDR access road works.

5.2.1.1 Clear Felling of Coniferous Plantation

A total of 22.3 hectares of forestry will have to be permanently felled within and around the footprint of the Proposed Development. The proposed felling is linear in nature and spread throughout the Proposed Development site and through several sub-catchments. The total felling figure includes 0.6ha of felling required at the habitat enhancement area.

The total amount to be felled accounts for approximately 5.86% of the existing forestry coverage at the site which is 380ha.

The tree felling activities required as part of the Proposed Development will be the subject of a Felling Licence application to the Forest Service, in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017) and as per the Forest Service's policy on granting felling licenses for wind farm developments.

Potential effects during tree felling occurs mainly from:

- Exposure of soil and subsoils due to vehicle tracking, and skidding or forwarding extraction methods resulting in a source of suspended sediment which can become entrained in surface water runoff and enter surface water courses;
- Entrainment of suspended sediment in watercourses due to vehicle tracking through watercourses;
- Damage to roads resulting in a source of suspended sediment which can become entrained in surface water runoff and enter surface water courses;
- Release of sediment attached to timber in stacking areas; and,
- Nutrient release.

5.2.1.2 Earthworks Resulting in Suspended Solids Entrainment in Surface Waters

Construction phase activities for the Proposed Development works will require varying degrees of earthworks resulting in excavation of peat and mineral subsoil where present. Potential sources of sediment-laden water include:

- Drainage and seepage water resulting from excavations;
- Stockpiled excavated material providing a point source of exposed sediment; and,
- Erosion of sediment from emplaced site drainage channels.

These activities can result in the release of suspended solids to surface water and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies. Potential effects on all watercourses downstream of the site could be significant if not mitigated against.

5.2.1.3 Potential Impacts on Groundwater Levels during Excavation Works

Dewatering of the borrow pits and 110kV substation platform works (as required) has the potential to impact on local groundwater levels and flows. However, groundwater level or flow impacts will not be significant due to the local topographical/ hydrogeological regime and the proposed excavation method as outlined below in relation the borrow pits and 110kV Substation.

No groundwater level impacts are predicted from the construction of the underground cabling and associated access roads, or TDR works due to the shallow nature of the excavation in the mineral soil (i.e. 0 -~1.2m).

5.2.1.4 Excavation Dewatering and Potential Impacts on Surface Water Quality

Some minor groundwater/surface water seepages will likely occur in excavations for the Proposed Development, and this will create additional volumes of water to be treated by the runoff management system. Inflows will likely require management and treatment to reduce suspended sediments. No contaminated land was noted at the site and therefore pollution issues arising from such sources will not occur.

5.2.1.5 Potential Release of Hydrocarbons during Construction and Storage

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk to groundwater, surface water and associated ecosystems, and to terrestrial ecology. The accumulation of small spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. It is also a nutrient supply for adapted micro-organisms, which can rapidly deplete dissolved oxygen in waters, resulting in death of aquatic organisms.

5.2.1.6 Groundwater and Surface Water Contamination from Wastewater Disposal

Release of effluent from on-site temporary wastewater treatment systems has the potential to impact on groundwater and surface water quality if site conditions are not suitable for an on-site percolation unit. Impacts on surface water quality could affect fish stocks and aquatic habitats.

5.2.1.7 Release of Cement-Based Products

Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. A pH range of $\geq 6 \leq 9$ is set in S.I. No. 293 of 1988 Quality of Salmonid Water Regulations, with artificial variations not in excess of ± 0.5 of a pH unit. Entry of cement-based products into the site drainage system, into surface water runoff, and hence to surface watercourses or directly into watercourses represents a risk to the aquatic environment. Peat ecosystems are dependent on low pH hydrochemistry. They are extremely sensitive to introduction of high pH alkaline waters into the system. Batching of wet concrete on site and washing out of transport and placement machinery are the activities most likely to generate a risk of cement-based pollution.

5.2.1.8 Morphological Changes to Surface Water Courses & Drainage Patterns

Diversion, culverting and bridge crossing of surface watercourses can result in morphological changes, changes to drainage patterns and alteration of aquatic habitats. Construction of structures over water courses has the potential to significantly interfere with water quality and flows during the construction phase.

The construction methodology for the 6 no. EPA/OSI mapped crossings has been designed to eliminate the requirement for in-stream works with 5 no. of these locations requiring a new crossing to be constructed to traverse the watercourse with the cabling ducts.

The proposed crossing methods are as follows:

Open Channel

Where no crossing currently exists, the cable will pass over the watercourse over a bottomless box culvert or pre-cast concrete slab in a standard trefoil arrangement.

Crossing Over Existing Culverts

Option A –

Where adequate cover exists above a culvert, the standard trench arrangement will be used where the cable ducts pass over a culvert without any contact with the existing culvert or water course. The cable trench will pass over the culvert in a standard trench.

Option B –

Where the culvert consists of a socketed concrete or sealed plastic pipe and sufficient depth is not available over the crossing, a trench will be excavated beneath the culvert, and cable ducts will be installed in the standard formation 300mm below the existing pipe.

Option C –

Where cable ducts are to be installed over an existing culvert and sufficient cover cannot be achieved, the ducts will be laid in a much shallower trench, the depth of which will be determined by the cover available at the culvert crossing location. The ducts within the shallow formation trench will be encased in 6mm thick steel galvanized plates and backfilled with 35N concrete.

Option D –

Directional Drilling is a method of drilling under obstacles such as bridges, culverts, railways, water courses, etc. in order to install cable ducts under the obstacle. This method is employed where installing the ducts using standard installation methods is not possible.

5.2.1.9 Progressive Replacement of Natural Surface with Lower Permeability Surfaces

Progressive replacement of the peat or vegetated surface with impermeable surfaces could potentially result in an increase in the proportion of surface water runoff reaching the surface water drainage network. This could potentially increase runoff from the site and increase flood risk downstream of the development. In reality, the access roads will have a higher permeability than the underlying peat. However, it is conservatively assumed in this assessment that the proposed access roads and 110kV substation hardstand are impermeable. The assessed footprint comprises access roads, site entrances and 110kV substation. During storm rainfall events, additional runoff coupled with increased velocity of flow could increase hydraulic loading, resulting in erosion of watercourses and impact on aquatic ecosystems.

5.2.1.10 Runoff Resulting in Suspended Solids Entrainment in Surface Waters

During the operational phase, the potential for silt-laden runoff is much reduced compared to the construction phase. In addition, all permanent drainage controls will be in place and the disturbance of ground and excavation works will be complete. Some minor maintenance works may be completed, such as maintenance of site entrances, internal roads and hardstand areas. These works would be of a very minor scale and would be very infrequent. Potential sources of sediment laden water would only arise from surface water runoff from small areas where new material is added during maintenance works

These minor activities could, however, result in the release of suspended solids to surface water and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies. Potential effects could be significant if not mitigated against.

During such maintenance works there is a low risk associated with release of hydrocarbons from site vehicles, although it is not envisaged that any significant refuelling works will be undertaken on site during the operational phase.

There are seven EPA mapped watercourse crossings associated with the footprint of the Proposed Development. There is the potential for the construction phase of the Proposed Development to result in pollution related effects, such as suspended sediment and nutrient release, on rivers, streams and sensitive aquatic faunal species within and adjacent to the Proposed Development, potentially affecting the following QIs in the absence of mitigation:

Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC [000365]

- [1095] Sea Lamprey (*Petromyzon marinus)*
- [1096] Brook Lamprey (*Lampetra planeri)*
- [1099] River Lamprey (*Lampetra fluviatilis)*

- [1106] Salmon (*Salmo salar)*
- [1355] Otter (*Lutra lutra)*
- [1833] Slender Naiad (*Najas flexilis)*
- [3110] Oligotrophic waters containing very few minerals of sandy plains *(Littorelletalia uniflorae)*
- [3130] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*
- [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
- [5046] Killarney Shad (*Alosa fallax killarnensis)*
- [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)**

5.2.2 Mitigation

5.2.2.1 Mitigation During Construction

5.2.2.1.1 *Mitigation by Avoidance*

The key mitigation measure during the construction phase is the avoidance of sensitive hydrological features where possible, by application of suitable buffer zones (i.e. 50m to main watercourses). Due to the linear nature of the Proposed Development and also because the Proposed Development utilises existing tracks/roads where possible, it is not possible to avoid all watercourses, however the majority of the Proposed Development works are located significantly away from the delineated 50m watercourse buffer zones.

The large setback distance from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures (discussed below) to be properly installed and operate effectively. The proposed buffer zone will:

- Avoid physical damage (river/stream banks and river/stream beds) to watercourses and associated release of sediment;
- Avoid excavations within close proximity to surface watercourses;
- Avoid the entry of suspended sediment from earthworks into watercourses; and,
- Avoid the entry of suspended sediment from the construction phase drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation of the buffer zone.

5.2.2.1.2 *Mitigation by Design*

- Source controls:
  - Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sand bags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems.
  - Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas.

- In-Line controls:
  - Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sand bags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriate systems.

- Treatment systems:

- Temporary sumps and ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems.

- It should be noted for this site that an extensive network of forestry and roadside drains already exists, and these will be integrated and enhanced as required and used within the Proposed Development drainage system. The integration of the existing forestry drainage network and the Proposed Development infrastructure is relatively simple. The key elements being the upgrading and improvements to existing water treatment elements, such as in line controls and treatment systems, including silt traps, settlement ponds and buffered outfalls.

The main elements of interaction with existing drains will be as follows:

- Apart from interceptor drains, which will convey clean runoff water to the downstream drainage system, there will be no direct discharge (without treatment for sediment reduction, and attenuation for flow management) of runoff from the proposed grid infrastructure drainage into the existing site drainage network. This will reduce the potential for any increased risk of downstream flooding or sediment transport/erosion;
- Silt traps will be placed in the existing drains upstream of any streams where construction works / tree felling is taking place, and these will be diverted into proposed interceptor drains, or culverted under/across the works area;
- Runoff from individual roads/hardstanding areas will be not discharged into the existing drain network but discharged locally through settlement ponds and buffered outfalls onto vegetated surfaces;
- Buffered outfalls which will be numerous over the site will promote percolation of drainage waters across vegetation and close to the point at which the additional runoff is generated, rather than direct discharge to the existing drains of the site; and,
- Drains running parallel to the existing roads requiring widening will be upgraded, and widening will be targeted to the opposite side of the road. Velocity and silt control measures such as check dams, sand bags, oyster bags, straw bales, flow limiters, weirs, baffles, andsilt fences, will be used during the upgrade construction works. Regular buffered outfalls will also be added to these drains to protect downstream surface waters.

The upgrading of existing roads, albeit presents a potential short-term potential non-significant effect on surface water quality during construction, will be a positive effect in the long-term with regard to improved drainage controls.

Pre-commencement Temporary Drainage Works

Prior to the commencement of the Proposed Development the following key temporary drainage measures will be installed:

- All existing dry forestry drains that intercept the proposed works area will be temporarily blocked down-gradient of the works using forestry check dams/silt traps;
- Clean water interceptor drains will be installed upgradient of the works areas;
- Check dams/silt fence arrangements (silt traps) will be placed in all existing forestry drains that have surface water flows and also along existing forestry roadside drains; and,
- A double silt fence perimeter will be placed down-slope of works areas that are located inside the watercourse 50m buffer zone.

Silt Fences:

Silt fences will be emplaced upslope of drains down-gradient of all construction areas. Silt fences are effective at removing heavy settleable solids such as those present in the subsoils/sandstone tills that overlie the site. This will act to prevent entry to water courses of sand and gravel sized sediment,

released from excavation of mineral sub-soils of glacial and glacio-fluvial origin, and entrained in surface water runoff. Inspection and maintenance of these of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase. Double silt fences will be placed within drains down-gradient of all construction areas inside the hydrological buffer zones.

Silt Bags:

Silt bags will be used where small to medium volumes of water need to be pumped from excavations. As water is pumped through the bag, the majority of the sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with natural vegetation filters or sedimats Sediment entrapment mats, consisting of coir or jute matting. These will be placed at the silt bag location to provide further treatment of the water outfall from the silt bag. Sedimats will be secured to the ground surface using stakes/pegs. The sedimat will extend to the full width of the outfall to ensure all water passes through this additional treatment measure.

Settlement Ponds:

The Proposed Development footprint has been divided into drainage catchments (based on topography, outfall locations, catchment size) and stormwater runoff rates based on the 10-year return period rainfall event were calculated for each catchment. These flows were then used to design settlement ponds for each drainage catchment. The settlement ponds are designed for 11hr or 24hr retention times used to settle out medium silt (0.006mm) and fine silt (0.004mm) respectively (EPA, 2006)[3]. Settlement ponds at the borrow pits are designed to allow 24hr retention and settlement ponds along access roads and at the 110kV substation will have 11hr retention as there is additional in-line drainage controls proposed along access tracks and at hardstands.

Level Spreaders and Vegetation Filters:

The purpose of level spreaders is to release treated drainage flow in a diffuse manner, and to prevent the concentration of flows at any one location thereby avoiding erosion. Level spreaders are not intended to be a primary treatment component for development surface water runoff. They are not stand alone but occur as part of a treatment train of systems that will reduce the velocity of runoff prior to be released at the level spreader. In the absence of level spreaders, the potential for ground erosion is significantly greater than not using them.

Vegetation filters are essentially end-of-line polishing filters that are located at the end of the treatment train. In fact, vegetation filters are ultimately a positive consequence of not discharging directly into watercourses which is one of the mitigation components of the drainage philosophy. This makes use of the natural vegetation of the site to provide a polishing filter for the development drainage prior to reaching the downstream watercourses.

Again, vegetation filters are not intended to be a single or primary treatment component for treatment of works area runoff. They are not sand alone but are intended as part of a treatment train of water quality improvement/control systems (i.e. source controls→check dams→silt traps→settlement ponds→level spreaders →silt fences→vegetation filters).

Water Treatment Train:

A final line of defence will be provided by a water treatment train such as a "Siltbuster". If the discharge water from construction areas fails to be of a high quality during regular inspections, then a filtration treatment system (such as a 'Siltbuster' or similar equivalent treatment train (sequence of water

[3] Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006).

treatment processes)) will be used to filter and treat all surface discharge water collected in the dirty water drainage system. This will apply for all of the construction phase.

Pre-emptive Site Drainage Management

The works programme for the entire construction stage of the development will also take account of weather forecasts, and predicted rainfall in particular. Large excavations and movements of soil/subsoil or vegetation stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

The following forecasting systems are available and will be used on a daily basis at the site to direct proposed construction activities:

- General Forecasts: Available on a national, regional and county level from the Met Eireann website (www.met.ie/forecasts) or other similar source. These provide general information on weather patterns including rainfall, wind speed and direction but do not provide any quantitative rainfall estimates;
- MeteoAlarm: Alerts to the possible occurrence of severe weather for the next 2 days. Less useful than general forecasts as only available on a provincial scale;
- 3-hour Rainfall Maps: Forecast quantitative rainfall amounts for the next 3 hours but does not account for possible heavy localised events;
- Rainfall Radar Images: Images covering the entire country are freely available from the Met Eireann website (www.met.ie/latest/rainfall_radar.asp). The images are a composite of radar data from Shannon and Dublin airports and give a picture of current rainfall extent and intensity. Images show a quantitative measure of recent rainfall. A 3-hour record is given and is updated every 15 minutes. Radar images are not predictive; and,
- Consultancy Service: Met Eireann provide a 24-hour telephone consultancy service. The forecaster will provide interpretation of weather data and give the best available forecast for the area of interest.

Using the safe threshold rainfall values will allow work to be safely controlled (from a water quality perspective) in the event of forecasting of an impending high rainfall intensity event.

Works will be suspended if forecasting suggests either of the following is likely to occur:

- >10 mm/hr (i.e. high intensity local rainfall events);
- >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
- >half monthly average rainfall in any 7 days.

Prior to works being suspended the following control measures will be completed:

- All active excavations will be secured and sealed off;
- Temporary or emergency drainage will be installed to prevent back-up of surface runoff; and,
- No works will be completed during heavy rainfall and for up to 24 hours after heavy events to ensure drainage systems are not overloaded.

Management of Runoff from Borrow Pit Reinstatement:

It is proposed that excavated peat/subsoil (spoil) will be used to reinstate the borrow pits and for landscaping throughout the site. The borrow pits are located outside the 50m stream buffer zone.

Proposed surface water quality protection measures regarding the borrow pit reinstatement are as follows:

- During the initial emplacement of peat and subsoil at the borrow pits, silt fences, straw bales and biodegradable matting will be used to control surface water runoff from the enclosure.
- The borrow pits are enclosed areas. their drainage can be easily managed.
- Drainage from the borrow pits will be pumped to settlement ponds as required or will overflow through controlled overflow pipes.
- Discharge or pumping will be intermittent and will depend on preceding rainfall amounts.
- Once the borrow pits have been seeded and vegetation is established, the risk to downstream surface water is significantly reduced.

Therefore, at each stage of the borrow pit reinstatement works the above mitigation measures will be deployed to ensure protection of downstream water quality.

The borrow pit area settlement ponds have been designed to allow a 24hr retention time as per EPA guidance (2006) which is highest level of protection recommended by the EPA with regard to retention time.

Timing of Site Drainage Construction Works:

Construction of the site drainage system will only be carried out during periods of low rainfall, and therefore minimum runoff rates. This will minimise the risk of entrainment of suspended sediment in surface water runoff, and transport via this pathway to surface watercourses. Construction of the drainage system during this period will also ensure that attenuation features associated with the drainage system will be in place for all subsequent construction works.

Monitoring:

An inspection and maintenance plan for the on-site construction drainage system will be prepared in advance of commencement of any works. Regular inspections of all installed drainage systems and culverts will be undertaken, especially after heavy rainfall, to check for blockages, and ensure there is no build-up of standing water in parts of the systems where it is not intended. Inspections will also be undertaken after tree felling.

Any excess build-up of silt levels at dams, the settlement pond, or any other drainage features that may decrease the effectiveness of the drainage feature, will be removed. Checks will be carried out on a daily basis.

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken for each primary watercourse, and specifically following heavy rainfall events (as per the CEMP included in Appendix 4-3 in the 'Description' Chapter of the EIAR).

5.2.2.2 Mitigation During Operation

5.2.2.2.1 *Mitigation by Design*

The drainage system of the Proposed Development will be installed and constructed in conjunction with the site construction works:

- Interceptor drains will be installed up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained. It will then be directed to areas where it can be re-distributed over the ground by means of a level spreader;

- Swales/road side drains will be used to collect runoff from access roads and hardstanding areas of the site, likely to have entrained suspended sediment, and channel it to settlement ponds for sediment settling;
- On steep sections of access road transverse drains ('grips') will be constructed in the surface layer of the road to divert any runoff off the road into swales/road side drains;
- Check dams will be used along sections of access road drains to intercept silts at source. Check dams will be constructed from a 4/40mm non-friable crushed rock;
- Settlement ponds will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, by retaining water until the storm hydrograph has receded, thus reducing the hydraulic loading to watercourses; and,
- Settlement ponds have been designed in consideration of the greenfield runoff rate.

As described above the proposed integration of the Proposed Development drainage with the existing forestry drainage is a key component of the proposed drainage management within the development. By integration we mean maintaining surface water flowpaths where they already exist, avoid creation of new or altered surface water flowpaths, and maintaining the drainage regime (i.e. normal flow) within each forestry compartment. Critically, there will be no alteration of the catchment size contributing to each of the main downstream watercourses. All development drainage water captured within individual site sub-catchments will be attenuated and released within the same sub-catchments that it was captured.

5.2.2.3 Decommissioning Phase

The potential impacts associated with decommissioning of the Proposed Development will be similar to those associated with construction but of a reduced magnitude, due to the reduced scale of the proposed decommissioning works in comparison to construction phase works. A description of the decommissioning works is contained in Chapter 4 of the EIAR below.

No significant effects on the hydrological and hydrogeological environment will occur during the decommissioning stage of the Proposed Development.

5.2.3 Disturbance and displacement

Due to the proximity of the Proposed Development to the relevant European Sites and to the potential presence of suitable habitat for the associated QI/SCI species, following a precautionary principle, indirect effects in the form of *ex situ* disturbance and displacement of QI/SCI species was considered. The relevant European Sites and species are listed below.

Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC [000365]

- [1355] Otter (*Lutra lutra)*

However, following the extensive site surveys undertaken, and having considered the nature, scale and location of the works, it is concluded that there is no potential for the short term works, which are located entirely outside the SAC and primarily in and around commercial conifer plantations, to result in any adverse effect resulting from disturbance to otter for the following reasons:

1. No instream works are required at any of the EPA mapped watercourse.
2. There will be no loss of otter habitat and no loss of connectivity along any watercourse.
3. No otter or sign thereof were recorded during the extensive surveys that were undertaken.

4. No high quality otter habitat was recorded within or surrounding the site of the Proposed Development.

In addition, otter are predominantly crepuscular in nature and it is anticipated that construction activity will mostly be confined to daytime hours, thus minimizing potential disturbance related impacts to the species. Channin P (2003) provides a literary review with regard to anthropogenic disturbance and refers to several reports which have found that disturbance is not detrimental to otters (Jefferies (1987), (Durbin 1993). (Green & Green 1997). Irish Wildlife Manual No 76 (National Otter Survey of Ireland 2010/2012) notes that the occurrence of otter was unaffected by perceived levels of disturbance at the survey sites. It also notes that there is little published evidence demonstrating any consistent relationship between otter occurrence and human disturbance (Mason & Macdonald 1986, Delibes et al. 1991; Bailey &Rochford, 2006).

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- [A082] Hen Harrier *(Circus cyaneus)*

However, following the extensive site surveys undertaken, and having considered the nature, scale and location of the works, it is concluded that there is no potential for the short term works, which are located entirely outside the SPA and primarily in and around commercial conifer plantations, to result in any adverse effect on hen harrier for the following reasons:

1. Most of the works themselves will be within a commercial forestry plantation that is located outside the SPA.
2. The construction works will be short term in nature with no potential for disturbance during their operation.
3. Hen Harrier was not recorded during the site surveys undertaken and is unlikely to regularly use the site of the Proposed Development.

6. ASSESSMENT OF RESIDUAL ADVERSE EFFECTS

The potential for adverse effects on each of the individual Qualifying Interests and Special Conservations Interests that were identified as being at risk of potential effects in the AA Screening Report is assessed in this section in view of the Conservation Objectives of those habitats and species.

6.1 Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC [000365]

A site-specific conservation objective supporting document is available for Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC [000365] (NPWS, 2017) and the site-specific targets and attributes provided in this document have been assessed below in the following sub-sections.

6.1.1 [3110] Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)

Table 6- 1 Targets and attributes associated with nominated site-specific conservation objectives for [3110] Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)

Attribute	Target	Assessment
Habitat area	Area stable or increasing, subject to natural processes	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the habitat area or distribution of this habitat within the SAC.
Habitat distribution	No decline, subject to natural processes	
Typical species	Typical species present, in good condition, and demonstrating typical abundances and distribution	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the condition, abundance and distribution of typical species present within the SAC.
Vegetation composition: characteristic zonation	All characteristic zones should be present, correctly distributed and in good condition	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the distribution and condition of characteristic zones present within the SAC.
Vegetation distribution: maximum depth	Maintain maximum depth of vegetation, subject to natural processes	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the maximum depth of vegetation, subject to natural processes, within the SAC.
Hydrological regime: water level fluctuations	Maintain appropriate natural hydrological regime necessary to support the habitat	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result

Attribute	Target	Assessment
		in any impact on the appropriate natural hydrological regime necessary to support the habitat within the SAC.
Lake substratum quality	Maintain appropriate substratum type, extent and chemistry to support the vegetation	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any impact on the appropriate substratum type, extent or chemistry within the SAC.
Water quality: transparency	Maintain/restore appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any alteration to water quality within the SAC.
Water quality: nutrients	Maintain/restore the concentration of nutrients in the water column to sufficiently low levels to support the habitat and its typical species	
Water quality: phytoplankton biomass	Maintain/restore appropriate water quality to support the habitat, including high chlorophyll a status	
Water quality: phytoplankton composition	Maintain/restore appropriate water quality to support the habitat, including high phytoplankton composition status	
Water quality: attached algal biomass	Maintain/restore trace/absent attached algal biomass (<5% cover) and high phytobenthos status	
Water quality: macrophyte status	Maintain/restore high macrophyte status	
Acidification status	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any alteration to the appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat within the SAC.
Water colour	Maintain appropriate water colour to support the habitat	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any alteration to the appropriate water colour to support the habitat within the SAC.
Dissolved organic carbon (DOC)	Maintain appropriate organic carbon levels to support the habitat	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any alteration to the appropriate organic carbon levels to support the habitat within the SAC.

Attribute	Target	Assessment
Turbidity	Maintain appropriate turbidity to support the habitat	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any alteration to the appropriate organic carbon levels to support the habitat within the SAC.
Fringing habitat: area and condition	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3110	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the area and condition of fringing habitats within the SAC.

6.1.2 [3130] Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*

Table 6- 2 Targets and attributes associated with nominated site-specific conservation objectives for [3130] Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea

Attribute	Target	Assessment
Habitat area	Area stable or increasing, subject to natural processes	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in habitat area and distribution within the SAC.
Habitat distribution	No decline, subject to natural processes	
Typical species	Typical species present, in good condition, and demonstrating typical abundances and distribution	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the condition, abundance and distribution of typical species the SAC.
Vegetation composition: characteristic zonation	All characteristic zones should be present, correctly distributed and in good condition	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any impact on vegetation composition within the SAC.
Vegetation distribution: maximum depth	Maintain maximum depth of vegetation, subject to natural processes	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any impact on vegetation distribution within the SAC.
Hydrological regime: water level fluctuations	Maintain appropriate natural hydrological regime necessary to support the habitat	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any alterations to the natural hydrological regime necessary to support the habitat within the SAC.
Lake substratum quality	Maintain appropriate substratum type, extent and chemistry to support the vegetation	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result

Attribute	Target	Assessment
		in any alterations to substratum type, extent and chemistry necessary to support the vegetation within the SAC.
Water quality: transparency	Maintain/restore appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in water quality within the SAC.
Water quality: nutrients	Maintain/restore the concentration of nutrients in the water column to sufficiently low levels to support the habitat and its typical species	
Water quality: phytoplankton biomass	Maintain/restore appropriate water quality to support the habitat, including high chlorophyll a status	
Water quality: phytoplankton composition	Maintain/restore appropriate water quality to support the habitat, including high phytoplankton composition status	
Water quality: attached algal biomass	Maintain/restore trace/absent attached algal biomass (<5% cover and high phytobenthos status)	
Water quality: macrophyte status	Maintain/restore high macrophyte status	
Acidification status	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in water and sediment pH, alkalinity and cation concentrations to support the habitat within the SAC.
Water colour	Maintain appropriate water colour to support the habitat	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in appropriate water colour to support the habitat within the SAC.
Dissolved organic carbon (DOC)	Maintain appropriate organic carbon levels to support the habitat	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in appropriate organic carbon levels to support the habitat within the SAC.
Turbidity	Maintain appropriate turbidity to support the habitat	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in appropriate turbidity to support the habitat within the SAC.

Attribute	Target	Assessment
Fringing habitat: area and condition	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3130	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in fringing habitats necessary to support the habitat within the SAC.

6.1.3 [3260] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

Table 6- 3 Targets and attributes associated with nominated site-specific conservation objectives for [3260] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation

Attribute	Target	Assessment
Habitat area	Area stable or increasing, subject to natural processes	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the area and condition of fringing habitats within the SAC.
Habitat distribution	No decline, subject to natural processes	
Hydrological regime: river flow	Maintain/restore appropriate hydrological regimes	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any impact on hydrological regime within the SAC.
Hydrological regime: groundwater discharge	Maintain appropriate hydrological regime	
Substratum composition: particle size range	Maintain/restore appropriate substratum particle size range, quantity and quality, subject to natural process	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any impact on substratum particle size, range and quality within the SAC.
Water quality	Maintain/restore appropriate water quality to support the natural structure and functioning of the habitat	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in water quality within the SAC.
Typical species	Typical species of the relevant habitat sub-type should be present and in good condition	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any impact on the typical species within the SAC.
Floodplain connectivity: area	The area of active floodplain at and upstream of the habitat should be maintained	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the area of active floodplain within the SAC.
Riparian habitat: area and condition	Maintain the area and condition of fringing habitats necessary to support the habitat and its sub-types	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the area and condition of fringing habitats within the SAC.

6.1.4 [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)*

*Table 6- 4 Targets and attributes associated with nominated site-specific conservation objectives for [91E0] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)**

Attribute	Target	Assessment
Habitat area	Area stable or increasing, subject to natural processes, with a minimum area of 170.84ha. See map 6	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in habitat area and distribution within the SAC.
Habitat distribution	No decline. The mapped woodland locations are shown on map 6	
Woodland size	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and “small” woods at least 3ha in size	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in habitat area and distribution within the SAC.
Woodland structure: cover and height	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semimature trees and shrubs; and well-developed herb layer	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any impacts on woodland structure within the SAC.
Woodland structure: community diversity and extent	Maintain diversity and extent of community types	
Woodland structure: natural regeneration	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	
Woodland structure: dead wood	At least 30m³/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder (*Alnus glutinosa*)	
Woodland structure: veteran trees	No decline	
Woodland structure: indicators of local disctinctiveness	No decline	
Hydrological regime: flooding depth/height of water table	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any impacts on hydrological regime necessary

Attribute	Target	Assessment
		for maintenance of alluvial vegetation within the SAC.
Vegetation composition: native tree cover	No decline. Native tree cover not less than 95%	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline or adverse effects on vegetation composition within the SAC.
Vegetation composition: typical species	A variety of typical native species present, depending on woodland type, including alder (*Alnus glutinosa*), willows (*Salix* spp.), oak (*Quercus* spp.), ash (*Fraxinus excelsior*) and birch (*Betula pubescens*)	
Vegetation composition: negative indicator species	Negative indicator species, particularly non-native invasive species, absent or under control	

6.1.5 [1095] Sea Lamprey (*Petromyzon marinus*)

Table 6- 5 Targets and attributes associated with nominated site-specific conservation objectives for [1095] Sea Lamprey (Petromyzon marinus)

Attribute	Target	Assessment
Distribution: extent of anadromy	Greater than 75% of main stem length of rivers accessible from estuary	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the extent of anadromy within the SAC.
Population structure of juveniles	At least three age/size groups present	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any changes to the population structure of juveniles or their density in fine sediment within the SAC.
Juvenile density in fine sediment	Juvenile density at least 1/m²	
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the extent and distribution of spawning habitat within the SAC.
Availability of juvenile habitat	More than 10% of sample sites positive	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the availability of juvenile habitat within the SAC.

6.1.6 [1096] Brook Lamprey (*Lampetra planeri*)

Table 6- 6 Targets and attributes associated with nominated site-specific conservation objectives for [1096] Brook Lamprey (Lampetra planeri)

Attribute	Target	Assessment
Distribution	Access to all water courses down to first order streams	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in distribution within the SAC.
Population structure of juveniles	At least three age/size groups of brook/river lamprey present	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any change of the population structure of juveniles or their density in fine sediment within the SAC.
Juvenile density in fine sediment	Mean catchment juvenile density of brook/river lamprey at least 5/m²	
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the extent and distribution of spawning habitat within the SAC.
Availability of juvenile habitat	More than 50% of sample sites positive	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the availability of juvenile habitat within the SAC.

6.1.7 [1099] River Lamprey (*Lampetra fluviatilis*)

Table 6- 7 Targets and attributes associated with nominated site-specific conservation objectives for [1099] River Lamprey (Lampetra fluviatilis)

Attribute	Target	Assessment
Distribution	Access to all water courses down to first order streams	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in distribution within the SAC.
Population structure of juveniles	At least three age/size groups of river/brook lamprey present	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any change of the population structure of juveniles or their density in fine sediment within the SAC.
Juvenile density in fine sediment	Mean catchment juvenile density of river/brook lamprey at least 5/m²	
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning beds	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the extent and distribution of spawning habitat within the SAC.
Availability of juvenile habitat	More than 50% of sample sites positive	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no

Attribute	Target	Assessment
		potential for the Proposed Development to result in any decline in the availability of juvenile habitat within the SAC.

6.1.8 [1106] Salmon (*Salmo salar*)

Table 6- 8 Targets and Attributes associated with nominated site-specific conservation objectives for [1106] Salmon (Salmo salar)

Attribute	Target	Assessment
Distribution: extent of anadromy	Percentage of river accessible	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the extent of anadromy within the SAC.
Adult spawning fish	Number	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the number of adult spawning and salmon fry or decline in out-migrating smolt or number and distribution of redds within the SAC.
Salmon fry abundance	Number of fry/5 minutes electrofishing	
Out-migrating smolt abundance	Number	
Number and distribution of redds	Number and occurrence	
Water quality	EPA Q value	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in water quality within the SAC.

6.1.9 [1355] Otter (*Lutra lutra*)

Table 6- 9 Targets and Attributes associated with nominated site-specific conservation objectives for [1355] Otter (Lutra lutra)

Attribute	Target	Assessment
Distribution	No significant decline	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the distribution of the otter population for which the SAC is designated.
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 1,936.8ha along river banks/lake shoreline/ around ponds	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in the loss of any supporting habitat anywhere within the SAC.
Extent of freshwater (river) habitat	No significant decline. Length mapped and calculated as 1,246.2km	
Extent of freshwater (lake) habitat	No significant decline. Area mapped and calculated as 2,710.3ha	

Attribute	Target	Assessment
Couching sites and holts	No significant decline	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in couching sites and holts within the SAC.
Fish biomass available	No significant decline	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in available fish biomass within the SAC.
Barriers to connectivity	No significant increase. For guidance, see map 11	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any increase in barriers to connectivity within the SAC.

6.1.10 [1833] Slender Naiad (*Najas flexilis*)

Table 6- 10 Targets and Attributes associated with nominated site-specific conservation objectives for [1833] Slender Naiad (Najas flexilis)

Attribute	Target	Assessment
Population extent	No change to the spatial extent of *Najas flexilis* within the lakes, subject to natural processes. See map 12 for known locations	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any change to the spatial extent of *Najas flexilis* within the lakes associated with this SAC.
Population depth	No change to the depth range of *Najas flexilis* within the lakes, subject to natural processes	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any change to the depth of *Najas flexilis* within the lakes associated with this SAC.
Population viability	No decline in plant fitness, subject to natural processes	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in plant fitness within the SAC.
Population abundance	No change to the cover abundance of *Najas flexilis*, subject to natural processes	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any change to the cover abundance of *Najas flexilis* within the SAC.
Species distribution	No decline, subject to natural processes	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in species distribution within the SAC.
Habitat extent	No decline, subject to natural processes	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result

Attribute	Target	Assessment
		in any decline in species distribution within the SAC.
Hydrological regime: water level fluctuations	Maintain appropriate natural hydrological regime necessary to support the habitat for the species	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the natural hydrological regime necessary to support habitat for the species within the SAC.
Lake substratum quality	Maintain appropriate substratum type, extent and chemistry to support the populations of the species	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any change to appropriate substratum type, extent and chemistry to support the populations of the species within the SAC.
Water quality	Maintain/restore appropriate water quality to support the populations of the species	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in water quality within the SAC.
Acidification status	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the populations of *Najas flexilis*, subject to natural processes	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any change in water and sediment pH, alkalinity and cation concentrations to support *Najas flexilis* within the SAC.
Water colour	Maintain appropriate water colour to support the populations of *Najas flexilis*	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any change in water colour to support *Najas flexilis* within the SAC.
Associated species	Maintain appropriate associated species and vegetation communities to support the populations of *Najas flexilis*	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any change in the appropriate associated species and vegetation communities to support *Najas flexilis* within the SAC.
Fringing habitat: area and condition	Maintain the area and condition of fringing habitats necessary to support the populations of *Najas flexilis*	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the area and condition of fringing habitats necessary to support *Najas flexilis* within the SAC.

6.1.11 [5046] Killarney Shad (*Alosa fallax killarnensis*)

Table 6- 11 Targets and Attributes associated with nominated site-specific conservation objectives for [5046] Killarney Shad (Alosa fallax killarnensis)

Attribute	Target	Assessment
Distribution	Widespread recording during appropriate fish sampling	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no

Attribute	Target	Assessment
	operations (e.g. netting, hydroacoustics); access into inflowing and outflowing rivers for potential spawning migrations	potential for the Proposed Development to result in any decline in distribution within the SAC.
Population structure: age classes	Full range of age classes present	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any change to population structure within the SAC.
Extent and distribution of spawning habitat	No decline in extent and distribution of spawning habitats	Following the implementation of the mitigation as set out in Section 5.2.2 of the NIS, there is no potential for the Proposed Development to result in any decline in the extent and distribution of spawning habitat, water quality or spawning habitat quality within the SAC.
Water quality: oxygen levels	No lower than 5mg/l	
Spawning habitat quality: filamentous algae; macrophytes; sediment	Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth	

6.1.1 Determination on Potential Adverse Effects on Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC [000365]

Based on the above review of the individual QIs and following implementation of best practice and mitigation measures described in Section 5.2.2 of this report, it can be concluded, in view of best scientific knowledge and based on objective information, that the proposed works will not adversely affect this SAC.

6.2 Mullaghanish to Musheramore Mountains SPA [004162]

A site-specific conservation objective supporting document is available for Mullaghanish to Musheramore Mountains SPA [004162] (NPWS, 2022) and the site-specific targets and attributes provided in this document have been assessed below in the following sub-sections.

6.2.1 [A082] Hen Harrier (Circus cyaneus)

Table 6- 12 Targets and attributes associated with nominated site-specific conservation objectives for [A082] Hen Harrier (Circus cyaneus)

Target	Assessment
To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA	Given the nature, scale and location of the Proposed Development and following the site surveys that were undertaken, there is no pathway for adverse effects on the conservation condition of hen harrier associated with the Proposed Development.

6.2.1 Determination on Potential Adverse Effects on Mullaghanish to Musheramore Mountains SPA [004162]

Based on the above review of the individual SCI, given the nature, scale and location of the Proposed Development and following the site surveys undertaken, it can be concluded, in view of best scientific knowledge and based on objective information, that the proposed works will not adversely affect this SPA.

6.3 Conclusion of Residual Impact Assessment

In view of best scientific knowledge, on the basis of objective information, and taking into account all necessary mitigation incorporated into the Proposed Development, there is no potential for adverse effect on the identified QIs and SCIs, and their associated targets and attributes, or on any European Site. All pathways for effect have been robustly blocked through measures to avoid impacts and the incorporation of best practice/mitigation measures into the project design.

It will not prevent the QIs of any European Sites from achieving favourable conservation status in the future as defined in Article 1 of the EU Habitats Directive. A definition of Favourable Conservation Status is provided below:

> *'conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the territory referred to in Article 2;*

The conservation status will be taken as 'favourable' when:

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

Based on the above, it can be concluded in view of best scientific knowledge, on the basis of objective information that the Proposed Development will not adversely affect the QIs/SCIs associated with any European Designated Sites including in particular the following:

- Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC [000365]
- Mullaghanish to Musheramore Mountains SPA [004162]

7. IN-COMBINATION EFFECTS

A search and review in relation to plans and projects that may have the potential to result in cumulative and/or in-combination impacts on European Sites was conducted on the 28th of April 2022. This included a review of online Planning Registers, development plans and other available information and served to identify past and future plans and projects, their activities and their predicted environmental effects.

7.1 Development context – Ecological Plans and Policies

The following development plans been reviewed and taken into consideration as part of this assessment:

- Cork County Development Plan 2022 – 2028
- Kerry County Development Plan 2015-2021
- Kerry County Development Plan 2022 - 2028
- National Biodiversity Action Plan 2017-2021

The review focused on policies and objectives that relate to Natura 2000 sites. Policies and objectives relating to sustainable land use were also reviewed. An overview of the search results with regard to plans is provided in Table 7-1.

7.2 Plans

Table 7- 1 Review of plans

Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on European Sites
Cork County Development Plan 2022 – 2028 Volume 1	**CS 2-5: North Cork Strategic Planning Area** f) Prioritise the adequate provision of water services and transport infrastructure to meet current needs and future population targets while protecting the areas environment; and Protect and enhance the natural heritage of the Blackwater catchment. **BE 15-2 Protect sites, habitats and species** a) Protect all natural heritage sites which are designated or proposed for designation under European legislation, National legislation and International Agreements. Maintain and where possible enhance appropriate ecological linkages between these. This includes Special Areas of Conservation, Special Protection Areas, Marine Protected Areas, Natural Heritage Areas, proposed Natural Heritage Areas, Statutory Nature Reserves, Refuges for Fauna and Ramsar Sites. These sites are listed in Volume 2, Appendix A of the Plan. a) Provide protection to species listed in the Flora Protection Order 2015, on Annexes of the Habitats and Birds Directives, and to animal species protected under the Wildlife Acts in accordance with relevant legal requirements. These species are listed in Volume 2, Appendix A of the Plan. Protect and where possible enhance areas of local biodiversity value, ecological corridors and habitats that are features of the County's ecological network. This includes rivers, lakes, streams and ponds, peatland and other wetland habitats, woodlands, hedgerows, tree lines, veteran trees, natural and semi-natural grasslands as well as coastal and marine habitats. It particularly includes habitats of special conservation significance in Cork as listed in Volume 2 Appendix A of the Plan.	The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the biodiversity, protected species and designated sites. The Proposed Development has been designed in order to avoid likely significant effect on areas of ecological importance. Where the potential for adverse effect on areas of ecological importance has been identified mitigation will be implemented. Where pathways for effect on Designated Sites have been identified, mitigation shall be implemented. No potential for negative cumulative impacts when considered in conjunction with the current proposal were identified. No developments or projects identified within the Development Plan were found to occur in the wider area surrounding the Proposed Development.
Kerry County Development Plan 2015-2021	NE-2 Ensure that the requirements of relevant national and EU legislation, including the Habitats Directive (92/43/EEC), the EU (Birds) Directive (79/409/EEC), the Environmental Impact Assessment Directive (85/337/EEC), the Water Framework Directive (2000/60/EC), and the Flood Directive (2007/60/EC), are met by the Council in undertaking its functions.	The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the biodiversity, protected species and designated sites.

Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on European Sites
	NE-11 Ensure that all projects likely to have a significant effect on a Natura 2000 / European site will be subject to Habitats Directive Assessment prior to approval. NE-12 Ensure that no projects which will be reasonably likely to give rise to significant adverse direct, indirect or secondary impacts on the integrity of any Natura 2000 sites having regard to their conservation objectives, shall be permitted on the basis of this Plan (either individually or in combination with other plans or projects) unless imperative reasons of overriding public interest can be established and there are no feasible alternative solutions. NE-13 Maintain the nature conservation value and integrity of all Natural Heritage Areas (NHAs), proposed Natural Heritage Areas (pNHAs), Nature Reserves and Killarney National Park. This shall include any other sites that may be designated at national level during the lifetime of the plan in co-operation with relevant state agencies NE-15 Achieve water quality targets by implementing the River Basin Management Plans (and associated programmes of measures) and to ensure that development undertaken or permitted by local authorities; other public agencies or private operators, shall not contravene the objectives of the Water Framework Directive, the European Communities Environmental Objectives (Surface Waters) Regulations 2009 SI 272 of 2009 and the European Communities Environmental Objectives) Groundwaters) Regulations 2010, SI 9 of 2010. NE-16 (a) Promote the protection of Protected Areas as outlined in Annex (IV) of the Water Framework Directive and the application of relevant Government Guidance in this area. Implement Sub-basin (b) Management Plans in accordance with the Fresh Water Pearl Mussel Regulations (SI 296 of 2009). NE-19 Ensure that planning applications are assessed with regard to the Groundwater Protection Scheme and the likely impacts the development may have on groundwater quality. Development considered inappropriate by the Council will be prohibited in the vicinity of important aquifers. Cumulative impacts shall also be taken into consideration. NE-22 Protect rivers, streams and other watercourses including those outside Protected Areas and maintain them where possible in an open state capable of providing suitable habitat for fauna and flora and to work with other	The Proposed Development has been designed in order to avoid likely significant effect on areas of ecological importance. Where the potential for adverse effect on areas of ecological importance has been identified mitigation will be implemented. Where pathways for effect on Designated Sites have been identified, mitigation shall be implemented. No potential for negative cumulative impacts when considered in conjunction with the current proposal were identified. No developments or projects identified within the Development Plan were found to occur in the wider area surrounding the Proposed Development.

Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on European Sites
	agencies, as appropriate, to prevent the spread of invasive species in or along the county's aquatic habitats by implementing biosecurity measures, where appropriate.	
Kerry County Development Plan 2022 - 2028	It is an Objective of the council to: **KCDP 11-1 -** Ensure that the requirements of relevant EU and national legislation, are complied with by the Council in undertaking its functions, including the requirements of the EU Birds and Habitats Directives. **KCDP 11-2 -** Maintain the nature conservation value and integrity of Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs). This shall include any other sites that may be designated at national level during the lifetime of the plan in co-operation with relevant state agencies. **KCDP 11-3** - Work with all stakeholders in order to conserve, manage and where possible enhance the County's natural heritage including all habitats, species, landscapes and geological heritage of conservation interest and to promote increased understanding and awareness of the natural heritage of the County. **KCDP 11-5** - Support and facilitate the actions in the National Biodiversity Action Plan and Kerry County Councils Biodiversity Action Plan 2022 – 2028. **KCDP 11-14** - Ensure invasive species are managed in compliance with the provisions of the EC (Birds and Habitats) Regulations (SI 477 of 2011), as amended, particularly Sections 49, 50 and the Third Schedule. Best practices, as produced and updated by relevant authorities, are to be adhered to in the management of invasive species particularly on sites proposed for development. **KCDP 11-19 -** Encourage and facilitate the retention and creation of features of local biodiversity value, ecological corridors and networks that connect areas of high conservation value such as watercourses, woodlands, hedgerows, earth banks and wetlands. **KCDP 11-21 -** Promote the integration and improvement of natural watercourses in development proposals having regard to the IFI's guidance Planning for Watercourses in the Urban Environment. **KCDP 11-26 -** Work with stakeholders to protect and sustainably enhance the biodiversity and where appropriate the landscape and recreational interests of woodlands in the County.	The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the biodiversity, protected species and designated sites. The Proposed Development has been designed in order to avoid likely significant effect on areas of ecological importance. Where the potential for adverse effect on areas of ecological importance has been identified mitigation will be implemented. Where pathways for effect on Designated Sites have been identified mitigation shall be implemented. No potential for negative cumulative impacts when considered in conjunction with the current proposal were identified. No developments or projects identified within the Development Plan were found to occur in the wider area surrounding the Proposed Development.

Plans	Key Policies and Objectives directly related to European Sites and Biodiversity in the Zone of Influence	Assessment of Potential Impact on European Sites
National Biodiversity Action Plan 2017-2021	**Objective 1 -** Mainstream biodiversity into decision-making across all sectors Developments in the area of Green Infrastructure are being initiated at the local and regional level. Green Infrastructure is a strategically planned network of natural and semi natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services such as water purification, air quality, space for recreation and climate mitigation and adaptation. **Objective 4 -** Conserve and restore biodiversity and ecosystem services in the wider countryside **Target 6.2** - Sufficiency, coherence, connectivity, and resilience of the protected areas network substantially enhanced by 2020.	The Plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to the biodiversity, protected species and designated sites. The Proposed Development has been designed in order to avoid any potential fragmentation of habitats or commuting corridors. No potential for negative cumulative impacts when considered in conjunction with the current proposal were identified.

7.3 Other Projects

Assessment material for this in-combination impact assessment was compiled on the relevant developments within the vicinity of the Proposed Development and was verified on the 13th June 2022. The material was gathered through a search of relevant online Planning Registers, reviews of relevant documents, planning application details and planning drawings, and served to identify past and future projects, their activities and their environmental impacts. All relevant projects were considered in relation to the potential for in-combination effects. All relevant data was reviewed (e.g. individual EISs/EIARs, layouts, drawings etc.) for all relevant projects. These are listed below.

7.3.1 Projects considered in the Cumulative Impact Assessment

The Proposed Development was assessed for the potential to result in adverse effects on European Sites when considered in combination with other projects and land uses. The potential for such cumulative effects was considered in relation to numerous projects, that were located in the vicinity of the Proposed Development or where a pathway for cumulative effect could be identified. The most relevant projects are listed below and were considered on a precautionary basis due to their physical proximity to the proposed works and their potential to result in additional pathways for effect (other than water pollution and disturbance) than had been previously identified when the Proposed Development was considered individually.

As the Proposed Development constitutes supporting infrastructure for the Permitted Development (Knocknamork Renewable Energy Development, Granted planning permission by Cork County Council on 2nd January 2020 (Pl. Ref. No. 19/4972)), other wind energy developments in the area are considered in this cumulative assessment. Although there are no wind turbines associated with the Proposed Development, it is associated with renewable energy production and the potential for similar types of impact which could compound one another was identified. All wind farms within a distance of 1km of the Proposed Development were considered to be within the Zone of Influence. This distance has been derived on a highly precautionary basis following an assessment of the nature and scale of the works and considering the lack of a pathway for significant cumulative effects to occur as a result of the proposed works at distances greater than 1km. Other, non-wind related projects within 200m of the Proposed Development were also assessed and are listed below. This was derived based on the nature and scale of both the Proposed Development and the surrounding planning applications, it was considered that there was no potential for significant additional cumulative effects to occur at a distance of over 200m and that this was an appropriate and conservative zone of influence.

All planning applications which are recorded as being within the EIAR Study Area are set out in Table 7-2 below. It reflects the fact that the Proposed Development forms part of a larger wind development project and assess the other similar developments in the vicinity. The developments that have not been listed previously in Table 7-2 are listed in Table 7-3. Table 7-4 below sets out those valid planning applications within a 200m buffer of the Proposed Development which are not renewable energy projects.

The Proposed Development was also considered in combination with other land uses in the surrounding area, which include commercial forestry, pastoral agriculture and turf cutting.

Table 7- 2 Planning Applications within EIAR Study Area made within the last 5 years.

Pl.Ref	Description	Decision
18/6438	The proposed development will comprise the construction of one (1) no. ± 100 Mvar STATCOM transformer, one (1) no. auxiliary transformer, three (3) no. reactors, one (1) no. outdoor cooling bank, control and valve building (268m²), underground connection to existing ESB substation. It further includes security fencing, security gate, four (4) no. 25m high lightning masts, permeable surfacing, and an internal access road. There will also be the construction of one (1) no. temporary contractors' compound. The development is an extension to the existing substation and the overall site area (within the planning application boundary) is 0.73ha. Access is provided via a local road (L5226) onto the R582.	Granted by CCC 07/03/2019
18/4182	A battery energy storage facility which will comprise of rechargeable battery units contained within up to 39 No. 40 foot containers on site and the associated development of unit substations, a 110 kV substation and associated site works.	Granted by CCC 15/01/2019
20/5281	Proposed modifications to the previously permitted development (planning ref: 18/06438 granted on 7th March 2019).The proposed modifications will comprise the additional construction of one (1) harmonic filter, one (1) HV circuit breaker (including CT and VT), one (1) MV disconnector and earth switch, two (2) cable sealing ends, three (3) additional lightning masts (approximately 25m high) and additional lamppost lightning. It further includes a retaining wall (approximately 2.5m high), asphalt (non-permeable) surfacing, additional permanent access road, additional fencing to match existing 2.6m high palisade, additional permanent access gate and all other ancillary site development works. The development will remain an extension to the existing substation and this extension will have an overall site area (within the planning application boundary) of 0.73ha. Access will continue to be provided via a L5226 and the R582.	Granted by CCC 21/09/2020

Table 7- 3 Wind energy applications Within 1km of the Proposed Development

Pl.Ref	Description	Decision
Clydaghroe Wind Farm – Currently Operational		
04/3152	Develop a Wind Farm to include 2 wind turbines and service roadways. An Environmental Impact Statement has been included.	Granted by KCC 16/11/2004
06/1680	Construct a wind farm, the development will consist of two wind turbines, two transformers, a control and metering building, a meteorological mast, site tracks and all associated works.	Granted by KCC 11/08/2006
06/91680	Extension of Duration – Complete Windfarm.	Granted by KCC 05/07/2011

Pl.Ref	Description	Decision
07/306	The development will consist of 1 wind turbine and service roadway. EIS Submitted.	Granted by KCC 25/04/2007
10/1302	Construct a single turbine extension to an existing three turbine wind farm.	Refused by KCC Granted by An Bord Pleanála (Ref: 238677) 21/07/2011
Caherdowney Wind Farm – Currently Operational		
03/3079	Windfarm to include 4 no. turbines, meteorological mast, transformers,38kv substation, control building, site tracks and associated works.	Granted by CCC 31/10/2003 Fully constructed
08/9493	Extension of Duration - Completion of windfarm to include 4 no. turbines, meteorological mast, transformers,38kv substation, control building, site tracks and associated works granted under pl.reg.no. 03/3079 (New permission to expire on 30/10/2011).	Granted by CCC 05/12/2008
11/4391	Extension of Duration - Completion of windfarm to include 4 no. turbines, meteorological mast, transformers, 38KV substation, control building, site tracks and associated works permitted under Planning Reg. Nos. 03/3079 and subsequently extended under Planning Reg. No. 08/9493.	Granted by CCC 26/04/2011.
Curragh Wind Farm – Currently Operational		
07/10105	Windfarm development comprising of 8 no. wind turbines, substation, meteorological mast, associated access roads, borrow pit and associated works.	Granted by CCC 21/08/2008.
Gneeves Wind Farm – Currently Operational		
99/616	15.6 MW windfarm to incl. 13 turbines, 45m high measuring mast, control building, hard standing areas, compound, access roads, signs & anc. site works.	Granted by CCC 15/09/1999
03/6585	Modifications to windfarm permitted under Reg. No. N/99/0616 to include increase of the turbine height from 44m to 65m.	Granted by CCC 29/03/2004
04/188	Extension to windfarm permitted under reg. no. N/99/0616 to consist of 4 no. wind turbines (hub height 65m, blade tip 91m), construction of an extension of internal site tracks and associated works.	Granted by CCC 16/08/2004
08/5636	Extension of Duration - Completion of wind farm (13 no. turbines) granted under pl. reg. no. 99/0616 and modified under pl. reg. no. 03/6585.	Granted by CCC 01/07/2008

Pl.Ref	Description	Decision
13/4566	Completion of windfarm (13 no. turbines), extension of duration to permission granted under Planning Reg. No. N/99/0616, modified under Planning Reg. No 03/6585 and which received an extension of duration under Planning Reg. No. 08/5636.	Granted by CCC 24/05/2013
13/5717	Ten year planning permission for an extension to existing Gneeves Wind Farm (Planning Refs. 99/0616, 03/6585, 04/1355, 04/0188, 08/5636, 13/4566). The proposed extension will comprise of 3no. turbines (each with a maximum tip height of 91m), a borrow pit, new internal access roads, upgrading of existing internal access roads, underground cables, an extension to the existing substation building with a wastewater holding tank and ancillary works.	Granted by CCC
Knocknamork Wind Farm – Not yet constructed		

Pl.Ref	Description	Decision
19/4972	Renewable energy development consisting of the provision of a 7 turbine wind farm, solar photovoltaic array, electricity substation, battery storage compound and all associated works consisting of the following, i. Up to 7 wind turbines with an overall blade tip height of up to 150 metres and all associated foundations and hard-standing areas; ii. Up to 70,000sq.m solar photovoltaic array, with up to 17 associated inverters and 2 no. control cabins; iii. 1 no. borrow pit, iv. 1 No. permanent meteorological mast with a maximum height of up to 100 meters; v. Upgrade of existing and provision of new site access roads, vi. 1 no. 38kV electrical substation with 1 no. control building with welfare facilities, associated electrical plant and equipment security fencing and waste water holding tank; vii battery storage compound accommodating 4 no. battery storage containers, security fencing, and associated electrical plant and equipment, viii. Forestry felling ix. 1 no. temporary construction compound, x. Site drainage xi. All associated internal underground cabling; xii. 38kV underground grid connection cabling; xiii. All associated site development and ancillary works. The proposed development will have an operational life of 30 years from the date of commissioning of the development and the application seeks a ten year planning permission.	Granted by CCC 18/11/2019.

Table 7- 4 Other Applications in 200m of the Proposed Development

Pl.Ref	Description	Decision
18/5686	Construction of a battery storage compound including 2 no. battery storage buildings with associated plant and equipment, an ancillary 110kV electricity substation with 2 no. control buildings, associated electrical plant & equipment and fencing, underground electricity cabling, surface water drainage, site entrance and access track, security fencing and all ancillary site works.	Granted by CCC, 15/02/2019

Pl.Ref	Description	Decision
20/5281	Proposed modifications to the previously permitted development (planning ref: 18/06438 granted on 7th March 2019).The proposed modifications will comprise the additional construction of one (1) harmonic filter, one (1) HV circuit breaker (including CT and VT), one (1) MV disconnector and earth switch, two (2) cable sealing ends, three (3) additional lightning masts (approximately 25m high) and additional lamppost lightning. It further includes a retaining wall (approximately 2.5m high), asphalt (non-permeable) surfacing, additional permanent access road, additional fencing to match existing 2.6m high palisade, additional permanent access gate and all other ancillary site development works. The development will remain an extension to the existing substation and this extension will have an overall site area (within the planning application boundary) of 0.73ha. Access will continue to be provided via a L5226 and the R582.	Granted by CCC, 21/09/2020

7.3.2 Conclusion of Cumulative Assessment

In the absence of mitigation, the potential for the Proposed Development to contribute to in combination effects on water quality within the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC [000365] was identified and considered.

Similarly, following the precautionary principle, the potential for the Proposed Development to contribute to in combination disturbance/displacement effects on SCI bird species associated with the Mullaghanish to Musheramore Mountains SPA [004162] and for otter associated with the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC [000365] was identified and considered.

Following the implementation of the mitigation measures outlined in Section 5.2.2 of this report, in the 'Water' Chapter of the EIAR (Appendix 3 of this NIS), and in the CEMP (Appendix 4-3 in the 'Description' Chapter of the EIAR, Appendix 2 of this NIS), all potential pathways for effect have been robustly blocked. There is therefore no potential for the Proposed Development to contribute to any effect on European Sites when considered on its own and therefore, no potential for cumulative or in combination effects in respect of water pollution, when considered with other plans and projects. Similarly, following detailed site surveys, potential for in combination disturbance/displacement effects can be excluded.

Table 7-5 below considers whether the Proposed Development has the potential to result in adverse effects on the integrity of any European Site when considered in combination with other plans and projects.

Table 7- 5 Integrity of site checklist and assessment for European Sites

Does the project have the potential to:	Assessment	Residual Impact: Yes/No
Conservation objectives		
Cause delays in progress towards achieving the conservation objectives of the site?	The potential for the Proposed Development to cause delays or interrupt progress towards achieving the conservation objectives of the European Sites was considered in relation to the relevant QIs and SCI species for the Screened in European Sites. All potential pathways for effect have been effectively and robustly blocked through the implementation of a suite of mitigation and best practice measures. When considered cumulatively with other developments and land uses in the area, there is no potential for the Proposed Development to cause delays in progress towards achieving the conservation objectives of the site.	No
Interrupt progress towards achieving the conservation objectives of the site?	The potential for the Proposed Development to cause delays or interrupt progress towards achieving the conservation objectives of the European Sites was considered in relation to the relevant QIs and SCI species for the Screened in European Sites. All potential pathways for effect have been effectively and robustly blocked through the implementation of a suite of mitigation and best practice measures. When considered cumulatively with other developments and land uses in the area, there is no potential for the Proposed Development to interrupt progress towards achieving the conservation objectives of the site.	No

Does the project have the potential to:	Assessment	Residual Impact: Yes/No
Disrupt those factors that help to maintain the favourable conditions of the site?	The potential for the Proposed Development to cause delays or interrupt progress towards achieving the conservation objectives of the European Sites was considered in relation to the relevant QIs and SCI species for the Screened in European Sites. All potential pathways for effect have been effectively and robustly blocked through the implementation of a suite of mitigation and best practice measures. When considered cumulatively with other developments and land uses in the area, there is no potential for the Proposed Development to disrupt those factors that help to maintain the favourable conditions of the site.	No
Interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	The potential for the Proposed Development to cause delays or interrupt progress towards achieving the conservation objectives of the European Sites was considered in relation to the relevant QIs and SCI species for the Screened in European Sites. All potential pathways for effect have been effectively and robustly blocked through the implementation of a suite of mitigation and best practice measures. When considered cumulatively with other developments and land uses in the area, there is no potential for the Proposed Development to interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site.	No
Other Indicators		
Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem?	The potential for the Proposed Development to cause delays or interrupt progress towards achieving the conservation objectives of the European Sites was considered in relation to the relevant QIs and SCI species for the Screened in European Sites. All potential pathways for effect have been effectively and robustly blocked through the implementation of a suite of mitigation and best practice measures. When considered cumulatively with other developments and land uses in the area, there is no potential for the Proposed Development to cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem.	No
Change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or	The potential for the Proposed Development to cause delays or interrupt progress towards achieving the conservation objectives of the European Sites was considered in relation to the relevant QIs and SCI species for the Screened in European Sites. All potential pathways for effect have been effectively and robustly blocked through the implementation of a suite of mitigation and best practice measures. When considered cumulatively with other developments and land uses in the area, there is no potential for the Proposed Development to change the dynamics of the relationships (between, for example,	No

Does the project have the potential to:	Assessment	Residual Impact: Yes/No
function of the site?	soil and water or plants and animals) that define the structure and/or function of the site.	
Interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	The potential for the Proposed Development to cause delays or interrupt progress towards achieving the conservation objectives of the European Sites was considered in relation to the relevant QIs and SCI species for the Screened in European Sites. All potential pathways for effect have been effectively and robustly blocked through the implementation of a suite of mitigation and best practice measures. When considered cumulatively with other developments and land uses in the area, there is no potential for the Proposed Development to interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition).	No
Reduce the area of key habitats?	The potential for the Proposed Development to cause delays or interrupt progress towards achieving the conservation objectives of the European Sites was considered in relation to the relevant QIs and SCI species for the Screened in European Sites. All potential pathways for effect have been effectively and robustly blocked through the implementation of a suite of mitigation and best practice measures. When considered cumulatively with other developments and land uses in the area, there is no potential for the Proposed Development to reduce the area of key habitats.	No
Reduce the population of key species?	The potential for the Proposed Development to cause delays or interrupt progress towards achieving the conservation objectives of the European Sites was considered in relation to the relevant QIs and SCI species for the Screened in European Sites. All potential pathways for effect have been effectively and robustly blocked through the implementation of a suite of mitigation and best practice measures. When considered cumulatively with other developments and land uses in the area, there is no potential for the Proposed Development to reduce the population of key species.	No
Change the balance between key species?	The potential for the Proposed Development to cause delays or interrupt progress towards achieving the conservation objectives of the European Sites was considered in relation to the relevant QIs and SCI species for the Screened in European Sites. All potential pathways for effect have been effectively and robustly blocked through the implementation of a suite of mitigation and best practice measures. When considered cumulatively with other developments and land uses in the area, there is no potential for the Proposed Development to change the balance between key species.	No

Does the project have the potential to:	Assessment	Residual Impact: Yes/No
Reduce diversity of the site?	The potential for the Proposed Development to cause delays or interrupt progress towards achieving the conservation objectives of the European Sites was considered in relation to the relevant QIs and SCI species for the Screened in European Sites. All potential pathways for effect have been effectively and robustly blocked through the implementation of a suite of mitigation and best practice measures. When considered cumulatively with other developments and land uses in the area, there is no potential for the Proposed Development to reduce diversity of the site.	No
Result in disturbance that could affect population size or density or the balance between key species?	The potential for the Proposed Development to cause delays or interrupt progress towards achieving the conservation objectives of the European Sites was considered in relation to the relevant QIs and SCI species for the Screened in European Sites. All potential pathways for effect have been effectively and robustly blocked through the implementation of a suite of mitigation and best practice measures. When considered cumulatively with other developments and land uses in the area, there is no potential for the Proposed Development to result in disturbance that could affect population size or density or the balance between key species.	No
Result in fragmentation?	The potential for the Proposed Development to cause delays or interrupt progress towards achieving the conservation objectives of the European Sites was considered in relation to the relevant QIs and SCI species for the Screened in European Sites. All potential pathways for effect have been effectively and robustly blocked through the implementation of a suite of mitigation and best practice measures. When considered cumulatively with other developments and land uses in the area, there is no potential for the Proposed Development to result in fragmentation.	No
Result in loss or reduction of key features (e.g. tree cover, tidal exposure, annual flooding, etc.)?	The potential for the Proposed Development to cause delays or interrupt progress towards achieving the conservation objectives of the European Sites was considered in relation to the relevant QIs and SCI species for the Screened in European Sites. All potential pathways for effect have been effectively and robustly blocked through the implementation of a suite of mitigation and best practice measures. When considered cumulatively with other developments and land uses in the area, there is no potential for the Proposed Development to result in loss or reduction of key features (e.g. tree cover, tidal exposure, annual flooding, etc.).	No

In the review of the projects that was undertaken, no connection, that could potentially result in additional or cumulative impacts was identified. Neither was there any potential for different (new) impacts resulting from the combination of the various projects and plans in association with the Proposed Development.

Taking into consideration the reported residual impacts from other plans and projects in the area and the predicted impacts with the current proposal, no residual cumulative impacts have been identified with regard to any European Site.

8. CONCLUSION

This NIS has provided an assessment of all potential direct or indirect adverse effects on European Sites whether considered individually or in combination with other plans and projects.

Where the potential for any adverse effect on any European Site has been identified, the pathway by which any such effect may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within this report and its appendices. The measures ensure that the construction and operation of the Proposed Development will not adversely affect the integrity of any European Sites.

Therefore, it can be objectively concluded that the Proposed Development, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site.

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APPENDIX 1

ARTICLE 6 (3) APPROPRIATE ASSESSMENT SCREENING REPORT – PROPOSED SUBSTATION, UNDERGROUND CABLING & ACCESS ROADS TO KNOCKNAMORK RENEWABLE ENERGY DEVELOPMENT

APPENDIX 2

CHAPTER 4 - DESCRIPTION OF THE PROPOSED DEVELOPMENT

APPENDIX 3

CHAPTER 8 - HYDROLOGY & HYDROGEOLOGY