



Dyrick Hill Wind Farm

Habitat Management Plan (HMP)

Doherty Environmental Consultants Ltd.

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Dyrick Hill Wind Farm

Habitat Management Plan

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## **1 Introduction**

Doherty Environmental Consultants (DEC) Ltd. have been commissioned by Dyrick Hill Windfarm Ltd. to prepare a Habitat Management Plan (HMP) for the proposed Dyrick Hill Wind Farm.

This HMP has been prepared for two distinct areas of lands associated with the Dyrick Hill Wind Farm. These parcels comprise the section of the proposed wind farm site occurring at Broemountain Commonage Area to the west of the wind farm site and a Lisleagh Mountain Waterford Wetland Area (Site Code No. 173) to the east of the wind farm site. The location of both areas are shown on Figure 1.1. The target habitat occurring in the Broemountain Commonage Area to the west is dry heath habitat. The target habitat occurring at the Lisleagh Mountain Wetland site to the east is poor fen.

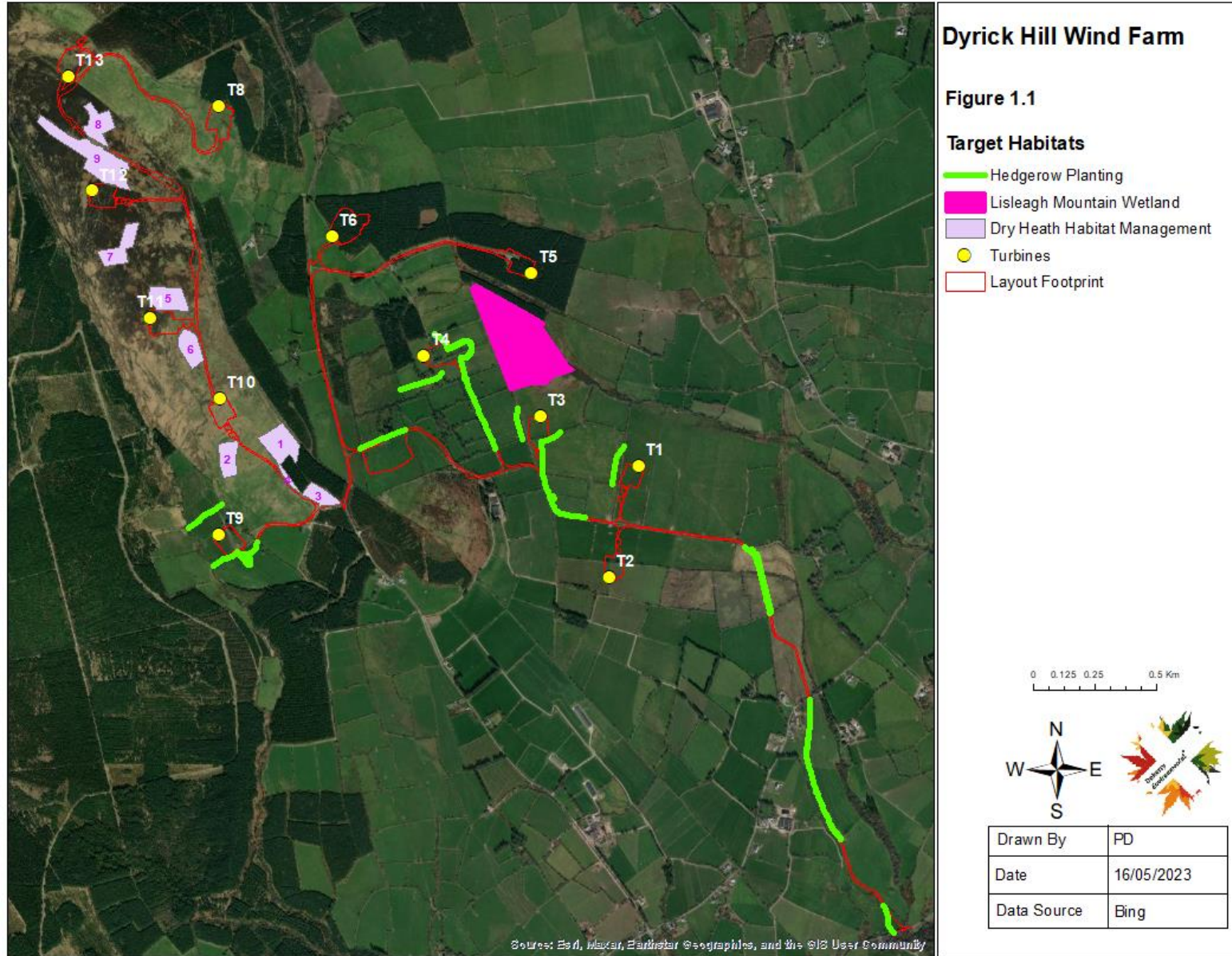
The parcels of land that will be targeted for the instatement and enhancement of dry heath habitat as shown on Figure 1.1 will amount to approximately 12 Ha.

The parcel of land that will be targeted for the enhancement of poor fen habitat at the Lisleagh Mountain Wetland site will amount to approximately 8 Ha.

In addition to these two habitats the establishment of hedgerow habitat within the wind farm site and the protection of water quality in eroding watercourses draining the wind farm site also represent target habitats and actions of this HMP. The hedgerow habitat that will be planted within the wind farm site amounts to approximately 3.65km and is shown on Figure 1.1.

The HMP land holding will be managed throughout the lifetime of the wind farm with a view to improving biodiversity throughout the site, managing Annex 1 heathland habitats and implementing measures to deal with sedimentation, peat slide risk, SUDS, hydrology and fisheries. It is noted that none of the lands currently included in the c. 20 Ha of this HMP land holding are managed under any nature conservation schemes, and thus there are no restrictions to land management practises, which is evident throughout both areas of land that are the subject of this HMP. The implementation of this HMP as part of the overall Dyrick Hill Wind Farm project provides an opportunity to manage and conserve the heathland and wetland habitats occurring within the HMP land holding for the lifetime of the project.

The wind farm operator will, throughout the lifetime of the wind farm, ensure the implementation of the actions specified within the HMP. Pursuant to the terms and conditions



of the lease agreements on site, the landowners must comply with all necessary actions and precautions required by the wind farm operator for the implementation of this HMP.

## **2 Purpose of the HMP**

The purpose of this HMP is to provide detailed descriptions of the locations, methods and activities of habitat restoration and enhancement that will:

- (a) reinstate dry heath around infrastructure elements of the proposed Dyrick Hill Wind Farm development in the Broemountain Commonage Area; and
- (b) instate and enhance areas of dry heath occurring within the Broemountain Commonage Area so as to compensate for the loss of dry heath habitat to the footprint of the project.
- (c) enhance and maintain wetland habitats at Lisleagh Mountains Waterford Wetlands Area.

In order for this HMP to be meaningful, the aims and objectives of habitat restoration and management for each part of the site are described. This is necessary to:

- (a) make sure that expectation levels for the quality of legacy habitat are realistic; and
- (b) ensure that post habitat restoration monitoring is adequately prescribed.

The implementation of the HMP will mitigate for the loss of habitats to the proposed wind farm development and will provide for a net increase in the extent of heath habitat at favourable conservation condition and hedgerow habitat.

## **3 Scope of HMP**

The HMP sets out the following:

1. Details of habitat management areas occurring within the wind farm site;
2. details of regular monitoring of habitat management measures using fixed quadrat locations;
3. appropriate maps, clearly identifying habitat management areas;
4. detailed methodology and prescriptions of habitat management measures, including timescales and with defined criteria for the success of the measures;
5. action measure to protect bat species during the operation phase of the wind farm. This action is set out in Section 6 below.
6. details of the production of regular monitoring reports to be submitted to the Planning Authority at years 1, 2, 3, 5, 7, 10, 15, 20, 25, 30, 35 & 40 which will include details of contingency measures should monitoring reveal unfavourable results.

## **4 Description of HMP Lands**

### **4.1 Overview of Location & Existing Land Cover**

#### **4.1.1 General Site Description**

The proposed wind farm Development is located within an area of farmland, forestry and upland heath, and is located within the townlands of Ballynaguilkee Upper, Broemountain, Corradoon, Dyrick, Lickoran, Lickoranmountain, Lisleagh, Lisleaghmountain, Lyrattin and Scartmountain. The Site is located 43km west of Waterford City, 55km northeast of Cork City, and 12.9km northwest of Dungarvan. The proposed grid connection passes through the townlands of Broemountain, Lyrattin, Farnane Lower, Farnane Upper, Castlequarter, Mountaincastle South, Carrigaun (Mansfield), Langanoran, Sleadycastle, Knockaunnaglokee, Garryduff, Colligan More, Garryclone, Colliganwood, Ballymacmague North, Ballymacmague South and Killadangan.

The Site is located across land which is predominantly underlain by sandstone rock and brown podzolic or podzol soils of coarse loamy drift with siliceous stones of the Knockmealdown, Knockboy and Ballycondon series. According to the Soil Information System National Soils Map, pockets of peat may exist at the north-western extent of the site although no peat has been identified at the site during the geotechnical surveys. The National Soils Hydrology Map classifies the majority of the site as being poorly drained, particularly in the western and northern areas. The remainder of the site is classified as being well drained with the majority of these areas being located in the eastern and southern areas of the Site.

The proposed Site is located beyond the south-eastern extent of the Knockmealdown Mountains mountain range. The western, northern and southern extents of the site are typically more elevated than the central and eastern extents of the Site. The site is broadly surrounded by the three main peaks of Knocknasheega (428m) west of the Site boundary, Broemountain (430m) in the northern extent of the site and Dyrick Hill (286m) within the southern central portion of the site. The eastern and central extents of the site are generally relatively flat with elevations typically ranging from between 130m to 190m. The main wind farm site extends to 161.88 hectares (ha).

Forestry and agricultural land uses, including dairy and sheep farming are the predominant land uses within the study area. Forestry plantations border the western extent of the proposed Site on an area of commonage land. Additional areas of forestry exist within the central, north-



eastern and southern extents of the proposed Site. The Site is intersected by Broemountain Road (L5058) which is a narrow local secondary road. The Farnane River, which is a tributary of the Finisk River, rises near the north-western extent of the Site and flows along the western extent of the Site. The Lisleagh Stream, which is also a tributary of the Finisk River, rises in the central portion of the Site and flows in a south-easterly direction until it merges with the Finisk River, north of the townland of Woodhouse. The Aughkilladoon Stream, another tributary of the Finisk River rises at the south-eastern extent of the Site and flows in a south-easterly direction until it merges with the Finisk River, east of the townland of Woodhouse.

#### **4.1.2 Topography**

The topography of the Site is variable, and it is broadly surrounded by or is partially overlapping three elevated areas. These include Knocknasheega (428m) west of the Site boundary, Broemountain (429m) in the northern extent of the site and Dyrick Hill (286m) within the southern central portion of the site. The western, northern and southern peaks of the site are more elevated than the central and eastern extents of the Site which are relatively flat with lower elevations ranging from between 130m to 190m. The Site is generally topographically elevated in the north / north-west and generally topographically low lying in the south and east with the exception of Dyrick Hill (286m) near the southern extent of the site. The steepest incline across the Site occurs at the northern extent of the Site near the proposed T8 position. A peat stability risk assessment (PSRA) has not been prepared due to the absence of observed peat at the site during the site surveys which are discussed in the **Chapter 8: Soils and Geology**.

The Farnane River, the Lisleagh Stream and the Aughkilladoon Stream are the main surface water bodies that drain the site. All of these surface waters are tributaries of the Finisk River which flows to the east and south-east of the proposed Site. The site is also drained by a network of artificial drainage ditches, many of which are located adjacent to field boundaries, particularly in the central and western extents of the Site. A number of small natural and artificial drains also exist at the western commonage area of the proposed Site. Two potential wetlands exist at the site located east and west of the proposed T4 position. The Map of Irish Wetlands (2021) identifies these locations as “Other/Unsurveyed”, it was notable that highly saturated ground was evident at these locations during the site surveys.

There are no lakes within the site boundary with the closest being a small reservoir north of Mt. Melleray Monastery, approximately 5km west of the proposed Site boundary.

With the exception of Knocknasheega, Broemountain and Dyrick Hill, elevations typically range from between 140m and 300m across the majority of the Site with areas of relatively flat ground existing within the central and eastern areas of the Site.

#### **4.1.3 Review of Historical Mapping**

The first edition 6-inch map of 1842 shows the northwest section of the wind farm site at Broemountain to be unenclosed. Numerous pathways are shown running north into the upland area from enclosed pasture land to the south. One of these paths will later form the Broemountain Road (L5058). The existing eastern boundary of the unenclosed commonage area of Broemountain is depicted on the 6-inch. To the east of this boundary the field patterns and agricultural enclosures start to emerge. Further east at Dyrick hill and Lisleagh Mountain, within the proposed wind farm site and to the south of the Lisleagh Stream, the land remained relatively unenclosed. The rate of enclosure increases further east in the vicinity of Lisleagh House and Aughkilladoon Stream.

The 25-inch map of 1904 depicts a significant increase in the rate of land enclosure and presumably agricultural improvement from that shown on the 6-inch map. Only the existing commonage area at Broemountain and the steep lands around Dyrick Hill remained unenclosed by this time. The presence of the Broemountain Road is also shown on the 1904 map. The last edition 6-inch map from 1923 shows further enclosure of lands surrounding Dyrick Hill and immediately to the east of the existing Broemountain commonage area. This latter area is now under conifer plantation.

The 1995 and 1999 orthophotography for the Broemountain commonage area show a large area of dark colouration indicative of established heather dominated heath. The 2000 imagery shows a similar extent of heather cover. The 2018 imagery shows a decrease in the cover of heather in areas indicated on Figure 4.1 below. A further reduction in cover is depicted on the current 2023 imagery of the site, as indicated on Figure 4.1 below. The extent of this remained similar up to the 2013 imagery. However, this imagery contrasts with the current satellite imagery for the commonage area which shows a large portion of the commonage area where heather cover has been reduced and replaced by a mosaic of heavily browsed heath with grassland and bracken.

The 1995 imagery shows that the conifer plantation immediately to the south of the proposed borrow pit location was planted around this time.

#### **4.1.4 Hydrology**

The proposed wind farm Site, and current grid connection route are located within the Blackwater (Munster) and Colligan Mahon catchment areas in Hydrometric Areas 18 and 17 respectively. The proposed wind farm Development and grid connection to Dungarvan Substation at Killadangan are located within three WFD sub-catchments. These include the Blackwater (Munster) (SC\_140), Finisk (SC\_010) and Colligan (SC\_010) subcatchments.

The National Soils Hydrology Map classifies the majority of the site as being poorly drained, particularly in the western and northern areas. The remainder of the site is classified as being well drained with the majority of these areas being located in the eastern and southern areas of the Site.

The Farnane River, the Lisleagh Stream and the Aughkilladoon Stream are the main surface water bodies that drain the site. All of these surface waters are tributaries of the Finisk River which flows to the east and south-east of the proposed Site. The site is also drained by a network of artificial drainage ditches, many of which are located adjacent to field boundaries, particularly in the central and western extents of the Site. A number of small natural and artificial drains also exist at the western commonage area of the proposed Site.

To the western extent of the site is the Farnane River which rises to the east of an area of upland forestry between Knocknasheega and Broemountain at an altitude of 290m. Two small unnamed streams merge with the Farnane River from both the east and west near the townland of Graigueavurra, approximately 1.3km southeast of the Site boundary. An additional small unnamed stream merges from the west of the Farnane River at Graigueavurra, approximately 2km southeast of the Site boundary. The total length of the Farnane River and its tributaries is 9.1km and it covers a catchment area of 8.1km<sup>2</sup>. The Farnane River flows in a south-easterly direction near parallel to the western Site boundary and then continues further to the south-east until it merges with the Finisk River at Millstreet, County Waterford.

The Lisleagh Stream rises near the central extent of the Site in an area mapped as a potential wetland to the northwest of the proposed T4 position. According to the EPA maps for the area, an unnamed stream is located immediately west of the proposed T04 position which is mapped as flowing in a north-easterly direction for approximately 390m until it merges with the Lisleagh Stream. However, during all site survey visits, there were no indications that this stream was present. It was initially suspected that this stream could be ephemeral, however it was not visible

at the site even after periods of heavy rainfall. It could also be the case that land drainage practices, or the construction of an unpaved road near the stream, have resulted in its removal or alteration of its course over time. The Lisleagh Stream flows in a south-easterly direction from its source for approximately 1.8km kilometres where it merges with a small unnamed stream that rises near the townland of Corradoon, approximately 1.5km north of this confluence. To the northeast of the proposed T05, at the north-eastern Site boundary, an additional unnamed stream flows in an easterly direction for approximately 660m until it merges with the unnamed stream mentioned above which ultimately merges with the Lisleagh Stream.

At the south-eastern extent of the Site, the Aughkilladoon Stream rises in the townland of Lickoranmountain. The Aughkilladoon Stream flows along the south-eastern site boundary and continues in a south-easterly direction for approximately 2km until it merges with the Finisk River, east of the townland of Woodhouse. Beyond the northern site boundary, five small unnamed streams flow in a north-easterly direction and merge with the Boolahallagh River. The Boolahallagh River flows along the boundary of Counties Waterford and Tipperary until it merges with the Aughavanlomaun Stream at Priestown Bridge, approximately 1.7km north-east of the Site. Beyond the western site boundary, to the west of Knocknasheega, the Glenshelane River rises to the east of Knocknansk. The Glenshelane River flows in a southerly direction between Knocknansk and Knocknasheega until it merges with the Blackwater River south of Cappoquin. Northeast of Coolagortboy and north of Scarthmountain, an unnamed stream rises approximately 670m west of the Site boundary and flows in a south-westerly direction until it merges with the Glenshelane River.

## **4.2 Existing & Past Site Management**

### **4.2.1 Proposed Wind Farm Site**

The dominant land use at the wind farm site is for livestock grazing with both cattle and sheep. Cattle are the dominant livestock on the grassland habitats dominating the land cover within the wind farm site to the east, whilst sheep are the dominant species occurring to the west at higher elevations on the Broemountain Commonage Area.

## **4.3 Overview of Habitat Condition within HMP Target Areas**

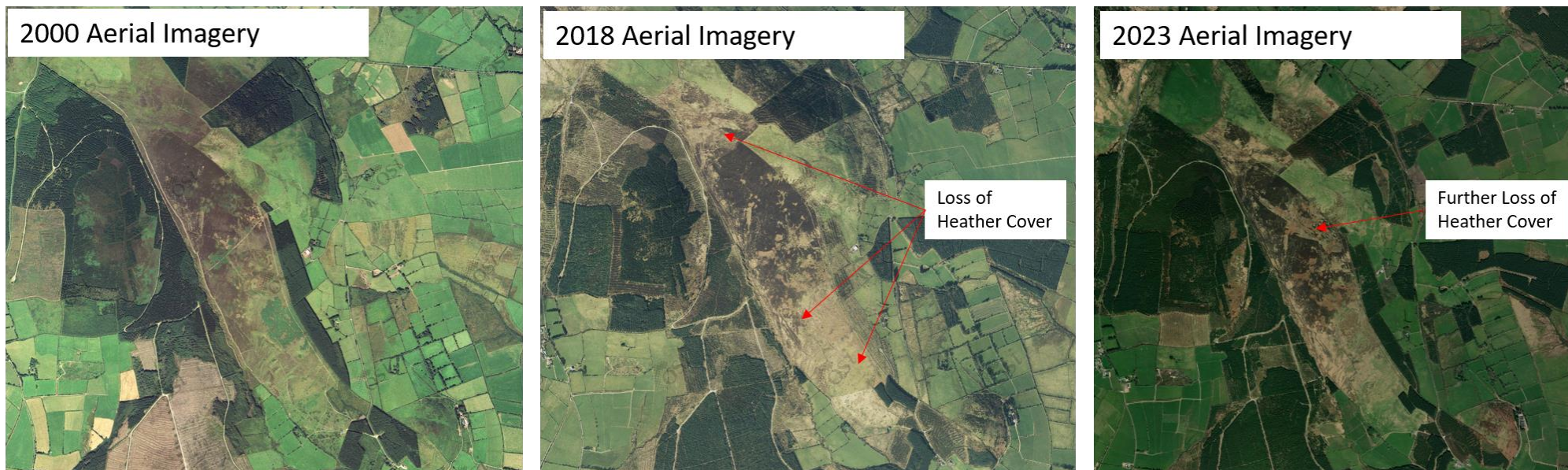
The habitats occurring within the dry heath and wetland target areas of this habitat management plan are shown on Figure 4.2 and Figure 4.3.

Expanses of dry heath habitat occur within the Broemountain Commonage Area of the Site. The dry heath is underlain by mineral soils. Exposed bedrock at the surface occurs throughout this habitat. The dry heath vegetation is dominated by tall and leggy swards of *Calluna vulgaris*. *Erica cinerea* is constant throughout this habitat. *Erica tetralix* and *Molinia caerulea* are also frequent. Acid grass species occur in area of less dense heather cover and include *Agrostis stolonifera*, *Agrostis capillaris*, *Deschampsia flexuosa*, *Festuca ovina* and *Nardus stricta*. *Juncus squarrosus*, *Potentilla erecta*, *Rhytidiadelphus squarrosus*, *Rhytidiadelphus loreus*, *Hylocomium splendens* and *Racomitrium lanuginosum* all occur frequently within this habitat. Areas mapped as dry heath habitat within the wind farm site are representative of the Annex 1 habitat European Dry Heath and have been mapped as part of the Favourable Reference Area for this habitat in Ireland (NPWS, 2019).

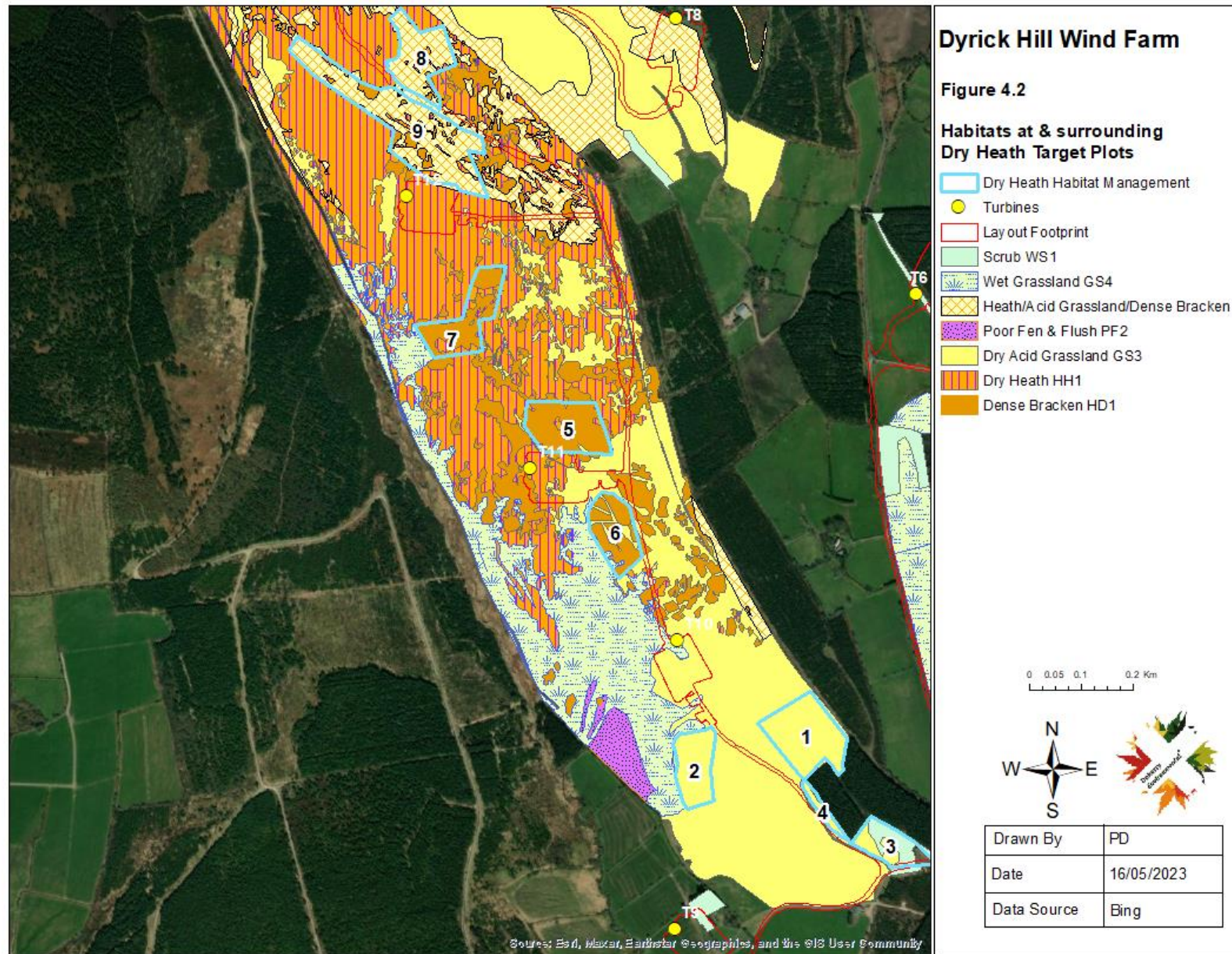
The dry heath habitat occurs as a mosaic with other areas of overgrazed heath that is in poor condition with well browsed and patchy cover of *Calluna vulgaris*. A large area of recent dry heath habitat loss is apparent on the site through a comparison of current aerial imagery with past imagery. Dense patches of species poor bracken occur within the Broemountain Commonage Area. Whilst bracken is listed as a natural component of the Annex 1 habitat European Dry heath, dense, mono-specific stands of this species has been identified as a serious invasive weed of upland and marginal lands (Alday et al., 2013; Marrs & Watt, 2006).

The habitat occurring within the Lisleagh Mountain wetland site is currently representative of a poor fen habitat underlain by peat substrate. The habitat is currently used for livestock grazing by cattle and excessive poaching, dunging and grazing has been recorded within this wetland site.

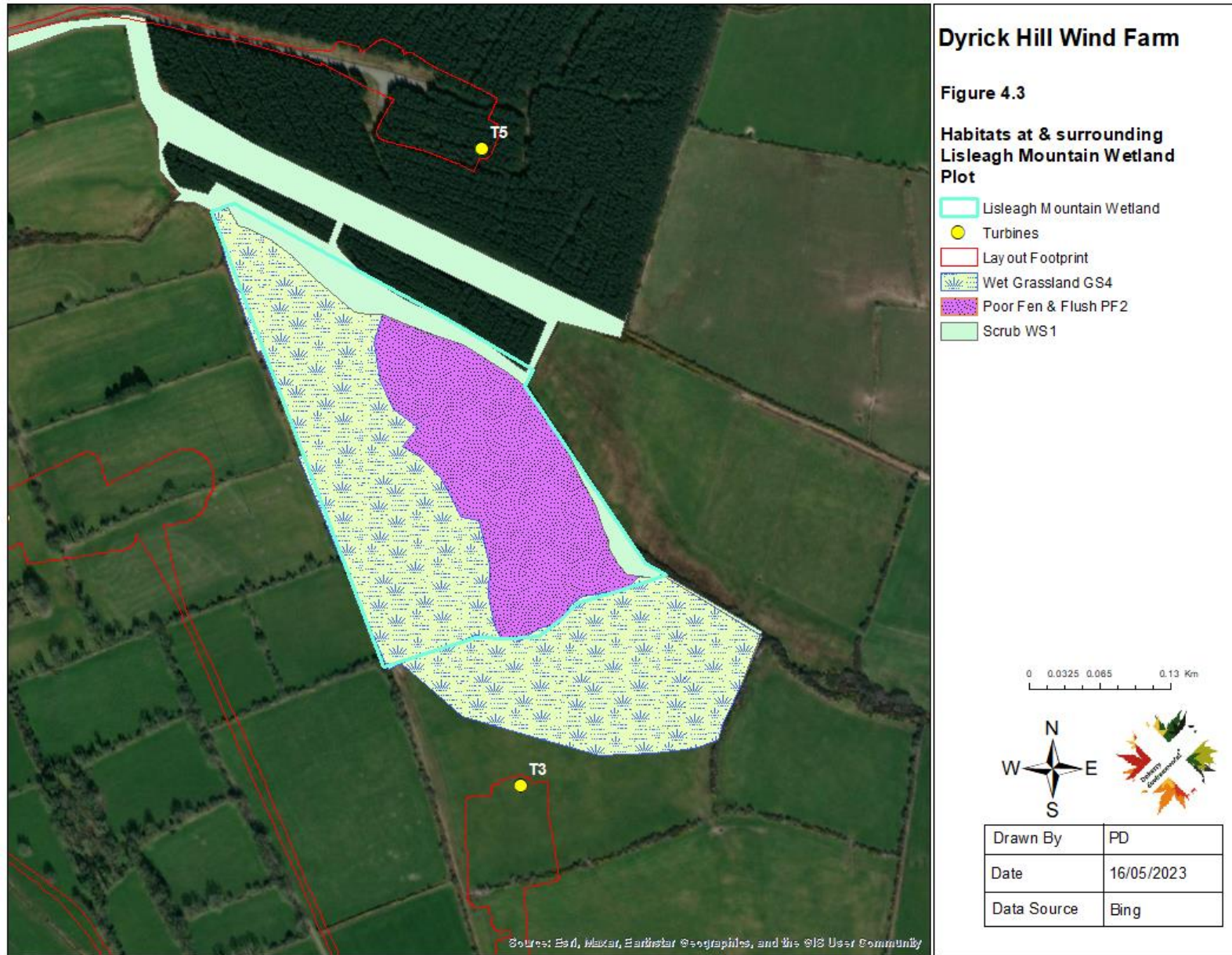
Figure 4.1: Historical Imagery













The current levels of livestock grazing are considered to undermine the status of this habitat.

#### 4.4 HMP Target Habitats

The HMP target habitats include heathland and wetland habitats identified on Figure 1.1 above. The extent of each of the plots of heathland and wetland habitat that will be subject to treatment are outlined in Table 4.1 below. In addition to heathland and wetland habitats, freshwater habitats in the form of eroding watercourses and hedgerow replacement are also included as a HMP target habitat.

Measures in the Plan will be specified for the target habitats and those specific to different types of habitat will be clearly specified. A description of the measures to be applied to these target habitats is provided in Table 4.1 below.

**Table 4.1: Extent of Target Habitats occurring within the HMP Target Lands**

Target Habitat	Plot_No	Existing Habitat	Area (HA)/Length (Km)	Treatment
Dry Heath	1	Acid Grassland with Spreading Gorse	0.97	Heather Establishment; Appropriate Grazing
	2	Acid Grassland (proposed Borrow Pit Location)	1.59	Heather Establishment; Appropriate Grazing
	3	Acid Grassland	0.20	Heather Establishment; Appropriate Grazing
	4	Acid Grassland/Gorse Scrub	0.79	Heather Establishment; Appropriate Grazing
	5	Dense Bracken	1.37	Bracken Removal, Heather Establishment, Grazing Control
	6	Dense Bracken	1.08	Bracken Removal, Heather Establishment, Grazing Control
	7	Dense Bracken	1.29	Bracken Removal, Heather Establishment, Grazing Control
	8	Degraded (Overgrazed) Dry Heath	1.28	Grazing Control
	9	Degraded (Overgrazed) Dry Heath	3.14	Grazing Control
Lisleagh Mountain Wetland	1	Poor Fen	8	Grazing Control

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<b>Target Habitat</b>	<b>Plot_No</b>	<b>Existing Habitat</b>	<b>Area (HA)/Length (Km)</b>	<b>Treatment</b>
Hedgerow Replacement		Improved Grassland	3.65	Hedgerow Planting

## **5 Habitat Restoration & Enhancement**

In addition to prescribing methods for restoring heathland vegetation around infrastructure after construction, this HMP discusses three main habitat enhancement and management activities, based on our inspections and assessment of heathland and fen conditions during the baseline surveys, as follows:

- Bracken removal (at dry heath Plot No. 5 – 7) and partial gorse scrub removal (at dry heath Plot No. 1 & 4)
- Overseeding all dry heath plots (no. 1 – 9 inclusive), using locally collected heather brash or seed from areas of existing dry heath habitat where the heather is mature to over-mature; and
- Landowner agreements on stock removal/management and to avoid damaging land management practices.

Each of the above activities is described in more detail below, after a description of general good working practices which will be followed throughout all works and phases of the development.

### **5.1 Good Working Practices During Construction and Habitat Restoration**

During construction and habitat restoration works a number of good working practices are proposed, to make sure that areas which are to be protected are not damaged during habitat restoration of other parts of the HMP lands and to ensure that the measures in this HMP are correctly implemented. The following sections describe standard good working measures which will be implemented as part of the development's habitat restoration works.

#### **5.1.1 Ecological Clerk of Works**

An Ecological Clerk of Works (ECoW) will be appointed to supervise the works and to ensure that more valuable areas are protected and avoided during the construction phase to ensure that habitat restoration and enhancement activities are implemented as planned, and to advise on any environmental or ecological aspect of the works. The ECoW will inspect habitat and ditches/water courses during the habitat restoration works and will be in charge of water quality monitoring throughout. The ECoW will be the first point of contact with the NPWS if required. A full description of the role and responsibilities of the ECoW is provided below under Section 7.

### **5.1.2 Access and egress**

The route of the access track will provide a designated controlled route for vehicles and plant and a permissible construction corridor will be designated within which vehicles and plant can operate during the construction works. This corridor will be marked with temporary fencing. The purpose of the controlled construction corridor is to prevent unnecessary vehicle and plant trafficking across parts of the site that support valuable (priority and non-priority Annex 1) habitats that are to be protected.

### **5.1.3 Laydown and temporary storage of materials**

Laydown and temporary storage of materials will take place only within designated areas (which are generally on constructed hard stands, access tracks, etc.). There will be no laydown of any type of materials without first consulting with the ECoW.

Both access and egress routes and laydown of materials will take place only within the construction corridor around the infrastructure footprint and at the temporary construction compound. A plan of temporary storage areas is provided for in Figure 2.1 of Chapter 2 the EIAR for the proposed wind farm development.

## **5.2 Habitat Restoration and Enhancement**

For the purposes of this HMP, the terms ‘habitat restoration’ and ‘habitat enhancement’ will be used in a specific manner, as follows:

Habitat restoration is used for restoring areas of vegetation that have been impacted by wind farm construction activities, such as the restoration of vegetation along access track verges and around hardstandings.

Habitat enhancement is a benefit of the development and this term is used for activities that are designed to improve the quality of existing degraded habitats on land that is within the control of Dyrick Hill Windfarm Ltd. Habitat enhancement targets the heathland and poor fen communities that have been degraded or damaged by past land management activities such as stock grazing, trampling/puddling and dunging.

### **5.3 Restoration of vegetation around the development footprint after construction**

Habitat restoration will be targeted along the sections of the proposed wind farm layout in the Broemountain Commonage Area, along the access track south of T10 and north to T13. The habitat restoration area includes Dry Heath Plot No. 1 which is the proposed borrow pit location.

In all areas where vegetation is stripped ahead of the construction of access tracks, turbine bases, crane hard standings, and cabling for the Dyrick Hill Wind Farm, there is the need to restore vegetation after the construction activities have been completed. The prime aim of the restoration of vegetation within the wind farm footprint is to re-vegetate bare soil to stabilise them, prevent erosion and to reinstate heathland or heathland vegetation.

#### **5.3.1 *Methods of Heathland vegetation restoration***

Heathland vegetation cover around the construction footprint will be restored by re-turfing with intact vegetated heath turves, saved at the time of turf stripping in areas of dry heath habitat. In the event that the area of turves saved from dry heath habitat within the wind farm footprint is not sufficient to restore habitat within the construction footprint then the restoration will be supplemented by over-seeding using locally collected heather brash or heather seed. The decision on where overseeding of re-turfed heathland areas might provide useful enhancement will be made by the ECoW once the initial turf replacement has been completed.

Careful stripping and replacement of turf is usually the best option for restoring around infrastructure because it permits restoration of a near full range of plant community species and possibly elements of the invertebrate fauna. It may also produce more rapid results as it largely involves vegetative regrowth of established plants. The quality of vegetation restoration depends very much on the quality of turf storage and the care taken during the replacement of turves.

Four main activities will be carried out to ensure that the restoration is effective and that vegetation is restored as quickly as possible. These are:

- Careful stripping of vegetation turves;
- Storage of intact turves close to their point of origin for as short a period of time as possible;
- Careful reinstatement of turves, with additional heather seeding where suitable; and
- Monitoring of reinstated vegetation.

Each activity is described in more detail below. Monitoring is described in Section 6.

### **5.3.2 Careful Stripping of Vegetation Turf**

Ahead of the construction of turbine bases and cut sections of access tracks, the vegetation will be stripped in intact turves, ideally in large sections using plant such as the bucket of a tracked excavator. The turves shall be large in area (ideally around 0.5m x0.5m) and as deep as the surface soil organic horizon. The depth of turves should be 30cm (where such depths occur) to ensure that the turves stay moist and intact during handling and storage. This will also assist their successful reinstatement. To ensure careful work, it is proposed that an experienced driver is used for this task and that all drivers are trained to meet this requirement.

For the excavation of cable trenches within dry heath habitat, the method for turf stripping and excavation will ensure that sections of cable trench (e.g. 500m sections) are excavated, laid and restored as quickly as possible and that the cable trench is not left open across the site and restored in one activity. This will allow the most rapid reinstatement of dry heath vegetation.

### **5.3.3 Storage of intact turves**

Stripped turves shall be stored as close to their point of origin and for as short a period of time as possible. In the case of turbine bases this is likely to be of the order of weeks, but for cable trenches it will be in the order of days.

The method of storage will be such that turf stripped from areas of dry heath habitat is stored vegetation side up to a maximum of two turf heights.

To ensure good conservation and to retain moisture status of turves during storage, particularly in dry weather when desiccation can occur rapidly, they may require periodic watering, or they will be covered (plastic sheeting) as determined by the ECoW, particularly if storage includes any longer spells of hot, sunny and windy weather.

### **5.3.4 Habitat restoration using stored turves**

The aim will be to restore habitat around all construction areas to dry heath vegetation type using stored turves initially stripped from these areas.

Where the access track is constructed as a 'cut' track, it will be ensured that the access track verges and the cable trench will be constructed in such a way as to minimize the disturbance of stripped vegetation and excavated peat. This approach will involve vegetation restoration on the road verge and over the cable trench as a single process after all the construction work has been completed.

Habitat restoration around batters of turbine bases, crane hardstandings and sections of cut access track will be achieved by:

- (a) ensuring sufficiently shallow batter gradients to prevent soil erosion;
- (b) careful levelling and firming of subsoil to the correct density to minimise the risk of uneven settlement; and
- (c) by careful replacement of turves, butted close together and well tamped into place, so that they will not easily erode. Any unavoidable gaps shall be filled with loose soil and brash and well tamped.

The quality of restored areas will be checked by the ECoW immediately after completion to confirm that turf reinstatement has been carried out correctly. Subsequent checks and monitoring of restored areas are described in Section 6.

Habitat restoration of cable trenches will be completed as soon as sections of trench, 500m long, are completed and back-filled. To ensure successful restoration of vegetation along cable trenches, and to ensure that trenches do not become routes of preferential flow for drainage waters, trenches will be designed with cross dams and back-filling and re-turfing will take place immediately after cables have been laid. Appropriate scale plant will be used for these activities to minimize as much as possible the trafficking of adjacent peat.

Should areas of replaced turf require overseeding to thicken up vegetation regeneration, the method will follow that described in Section 5.4.4 below.

### **5.3.5 Habitat Restoration using Brash**

In the event that there is a short-fall in the saved turves required to restore dry heath habitat within the construction footprint, heather brashing will be used to substitute for this short-fall.

Heather brashing will also be used as the primary restoration technique on areas of steeper battered slopes where turves are at greater risk of erosion.

The techniques that can be implemented to achieve the colonisation of these slopes with *Calluna vulgaris* include the application of heather brash/chopper material using a scatter roller; hydroseeding of the slope; and or the application of seed and geojute/netting<sup>1</sup> to stabilise and protect the surface during vegetation establishment. Brash/chopper material and seed material to be used for seeding steeper slopes will be harvested from local stands of heather. Harvesting will be undertaken in line with the method outlined in Section 5.4.3 below.

The final approach to be used for the establishment of *Calluna vulgaris* swards on steeper slopes will be selected by the ECoW in consultation with a landscape specialist.

## **5.4 Habitat Enhancement**

### **5.4.1 Introduction**

A number of agricultural land management practices have damaged and caused the degradation of heathland habitats at the Dyrick Hill Wind farm site. In addition to preventing the occurrence of these damaging management practices in the future, there are a number of habitat enhancement and improvement activities that will be implemented as part of the HMP.

Dyrick Hill Windfarm Ltd. will work with the current landowners to manage areas of heathland within the wind farm site so as to return it to good conservation status for at least the lifetime of the Dyrick Hill Wind Farm Development, which is predicted to be at least 40 years.

The techniques for habitat enhancement and improvement that will be implemented will comprise:

- **Bracken removal and Gorse Control.**

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<sup>1</sup> Salmon smolt netting has been successfully used for stabilisation of seed during blanket bog restoration in Scotland: see [https://www.iucn-uk-heathlandprogramme.org/sites/www.iucn-uk-heathlandprogramme.org/files/file\\_attach/Session%208%20Combined%20Workshop%20Presentation.pdf](https://www.iucn-uk-heathlandprogramme.org/sites/www.iucn-uk-heathlandprogramme.org/files/file_attach/Session%208%20Combined%20Workshop%20Presentation.pdf)



- **Control stock grazing.** Dyrick Hill Windfarm Ltd. will work with landowners to improve general land management and grazing regimes.
- **Fencing.** Fencing will be provided both during the construction and decommissioning phase and the operation phase of the wind farm site to promote heathland restoration and ongoing management.
- **Agreements with landowners** to prevent any ongoing damaging land management practices.

#### **5.4.2 Bracken Removal & Gorse Control**

There are a range of treatment approaches used to eradicate bracken infestations in upland habitats. These included cutting regimes, such as 1 cut or 2 cuts per year, the application of asulum herbicide, controlled burning; grazing by livestock; and a mix of the above treatment approaches. The Bracken Control Group (<https://www.brackencontrol.co.uk/>) have undertaken detailed research examining the effectiveness of treatment approaches. These treatment approaches have also been published by Natural England in their Technical Information Note (TIN) 048 – Bracken Management and Control. The treatment set out by Natural England is based on a two stage approach with stage one requiring the application of treatments that reduce the cover of bracken and open up the stand for re-vegetation and stage two involving either intensive follow-up treatments aimed at all eradication or less intensive treatments aimed at managing bracken at low levels.

With regard to the initial reduction in bracken cover Akpınar *et al.* (2023) reported that a cycle of cutting applied twice per year represented the most effective approach at reducing cover and maintaining low cover over a prolonged time frame. Natural England also recommend two cuts per year. In line with this guidance the following cutting regime will be implemented for dry heath Plot No. 5, 6 and 7:

- First cut mid-June (provided no ground nesting birds are present – where ground-nesting birds are present within the Plots cutting will be postponed until after the chicks have fledged and the nest is quit – likely mid to late July)
- Second cut – late August.

This cutting regime will be implemented at all Plot No. 5, 6 and 7 for the first 5 years of the operation phase.

This cutting will also be repeated throughout the lifetime of the operation phase where bracken shows signs of recovery.

Areas of cut and cleared bracken will be seeded with heather as per the approach outlined in Section 5.4.3.

Gorse cover will be reduced in Plot No. 2 and 3 such that the area of gorse cover is less than 50% of the cover in the Plot. This is in keeping with the targets for favourable conservation status of dry heath habitat (Perrin *et al.*, 2014). Cut areas will be treated with heather as per the approach outlined in Section 5.4.3 below.

### **5.4.3 Heather Seeding**

To the north of the Broemountain Commonage Area, *Calluna*-dominated vegetation community is in generally good condition and supports stands of mature heather. These areas will also act as donor areas of heather seed for re-seeding and over-seeding other habitat enhancement areas within the wind farm site.

Under the guidance of the ECoW, small areas with mature *Calluna vulgaris* will be selected for mowing. This will involve an inspection of the area to select the best and most easily accessible areas as donor locations for collection of heather seed for re-seeding elsewhere. These areas will display signs of mature and ‘leggy’ heather stands in need of regenerating and display good seed production.

Heather seed is very small and can be produced in great abundance. Heather seed does not ripen until about October, depending on weather conditions. Germination requires light, warmth and moisture, so seed collected in the autumn is best sown in the spring. Most germination usually occurs in mid to late summer. If conditions are unsuitable, seed will remain dormant and can persist in the seedbank for decades although viability varies greatly according to site conditions.

In order to use locally-sourced heather seed for both revegetating areas of bare peat and enhancing re-turved areas, a programme of heather seed collection, using brush harvesters, will be conducted on suitable areas of heather moorland in the north-eastern part of the site. Brush harvesters can be deployed as rear and side-mounted brush harvesters, tractor-trailed, ATV-trailed and pedestrian brush harvesters. For the purpose of heather seed collection at Dyrick Hill, the equipment to be deployed will be a combination of either quad-bike ATV-trailed

harvesters and pedestrian harvesters. This will avoid the use of heavy machinery on site and the compaction of underlying peat en route to donor locations.

A number of component tasks will be carried out and managed by the ECoW. These tasks will include as a minimum:

- Inspection of all areas of heather moorland in the north-east of the site to identify and select suitable donor locations for heather seed. Likely areas suitable for seed collection will be accessible and will display signs of mature and ‘leggy’ swards showing good flowering characteristics. This inspection and selection will be carried out by the ECoW;
- Plan suitable storage facilities for both heather brash and heather seed (if required) so that harvested materials can be suitably conserved until it is deployed in habitat restoration and enhancement works; and
- If there are any bare patches in restored areas within the Dyrick Hill wind farm site boundary, implement heather seed spreading on a location-by location basis, as indicated below and as directed by the ECoW.

Ahead of heathland habitat restoration/enhancement works elsewhere on site, the ECoW will plan and supervise a targeted heather seed collection programme in the northeast of the site. In line with the requirements of the Wildlife Act and the breeding bird season, heather flailing must not be carried out during the period 1<sup>st</sup> March to 31<sup>st</sup> August to protect ground-nesting birds.

Donor seed will be harvested at the optimum time of year, from October through to December.

Suitable dry storage facilities for both heather brash and heather seed will also be planned so that harvested materials can be suitably conserved and protected from wet conditions until they are deployed in habitat restoration works.

#### *5.4.3.1 Seed Application & Management*

Heather reseedling shall take place in late spring (late April to May) to allow warmth and moisture conditions of early summer to optimise germination. A sowing rate of 15 – 17kg per hectare, with repeated applications over several years, will be required as part of the habitat restoration.

Regrowth of competitor vegetation must be reduced during the establishment phase by one or a combination of the following management actions:

- Topping
- Controlled grazing; and/or
- Weed wiping

All Plot Nos. 2 to 9 as shown on Figure 1.1 will be treated with heather seed. (Plot No. 1 at the borrow pit will be subject to heather seeding in the event that there is a shortfall in saved turves to cover this area). Seeding of these areas with heather seed, along with the combined treatment of bracken removal, gorse reduction and control and stock reduction will contribute towards the re-establishment of heath vegetation in these areas of the Dyrick Hill Wind Farm site.

#### **5.4.4 Stock management**

Stock management of both sheep and cattle will be agreed between Dyrick Hill Windfarm Ltd and landowners. The HMP target habitats of dry heath and poor fen will benefit from stock management.

##### **5.4.4.1 Lisleagh Mountain Wetland Poor Fen - Cattle Management**

The rate of grazing in the poor fen habitat of the Lisleagh Mountain wetland will be restricted to a stocking rate of 0.075 livestock units per hectare between 1 March to 31 October. No grazing will be permitted outside of this period.

Over the period of the wind farm lifetime (40 years) it is considered that the implementation of an appropriate grazing regime will result in a very significant improvement of sward structure and biodiversity of the poor fen habitat in this area.

##### **5.4.4.2 Dry Heath - Sheep Management**

At Plot No. 1, 8 and 9 complete removal of sheep will occur during the construction phase and for the following three years. Thereafter, the rate of sheep stocking will be restricted to a sheep-only stocking rate of 0.3 livestock units per hectare between 1 March to 31 October. No grazing will be permitted outside of this period.

At Plot No. 2 – 7 stocking rates of 0.3 livestock units per hectare between 1 March to 31 October, with no grazing will be permitted outside of this period, will be implemented following the removal of bracken and control of gorse.

Records will be kept of initial habitat condition, current and historical stocking densities will be compiled and maintained for the duration of stock management and grazing restrictions.

#### **5.4.5 Hedgerow Design Treatment**

All new hedgerows will support a variety of native broadleaved tree species. A minimum of 6/7 species will be supported by these hedgerows along any 30m length. These species will include a mix of the following: pedunculate oak, hazel, wytch elm, crab apple, hawthorn, blackthorn, elder, spindle, holly, grey willow, goat willow and eared willow.

Hedgerows will be maintained so that a diversity of hedgerow structure is provided. Tall and short ( $\leq 3\text{m}$ ) sections will be provided. Thick and dense cover at the base of the hedgerow will be maintained and gaps along hedgerows will be minimised. Gaps to facilitate agricultural farm access will be provided at selected locations along hedgerows as required.

Hedgerows will be maintained on an ongoing basis as follows:

- Hedgerow trimming will be undertaken on three-year rotations.
- Hedgerow trimming will be alternated between sections of hedgerows so that at least one-third of the hedgerow length remains uncut.
- Hedgerow trimming will be undertaken between the months of January and February.

#### **5.4.6 Management agreements with landowners**

A number of land management practices are damaging to heathland. Under the terms of their lease with the respective landowners, Dyrick Hill Windfarm Ltd. will prevent ongoing damaging land management practices during the lifetime of the development. In this respect, there will be:

- no overgrazing (grazing on site will be in line with the stocking rates specified in Section 5.4.4 above);
- no new drainage and no maintenance of existing drains, with the exclusion of drains designed to protect the development's infrastructure;
- no flailing or mowing (with the exception of any flailing or mowing designed specifically for habitat enhancement as part of the wind farm development).

## **6 Habitat Management Action Plan**

Table 6.1 outlines an Action Plan for the promotion and implementation of management actions to manage and enhance heathland habitats within the HMP Area.

The responsibility for the completion of actions are outlined in Table 6.1. The implementation of actions during the construction phase will be completed by the main civil contractor.

### **6.1 Monitoring**

To ensure that management actions outlined in Table 6.2 are achieving the required objectives for each target, regular monitoring is required. Table 6.2 below lists the monitoring required for each target, the measurement to be recorded, timing and frequency of monitoring and the personnel who shall carry out each task.

This monitoring programme covers the construction period in addition to (as a minimum) years 1, 2, 3, 5, 7, 10, 15, 20, 25, 30, 35 & 40 following the completion of the construction period. Baseline surveys exist for the entire site, and these will be complemented by confirmatory surveys completed through the construction phase.

Habitat monitoring will be undertaken using quadrats and fixed point photography.

Monitoring during the early years of the operation phase will be particularly important for evaluating the success or otherwise of management actions to achieve favourable conservation status for heathland habitats.

The Favourable Conservation Status of Heathland Habitats will be based upon the attributes and targets outlined in Table 6.1.

**Table 6.1: Attributes, Measurements and Targets for Achieving Favourable Conservation Status**

Attribute	Measurement	Target
<b>Dry heath</b>		
Vegetation Composition	Relevé	Number of bryophyte or non-crustose lichen species present, excluding <i>Campylopus</i> spp. and <i>Polytrichum</i> spp. $\geq 3$ .
	Relevé	Number of positive indicator species present $\geq 2$
	Relevé	Cover of positive indicator species $\geq 50\%$
	Relevé	Proportion of dwarf shrub cover composed of <i>Myrica gale</i> , <i>Salix repens</i> , <i>Ulex gallii</i> collectively $< 50\%$
	Relevé	Cover of the following weedy negative indicator species: <i>Cirsium arvense</i> , <i>C. vulgare</i> , <i>Ranunculus repens</i> , large <i>Rumex</i> species (except <i>R. acetosa</i> ), <i>Senecio jacobea</i> , <i>Urtica dioica</i> collectively $< 1\%$
	Relevé	Cover of non-native species $< 1\%$
	Local vicinity	Cover of non-native species $< 1\%$
	Local vicinity	Cover of scattered native trees and scrub $< 20\%$
	Local vicinity	Cover of <i>Pteridium aquilinum</i> $< 10\%$
Local vicinity	Cover of <i>Juncus effusus</i> $< 10\%$	
Vegetation Structure	Relevé	Senescent proportion of <i>Calluna vulgaris</i> cover $< 50\%$
	Relevé	Last complete growing season's shoots of ericoids and <i>Empetrum nigrum</i> showing signs of browsing collectively $< 33\%$ (Assess a minimum of 10 shoots distributed across the plot)
	Local vicinity	No signs of burning inside boundaries of sensitive areas
	Local vicinity	Outside boundaries of sensitive areas, all growth phases of <i>Calluna vulgaris</i> should occur throughout, with $\geq 10\%$ of cover in mature phase
Physical Structure	Relevé	Cover of disturbed bare ground $< 10\%$
	Local vicinity	Cover of disturbed bare ground $< 10\%$

Attribute	Measurement	Target
<b>Poor Fen</b>		
Vegetation composition	Relevé	Cover of positive indicator species $\geq 50\%$
	Relevé	Total cover of negative indicator species $\geq 10\%$ . Native negative indicators may include graminoids such as reed canary-grass ( <i>Phalaris arundinacea</i> ) and reed sweet-grass ( <i>Glyceria maxima</i> ), tall herbs such as great willowherb ( <i>Epilobium hirsutum</i> ), bracken ( <i>Pteridium aquilinum</i> ), bramble ( <i>Rubus fruticosus</i> ) and common nettle ( <i>Urtica dioica</i> ), and bryophytes such as <i>Brachythecium rutabulum</i> and <i>Kindbergia praelonga</i>
	Relevé	Cover of ericoid species and/or <i>Vaccinium myrtillus</i> ; <i>Empetrum nigrum</i> $\geq 15\%$
	Relevé	Cover of the following negative indicator species: <i>Agrostis capillaris</i> , <i>Holcus lanatus</i> , <i>Phragmites australis</i> , <i>Ranunculus repens</i> collectively $< 1\%$
	Relevé	Cover of non-native species $< 1\%$
	Local vicinity	Cover of non-native species $< 1\%$
	Local vicinity	Cover of scattered native trees and scrub $< 10\%$
	Local vicinity	Cover of litter not more than 25%
	Local vicinity	Cover of disturbed ground not more than $< 10\%$
Vegetation Structure	Relevé	Crushed, broken and/or pulled up Sphagnum species $< 10\%$ of Sphagnum cover
	Relevé	Last complete growing season's shoots of ericoids, <i>Empetrum nigrum</i> and <i>Myrica gale</i> showing signs of browsing collectively $< 33\%$ (assess a minimum of 10 shoots distributed across the plot)
	Local vicinity	No signs of burning into the moss, liverwort or lichen layer or exposure of peat surface due to burning
	Local vicinity	No signs of burning inside boundaries of sensitive areas



Attribute	Measurement	Target
Physical Structure	Soil pH	Maintain soil pH and nutrient status within natural ranges
	Percentage cover of peat-forming vegetation and water table levels	Maintain active peat formation, where appropriate
	Water levels (centimetres); duration of levels; hydraulic gradients	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat
<b>Hedgerows</b>		
Vegetation Composition & Structure	Species Diversity	Maintain species diversity at > 6/7 species per 30m strip
	Habitat Connectivity	Maintain connectivity with hedgerow network
	Vegetation Height	Achieve and maintain hedgerow height at >2.5m
	Vegetation – Basal density	Achieve and maintain semi-opaque to opaque/dense conditions.
	Hedgerow width	Achieve and maintain hedgerow width at >2m
	Hedgerow gaps	Achieve and maintain gaps at <5% of any hedgerow.

Management Actions and techniques outlined in Sections 5 above aim to achieve favourable conservation status of heathland, poor fen and hedgerow habitats within the HMP area.

Where management actions are not deemed to be successful in achieving the targets for favourable conservation status of heathland and heathland habitat, as outlined in Table 6.1 above, then the implementation of remedial measures will be required. Examples of these remedial measures are provided in Section 5 above. It is noted that the nature of the remedial action to be applied will be dependent upon which attributes are not meeting the targets of favourable conservation status.

### 6.1.2 Ongoing Monitoring – Meeting Targets

If a habitat fails to meet one of the targets then management action as listed in Table 6.2 will be undertaken.

## **6.2 Reporting of Monitoring**

Table 6.2 specifies the timing of monitoring for each HMP Action.

The ECoW will produce a final report documenting the implementation of Habitat Management Plan Actions (as well as environmental and ecological effects – see Section 7) of the construction period. The report will be made available to the wind farm operator, Contractor, Planning Authority, NPWS and other external agencies where appropriate (e.g. Inland Fisheries Ireland).

A report detailing the results of all actions requiring implementation during the construction phase will be furnished to the Planning Authority within 12 months of the completion of construction activity, and subsequently in years 1, 2, 3, 5, 7, 10, 15, 20, 25, 30, 35 & 40.

### **6.2.1 Quadrats & Fixed-Point Photography**

Habitat surveys during the monitoring programme will be based on fixed quadrat surveys. Each quadrat will be surveyed using the DOMIN Scale so that individual vegetation communities are identified. Fixed quadrat monitoring locations will be identified by the ECoW during the construction phase.

Quadrats will be located within all areas of the proposed wind farm site and the peat storage and restoration (habitat enhancement) area that are subject to the habitat management measures outlined in Section 5 above.

Fixed point photographs will be taken of the vegetation at all quadrats and of the surrounding area during each round of monitoring. The grid reference of the initial fixed point photograph location will be recorded during the initial round of monitoring and the direction of view of photographs recording the surrounding area will also be recorded.

**Table 6.2: Habitat Management & Monitoring Action**

HMP Action Ref. No.	Management Measure	Target	Method	Measurement	Timing	Entity Responsible
1.	<b>Protect Water Quality in Eroding Upland Rivers</b>	No decrease in water quality in eroding upland rivers during the construction phase.	Implementation of all project design and construction phase management measures as specified in the EIAR for the proposed development.	ECoW to review and monitor construction phase to ensure implementation of design measures and construction phase management measures.	Throughout the construction phase	Construction Contractor
2.	<b>Grazing Control</b>	Promote grazing regimes as outlined in Section 5	Implementation of livestock numbers specified in Section 5	Monitor grazing and liaise with landowner to check that livestock numbers and grazing regime are adhered to. The success of the grazing regime in terms of contributing to heathland and heathland restoration will be monitored using permanent fixed quadrats. A photographic log of all quadrats and areas subject to grazing control will be maintained.	Throughout lifetime of the HMP.  Monitor during Years 1, 2, 3, 5, 7, 10, 15, 20, 25, 30, 35 & 40 of the operation phase	Operator

HMP Action Ref. No.	Management Measure	Target	Method	Measurement	Timing	Entity Responsible
4.	<b>Bracken Removal &amp; Gorse Control</b>	Reduce bracken cover to <10% within treatment Plots 5, 6, and 7; Reduce gorse cover to <50% within treatment Plots 2 and 3	Cutting and Seeding	The success of removal and control will be monitored using permanent fixed quadrats to measure vegetation composition and percentage cover. A photographic log of all quadrats will be maintained.	Cut first during the construction phase prior to the completion of construction works. Then continue to cut during first 5 years of operation and where regrowth is identified during any subsequent monitoring years.  Monitor during Years 1, 2, 3, 5, 7, 10, 15, 20, 25, 30, 35 & 40 of the operation phase	Construction Contractor /Operator
5.	<b>Sensitive removal of heathland vegetation from areas of the construction footprint as turves</b>	Sensitively remove heathland vegetation as turves under the footprint construction site, maintain turves in good condition so that they can be reinstated in temporary construction areas.	Remove peat as turves excavated to a depth of at least 30 cm, where soil depths are to this level or below. Where shallower remove to base of soil. This layer will be stored as turves and kept viable by irrigation if necessary because peat is prone to shrinkage and drying.	Construction Contractor's ECoW monitoring of heathland turving and condition during the construction phase.	Construction phase – vegetation clearance.	Construction Contractor
6.	<b>Re-instate turves in Re-instatement Areas</b>	Re-instate turves and restore heathland vegetation in the reinstatement areas.	Re-instate turves following the management techniques outlined in Section 5.3.4	The success of turve re-instatement and heathland restoration will be monitored using permanent fixed quadrats. A photographic log of all quadrats and areas subject to turve reinstatement will be maintained.	Re-instate turves during the Construction stage.  Monitor during Years 1, 2, 3, 5, 7, 10, 15, 20, 25, 30, 35 & 40 of the operation phase.	Construction Contractor

HMP Action Ref. No.	Management Measure	Target	Method	Measurement	Timing	Entity Responsible
7.	<b>Plant Replacement hedgerows</b>	Plant and maintain hedgerows in line with the targets set out under Section 5.4.5 and Table 6.1.	Planting during construction phase. Ongoing maintenance during operation phase	Fixed 30m sample lengths along new hedgerows.  Measurements along each 30m sample length will be as per Table 6.1 above.	Monitor during Years 1, 2, 3, 5, 7, 10, of the operation phase.	The Construction Contractor /Operator
8.	<b>Control competitive non-indicator heathland species</b>	Non-indicator peat species should be kept to a minimum of <10% of the vegetation in the HMP area priority habitats.	Removal of Competitive Species. Remove spreading conifer trees.	Quadrat monitoring and photographic log will be undertaken to measure the extent of non-indicator species.	Control on an annual basis.  Monitor during Years 1, 2, 3, 5, 7, 10, 15, 20, 25, 30, 35 & 40 of the operation phase.	The Construction Contractor /Operator
9.	<b>Restrict drainage</b>	No drainage of Lisleagh Mountain wetland throughout the lifetime of the HMP.	Restrict drainage activity	Monitoring of site for any signs of turbary activity. Liaise with landowner to ensure no commercial turbary activity is undertaken throughout the lifetime of the plan.	Throughout the lifetime of the HMP.	Operator

HMP Action Ref. No.	Management Measure	Target	Method	Measurement	Timing	Entity Responsible
10.	<b>Prevent certain land use practices</b>	Prevent certain land use practices to ensure favourable conservation status of heathland habitats.	Prevent the following activities throughout the lifetime of the HMP: <ul style="list-style-type: none"> <li>The reclamation, fertilisation or drainage of the HMP area will be restricted.</li> <li>The application of slurry, lime, herbicides, pesticides, insecticides, fungicides will be restricted.</li> <li>Scrub will be prevented from establishing on heathland and heathland habitats through ongoing removal.</li> </ul>	Quadrat monitoring  Photographic log	Implement throughout lifetime, and monitor/report during Years 1, 2, 3, 5, 7, 10, 15, 20, 25, 30, 35 & 40.	Operator
11.	<b>Identification of Areas within the Heathland Management Area Requiring Remedial Active Re-Seeding/Brashing</b>	Actively re-seed areas of the Heathland Management Area where surface turves have failed to knit together or where heathland vegetation has failed to establish.	Collect seeds/brash from priority heathland habitats during the autumn of the year when any areas of the Heathland Management Area are identified as failing and seed/brash identified areas during the next spring season.	The success of seeding/brashing (if required) will be monitored using permanent fixed quadrats within remedial areas as described above. It is noted that as areas that may require seeding/brashing are as yet unknown, additional quadrats, will be required to monitor areas subject to this HMP Action. A photographic log of all quadrats and areas subject to seed/brash remediation will be maintained.	Identification of areas requiring seeding during the ongoing monitoring. Areas requiring seeding/brashing as a remedial measure will be monitored during the summer months following the application of seed/brash. Further monitoring will be undertaken in the subsequent year.	Operator

HMP Action Ref. No.	Management Measure	Target	Method	Measurement	Timing	Entity Responsible
12	Protect Bat Species during the Operation phase	Maintain 100m vegetation buffer surrounding all turbines	Clear all structured vegetation in the form of hedgerow, treeline, scrub and/or woodland edge occurring within 100m buffer of turbines. The clearance of such vegetation will be completed during the construction phase. Note that the hedgerow planting to be undertaken as per HMP Action Ref. No. 7 above will compensate for any loss of structured vegetation and result in an overall net increase in hedgerow habitat within the wind farm site.	Visual monitoring and fixed photographic log from 2 points at each turbine location.	Implement throughout lifetime, and monitor/report during Years 1, 2, 3, 5, 7, 10, 15, 20, 25, 30, 35.	The Construction Contractor /Operator

## **7 Ecological Clerk of Works**

### **7.1 Background**

An appropriately qualified Environmental/Ecological Clerk of Works (ECoW) will be employed for the duration of the Civil Works Contract. This person will be known as the Dyrick Hill Wind Farm ECoW. The ECoW must be a member of the Chartered Institute of Ecology and Environmental Management (CIEEM) or equivalent body. The ecologist performing the ECoW role will attend the site on a weekly basis to ensure that all works are being completed to the appropriate standards.

As the delivery of this HMP is highly dependent on the roles and responsibilities of the ECoW, some detail is provided here regarding this position.

### **7.2 Term of Appointment**

The ECoW will be on site for minimum 1 day per week during the construction works; provision will be made for an initial briefing to all contractors, and a final visit to report on the ecological aspects of construction. Some office time is also required for weekly reporting.

### **7.3 ECoW Tasks**

#### **Overview**

The provision of an ECoW helps to ensure that ecological protection aspects of the Environmental Statement, HMP, Construction Environmental Management Plan (CEMP) and Construction Method Statements (CMS) are fully adhered to during construction. It also allows any issues arising to be dealt with in an appropriate manner.

Taking account of the requirements set out in this HMP, the following are deemed to be required services of the ECoW:

- a) Construction surveys.
- b) Water quality monitoring.
- c) Monitoring SuDS stilling pond construction to ensure appropriate wildlife habitats are incorporated into their design (including briefing of digger drivers).
- d) Maintaining records of checks and issues.
- e) Providing a report detailing the implementation of the HMP Management Actions during the construction phase.



- f) Survey the site for sensitive and protected species prior to construction (due diligence survey).

### **Pollution Prevention Plan**

- a) Review, agreement and approval of Contractor's pollution prevention plan prior to commencement of work.
- b) Conduct weekly inspection of site pollution prevention measures (silt traps, etc.) and visually assess their effectiveness. This will include inspection of water management measures installed by Contractor such as excavation pumping and diversion channels, as well as containment of silt away from watercourses and advice on micro-siting of mitigation measures.
- c) Maintain a Pollution Prevention Measures Register of the weekly inspections, to include an inventory of all measures on the site, their effectiveness, as well as any advice provided.
- d) Collation of water sampling results (collected and analysed by third parties) for presentation in weekly reports.
- e) Suspension of work where potential risk from pollution is identified and agreed safeguarding measures, as specified in the CEMP or method statements, are not in place, or where construction methods and mitigation measures are not specified in construction method statements and/or plans as agreed at commencement of works.
- f) Provide advice and recommendation to the wind farm owner and its contractors regarding the above.

### **Waste Management**

- a) Review, agreement and approval of the Contractor's Site Waste Management Plan.
- b) Review of the Contractor's records for all inspections of fuel, oil or chemical storage areas, including the integrity of storage facilities.

### **Drainage Management**

- a) Review, agreement and approval of the Contractor's Site Drainage Management Plan.
- b) Inspection of drainage management works.
- c) Liaison with Planning / NPWS inspecting the works.
- d) Agreement of monitoring standards to be applied by Contractor's personnel.
- e) Confirmatory survey in advance of habitats and species for ground to be affected by drainage management.

- f) Review of Contractor's records for plant inspections, evidence of contamination and checks made after extreme weather conditions.
- g) Liaison, field discussion and agreement of drainage management works with Planning Authority, IFI, NPWS when required by consultees and when considered necessary by ECoW.
- h) Agreement of drainage management associated with temporary peat storage and reinstatement works in advance of such works commencing.

#### **Watercourse Crossings**

- a) Review, agreement and approval of the Contractor's Site Watercourse Crossing Plan.
- b) Confirmatory survey in advance of watercourse condition and protected mammals for all ditch and stream crossings, using established specialist if necessary.
- c) Review the Contractor's records for plant inspections, evidence of contamination and checks made after extreme weather conditions.

#### **Water Quality Monitoring**

- a) Review, agreement and approval of the Contractor's and independent Site Water Quality Monitoring Plans where undertaken.
- b) Inspection of Contractor's records for water environmental monitoring and comparison of those records with independent records.
- c) Presentation of independent water environmental monitoring results at weekly site meetings.

#### **Excavated Materials and Reinstatement**

- a) Review, agreement and approval of the Contractor's Spoil Management and Reinstatement Plan.
- b) Marking working areas and route corridors, in consultation with the Geo-technical/Civil Designer and/or Archaeologist as necessary.
- c) Granting permission to work off hard ground using low ground pressure machines, including specification points for entry and return, and the route to be taken.
- d) Agreeing proposals for side casting and temporary storage areas as development proceeds.
- e) Agreeing timing of restoration and reinstatement of access track sides.
- f) Monitoring the condition of stored turf.
- g) Agreeing any required hydroseeding specification, including seed mix and fertiliser quantities.
- h) Issuing instruction to cease work if unexpected risks arise, until an agreed alternative solution is identified and risks are avoided or minimised.

## 7.4 Recording

The ECoW will keep a record of the following:

- a) notable animal sightings and signs (including birds, in addition to other site ornithological monitoring);
- b) The Pollution Prevention Measures Register (as detailed above);
- c) The habitats and soil (including peat depth) of ground to be developed via survey at least a week in advance of construction work;
- d) record of tasks carried out;
- e) written record of all oral advice given.

The ECoW will maintain a GIS database of key recordings made during the construction period. ECoW weekly site visit notes will be made available for all personnel on site to consult and will incorporate the following:

- Monitoring of requirements listed under HMP
- Monitoring of requirements listed under the CMS
- Pollution Prevention Measures Register

## 7.5 On-Site Communication

The success of ECoW appointment is largely dependent on well-defined lines of communication. In theory, robust construction method statements will incorporate many of the areas of ECoW concern into the daily activities of construction personnel. However, the ECoW will always inform the Civil Contractor and their Designer of areas of particular concern, who will then make a decision as to the subsequent action.

The ECoW will be involved in the delivery of biodiversity-related Toolbox Talks as part of the site induction process. Toolbox talks will be given to the work force at regular intervals to highlight the environmental issues that are unique to the wind farm located at Dyrick Hill. The ECoW will inform the staff of the following:

All staff working onsite and personnel visiting the site are briefed on the importance of the protection of key biodiversity receptors occurring onsite.

All staff will be informed of obligations to restrict construction operations to the construction footprint.

Restrictions on plant machinery traversing into sensitive habitats outside of the construction footprint.

The responsibility of all construction staff to ensure that sensitive heathland habitats occurring outside the construction footprint are not tampered with, removed, damaged or breached by any field operators or others visiting the site.

## 7.6 Incident Response

If an ecological incident occurs on site, the following protocol should be implemented:

- The ECoW shall be contacted immediately;
- Ensure appropriate corrective measures are put in place;
- Implement actions to prevent reoccurrence/further incidents; and
- Identify responsibilities and timescales for implementation.

## 7.7 Liaison with Consultees

The ECoW will provide a liaison between NPWS and IFI if this is required.

## 7.8 Final Report

The ECoW will produce a final report documenting the environmental and ecological effects of the construction period. The evidence for effects will be based on findings included in the minutes of weekly meetings, together with other recording information maintained by the ECoW. The report will be made available to the wind farm operator, Contractor, the relevant Planning Authority, NPWS and other external agencies where appropriate (e.g., IFI).

## References

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