

Appendix 6-1

Habitat Report



Habitat Survey Report

Proposed Carrownagowan Wind Farm



ISSUE FORM	
Project number	19107
Document number	6026
Document revision	Rev A
Document title	Habitat Report
Document status	Final
Document prepared by	CoN - MWP (May 2020)
Document checked by	MKy – MWP (May 2020)

Table of Contents

1	INTRODUCTION	1
1.1	Survey limitations	1
2	METHODOLOGY.....	1
2.1	Desk Study and data request.....	1
2.2	Field Surveys.....	1
2.2.1	Survey Timing-Events.....	3
2.3	GIS	4
3	RESULTS	4
3.1	Flora.....	17
3.1.1	Desk Study.....	17
3.2	Overview of habitat types in the study area.....	4
3.3	habitat descriptions	7
4	REFERENCES	20

Appendix 1: Species List

1 INTRODUCTION

This report describes the habitats and associated flora surveys undertaken for the proposed Carrownagowan Wind Farm development.

The surveys were completed to describe, map the habitats present, and identify any important habitats and flora species occurring at the study area. The aims of the surveys were to establish the ecological features and resources of the site, particularly any rare or protected species and habitats present at the study area.

1.1 SURVEY LIMITATIONS

Breeding bird activity prevented surveying at some locations during the breeding season. However because the study area was visited frequently over the ecology survey period, surveys were undertaken in these locations once breeding activity has ceased. This is not considered a significant limitation.

2 METHODOLOGY

2.1 DESK STUDY AND DATA REQUEST

The desk study involved a comprehensive review of publications and resources relating to the receiving environment. The principal sources of data referred to during the desk review included:

- Ordnance Survey Ireland (OSI) aerial photography and 1:50000 mapping
- National Parks and Wildlife Service (NPWS) online datasets and literature
- Review of data available from the National Biodiversity Data Centre (NBDC)
- Flora (Protection) Order of 2015, and the Irish Red Data Book (Wyse Jackson, et al., 2016).
- A review of the NPWS Habitat Directive - Article 17 datasets, Irish Semi-Natural Grassland Survey datasets, National Survey of Native Woodland datasets and Long Established Woodland dataset
- Teagasc soil area maps (at NBDC on-line mapping)
- Geological Survey Ireland (GSI) area maps
- Environmental Protection Agency (EPA) water quality data and on line mapping/CORINE data.

Searches of the NPWS and NBDC databases were undertaken for any documented rare and protected plant species. The search targeted plant species listed in Annex II of the EU Habitats Directive, Flora Protection Order species (FPO) (2015), and species listed in The Irish Red Data Book (Jackson et. al 2016).

The NPWS data response was also reviewed.

2.2 FIELD SURVEYS

Following the initial desk study, ecological walkovers were undertaken in July and August 2018, to define the scope of the surveys, the scale of the study area and to identify any ecological constraints to the project. Habitats which could constitute an ecological constraint to the project were excluded

from the developable area during the early design process. The study area for the project includes all lands within the red line boundary (wind farm and haul route), the adjacent habitats ecologically connected to the lands within the red line boundary, and the grid route. The development area is the footprint of turbines, substations, internal access roads, borrow pits, met mast and haul route.

Habitat surveys were undertaken on the dates shown in Table 1 between the spring and autumn of 2019 prior to finalisation of turbine locations. Following finalisation of turbine locations, relevant sections of the study area were re-surveyed in April 2020.

Habitat surveys were undertaken as per national best practice guidance:

- Best Practice Guidance for Habitat Survey and Mapping' (Smith et al., 2011).
- A Guide to Habitats in Ireland. Kilkenny, The Heritage Council Fossitt, J. A. (2000).
- Guidelines; Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes (NRA 2009)

When determining ecological value reference was also made to habitat descriptions and survey methodologies outlined in:

- Perrin, P.M., Barron, S.J., Roche, J.R. & 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, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- NIEA (2012) Northern Ireland Environment Agency Natural Heritage, Development Management Team Advice Note on Active Peatland Assessment
- Interpretational Manual of European Union Habitats EUR Version 28 April 2013.

Habitats in the study area were classified and mapped using the national standard scheme for describing habitats in Ireland 'A Guide to Habitats in Ireland' (Fossitt, 2000). This classification system provides a standard scheme for identifying, describing and classifying habitats in Ireland. The classification is hierarchical and operates at three different levels, outlining the correlation between its habitat categories and the plant communities of botanical classifications. Habitat surveys were carried out to level 3. Habitat surveys involved recording dominant vegetation, vegetation structure, plant species diversity, non-native invasive plant species, and any protected flora. The survey aimed to confirm any presence of plant species which are considered to be rare in both a national and local context (Scannell and Synnott 1987), but with particular emphasis on the following plant species;

- The plant species listed in Annex II of the EU Habitats Directive
- Flora Protection Order species (FPO) (2015)
- Flora species listed in The Irish Red Data Book (Jackson et. al 2016)

Topography, drainage, disturbance and land management practices were also noted. Habitats extending away from the site were mapped using visual observations from adjacent vantage points in combination with aerial photography and desk studies.

Plant nomenclature for vascular plants followed Webb's An Irish Flora (John Parnell and Tom Curtis Eight Edition). Mosses and liverworts followed Mosses and Liverworts of Britain and Ireland a field guide (British Bryological Society, 2010).

2.2.1 Survey Timing-Events

Table 1. Details of habitat surveys completed at the study area

Date	Personnell	Survey/Location/Comments
18/07/2018	Caoimhin O'Neill, Muiread Kelly, Fiona Mckenna, Deirdre O'Brien	Habitat descriptions at bat detector locations throughout the site, including walkover of unplanted areas.
24/07/2018	Caoimhin O'Neill	Habitat walkover of study area.
29/08/2018	Caoimhin O'Neill Muiread Kelly	Habitat walkover survey, including visiting unplanted areas throughout the site.
29,30/08/2018	Ger Hayes Deirdre O'Brien	Habitat walkover survey, including visiting unplanted areas throughout the site. Habitat survey along rivers and streams.
07/09/2018	Caoimhin O'Neill	Walk over of open bog land sites, including bogland to north of old T17.
13/09/2018	Pat Ryan	Marsh Fritillary Habitat Condition Assessment, on bogland and grassland.
21/04/2019	Pat Ryan Caoimhin O'Neill	Habitat walkover survey at preliminary turbine locations. Site visited during deployment of bat detectors. Descriptions taken at all bat detector locations, extending dominant habitats, and features extending away from each site.
9,13,14/05/2019	Fergus Doyle	Habitat walkover survey, at site infrastructure locations. Carried out in conjunction with Peat Survey.
12,17,19/06/2019	Fergus Doyle	Habitat walkover survey, at site infrastructure locations. Carried out in conjunction with Peat Survey.
05/07/2019	Caoimhin O'Neill	Habitat walkover survey, at site infrastructure locations. Carried out in conjunction with bat surveys.
20,22/09/2019	Fergus Doyle	Habitat walkover survey, at site infrastructure locations, including stream crossings. Carried out in conjunction with Peat Survey.
05/09/2019	Caoimhin O'Neill Muiread Kelly	Habitat walkover survey, at site infrastructure locations. Carried out in conjunction with bat surveys.
01/09/2019	Caoimhin O'Neill	Habitat Walk Over Survey at 3 locations where works are proposed along proposed haul route.
19/06/2019	Muiread Kelly	Invasive plant species survey along grid route. Otter, bird and bat suitability assessment at water crossings along grid route.
07/04/2020	Caoimhin O'Neill	Site walk over at turbine locations following lock down of turbines (Turbines that moved)

2.3 GIS

Habitat boundaries and associated attribute data were mapped using desk-based GIS software, namely ArcMap 10.8.

3 RESULTS

3.1 ANNEX I ARTICLE 17 DATA SETS

A review of the NPWS Habitat Directive - Article 17 datasets, Irish Semi-Natural Grassland Survey datasets, and National Survey of Native Woodland datasets along with Long Established Woodland dataset was conducted prior to undertaking the multi-disciplinary walkover surveys. The datasets were downloaded and overlain on the proposed development study area. None of the GIS datasets contain region or point data for the Carrownagowan Study Area. Article 17 data sets received from NPWS were also reviewed. The nearest is old sessile oak woods with *Ilex* and *Blechnum* in the British Isles, adjacent to the proposed grid connection, and c.6.7km to the southwest of T1. This woodland is protected within the Glenomra Wood SAC (001013) and will interact with the grid route.

3.2 OVERVIEW OF HABITAT TYPES IN THE STUDY AREA

The predominant habitat within the site is conifer plantation (WD4). Fragmented sections of upland blanket bog (PB2), raised bog (PB1), cutover bog (PB4), and wet heath (HH3) occur in the limited unplanted areas between large forestry blocks. Wet heath also occurs in a mosaic with blanket bog and wet grassland. The peatland habitats occurring have been damaged by on-going forestry operations at the site. Drainage is an obvious negative influence on these habitats with many drainage ditches (FW4) recorded throughout these areas. Discrete areas of higher value peatland habitats were identified during initial constraints surveys and excluded from development.

A number of areas of wet grassland (GS4) occur, which are reverting from previous agricultural improvement. This habitat type sometimes occurs in a mosaic with wet heath (HH3) and improved agricultural grassland (GA1). The site is drained by a number of first and second order streams (FW1), in the upper reaches of the catchment area, largely draining to the Owengarney River. Within the Carrownagowan site, the conifer plantation sometimes extends to the margins of the rivers and streams. Two small sections of riparian woodland (WN5) occur along the Coumnagun/Inchalughoeg river banks where gradients flatten out and the watercourse bends and meanders.

The site is accessed via the local road to the north (BL3), connected to a network of existing access tracks (BL3) within the site. The immediate landscape extending away from the site, is dominated by bogland, heathland and conifer plantation, with agricultural grassland becoming more dominant beyond these habitats.

The proposed grid route, which is c.22.4km in length, runs from the proposed Carrownagowan Substation to the Substation at Ardnacrusha. The proposed grid connection exits the southern end of the site, using the existing conifer access track (BL3), and the access track installed in agricultural grassland (GA1). The route uses the network of local and regional roads (BL3), bounded by hedgerow (WL1), treeline (WL2), and improved grassland (GA1), generally in a southern direction, connecting to the Ardnacrusha hydroelectric station. In some locations along the grid route grassy verges, c. 0.5m wide border the public road between dwellings. These verges are limited to where the route occurs on local roads. Roadside maintenance is obvious along the public road network, including

maintenance of drains and roadside hedgerows. A number of stream and river crossings (FW1) are required along the grid route. Towards the north centre of the proposed grid route, oak woodland (WN1) occurs, protected within the Glenomra Wood SAC (001013). The dominant tree species within this SAC is downy birch (*Betula pubescens*). There is a mix of sessile oak (*Quercus petraea*), ash (*Fraxinus excelsior*) and beech (*Fagus sylvatica*) throughout this woodland. Holly (*Ilex aquifolium*) is abundant and is the main under storey species. The under story includes; Hazel (*Corylus avellana*), regenerating birch, gorse (*Ulex europaeus*) and bramble (*Rubus fruticosus agg.*) are other, with willow (*Salix spp.*) in the wetter areas¹. Where the proposed grid route occurs on public road within this SAC boundary, a grassy vegetated mound, sometimes becoming scrubby occurs between the public road extending to the woodland.

¹ <https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY001013.pdf>

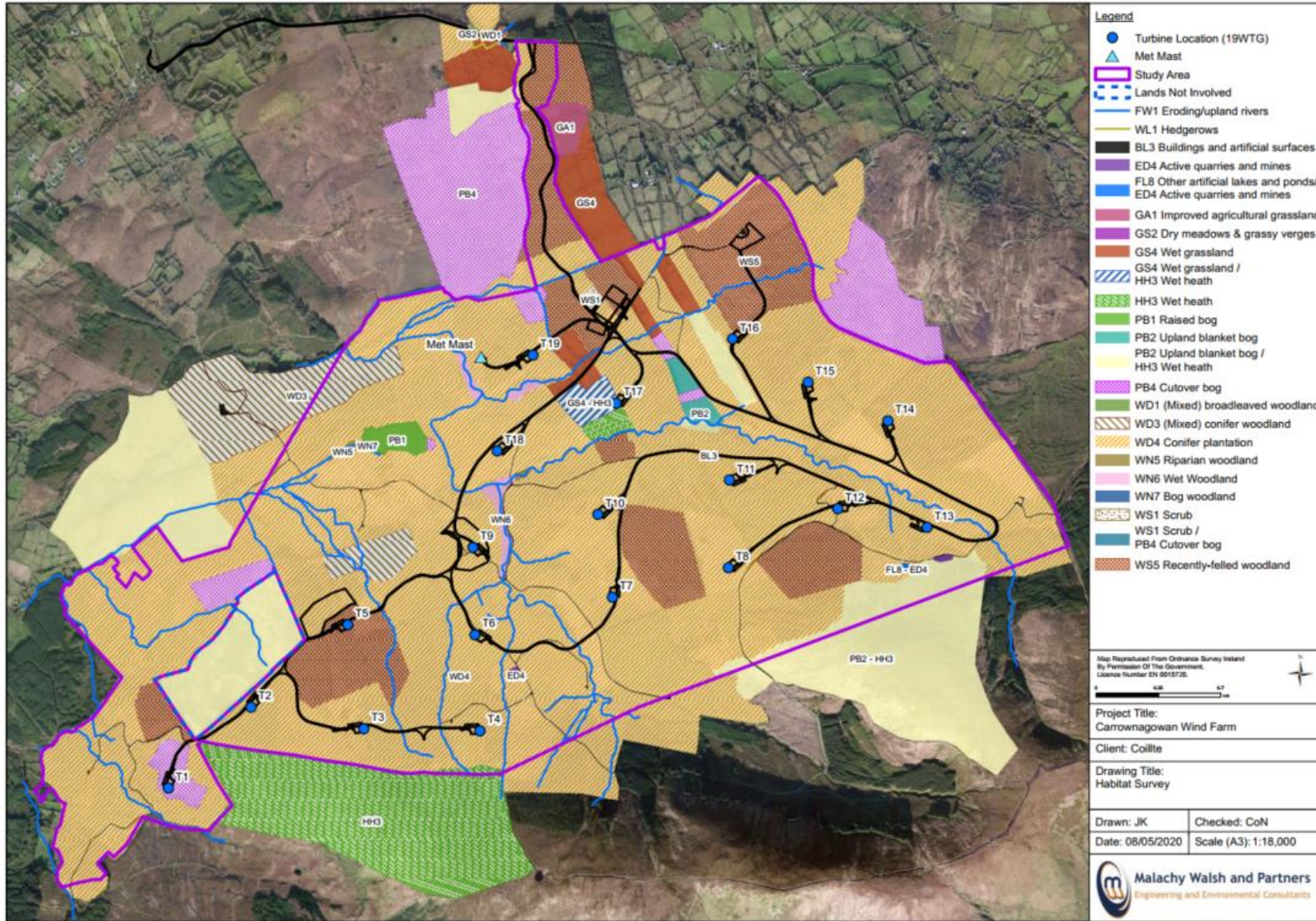


Figure 1. Habitat map of wind farm study area

3.3 HABITAT DESCRIPTIONS

3.3.1.1 Conifer plantation

The dominant habitat type within the proposed development site is conifer plantation, harvested for commercial forestry. Dominant species consist of Sitka spruce (*Picea sitchensis*), and Lodge pole pine (*Pinus contorta*). Larches (*Larix* spp) were also recorded. Within the mature sections of forestry, the closed canopies (often not well defined), do not allow sun light to the woodland floor, therefore a diverse woodland flora is absent. Sometimes a covering of sphagnum mosses (*Sphagnum* spp.) occurs on the woodland floor (rare to abundant), and on tree branches. Sometimes pine needles form a blanket covering the forestry floor. In immature and pre-thicket conifer plantation, bramble (*Rubus fruticosus* agg.), willow herbs (*Epilobium* spp), rushes (*Juncus* spp.), and ash saplings (*Fraxinus excelsior*) occur throughout. Sometimes fire breaks are becoming consumed with species such as bramble (*Rubus fruticosus* agg.), willow (*Salix* spp.) and gorse (*Ulex europaeus*), and are almost impassable. In some areas stands of willow trees have developed in unplanted areas between forest access track, and conifer plantation.

Rows of deciduous trees, including beech (*Fagus Sylvatica*) and alder (*Alnus glutinosa*) are often planted in front of this habitat type to increase biodiversity, with the latter in more wetter, low lying areas. At the northern extent of the site, rows of beech trees (*Fagus Sylvatica*) (c.20m deep), have been planted in-front of Sitka spruce plantation.

Along conifer plantation edge, and on fire breaks between sections of conifer plantation, corridors and open areas occur, which are reminiscent of flora species on open heathland or blanket bog habitat. Dominant species include, ling heather (*Calluna vulgaris*), and purple moor grass (*Molinia caerulea*), with bramble (*Rubus fruticosus* agg) and willows (*Salix* spp.) emerging from the conifer edge.

Plots of recently planted conifer plantation are scattered throughout the study area with the largest expanse at the location of the borrow pit located towards the north eastern end of the site.

This habitat type has been planted for commercial forestry, and diverse flora is absent.

3.3.1.2 Recently felled woodland (WS5)

Sections of this habitat type occur throughout the study area. Visual observations during surveys indicate that once felled, these stands are replanted usually within one year at the site. Therefore, significant amounts of recolonising species do not have time to become established in these areas. Among tree stumps and brashings, and broken woody material, species recorded included from rare to occasional bramble (*Rubus fruticosus*), fox glove (*Digitalis purpurea*), and willow saplings (*Salix* spp.). Bogland species such as lousewort (*Pedicularis sylvatica* ssp), heath dog-violet (*Viola canina*), and tormentil (*Potentilla erecta*) were also recorded.

3.3.1.3 Oak-holly woodland (WN1)

This habitat extends north of the L-8221 close to its junction with the Regional Road to the west of the wind farm entrance. This woodland appears to be the successional result of under-management of wet agricultural fields, scrub and hedgerows and is now considered a semi-natural woodland habitat. Conifer forestry and agriculture to the north and east of this area of woodland limits its

continual succession as does its proximity to the local road to the south. It is considered to have reached its potential in terms of area and species diversity.

The woodland adjacent to the stretch of road, is rather broken, and includes sections of this habitat type dispersed in abandoned grassland, interspersed with willow and bramble scrub habitat emerging. This habitat has become more established further to the north where it is more isolated from anthropogenic activity. Typically dominant species include oak (*Quercus petraea*), holly (*Ilex aquifolium*), and birch (*Blechnum* ssp), with a ground cover of ferns, mosses, lichens, and evergreens. Indicative species recorded included oak (*Quercus petraea*), and holly (*Ilex aquifolium*). Where this habitat occurs adjacent to the L-8221 local road, the frequent occurrence of beech and the occasional Sitka spruce trees, and the lack of cover of oak trees, and sometime lack of cover on the ground layer indicates that this habitat type is does not correspond to Annex I habitat.

3.3.1.4 Mixed conifer woodland (WD3)

Sections of this conifer have been planted at the site. All stands have been planted for commercial forestry. One stand of this habitat type occurs to the west of the proposed met mast. Tree species include Sitka Spruce (*Picea sitchensis*), and Beech (*Fagus Sylvatica*). Where this habitat occurs, there is still significant shading, and little to no ground flora.

3.3.1.5 Mixed broadleaved woodland (WD1)

This habitat type occurs to the northeast of T5, and a stand of this habitat occurs on the southern side of the road entrance. All stands have been planted for commercial forestry. Beech (*Fagus Sylvatica*) is the dominant species. Where these stands occur, they are more mature, have been thinned, and have better quality ground flora, including bramble (*Rubus fruticosus*), fox glove (*Digitalis purpurea*), bracken (*Pteridium aquilinum*), and wood sorrel (*Oxalis acetosella*).

3.3.1.6 Riparian Woodland (WN5)

Two small sections of this habitat type occur along the banks of the Owenogarney to the north-east of the site, and the Coumnagun towards the centre of the site. This habitat occurs where the gradient of the land area flattens out, and at turns in the river. The dominant tree species is willow (*Salix cinerea*). Alder (*Alnus glutinosa*) and ash (*Fraxinus excelsior*) are occasional to frequent. The ground layer includes creeping butter cup (*Ranunculus repens*), wild angelica (*Angelica sylvestris*), bindweed (*Calystegia sepium*), harts tongue fern (*Asplenium scolopendrium*), and nettle (*Urtica dioica*).

This habitat type where it occurs along the Coumnagun south of T18 and T17 occurs on alluvium soil. The potential to expand is limited by its setting between large blocks of conifer forestry. The vegetation community corresponds best with the '*Salix cinerea – Equisetum fluviatile*' vegetation type as set out in Perrin et al (2008). Both areas of this habitat type occur in isolation, not amongst broader areas of other wetland types and are dominated by *Salix* species. This habitat type does not correspond to Annex I habitat 91EO.

3.3.1.7 Wet Woodland (WN6)

Small broken sections of this habitat type occur along the riparian sections of the streams and rivers draining the site. Dominant species include goat willow (*Salix caprea*) and grey willow (*Salix cinerea*), alder, (*Alnus glutinosa*) whitethorn (*Crataegus monogyna*), and ash (*Fraxinus excelsior*) were recorded as occasional to rare. The field layer is made up of a mix of creeping bent (*Agrostis stolonifera*), Yorkshire fog (*Holcus lanatus*) (frequent), rare to occasional bramble (*Rubus fruticosus*

agg.), and soft rush (*Juncus effusus*). Other species recorded included fox glove (*Digitalis purpurea*), and polypody (*Polypodium spp.*).

The habitat type where it occurs between large blocks of conifer forestry and narrow tributary streams within the wind farm, for the most part, does not occur on alluvial soil. The vegetation community best corresponds with '*Alnus glutinosa – Rubus fruticosus*' as described in Perrin et al (2008). These discreet areas of habitat are found in isolation, not amongst broader areas of other wetland types, and are dominated by *Salix* species. Therefore this habitat type does not correspond to Annex I habitat 91EO.

3.3.1.8 Bog Woodland (WN7)

A small stand of this habitat type occurs to the western margin of a section of degraded raised bogland. This section of woodland is situated outside the site boundary c. 750m to the west of T18. Forestry drainage bounds the northern, eastern and southern margins of this habitat. The forestry drainage, and to some extent the topography diverts surface down through the eastern part of this habitat. Tree species include birch (*Betula pubescens*) (frequent), and willow species (*Salix spp.*) (abundant), and some occasional scattered ash saplings (*Fraxinus excelsior*). There is no defined or well developed canopy, and tree growth is relatively sparse overall, with little to no regeneration recorded during surveys. Grey willow (*Salix cinerea*) dominates the eastern section, where the ground is somewhat heavy on foot and more flushed from runoff from conifer plantation. Tree height is roughly 3-4m, with the majority of trees bent and fallen. Ground cover, mostly includes species encroaching from the bogland habitat, including some scattered ling heather (*Calluna vulgaris*) (frequent), purple moor grass (*Molinia caerulea*) (occasional). (*Bramble Rubus fruticosus agg.*), rushes (*Juncus spp.*) and bracken (*Pteridium aquilinum*) (mostly at the margins), and bilberry (*Vaccinium myrtillus*) ranged from rare to occasional, again towards the margins. Overall, moss cover is sparse, occurring in pockets, with little to no cover in some parts, to some part dominated by sphagnum mosses (rare to occasional c. 10% cover). This habitat merges with conifer plantation, to the southeast and failed conifer forestry, encroached by willow scrub emerging from water logged western margin of the conifer plantation.

Bog Woodland (WN7) corresponds to the Annex I habitat Bog Woodland (91D0). This habitat classification refers to woodland of intact raised bog. However, it is considered the bog woodland present does not have links to Annex I habitat. This is due to the land management in the area. As noted in surveys moss cover was c. 10-15%, which is less than the 25% cover outlined in NPWS 2013.

3.3.1.9 Scrub (WS1)

A number of small stands of scrub occur within the site boundary. Most of these are associated with juvenile conifer plantation, along forestry edge, unmaintained fire breaks, and along forestry access track. The majority of these locations are too small to map. Dominant species included willow (*Salix spp.*), bramble and gorse. Small sections of this habitat type are dominated by whitethorn. Some sections of scrub were impenetrable during time of survey. This habitat type can be important for biodiversity, including invertebrates, birds, and resting places for fauna in a local context. This habitat type does not correspond to Annex I habitats.

3.3.1.10 Hedgerows (WL1) & Treelines (WL2)

This is the dominant habitat type forming field and roadside boundaries extending away from the site. Hedgerows bound the haul route leading up to the site. Dominant species include, blackthorn

(*Prunus Spinosa*), whitethorn (*Crataegus monogyna*), willows, (*Salix* spp.), ash (*Fraxinus excelsior*) holly (*Ilex aquifolium*), bramble (*Rubus fruticosus*) and gorse (*Ulex europaeus*). Species extending to the hedgerow from the sometimes grassy verges, include Yorkshire fog (*Holcus lanatus*), Cock's-foot (*Dactylis glomerata*) false oatgrass (*Arrhenatherum elatius*) and annual meadow grass (*Poa annua*). Other species recorded included honey suckle (*Lonicera periclymenum*), cleavers (*Galium aparine*), bracken (*Pteridium aquilinum*), wild strawberry (*Fragaria vesca*), Tutsan (*Hypericum rosaemum*). Ornamental non-native species recorded include *Mountbretia*, Snowberry (*Symphoricarpos rivularis*), Fuchsia (*Fuchsia magellanica*) cherry laurel (*Prunus laurocerasus*) (often bordering houses), and Rhododendron (*Rhododendron ponticum*).

Occasionally taller mature trees were also recorded within the hedgerows, including mature ash (*Fraxinus excelsior*), oak (*Quercus petraea*), sycamore (*Acer pseudoplatanus*), and more mature willow (*Salix* spp.), beech (*Fagus sylvatica*), and hazel (*Corylus avellana*). In some instances the roadside hedgerows have consumed stone walls and earth banks. Sometimes species such as bramble (*Rubus fruticosus*), and willow (*Salix* spp.) are forming patches of scrub extending away from the hedgerows.

Some good example of mature treelines can be found bounding field areas, and farm yards extending away from the wind farm site. Sections of this habitat also occur along the haul route leading up the site. Dominant species include mature ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*), Beech trees and Sitka spruce, likely encroaching from commercial forestry. Rarely encountered trees include sessile oak, (*Quercus petraea*) and Hazel (*Corylus avellana*).

The hedgerow and treeline habitat has ecological importance in a local context, as foraging, commuting and resting habitat for fauna. These habitat types do not correspond to Annex I habitat.

3.3.1.11 Eroding/upland rivers (FW1)

The majority of the proposed wind farm site is drained by the upper reaches of the Owengarney River. The haul route will require a stream crossing of an unmapped tributary stream of the Annacarriga River. The watercourses in the study area are generally fast flowing of spate nature. The Owengarney River flows for ca. 3.5km northwest through the proposed development site, draining the central part of the site. The Coumnagun Stream is a 1st order watercourse of ca. 5km and joins the Owengarney from the east within the site.

The EPA carries out biological monitoring at various locations on the watercourses draining the proposed development. During the most recent (2016) assessment, Good or high ecological quality was recorded at all the Owengarney sites. The Annacarriga River has not been biologically assessed by the EPA since 1998; when it was rated Q4-5 at the first Bridge u/s Lough Derg (RS25A050100). The results of aquatic surveys completed in 2018 (see Aquatic Report), indicate that biological water quality in the watercourses draining the proposed development is generally very good, providing water of a quality adequate to support a range of pollution sensitive mayfly and stonefly larvae, as well as salmonids.

The main channels include mainly riffles and glides, with some pools recorded. Shading was recorded along most banks, dominated by willow species (*Salix* spp.), bramble (*Rubus fruticosus* agg), gorse (*Ulex europaeus*), bracken (*Pteridium aquilinum*), and Yorkshire fog (*Holcus lanatus*).

Eroding/upland rivers can have links to the EU Annex I habitat type;

- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (3260)

In Ireland, many river communities represent an altered state caused by anthropogenic impacts on habitats, particularly changes in hydrology and morphology. High conservation value sub-types are associated with natural hydrological regimes, including functioning floodplains. A natural flow regime is required for both plant communities and channel geomorphology. This is the case with the watercourses recorded within the project site, which are influenced by the agricultural and forestry management practices in the immediate area. Within the windfarm site, the conifer plantation often extends to the river margins. Some stretches are more open and include the peatland extending to the river margin. Little in-stream vegetation was recorded, with that recorded being limited to some aquatic mosses. This habitat type has ecological importance in a local context. This habitat type does not correspond to Annex I habitat.

3.3.1.12 Acid Oligotrophic lakes (FL2)

The majority of the rivers and stream draining the site enter Doon Lough (c.3km to the west of the site boundary). This site was not visited during habitat surveys, but was visited as part of bird surveys completed for the proposed development. This is a large lake system with a variety of fringing habitats, which include scrub, woodland, marsh, and wet grassland. The emergent vegetation is usually confined to the more sheltered extensions of the lake with common reed (*Phragmites australis*) and bulrush (*Typha latifolia*) locally abundant. Birch (*Betula* spp.) and willow (*Salix* spp.) woodland and scrub occur in areas close to the lake edge².

Lough O'Grady is situated c.3.4 km to the north. This site was not visited during habitat surveys, but was visited as part of bird surveys completed for the proposed development. The proposed development has a stream crossing which ultimately drains to this lake, via the Annacarriga River. Lough O'Grady is a medium sized lake, with sparse fringing vegetation, but is diverse. There are few emergent plants and only small pockets of common reed (*Phragmites australis*), mainly at the south-east and north-east shore. Wet woodland occurs at the western end and side and is mainly willow (*Salix* spp.) and downy birch (*Betula pubescens*). A variety of wet grassland, which in places grades into freshwater marsh, occurs around the lake. There is a good diversity of plants, with sedges (*Carex* spp.) and soft rush (*Juncus effusus*) dominant in places, along with such species as meadowsweet (*Filipendula ulmaria*), cuckooflower (*Cardamine pratensis*), and Devil's-bit Scabious (*Succisa pratensis*)³.

Acid Oligotrophic lakes correspond to two Annex I habitats;

- Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) (3110)

² <https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY000337.pdf>

³ NPWS Lough O'Grady Site Synopsis.

- Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoeto-Nanojuncetea* (3130)ʹ.

Both Doon Lough and Lough O Grady are designated as Natura Heritage Area (NHA) and proposed Natura Heritage Area (pNHA) respectively by the NPWS, not for their freshwater habitats but for their associated peatland habitats and waterfowl. Both lakes are outside the development footprint. However, the precautionary principal is applied and these habitats are evaluated as Local importance (Higher value) due to their physical and ecological connection to the project (fish species and otter may utilise these lakes and the tributaries which feed into them from the project site).

3.3.1.13 Drainage ditches (FW4)

A network of drainage ditches associated with the forestry operations drain the site. Shallow drains (often dry during surveys) occur within the stands of forestry, and deeper drains border stands of forestry (often wet/active during surveys at the site). Sometimes drainage ditches along the periphery of conifer plantation is becoming overgrown with vegetation, including bramble. Roadside drainage would be subjected to regular maintenance. Species recorded in pools within the drainage system includes, common duckweed (*Lemna minor*), and water starwort (*Callitrichaceae* spp.) and Bog bean (*Menyanthes trifoliata*). The deeper drains were often covered with a blanket of moss, including *Sphagnum* species. The lichen, (*Cladonia portentosa*) and ling heather (*Calluna vulgaris*) are sometimes abundant along banks of drains along fire break, and drainage ditches bounding bogland habitats.

Drains are important for invertebrate diversity and spawning common frog. Biodiversity value is increased, as the large network of drains occurring is linked to the rivers and streams draining the site. This habitat type does not have links to Annex I habitats.

3.3.1.14 Upland blanket bog (PB2)

This habitat type occurs in two areas within the site boundary (to the east of T17, and to the west of T16). The blanket bog occurring to the west of T16 occurs in a mosaic with wet heath, where topography, peat depth reduction, and the installation of drainage ditches to some extent has resulted in the regeneration of wet heath from the original blanket bog. The blanket bog has been degraded as a result of forestry operations at the site. Both areas occurring within the wind farm site boundary are surrounded by conifer plantation. A large proportion of the peat mass remains, however the drainage ditches have altered the hydrology in these areas. Deep drains have been installed along all the margins of this habitat type, and sometimes overgrown internal drains (sometimes deep, with water flow still present during surveys), bisect through this habitat type.

To the east of T17, peat depth ranges from 1m to 2m on a relatively flat land area, gently sloping to the south, and southwest. The dominant species by far is ling heather (*Calluna vulgaris*) (dominant, often forming mono species with 80% cover over vast areas of this habitat). Deer grass (*Trichophorum germanicum*) and purple moor grass ranged from frequent to abundant. The ling heather in some areas is becoming woody, and is difficult to walk through. Cutover bog is also associated with this habitat in this location. Scattered tussocks of cotton grass (*Eriophorum vaginatum*) are frequent, and spread throughout this habitat type, particularly in the area to the east of T17. Other bogland species recorded were, common cotton grass (*Eriophorum angustifolium*) cross leaved heath (*Erica tetralix*), and lousewort (*Pedicularis sylvatica*) recorded in the proximity of drains and roads.

Sphagnum mosses, including red bog moss (*sphagnum capillifolium*), occur in pockets, and are best described as rare to occasional on this habitat type. The lichen *Cladonia portentosa* was occasionally encountered. During surveys, the scarcity of hollows, and absence of standing water, or pools were noted. Sitka spruce saplings are encroaching into this habitat type, and a number of individual Rhododendron (*Rhododendron ponticum*) plants occur.

Upland blanket bog (PB2) has links to the following Habitats Directive Annex I habitat types:

- Blanket bog (if active bog) [7130]
- Depressions on peat substrates of the Rhynchosporion [7150]

In terms of precisely defining Annex I blanket bog habitats, the key reference document is the European Commission's Interpretation Manual of European Union Habitats (Version 28). Blanket bogs are European priority habitats if they are 'active'. The manual defines active as to mean "still supporting a significant area of vegetation that is normally peat forming". The term 'active', in relation to peatlands, therefore incorporates two main concepts –'peat forming' and 'significant area'. On blanket bogs, peat may be formed by both Sphagnum mosses and species such as cotton-grasses (*Eriophorum angustifolium* and *Eriophorum vaginatum*). The EU manual states that Sphagna play an important peat forming role in all bogs, but in blanket bogs; the cyperaceous component is greater than in raised bogs. The decisive factor in distinguishing between active and non-active bog is whether the surface is peat forming, rather than whether it has been cutover or not. Many secondary surfaces (i.e. cutover bogs) remain active if they support a sufficient peat forming species assemblage.

To further assess the potential Annex I links the indicators outlined in Perrin *et al.* (2014) and NIEA (2012) have been reviewed and applied. As described, the habitat type occurs in significantly drained areas, as a result of forestry operations. Both areas are surrounded by conifer plantation. The species occurring within these areas best correspond to the BB5 classification; high altitude bog that can be dry, often lacking any appreciable Sphagnum cover. While the vegetation supports typical upland blanket bog species, the active drains have dried out significant proportions of the bog, which has likely resulted in the significant increase in heather cover, particularly ling heather. During surveys, it was noted that the surface was dry, and the hydrology has been severely affected by the installation of drains. While sphagnum mosses are present, they occur in scattered pockets, and few hummocks were noted, pool topography is absent. The management of the site, including the network of drainage ditches, the associated dominance of ling heather, to some extent the encroachment of spruce and pine trees, and the occurrence of rhododendron are all negative indicators of links to Annex I habitats.

The majority of this habitat type has been assessed as Local Importance (Higher Value). Having regard to NRA guidelines (2009), the small pockets of this habitat type which are considered potentially peat forming has been conservatively evaluated as County Importance. Therefore, the precautionary principal is applied, and all Upland Blanket Bog (PB2) within the red line boundary is evaluated as County Importance.

3.3.1.15 *Wet Heath (HH3)*

Anthropogenic influences (disturbance and or drainage), have likely led to the generation of wet heath towards the centre of the site, where it occurs alone and grades into a mosaic with wet grassland (GS4). This area is indicative of previous reclamation and abandonment and is now reverting back to a more natural, or semi natural state.

The majority of the wet heath habitat comprises of ling heather (*Calluna vulgaris*) (abundant to dominant), with the occurrence of purple moor grass (*Molinia caerulea*), deer grass (*Trichophorum germanicum*) and cotton grass (*Eriophorum* spp.), occasional, frequent, or abundant. Other species recorded included, tormentil (*Potentilla reptans*), heat rush (*Juncus squarrosus*), and milkworth (*Polygala serpyllifolia*). Bryophytes were recorded as rare to occasional and included *Sphagnum capillifolium*, and *Sphagnum palustre*, and *Sphagnum fallax*. Fir Clubmoss (*Huperzia selago*) was also recorded. Where this habitat occurs in a mosaic with wet grassland, rush species (*Juncus* spp.) were encroaching into this habitat type. Other species recorded were, butter cups (*Ranunculus repens*), thistles (*Cirsium* spp.), and silverweed (*Potentilla anserine*).

Wet heath (HH3) has links to Habitats Directive Annex I habitat types:

- Northern Atlantic wet heaths with *Erica tetralix* (4010)

Using the National Survey of Upland Habitats, the vegetation communities at the location where this habitat occurs correspond somewhat to WH4, *Trichophorum germanicum* – *Eriophorum angustifolium* wet heath (with *Calluna vulgaris* frequent). However, the wet heath in the study area is considered to be transitional owing to the current lack of grazing allowing indicative species to regenerate, while complete succession to woodland may be arrested due to soil conditions or waterlogging. It is considered that this habitat type is not stable and will over time either revert through agricultural management/forestry operations or, indeed, if not managed, will eventually turn to scrub or wet woodland. Therefore, this habitat type is not Annex I.

3.3.1.16 *Raised bog (PB1) (degraded)*

This habitat occurs towards the west centre of the site, c. 400m to the northwest of T18. The dome shape could be slightly seen during surveys at the site. The commonly recorded species characteristic of this habitat type include, deer grass (*Trichophorum germanicum*), ling heather (low growing) (*Calluna Vulgaris*), purple moor grass (*Molinia caerulea*), cotton grasses (*Eriophorum angustifolium* and *Eriophorum vaginatum*), and rare to occasional lichen cover (*Cladonia portentosa*) was also recorded. White beak sedge (*Rhynchospora alba*), sundews and bog asphodel (*Narthecium ossifragum*) were all recorded as rare to occasional in small discreet wet areas, and some bare, and exposed peat towards the margins, mostly at the north western part of the bog.

Sphagnum mosses are present but were noted as rare to occasional, except for discreet locations in the east and west centre of the raised bog habitat, which were identified as discreet patches of active peat forming communities (<0.1ha). These active areas contain sub-central ecotopes⁴ comprising of abundant sphagnum moss cover, and the substrate is soft under foot, compared to the relative harder, and crisp dry conditions throughout the majority of this habitat type. The micro-

⁴ Fernandez *et al* (2012). Raised bog monitoring project (2011) Appendix 2.

topography is not well developed in these areas, consisting of little to no hummocks, but there is a good cover of sphagnum, and there are wet patches of ground, rather than pools.

Towards the margins of this habitat, the conditions are drier, with evidence of marginal, sub-marginal and some face bank ecotope types, which would conform to degraded raised bogs. Along the northern margins of the high bog there is evidence of one time peat harvesting, with peat banks, around the margins and one bank extending into the bog. Forestry drains have been installed along the south-western, northern, and eastern margins of the bog. Conifer plantation surrounds the bog, with a small section of bog towards the south-eastern margin corresponding more to wet heath as a result of drainage, peat harvesting, failed forestry, and to some extent topography. Quad bike tracks were noted at this location. During the surveys the absence of pools areas and hollows was noted and Sphagnum lawns are generally absent, within the overall bog. Overall the hummock, and hollow topography is poor throughout.

Raised bog (PB1) has links to Habitats Directive Annex I habitat types:

- “Active Raised Bogs (7110)”, if they are still capable of peat formation, or if peat formation has temporarily ceased.
- “Degraded raised bogs still capable of natural regeneration (7120)”. These are damaged bogs where it is judged that the peat forming capability can be restored within 30 years.
- The annexed habitat “Depressions on peat substrates of the *Rhynchosporion* [7150]” occurs in pockets as a sub habitat of raised bogs.

The habitat type is not Annex I. The habitat type does contain significant areas that support species of active raised bog, or degraded raised bog capable of natural regeneration. This area of bog has been significantly impacted by peat harvesting and continues to be impacted by on-going forestry drainage. Therefore this habitat type has been evaluated as County Importance.

3.3.1.17 Cutover bog (PB4)

Small isolated sections of this habitat type occur throughout the site, mainly occurring in areas of one time blanket bog that was drained for forestry, or cutaway as a result of peat harvesting, resulting in shallow peat depths. For example, a small discreet patch of this habitat type occurs in association with the upland blanket bog (PB2) habitat within the red line boundary (to the east of T17). As described above, this area of upland blanket bog and cutover bog is influenced by the current land management practices and drainage regime which are limiting the regeneration potential and subsequent ecological value of these habitat types. Where cutover bog occurs between the two larger areas of upland blanket bog to the east of T17, the cutover bog is considered to be part of the overall upland blanket bog (PB2) habitat in this location.

The small patch of cutover bog extending north from this location, between the PB2 and GS4 habitat is considered as a separate block of PB4 habitat. The largest area of this habitat type occurs towards the south-western end of the site, at the location of T1. Conifer plantation surrounds both areas. Peat harvesting has been carried out throughout these areas, likely mechanical, with peat banks spread throughout. The cutover has largely re-vegetated, with little to no bare areas of peat remaining. There is now a dominance of ling heather (*Calluna vulgaris*), and purple Moor-grass

(*Molinia caerulea*). In the section that surrounds T1, the gradient increases northwards, resulting in the southern section being wetter.

Cutover bog (PB4) has links to Habitats Directive Annex I habitat types:

- Depressions on peat substrates of the Rhynchosporion [7150]

During surveys, there were little to no exposed areas of bare wet areas of ground, or bare peat areas to support Rhynchosporion communities. The peat harvesting in these locations would have ceased for some time, and the cutover has recolonised mainly with ling heather, and cotton grass (*Eriophorum spp.*). Favourable stripped humid areas to support the Annex I type habitat do not occur.

3.3.1.18 Wet Grassland (GS4) and Wet Grassland & Wet Heath

Where wet grassland occurs adjacent to the haul route, it was recorded in the lower lying areas of improved agricultural grassland (GA1). These sections were heavy on foot, and are best described as wet grassland (GS4), reverting from improvement. The species recorded in these areas included *Juncus effuses*, *Holcus lanatus*, *Lolium perenne*, *Rumex acetos*, and *Ranunculus repens*. This habitat corresponds best with the National Vegetation Classification⁵ community vegetation type 'GL2D *Juncus effuses* – *Rumex acetos*', a species poor wet grassland type.

Wet grassland (GS4) also occurs towards the centre-north of the site. From visual observation in the field it is likely that the fields in these locations are reverting back, following historic improvement for agriculture. Grass species included Yorkshire fog (*Holcus lanatus*), purple moor grass (*Molinia caerulea*), pockets of fox tail (*Alopecurus geniculatus*), rough meadow-grass (*Poa trivialis*), and sweet vernal-grass (*Anthoxanthum odoratum*). Significant areas of rushes occur (*Juncus articulatus/acutiflorus/effusus/inflexus*). Other species included meadowsweet (*Filipendula ulmaria*) along the periphery, clovers (*Trifolium spp.*), and buttercups (*Ranunculus spp.*), marsh bed straw (*Galium palustre*), horse tail (*Equisetum arvense*), and yellow flag iris (*Iris pseudacorus*).

In the vicinity of T17 some species typical of wet heath (HH3) occur. Where these habitat types merge, species recorded include tormentil (*Potentilla erecta*), Devil's-bit scabious (*Succisa pratensis*), Bog Asphodel (*Narthecium ossifragum*) and heath milkwort (*Polygala serpyllifolia*). Bog mosses (*Sphagnum spp.*) were occasional in some of the damp/wetter areas.

Wet grassland can contain Annex I links to:

- "Mollinia meadows on calcareous, peaty, or clayey-silt laden soils (*Molinia caerulea*) (6410)

The wet grassland habitat type occurring within the wind farm site boundary has come about as a result of the modification of peatland habitats, and the associated agricultural activities. The species recorded and the associations with wet heath correspond to the community type '*Molinia caerulea* – *Potentilla erecta* – *Agrostis stolonifera* grassland', a species poor wet grassland type as defined by

⁵ <https://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/gl1d/>

the National Vegetation Classification⁶. The wet grassland habitat type occurring within the site boundary does not correspond to the EU Habitats Directive Annex I habitat.

3.3.1.19 Active quarry (ED4) and Spoil and bare ground (ED2)

There are a number of quarries within the site boundary. There was evidence of activity at one of these locations towards the southern part of the site during site visits in the summer of 2019. The majority of the quarry areas were disused during time of survey and are best described as Spoil and Bare ground (ED2). Scrub dominates the margins of these area dominated by willow (*Salix* spp.) Other species recorded from the quarry area included, gorse (*Ulex europaeus*), fox glove, soft rush, (*Juncus conglomeratus*), jointed rush (*Juncus articulatus*), heath bedstraw (*Galium saxatile*), heath speedwell (*Veronica officinalis*), red clover (*Trifolium pratense*), and fox glove (*Digitalis purpurea*). These habitat types do not have links to Annex I habitats.

3.3.1.20 Artificial ponds/disused quarry (FL8/ED4)

A pond has formed at an old quarry site c.240m to the southwest of T13. The pond is maintained from natural run off from bogland to the south, with outflow to forestry access track drainage. During surveys, species in the pond included beetles, dragon flies, frogs, algae and pond weeds. The once disturbed ground area around it and old spoil heaps are vegetated with species such as yellow flag iris (*Iris pseudacorus*), dandelion (*Taraxacum* sp.), rushes (*Juncus* spp.), Yorkshire fog (*Holcus lanatus*), and willow herbs (*Epilobium* spp.). This habitat is considered to have ecological importance in a local context. This habitat types do not have links to Annex I habitats.

3.4 RARE AND PROTECTED FLORA

3.4.1 Desk Study

The majority of the proposed development site occurs within Hectad R67, the most westerly part of the site occurs within R57. The southern part of the grid route is situated within Hectad R66 and R56. The proposed works required for the grid route outside of the wind farm are confined to the public road network with no encroachment into adjacent habitats.

3.4.1.1 Species

During field surveys, attention was paid to the possible occurrence of plant species which are considered to be rare in both a national and local context (Scannell and Synnott 1987) with particular emphasis on plant species listed in the Irish Red Data Book for vascular plants (Wyse Jackson, et al., 2016), the Flora Protection Order (2015), and Annex II of the E.U. Habitats Directive. Desk-top studies revealed records for two Flora Protection Order species within 10km grid square R67, namely Heath Cudweed (*Gnaphalium sylvaticum*) (1896) and Opposite-leaved Pondweed (*Groenlandia densa*) (1970). These species are assessed as endangered and near threatened respectively under the Irish Red Data Book (Wyse Jackson, et al., 2016). Small Cow-wheat (*Melampyrum sylvaticum*) (2008) was also previously recorded within 10km grid square R67 and is assessed as endangered under the Irish Red Data Book (Wyse Jackson, et al., 2016).

⁶ <https://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/gl1d/>

Table 2: Documented records of protected flora species within hectads overlapping proposed development site

Species name	Common name	Level of protection	Habitat requirements ⁷
<i>Gnaphalium sylvaticum</i>	Heath Cudweed	Flora Protection Order (2015) Red List: Endangered	Upland pastures and damp, sandy places; mainly in the north; rare and decreasing.
<i>Groenlandia densa</i>	Opposite-leaved Pondweed	Flora Protection Order (2015) Red List: Near threatened	Rivers, canals and estuarine muds; very rare and mostly in the southern half.
<i>Melampyrum sylvaticum</i>	Small Cow-wheat	Red List: Endangered	Woods, bog margins, stony lake-shores and mountain slopes; frequent.

The documented records of Heath Cudweed and Opposite-leaved Pondweed are historical sightings dating back to 1896, and 1970 respectively. These are historical records, and habitats at the proposed project site are not optimal for either of these species. Prior to field surveys, it was determined that the peatlands present in the study area could potentially offer habitat for small cow wheat. However, this species was not recorded during surveys.

3.4.1.2 Non Native Species

Searches of the NBDC for Invasive species were carried out for any documented records of non-native species listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2015). Documented records of high impact flora species in R67 include curly waterweed (*Lagarosiphon major*), Canadian waterweed (*Elodea Canadensis*), Nuttall's waterweed (*Elodea nuttallii*) and Japanese knotweed (*Fallopia japonica*). Records of medium impact species listed on the Third Schedule include water fern (*Azolla filiculoides*) and Himalayan knotweed (*Persicaria Wallichii*). Documented records of High Flora Impact species Regulation (Ireland) in R57 include Japanese knotweed (*Fallopia japonica*) and Indian balsam (*Impatiens glandulifera*). Records of medium impact species listed on the Third Schedule include Himalayan knotweed (*Persicaria wallichii*) and Rhododendron (*Rhododendron ponticum*).

Invasive species identified during field surveys included Himalayan knotweed (*Persicaria wallichii*), and Rhododendron (*Rhododendron ponticum*), within the wind farm site. Rhododendron infestations were recorded along the haul route leading up to the site. Japanese Knotweed (*Fallopia japonica*), Himalayan Knotweed, and Rhododendron infestations were recorded along the grid route. One stand of Giant Rhubarb (*Gunnera tinctoria*) was observed at an agricultural grassland field entrance adjacent to the local road of proposed grid route. **Appendix 6-9** provides the details of the Invasive Species surveys.

⁷ Webb's An Irish Flora. Eight Edition. John Parnell and Tom Curtis

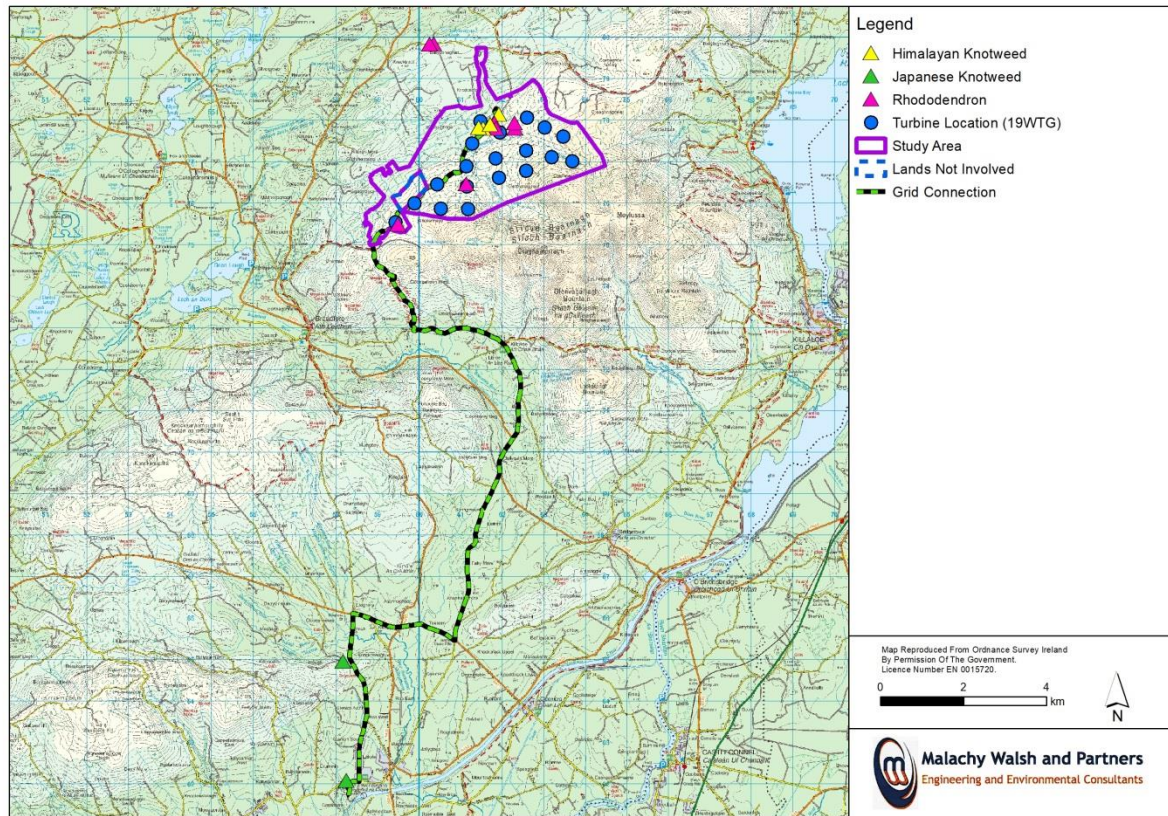


Figure 2: Invasive species locations

4 REFERENCES

Fossitt, J. A. (2000). A Guide to Habitats in Ireland. Kilkenny, The Heritage Council.

Interpretational Manual of European Union Habitats EUR Version 28 April 2013.

NIEA (2014). Northern Ireland Environment Agency Natural Heritage, Development Management Team Advice Note on Active Peatland Assessment

NRA, (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes)

NPWS, (2013). The Status of EU Protected Habitats and Species in Ireland. Habitats Assessment, Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage and Gaeltacht, Dublin, Ireland

Perrin, P.M., Barron, S.J., Roche, J.R. & 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, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P., Martin, J., Barron, S., O’Neill, F., McNutt K. & Delaney, A. (2008). National Survey of Native Woodlands. Volume II, Woodland Classification. A Report Submitted to the National Parks and Wildlife Service.

Scannell, M. J. P. and Synnott, D. M. (1987). Census catalogue of the flora of Ireland (2nd edn). Stationery Office, Dublin.

Smith et al. (2011). Best Practice Guidance for Habitat Survey and Mapping

Appendix 1

Species List

Flora Species List

Common name	Scientific
Alder	<i>Alnus glutinosa</i>
Annual meadow-grass	<i>Poa annua</i>
Ash	<i>Fraxinus excelsior</i>
Beech	<i>Fagus Sylvatica</i>
Bell heather	<i>Erica cinerea</i>
Bilberry	<i>Vaccinium myrtillus</i>
Black bog rush	<i>Schoenus nigricans</i>
Blackthorn	<i>Prunus spinosa</i>
Bluebell	<i>Hyacinthoides non-scripta</i>
Bog asphodel	<i>Narthecium ossifragum</i>
Bog myrtle	<i>Myrica gale</i>
Bogbean	<i>Menyanthes trifoliata</i>
Box	<i>Buxus sempervirens</i>
Bracken	<i>Pteridium aquilinum</i>
Bramble	<i>Rubus fruticosus agg.</i>
Broad-leaved dock	<i>Rumex obtusifolius</i>
Brooklime	<i>Veronica beccabunga</i>
Bulrush	<i>Typha latifolia</i>
Bush vetch	<i>Vicia sepium</i>
Butterfly bush	<i>Buddleja davidii</i>
cherry laurel	<i>Prunus laurocerasus</i>
Cleavers	<i>Galium aparine</i>
Cocksfoot	<i>Dactylis glomerata</i>
Colt's foot	<i>Tussilago farfara</i>
Common bent	<i>Agrostis capillaris</i>
Common bird's foot trefoil	<i>Lotus corniculatus</i>
Common cottongrass	<i>Eriophorum angustifolium</i>
Common ivy	<i>Hedera helix</i>
Common knapweed	<i>Centaurea nigra</i>
Male fern	<i>Dryopteris spp.</i>
Common milkwort	<i>Polygala vulgaris</i>
Common mouse-ear	<i>Cerastium fontanum</i>
Common nettle	<i>Urtica dioica</i>
Common ragwort	<i>Senecio jacobaea</i>
Common sedge	<i>Carex nigra</i>
Common sorrel	<i>Rumex acetosa</i>
Compact rush	<i>Juncus conglomeratus</i>
Creeping bent	<i>Agrostis stolonifera</i>
Creeping buttercup	<i>Ranunculus repens</i>
Creeping cinquefoil	<i>Potentilla reptans</i>
Creeping thistle	<i>Cirsium arvense</i>
Cross-leaved heath	<i>Erica tetralix</i>
Cuckoo flower	<i>Cardamine pratensis</i>
Daisy	<i>Bellis perennis</i>
Dandelion sp.	<i>Taraxacum officinale agg.</i>

Common name	Scientific
Deergrass	<i>Trichophorum cespitosum</i>
Devil's bit scabious	<i>Succisa pratensis</i>
Downy birch	<i>Betula pubescens</i>
Elder	<i>Sambucus nigra</i>
False oat-grass	<i>Arrhenatherum elatius</i>
Fools parsley	<i>Aethusa cynapium</i>
Fool's water cress	<i>Apium nodiflorum</i>
Foxglove	<i>Digitalis purpurea</i>
fox tail	<i>Alopecurus geniculatus</i>
Fuchsia	<i>Fuchsia magellanica</i>
Germander speedwell	<i>Veronica chamaedrys</i>
Giant Rhubarb**	<i>Gunnera tinctoria</i>
Goat willow	<i>Salix caprea</i>
Gorse	<i>Ulex europaeus</i>
Greater plantain	<i>Plantago major</i>
Grey willow	<i>Salix cinerea</i>
Hard rush	<i>Juncus inflexus</i>
Harestail cotton-grass	<i>Eriophorum vaginatum</i>
Hart's tongue	<i>Asplenium scolopendrum</i>
Hawthorn	<i>Crataegus monogyna</i>
Heath bedstraw	<i>Galium saxatile</i>
Heath milkwort	<i>Polygala serpyllifolia</i>
Heath rush	<i>Juncus squarrosus</i>
heath speedwell	<i>Veronica officinalis</i>
Heath woodrush	<i>Luzula multiflora</i>
Hedge bindweed	<i>Calystegia sepium</i>
Herb-robert	<i>Geranium robertianum</i>
Himalayan knotweed**	<i>Persicaria Wallichii</i>
Holly	<i>Ilex aquifolium</i>
Honeysuckle	<i>Lonicera periclymenum</i>
Japanese Knotweed**	<i>Fallopia japonica</i>
Japanese larch	<i>Larix kaempferi</i>
Kidney vetch	<i>Anthyllis vulneraria</i>
Lady's bedstraw	<i>Galium verum</i>
Larches	<i>Larix spp</i>
Lesser spearwort	<i>Ranunculus flammula</i>
Ling heather	<i>Calluna vulgaris</i>
Lodgepole pine	<i>Pinus contorta</i>
Lousewort	<i>Pedicularis sylvatica</i> <i>ssp.sylvatica</i>
Male fern	<i>Dryopteris filix-mas</i>
Marsh bedstraw	<i>Galium palustre</i>
Marsh cinquefoil	<i>Potentilla palustris</i>
Marsh Foxtail	<i>Alopecurus geniculatus</i>
Marsh thistle	<i>Cirsium palustre</i>
Meadow buttercup	<i>Ranunculus acris</i>
Meadowsweet	<i>Filipendula ulmaria</i>

Common name	Scientific
Montbrettia*	<i>Crocasmia × crocosmiiflora</i>
Nettle	<i>Urtica dioica</i>
Polypody	<i>Polypodium spp.</i>
Primrose	<i>Primula vulgaris</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Purple moor-grass	<i>Molinia caerulea</i>
Ragged robin	<i>Lychnis flos-cuculi</i>
Red clover	<i>Trifolium pratense</i>
Red fescue	<i>Festuca rubra</i>
Rhododendron**	<i>Rhododendron ponticum</i>
Ribwort plantain	<i>Plantago lanceolata</i>
Rough meadow-grass	<i>Poa trivialis</i>
Royal fern	<i>Osmunda regalis</i>
Selfheal	<i>Prunella vulgaris</i>
Sessile oak	<i>Quercus petraea</i>
Sharp-flowered rush	<i>Juncus acutiflorus</i>
Sheep sorrel	<i>Rumex acetosella</i>
Silverweed	<i>Potentilla anserina</i>
Sitka spruce	<i>Picea sitchensis</i>
Snowberry*	<i>Symphoricarpus rivularis</i>
Soft rush	<i>Juncus effusus</i>
Spleenwort	<i>Asplenium trichomanes</i>
Sweet vernal grass	<i>Anthoxanthum odoratum</i>
Sycamore	<i>Acer pseudoplatanus</i>
Tormentil	<i>Potentilla erecta</i>
Tufted vetch	<i>Vicia cracca</i>
Tutsan	<i>Hypericum androsaemum</i>
Horsetail	<i>Equisetum spp.</i>
Water mint	<i>Mentha aquatica</i>
Water starwort	<i>Callitrichaceae spp.</i>
White beak sedge	<i>Rhynchospora alba</i>
White clover	<i>Trifolium repens</i>
Wild angelica	<i>Angelica sylvestris</i>
Wild strawberry	<i>Fragaria vesca</i>
Willow herbs	<i>Epilobium spp.</i>
Winter Heliotrope*	<i>Petasites fragrans</i>
Wood sorrel	<i>Oxalis acetosella</i>
Yarrow	<i>Achillea millefolium</i>
Yellow flag iris	<i>Iris pseudacorus</i>
Yorkshire fog	<i>Holcus lanatus</i>
Non Vascular Plants	
	<i>Sphagnum capillifolium,</i>
	<i>Sphagnum palustre,</i>
	<i>Sphagnum fallax.</i>
Fir Clubmoss	<i>Huperzia selago</i>
Lichen	<i>Cladonia portentosa</i>