

Appendix 6-1

Botanical Survey, Cleanrath Wind Farm





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1. INTRODUCTION

1.1 Introduction

MKO were commissioned to undertake detailed botanical surveys to provide an evaluation and assessments of the habitats occurring on site at Cleanrath Wind Farm, Co. Cork. The detailed assessments focussed on the habitats occurring immediately adjacent to the constructed development footprint including the turbine bases new access roads and associated infrastructure. The detailed botanical surveys were undertaken on the 14th May 2020.

1.2 SURVEY METHODS

A total of 13 relevés were undertaken adjacent to the construction footprint and are shown on Figure 1.1.

Relevés that were undertaken in peatland habitats followed guidelines set out in the following document:

- *Perrin, P.M, Martin, J.R., Barron, J.R., Roche & O' Hanrahan, B. (2014) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. Irish Wildlife Manuals, No. 79. National Parks and Wildlife Service.*

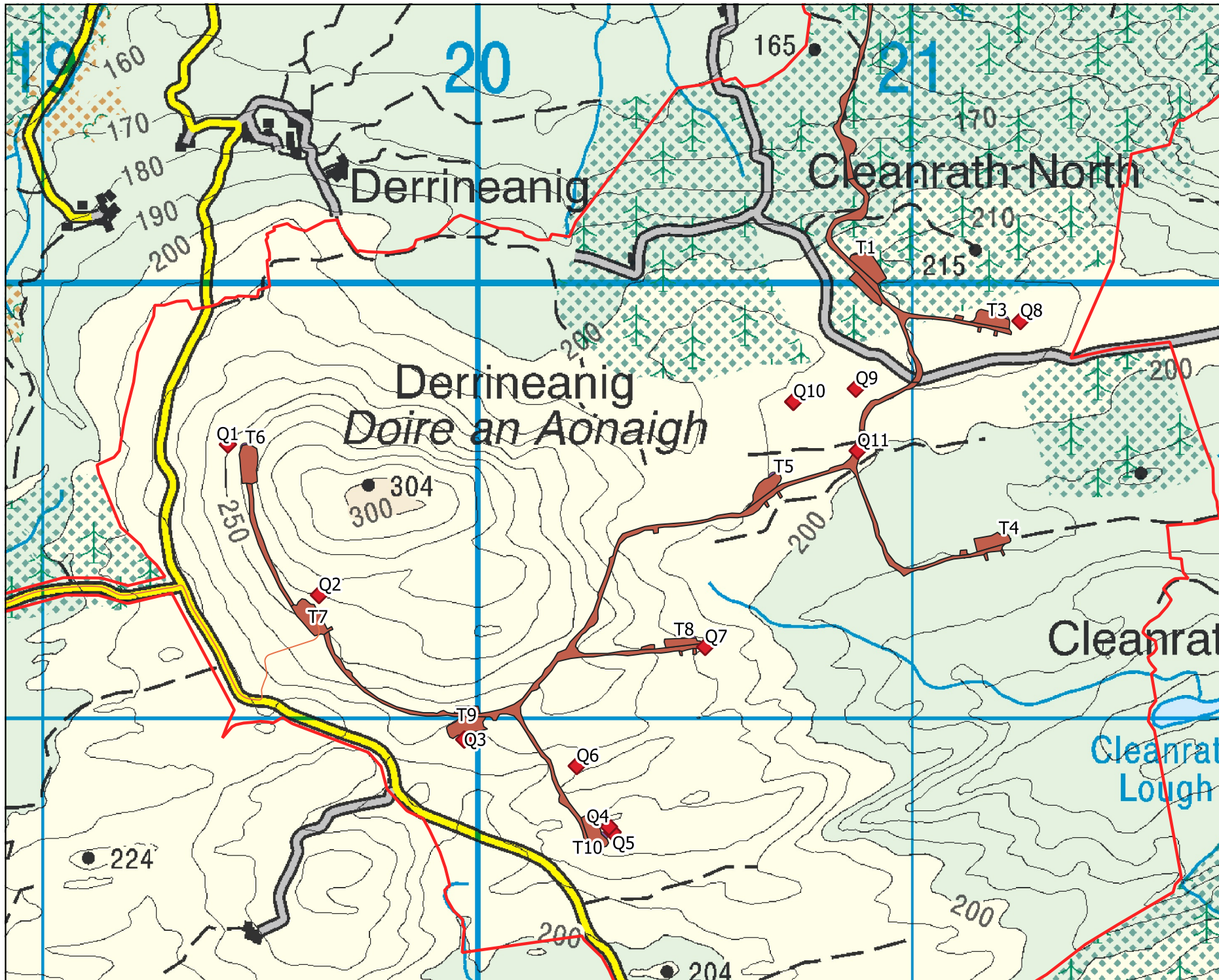
Relevés that were undertaken in woodland followed methods that were set out in the following document:

- *Cross, J. & Lynn, D. (2013) Results of a monitoring survey of bog woodland. Irish Wildlife Manuals, No. 69. National Parks and Wildlife Service*

All species were readily identifiable during the survey. Plant nomenclature for vascular plants follows 'New Flora of the British Isles' (Stace, 2010), while mosses and liverworts nomenclature follows 'Mosses and Liverworts of Britain and Ireland - a field guide' (British Bryological Society, 2010).

1.3 Statement of Authority

Field surveys were undertaken by David McNicholas (B.Sc., M.Sc., MCIEEM) of MKO on 14th May 2020. David is an experienced ecologist with over nine years professional experience. This report has been reviewed by Pat Roberts (B.Sc., MCIEEM). Pat is a highly experienced ecologist has over 14 years' professional experience in environmental management and ecological assessment.



Map Legend

- ◆ Quadrat locations
- Infrastructure layout
- Study Area Boundary



Drawing Title

Botanical quadrat locations

Project Title

Cleanrath WindFarm

Drawn By

DMN

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Figure 1.1

Scale

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Date

20.05.2020



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2.

RESULTS

Turbine 6

Turbine no. 6 is located within an area of degraded Wet heath (HH3) habitat. The area is extensively grazed by sheep resulting in a low sward height in places as well as, increased *Molinia caerulea* and grass species occurrence and stunted heathers. Where grazing has been more intensive further to the south, nearer the local road, this habitat grades into a mosaic with Dry-humid acid grassland (GS3) The elevated lands to the north of the turbine comprise a mosaic of Wet heath, dry siliceous heath (HH1) and Exposed siliceous rock (ER1).

Table 2.1 Botanical Survey Results

Quadrat 1	Grid reference: 0519402 0569737	Date: 14/05/2020
Species	Common Name	% Cover
<i>Molinia caerulea</i>	Purple moor-grass	55
<i>Pedicularis sylvatica</i>	Lousewort	0.5
<i>Ulex gallii</i>	Gorse	30
<i>Carex nigra</i>	Black sedge	2
<i>Anthoxanthum odoratum</i>	Sweet vernal grass	0.5
<i>Erica tetralix</i>	Cross-leaved heath	3
<i>Trichophorum germanicum</i>	Deergrass	1
<i>Carex binervis</i>	Green-ribbed sedge	2
<i>Calluna vulgaris</i>	Common heather	5
<i>Campylopus introflexus</i>	Heath star moss	0.5
<i>Rhytidiadelphus squarrosus</i>	Springy turf moss	5
<i>Hypnum jutlandicum</i>	Heath plait-moss	3
<i>Agrostis stolonifera</i>	Creeping bent	0.5
<i>Potentilla erecta</i>	Tormentil	0.5
<i>Polygala serpyllifolia</i>	Heath milkwort	0.5
% Bare ground		2
Habitat Classification		HH3



Plate 2.1 Turbine 6 location

Turbine 7

Turbine no. 7 is located within an area of degraded Wet heath (HH3) habitat. Patches of established gorse are now showing signs of regeneration, post burning. In addition, the area is extensively grazed by sheep resulting in a low sward height in places. Purple moor-grass is becoming more abundant due to burning and sheep grazing and the heather species comprised largely of young plants.

Table 2.2 Botanical Survey Results

Quadrat 2	Grid reference: 0519604 0569345	Date 14/05/2020
Species	Common Name	% Cover
<i>Holcus lanatus</i>	Yorkshire fog	1
<i>Molinia caerulea</i>	Purple moor-grass	50
<i>Ulex gallii</i>	Gorse	3-5
<i>Potentilla erecta</i>	Tormentil	3
<i>Luzula multiflora</i>	Heath woodrush	0.5
<i>Festuca ovina</i>	Sheeps fescue	0.5
<i>Anthoxanthum odoratum</i>	Sweet vernal grass	2
<i>Viola riviniana</i>	Common Dog violet	0.5
% Bare ground		10
Exposed siliceous rock		20-30
Habitat Classification		Degraded Wet heath (HH3)
Notes:		Recently burnt



Plate 2.2 Example of degraded Wet heath (HH3) habitat occurring around Turbine no. 7

Turbine 9

A mosaic of degraded peatland and acid grassland habitats occur in the area adjacent to T9. These areas have been subject to extensive grazing and regular burning resulting in stunted heather. Blanket bog (PB2) occurs to the south of the turbine infrastructure with an intimate mosaic of acid flush (GS3) and Exposed siliceous rock (ER1). The area to the north of the infrastructure is located at a higher elevation as the gradient increases. This area consists of a mosaic of Wet heath (HH3) and Exposed siliceous rock (ER1).

Table 2.3 Botanical Survey Results

Quadrat 3	Grid reference: 0519938 0569012	Date 14/05/2020
Species	Common Name	% Cover
<i>Molinia caerulea</i>	Purple moor-grass	60
<i>Myrica gale</i>	Bog-myrtle	5
<i>Calluna vulgaris</i>	Common heather	0.5
<i>Schoenus nigricans</i>	Black sedge	2
<i>Juncus acutiflorus</i>	Sharp flowered rush	0.5
<i>Erica tetralix</i>	Cross leaved heath	3-5
<i>Carex binervis</i>	Green-ribbed sedge	1
<i>Eriophorum angustifolium</i>	Common cottongrass	1
<i>Sphagnum palustre</i>	Blunt leaved bog moss	20
<i>Narthecium ossifragum</i>	Bog Asphodel	2
<i>Trichophorum germanicum</i>	Deergrass	0.5
<i>Pinguicula grandiflora</i>	Large-flowered Butterwort	0.5
<i>Sphagnum capillifolium</i>	Red bog moss	10
<i>Dicranum scoparium</i>	Broom forkmoss	0.5
<i>Dactylorhiza sp.</i>	Orchid species	0.5
<i>Polygala serpyllifolia</i>	Heath milkwort	0.5
% Bare ground		7-10
Peat depth		30-60cm

Habitat Classification	Wet Heath (HH3)
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Plate 2.3 Blanket bog (PB2) occurring to the south of T9 with a mosaic of acid flush occurring further to the south and some Exposed siliceous rock (ER1).

Turbine 10

Turbine no. 10 occurs primarily within a mosaic of Dry siliceous heath (HH1) and Exposed siliceous rock (ER1). Stunted gorse is a common component of the vegetation where dry heath occurs on shallow peat on siliceous rock. Some areas of Wet heath (HH3) occur in the wider area where deeper peat occurs between bands of siliceous rock. These areas have been subject to extensive grazing and regular burning resulting in stunted heather.

Table 2.4 Botanical Survey Results

Quadrat 4	Grid reference: 0519604 05469345	Date 14/05/2020
Species	Common Name	% Cover
<i>Campylopus introflexus</i>	Heath star moss	0.5
<i>Dicranum scoparium</i>	Broom fork moss	0.5
<i>Xanthoparmelia stenophylla</i>	Lichen	0.5
<i>Ulex gallii</i>	Gorse	0.5
<i>Rhizocarpon geographicum</i>	Map lichen	0.5
<i>Calluna vulgaris</i>	Common heather	0.5
<i>Festuca ovina</i>	Sheeps fescue	4
<i>Molinia caerulea</i>	Purple moor-grass	0.5
<i>Carex binervis</i>	Green-ribbed sedge	0.5
<i>Anthoxanthum odoratum</i>	Sweet vernal grass	0.5
% Bare ground		95
Habitat Classification		Exposed siliceous rock (ER1)



Plate 2.4 Example of Dry siliceous heath (HH1) and Exposed siliceous rock (ER1) occurring to the north of T10.

Table 2.5 Botanical Survey Results

Quadrat 5	Grid reference: 0520279 0568798	Date 14/05/2020
Species	Common Name	% Cover
<i>Narthecium ossifragum</i>	Bog Asphodel	5
<i>Erica tetralix</i>	Cross leaved heath	5
<i>Eriophorum angustifolium</i>	Common cottongrass	5
<i>Trichophorum germanicum</i>	Deergrass	7
<i>Calluna vulgaris</i>	Common heather	7
<i>Ulex gallii</i>	Gorse	7
<i>Carex binervis</i>	Green-ribbed sedge	5
<i>Carex demissa</i>	Common yellow-sedge	0.5
<i>Molinia caerulea</i>	Purple moor-grass	20
<i>Hypnum jutlandicum</i>	Heath plait moss	40
<i>Racomitrium lanuginosum</i>	Woolly fringemoss	0.5

<i>Sphagnum capillifolium</i>	Red bog moss	10
% Bare ground		5
Habitat Classification	Dry siliceous heath (HH1) grading into Wet heath (HH3)	
Peat depth		20cm
Notes:	Evidence sheep grazing	



Plate 2.5 Example of Dry siliceous heath (HH1) and Exposed siliceous rock (ER1) occurring to the north of T10.

Turbine 8

Turbine 8 is predominantly located within plantation forestry (WD4) dominated by Sitka spruce (*Picea sitchensis*). Some Wet heath (HH3) occurs on rocky outcrop features where forestry has not been planted, in which the below botanical data was taken.

Table 2.6 Botanical Survey Results

Quadrat 7	Grid reference: 0520492 0569225	Date 14/05/2020
Species	Common Name	% Cover
<i>Calluna vulgaris</i>	Common heath	7
<i>Molinia caerulea</i>	Purple moor-grass	40
<i>Erica tetralix</i>	Cross-leaved heath	3
<i>Ulex gallii</i>	Gorse	10
<i>Carex binervis</i>	Green-ribbed sedge	20
<i>Trichophorum germanicum</i>	Deergrass	2
<i>Pedicularis sylvatica</i>	Lousewort	0.5
% Bare ground (exposed rock)		30
Habitat Classification		Small area of Wet Heath (HH3) surrounded by plantation coniferous forestry (WD4)



Plate 2.6 Example of plantation forestry (WD4) in which T8 is located, including areas of Wet heath (HH3) occurring in an intimate mosaic on rocky outcrop features.

Turbine 5

Turbine no. 5 is located within plantation forestry (WD4) dominated by Sitka spruce (*Picea sitchensis*). As the forestry is planted on peatland, the vegetation beneath the trees is dominated by purple moor-grass (*Molinia caerulea*) with some Ling (*Calluna vulgaris*). In wetter areas, *Polytrichum commune* occurs between hummocks of purple moor-grass.



Plate 2.7 Example of plantation forestry (WD4) in which T5 is located.

Turbine 4

Turbine no. 4 is located within a low ridge of improved agricultural grassland (GA1) that extends into lowland blanket bog (PB2) adjacent to the north. To the south the wider landscape is dominated by Wet heath (HH3)/Exposed siliceous rock (ER1) mosaic.



Plate 2.8 Example of improved agricultural grassland (GA1) grading into lowland blanket bog (PB2) to the north of T4. Turbine 4 is located to the southeast of photo location.

Turbine 3

Turbine 3 occurs within a mosaic of peatland habitats comprising mainly of Wet heath (HH3), with some areas of Exposed siliceous rock (ER1) occurring to the east and south and lowland blanket bog (PB2) occurring to the west. These areas have been subject to extensive grazing and regular burning resulting in stunted heathers. The lands immediately adjacent to the north comprise of Conifer plantation (WD4) dominated by Sitka spruce.

Table 2.7 Botanical Survey Results

Quadrat 8	Grid reference: 0521217 0569975	Date 14/05/2020
Species	Common Name	% Cover
<i>Calluna vulgaris</i>	Common heath	15
<i>Molinia caerulea</i>	Purple moor-grass	40
<i>Erica tetralix</i>	Cross-leaved heath	10
<i>Ulex gallii</i>	Gorse	2
<i>Carex binervis</i>	Green-ribbed sedge	+
<i>Trichophorum germanicum</i>	Deergrass	2
<i>Pedicularis sylvatica</i>	Lousewort	+
<i>Polygala serpyllifolia</i>	Heath milkwort	3
<i>Cladonia portentosa</i>	Cladonia lichen	2
<i>Potentilla erecta</i>	Tormentil	1
<i>Dicranum scoparium</i>	Broom Fork-moss	8
<i>Hypnum jutlandicum</i>	Heath plait-moss	30
% Bare ground (exposed peat)		2
Habitat Classification		Wet heath (HH3)



Plate 2.9 – Example of Wet heath (HH3) habitat occurring to the east of T3.

Turbine 1

Turbine no. 1 is located within second rotation plantation forestry (WD4) dominated by Sitka spruce (*Picea sitchensis*). As the forestry is planted on peatland, the vegetation beneath the trees is dominated by purple moor-grass (*Molinia caerulea*) with some Ling (*Calluna vulgaris*).



Plate 2.10 – Example of second rotation forestry (WD4) occurring to the west of Turbine no. 1.

Acid flush habitat

Acid flush habitats are widespread within the study area and are particularly prominent in the southern and south-eastern sides of the site. They occur where seepages, or small streams, flow down gentle or moderate slopes, and often occur in intimate mosaics with bog habitats. One area of acid flush, which crosses the access track between T9 and T10 was characterised by the presence of common reed (*Phragmites australis*).

Table 2.8 Botanical Survey Results

Quadrat 6	Grid reference: 0520187 0568951	Date 14/05/2020
Species	Common Name	% Cover
<i>Schoenus nigricans</i>	Black bog rush	20
<i>Phragmites australis</i>	Common reed	0.5
<i>Myrica gale</i>	Bog myrtle	5
<i>Molinia caerulea</i>	Purple moor-grass	60
<i>Erica tetralix</i>	Cross leaved heath	2
<i>Potentilla erecta</i>	Tormetil	3
<i>Sphagnum capillifolium</i>	Red bogmoss	10
<i>Sphagnum palustre</i>	Prairie sphagnum	5
<i>Polygala serpyllifolia</i>	Heath milkwort	0.5
<i>Juncus acutiflorus</i>	Sharp flowered rush	0.5
% Bare ground (leaf litter)		4
Habitat Classification		Acid flush (PF2)



Plate 2.11 Example of acid flush PF2 occurring between T9 and T10

Blanket bog

Blanket bog is widespread within the main study area but mainly occurs in small patches on level, or very gently sloping, ground, in intimate mixes with wet heath and acid flush habitat. The largest area of lowland blanket bog (PB3) habitat occurs to the north of T5, with another notable area occurring to the north of T4. This habitat mainly occurs outside the detailed habitat survey area. Where lowland blanket bog occurs within the EIAR study area boundary it is a relatively intact example of active upland blanket bog on deep peat. However, its margins have been affected by peat cutting. Where the ground becomes more undulating lowland blanket bog vegetation forms an intimate mosaic with upland blanket bog type vegetation and wet heath. The below data and photograph provide a representative example of the vegetation occurring within this habitat to the north of T5.

Table 2.9 Botanical Survey Results

Quadrat 10	Grid reference: 0520695 0569790	Date 14/05/2020
Species	Common Name	% Cover
<i>Calluna vulgaris</i>	Ling	30
<i>Eriophorum angustifolium</i>	Common cottongrass	2
<i>Molinia caerulea</i>	Purple moor-grass	65
<i>Erica tetralix</i>	Cross leaved heath	5
<i>Potentilla erecta</i>	Tormetil	+
<i>Sphagnum capillifolium</i>	Red bogmoss	10
<i>Polygala serpyllifolia</i>	Heath milkwort	+
% Bare ground (leaf litter)		-
Habitat Classification		Lowland blanket bog (PB3)



Plate 2.12a Example of Lowland blanket bog (PB3) occurring to the north of T5



Plate 2.12b Example of turf cutting on Lowland blanket bog (PB3) occurring to the north of T5

Recolonising bare ground

Following construction of the infrastructure footprint, some areas have been categorised as Recolonising bare ground (ED3), where reinstatement works have been implemented adjacent to the infrastructure post construction. These areas were subject to temporary disturbance during initial vegetation stripping and infrastructure construction. The below data provides an example of the vegetation regenerating adjacent to the main infrastructure.

Table 2.10 Botanical Survey Results

Quadrat 11	Grid reference:	Date 14/05/2020
Species	Common Name	% Cover
<i>Anthoxanthum odoratum</i>	Sweet vernal grass	5
<i>Digitalis purpurea</i>	Foxglove	+
<i>Juncus bufonius</i>	Toad rush	10
<i>Rumex acetosella</i>	Sheep's sorrel	15
<i>Luzula multiflora</i>	Heath woodrush	+
<i>Festuca ovina</i>	Sheep's fescue	2
<i>Holcus lanatus</i>	Yorkshire fog	3
<i>Potentilla erecta</i>	Tormetil	2
<i>Hypnum jutlandicum</i>		3
% Bare ground (leaf litter)		60
Habitat Classification		

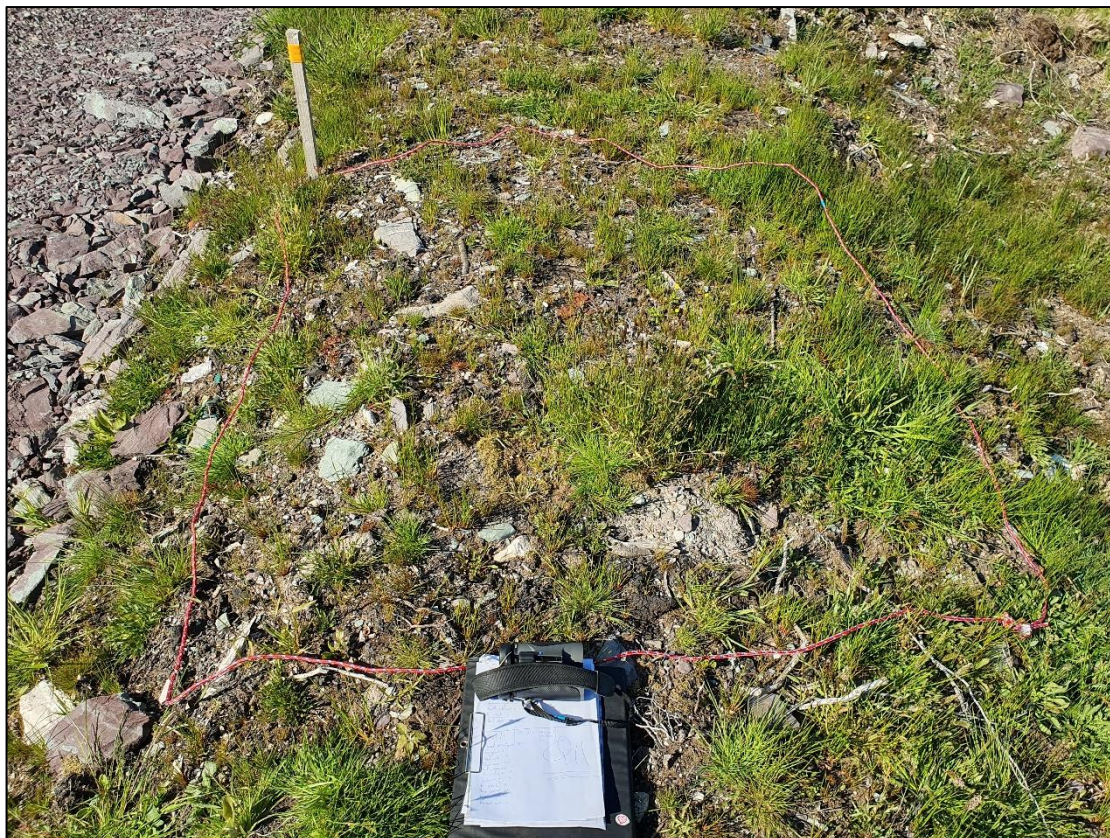


Plate 2.13 Example of Recolonising bare ground (ED3) northeast of T5, where reinstatement works have been implemented adjacent to the infrastructure post construction

Bog woodland

Small areas of semi-natural scrub and patches of woodland habitat occur on heath/peatland habitats within the study area. A linear strip of scrub (WS1)/bog woodland (WN7) occurs along the access road between T8 & T3. This is dominated by both grey willow and some downy birch occurring on drier ground.

Table 2.11 Botanical Survey Results

Quadrat no. 9	Grid reference: 0520838 0569819	Date 14/05/2020
Species	Common Name	% Cover
<i>Calluna vulgaris</i>	Common heather	7
<i>Pteridium aquilinum</i>	Bracken	3
<i>Phragmites australis</i>	Common reed	+
<i>Ulex gallii</i>	Gorse	+
<i>Blechnum spicant</i>	Hard fern	+
<i>Myrica gale</i>	Bog myrtle	+
<i>Molinia caerulea</i>	Purple moor-grass	75
<i>Sphagnum capillifolium</i>	Red bogmoss	+
<i>Salix cinerea</i>	Grey willow	20
<i>Rubus fruticosus</i> agg.	Bramble	+
<i>Hylocomium splendens</i>	Glittering wood-moss	30
<i>Polytrichum commune</i>	Common haircap	+
<i>Juncus effusus</i>	Soft rush	+
% Bare ground (leaf litter)		2
Habitat Classification		Bog woodland (WN7)



Plate 2.14 Example willow scrub, some of which conforms to bog woodland, occurring on degraded/cutover blanket bog

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