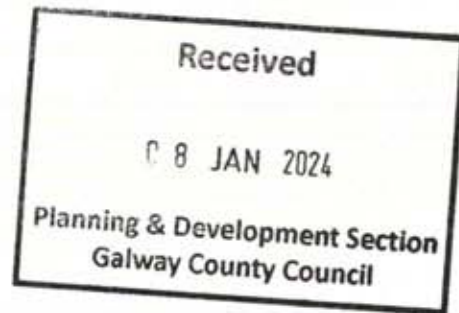


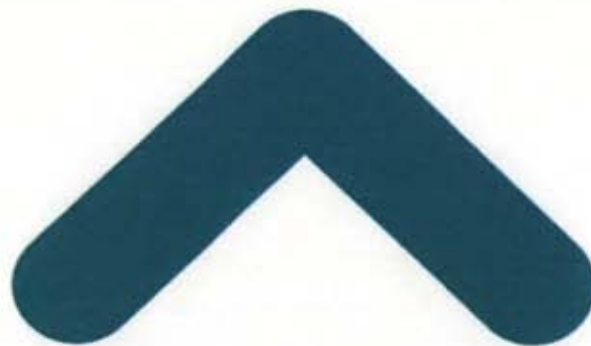


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Construction and Environmental Management Plan

Derryclare Wild Western
Peatlands Project



East Africa
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DOCUMENT DETAILS

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Project Number: **210603**

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Prepared By: **MKO
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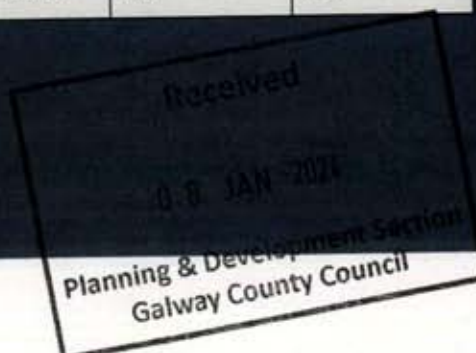


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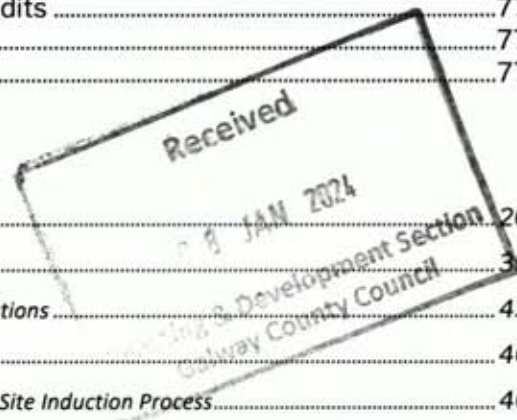




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1.

INTRODUCTION

This Construction & Environmental Management Plan (CEMP) has been prepared by MKO on behalf of Coillte Nature who intend to submit a planning application to Galway County Council for proposed restoration works at the Coillte property at Derryclare (project site), Co. Galway.

The CEMP provides the environmental management framework to be adhered to during the pre-commencement and construction phases of the restoration works and it incorporates the mitigating principles to ensure that the work is carried out in a way that minimises the potential for any environmental impacts to occur. The CEMP has been informed by and takes account of the accompanying documents which have been prepared for the Proposed Project.

All measures identified in this Construction Environmental Management Plan, which will be finalised subsequent to any permission granted and updated prior to construction will include all mitigation measures identified to be adhered to during the pre-commencement and construction phases of the development.

The CEMP to be prepared by the appointed contractor will be a single, amalgamated document that can be used during the construction phase of the project, as a single consolidated point of reference relating to all construction, environmental and drainage requirements for the Planning Authority, developer and contractors alike. The CEMP may evolve over further iterations as the construction works progress, but at all times must meet or exceed the standards and requirements set out in this document. It will be the contractor's current version of the CEMP, which at any point in time, will guide the construction activities on site and the implementation of which will be audited during construction by the Coillte Site Manager/Environmental Manager.

1.1

Background to the Development

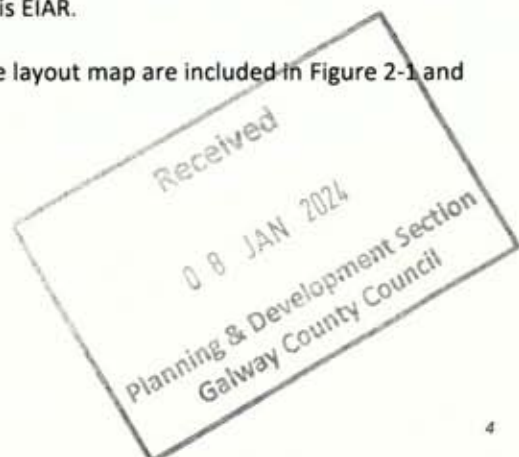
A Description of the Project Report prepared by MKO outlines the following processes of the proposed peatland restoration.

The Proposed Project involves the felling of 343 hectares of coniferous forestry in various stages of the forestry cycle. The Proposed Project will restore up to 281 hectares of peatland habitat (blanket bog and wet heath) in the felled area. Peatland restoration is one of the primary nature-based solution to the biodiversity and climate crisis in Ireland, as blanket bogs accumulate and store carbon as well as possessing unique habitats with high biodiversity value.

These peatlands also store and filter water, playing a vital role in the management of water catchments. The Proposed Project will also include the establishment of up to 62 hectares of native pioneer woodland on areas cleared of coniferous forestry.

The proposed new native woodland will be established adjoining the existing Derryclare Nature Reserve, where appropriate, thereby maximising biodiversity, water and climate benefits. A detailed description of the project and the proposed harvesting, peatland restoration, and native woodland establishment techniques are provided in Chapter 4 of this EIAR.

All works will be completed within the confines of the site layout map are included in Figure 2-1 and Figure 2-2 below.



Scope of the Construction and Environmental Management Plan

This report is presented as a guidance document for the management of construction activities and waste materials generated during the proposed restoration works and following completion. It clearly outlines the mitigation measures that are required to be adhered to in order to manage activities and waste materials in an appropriate manner.

The report is divided into Seven sections as outlined below:

- Section 1 provides a brief introduction as to the scope of the report.
- Section 2 outlines the Site and Project details, detailing the objectives of this plan along with providing an overview of construction methodologies that will be adopted throughout the project.
- Section 3 sets out details of the environmental controls on site which addresses, water quality protection measures, invasive species management, waste management, and noise and dust controls.
- Section 4 sets out a fully detailed implementation plan for the environmental management of the project outlining the roles and responsibilities of the project team. The Emergency Response Plan to be adopted in the event of an emergency with respect to site health and safety, and environmental protection is also included in this section.
- Section 5 consists of a summary table of all mitigation proposals to be adhered to during the project.
- Section 6 consists of a summary table of all monitoring proposals to be adhered to during the project.
- Section 7 outlines the proposals for reviewing compliance with the provisions of this report.



2.

SITE AND PROJECT DETAILS

2.1

Site Location and Development Description

The Coillte property at Derryclare (project site) lies to the west of Lough Inagh and Derryclare Lough in Connemara, Co. Galway, north of the Galway to Clifden Road (N59). The Derryclare property extends to approximately 571 Hectares (ha) on the western slopes of Derryclare and Bencorr mountains. The site is located in the townlands of Derryclare and Cloonnacartan in County Galway.

During the construction phase, the site will be accessed via the existing entrance off R344 road from the N59 at Recess to the N59 at Kylemore which runs in a north-south directions along the eastern side of the site in the townland of Glenard. The R344 connects to the N59 approximately 2km south of the site entrance. All timber extracted from the site will be transported from the R344 to the N59. Following the completion of restoration works at the site, the site entrance will also be used for monitoring and maintenance activities, ongoing forestry activities on the property, and by the visiting public.

The Proposed Project site is drained by the Derryclare stream and other unnamed first order streams, which discharge into Lough Inagh and Derryclare Lough, both of which are designated as pNHA and are adjacent to the Proposed Project site. Therefore, there is potential for indirect impacts on this pNHA via deterioration in water quality arising from the runoff of pollutants into surface water systems, during the construction phase of the Proposed Project.

There is upstream hydrological connectivity between this Designated Site and the Proposed Project site via the Tooreenacoon stream and other unnamed first order streams which discharge into Lough Inagh and Derryclare Lough. Therefore, there is potential for indirect impacts on this pNHA via deterioration in water quality arising from the runoff of pollutants into surface water systems, during the construction phase of the Proposed Project.

The Proposed Project site drains into Lough Inagh and Derryclare Lough, to the east, both of which are located within the Ballynahinch WFD hydrological catchment. A search of the wdfish.ie website on the 04/11/2022 found Inland Fisheries Ireland (IFI) Fish stock survey reports for surveys carried out in 2019. These are summarized below.

The Proposed Project site is partially located within the Twelve Bens/Garraun Complex SAC [002031]. There is upstream hydrological connectivity to the Maumturk Mountains SAC [002008] and downstream hydrological connectivity to the Connemara Bog Complex SAC [002034].

A layout of the site once the proposed restoration works are carried out is shown in Figure 2-2 below.

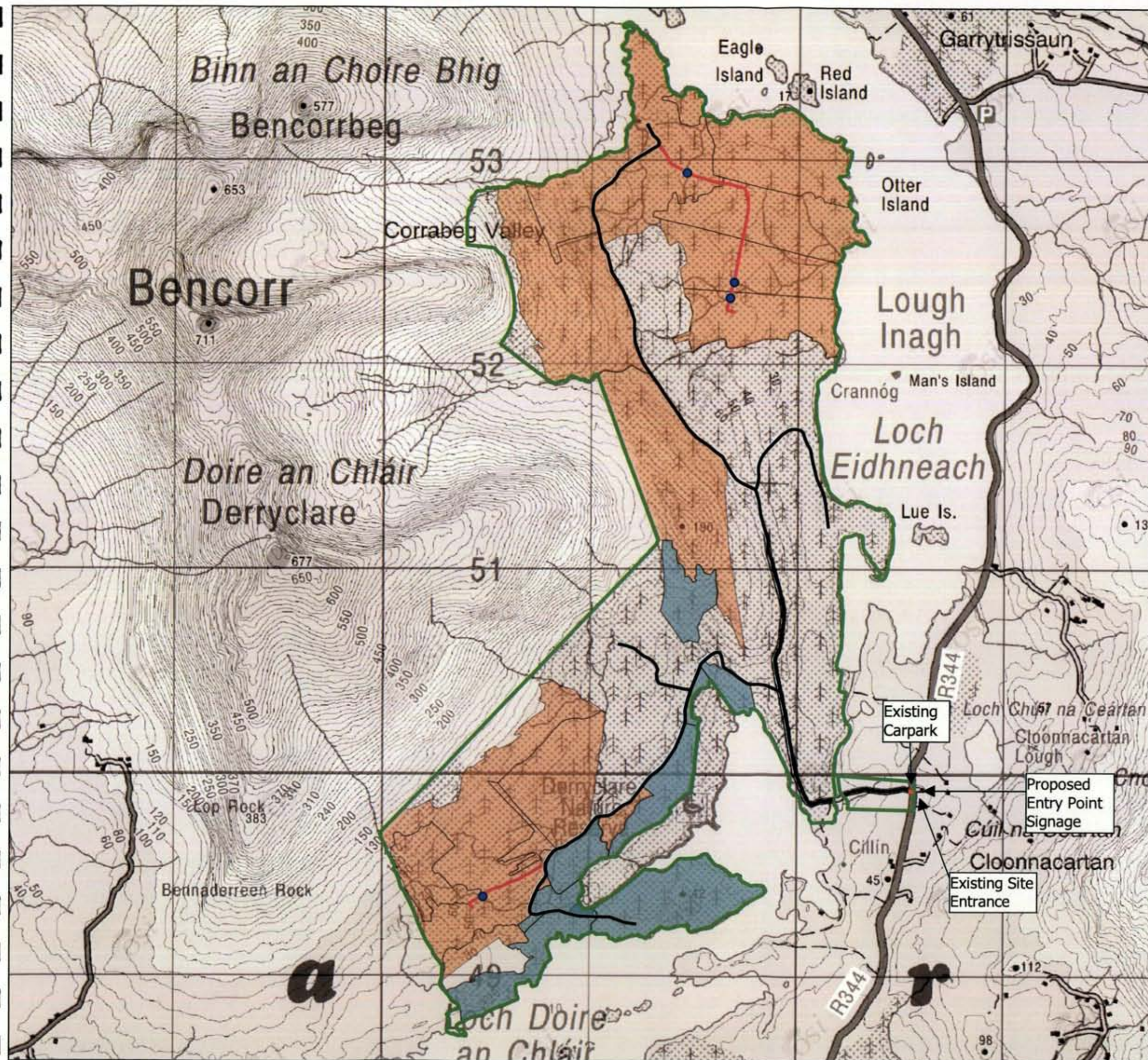
2.2

Objectives

The following key objectives will inform the final detailed design should the Proposed Project secure planning permission and proceed to the construction phase:

- Ensure the construction phase impact of restoration work is kept to a minimum on the local environment, watercourses and wildlife;
- Comply with all relevant water quality legislation;
- Ensure restoration works and activities are completed in accordance with mitigation and the best practice approach presented in the Environmental Impact Assessment Report (EIAR) and associated planning documentation;
- Ensure restoration works and activities are completed in accordance with all planning conditions for the project;

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Map Legend

- Derryclare Site
- Proposed Native Woodland
- Proposed Peatland Restoration
- Existing Forest Road
- Proposed Road Extension
- Watercourse Crossings
- Existing Carpark



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Drawing Title Project Site Layout	
Project Title Derryclare Wild Western Peatland Project	
Drawn By ER	Checked By TB
Project No. 210603	Drawing No. Figure 2-2
Scale 1:18,000	Date 2023-02-14



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2.3 Key Environmental Sensitivities

2.3.1 Existing Geological Environment

The published soils and subsoils map (www.epa.ie) for the local area shows that the project site is predominantly overlain by blanket peat (BktPt) with some acid shallow, rocky, peaty mineral soil (AminSRPT) located on the higher ground in the west and along the western shores of Derryclare Lough in the south of the project site as well as on Bencorr and Derryclare Mountains to the west of the project site. The north of the project site, along the western shores of Lough Inagh, is underlain by blanket peat (BktPt). Other soils mapped within the project site include acid deep well drained mineral soils (AminDW) in the southwest.

Further south, till derived from metamorphic rocks (TMp) is mapped along the western shores of Derryclare Lough. Meanwhile, bedrock outcrop or subcrop (Rck) is mapped on the elevated ground in the west of the project site and on Derryclare and Bencorr Mountains. A total of 117 no. peat probes have been completed at the project site. Where present the peat depths range from 0.1 – 4.7m with an average peat depth of 1.17m. 59% of the probes completed at the project site encountered peat depths less than 1m, while 81% recorded peat depths less than 2m. During these site investigations the peat was found to be underlain by till (silts, clays, sands and gravels) or solid bedrock.

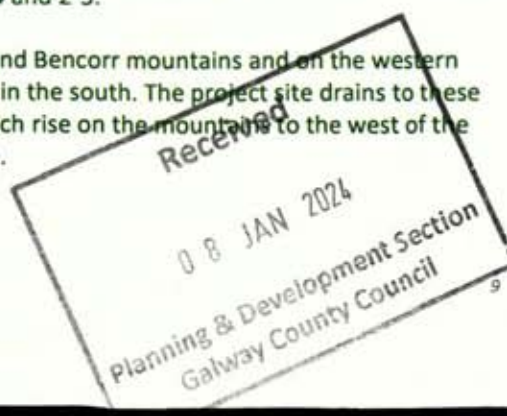
An analysis of peat stability was completed at 432 no. locations at the project site. The purpose of the analysis was to the Factor of Safety (FoS) of the peat slopes. The findings of the peat stability assessment showed that the project site (harvest blocks, new and existing roads) generally has an acceptable margin of safety, is at low risk of peat failure and is suitable for the Proposed Project. The Geotechnical and Peat Stability Assessment Report (FT, 2023) includes control measures for the proposed works to ensure that all works adhere to an acceptable standard of safety Impact on SACs and SPAs.

2.3.2 Existing Hydrological Environment

Regionally the project site is located in the Galway Bay North WFD catchment and Hydrometric area 31 of the Western River Basin District.

Locally, the project site is located within the Recess river sub-catchment (Recess_SC_010) and the Recess_020 WFD river sub-basin. In the vicinity of the project site, EPA mapping shows several watercourses (mountain streams) originating on the eastern slopes of Bencorr and Derryclare Mountains. In the north of the project site, these watercourses are unnamed and flow to the east from Bencorr Mountain into Lough Inagh. To the south, the Derryclare stream (EPA Code: 31D10) flows to the east from Derryclare Mountain and discharges into Lough Inagh. Further south, 3 no. unnamed streams rise on the slopes of Derryclare mountain and flow to the southeast, discharging into Derryclare Lough. Derryclare Lough itself is also fed by the Tooreenacoona river (EPA Code: 31T01) which provides a hydrological connection between Lough Inagh in the north to Derryclare Lough in the south. Downstream of Derryclare Lough, the Recess River (EPA Code: 31R01) crosses the N59 before discharging into Ballynahinch lake. Ballynahinch Lake is an east-west elongated lake which lies to the south of the Galway to Clifden Road. This lake is noted for salmon and sea-trout fishing. Downstream of Ballynahinch Lake, the Owenmore River flows to the south before it discharges into Roundstone Bay estuary. Further downstream the estuary discharges to the Betraghboy Bay coastal waterbody and the Aran Islands, Galway Bay, Connemara coastal waterbody. Regional hydrology is displayed in Figure 2-3 and existing site drainage map displayed in Figure 2-4 and 2-5.

The project site lies on the eastern slopes of Derryclare and Bencorr mountains and on the western shores of Lough Inagh in the north and Derryclare Lough in the south. The project site drains to these 2 no. lake waterbodies via several mountain streams which rise on the mountains to the west of the project site and flow to the east, through the project site.



The key drainage features of the project site were encountered during site walkover surveys. In the north of the project site, an unnamed mountain stream rises on the easter slopes of Bencorr Mountain and flows eastwards through the Corrabeg Valley. This watercourse runs along the northern site boundary and receives flow from several smaller unnamed EPA mapped watercourses which originate within the forestry plantation. This watercourse discharges into Lough Inagh immediately to the north of the project site. Further south, the EPA named Derryclare River rises on the eastern slopes of Derryclare Mountain before flowing eastwards through the project site and discharging into Lough Inagh. Further south, 3 no. unnamed watercourses rise on the slopes of Derryclare Mountain and flow to the southeast, discharging into Derryclare Lough downstream of the project site. All natural watercourses encountered onsite were fast flowing, following surface topography and had incised channels into the peat deposits with some of the larger watercourses exposing bedrock outcrop.

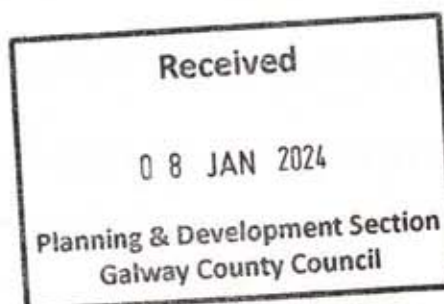
Within the project site there are also numerous manmade drains that are in place predominately to drain the forestry plantations. The current internal forestry drainage pattern is influenced by the topography, peat subsoils, layout of the forest plantation and by the existing road network. The forest plantations are generally drained by a network of mound drains which typically run perpendicular to the topographic contours of the project site and feed into collector drains, which discharge to interceptor drains downgradient of the plantation.

2.3.2.1 Flood Risk Assessment

The OPW National Flood Hazard Maps have no records of recurring or historic flood instances within the project site. Similarly, identifiable text on local available historical 6" or 25" mapping for the project site does not identify any lands that are "liable to flood".

The closest mapped recurring flood event to the project site (Flood ID: 1758) is located at Garroman, ~1.38km southeast of the project site, where an extensive low-lying area floods due to overflow of the Recess River and rising lake levels in Derryclare Lough. A recurring flood event (Flood ID: 1774) is also mapped between Derryclare and Ballynahinch Lough. There were multiple surface water floodings recorded in Lough Inagh and Derryclare Lough. However, all recorded flooding, including the 2015/2016 flood event, recognised as being the largest flood event on record in many areas, and medium and low probability flood zones and climate change rainfall scenarios are all limited to the immediate vicinity of the two loughs.

The main risk of flooding across much of the project site is via pluvial flooding due to the low permeability peat soils and subsoils. The surface of the project site contains an extensive network of surface waterdrains which drain the existing forestry harvest blocks and discharge either directly into Lough Inagh or Derryclare Lough or into a nearby stream which in turn discharges into these lake waterbodies. This existing drainage network has reduced the risk of pluvial flooding across much of the project site. However, following periods of intense and prolonged rainfall events localised surface water ponding is still likely to occur in places.



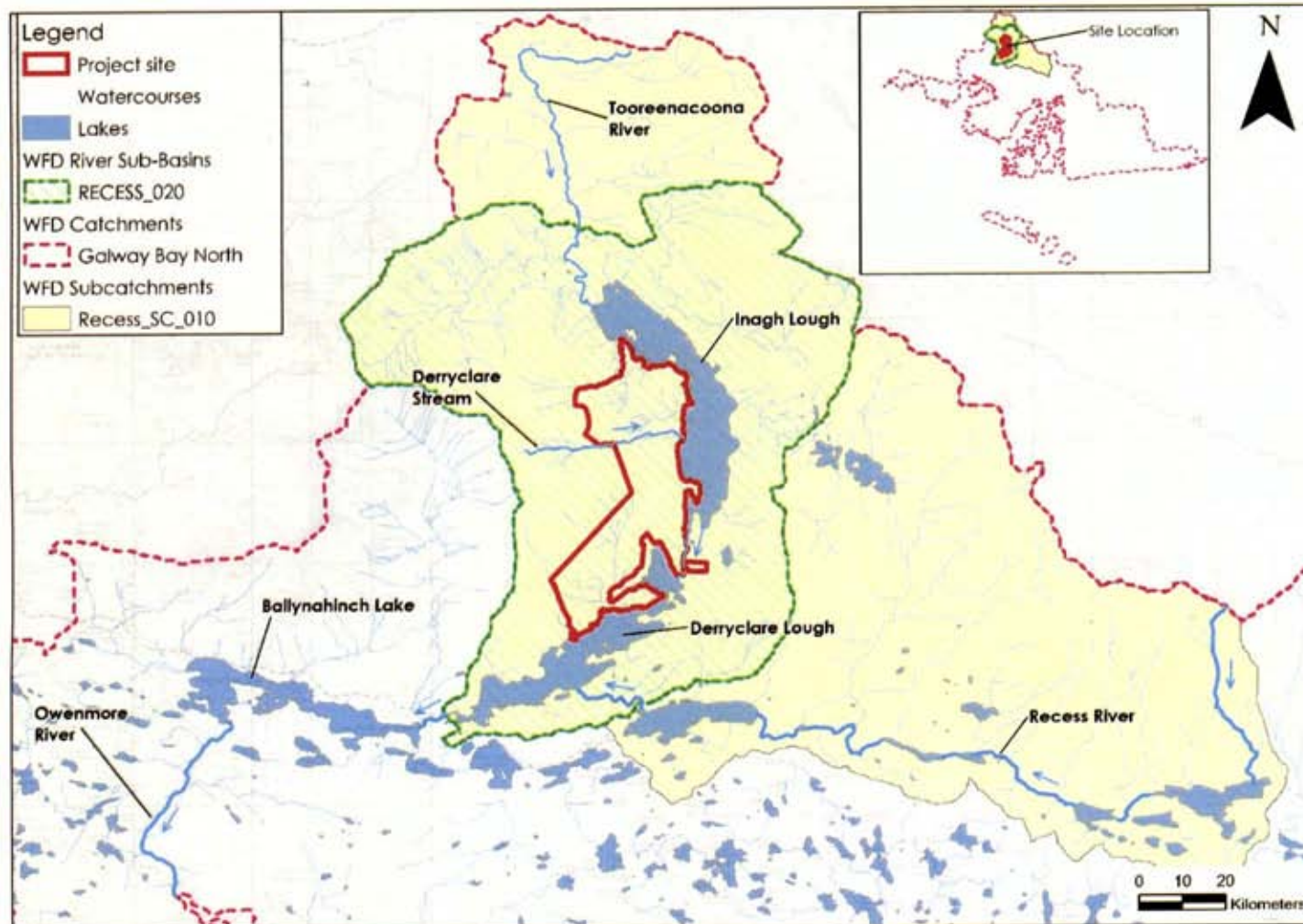


Figure 2-3: Regional Hydrology Map



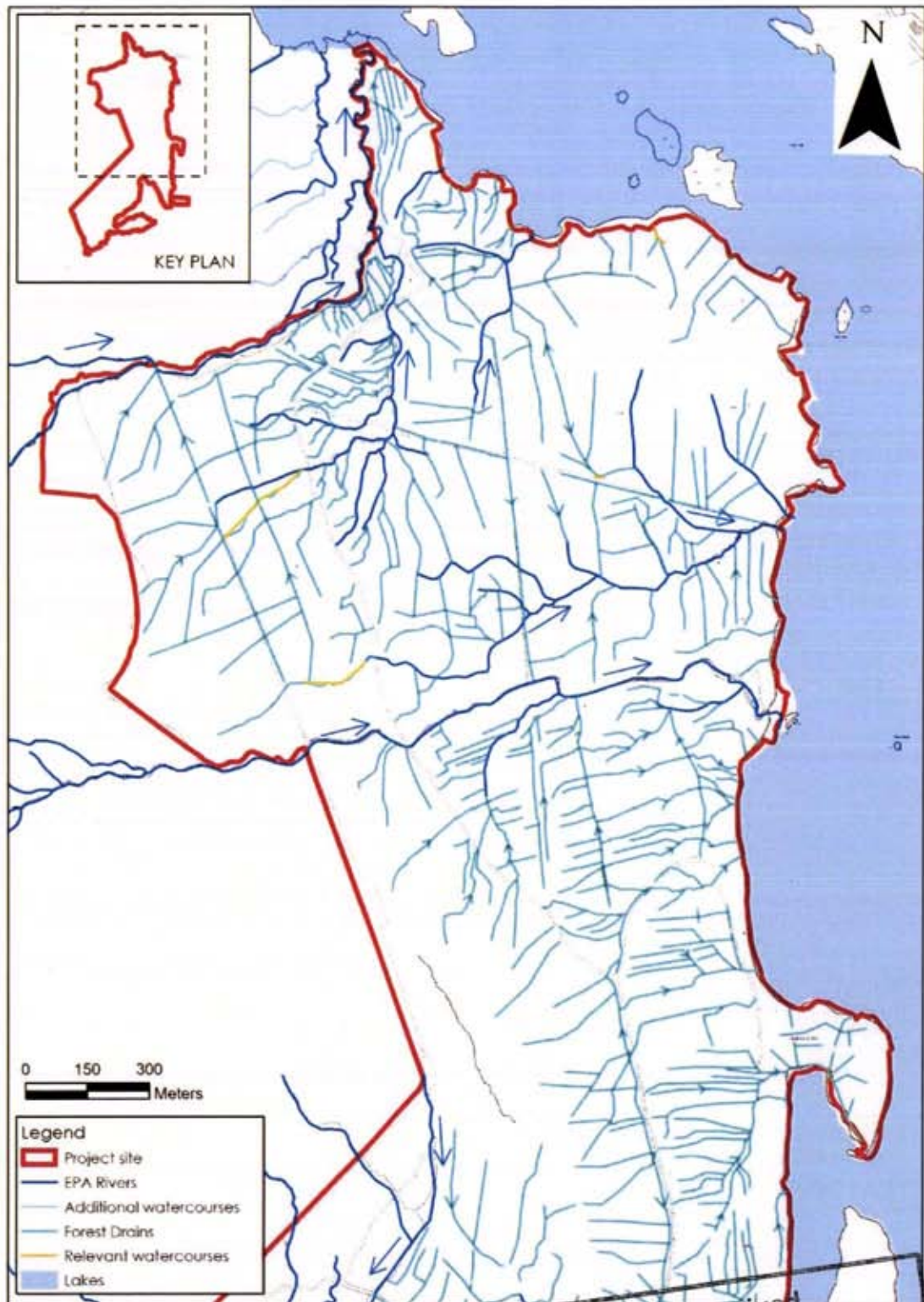


Figure 2-4 Existing Site Drainage Map (North)



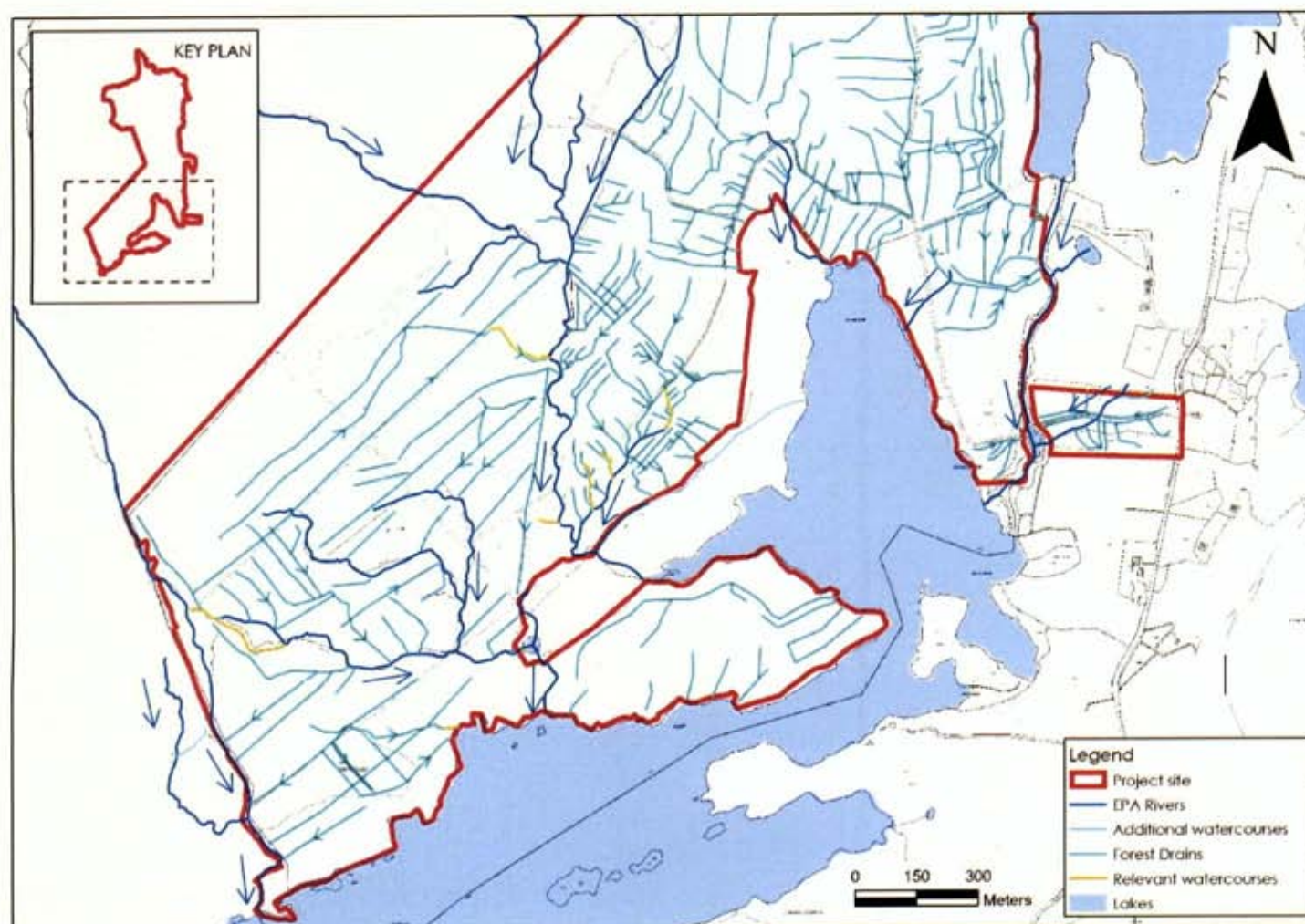
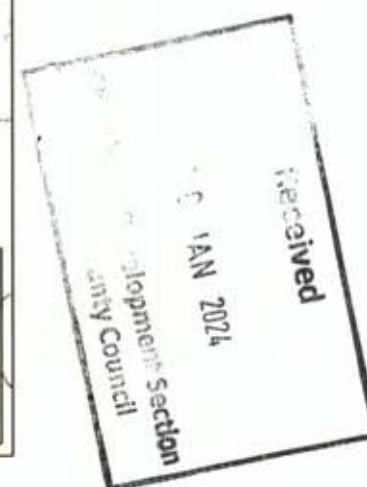


Figure 2-5 Existing Site Drainage Map (South)



2.3.3 Existing Ecological Environment

The EIAR study area was divided into three main divisions, A, B and C, in which multiple habitats were recorded. The habitats are displayed in Figures 2-6 and 2-7.

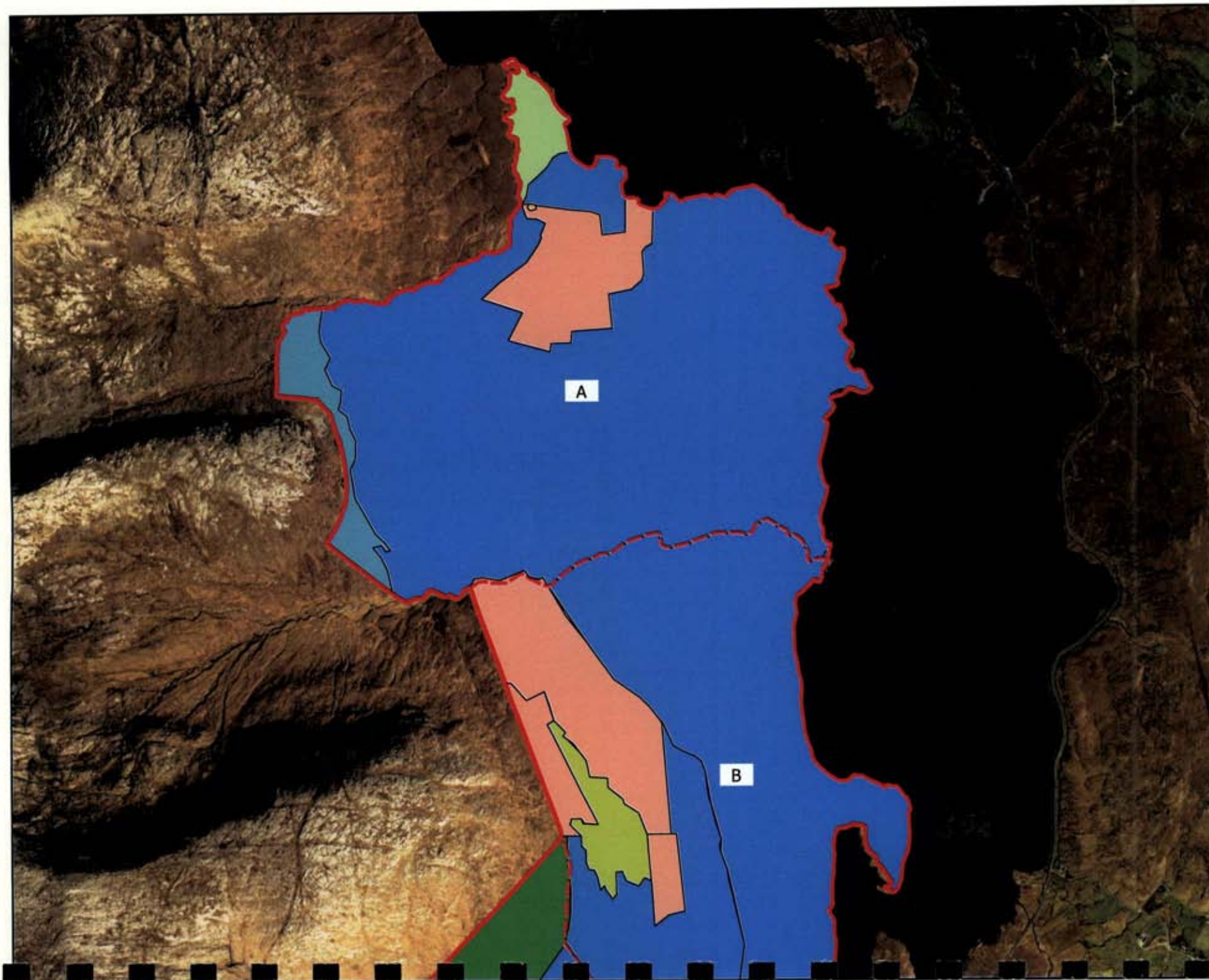
The northern section of area A was dominated by lowland blanket bog (PB3), that was historically planted but has been felled and has not been replanted since 2009, and conifer plantations (WD4), some of which were recently felled and now classified as recently felled woodland (WS5). Also located within area A and categorised as conifer plantation (WD4), were numerous stands of failed conifers. Some invasive *Rhododendron* was recorded in this part of the conifer plantation. Non-calcareous spring (FP2) habitat and an area categorised as other artificial lakes and ponds (FL8), were identified in a previously excavated area of ground. The boundary between area A and area B is demarcated by eroding upland river (FW1) habitat. Numerous streams are also located throughout area A, which flowed north and east within the EIAR study area, discharging into Lough Inagh.

Area B is the central section of the EIAR study area. The area has been extensively modified by afforestation and was dominated by conifer plantation (WD4) and recently felled woodland (WS5). Furthermore, there are numerous areas within area B where trees were previously planted and have since failed and/or where the land was too rocky or wet for trees to have been planted. While the peatland habitats underlying these conifer plantations have been modified by previous planting and afforestation, elements of the peatland community remain intact. Natural regeneration of conifers was evident and as per the DAFOR scale, the invasive *Rhododendron* was considered to be "occasional". Towards Derryclare mountain is a rocky summit with unplanted wet heath, categorised as a mosaic of wet heath (HH3) and exposed siliceous rock (ER1). This area has not been previously modified by afforestation and retains a peat depth of <50 cm and a community reflective of wet heath habitat.

Area C is located on the lower flanks of Derryclare mountain and slopes moderately to the east, where it reaches Derryclare Lough. The area has been extensively modified by afforestation and remains largely dominated by conifer Plantation (WD4) but also supports significant wet Heath (HH3) and upland blanket bog (PB3) habitat. Two areas of wet willow alder ash woodland (WN6) and a mosaic of wet Grassland (GS4) and scrub (WS1) was also recorded in this area. As per the DAFOR scale, the abundance of *Rhododendron* within area C is recorded as being "occasional to rare".

Area D encompasses a large peninsula along the south-eastern boundary of the proposed project, which extends east and into Derryclare Lough. It also includes lands further north, which separate Derryclare Lough and Lough Inagh. The peninsula was categorised as a mosaic of conifer plantation (WD4) and wet heath (HH3). Evidence of recent planting was seen in the tree guards placed around saplings to protect them from foraging deer.





Map Legend

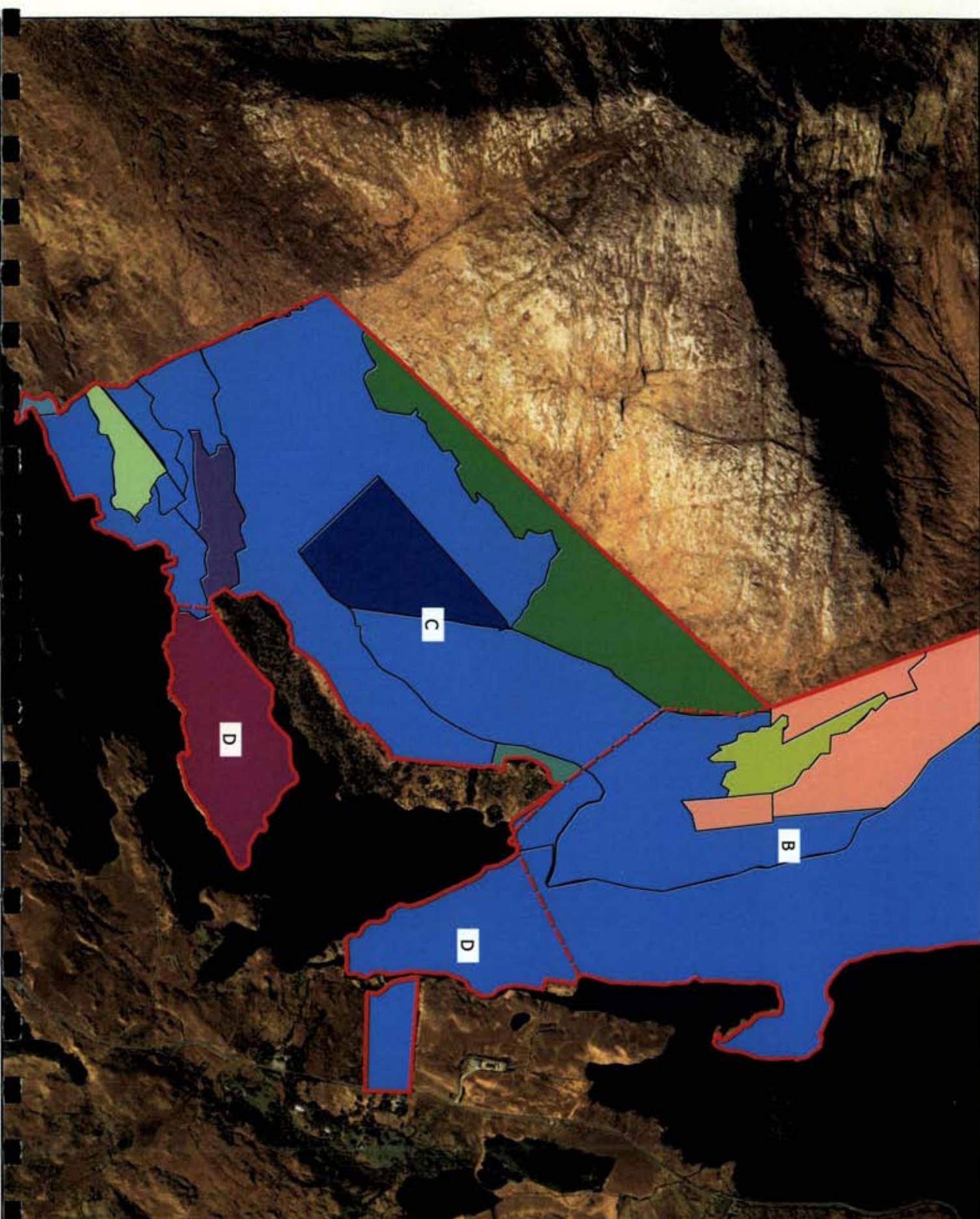
- Site Boundary
- Recolonizing bare ground/ Wet heath (ED3/HH3)
- Other artificial lakes and ponds (FL8)
- Wet Grassland / Scrub (GS4/WS1)
- Wet Heath (HH3)
- Wet heath/ Exposed siliceous (HH3/ER1)
- Heath Heath/ Blanket bog (HH3/PB2)
- Lowland Blanket bog (PB3)
- Conifer Plantation (WD4)
- Conifer Plantation/ Wet heath (WD4/HH3)
- Scrub (WS1)
- Recently felled woodland (WS5)

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Habitat Map (North)

Project Title Proposed Derryclare Wild Western Peatlands Project	
Drawn By PD	Checked By SM
Project No. 210603	Drawing No. 2-6
Scale 1:16000	Date 13/02/2023

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Map Legend

- Site Boundary
- Recolonizing bare ground/ Wet heath (ED3/HH3)
- Other artificial lakes and ponds (FLB)
- Wet Grassland / Scrub (GS4/MS1)
- Wet Heath (HH3)
- Wet heath/ Exposed siliceous (HH3/ER1)
- Heath Heathy/ Blanket bog (HH3/PB2)
- Lowland Blanket bog (PB3)
- Conifer Plantation (WD4)
- Conifer Plantation/ Wet heath (WD4/HH3)
- Scrub (MS1)
- Recently felled woodland (WSS)

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Habitat Map (South)

Project: Peatlands Project

Drawn by: SM

Project No: 210603

Scale: 1:16000

Date: 13/02/2023

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2.3.3.1 Designated Sites

Multiple protected sites were found in the likely Zone of Impact (ZOI). No Natural Heritage Areas (NHAs) were identified within the ZOI, however proposed natural heritage areas (pNHAs) were found within the ZOI and are outlined in Figure 2-8 and listed below:

- > The Twelve Bens/Garraun Complex [002031]
- > Maumturk Mountains [002008]
- > Connemara Bog Complex [002034]
- > Dernasliggaun Wood [001253]
- > Bertraghboy Bay [001234]
- > Maumtrasna Mountain Complex [00735]
- > Rosroe Bog [000324]
- > Mweelrea/Sheeffry/Erriff Complex [001932]
- > Letterfrack Hostel [002080]
- > Lough Corrib [000297]
- > Cregduff Lough [001251]

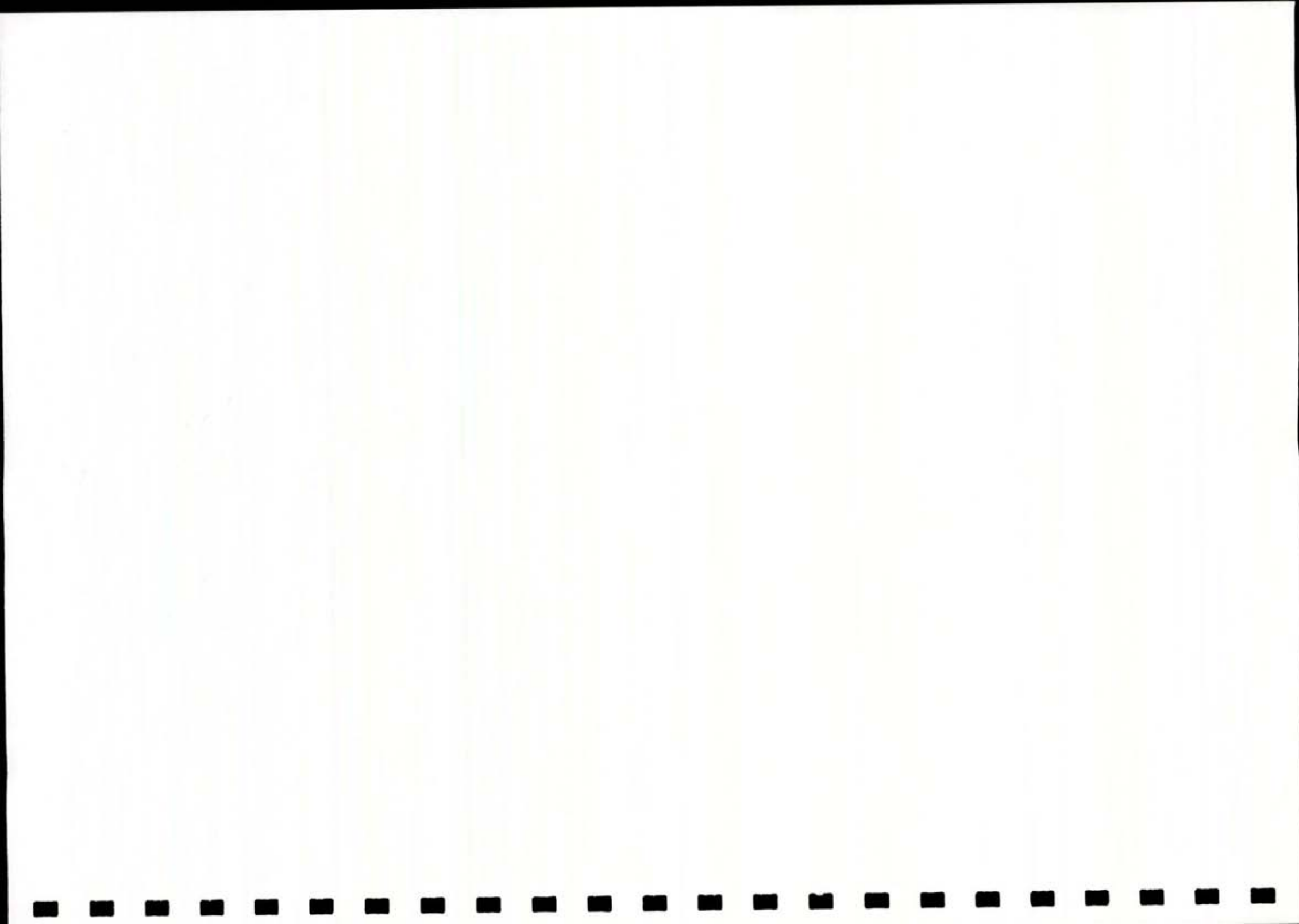
There were multiple SACs and SPAs identified in the ZOI outlined in Figure 2-9 and listed below:

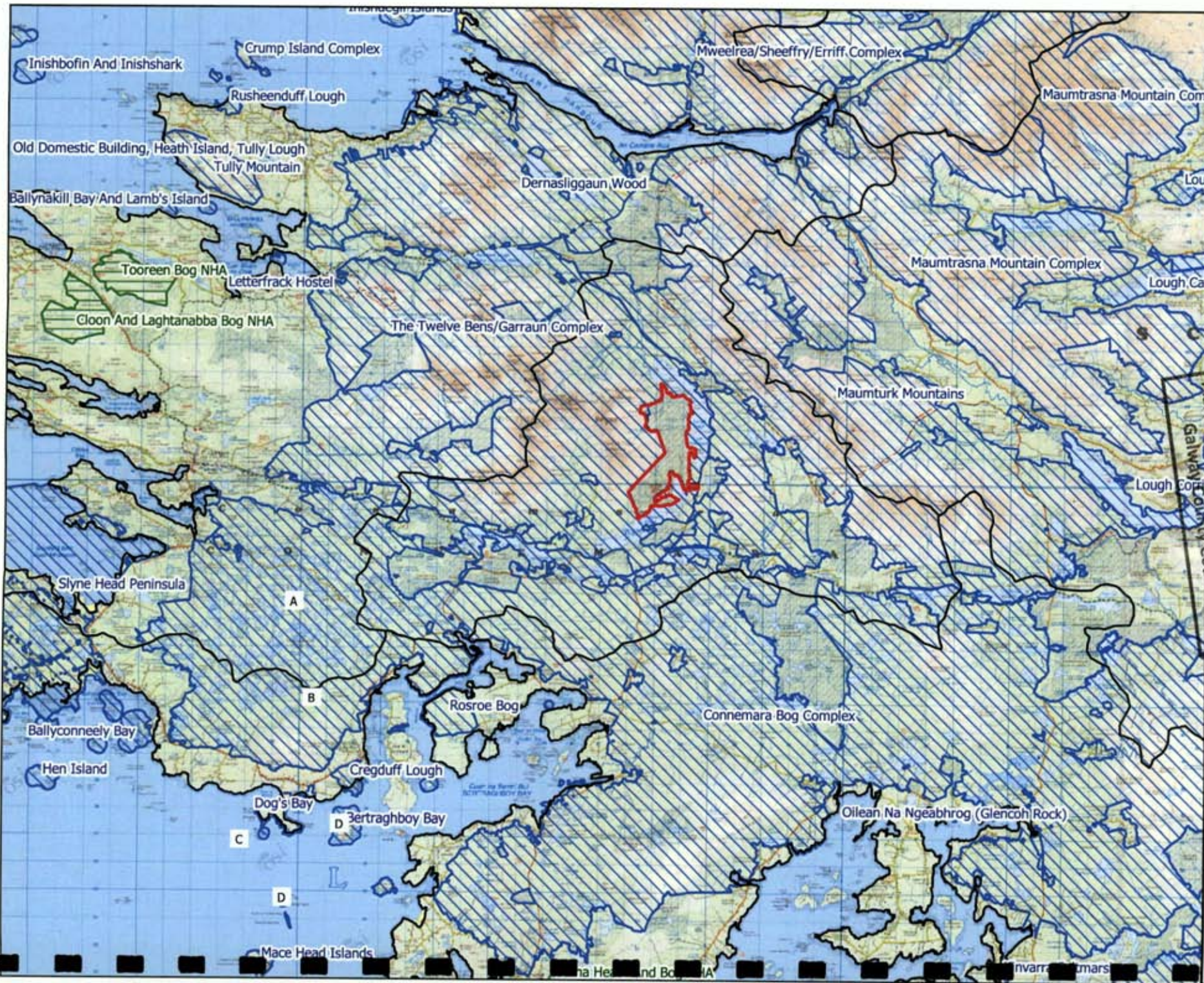
- > the Maumturk Mountains SAC [002008]
- > Rosroe Bog SAC [000324]
- > Mweelrea/Sheeffry/Erriff Complex SAC [001932]
- > Kilkieran Bay And Islands SAC [002111]
- > Lough Corrib SAC [000297]
- > West Connacht Coast SAC [002998]
- > Cregduff Lough SAC [001251]
- > Connemara Bog Complex SPA [004181]
- > Lough Corrib SPA [004042]
- > Illaunnanoon SPA [004221]
- > Slyne Head To Ardmore Point Islands SPA [004159]

The proposed project site is partially located within the Twelve Bens/Garraun Complex SAC [002031]. There is upstream hydrological connectivity to the Maumturk Mountains SAC [002008] and downstream hydrological connectivity to the Connemara Bog Complex SAC [002034]. The proposed project site is situated within the core foraging range of the golden plover ([A140] *Pluvialis apricaria*) and Merlin ([A098] *Falco columbarius*), for which it is also a suitable breeding habitat. These two bird species are qualifying interests for the Connemara Bog Complex SPA [004181].

As per the national survey of native woodlands and ancient and long-established woodland datasets, Derryclare Nature Reserve, located adjacent to the southern section of the proposed project site, is mapped as both native woodland (wet willow alder ash woodland (WN6) and oak birch holly woodland (WN1) and ancient/long established woodland







Map Legend

- Site Boundary
- National Heritage Areas (NHAs)
- Proposed National Heritage Areas (pNHAs)
- WFD Catchments

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Drawing Title
National Sites in the wider vicinity of the Proposed Project

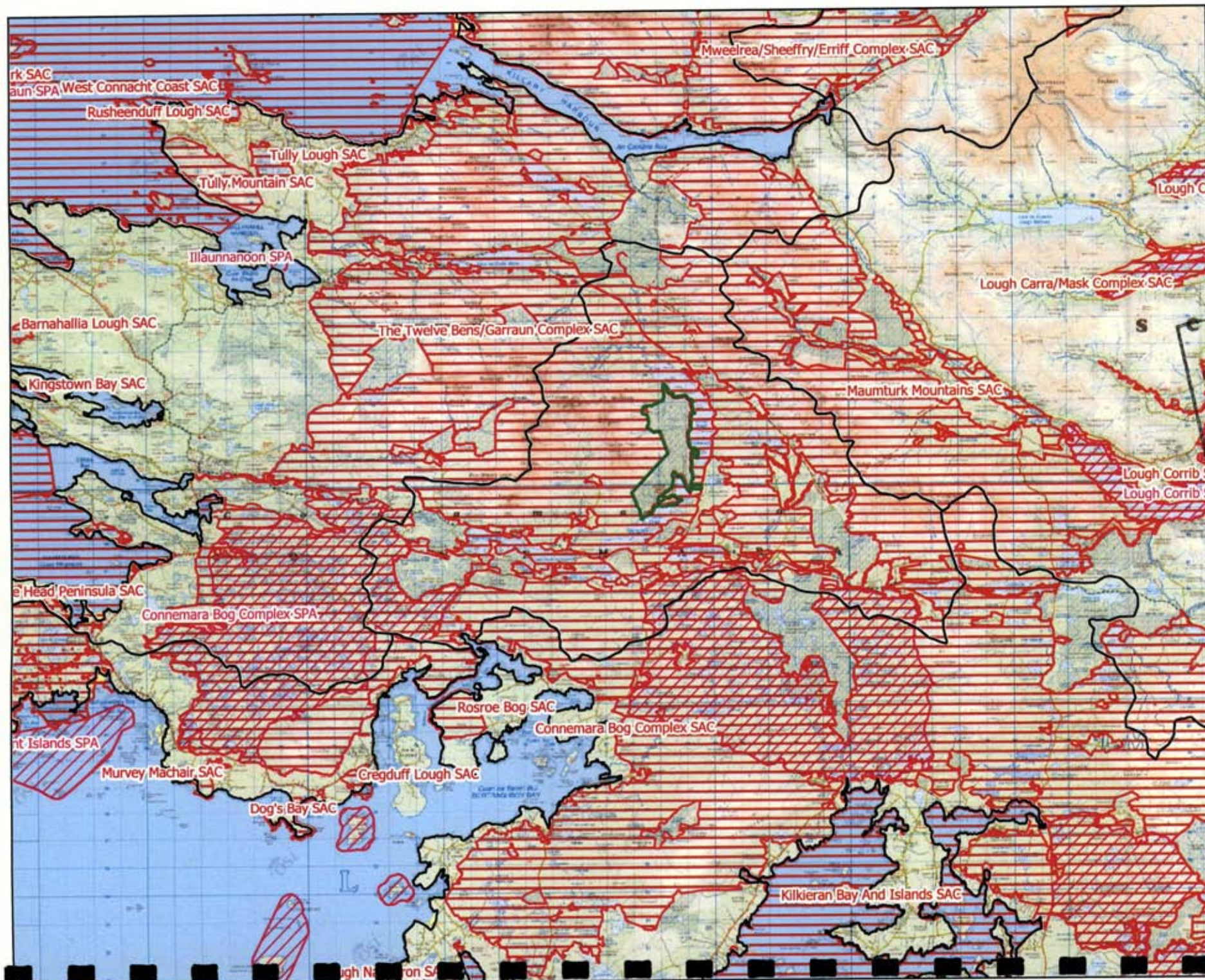
Project Title
Proposed Derryclare Wild Western Peatlands Project

Drawn By PD	Checked By SM
Project No. 210603	Drawing No. 2-8
Scale 1:180000	Date 13/02/2023

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Map Legend

- Site Boundary
- Special Areas of Conservation (SACs)
- Special Protected Areas (SPAs)
- WFD Catchments

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Drawing Title
European Sites in the wider vicinity of the Proposed Project

Project Title
Proposed Derryclare Wild Western Peatlands Project

Drawn By PD	Checked By SM
Project No. 210603	Drawing No. 2-9
Scale 1:180000	Date 13/02/2023

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2.3.4 Existing Archaeological Environment

No recorded monuments are located within the Proposed Project site boundary. A total of four monuments are located within 2km of the Proposed Project boundary, out of which three are located within 500m of the proposed project boundary. Using Groundworks associated with the project will be minimal as it is a restoration project. No indirect effects were identified which would occur during the construction stage. The nearest monument, metalworking site GA037-015---, is situated c. 48m to the east of the eastern boundary on the shores of Derryclare Lough in an area which is currently tree-covered. The Proposed Project does not encroach on the monument or its associated Zone of Notification. No direct impacts to any recorded monuments, the archaeological or cultural heritage resource, protected Structures or NIAH structures or the built heritage will occur as a result of the Proposed Project due to mitigation measures proposed.

2.4 Construction Management

2.4.1 Introduction

The appointed contractors for the construction phase of the Proposed Project will be required to comply with this CEMP and any revisions made to this document throughout the construction phase. An overview of the anticipated Construction Methodologies is provided below.

2.4.2 Overview of the Proposed Construction Methodology

The EIAR for the Proposed Project includes construction methodologies for various elements of work to be undertaken as part of the project. These construction methodologies are reproduced in the following sub-sections but will be superseded by an appointed contractor's construction method statements, which will form part of the CEMP. The contractor's construction method statements will be prepared to take account of the detailed engineering, geotechnical and drainage design which will be prepared prior to commencement of construction and all requirements of this CEMP.

The proposed anticipated construction methodology is summarised under the following main headings:

- Forest Service Best Practice
- Floating Road/Build On-Top Road Construction
- Tree Felling
- Tree Planting
- Seeding Methodology
- Tree Protection
- Bog Restoration
- Site Drainage
- Temporary Watercourse Crossings
- Vegetation Control/Invasive Species Management



2.4.2.1 Forest Service Best Practice

Forestry operations will conform to current best practice Forest Service regulations, policies and strategic guidance documents as well as Coillte and DAFM guidance documents, including the specific guidelines listed below, to ensure that felling, planting, seeding and other forestry operations result in minimal potential negative impacts to the receiving environment.

- Forestry Standards Manual (Forest Service, 2015)
- Environmental Requirements for Afforestation (Forest Service, 2016a)
- Land Types for Afforestation (Forest Service, 2016b)

- > Forest Protection Guidelines (Forest Service, 2002)
- > Forest Operations and Water Protection Guidelines (Coillte, 2013)
- > Forestry and Water Quality Guidelines (Forest Service, 2000b)
- > Forestry and the Landscape Guidelines (Forest Service, 2000c)
- > Forestry and Archaeology Guidelines (Forest Service, 2000d)
- > Forest Biodiversity Guidelines (Forest Service, 2000e)
- > Forests and Water, Achieving Objectives under Ireland's River Basin Management Plan 2018-2021 (DAFM, 2018)
- > Coillte Planting Guideline SOP
- > A Guide to Forest Tree Species Selection and Silviculture in Ireland (Horgan et al., 2003)
- > Management Guidelines for Ireland's Native Woodlands. Jointly published by the National Parks & Wildlife Service (Cross and Collins, 2017)
- > Native Woodland Scheme Framework (Forest Service, 2018)
- > Code of Best Forest Practice (Forest Service, 2000)
- > Standards for Felling and Reforestation (Forest Service, 2019)

2.4.2.2 Built on Top Embankment Roads (Floating Roads)

The proposed forestry road extensions in the north and south of the site will be constructed as floating roads over peat. Floating roads minimise impact on the peat, particularly peat hydrology, and significantly reduce the volumes of peat requiring management as there is no excavation required and no peat arisings are generated. On embankment roads, the natural vegetation is left untouched as it contributes to the bearing strength of the site. Trees growing on the road line should be felled close to ground level and stumps left *in situ*. Where available, closely spaced, felled poles (delimbed trees), covered with brash can be spread across the formation base width to help load distribution.

The following methodology includes procedures that are to be included in the construction to minimise any adverse impact on peat stability:

- > Prior to commencing floating road construction movement monitoring posts will be installed in areas where the peat depth is greater than three metres.
- > Trees growing on the road line will be felled close to ground level and stumps left *in situ*.
- > Base geogrid to be laid directly onto the existing peat surface along the line of the road in accordance with geogrid provider's requirements.
- > Road construction to be in accordance with appropriate design from the designer.
- > The typical make-up of the new floated access road is 500 to 750mm of selected granular fill with 2 no. layers of geogrid.
- > Stone delivered to the floating road construction shall be end-tipped onto the constructed floating road. Direct tipping of stone on to the peat shall not be carried out.
- > To avoid excessive impact loading on the peat due to concentrated end-tipping all stone delivered to the floating road shall be tipped over onto at least a ten metres length of constructed floating road.
- > Where it is not possible to end-tip over a 10m length of constructed floating road then dumpers delivering stone to the floating road shall carry a reduced stone load (not greater than half full) until such time as end-tipping can be carried out over a ten metre length of constructed floating road.
- > Following end-tipping a suitable bull-dozer or excavator shall be employed to spread and place the tipped stone over the base geogrid along the line of the road.
- > A final surface layer shall be placed over the floating road, as per design requirements, to provide a road profile.
- > The surface profile should be maintained as settlement proceeds, preferably by the re-distribution of existing formation material rather than by the addition of further material.

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2.4.2.3 Tree Felling

2.4.2.3.1 Conventional Machine Harvesting

The felling of standing trees in the harvest blocks (HB) will be undertaken by a timber harvesting machine. Extraction of the logs to the forest road will be carried out using a forwarder machine. Both the harvester and the forwarder are designed specifically for the forest environment and are low ground pressure machines. Furthermore, these machines will traverse the site along specified routes ('racks'), over brash mats comprised of deposited branches, off-cuts from tree stems and tops of trees. This is to distribute machine weight and to provide further soil protection from compaction, rutting and erosion. Timber will be stacked by the forwarder at points (loading bays) along the forest road, for subsequent collection by haulage trucks and onward transportation by road to the customer for processing.

As it fells trees and progresses into the harvest block (HB), the harvester will collect the brash produced by the felling and delimbing of individual trees, and place it in front of the machine, in advance of it moving further forward along the rack. These brash mats will also be used by the forwarder, as it will remain on the racks as it traverses the site. Both machines may travel over the same section of the rack several times. Therefore, racks will be monitored and fresh brash will be gathered by the forwarder and applied to racks to ensure that they remain effective, as required. The harvester machine will cut standing trees within the HB using a combined chainsaw and grapple (referred to as a 'harvester head') located at the end of a hydraulic boom. This head fells each tree and then strips (or 'delimbs') the stem of branches. The merchantable timber will be cross cut into sawlog and pulpwood log products of various lengths from 1.6 to 5.5m. These logs will be temporarily deposited on either side of the brash-protected rack from where the harvester will operate and over which, the harvester and the forwarder will travel as they traverse the HB. The racks will be generally parallel to each other throughout the HB, spaced so that the harvester can fell those trees within its reach on both sides. The location of racks will avoid any waterlogged and potentially sensitive areas of the site, and machines will not travel within the aquatic or other exclusion zones of this HB.

Felled timber along the racks will be subsequently collected by the forwarder, which uses a hydraulic grapple arm to load timber into a receiving bunk in its powered trailer. Once the bunk is full, the forwarder will traverse the site along a rack to a stacking bay located beside the forest road, where it will then offload the timber to form (or add to an existing) timber stack, for collection by the haulage truck. At no stage will the forwarder exceed its loading capacity and traverse overloaded across the site.

2.4.2.3.2 Fell to Waste

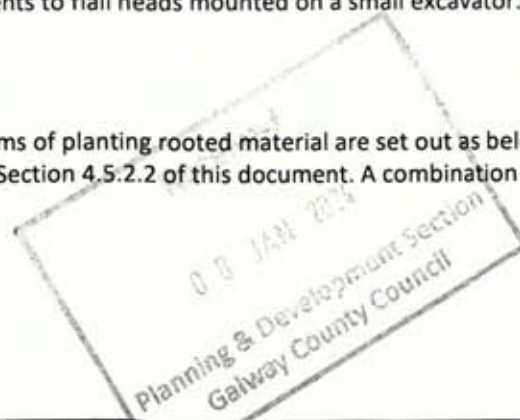
The felling of standing trees in the harvest blocks (HB) will be undertaken by a timber harvesting machine. The process is the same as outlined in section 4.7.3.1 above, except only the harvester is involved and all felled trees are not extracted to roadside but are instead either left in the rack or on the forest floor. Fell to waste will occur in areas where the timber density is low and there is no merchantable timber and usually occurs where the trees are dead or dying.

2.4.2.3.3 Mulching Crop

Mulching will occur on crops that are undeveloped or young and not large enough to be felled using a conventional forest harvester. Mulching typically breaks up the tree into strips or chips. Mulching machines can vary from tractor mounted attachments to flail heads mounted on a small excavator.

2.4.2.4 Tree Planting Methodology

Planting will be carried out manually. The main forms of planting rooted material are set out as below and a proposed planting schedule can be found in Section 4.5.2.2 of this document. A combination of



all the planting methods described below may be used on the site as conditions dictate. All planting should be to root collar depth or slightly deeper, and trees should be firm and upright with their roots hanging vertically and well spread out.

2.4.2.4.1 **Ground Preparation: Windrow, Scrap Mounding and Mounding**

After the timber harvesting operation is complete and prior to replanting, windrowing will be undertaken. In this operation a tracked excavator will gather together the brash (branches, stem off-cuts and tree tops), previously distributed along racks during the timber harvesting operation, into a series of linear rows distributed throughout the site. The purpose of windrowing is to provide a cleaner site for subsequent replanting.

Scrap mounding is the preferred cultivation method for the native woodland establishment, and it occurs when a tracked excavator will be used to create small mounds of soil. No additional drainage channels are installed. The mound creates a favourable planting site for young nursery trees by loosening compacted soil, removing excessive surface water and creating a raised planting position to lessen the effect of competing vegetation. These factors contribute to plant survival and the development of a stable and healthy forest into the future.

Mounding is similar to scrap mounding except that regular new drainage channels are installed at 10-12m intervals to improve site drainage. Similar to scrap mounding, the mound creates a favourable planting site for young nursery trees by loosening compacted soil, removing excessive surface water and creating a raised planting position to lessen the effect of competing vegetation, with the added benefits of additional drainage provided by the mound drains. As the establishment of new native woodland is targeting the areas with shallow peat depths, it is not envisaged that mounding will be extensively used.

Following the scrap mounding or mounding operation, replanting will be undertaken. Replanting will be an entirely manual operation; an opening will be made in the centre of each mound with a spade and the roots of the sapling placed in the opening. The loose soil will then be backed filled with the spade, ensuring that it is upright and straight and finally firmed in by foot around the plant.

2.4.2.4.2 **Slit Planting**

The spade is used to make a vertical slit in the ground. The tree roots are carefully positioned into the slit by hand to ensure that roots are equally spaced in the vertical slit created. The slit is closed by foot and firmed up, ensuring the tree is vertical and upright. It is important to ensure that roots are not bent over, as this can lead to poor development, e.g. J-shaped root.

2.4.2.4.3 **Angle Notch Planting: L notch or T notch**

A double slot is made using a suitable planting spade. The slots can either be "L" or "T" shaped and should be approx. 15cm deep as illustrated in Figure 2-10 below. The purpose of the double slot is to lift up the peat and create space to allow the roots to be distributed evenly. Once the tree has been positioned in the slot and the roots have been pushed in fully by hand, the plant is pulled up slightly to allow the roots to hang down to ensure the correct planting depth is achieved. The spade is subsequently removed, and the soil is firmed with the ball of the foot. The angle notch planting methodology is illustrated in Figure 2-11, below.



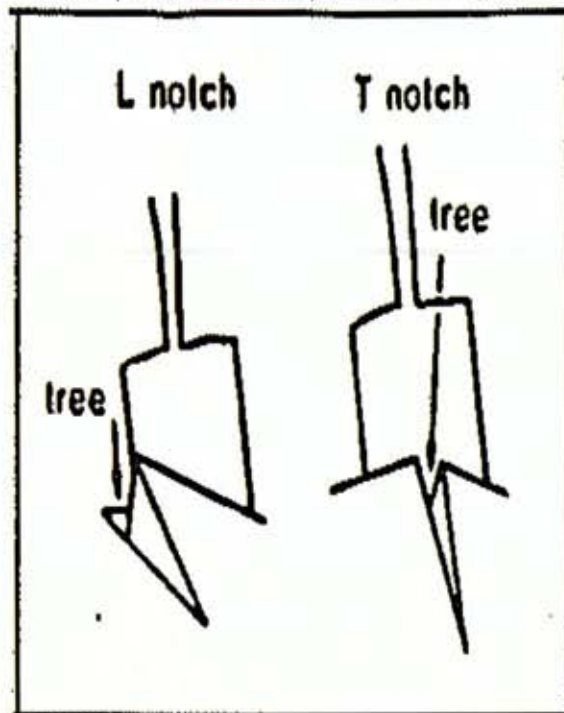


Figure 2-10 L" and "T" Planting Notches

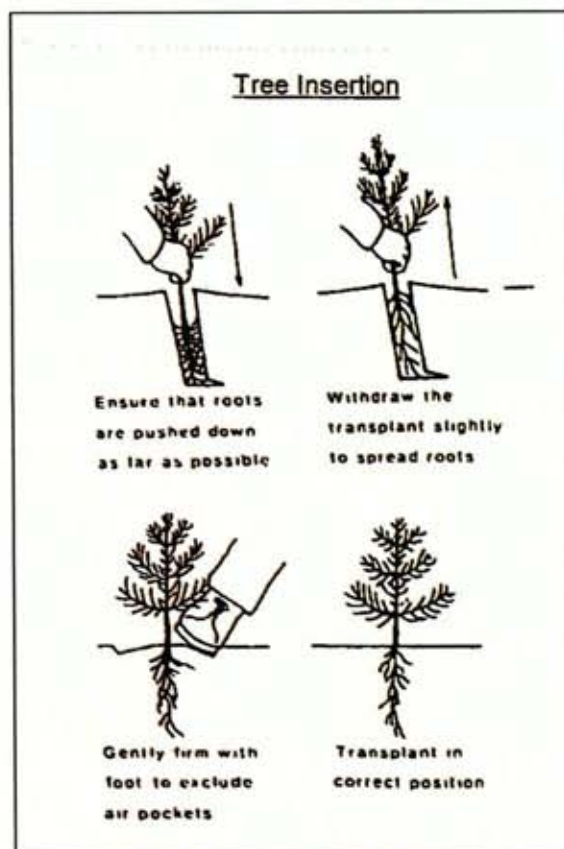
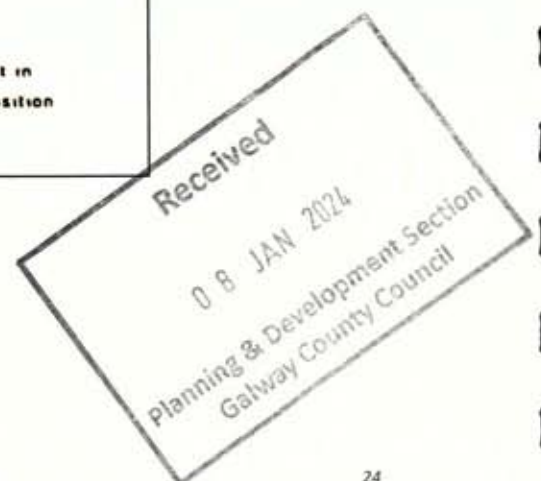


Figure 2-11 Angle Notch Planting Steps

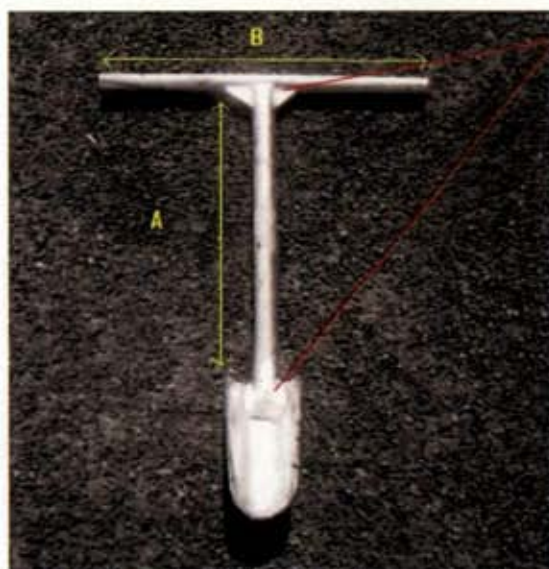


2.4.2.4.4 Plug planting (semi-circular spade)

This planting method is appropriate for use on all peat soil types and can be used on mounded ground or when planting directly into the flat. Also, use of the semi-circular spade (Figure 2-12 below) is not confined to peats, it will work on any soils provided it is not too compact or stony. This technique is different to any other type of planting and its use should be demonstrated to planting staff. The methodology is illustrated in Plate 4-8.

The following methodology is used for plug planting with a semi-circular spade:

- > Identify planting position
- > Match spade size to plant size.
- > Hold spade at an angle to hips - hollow side facing operator
- > Tilt handle away from operator.
- > Insert spade into ground.
- > Swing through 180° in one movement.
- > Withdraw spade applying pressure at the same time so removing plug at an angle towards the operator.
- > Place plant in planting hole with straight back of stem against straight side of plug hole (to ensure straightness), ensuring no bent, crushed or folded roots.
- > Replace plug and hold plant while firming with sole of foot or toe.
- > Ensure plant is straight / Upright.
- > Test for firmness using thumb and middle finger.



Note; reinforced locations for extra strength.

Spades should be galvanised to prevent rust.

Average Dimensions

A: 55cm

B: 45cm

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Figure 2-12 Semi-Circular Planting Spade



Plate 2-1 Plug Planting Methodology

2.4.2.4.5 Pit Planting

A spade is used to dig a hole and the tree roots placed in the centre. Soil is placed around the tree and firmed in, ensuring that it is upright and straight. This form of planting can be used in sensitive sites where no ground preparation has taken place. It may also be appropriate for steep slopes where other preparation methods may lead to sediment run off.

The following methodology is used for pit planting:

- > Identify planting position
- > Remove 7cm sod from top of pit
- > Open pit using minimum number of spade movements - to required root depth min 20cm X 20cm.
- > Ensure planting face is straight
- > Ensure soil loosening at bottom of pit
- > Place tree in pit against planting face and allow roots to hang down - no bent or crushed roots.
- > Back fill soil holding tree.
- > Pull plant up slightly and firm with sole of foot
- > Replace top sod inverted
- > Ensure correct planting depth is achieved
- > Ensure plant is straight and upright
- > Test for firmness using thumb and middle finger
- > Ensure straight lines using pole lines if necessary
- > Ensure correct spacing

2.4.2.5 Seeding Methodology

Seeding will be carried out in either April/May or autumn/early winter (October to November) depending on site conditions. Seeding will be accomplished either manually with a handheld broadcast seeder or by tractor/quad and fertiliser spinner. The spread method will depend on the size and accessibility of the seeding location. Only native or local seed sources will be used in the project. Seed will be mixed with appropriately sized sand/grit at the rates provided in Table 4-6. The purpose of the grit is to aid in the distribution of the seed and to reduce seed losses due to wind. The proposed seeding rates are summarised in Table 4-6 below.

Table 2-1 Proposed Seeding Rates

Species	Target Density (Seeds/Ha)	Viable seed per Kg	Seed Quantity per Ha (Kg)	Grit (Kg/Ha)
Downy birch	1,000,000	826,000	1.21	12.11
Alder	44,000	212,000	0.21	1.04
Rowan	93,000	345,000	0.27	0.54
Scots pine	4,100	127,000	0.03	0.16
Totals	1,141,100	1,510,000	1.72	13.85

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2.4.2.6 Tree Protection

Fencing will be installed around the native woodland establishment areas to protect planted broadleaves. A detail drawing of the proposed deer proof fencing is included in Appendix 4-1 of this EIAR.

Tree shelters may also be used instead of fencing to protect planted broadleaves in some areas. The project will use newly developed shelters which biodegrade much faster than normal shelters. A specification sheet for the proposed tree shelters is provided as Appendix 4-4 of this EIAR.

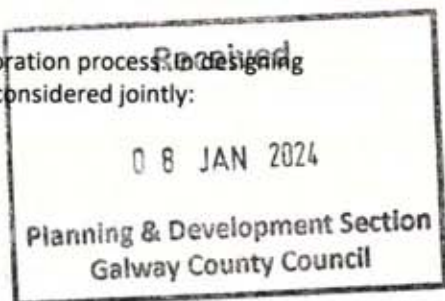
2.4.2.7 Bog Restoration Techniques

The proposed bog restoration will follow current best practices and include the techniques recommended in NatureScot's Peatland ACTION - Technical Compendium -Restoration – 4 Artificial Drains and 8 Forest to Bog Restoration (NatureScot, 2022) and best practice established from other bog restoration projects in Ireland. The proposed restoration techniques that will be implemented are discussed below.

2.4.2.7.1 Furrow and Drain Blocking

The blocking of bog drains is a very important part of the bog restoration process. In designing effective drain blocking measures the following factors should be considered jointly:

- > ☒ Blocking materials,
- > ☒ Slope and size of the drains,
- > ☒ Ground conditions and accessibility, and
- > ☒ Cost



The most common drain blocking materials are the onsite peat dams and plastic sheet piling. Recent bog restoration projects are leaning more towards using peat dams, with the use of plastic dams becoming less common. Wooden dams (planks, plywood & timber logs) will also be used. Peat dams are generally effective but less so where the depth of solid peat at the base of the drain is ≤ 50 cm. It would be difficult to get sufficient materials for peat dams in this case. Plastic dam would be the most appropriate option in this case. The longevity of wooden dams is a concern, because the dams become leaky over time. Wooden dams will be used in smaller ditches which, over time, will become blocked due to natural sedimentation and re-filling. Therefore, the decomposition of the wooden dams are not a problem in these locations.

Current best practice indicates that slope and sizes of the drains are the deciding factors in selecting the types of dam material as well as the spacing of the dams within the drains. Peat dams are usually only effective on a shallow slope ($<10^\circ$ gradient). Steeper drains could pose significant erosion risks, therefore where this gradient is exceeded plastic dams should be used.. Peat dams are also not suitable for the large size drains (drain cross sectional area > 0.7 m²). The ideal dam spacing depends on drain slope and volume of water; drains on steeper slopes and with greater catchment area draining into them should be blocked at shorter intervals as the volume of flows within the drains will be higher. Dams will be installed such that the water level in the bog is maintained within 10 cm of the bog surface which means that a dam is required for each 10 cm fall in the bog surface. The dam spacing should be between 7.5 m and 20 m on flatter ground, however, the frequency of dams should increase to between 5 m and 7 m on steeper ground.

The construction machinery access to some of the site areas may be problematic due to presence of saturated soils and steep topography. This will have to be assessed on a site-by-site basis by the contractor and land managers as appropriate. Where the machinery accessibility is limited, or deemed unsafe, plastic dams are more suitable as they are easier to install manually.

Based on the above considerations, it is recommended to first block the main collector artificial drains which are located nearest the natural watercourse followed by the strategic placement of silt traps to trap suspended solids in runoff from the work areas. The restoration works will then commence upslope at the highest point and work systematically downslope towards the natural watercourse. The natural watercourses which drain the site naturally will not be blocked. Ideally, where suitable the site should also be reprofiled as this is the most effective restoration method that does not require as much drain blocking. However, if reprofiling is not suitable, then continue to block the drains systematically back from the watercourse. It is also recommended to block the smaller artificial drains (mainly furrows) in the moderately flat areas using the felled timber logs (i.e. log dams). Roadside drains will not be blocked in order to avoid flooding, but they will have regular silt traps installed. All outlets of the collector /peripheral drains (excluding relevant watercourses) to adjacent natural watercourses will be blocked. A layout plan of the proposed drain blocking measures using log, peat and plastic dams, across the entire site area are provided Appendix 4-5. Final decisions on the method of drain blocking will be made based on observable conditions in the field. The following drain blocking methods will be used as appropriate.

2.4.2.7.2 Plastic Dams

This section provides the proposed methodology for the installation of plastic piling dams on ditches less than 1.5m wide. Plastic piling is light, versatile and slots together on site. If properly installed, plastic piling dams can form a good watertight seal that will last for decades. Generally, dams are placed at between 10 and 20 metre intervals on flat ground but would need to be closer depending on slope. It is expected that the final water level from the lower dam will rise half-way up the upstream dam. The final water level should be at the peat surface or no more than 20cm below the surface. Plastic piling dams will typically be used in the following situations:

- On ground that is too soft/saturated and/or unstable to allow safe machine access.
- On portions of the site that are inaccessible by machine.
- On active drains that are partially infilled with vegetation but hold too much water to allow effective installation of peat dams.

The methodology for the installation of plastic dams is provided below:

1. Hammer piles in starting from the centre of the ditch
2. Position the longest pile in the deepest part of the drain. Use a sharp spade to pre-cut the outline of each pile in the surface vegetation. Push the pile into the peat using your own weight.
3. Ensure that the piles remain vertical as it will become increasingly difficult to insert piles if they lean in any direction. Using a mel, drive the pile deeper and when firm guide adjacent piles into their cams, repeating the process. Continue until all piles are firm in the peat.
4. Piling will only create a good seal if driven into at least 75cm of solid peat, usually found below the 50 cm of soft peat in the base of the ditch.
5. The top edge of the pile may require shielding from the metal of the mel. Several methods are used but the most effective is a timber batten resting on the pile.
6. Shape the dam to form a gently curving upstream 'C' shape at the ends. This shape assists dam strength and increases the amount of water retained. The dam must extend well into the banks of the ditch. A rule of thumb is the extensions into the bank on each side, equal the width of the ditch. On slopes, the wings of the dam can be angled down the slope to re-distribute water over the site and reduce pressure behind the dam.
7. Continue driving the piles starting at the centre, until all piles are approximately 30cm above bank level. Leave the dam to fill with water, as the last firming is best done with water behind the dam to lubricate the piles. Finally, hammer the piles until they sit no more than 10cm above the ground surface. The dams should not be visible above the vegetation. If they are too high after installation, then the tops of the piling should be trimmed off to make sure that the dams blend in with the landscape. Do not hammer

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the piles below the ground level, as this reduces the amount of water held and spread across the adjacent peatland.

2.4.2.7.3 Peat Dams

Installing peat dams using an excavator

Construction of peat dams will be achieved using a low ground pressure excavator with a moderate to long bucket reach to reduce movements. It is important that operators are experienced at working on deep peat and are made aware of the specific risks one may encounter. It is a good idea for the operator to walk the site before bringing the machine on. On wet parts of the bog, the excavator may need to travel on bog mats.

Method:

1. *Remove the turfs from the surface of the in ditch borrow pit and the dam location, and place to the side.*
2. *Clean out/push away from dam location the unconsolidated peat and debris.*
3. *Key the dam into the sides of the ditch, with a 0.5 to 1 metre indent on both sides.*
4. *Use consolidated peat from an in-ditch borrow pit upstream to create the dam. Avoid leaving steep sided or deep holes behind the dam, as these can be dangerous to livestock.*
5. *On a sloping site, shallow swales that extend out (or on one side) from behind the dam can be added to re-direct water from the ditch line.*
6. *Regularly compact the peat in the dam with the back of the excavator bucket to ensure an effective seal.*
7. *When the dam is 50cm above the surface place the vegetation turfs across the top of the dam (and in swale if present) and press with the bucket to ensure good contact between the turf and the peat.*

2.4.2.7.4 Log Dams

Log dams will be used to block smaller ditches in low gradient areas. The ditches over time will be blocked due to natural sedimentation and re-filling, therefore the decomposition of the wooden dam is not a problem.

Installing log dams using an excavator

Construction of log dams will be achieved using a low ground pressure excavator (or equivalent) with a moderate to long bucket reach to reduce movements. It is important that operators are experienced at working on deep peat and are made aware of the specific onsite risks that may be encountered. It is a good idea for the operator to walk the site before bringing the machine on. On wet parts of the bog, the excavator may need to travel on bog mats.

Method:

1. *Logs should be a minimum of 20cm in diameter*
2. *Logs should be cut to approximately 3 times the width of the ditch to be blocked.*
3. *Use excavator to move create a shallow depression on either side of ditch. Place excavated material to the side.*
4. *Log should be placed across the ditch at right angles and seated in the depression.*
5. *The excavator bucket should be used to push the log into the bed to the ditch ensure good contact between the log and the peat.*
6. *Cover the ends of the logs with the previously excavated material and tap down with excavator bucket.*

2.4.2.7.5 Surface Smoothing and Re-Profiling

Bog restoration techniques should reverse the impact of the ridge-furrow cultivation process which will continue to persist post-felling, to assist with the raising of the bog water table within the underlying peat mass, where bog functioning may have been damaged by the afforestation process. Methods comprising various surface smoothing techniques, and furrow/drain blocking or a combination of both have been shown to have good potential in accelerating the restoration of blanket bog habitat. A variety of techniques can be used depending on the site conditions.

The key principles are 'enough and no more' and aim to minimise compaction and disturbance. Mitigation measures to manage surface run-off (particularly water quality) from restored sites may be necessary, depending on the method used, site conditions and sensitivity of receptors. Research in Scotland shows a clear differentiation between ridge-furrow original surface in terms of depth to water table and therefore rates of recolonisation of specialist bog species post felling. Leaving furrows untreated may allow bog vegetation to colonise them over time, but the prospects for expanding cover of bog vegetation onto plough shoulders (the original surface level) and then to ridges seems very poor and the restoration process would likely take a very long time. Plough ridges often occupy up to 50% of the plantation surface area.

2.4.2.7.6 Drain Reprofiling

Reprofiling the site is a relatively new approach to bog restoration, where the original plough furrow is levelled off, thus effectively removing the need to block the drain. Blocking main drains and plough furrows alone is unlikely to raise the bog water table sufficiently in many situations. Reprofiling and levelling of the plough ridges can speed up the process and lead to more effective rewetting and recolonisation of bog vegetation across the whole surface. Infilling of main drains can use stumps, root plates, drain spoil and excavated peat as required to create the seal. In combination with damming, drain reprofiling is used to further reduce water loss down artificial drains, to remove incised drain features which can be dangerous for livestock and game, and to reduce erosion of exposed peat sides of drains. It makes the profile of the drains shallower which can make them safer for animals and humans.

Reprofiling should always be carried out in conjunction with damming to reduce waterflow down a drain. There are three general techniques:

1. *Pushing the edges of the drain into the drain line using the back of the excavator bucket.*
2. *Re-turving the drain line, which is more like hag reprofiling, when turves are stretched from the drain side into the drain channel, with borrowed turves used from either side of the drain if required.*
3. *Use of a rollerball.*



Plate 2-2 Examples of blocked and reprofiled drains on peatland in Scotland

2.4.2.7.7 **Stump Flipping and Surface Smoothing**

Stump flipping is the process of carefully prying the root plate of a stump off the bog surface and turning it upside down in the adjacent furrow. Using a low ground pressure excavator with a toothed bucket the root plate of a stump is carefully dug up, flipped and pushed into the adjacent furrow. The plough ridges are then reprofiled by sliding the ridge material carefully into the furrows with the excavator bucket, ensuring any vegetation remains on top.

2.4.2.7.8 **Stump Mulching**

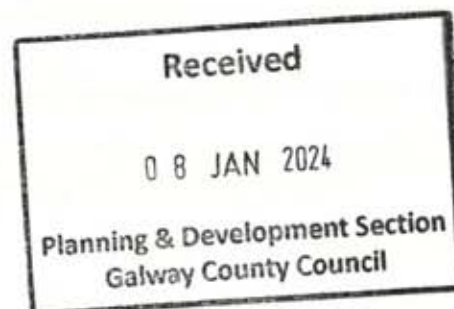
Stump mulching involves the removal of the stump using a stump removal attachment fitted to an excavator. This process is similar to stump removal, except that the stump is mulched instead of flipped before the ground is reprofiled.

2.4.2.7.9 **Cross-Tracking**

Once the surface of the ground has been reprofiled as described above, the excavator then tracks over the bog surface and the weight of the machine will compress the surface (cross tracking). The aim is to level the ground and retain as much of the bog vegetation as possible and not to bring up sub-surface peat to the surface which takes longer to revegetate. The use of a low ground pressure excavator with wide tracks is recommended (1.9m or greater) as it more effective and it will reduce compaction of the site.



Plate 2-3 Recently ground smoothed peat on a site in Scotland (May 2022)



2.4.2.8 **Site Drainage**

No new site drainage is proposed as part of this project. Existing drains will be blocked as part of the overall restoration plan for the site. During felling and bog restoration operations silt traps will be strategically installed at the outfalls of existing forestry drains. These traps will provide surface water settlement for runoff from the restoration areas to prevent sediment from entering watercourses. In addition, the proposed blocking of the drain network at each felling block will also provide attenuation. A detailed Surface Water Management Plan for the Proposed Project is provided as Appendix 4.5 of this EIAR.

2.4.2.9 **Temporary Watercourse Crossing Methodology**

There is a total of 4 no. temporary watercourse crossing points required along the proposed forestry road extensions. All proposed crossings are considered minor considering the flow and volume of

water identified therein during the site investigation in November 2022. All watercourse crossings will comprise of standard log bridge crossings typically used in normal forest operations.

The temporary log bridge crossings will be installed as follows:

- a) Ensure the construction of the bridge will not impede the water flow.
- b) Ensure bridging is able to cope with increases in water flow resulting from above normal rainfall.
- c) Ensure the movement of fish is not impeded
- d) Ensure crossings points are constructed at right angles to the water flow.
- e) On sloping ground temporary bridges should be constructed in a 'Hump Back' fashion. This will reduce the risk of silt flowing down the wheel ruts and directly entering the stream/drain being crossed. However, it is of primary importance to ensure that there is no run-off to the stream on either side of the bridge. Consequently, any run-off must be diverted onto a buffer strip at a suitable point well above the stream.
- f) The machine track leading to the bridge must be very well brashed and tracks should not be allowed to develop that can act as water channels down to the stream (see examples in Plate 4-11, below)
- g) Bridging logs should be placed from the top of bank to the top of the opposite bank to ensure that the natural stream banks are left intact.



Plate 2-4 Examples of temporary stream crossings

2.4.2.10 Vegetation Control/Invasive Species

As part of the ecological survey, the location and extent of invasive species and conifer regeneration were mapped. Rhododendron is the main invasive species. Currently there are well established clumps and regeneration is evident to varying degrees across the property. The threat of it spreading is very significant in the coming years, particularly in areas that are cleared of trees, and where the peat is disturbed. A targeted management plan for the control of rhododendron regeneration is required in combination with felling, bog restoration and the establishment of native woodland. Rhododendron removal will be conducted using best current practice including injecting stems with glyphosate, manual removal with brush-cutters, manual chainsaw felling and stump treatment using 'Ecoplugs'.

Invasive species control will be carried out each year for at least five years following the completion of restoration works. Rhododendron removal will be informed by current best practices, and it will be conducted using a combination of the methods described below. If necessary, other methods may also be used at the discretion of the site forester.

2.4.2.10.1 Stem Injection

This method involves the application of herbicide directly into the stem of standing rhododendron. A hole or cut will be made in the stem of the standing rhododendron plant using a drill, hatchet, or chainsaw. A suitable glyphosate based herbicide will be inserted into the hole/cut for targeted



application and translocation to the root. A drawback of this method is that the dead *Rhododendron* may persist in situ for 10-15 years. For this reason it is proposed to pre-treat *Rhododendron* using stem injection in all proposed harvest blocks prior to felling operations. This will reduce the potential for *Rhododendron* spread as a result of the fragment dispersal of live material during the felling process. Dead *Rhododendron* will be cleared as part of the felling process.

2.4.2.10.2 **Cut and Stump Treatment**

Bushes above 1.3 m in height will be cut to ground level using a chainsaw/brush-cutter. Material will be heaped in stacks or chipped, away from cut stumps. Avoid burying branches where they will have the opportunity to re-sprout.

Stump treatment will occur directly after cutting. Given the sensitivity of the site stumps shall generally be treated using Ecoplugs as described in Section 4.8.11.3, below. For small stems (<3cm in diameter) the freshly cut stumps shall be treated by direct application of glyphosate (using 20% solution of water, marker dye, and glyphosate). This should be applied using a paint brush within 30 minutes of cutting and no later than 12 hours after cutting. Ecoplugs will be used on large diameter stumps.

Any necessary work near aquatic zones must be carried out by an operator who has PA6 (AW) certification and using only a product that has been designated for aquatic use i.e. Roundup Biactive or Ecoplugs. Spraying/stump treatment operations to take place only in dry weather.

2.4.2.10.3 **Spot spray**

Regrowth of rhododendron and any emergent seedlings (under 1.3 m) will be spot sprayed with a suitable glyphosate product and surfactant (preferably within 2 years after the initial operation). This should be carried out between early May to late September. This will be applied by qualified contractors and utilising an appropriate product mix (refer to product labels).

Any necessary work adjacent to aquatic zones needs to be carried out by operators with PA6 (AW) certification and using only a product that is designated for aquatic use, e.g. Roundup Biactive. Spot spraying must be undertaken during dry, windless conditions.

2.4.2.10.4 **Use of Ecoplugs**

Stump treatment will occur directly after cutting. In sensitive sections of the site, or adjacent to watercourses stumps shall be treated using Ecoplugs. The stump will be drilled to insert the Ecoplug, i.e. 1 Ecoplug (as Ecoplug Max® 4 (680 g kg⁻¹ glyphosate); Monsanto, 2009) per 3cm of stump diameter. Equivalent of 0.068 g a.i. glyphosate per cm of stump diameter.

Any necessary work near aquatic zones must be carried out by an operator who has PA6 (AW) certification and using only product that has been designated for aquatic use.



3. ENVIRONMENTAL MANAGEMENT

3.1 Introduction

This CEMP has been prepared and presented as a standalone document and includes all sediment and erosion control measures required to complete the proposed restoration project. The sediment and erosion control proposals will be developed further prior to the commencement of construction; however, any such improvements will be in line with the principles set out here and will also be in full compliance with the planning consent and mitigation measures as presented in the EIAR, NIS, and all other relevant planning documents. The following sections give an overview of the sediment and erosion control measures, dust and noise control measures and a waste management plan for the site.

3.2 Environmental Setbacks

The Interim Standards for Felling & Reforestation (DAFM, 2019) stipulates the application of setbacks for various environmental receptors, based on the stipulations under the Environmental Requirements for Afforestation (DAFM, 2016). Setbacks will be implemented along watercourses present on site. There will be no mechanical disturbance of these setbacks, nor will they be entered into by any machinery or receive any pesticide or herbicide application.

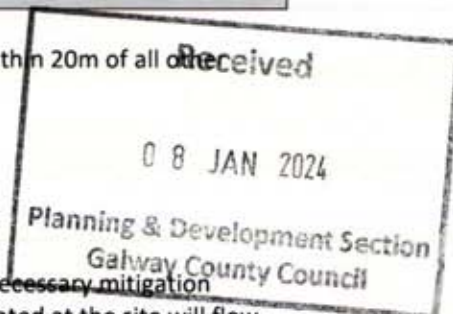
A minimum 10m setback will be established along all aquatic zones and 5m setbacks will be established along all relevant watercourses and water hotspots. The setback distance will be increased with increasing slope per the Table 2.2 below. Greater set back distances will be employed at particularly sensitive hotspots on a case-by-case basis.



Table 3-1 Environmental Setback Distances

Average slope leading to the aquatic zone		Buffer zone width on either side of the aquatic zone	Buffer zone width for highly erodible soils
Moderate	(0 – 15%)	10m	15m
Steep	(15 – 30%)	15m	20m
Very Steep	(>30%)	20m	25m

There will be no fuels or fertiliser stored within 50m of an aquatic zone or within 20m of all other water features.



3.3

Protecting Water Quality

Prior to the commencement of any subsequent construction activities, the necessary mitigation measures will be put in place to ensure that no silt laden water runoff generated at the site will flow to nearby watercourses thus ensuring the protection of surface water during the works. This will involve delineating between drainage systems. Surface waters will be managed to ensure the minimisation of run off from areas where ground disturbing activities occur does not result in silt laden water entering the existing drainage network. Stockpiled material will be located a minimum of 50m from watercourses and if deemed necessary will be surrounded by silt fencing where there is a risk of run-off during prolonged periods of rainfall.

Particular emphasis will also be placed on hazardous materials entering the surface water management system as well as spill or leaks of fuel oils. Section 4 provides an Emergency Response Plan for dealing with spillages which may result in adverse environmental effects.

3.3.1

Prevention Pollution Control Measures

The following measures will be put in place to prevent the transportation of silt laden water or pollutants from entering the wider environments including watercourses:

- All temporary fills or stockpiles will be damped down or covered with polyethylene sheeting as required to avoid sediment release associated with heavy rainfall.
- Prior to the commencement of earthworks, silt fencing will be strategically erected along adjacent watercourses. All diesel or petrol pumps required onsite will be operated within bunded units.
- The design, construction and maintenance of an on-site drainage system specified in the EIAR will prevent sediment related pollution of nearby surface waters. Where possible, earthworks will not be carried out during periods of heavy rainfall.

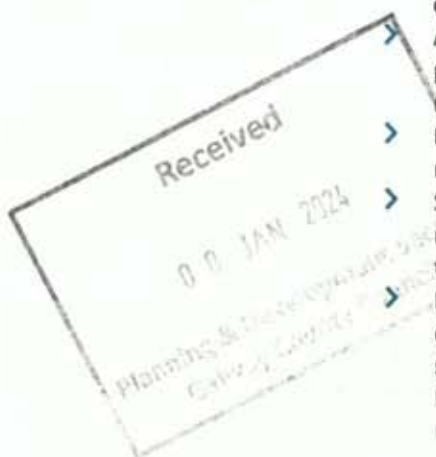
3.3.2

Refuelling, Fuel and Hazardous Materials Storage

The following measures are proposed to avoid release of hydrocarbons at the site:

- Fuels, lubricants and hydraulic fluids for equipment used on the site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment.
- Minimal refuelling or maintenance of construction vehicles or plant will take place on site. Off-site refuelling will occur at a controlled fuelling station.

- On-site refuelling will take place by direct refuelling from the delivery truck or from fuel stored within a bunded fuel tank. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.
- Vehicles will never be left unattended during refuelling. Only dedicated trained and competent personnel will carry out refuelling operations and plant refuelling procedures shall be detailed in the contractor's method statements.
- The small volume of fuels, lubricants and hydraulic fluids that will be stored at the site will be placed within an appropriately bunded storage area within the boundaries of the Proposed Project site.
- Storage bunds/trays, if required will be constructed of an impermeable membrane (HDPC Plastic) and will have the adequate capacity to contain the volume of the liquids contained therein, if a leak/spillage does occur from one of the storage vessels.
- The storage area will contain a small bund lined with an impermeable membrane in order to prevent any contamination of the surrounding soils and vegetation.
- All site plant will be inspected at the beginning of each day prior to use. Defective plant shall not be used until the defect is satisfactorily fixed. All major repair and maintenance operations will take place off site.
- Potential impacts caused by spillages etc. during the construction phase will be reduced by keeping spill kits and other appropriate equipment on-site.
- Spill kits will be used to deal with any accidental spillage in and outside the refuelling area. Spill control measures as outlined fully in the CEMP accompanying this application will be adhered to.
- Harmful materials such as fuels/chemicals shall be stored on site for use in connection with the construction works only. These materials shall be stored in a safe and controlled manner such as within an appropriately sized bunded unit. Fuels/chemicals will be stored for periods in line with the manufacturer's recommendations.



3.3.3

Spill Control Measures

It is not proposed to store any large volumes of oils/fuels for the purpose of refuelling on the site as refuelling of large plant equipment will be carried out where possible directly from the fuel supplier's delivery truck at a designated refuelling location on site which will be a minimum of 50m from nearby watercourses. Where fuel is required to be stored for smaller plant and equipment, it will be in a bunded fuel tank will be stored within the confines of the site boundary whilst also respecting the 50m watercourse buffer. It will be positioned on an impermeable surface and will be equipped with a spill kit. This bunded fuel tank will be used for smaller plant and equipment i.e., site dumpers. Onsite plant (excavator) will be refuelled by an external contractor who will call to site as required. Road vehicles will not be refuelled at the site.

In the event of minor spills and leaks from road vehicles and the onsite excavator, the following steps provide the procedure to be followed in the event of any significant spill or leak.

- Stop the source of the spill and raise the alarm to alert people working in the vicinity of any potential dangers.
- ☑ If applicable, eliminate any sources of ignition in the immediate vicinity of the incident
- ☑ Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill.
- ☑ If possible, cover or bund off any vulnerable areas where appropriate, such as drains or watercourses.
- ☑ If possible, clean up as much as possible using the spill control materials.
- ☑ Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited.

- ☒ Notify the applicant immediately giving information on the location, type and extent of the spill so that they can take appropriate action and further investigate the incident to ensure it has been contained adequately.
- ☒ External consultants will inspect the site and ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring.
- The applicant will notify the appropriate regulatory body such as Galway County Council if deemed necessary.

3.4

Dust Control

Dust can be generated from many on-site activities such as road construction or capping. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust, i.e., soil, sand, etc and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Construction traffic movements also have the potential to generate dust as they travel along the haul route. The measures below will also prevent construction debris arising on the public road network.

- Site roads/site entrances with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions.
- ☒
- ☒ Material handling systems and material storage areas will be designed and laid out to minimise exposure to wind.
- ☒ Water misting will be utilised on-site as required to mitigate dust in dry weather conditions.
- ☒ The transport of road stone or other material, which has significant potential to generate dust, will be undertaken in tarpaulin-covered vehicles, where necessary.
- ☒ Daily inspection of construction sites to examine dust measures and their effectiveness.

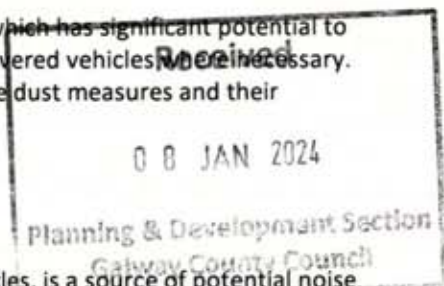
3.5

Noise and Vibration Control

The operation of plant and machinery, including construction vehicles, is a source of potential noise impacts. Noise levels shall be kept below those levels specified in the National Roads Authority – “Guidelines for the Treatment of Noise and Vibration in National Roads Schemes” or additional limits as imposed by Galway County Council. The Proposed Projects shall comply with BS 5228 “Noise Control on Construction and open sites Part 1: Code of practice for basic information and procedures for noise control.” During the works, any plant introduced to the site will not be excessively noisy. Exhaust and silencer systems on plant will be maintained in a satisfactory condition and operating correctly at all times. Defective silencers will be immediately replaced.

Proposed measures to control noise include:

- Construction equipment for use outdoors shall comply with the European Communities Regulations– Noise Emission by Equipment for Use Outdoors – SI 241 - 2006.
- Diesel generators, if utilised will be enclosed in sound proofed containers to minimise the potential for noise impacts.
- ☒ Plant and machinery with low inherent potential for generation of noise and/or vibration will be selected. All construction plant and equipment to be used on-site will be modern equipment and will comply with the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations.
- ☒ Plant with the potential of generating noise or vibration will be placed as far away from sensitive properties as permitted by site constraints.



- > If work activities have the potential to result in vibration, the appointed contractor shall source vibration monitoring equipment immediately from a specialist company who specialise in monitoring equipment.
- > Regular maintenance of plant will be carried out in order to minimise noise emissions. Particular attention will be paid to the lubrication of bearings and the integrity of silencers.
- > All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the works.
- > Compressors, if utilised will be of the "sound reduced" models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.
- > Machines, which are used intermittently, will be shut down during those periods when they are not in use.
- > Training will be provided by the Site Management to drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation.

It is recommended that drivers of heavy goods vehicles (HGVs) associated with the development will extend due care and courtesy to other road users. Excessive engine revving will be avoided at all times.

The proposed construction working hours will be limited where possible to daylight working hours Monday to Saturday. Construction will not take place at the site on Sundays or Public Holidays.

Deviation from these times will only be allowed in exceptional circumstances and when other relevant third parties i.e., nearby homeowners have been notified and have agreed to works taking place during such time periods.

3.6

Traffic Management Proposals

The proposed traffic management measures to be adopted during the construction works are summarised below. Please note that this is not an exhaustive list, and it will be updated accordingly by the appointed contractor in consultation with the local authority.

- > Warning signs / Advanced warning signs will be installed at appropriate locations in advance of the construction site access locations.
- > Construction and delivery vehicles will be instructed to use only the approved and agreed means of access; and movement of construction vehicles will be restricted to these designated routes.
- > Appropriate vehicles will be used to minimise environmental impacts from transporting construction material, for example the use of dust covers on HGVs carrying dust producing material.
- > Speed limits of construction vehicles to be managed by appropriate signage, to promote low vehicular speeds.
- > Parking of site vehicles will be managed and will not be permitted on public road, unless proposed within a designated area that is subject to traffic management measures and agreed with Galway County Council.
- > All vehicles will be suitably serviced and maintained to avoid any leaks or spillage of oil, petrol or diesel. All scheduled maintenance will not be carried out on the public highway.

The site will be accessed exclusively from the existing entrance at the south-east corner of the site boundary. As Coillte operate an open forest policy, the site will remain accessible to users. However, as works progress, parts of the site will be closed off to the public, where high impact works are occurring. Appropriate signage to be used to inform the public.

3.7 Invasive Species Management

During the multidisciplinary surveys carried out by MKO, a search for Invasive Alien Species (IAS), with a focus on those listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) was conducted by a suitably qualified ecologist. Invasive species were found on site as part of site investigations and walkovers (See section 6.5.1.9 of Chapter 6 of this EIAR). A detailed invasive species management plan will be prepared. The treatment and control of invasive alien species will follow guidelines issued by the National Roads Authority – The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads (NRA 2010) and the Environment Agency (2013) – The Knotweed Code of Practice: Managing Japanese Knotweed on Development Sites (Version 3, amended in 2013). To prevent the introduction of any invasive species to the site best practice control methods are summarised in the following sections

3.7.1 Site Management

An invasive species management plan will be prepared, and the following measures will be adopted. Careful preparation of the site and planning of the works is crucial to successfully prevent the introduction of invasive species. The following list of guidelines, which is not exhaustive, shall be followed by all on-site personnel. Only those who have been inducted into biosecurity measures on-site may enter the contaminated zones within the works areas.

3.7.2 Establishing Good Site Hygiene

- A risk assessment and method statement must be provided by the Contractor prior to commencing works.
- A suitably qualified ecologist, forester, or equivalent will be on site to monitor and oversee the implementation of invasive species remedial works.

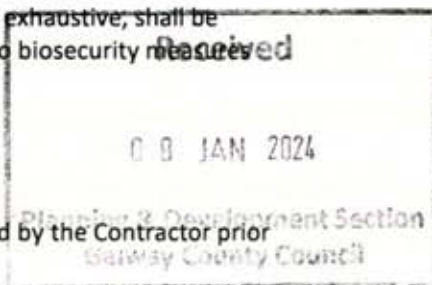
Plant and equipment which is operated within an area for the management of materials in contaminated areas will be decontaminated prior to relocating to a different works area. The decontamination procedures will take account of the following:

- Personnel may only clean down if they are familiar with the plant and rhizome material and can readily identify it.
- Decontamination will only occur within designated wash-down areas.
- Vehicles will be cleaned using stiff-haired brush and pressure washers, paying special attention to any areas that might retain rhizomes e.g., wheel treads and arches.
- All run-offs will be isolated and treated as contaminated material. This will be disposed of in already contaminated areas.

3.8 Waste Management

The Waste Management Acts 1996 to 2011 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling and recovery. The Act also provides a regulatory framework for meeting higher environmental standards set out by other national and EU legislation.

The Act requires that any waste related activity must have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the site of the Proposed Project to ensure that all contractors hired to remove waste from the site have valid Waste Collection Permits. It will then be necessary to ensure that the waste is delivered to a licensed or permitted waste facility. The hired waste contractors and subsequent receiving facilities must adhere to the conditions set out in their respective permits and authorisations.



Given the nature of the Proposed Project it is not anticipated that there will be significant volumes of waste generated. Forestry activities will be carried out in accordance with all relevant Forest Service guidance and regulations. Minor amounts of waste generated on site will be segregated into a number of waste categories in accordance with a general waste segregation policy. The categories for segregation will include timber, plastics, and metals. This material will be removed by authorised waste collection contractors for recycling and recovery at various licensed facilities.



4.

ENVIRONMENTAL MANAGEMENT, IMPLEMENTATION AND EMERGENCY RESPONSE

4.1

Environmental Manager

The Coillte Site Manager will also fulfil the role of Environmental Manager for the project.. In general, this Environmental Manager will maintain responsibility for monitoring the works and Contractors/Sub-contractors from an environmental perspective. The Environmental Manager will act as the regulatory interface on environmental matters by liaising with Galway County Council and other statutory bodies as required. The duties of the appointed Environmental Manager are summarised as follows:

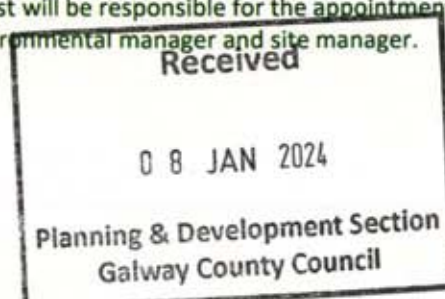
- Maintain and update as required the Construction Phase CEMP and supporting environmental documentation and review/approval of contractor method statements.
- Undertake inspections and reviews to ensure the works are carried out in compliance with the CEMP.
- Monitor the implementation of the CEMP, particularly all proposed/required Environmental Monitoring.
- Advise site management/contractor/sub-contractors on:
 - Prevention of environmental pollution and improvement to existing working methods.
 - Changes in legislation and legal requirements affecting the environment.
 - Suitability and use of plant, equipment and materials to prevent pollution.
 - Environmentally sound methods of working and systems to identify environmental hazards.
- Ensure proper mitigation measures are initiated and adhered to during the construction phase.
- Liaise with Project Team and present the findings of site audits/inspections that are completed.
- Ensure adequate arrangements are in place for site personnel to identify potential environmental incidents.
- Ensure that details of environmental incidents are communicated in a timely manner to the relevant regulatory authorities, initially by phone and followed up as soon as is practicable by email.
- Support the investigation of incidents of significant, potential or actual environmental damage, and ensure corrective actions are carried out, recommend means to prevent recurrence and communicate incident findings to relevant parties.
- Identify environmental training requirements and arrange relevant training for all levels of site-based staff/workers,

4.2

Project Ecologist

A suitably qualified Ecologist will be appointed and will report to the Environmental Manager. This position is responsible for the implementation of ecology-related mitigation measures of the CEMP and associated planning documents. The project ecologist will be responsible for the appointment of an ecological clerk of works, who will liaise with the environmental manager and site manager.

Their duties will include the following:



- Provision of oversight on the protection of sensitive habitats and species encountered prior to or during the construction phase of the proposed Development.
- Undertake any required ecological surveys prior to or during construction.
- Provide support to the Site Manager/ Environmental Manager on the ecology of the site.
- Undertake a pre-construction transect/walkover bird survey to ensure that significant effects on breeding birds will be avoided.
- Inform and educate on-site personnel of the ornithological and ecological sensitivities within the Proposed Project area.
- Oversee management of ornithological, water quality protection and ecological issues during the construction period and advise on these issues as they arise.
- Provide guidance to contractors to ensure legal compliance with respect to protected species onsite.
- Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress.

4.3 Emergency Response Plan

4.3.1 Emergency Response

The Emergency Response Plan (ERP) is presented in this section of the CEMP. It provides details of procedures to be adopted in the event of an emergency in terms of site health and safety and environmental protection. The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. The ERP will require updating and submissions from the contractor/PSCS and suppliers as the Proposed Project progresses. Where sub-contractors that are contracted on site are governed by their own emergency response procedure a bridging arrangement will be adopted to allow for inclusion of the sub-contractor's ERP within this document.

This is a working document that requires updating throughout the various stages of the project.

4.3.2 Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The Site Manager will lead the emergency response which makes him responsible for activating and coordinating the emergency response procedure. The other site personnel who can be identified at this time who will be delegated responsibilities during the emergency response are presented in Figure 4-1. In a situation where the Site Manager is unavailable or incapable of coordinating the emergency response, the responsibility will be transferred to the next person in the chain of command outlined in Figure 4-1. This will be updated throughout the various stages of the project.



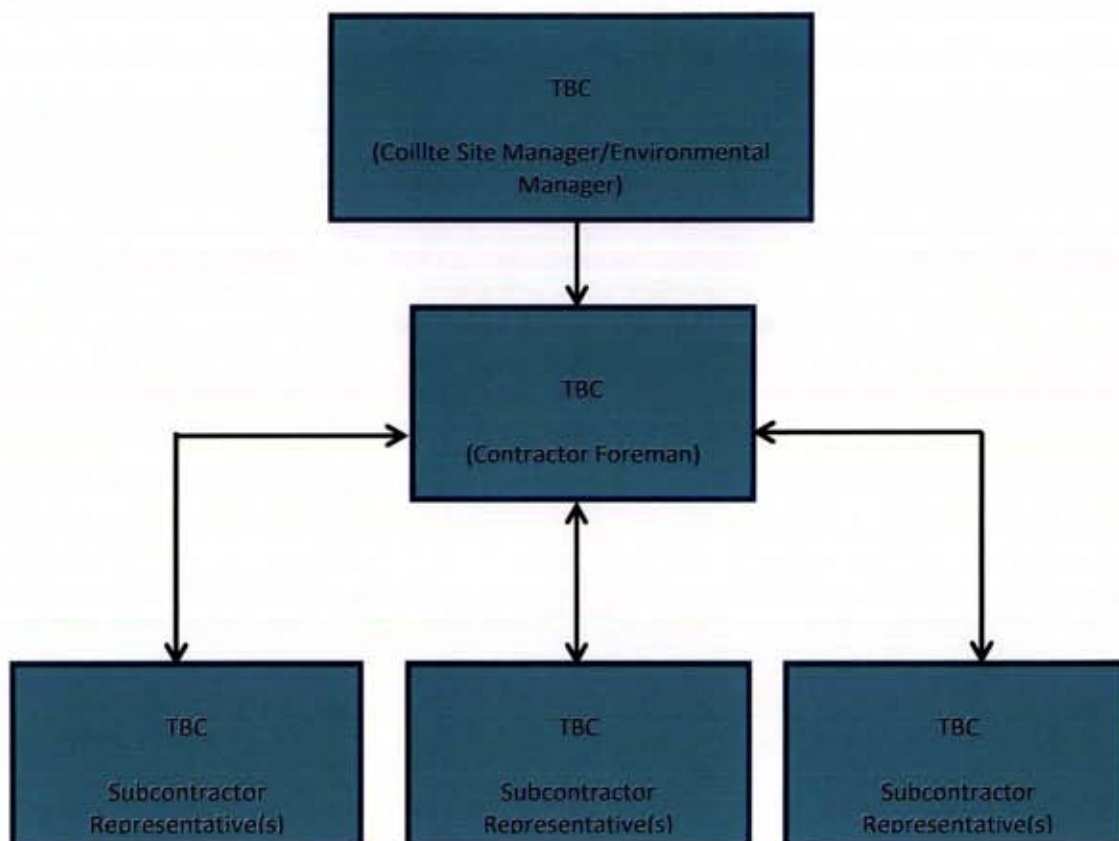


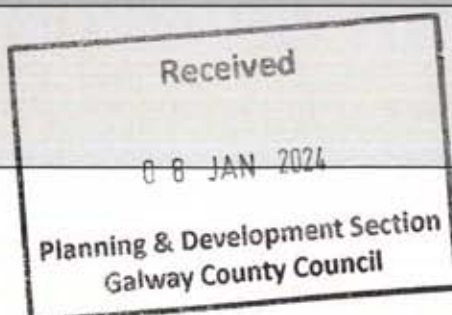
Figure 4-1 Emergency Response Procedure Chain of Command

4.3.3 Initial Steps

In order to establish the type and scale of potential emergencies that may occur, the following hazards have been identified as being potential situations that may require an emergency response in the event of an occurrence.

Table 4-1 Hazard Associated with Potential Emergency Situations

Hazard	Emergency Situation
Construction Vehicles: tractors, excavators etc.	Collision or overturn which has resulted in operator or third-party injury.
Abrasive wheels/Portable Tools.	Entanglement, amputation or electrical shock associated with portable tools.
Fire	Injury to operative through exposure to fire.
Sickness	Illness unrelated to site activities of an operative e.g., heart attack, loss of consciousness, seizure.




In the event of an emergency situation associated with, but not restricted to, the hazards outlined in Table 4-1 the Site Manager will carry out the following:

- Establish the scale of the emergency situation and identify the number of personnel, if any, that have been injured or are at risk of injury.
- Where necessary, sound the emergency siren/foghorn that activates an emergency evacuation on the site.
- Make safe the area if possible and ensure that there no identifiable risk exists with regard to dealing with the situation e.g., if a machine has turned over, ensure that it is in a safe position so as not to endanger others before assisting the injured.
- Contact the required emergency services or delegate the task to someone if he is unable to do so. If delegating the task, ensure that they follow the procedures for contacting the emergency services as set out in Section 4.2.6.
- Take any further steps that are deemed necessary to make safe or contain the emergency incident e.g., cordon off an area where an incident associated with electrical issues has occurred.
- Contact any regulatory body or service provider as required e.g., ESB Networks the numbers for which as provided in Section 4.2.6.
- Contact the next of kin of any injured personnel where appropriate. The procedure for this is outlined in Section 4.2.6.

4.3.4 Environmental Emergency Response Procedure

4.3.4.1 Spill Control Measures

Every effort will be made to prevent an environmental incident during the construction phase of the Proposed Project. Oil/fuel spillages are one of the main environmental risks that could occur on the proposed site which will require an emergency response procedure. The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. The following procedures should be followed in the event of such an incident.

- 
- Stop the source of the spill and raise the alarm to alert people working in the vicinity of any potential dangers.
 - If applicable, eliminate any sources of ignition in the immediate vicinity of the incident
 - ☒ Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill.
 - ☒ If possible, cover or bund off any vulnerable areas where appropriate, such as drains, watercourses or sensitive habitats.
 - ☒ If possible, clean up as much as possible using the spill control materials.
 - ☒ Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited.
 - ☒ Notify the Environmental Manager immediately giving information on the location, type and extent of the spill so that they can take appropriate action.
 - ☒ The Environmental Manager will inspect the site and will assist by providing any advice possible to ensure the necessary containment and clean up measures are in place and prevent further spillage from occurring.
 - ☒ The Environmental Manager will notify the appropriate regulatory body such as Galway County Council and Environmental Protection Agency (EPA) etc. if deemed necessary.

Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident must be investigated in accordance with the following steps.

- The Environmental Manager must be immediately notified.

- If necessary, the Environmental Manager/Site Manager will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident.
- ☒ The details of the incident will be recorded on an Environmental Incident Form which will provide information such as the cause, extent, actions and remedial measures that were used following the incident. The form will also include any recommendations made to avoid reoccurrence of the incident.
- ☒ If the incident has impacted on an ecologically sensitive receptor, such as a sensitive habitat, adjacent waterbodies, protected species or designated conservation site, (pSPA or cSAC), the Environmental Manager will liaise with the project ecologist.
- ☒ If the incident has impacted on a sensitive receptor such as an archaeological feature the Environmental Manager will liaise with the Project Archaeologist.
- ☒ A record of all environmental incidents will be kept on file by the Environmental Manager and the Main Contractor. These records will be made available to the relevant authorities such as Galway County Council and the EPA if required.

The Environmental Manager/Site Manager will be responsible for any corrective actions required as a result of the incident e.g., an investigative report, formulation of alternative construction methods or environmental sampling, and will advise the Main Contractor as appropriate.

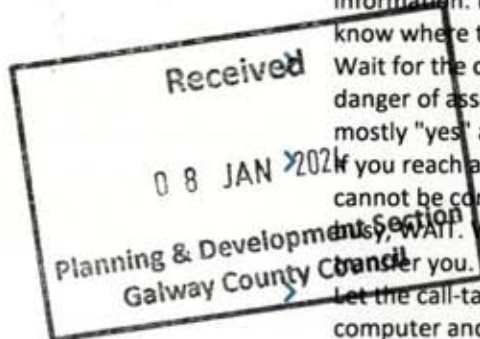
4.3.5 Contacting the Emergency Services

4.3.5.1 Emergency Communications Procedure

In the event of requiring the assistance of the emergency services the following steps should be taken:

- Stay calm. It is important to take a deep breath and not get excited. Any situation that requires 999/112 is, by definition, an emergency. The dispatcher or call-taker knows that and will try to move things along quickly, but under control.
- Know the location of the emergency and the number you are calling from. This may be asked and answered a couple of times but do not get frustrated. Even though many emergencies call centres have enhanced capabilities meaning they are able to see your location on the computer screen they are still required to confirm the information. If for some reason you are disconnected, at least emergency crews will know where to go and how to call you back.
- Wait for the call-taker to ask questions, then answer clearly and calmly. If you are in danger of assault, the dispatcher or call-taker will still need you to answer quietly, mostly "yes" and "no" questions.
- If you reach a recorded message, listen to what it says. If the recording says your call cannot be completed, hang up and try again. If the recording says all call takers are busy, wait. When the next call-taker or dispatcher is available to take the call, it will let you know.
- Let the call-taker guide the conversation. He or she is typing the information into a computer and may seem to be taking forever. There is a good chance, however, that emergency services are already being sent while you are still on the line.
- Follow all directions. In some cases, the call-taker will give you directions. Listen carefully, follow each step exactly, and ask for clarification if you do not understand.
- Keep your eyes open. You may be asked to describe victims, suspects, vehicles, or other parts of the scene.
- Do not hang up the call until directed to do so by the call taker.

All staff members will know the address and location of the site as it may be necessary to liaise with the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services.



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4.3.5.2 Contact Details

Table 4-2 Emergency Contacts

Hazard	Emergency Situation
Emergency Services – Ambulance, Fire, Gardaí	999/112
Doctor – Elm Tree, Clifden	09530930
Hospital – Clifden District Hospital, Clifden	09521301
ESB Emergency Services	1850 372 999
Bórd Gais Emergency	1850 20 50 50
Gardaí – Clifden Garda Station	09522500
Health and Safety Coordinator - Health & Safety Services	TBC
Health and Safety Authority	1890 289 389
Project Supervisor Construction Stage (PSCS): TBC	TBC
Project Supervisor Design Stage (PSDS): TBC	TBC
Client – Coillte	0818 367 378

4.3.5.3 Procedure for Personnel Tracking

All operatives on site without exception must undergo a site induction where they will be required to provide personal contact details which will include contact information for next of kin.

In the event of a site operative becoming involved in an emergency situation where serious injury has occurred, and hospitalisation has taken place, it will be the responsibility of the Site Manager or next in command if unavailable to contact the next of kin to inform them of the situation that exists.

4.3.5.4 Induction Checklist

Table 4-3 provides a list of items highlighted in this ERP which must be included or obtained during the mandatory site induction of all personnel that will work on the site. This will be updated throughout the various stages of the project.

Table 4-3 Emergency Response Plan Items Applicable to the Site Induction Process

ERP Items to be included in Site Induction	Status
All personnel will be made aware of the evacuation procedure during site induction.	

Due to the location of the site, it may be necessary to liaise with and assist the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This should form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable.	
All operatives on site without exception must undergo a site induction where they will be required to provide personal contact details which will include contact information for next of kin.	



4.4

Water Quality and Monitoring

4.4.1

Pre-Construction Baseline Monitoring

Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement of felling and construction at the site. The baseline monitoring programme will be subject to agreement with Galway County Council.

Analysis will be for a range of parameters with relevant regulatory limits along with Environmental Quality Standards (EQSs) and sampling will be undertaken for each watercourse e.g. at SW1, SW2, SW3 & SW4 as outlined in Figure 9-2 of the EIAR on a monthly basis.

Pre-commencement baseline sampling will be completed on at least two occasions, and these should coincide with low flow and high flow stream conditions. The high flow sampling event will be undertaken after a period of sustained rainfall, and the low flow event will be undertaken after a dry spell.

4.4.2

Construction Phase Monitoring

4.4.2.1

Daily Visual Inspections

Daily visual inspections of drains and outfalls will be performed during the construction period to ensure suspended solids are not entering streams and rivers on site, to identify any obstructions to channels and to allow appropriate maintenance of the drainage regime. Should the suspended solids levels measured during construction be higher than the background levels, the source will be identified and additional mitigation measures implemented.

The following periodic inspection regime will be implemented:

Daily general visual inspections of site operations and inspections of watercourses within the active works area will be carried out by the Environmental Manager or a suitably qualified and competent person as delegated by the Environmental Manager;

Inspections to include all elements of drainage infrastructure to ensure the system is operating correctly. Any changes, such as discolouration, odour, oily sheen or litter will be noted and corrective action implemented. High risk locations such as settlement ponds will be inspected daily. Daily inspections checks will be completed on plant and equipment, and materials such as straw bales or oil absorbent materials which may need replacement;

Event based inspections by the Environmental Manager as follows:

- > >10 mm/hr (i.e. high intensity localised rainfall event);
- > >25 mm in a 24-hour period (heavy frontal rainfall lasting most of the day); or,
- > Rainfall depth greater than monthly average in 7 days (prolonged heavy rainfall over a week).
- > Monthly site inspections by the / Environmental Manager or a suitably qualified and competent person during construction phase;
- > Quarterly site inspections by the / Environmental Manager after construction for a period of one year following the construction phase; and,
- > A written record will be maintained or available on-site within this Construction Environmental Management Plan (CEMP) which will be maintained on-site during the construction phase.

4.4.2.2 Continuous Turbidity Monitoring

Turbidity monitors or sondes can be installed where required at active locations in the restoration site. The sondes will provide continuous readings for turbidity levels in the watercourse. This equipment will be supplemented by daily visual monitoring at their locations as outlined in the sections below.

4.4.2.3 Monthly Laboratory Analysis

Baseline laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken as per the water monitoring programme for the Proposed Project. This will not be restricted to just these locations around the development site with further sampling points added as deemed necessary by the Environmental Manager in consultation with the Site Manager.

4.4.2.4 Monitoring Parameters

The analytical determinants of the chemical water monitoring programme (including limits of detection and frequency of analysis) will be as per S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations and European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. The likely suite of determinants will include:

- > pH (field measured)
- > Electrical Conductivity (field measured)
- > Temperature (field measured)
- > Dissolved Oxygen (field measured)
- > Total Phosphorus
- > Chloride
- > Nitrate
- > Nitrite
- > Total Nitrogen
- > Ortho-Phosphate
- > Ammonia N
- > Biochemical Oxygen Demand
- > Total Suspended Solids
- > Turbidity
- > Dissolved organic carbon
- > Heavy metals



4.4.3 Surface Water Monitoring Reporting

Visual inspection and laboratory analysis results of water quality monitoring shall assist in determining the requirements for any necessary improvements in drainage controls and pollution prevention measures implemented on site.

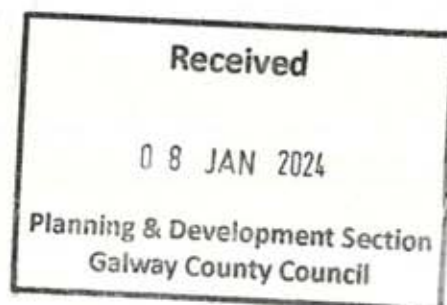
It will be the responsibility of the Environmental Manager/Site Manager to present the ongoing results of water quality and weather monitoring at or in advance of regular site meetings.

Reports on water quality will consider all field monitoring and visual inspections, and results of laboratory analysis completed for that period. Reports will describe how the results compare with baseline data as well as previous reports on water quality. The reports will also describe whether any deterioration or improvement in water quality has been observed, whether any effects are attributable to construction activities and what remedial measures or corrective actions have been implemented.

4.4.4 Post Construction Monitoring

4.4.4.1 Monthly Laboratory Analysis Sampling

Monthly sampling for laboratory analysis for a range of parameters adopted during pre-commencement and construction phases will continue for six months after construction. The Project Hydrologist will monitor and advise on the readings being received from the testing laboratory.



5.

MITIGATION PROPOSALS

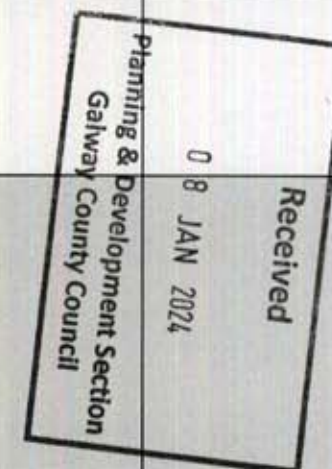
The Mitigation Measures which will be implemented are presented in this section of the CEMP. The CEMP will be finalised subsequent to whatever permission is granted by Galway County Council and will be updated prior to construction to include, *inter alia*, any additional requirements pursuant to relevant planning conditions imposed.

By presenting the mitigation proposals in the below format, it is intended to provide an easy to audit list that can be reviewed and reported on during future phases of the project.

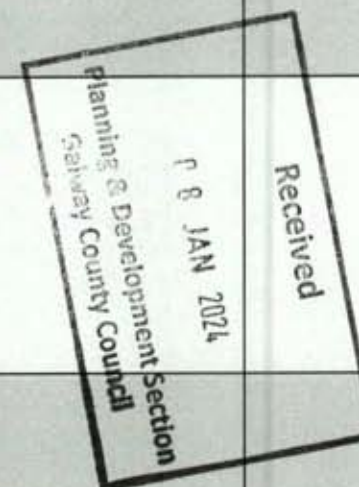


Table 5-1 Mitigation Measures for the Pre-commencement and Construction Phases

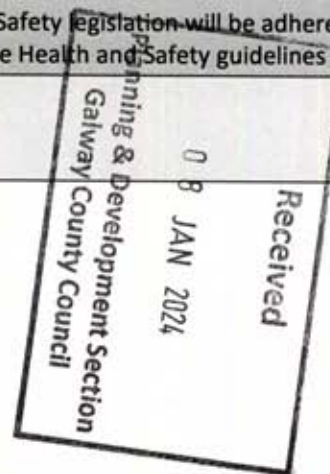
Ref. No.	Mitigation Measure	Audit Result	Action Required
Pre-Commencement Phase			
MM1	All site activities will be provided for in an Environmental Management Plan, prepared prior to the commencement of any operations onsite. The environmental management plan will set out all measures necessary to ensure works are carried out in accordance with the mitigation measures set out in the EIAR and will set out the monitoring and inspections procedures and frequencies.		
MM2	A designated environmental manager will oversee the site works and implementation of the Environmental Management Plan and provide on-site advice on the mitigation measures as necessary to ensure the project proceeds as intended. The level, detail and frequency of reporting expected from the environmental manager for the project manager, and any Authorities or other Agencies, will be agreed by all parties prior to commencement of construction, and may be further adjusted as required during the course of the project.		
MM3	The works programme for the groundworks part of the construction phase of the project will also take account of weather forecasts and predicted rainfall in particular.		
MM4	<p>Baseline water quality field testing and laboratory analysis will be undertaken where required prior to commencement of felling and construction at the site. The baseline monitoring programme will be subject to agreement with Galway County Council.</p> <p>Analysis will be for a range of parameters with relevant regulatory limits along with Environmental Quality Standards (EQSs) and sampling will be undertaken on a monthly basis.</p> <p>Additional baseline sampling will be completed on at least two occasions, and these should coincide with low -flow and high flow stream conditions during on-site operations. The high flow sampling event</p>		



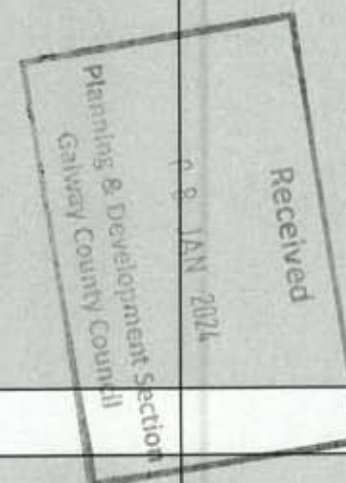
Ref. No.	Mitigation Measure	Audit Result	Action Required
	will be undertaken after a period of sustained rainfall, and the low flow event will be undertaken after a prolonged dry spell.		
MM5	A pre-construction invasive species survey will be undertaken a part of the proposed project. This will provide updated data in advance of any construction given the intervention time period between the original survey work and any future grant of permission/ construction. Measures will be in place to prevent the spread of these species during the proposed works. In addition, all necessary precautions will be taken to prevent the introduction of invasive species to the site from elsewhere.		
MM6	Pre-treatment of Rhododendron will be undertaken on all harvest blocks in the year prior to harvesting.		
MM7	The procedures for the implementation of the mitigation measures outlined in the EMP and their effectiveness and completion is typically audited by way of an Environmental Management Plan Audit Report. The EMP Audit Report effectively lists all mitigation measures prescribed in any of the planning documentation and any further mitigation measures proposed during the detailed design stage and this allows all mitigation measures to be audited on a systematic and regular basis.		
MM8	Where necessary, sections of trails or waymarked areas, recreation areas and car parks will be closed/shut down, or diversions put in place, to prevent members of the public from trespassing in high risk operational areas		
Construction Phase			



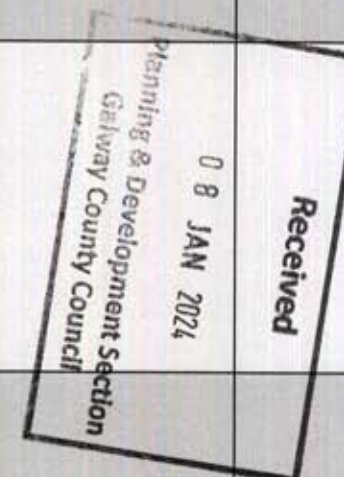
Ref. No.	Mitigation Measure	Audit Result	Action Required
Construction Management			
MM9	<p>On-site refuelling of machinery will be carried out at dedicated refuelling locations using a mobile double skinned fuel bowser. The fuel bowser, a double-axle custom-built refuelling trailer will be re-filled off site and will be towed around the site by a 4x4 jeep to where machinery is located. It is not practical for all machinery to travel back to a single refuelling point, given the size of the excavators, etc. that will be used during construction. The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use.</p> <p>Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays, spill kits and fuel absorbent mats will be used during all refuelling operations.</p>		
MM10	<ul style="list-style-type: none"> • Signage will be erected prior to commencement of operations • General safety signage and prohibitive notices will be erected wherever necessary 		
MM11	Public roadways and rights of way will be kept free of debris and will be restored to pre-operations conditions.		
MM12	All Forest Service guidelines and Health and Safety legislation will be adhered to during all forestry-related activities. In addition to this, all Coillte Health and Safety guidelines will also be adhered to.		
Water Quality and Drainage			



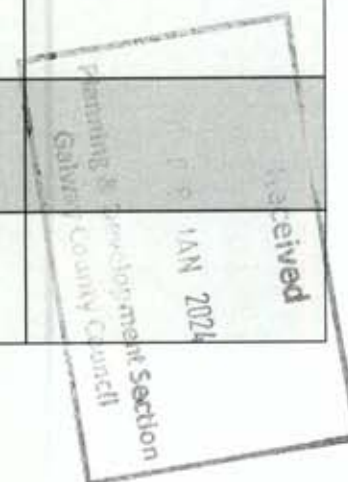
Ref. No.	Mitigation Measure	Audit Result	Action Required																
MM13	<p>The setback distance from sensitive hydrological features ensures that adequate room is maintained for the proposed mitigation measures (discussed below) which are properly installed and operate effectively. The buffer/setback zone will:</p> <ul style="list-style-type: none"> ➤ Avoid physical damage (river/stream banks and river/stream beds) to watercourses and the associated release of sediment; ➤ Avoid and minimise peat/soil disturbance and compaction within close proximity to surface watercourses; ➤ Avoid and minimise the entry of suspended sediment from works into watercourses; and, ➤ Avoid and minimise the entry of suspended sediment from the drainage system into watercourses, achieved in part by ending drain discharge outside the buffer zone and allowing percolation across the vegetation within the buffer zone. <table border="1"> <thead> <tr> <th colspan="2">Average slope leading to the aquatic zone</th><th>Buffer zone width on either side of the aquatic zone</th><th>Buffer zone width for highly erodible soils</th></tr> </thead> <tbody> <tr> <td>Moderate</td><td>(0 – 15%)</td><td>10m</td><td>15m</td></tr> <tr> <td>Steep</td><td>(15 – 30%)</td><td>15m</td><td>20m</td></tr> <tr> <td>Very Steep</td><td>(>30%)</td><td>20m</td><td>25m</td></tr> </tbody> </table>	Average slope leading to the aquatic zone		Buffer zone width on either side of the aquatic zone	Buffer zone width for highly erodible soils	Moderate	(0 – 15%)	10m	15m	Steep	(15 – 30%)	15m	20m	Very Steep	(>30%)	20m	25m		
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Moderate	(0 – 15%)	10m	15m																
Steep	(15 – 30%)	15m	20m																
Very Steep	(>30%)	20m	25m																
MM14	All machinery will be operated by suitably qualified personnel;																		
MM15	Checking and maintenance of roads and culverts will be on-going through any felling operations. No tracking of vehicle through watercourses will occur, as vehicles will use road infrastructure and existing watercourse crossing points. Where possible, existing drains will not be disturbed during felling works;																		



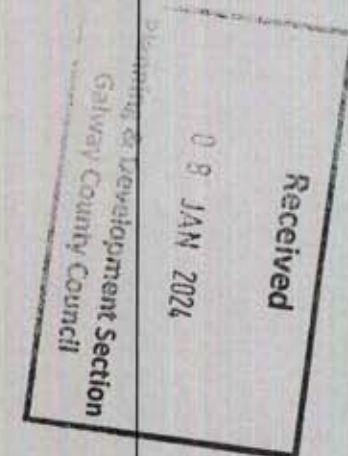
Ref. No.	Mitigation Measure	Audit Result	Action Required
MM16	<p>Machines will traverse the site along specified off-road routes (referred to as racks);</p> <ul style="list-style-type: none"> > The location of racks will be chosen to avoid waterlogged and potentially sensitive areas; > Brash mats will be placed on the racks to support the vehicles on soft ground, reducing peat and mineral soil disturbance and erosion, and avoiding the formation of rutted areas, in which surface water ponding can occur. Brash mat renewal will take place when they become heavily used and worn. Provision should be made for brash mats along all off-road routes, to protect the soil from compaction and rutting. 		
MM17	Where there is risk of severe erosion occurring, extraction will be suspended during periods of high rainfall.		
MM18	Continuous turbidity monitoring of surface watercourse downstream of the proposed work areas will be completed throughout the construction phase of the Proposed Project. This will be completed with the installation of automated water quality probes which will record turbidity and other hydrochemical parameters at regular intervals (typically every 15 minutes). These probes will be installed in natural watercourses downstream of work areas. The data will be processed and analysed at regular intervals and work will cease if elevated turbidity concentrations are recorded. In this event, all upstream silt traps and drainage routes will be inspected to identify the cause of the elevated turbidity levels. Work will not recommence until any issues have been resolved and the turbidity concentrations have returned to background concentrations.		
MM19	<p>To avoid potential sedimentation of watercourses the following mitigation measures will be employed:</p> <ul style="list-style-type: none"> > Silt fences will be installed at the outfalls of existing drains downstream of works areas. No direct discharge of such drains to watercourses will occur. Sediment traps and silt fences will be installed in advance of any felling works and will provide surface water settlement for runoff from work areas and will minimise sediment 		



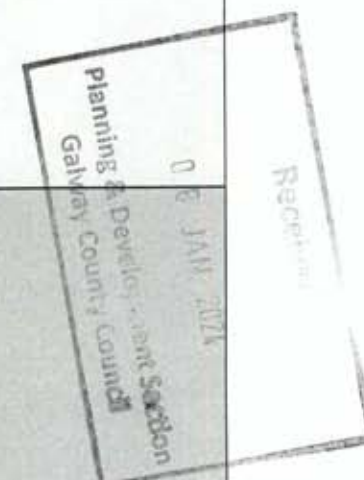
Ref. No.	Mitigation Measure	Audit Result	Action Required
	<p>from entering downstream watercourses. Accumulated sediment will be carefully disposed of at pre-selected peat disposal areas. Where possible, all new silt traps will be constructed on even ground and not on sloping ground;</p> <ul style="list-style-type: none"> > In areas particularly sensitive to erosion it will be necessary to install double or triple sediment traps and increase buffer zone width. These measures will be reviewed on site during construction; > Double silt fencing will also be installed down slope of felling areas which are located in close proximity to streams and/or relevant watercourses; > Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded; 		
MM20	Timber will be stacked in dry areas, and outside watercourse buffer zones. Straw bales and check dams to be emplaced on the down gradient side of timber storage/processing sites;		
MM21	Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water runoff;		
MM22	Refuelling or maintenance of machinery will not occur within 50m of an aquatic zone or within 20m of any other hydrological feature. Mobile bowser, drip kits, qualified personnel will be used where refuelling is required;		
MM23	Branches, logs or debris will not be allowed to build up in aquatic zones. All such material will be removed when harvesting operations have been completed, but care will be taken to avoid removing natural debris deflectors.		
MM24	Silt traps will be strategically placed down-gradient of felling areas within forestry drains near streams. The main purpose of the silt traps and drain blocking is to slow water flow, increase residence time, and allow settling of silt in a controlled manner.		



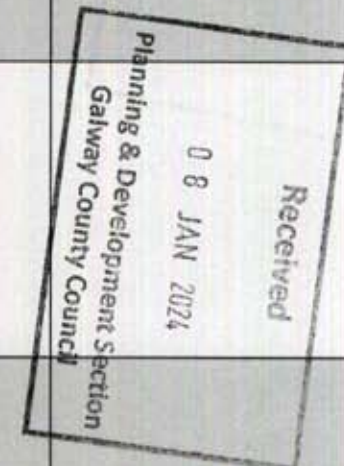
Ref. No.	Mitigation Measure	Audit Result	Action Required
MM25	<p>The works programme for the felling operations will also take account of weather forecasts and predicted rainfall in particular. Operations will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.</p> <p>The following forecasting systems are available and will be used on a daily/weekly basis, as required, to allow site staff to direct proposed and planned construction activities:</p> <ul style="list-style-type: none"> ➤ General Forecasts: Available on a national, regional and county level from the Met Éireann website (www.met.ie/forecasts). 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 Éireann 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 Éireann provide a 24-hour telephone consultancy service. The forecaster will provide an interpretation of weather data and give the best available forecast for the area of interest. <p>Using the safe threshold rainfall values will allow planned works to be safely executed (from a water quality perspective) in the event of forecasting of an impending high rainfall intensity event. Works will be suspended if forecasting suggests any of the following is likely to occur:</p> <ul style="list-style-type: none"> ➤ >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, 		



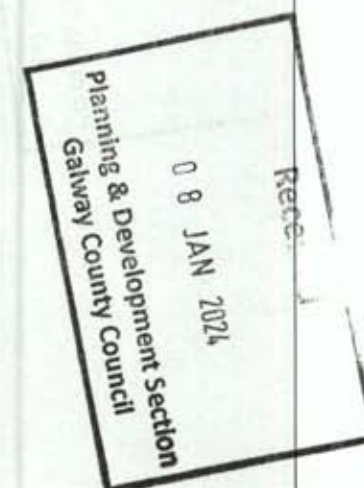
Ref. No.	Mitigation Measure	Audit Result	Action Required
	<ul style="list-style-type: none"> > >half monthly average rainfall in any 7 days. 		
MM26	<p>The following items shall be carried out during inspection pre-felling and after:</p> <ul style="list-style-type: none"> > Communication with tree felling operatives in advance to determine whether any areas have been reported where there is unusual water logging or bogging of machines; > Inspection of all areas reported as having unusual ground conditions; > Inspection of main drainage ditches and outfalls. During pre-felling inspections, the main drainage ditches shall be identified. Ideally the pre-felling inspection shall be carried out during rainfall; > Following tree felling all main drains shall be inspected to ensure that they are functioning; > Extraction tracks near drains need to be broken up and diversion channels created to ensure that water in the tracks spreads out over the adjoining ground; > Culverts on drains exiting the site will be unblocked; and, > All accumulated silt will be removed from drains and culverts, and silt traps, and removed material will be deposited away from watercourses to ensure that it will not be carried back into the trap or stream during subsequent rainfall events. 		
MM27	<p>In order to protect downstream surface water quality during bog restoration works the following measures will be implemented:</p> <ul style="list-style-type: none"> > Use of aquatic buffer zones, including at least a 10m buffer to watercourses, and a 5m buffer to relevant watercourses; > All machinery operators will be experienced; > The project site will be walked before a machine goes off-road; > Bog mats will be used where the excavator is required to travel over wet ground; > A low ground pressure excavator with wide tracks (1.9m or greater recommended) will be used to reduce compaction of the peat and subsoils; 		



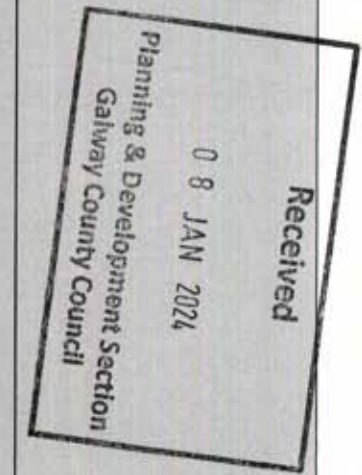
Ref. No.	Mitigation Measure	Audit Result	Action Required
	<ul style="list-style-type: none"> Silt traps will be installed at the outfalls of existing forestry drains downstream of the work areas before any works commence. These traps will prevent sediment from entering downstream watercourses; Silt fences will be inspected and maintained for the duration of the works; Works will be suspended or scaled back prior to and following periods of heavy, intense and/or prolonged rainfall; During drain blocking the main collector drains nearest the natural watercourse will be blocked first and silt traps will be inserted as required. Then the operators shall begin work at the highest point and work systematically downslope towards the watercourse; and, All outlets of the collector and peripheral drains will be blocked. 		
MM28	<p>During invasive species management operations the following mitigation measures are proposed:</p> <ul style="list-style-type: none"> Any spraying or stump treatment shall only take place in dry weather; Any work near aquatic zones will be completed by an operator who has PA6 (AW) certification; Any work near aquatic zones must be completed using a product designated from aquatic use such as ecoplugs or bioactive roundup; and, Spraying will be undertaken during dry calm weather. 		
MM29	<ul style="list-style-type: none"> All site access roads (existing and proposed) to be used as part of the Proposed Project will be capped with clean stone to minimize the risk of sediment runoff to surface waters; The upgrade of the existing road network will only be completed where necessary using local stone compatible with onsite geological materials; The proposed new roads will be designed as "Build On-Top Embankment Roads" in accordance with the COFORD (2004) Forest road Manual – Guidelines for the Design, Construction and Management of Forest Roads. 		



Ref. No.	Mitigation Measure	Audit Result	Action Required
	<ul style="list-style-type: none"> ➤ These proposed new floating roads will minimize effects on peat hydrology and water quality as there is no requirement for excavation and/or spoil generation. The proposed roads will be created on the existing ground surface by adding crushed stone on a geogrid material. 		
MM30	<p>In order to avoid accidental spillage of hydrocarbons the following mitigation measures will be implemented:</p> <ul style="list-style-type: none"> ➤ There will be no fuels or herbicides stored within 50m of an aquatic zone or within 20m of all other water features. ➤ All road-going vehicles will be refuelled off-site; ➤ On-site re-fuelling will be required for forestry and excavator machinery which will be based continuously at the project site; ➤ The on-site refuelling will be undertaken using a mobile double skinned bowser with spill kits kept on site for accidental leakages or spillages; ➤ The bowser will be refilled off-site and towed around the site by a 4x4 jeep; ➤ The 4x4 jeep will carry absorbent materials and pads in the event of accidental spillages; ➤ The fuel bowser will be parked on a level area on the construction compound when not in use; ➤ Only designated trained operatives will be authorised to refuel plant on-site; ➤ Taps, nozzles or valves associated with refuelling equipment will be fitted with a lock system; ➤ Fuels storage on-site will be minimised. All storage areas will be bunded appropriately for the duration of the construction phase. All bunded areas will be fitted with a storm drainage system and an appropriate oil interceptor. Ancillary equipment such as hoses and pipes will be contained within the bunded area; ➤ Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage; ➤ The plant used during construction will be regularly inspected for leaks and fitness for purpose; and, ➤ An emergency response plan for the construction phase to deal with accidental 		

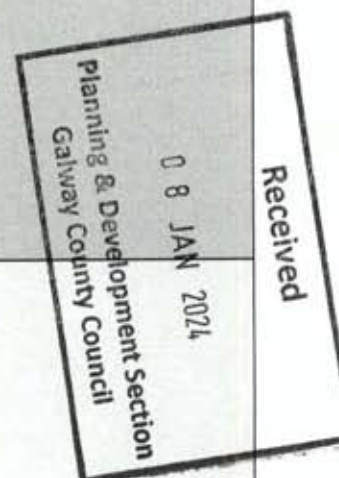


Ref. No.	Mitigation Measure	Audit Result	Action Required
	spillages will be contained within the Construction Environmental Management Plan (which is contained in Appendix 4.3).		
MM31	<p>The following mitigation measures are proposed:</p> <ul style="list-style-type: none"> ➤ All proposed crossings will comprise of standard log-bridge crossings which are typically used in normal forestry operations; ➤ Any guidance / mitigation measures proposed by the OPW or Inland Fisheries Ireland will be incorporated into the design of the proposed crossings; ➤ As a further precaution, near stream construction work, will only be carried out during the period permitted by Inland Fisheries Ireland for in-stream works according to the Eastern Regional Fisheries Board (2016) guidance document "Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters", i.e., May to September inclusive. This time period coincides with the period of lowest expected 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 (any deviation from this will be done in discussion with the IFI); ➤ During the stream crossing construction work double row silt fences will be emplaced immediately down-gradient of the construction area for the duration of the construction of the bog-bridge crossing. There will be no batching or storage of cement allowed in the vicinity of the crossing construction areas; and, ➤ All new river/stream crossings will require a Section 50 application (Arterial Drainage Act, 1945). The river/stream crossings will be designed in accordance with OPW guidelines/requirements on applying for a Section 50 consent. 		

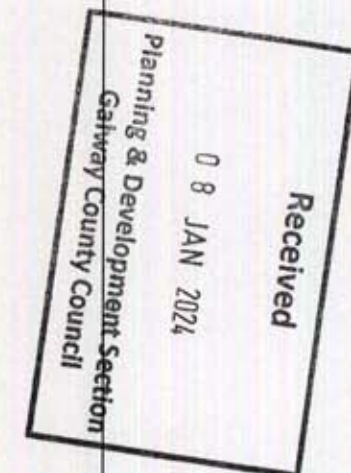


Peat, Soils and Bedrock

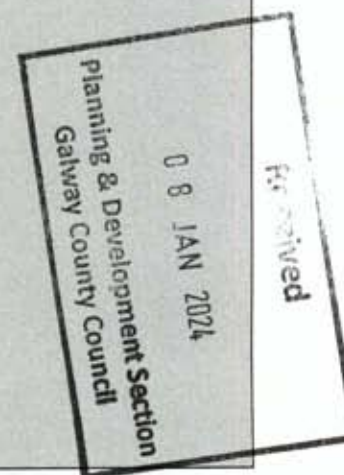
Ref. No.	Mitigation Measure	Audit Result	Action Required
MM32	<p>To avoid erosion of subsoils and peat, the following mitigation measures will be implemented during felling operations:</p> <ul style="list-style-type: none"> ➤ Before any works are completed silt fences will be installed to limit the movement of entrained sediment in surface water runoff; ➤ The harvester and the forwarder are designed specifically for the forest environment and are low ground pressure machines; ➤ All machinery will be operated by suitably qualified personnel; ➤ These machines will traverse the site along specified off-road routes (referred to as racks or brash mats); ➤ Brash mats will be placed on all routes off the forest road to support the vehicles on soft ground, reducing peat and mineral soil disturbance, compaction and erosion and avoiding the formation of rutted areas, in which surface water ponding can occur; ➤ As felling progresses, the harvester will collect brash produced by the felling and place it in front of the machine before it advances forward along the rack; ➤ The condition of the racks will be continually monitored and fresh brash will be applied when the brash mat becomes heavily used and worn, ensuring that the mat remains effective throughout the construction phase; and, ➤ The location of racks will be chosen to avoid wet and potentially sensitive areas. 		
MM33	<p>During bog restoration works the following mitigations measures are proposed:</p> <ul style="list-style-type: none"> ➤ Before any works are completed silt fences will be installed to limit the movement of entrained sediment in surface water runoff; ➤ Proposed off-road routes will be walked in advance of any machinery; ➤ All machinery operators will be experienced; ➤ The site will be walked before a machine goes off-road; ➤ Bog mats will be used where the excavator is required to travel over wet ground; and, ➤ A low ground pressure excavator with wide tracks (1.9m or greater recommended) will be used to reduce compaction of the peat and subsoils. 		



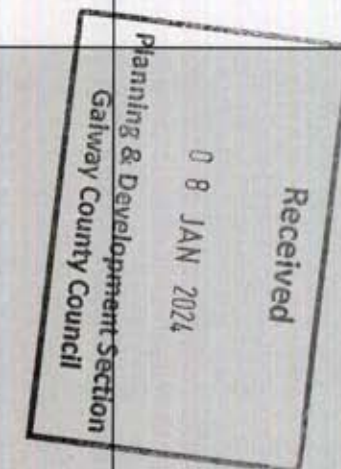
Ref. No.	Mitigation Measure	Audit Result	Action Required
MM34	All proposed planting works at the project site will be in accordance with the best practice Forest Service regulations, policies and strategic guidance documents as well as Coillte and DAFM guidance documents to ensure minimal potential negative effects on the local peat, soil and subsoil environment.		
MM35	<p>In order to avoid accidental spillage of hydrocarbons the following mitigation measures will be implemented:</p> <ul style="list-style-type: none"> ➤ All road-going vehicles will be refuelled off-site; ➤ On-site re-fuelling will be required for forestry and excavator machinery which will be based continuously at the site; ➤ The on-site refuelling will be undertaken using a mobile double skinned bowser with spill kits kept on site for accidental leakages or spillages; ➤ The bowser will be refilled off-site and towed around the site by a 4x4 jeep; ➤ The 4x4 jeep will carry absorbent materials and pads in the event of accidental spillages; ➤ The fuel bowser will be parked on a level area on the construction compound when not in use; ➤ Only designated trained operatives will be authorised to refuel plant on-site; ➤ Taps, nozzles or valves associated with refuelling equipment will be fitted with a lock system; ➤ Fuels stored on-site will be minimised. All storage areas will be bunded appropriately for the duration of the construction phase. All bunded areas will be fitted with a storm drainage system and an appropriate oil interceptor. Ancillary equipment such as hoses, pipes will be contained within the bunded area; ➤ Fuel and oil stores including tanks and drums will be regularly inspected for leaks and signs of damage; ➤ The plant used during construction will be regularly inspected for leaks and fitness for purpose; and, ➤ An emergency response plan for the construction phase to deal with accidental spillages will be contained within the Construction Environmental Management Plan (which is contained in Appendix 4.3). 		



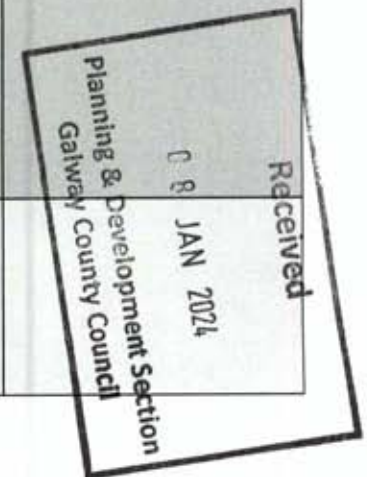
Ref. No.	Mitigation Measure	Audit Result	Action Required
MM36	<p>To minimise the risk of peat instability or failure, the following mitigation measures are proposed in relation to the new floating roads:</p> <ul style="list-style-type: none"> ➤ Prior to commencing floating road construction, movement monitoring posts will be installed in areas where the peat depth is greater than three metres. ➤ Trees growing on the road line will be felled close to ground level and stumps left <i>in situ</i>. ➤ Base layer of geogrid to be laid directly onto the existing peat surface along the line of the road in accordance with geogrid provider's requirements. ➤ Road construction to be in accordance with appropriate design from the designer. ➤ The typical make-up of the new floated access road is 500 to 750mm of selected granular fill with 2 no. layers of geogrid. ➤ Locally-derived stone delivered to the floating road construction shall be end-tipped onto the constructed floating road. Direct tipping of stone on to the peat shall not be carried out. ➤ To avoid excessive impact loading on the peat due to concentrated end-tipping all stone delivered to the floating road shall be tipped over at least a ten-metre length of constructed floating road. ➤ Where it is not possible to end-tip over a 10m length of constructed floating road, dumpers delivering stone to the floating road shall carry a reduced stone load (not greater than half full) until such time as end-tipping can be carried out over a ten-metre length of constructed floating road. ➤ Following end-tipping a suitable bull-dozer or excavator shall be employed to spread and place the tipped stone over the base geogrid along the line of the road. ➤ A final surface layer shall be placed over the floating road, as per design requirements, to provide a road profile. ➤ The surface profile should be maintained as settlement proceeds, preferably by the re-distribution of existing formation material rather than by the addition of further material. 		



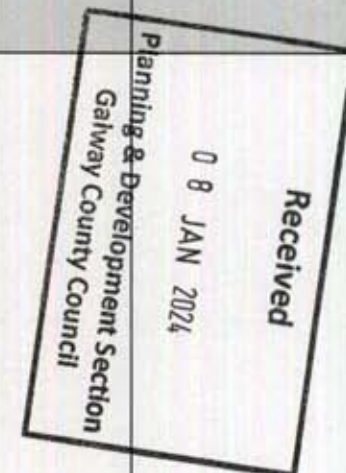
Ref. No.	Mitigation Measure	Audit Result	Action Required
	<ul style="list-style-type: none"> A number of "exclusion zones" are identified in Drawing Numbers 004 and 005 of the Addendum to Geotechnical & Peat Stability Assessment Report (Fehily Timony 2024). Within these exclusion zones the use of heavy machinery for restoration purposes shall be restricted. 		
Biodiversity – Flora and Fauna			
MM37	Locate timber - stacking bays at least 50m from the nearest aquatic zone.		
MM38	All measures outlined in section 9 of the Standards for Felling & Reforestation (DAFM, 2019) will be adhered to.		
MM39	<p>Brash Management:</p> <ul style="list-style-type: none"> Brash mats will be put in place to facilitate movement of machinery around the project area but will avoid proximity to relevant watercourses and aquatic zones as far as possible. Extraction racks will be aligned to the contour where possible, reducing the rate of water flow to the receiving waters. Extra brash will be applied along extraction racks and at timber stacking areas, to accommodate higher levels of machine tracking, using extra lengths of timber to protect sensitive locations. No snedding (delimbing) will be carried out within environmental setbacks along aquatic zones/relevant watercourses. During felling and extraction, a minimum 10m exclusion zone will be applied along the edge of any aquatic zone on or adjoining site. Machine traffic and timber stacking will not be permitted within this zone. Trees within the reach of the harvester arm will be felled by harvester, and snedded and bunched outside the exclusion zone. 		



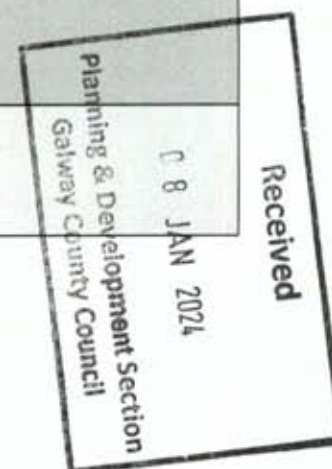
Ref. No.	Mitigation Measure	Audit Result	Action Required
	<p>Trees outside machine reach will be felled manually. Felled trees will be winched out of the exclusion zone where appropriate and safe to do so, or removed by extended harvester arm, for subsequent snedding and processing outside the exclusion zone to avoid mobilisation of soils. All other requirements relating to water exclusion zones, as set out in Section 6.1 of the Standards for Felling & Reforestation will be adhered to (DAFM, 2019).</p> <p>➤ There will be no cleaning of any machinery within 50m of an aquatic zone.</p>		
MM40	<p>The following mitigations and best practice measures will be applied during the construction phase to avoid encroachment on peatland habitats;</p> <ul style="list-style-type: none"> Where ground re-profiling is required, a 10-meter buffer will be applied where only drain blocking and manual conifer removal or ring barking will occur. All machinery operators will be made aware of the sensitive nature of peatland habitats by the site manager. 		
MM41	<p>The following mitigations and best practice measures will be applied during the construction phase to avoid encroachment into existing woodland habitats;</p> <ul style="list-style-type: none"> Where woodland habitats are located adjacent to felling and construction activities associated with the fencing will be erected between the works area and this habitat to ensure no machinery encroaches onto the woodland habitat. <p>All machinery operators will be made aware of the sensitive nature of woodland habitats by the site manager.</p>		
MM42	<p>Following a precautionary approach, a pre-commencement survey will be carried out to identify whether merlin are nesting within the Proposed Project site. This will be undertaken within the merlin breeding season (1st March to 31st August inclusive) prior to the commencement of felling. Should active nests be identified, an exclusion zone of 500m will be established until the end of the breeding season.</p>		



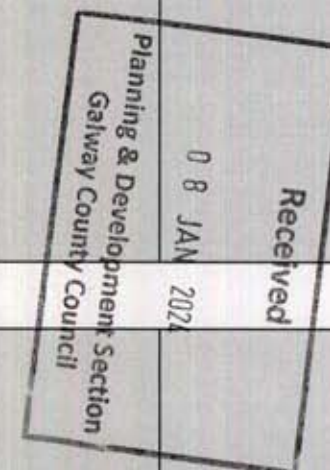
Ref. No.	Mitigation Measure	Audit Result	Action Required
MM43	<p>Disturbance limitation measures will be adhered to, which include the following:</p> <ul style="list-style-type: none"> All plant and equipment for use will comply with Statutory Instrument No 359 of 1996 "European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations 1996". Plant machinery will be turned off when not in use. Machines, which are used intermittently, will be shut down during those periods when they are not in use. Operating machinery will be restricted to the proposed works site area. Reduced illumination of the site will be used where possible to prevent disturbance to bats that may potentially occur in the wider area. Where lighting is unavoidable during felling operations, low-intensity lighting and motion sensors will be used to limit illumination. Light spills during construction works will be minimised where possible thus reducing the effect on areas outside the Proposed Project, and consequently on fauna of conservation. 		
MM44	<p>Following a precautionary approach, a pre-commencement red squirrel survey for each felling block will be carried in advance of felling, to identify whether any breeding red squirrel or dreys are located within that felling block. Surveys will be carried out as per NRA guidance (NRA, 2009, Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. Dublin: National Roads Authority).</p> <p>Should active dreys be identified within the felling block to be felled, the following mitigations and best practice procedures will be followed to ensure that no breeding red squirrel sites are impacted:</p> <ul style="list-style-type: none"> avoid clearfelling in the breeding season from February – September. Where this is not possible, zone felling away from the any identified dreys up to the end of June. Buffer zones of 50 meters will be established around the breeding sites during the breeding seasons (February to September inclusive). 		



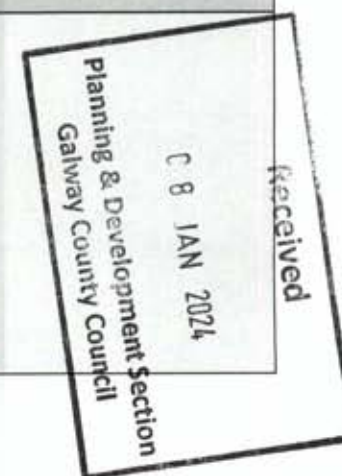
Ref. No.	Mitigation Measure	Audit Result	Action Required
	<p>Additionally, the following measures will be followed on a precautionary basis:</p> <ul style="list-style-type: none"> As the proposed felling will result in a temporary reduction of food resources, supplementary feeding of red squirrel will be carried out if necessary. 		
MM45	<p>Following a precautionary approach, a pre-commencement badger and pine marten survey for each felling block will be carried in advance of felling, to identify whether any breeding badger and pine marten, and their associated habitats are located within that felling block. Surveys will be carried out as per NRA guidance (NRA, 2009, Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. Dublin: National Roads Authority, and NRA, 2006, Guidelines for the Treatment of Badger Prior to the Construction of National Road Schemes. National Roads Authority).</p> <p>Should active breeding sites for either species be identified within the felling block to be felled, the following mitigations and best practice procedures will be followed to ensure that no breeding badger or pine marten sites are impacted:</p> <ul style="list-style-type: none"> Buffer zones of 50 meters will be established around the breeding sites during the breeding seasons. These exclusion zones will remain unfelled or will be managed as per guidance set out in the Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes (NRA 2006). 		
MM46	<p>An invasive species Management Plan will be produced to ensure sufficient management of Rhododendron is carried out within the site and that there is no continued spread as a result of the Proposed Project.</p>		



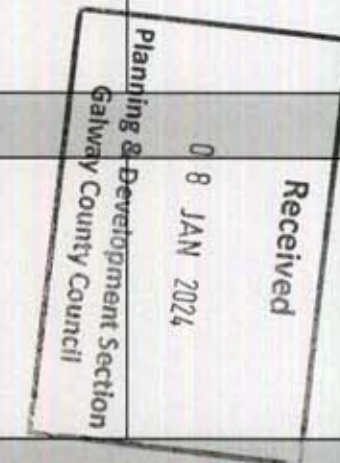
Ref. No.	Mitigation Measure	Audit Result	Action Required
MM47	<p>Measures will be in place to prevent the spread of invasive species during the proposed works. In addition, all necessary precautions will be taken to prevent the introduction of invasive species to the site from elsewhere. Best practice measures in relation to invasive species are described below:</p> <ul style="list-style-type: none"> All earthworks machinery and forestry machinery will be thoroughly pressure-washed prior to arrival on site and prior to their further use elsewhere. Care will be taken not to disturb or cause the movement of invasive species fragments, either intentionally or accidentally. Rhododendron will be pre-treated in the season prior to felling operations. Any material that is imported onto any site will be verified by a suitably qualified ecologist to be free from any invasive species listed on the 'Third Schedule' of Regulations 49 & 50 of Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011). This will be carried out by searching for rhizomes and plant material. <p>The treatment and control of invasive alien species will follow guidelines issued by the National Roads Authority. The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads (NRA 2010).</p>		
Air Quality and Dust			
MM48	<p>> In periods of extended dry weather, dust suppression may be necessary along haul roads and site roads to ensure dust does not cause a nuisance. If necessary, a water spreader will be used to dampen down haul roads to prevent the generation of dust where required. Water bowser movements will be carefully monitored to avoid, insofar as reasonably possible, increased runoff.</p>		



Ref. No.	Mitigation Measure	Audit Result	Action Required
	<ul style="list-style-type: none"> ➤ All plant and materials vehicles shall be stored in dedicated areas (on Site). ➤ The agreed haul route roads adjacent to the Site will be regularly inspected for cleanliness and cleaned as necessary. ➤ The Site access roads will be checked weekly for damage/potholes and repaired as necessary. ➤ The transport of construction materials to the Site that have significant potential to cause dust, will be undertaken in tarpaulin or similar covered vehicles where necessary. 		
MM49	<ul style="list-style-type: none"> ➤ All construction and forestry vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise. ➤ When stationary, delivery and on-site vehicles will be required to turn off engines. ➤ Users of the Site will be required to ensure that all plant and vehicles are suitably maintained to ensure that emissions of engine generated pollutants are kept to a minimum. 		
Noise			
MM50	<ul style="list-style-type: none"> ➤ All plant and machinery used on the site will comply with E.U. and Irish legislation in relation to noise emissions. ➤ Operation of plant: all construction operations will comply with guidelines set out in British Standard documents 'BS 5338: Code of Practice for Noise Control on Construction and Demolition Sites' and 'BS5228: Part 1: 1997: Noise & Vibration Control on Construction and Open Sites'. ➤ The correct fitting and proper maintenance of silencers and/or enclosures, the avoidance of excessive and unnecessary revving of vehicle engines, and the parking of equipment in locations that avoid possible effects on noise-sensitive locations was employed. 		



Ref. No.	Mitigation Measure	Audit Result	Action Required
Traffic			
MM51	<ul style="list-style-type: none"> ➤ Resurfacing of the existing access with tarmacadam to tie into the existing R344 with a minimum radii of 13m provided and an access road width of 6m. ➤ The introduction of STOP road markings and signs in accordance with Figure 7.35 of the Traffic Signs Manual (TSM). ➤ "Agriculture (or Other) Machinery" warning signs are to be provided on both of the R344 approaches to the existing junction. ➤ Clearance of a visibility triangle (3m at the junction tapering to 1m at a distance of 140m) of shrubs and bushes along the western side of the R344 in order to maximise visibility to the south of the junction. ➤ Clearance of a short section of shrubs to the north of the junction in order to provide clear visibility to the north. 		
Cultural Heritage			
MM52	<p>A walk-over archaeological survey of the site should be carried out following the clear-felling of existing forestry stands.</p> <p>Any archaeological sites/features detected during the walk-over survey will be preserved in-situ (avoidance).</p>		
Operational Phase			
Land, Soils and Geology/Water			
MM53	<ul style="list-style-type: none"> ➤ Vehicles used during the operational phase will be refuelled off site before entering the site; 		



Ref. No.	Mitigation Measure	Audit Result	Action Required
	<ul style="list-style-type: none"> > No fuels will be stored on-site during the operational phase; and > Spill kits will be available in all site vehicles to deal with accidental spillages and breakdowns; 		



6.

MONITORING PROPOSALS

All monitoring proposals relating to the pre-commencement, construction and operational phases of the Proposed Project are set out in the relevant chapters of the Environmental Impact Assessment Report (EIAR).

This section of the Construction and Environment Management Plan groups together all of the monitoring proposals presented in the EIAR. The monitoring proposals are presented in Table 6-1 below.

By presenting the monitoring proposals in the format outlined, it is intended to provide an easy to audit list that can be reviewed and reported on during the future phases of the project. The tabular format in which the information is presented, can be further expanded upon during the course of future project phases to provide a reporting template for site compliance audits (Table 6-1).

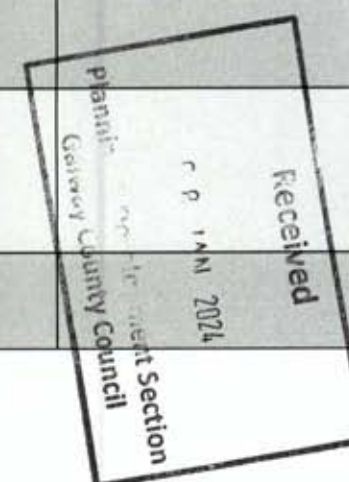
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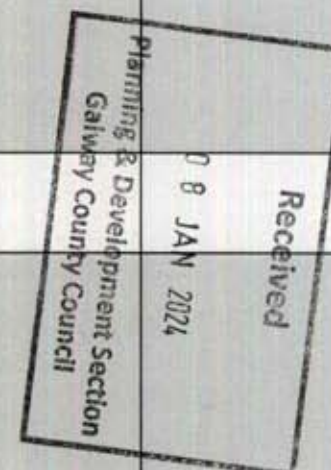
Planning & Development Section
Galway County Council

Table 6-1 Monitoring Measures

Ref. No.	Survey / Monitoring Measure	Audit Result	Action Required
Pre-Commencement Phase			
MX2	Prior to commencement of works in sub-catchments across the site main drain inspections will be completed to ensure ditches and streams are free from debris and blockages that may impede drainage water discharge.		
MX3	Pre-commencement surveys will be undertaken prior to the initiation of works. The survey will include a thorough walkover survey to a 500m radius of all works areas, where access allows. If winter roosting or breeding activity of birds of high conservation concern is identified, the roost or nest site will be located and earmarked for monitoring at the beginning of the first winter or breeding season of the construction phase. If it is found to be active during the construction phase, no works shall be undertaken within a disturbance buffer (Forestry Commission Scotland, 2006; Ruddock and Whitfield, 2007) in line with industry best practise. No works shall be permitted within the buffer until it can be demonstrated that the roost/nest is no longer occupied.		
Construction Phase			
MX4	Archaeological walkover of site will be undertaken following felling of trees.		
MX6	Check dams will be inspected and maintained regularly to insure adequate performance. Maintenance checks will also ensure the centre elevation of the dam remains lower than the sides of the dam.		
MX7	A daily visual inspection of each settlement pond on the active site will be undertaken to identify when sediments are nearing capacity within the pond and sediment will be cleaned out as required. Settlement ponds will also be checked for anything else that might interfere with flows.		
MX8	Settlement ponds will be inspected weekly and following significant rainfall events i.e. after events of >25mm rainfall in any 24-hour period. Inlet and outlets will be checked for sediment accumulation and anything else that might interfere with flows. Inspection and maintenance of these structures during construction phase is critical to their functioning and purpose.		
MX9	All culverts will be inspected regularly to ensure they are not blocked by debris, vegetation or any other material that may impede conveyance.		



Ref. No.	Survey / Monitoring Measure	Audit Result	Action Required
MX10	The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the Environmental Manager. The Environmental Manager will respond to changing weather, ground or drainage conditions on site as the project proceeds, to ensure the effectiveness of the drainage system is maintained in so far as is possible.		
MX11	The plant used should be regularly inspected for leaks and fitness for purpose.		
MX12	Regular inspections of all installed drainage systems 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.		
MX13	During the construction phase field testing and laboratory water analysis of a range of parameters with relevant regulatory limits and EQSs should be undertaken for each watercourse and specifically, following heavy rainfall events (<i>i.e.</i> weekly, monthly and event based). This will be completed in consultation with Inland Fisheries Ireland.		
MX15	Any requirement for construction works to run into the merlin breeding season following commencement will be subject to pre-construction bird surveys to confirm the presence/absence of breeding merlins.		
MX17	<p>A Project Ecologist will be appointed. The responsibilities and duties of the Project Ecologist will include the following:</p> <ul style="list-style-type: none"> ➤ Undertake a pre-construction transect/walkover bird survey to ensure that significant effects on breeding birds will be avoided. ➤ Inform and educate on-site personnel of the ornithological and ecological sensitivities within the Proposed Project area. ➤ Oversee management of ornithological, water quality protection and ecological issues during the construction period and advise on these issues as they arise. ➤ Provide guidance to contractors to ensure legal compliance with respect to protected species onsite. 		



Ref. No.	Survey / Monitoring Measure	Audit Result	Action Required
	> Liaise with officers of consenting authorities and other relevant bodies with regular updates in relation to construction progress.		
Operational Phase			
MX18	Monthly sampling for laboratory analysis for a range of parameters adopted during pre-commencement and construction phases will continue for at least six months during the operational phase. The Project Hydrologist will monitor and advise on the results received from the testing laboratory.		



7. COMPLIANCE AND REVIEW

7.1 Site Inspections and Environmental Audits

Routine inspections of activities will be carried out on a daily and weekly basis by the Site Manager/ Environmental Manager or by a suitably qualified and competent person to ensure all controls are in place to prevent negative environmental impacts, due to the construction activities taking place. A report will be issued to Galway County Council detailing the findings of site inspections/ environmental audits. The frequency of reporting will be agreed prior to commencement of construction.

Environmental inspections will ensure that the works are undertaken in compliance with this CEMP. Environmental site inspections will be carried out by suitably trained staff.

7.2 Environmental Compliance

The following definitions shall apply in relation to the classification of Environmental Occurrences during the infilling works:

Environmental Near Miss

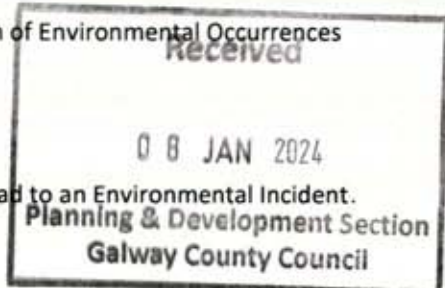
An occurrence which if not controlled or due to its nature could lead to an Environmental Incident.

Environmental Incident

Any occurrence which has potential, due to its scale and nature, to migrate from source and have an environmental impact.

Environmental Non-Compliance

Non-fulfilment of a requirement includes any deviations from established procedures, programs and other arrangements related to the CEMP.



7.3 Corrective Action Procedure

A corrective action is implemented to rectify an environmental issue on-site. Corrective actions will be implemented by the contractor, as advised by the Site Environmental Manager. Corrective actions may be required as a result of the following:

- > Environmental Audits.
- > Environmental Inspections and Reviews.
- > Environmental Incidents; and,
- > Environmental Complaints

A Corrective Action Notice will be used to communicate the details of the action required to the main contractor. A Corrective Action Notice is a form that describes the cause and effect of an environmental problem on site and the recommended corrective action that is required. The Corrective Action Notice, when completed, will include details of close out and follow up actions.

If an environmental problem occurs on site that requires immediate attention direct communications between the Contractor's foreman and the Site Environmental Manager will be conducted. This in turn will be communicated to all the site staff involved. A Corrective Action Notice will be completed at a later date.